

STUDY ON THE SPECIFICITY OF THE KYIV CHURCHES' VOLUMETRIC AND SPATIAL COMPOSITION AS A BASIS FOR THEIR RESTORATION

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Abstract

The article analyzes the volumetric and spatial composition of Orthodox churches in Kyiv from the Kyivan Rus and Baroque periods. Using the method of system-structural analysis and style classifiers, the presence of signs of Byzantine traditions in the architecture of the princely churches of Kyiv was analyzed and in the churches of the Ukrainian Baroque – signs of Western European Baroque. Based on this, regional originality was determined and conclusions were drawn that Kyivan Rus architecture had a more typified character than the architecture of the Ukrainian Baroque, which was an expression of national identity. The compositional construction of Kyivan Rus and Baroque churches was analyzed and compared. The domestic experience of recreating unique churches from the Kyivan Rus and Baroque periods is presented.

Keywords: Kyiv; spatial and volumetric composition; church; specificity; restoration

Introduction

The relevance of the topic is related to the need to explore the evolution of the image of the Orthodox Church in Kyiv throughout its existence, from the times of Kyivan Rus to the present day.

It is necessary to trace how the compositional structure, planning decisions and morphology of forms changed over several millennia and to identify which of these components were the most resistant to change and have survived to this day in newly built churches.

There is also a lack of research devoted to modern Orthodox churches in Kyiv and their consideration in the context of the evolution of the image of the Orthodox church in Kyiv from Kyivan Rus times to the present day.

The topic of the study is related to such internationally recognized heritage protection documents as the Venice Charter of 1964, the Paris Convention for the Protection of the World and Natural Heritage of 1972, the Washington International Charter for the Protection of Historic Cities of 1987, the Convention for the Protection and Promotion of Forms of Cultural

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Expressions of 2005, the International Convention for the Safeguarding of the Intangible Cultural Heritage of 2006, as well as to the scientific programs of the Kyiv National University of Construction and Architecture and the Cracow University of Technology (state registration numbers – “Public Space near Architectural Monuments – Analysis of Selected Examples” – 0220U103849, “Adaptation of Architectural Monuments” – 0220U103850).

The research aims to determine the evolution of the Orthodox church image in Kyiv from ancient times to the end of the 18th century.

The objectives of the research are as follows:

- to analyze the historical and national prerequisites for the formation and development of the Orthodox architecture of Kyiv in the 10th–18th centuries;
- to develop a methodology for studying the Orthodox architecture of Kyiv in the 10th–18th centuries;
- to analyze the spatial and planning and compositional features of Kyiv churches to determine the specifics of the regional school;
- to investigate the features of proportional and metro-rhythmic construction;
- to formulate and argue the signs of regional originality of the Orthodox architecture of Kyiv in the 10th–18th centuries;
- to analyze domestic experience in the protection, restoration and reproduction of the Orthodox architecture of Kyiv in the 10th–18th centuries.

A wide range of sources was used for the study. They can be grouped under the following headings:

- general issues related to the existence of the monument in the surrounding space, degradation of the historical environment and monument protection activities [1-5];
- general issues of restoration activities and professional education [6-8];
- restoration technologies [9-14];
- research of ancient Russian churches of Kyiv [15-18];
- research of baroque churches of Kyiv [19-22];
- publications on wooden churches [23];
- publications on the impact of war destruction on the state of cultural heritage [24-26].

It should be noted that the oldest descriptions of Kyiv belong to Kyivan Rus chroniclers, who not only recorded historical events but also left evidence of the existence of various topographical monuments of the city in the 9th–13th centuries. In particular, descriptions of early monuments of Kyiv were left by travelers and memoirists of the 16th–18th centuries.

The study of the source database proved that predecessors did not sufficiently address the issue of manifestations of the regional originality of Kyivan churches of the Kyivan Rus' and Baroque eras in compositional construction and planning.

The cooperation of Ukrainian authors with Polish scholars has allowed us to somewhat correct scientific views on the style of Ukrainian Baroque. Let us give one of the striking examples. Thus, there is an opinion that the appearance of the interception – “kovnir” and pear-shaped domes—is inherent in Ukrainian Baroque and is a sign of originality. In contrast, familiarization with architectural monuments in Poland has confirmed the presence of domes with such interceptions, albeit smaller in size, which allows us to put forward a version about the transformation of the borrowed element: indeed, domes with an interception, pear-shaped in shape, spread more in Ukraine than in Poland, becoming one of the “iconic” signs of Ukrainian Baroque; such domes crowned separate tower volumes and their number and size could vary.

We specifically cited this example to argue that making a judgment about whether a certain compositional technique or element was a sign of regional and national identity, whether

it was found in the architecture of other states and was essentially borrowed from there, is possible only by considering architectural objects in Ukraine of a certain period with objects of other countries of the same period. In the case of Kyivan Rus architecture, it was compared with the architecture of Byzantium; in the case of the Baroque style, primarily with the architecture of Poland.

Materials and Methods

To solve the study's tasks, the graph-analytical method, methods of comparative analysis, system-structural analysis, field surveys and photo fixation were used. Historiographic, iconographic and written sources; materials from field surveys of architectural monuments; descriptions of restoration technologies in general; and examples of specific monuments were also involved in the work. According to the classifier system, Kyiv churches were also checked for compliance with style features.

Results and Discussion

a. Historical background

The church architecture of Ukraine is unique and occupies an honorable place not only in the national historical and cultural heritage but also in the UNESCO world heritage, if we talk about such unique objects as St. Sophia of Kyiv and the Kyiv-Pechersk Lavra. A feature of the architectural heritage of Kyiv (and in general the Right-Bank and Left-Bank Dnipro regions) is that it covers only a few historical periods – the Kyivan Rus period, the period called Ukrainian Baroque, the period of Classicism-Empire of the 19th century and the period of Historicism-Eclecticism of the second half of the 19th and early 20th centuries.

It is worth paying special attention to the period at the beginning of the 20th century, which marked a change in approaches to archaeological research, which was facilitated by such prominent scientists as V. Khvoika, D. Mileiev and S. Vyrin, who conducted excavations on the territory of Starokyivska Hill, primarily in the area of the spot on the plan of the Tithe Church and St. Sophia Cathedral in Kyiv. A serious scientific and methodological approach already marked these archaeological studies, but this process was interrupted by the First World War.

However, despite the achievements in archaeology, it is worth noting that up to the end of the 1930s, these studies were isolated in nature. They were carried out mainly thanks to enthusiastic scientists who risked their freedom and lives to defend the historical heritage.

If we characterize the state of the work of these years, it is worth noting that architectural and archaeological research was concentrated in state scientific institutions. Despite the change in state ideology after 1917, these works were based on a methodology whose foundation lay in the pre-revolutionary developments of Lashkaryov and Pokryshkin.

The next stage of archaeological research covered the period before and after the Second World War. It is dated from 1938 to 1952. In the subsequent post-war years, namely in the 50s and 60s of the 20th century, traditional archaeological surveys of the territory of Starokyivska Hill (P. Tolochko, V. Goncharov, S. Kyliyovych, M. Braichevskyi) continued, to which the territories of Kopyriv End (P. Tolochko, Yu. Asieiev) and Klov (P. Tolochko) were added. The expansion of the territory of surveys with new areas made it possible to discover the remains of previously unknown churches and thus expand the idea of the scale and nature of church construction in ancient Kyiv.

An important stage in the development of the Kyiv school of archaeological research was the establishment in 1970 of the Kyiv Expedition of the Institute of Archaeology of the

Academy of Sciences of the Ukrainian SSR (under the direction of P. Tolochko) to systematize the research conducted in Kyiv. A feature of the Kyiv Expedition's activities was that it was engaged in excavations in all historical parts of ancient Kyiv, including the surrounding areas ("city of Volodymyr," "city of Yaroslav," Podil, Kopyriv End, Klov, Pechersk, Vydubychi, Kytaievo, Tserkovshchyna etc.).

If we characterize the contribution of scientists to archaeological research in Kyiv in the last third of the 20th and early 21st centuries, it is worth mentioning the names of Ya. Borovskiy, K. Hupal, V. Zotsenko, H. Ivakin, I. Movchan, M. Sahaidak and other scientists.

b. The influence of external factors on the formation of the image of the Orthodox Church in Kyiv

Even though several Christian churches existed in Kyiv even before the baptism of Rus, building churches became widespread only in 988. It was with the construction of the first "state" Orthodox church – the Tithe Church dedicated to the Virgin Mary – that cathedrals, churches and chapels became the main dominants of princely Kyiv. Since the Kyiv princes, starting with Prince Volodymyr, in every way contributed to the church building, the location of churches at the most prominent points of the relief, from where they could be seen from afar, had not only aesthetic but also ideological significance, emphasizing Christianity as the only official state religion.

The dominant role of the Orthodox church in the urban structure of princely Kyiv was also reflected in the architectural image of the church, namely, the volumetric and spatial composition, monumental forms, active dynamic silhouette, morphology of forms and lush decor.

Speaking of ancient Russian churches as urban dominants of Kyiv (as, incidentally, of Chernihiv), it is worth noting that the most important, "iconic" churches were located on the so-called *dytynets* (stronghold), that is, directly in the very center of the city. Examples include the Tithe Church, the Sophia Monastery, the St. Michael Golden-Domed Monastery in Kyiv and the Cathedral of the Transfiguration of the Saviour and Saints Borys and Hlib Cathedral in Chernihiv. In these cases, a justified method of enhancing the architectural properties of the object with accent forms of relief was used because the territory of the historical stronghold was on the upper points of the high riverbank.

If we characterize Kyivan Rus church construction, it was concentrated in Kyiv, Chernihiv, Galicia and Ovruch, in the northern territories. There were a large number of wooden churches and chapels and a much smaller number of stone ones. Such a disproportion between wooden and stone churches was explained by the fact that pre-Christian Rus had accumulated rich experience in the log construction of dwellings, defensive structures, palaces and sanctuaries, while the experience of stone construction was borrowed from Byzantium and such churches were much more expensive to build and decorate. If we compare the spatial planning solutions and structural schemes of wooden and brick churches, then wooden churches are more similar, based on a square log cabin (*kliit'*) completed with a tent roof, while in brick churches there are variations – pillarless churches and chapels, four-column one-dome churches and six-pillar – seven-nine-thirteen-dome churches.

This gives grounds to argue about the direct influence of external factors, such as the adoption of Christianity in 988 and the influence of Byzantine architectural and building traditions, on the diversification of the image of the architectural dominants of princely Kyiv, into which quite diverse churches turned. Their location in the development created picturesque perspectives.

However, the development period of church building in Kyiv was interrupted by the Tatar-Mongol invasion of 1240 and the next stage of the revival of these traditions was in the 17th century.

The architecture of Kyiv during the Cossack era cannot be analyzed separately from the processes that took place on the Right Bank and Left Bank during the Hetmanate, where in different years (namely from 1654 to 1782) the state centers of administration were three cities – Chyhyryn (during the time of B. Khmelnytskyi), Baturyn (under I. Mazepa) and Hlukhiv (before the liquidation of the Hetmanate). Although Kyiv did not perform the functions of the capital of the Hetmanate during this period, its importance for establishing the national idea is difficult to overestimate; it was a symbol of the “mother of Russian cities” and the main cultural center.

The activities of the higher clergy, primarily Metropolitan Petro Mohyla, also had an unconditional influence on the activation of Orthodox construction in Kyiv.

The second half of the 17th–18th centuries, called the era of the Ukrainian Baroque (in some sources, the second Ukrainian Renaissance), is the era of mass reconstruction of the existing Kyivan Rus churches of Kyiv in the Baroque style. That is, the general volumetric and spatial composition and appearance underwent radical changes; the size of the churches increased due to new additions and decorative decoration was performed in the traditions of the Baroque.

The specifics of the development of church building in Kyiv in the 17th–18th centuries were that the activation of the processes of national self-awareness continued against the backdrop of military operations, which influenced the waves of people's resettlement. By the way, this is precisely what explains the fact that, unlike the Chernihiv, Poltava or Slobozhanshchyna schools of Baroque, where there are dominant types of church plans, there is no such dominant plan in the Kyiv school of Baroque.

The churches of Kyiv of this period have noticeable features of defensive construction: they are massive, with thick walls and small windows in the lower tiers. It is worth emphasizing here that this is the influence of active fortification construction in Kyiv when the old fortification network was being improved.

Starting from the end of the 17th century, we can talk about the construction of churches at the expense of private individuals. In parallel with the brick churches, wooden ones continue to be built, but the features of Ukrainian Baroque are best traced in brick churches and cathedrals.

In the literature, you can find different dates for the period called Ukrainian or Cossack Baroque. We will focus on the most common dating of the second half of the 17th century – the 1770s–1780s—when the Baroque style gradually replaced classicism, forcibly imposed in the process of capturing and subordinating Ukrainian lands by the Russian Empire.

Equally debatable is the question of the appropriateness of assigning to the Baroque style those churches that essentially do not have the features of Western European Catholic Baroque and at the same time have much in common with the features of Ukrainian wooden church architecture.

c. Characteristics of Kyivan churches of the Kyivan Rus and Baroque periods

In the Kyivan Rus' period, three sub-periods are distinguished (as, in fact, in the architecture of Kyivan Rus' as a whole). The second half of the 10th century – the middle of the 11th century – is the period of the reign of Volodymyr and Yaroslav, which is characterized by the strength of the state under sole rule and with centralized power. These external factors, reinforced by the single state religion – Christianity, contributed to the economic prosperity of both the state as a whole and the capital – Kyiv – in particular. The adoption of Christianity led to the appearance of masonry construction borrowed from Byzantium and thus to the elevation of the architectural and building traditions of Kyivan Rus' to a new level. In the first period, the

Tithe Church, St. Sophia Cathedral, St. George's Church and St. Irene's Church in Kyiv, as well as the Transfiguration Cathedral in Chernihiv, were erected.

If we talk about the general characteristics of the churches of the first period, then all of them, in comparison with the churches of the two following periods, were distinguished by a larger scale, had, as a rule, a pyramidal composition, were multi-domed and multi-naved and were decorated in the interiors with expensive materials, with frescoes and mosaics. The churches had the ancient Roman masonry technique of "opus mixtum" with the alternation of stone and plinth on pink mortar.

In the first period, the function of the most important cathedrals for the state was not limited to the spiritual: in fact, it was the first example of a multifunctional public building, which was used simultaneously as a church, as a government building for receiving ambassadors and important ceremonies, as a library (it is worth mentioning the library of Yaroslav the Wise at St. Sophia Cathedral, which has not yet been found) and as a "place of last defense" of the townspeople if the enemy broke into the city (it is worth mentioning the Tithe Church, where the people of Kyiv hid during the invasion of Batu in January 1240).

The most characteristic church of the first period is a three- or five-nave, multi-pillar, multi-domed, cross-in-square church, with galleries, where smaller domes on the facade rise pyramidally to the main one.

With the death of Yaroslav the Wise, the first period of Kyivan Rus ended and the second began, which lasted from the second half of the 11th century to the 1130s. The second period was marked by the constant struggle of Yaroslav's successors for the Kyiv throne, which ultimately led to the gradual weakening and decline of the state and the decentralization of princely power, as other principalities became less dependent on Kyiv. Such phenomena led to economic problems in the state, to which church architecture responded. This reaction consisted in reducing the scale of objects and their sizes, radically changing the vector of development of volumetric and spatial composition and the type of plan. A typical church of the second period is a six-column, three-nave, single-domed, cross-in-square. In the second period, there are still frescoes and mosaics. During the second period, the St. Cyril's Church, the Assumption Cathedral of the Kyiv-Pechersk Lavra, the St. Michael's Golden-Domed Cathedral in Kyiv, the Sts. Borys and Hlib Cathedral and the Assumption Cathedral of the Yeletskyi Monastery in Chernihiv were built.

The third period, dated to the second half of the 12th century – 1240, was interrupted by the Tatar-Mongol invasion. In the third period, the negative phenomena of decentralization of power across principalities, internecine strife and economic problems only intensified and finally weakened Kyivan Rus. The impact of negative trends on church construction is evidenced by the fact that the number of newly built churches has sharply decreased; they are small, four-pillar, single-domed, cross-in-square and elongated vertically. There are no more frescoes and mosaics in the interiors.

The second important period in the history of Orthodox construction in Kyiv is the Baroque period. It is also divided into three sub-periods, the dating of which differs in different scientific sources. In the presented study, we are guided by the dating given by Yu. Ivashko in her publications [19].

Thus, she identified the following dates of periods [19]:

i) Early Baroque (1648–1680)—she characterized it as transitional from the Renaissance to the Baroque proper, noting that at an early stage, the basic features of Baroque were not yet formed, which led to a combination of Renaissance and Baroque features. The church in Subotov, the St. Nicholas Cathedral in Nizhyn, the Trinity Cathedral in Chernihiv (the boundary

between early and high Baroque), the cathedral of the Mharskyi Monastery and the Hustyn Monastery are dated to the early Baroque period.

ii) High Baroque (1680–1740)—this is the period when the features of Baroque are maximally manifested; architecture is marked by the greatest perfection in volumetric and spatial composition, morphology of forms and decoration. The period of high baroque dates back to the St. George Cathedral of the Vydubetskyi Monastery, the Church of All Saints above the Economic Gate, the Great Bell Tower of the Lavra, the bell tower of Sophia – in Kyiv, the Church of St. Catherine in Chernihiv, the church in Sokyryntsi, the Cathedral of St. George in Lviv and the Cathedral of the Pochaiv Lavra.

iii) Late Baroque (1740s–late 1770s)—a period of gradual reduction of the signs of baroque and its displacement by classicism. The Cathedral of the Nativity of the Virgin in Kozelets, the Church of the Intercession at Podil in Kyiv and the bell tower on the Far Caves of the Lavra are dated to the period of late Baroque.

Since the Kyiv Baroque school is a component of the Ukrainian Baroque, in our opinion, it is logical to analyze it in combination with other schools in order to determine the common and distinctive features and signs of regional identity.

She gives the following characteristics of each Baroque period [19]:

- early Baroque: unformed style features, Renaissance features;
- high Baroque: flourishing of style features, pear-shaped domes with an interception-“kovnir”;
- late Baroque: domes become semicircular without interception, symmetry of the composition, decor disappears, restraint and rusticated lower floor.

Thus, we should note that unlike the Kyivan Rus period, which was marked by a certain uniformity of composition and planning structure of churches, the Baroque period was marked by a much larger number of churches and their much greater diversity. It was during the Baroque period that the variability of church compositions spread from three-part single-domed to nine-part nine-domed.

iv. Compositional characteristics of the churches of Kyivan Rus and Baroque

During the study, an analysis of the composition of the facades of thirteen churches of Kyivan Rus was conducted.

An analysis of four churches in the first period was conducted: the Tithe Church (989–996), the St. Irene Church (1030–1037), the St. Sophia Cathedral (1037–1040) and the St. George Church (1051) (Fig. 1).

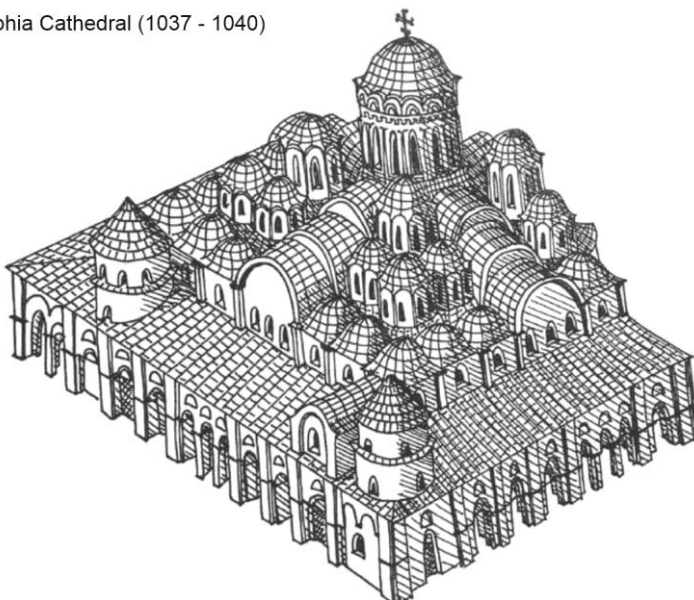
Six churches in the second period were analyzed: St. Michael's Cathedral of the Vydubychi Monastery (1070–1088), the Trinity Gate Church (1106–1108), St. Michael's Golden-Domed Cathedral (1108–1113), the Assumption Cathedral of the Kyiv-Pechersk Lavra (1073–1078), the Church of the Savior on Berestov (1113–1125) and St. Cyril's Church (1139) (Fig. 2).

Also, churches in the third period were analyzed: the Church of the Virgin of Pyrohoshcha (1131–1132), the Church of the Three Saints (St. Basil's Church) (1183) and the church on the Kopyriv End (2nd half of the 12th century) (Fig. 3).

1. Tithe Church (989 - 996)



2. St. Sophia Cathedral (1037 - 1040)



3. St. Irene Church (1030 - 1037)



Fig. 1. The main churches of Kyivan Rus-time Kyiv during the first period (second half of the 10th century – mid-11th century). Drawings by A. Urakina, 2024



1. St. Michael Cathedral of the Vydubychi Monastery (1070 - 1088)



2. Trinity Gate Church (1106 - 1108)



3. St. Michael Golden-Domed Cathedral (1108 - 1113)



4. Church of the Savior on Berestov (1113 - 1125)



5. Assumption Cathedral of the Kyiv-Pechersk Lavra (1073 - 1078)



6. St. Cyril Church (1139)

Fig. 2. The main churches of Kyivan Rus-time Kyiv during the second period (second half of the 11th century–1130s). Drawings by A. Urakina, 2024

1. Church of the Virgin of Pyrohoshcha
(1131 - 1132)



2. Church of the Three Saints
(St. Basil Church) (1183)



3. Church at the Kopyriv End
(2nd half of the 12th century)



Fig. 3. The main churches of Kyivan Rus-time Kyiv during the third period (second half of the 12th century–1240).
(Drawings by A. Urakina, 2024)

Graphic analysis of the proportional construction clearly demonstrates the change in the type of composition, which is emphasized by the change in the angle at the apex if we conditionally inscribe the main facade into a triangle: in the first period, the angle at the apex was $76\text{--}99^\circ$, that is, it was as close as possible to a right angle; in the second period, the angle at the apex was $56\text{--}88^\circ$; and in the third period, the angle at the apex was $67\text{--}76^\circ$, which accordingly affected the visual perception of the image of the church – initially more squat, spread out on the ground, with a larger plan area, gradually more slender, elongated upwards, with a smaller plan area.

The ratio of the width of the western facade to the height of Kyivan Rus churches was also analyzed. In the first stage, the ratio was 1.04–1.86; in the second, 0.65–1.18; and in the third, 0.49–0.67, which also demonstrates a change in the silhouette of the churches from more squat to vertically oriented (Fig. 4).

The Baroque period became the second significant period of Orthodox construction in the history of Kyiv, the Middle Dnipro and the Left Bank regions, where the Cossacks spread.

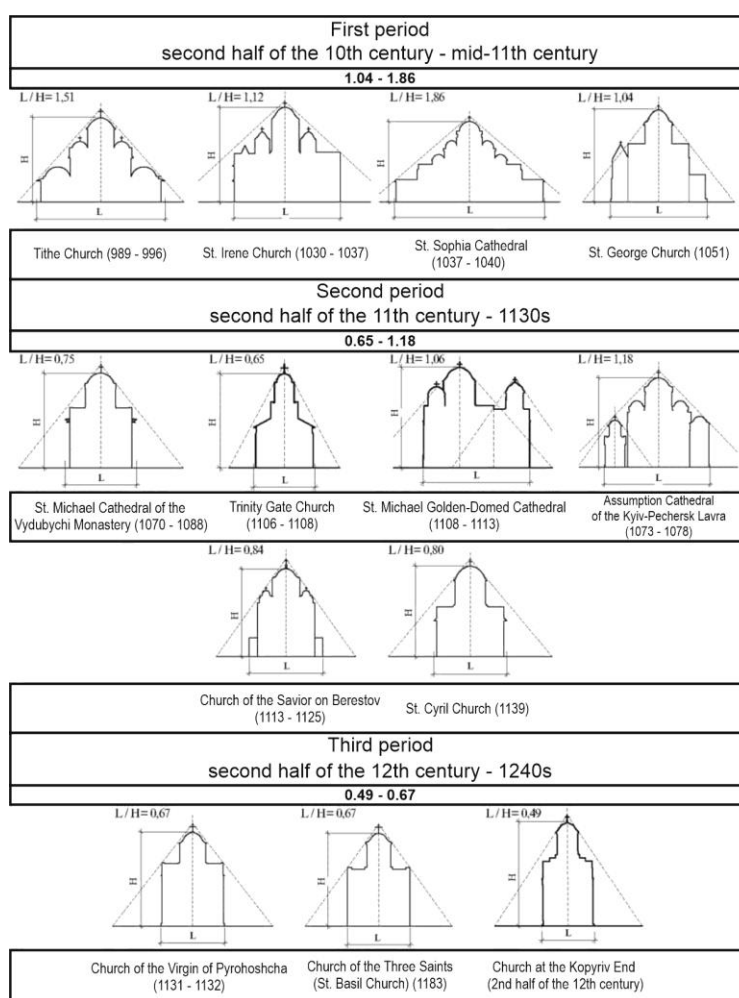


Fig. 4. The ratio of the width of the western facade to the height of Kyiv churches from the time of Kyivan Rus.

Investigating existing and lost objects of Orthodox masonry architecture of the Dnipro and Left Bank regions of the Hetmanate era, V. Vecherskyi noted that symmetrical

compositions prevail in most objects, architectural masses of forms are balanced and elements are harmoniously combined. The most expressive objects expressing semantic and morphological features of the architecture of this period are distinguished by scale, monumentality and an active silhouette, which is emphasized by the combination of tower volumes, opened in the interior to the zenith of the dome and finishing elements – domes, roofs and pediments—developed by unfastened cornices of a large extension.

At the same time, he noted that due to the absence of a large amount of small-scale phytomorphic, anthropomorphic and heraldic decor on the surfaces of the walls in the high period, Orthodox churches of the early period with white undecorated walls look more large-scale and monumental.

A similar process occurs during the transition from the high to the late period, when under the influence of classical trends, small-scale facade decoration disappears, instead the order becomes closer to classical proportions and the lower floor becomes rusticated, pear-shaped domes with a kovnir interception disappear and semicircular domes appear instead, which leads to the formation of a monumental image of temples (visually noticeable in the objects of the late period – in the Church of the Nativity of the Virgin and the bell tower at the Far Caves by architect S. Kovnir, which, despite their smaller size in terms of height, are large-scale compared to the Sophia Bell Tower, the Great Bell Tower of the Lavra by architect I.-G. Schedel and the St. Andrew's Church by architects F.-B. Rastrelli and I. Michurin).

Based on the analysis of Kyiv churches of different periods of Ukrainian Baroque, it can be argued that the scale of the building and the impression of expression, greater monumentality or greater fragmentation, decoration and intimacy were laid down from the beginning and were determined by the following:

i) churches had greater expression, the spatial and planning structure of which did not originate from the basilica structure of the churches of Kyivan Rus or European Baroque but directly from folk wooden church architecture, the most expressive feature of which in the indicated territories was the combination of several tower volumes opened in the interior to the zenith of the dome, between which arched openings were arranged to create a common internal space and better acoustics;

ii) the scale and monumentality of the churches were dictated by the ratio of tiers and elements and the presence or absence of facade decoration: for example, even the small, domeless St. Eliah Church is larger than the Trinity Gate Church in the Lavra, decorated with stucco decoration and facade paintings. At the same time, the framing of windows and doors with moldings did not have such a strong effect in reducing the effect of monumentality;

iii) the semantic features of the Orthodox masonry architecture of the Hetmanate, embodied in the volumetric and spatial composition of religious objects, consisted in the affirmation of the ideas of the triumph of Orthodoxy, while at the same time, the churches personified a sublime chivalric character since the thesis about the Cossacks as the defenders of Orthodoxy was praised.

If we analyze the brick churches of the Hetmanate period, it becomes obvious that they correspond to the following features:

– the predominance of symmetrical compositions, that is, all-facade (which is not present in Catholic Baroque);

– the predominance of tower compositions, especially where the founders were representatives of the Cossack elite;

– the spaciousness of the interiors and their openness to the zenith of the dome; each tower volume is crowned with a separate dome, open in the interior to the zenith.

Based on the study of churches, some judgments can be made:

i) the height of the main top (tower) most often consists of three parts, either equal to each other or two identical and the third is half as small. In the latter case, the decorative crown

with a cross is most often the smaller part (sometimes the height to the arms of the cross should be taken into account);

ii) the height of the walls of the first tier is either $1/3$ of the total height (if the total height is divided into three equal parts) or one of the two larger parts (if the height is divided in the ratio of $2/5$).

An analysis of the composition of the facades of nine newly built (not rebuilt) churches of the Baroque era was conducted – one in the first period: the Church of Saints Peter and Paul (1610–1640); seven in the second period: Epiphany Cathedral (Kyiv-Bratskyi Monastery) (1690–1693), St. Nicholas Military Cathedral (1690–1696), Church of All Saints (Kyiv-Pechersk Lavra) (1696–1698), St. George Cathedral (Vydubychi Monastery) (1696–1701), Church of Theodosius of the Caves (1698–1700), Church of the Exaltation of the Holy Cross (Kyiv-Pechersk Lavra) (1700–1704) and St. Nicholas Cathedral (Slupskyi Monastery) (1715–1831); and one in the third period: St. Andrew's Church (1749–1754). In the early Baroque period, such objects have a vertex angle of 54.80° ; in the high Baroque period, 25.90° – 100.32° ; and in the late Baroque period, 83.18° . Thus, from the first to the third Baroque period, the vertex angle decreased in some cases by half (Fig. 5).

Certain conclusions can be drawn by comparing the angles at the top of Kyivan Rus and Baroque churches.

In Kyivan Rus churches, there is a tendency to replace the more common composition with a more compact one, with vertical development.

If you fit a Kyivan Rus church into a triangle, in most cases the tangents of the triangle literally pass through the extreme points of the roof above the walls and the crosses.

Other conclusions can be drawn if you analyze the location inside the virtual triangle of a Baroque church. As a rule, the church becomes much narrower in terms of the ratio of the sides in plan and height, since the tangents—sides of the triangle—no longer intersect the extreme points of the roof above the walls and pass through the crosses.

That is, the church easily fits into the inner field of such a triangle. Significantly, this technique was used both in churches with a basilical three-nave plan, derived from the Kyivan Rus plan (the cathedral of the Mharskyi Monastery, the Epiphany Church of the Bratskyi Monastery) and in churches with a plan based on an equal-armed Greek cross (St. Nicholas Cathedral in Nizhyn, the Cathedral of the Nativity of the Virgin in Kozelets), which spread in Ukraine during the Baroque era.

The ratio of the width of the western facade to the height of Kyiv Baroque churches was also analyzed. In the first stage, the indicator was 0.69; in the second, 0.48–0.83; and in the third, 0.59 (Fig. 6).

According to the same principles, six rebuilt churches were analyzed, which were built during the Kyivan Rus period but underwent significant changes during the non-Baroque period—one in the first period: the Church of the Savior on Berestov (1113–1125 → 1640–1643); two in the second period: St. Sophia Cathedral (1037–1040 → 1699–1706) and the Assumption Cathedral of the Kyiv-Pechersk Lavra (1073–1078 → 1722–1729); and three in the third period: St. Michael's Golden-Domed Cathedral (1108–1113 → 1746), St. Cyril's Church (1139 → 1750s) and Trinity Gate Church (1106–1108 → late 17th–18th centuries).

As a result, it is possible to trace how the value of the angle at the top changed after the reconstruction of the churches. In the first period, the angle at the top changed from 70.96° to 107.55° ; in the second, from 88.00° – 98.58° to 90.00° – 117.03° ; and in the third, from 56.07° – 82.37° to 39.12° – 90.21° .

The change in the ratio of the width of the western facade to the height of Kyiv's rebuilt Baroque churches was also investigated. In the first period, this value changed from 0.84 to 1.24; in the second, from 1.18–1.86 to 0.92–1.49; and in the third, from 0.65–1.06 to 0.46–1.36. At the same time, the proportional construction of Baroque bell towers was also investigated (Fig. 6).

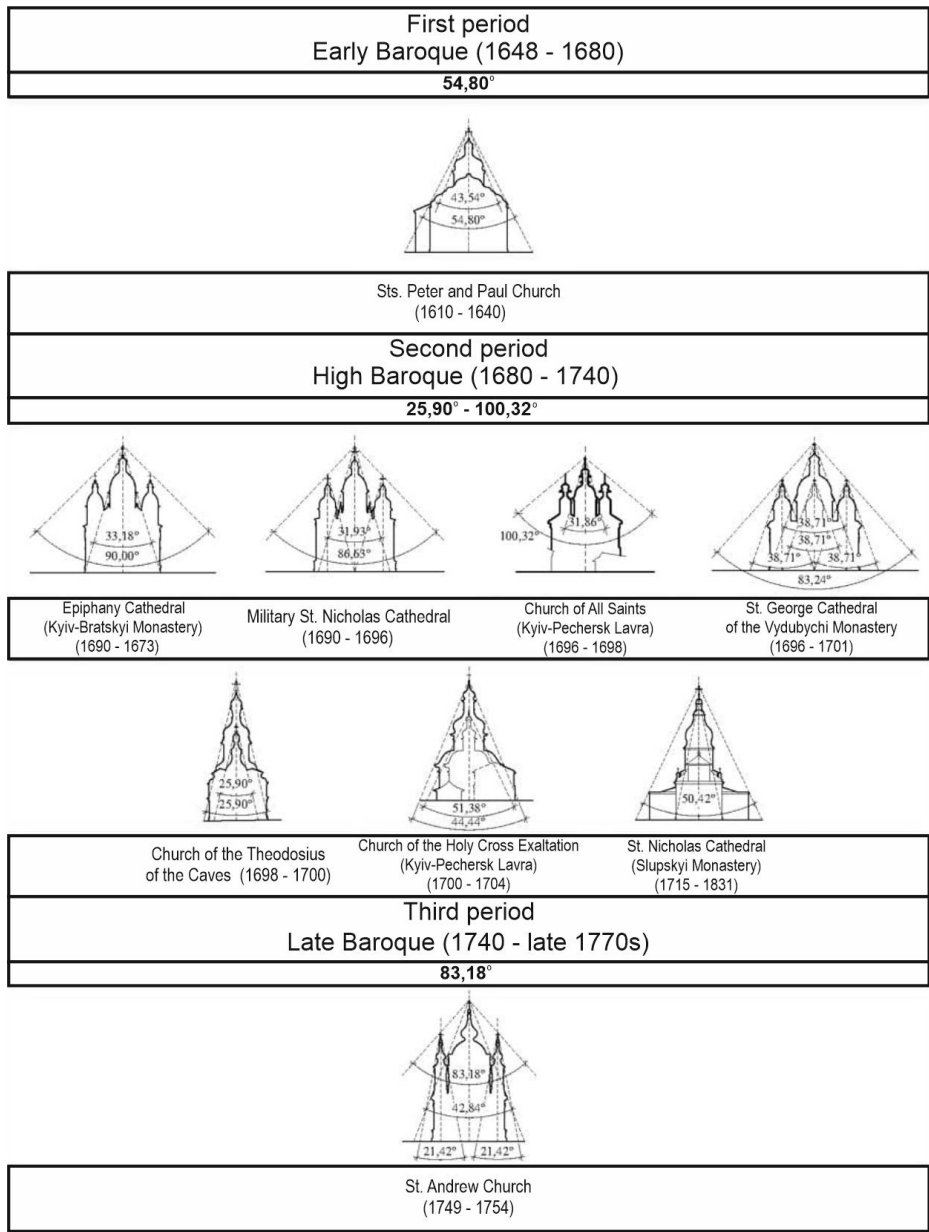


Fig. 5. Compositional construction of newly built Kyiv Baroque churches concerning the angle at the apex.

d. Planning solutions

In the first stage (second half of the 10th century – mid-11th century), the formation of the architectural skill of Kyivan builders was significantly influenced by Byzantine architects.

In terms of planning and volume design, the first stone Orthodox churches of the Kyivan state were typical Byzantine architecture three-nave (five-nave) churches with a narthex, with three apses of equal height and three pairs of columns; in other words, it was a six-column version of the cross-in-square church, which had large galleries on three sides. An important role in forming the stylistic features of architecture was played by local features inherent in Kyiv.

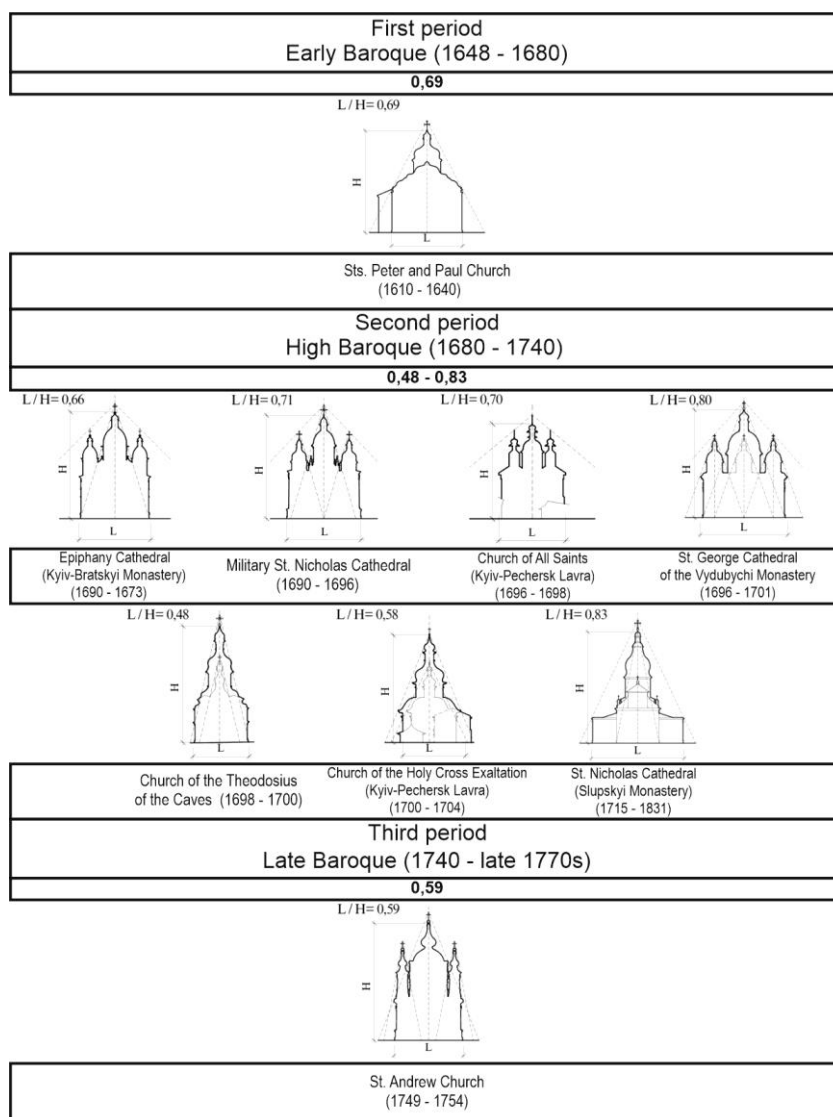


Fig. 6. The ratio of the width of the western facade to the height of newly built Kyiv Baroque churches.

In the second stage of development of the stone churches of Kyiv, the features of the previous stage, such as multi-nave, five-aisled plans, large galleries, choirs and powerful towers with stairs leading to the choirs, disappear. A single-story, six-aisled, cross-in-square temple becomes typical. In the middle of the 12th century, a new stage of feudal fragmentation of the Kyivan state began, which led to a decrease in the volume of church construction and the spread of smaller four-story single-domed churches. This type of church was generally characteristic of the third-period churches on the territory of the Kyivan Rus principalities (Fig. 7).

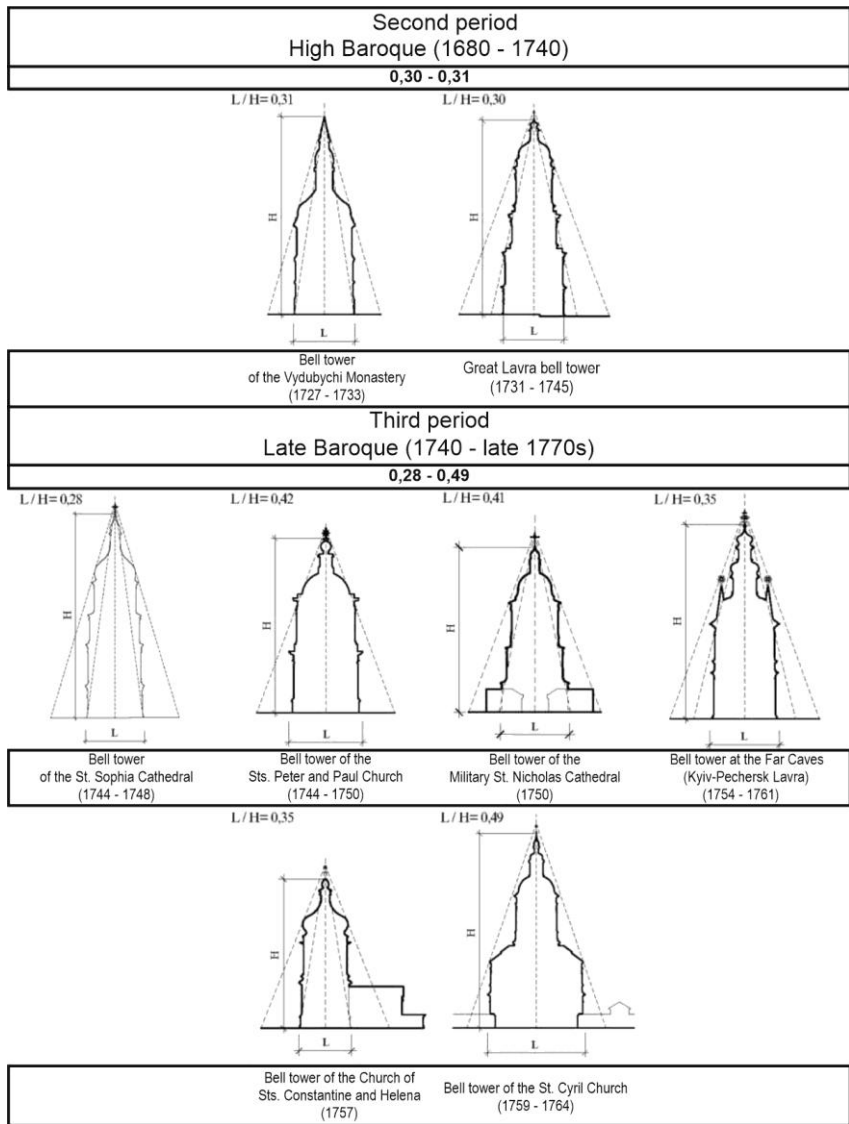


Fig. 7. The ratio of the width of the western facade to the height of the newly built Kyiv Baroque bell towers.

Further development of the architecture of the Kyivan principality was interrupted by the invasion of Mongol troops in 1240.

When analyzing the planning structure and volumetric-spatial composition of brick churches of the Hetmanate period, the hypotheses of *V. Vecherskyi* [21, 22] and *H. Shevtsova* [23] regarding the origin of these churches from wooden church architecture were taken into account [21-23].

V. Vecherskyi [21, 22] distinguished four main planning types of churches of the Hetmanate period in the Dnipro and Left Bank regions:

- churches that had compositional elements of city and monastery churches of the princely era but with influences of Lithuanian and Polish Baroque and without continuity with the traditions of folk wooden architecture. These churches had various architectural features,

including six-aisled, three-apsed, three-, five- and seven-domed churches with two-tiered western porches and two towers on the main facade, according to the Catholic type;

- churches that were traditionally associated with wooden church architecture. Among them were three-part, one- and three-domed, cruciform five-part, one- and five-domed and nine-part one- and nine-domed churches, which consisted of tower volumes opened to the zenith of domes;

- churches without domes of the hall type, which arose as derivatives of small stone churches of the hall type of the 16th–17th centuries;

- churches with three or four apses (triconches and tetraconches), usually manor or memorial churches.

Thus, after the analysis, the previously made conclusions, which were published in the articles of *Y. Ivashko* [18], regarding the diversity of types of plans of churches of the Kyiv school in the high period, were confirmed. The indicated conclusions of *Y. Ivashko* [19] were expanded and clarified and it was also duly substantiated that at the early stage of the development of the Kyiv school, three-chamber churches were popular, which were widely distributed, as well as cruciform, three-nave and mixed-type churches with additional buildings. At the later stage of development, three-nave churches and churches with mixed-type plans with additional buildings became more widespread.

The analysis was carried out on the following objects of the Kyiv school, considered by *Y. Ivashko* [19]: i. Church of the Conception of St. Anna (1679); ii. Church of Sts. Peter and Paul (1610–1640); iii. St. Eliah Church (1692); iv. Church of Theodosius of the Caves (1698–1700); v. St. Nicholas Cathedral (Slupskyi Monastery) (1715–1831); vi. Church of All Saints in the Lavra (1696–1698); vii. St. George Cathedral (Vydubychi Monastery) (1696–1701); viii. Epiphany Cathedral (Kyiv-Bratskyi Monastery) (1690–1693); ix. Military St. Nicholas Cathedral (1690–1696); x. Ascension Church of the Florivskyi Monastery (1722–1732); xi. Prytysko-St. Nicholas Church (1695–1707); xii. Church of the Nativity of the Virgin in the Lavra (1696); xiii. Church of the Holy Cross Exaltation in the Lavra (1700–1704); xiv. St. Andrew's Church (1749–1754); xv. Church of Sts. Constantine and Helena in Podil (1757); xvi. Trinity Church of the Kitaivska Hermitage (1763–1767); xvii. Church of the Intercession in Podil (1766–1772); xviii. Church of St. Nicholas on the Embankment (1772–1775).

The study of the origins of triconch churches was carried out using the works of V. Vecherskyi, who pointed to the appearance of this type of church in the Dnipro and Left Bank regions during the Hetmanate. Researchers associate this with the work of the Kyiv architect I. Hryhorovych-Barskyi, who improved this type of building in our territory. In the 18th century, this type was combined with a three-part, three-domed church.

These churches differed from the three-part triconch churches in less visible side exedra in their external forms.

The first example of such a church is the Church of the Intercession in Kyiv-Podil, built by Kyiv architect I. Hryhorovych-Barskyi in 1766–1772. In its three-dimensional composition, each of the three exedras was emphasized by a semicircular bow-shaped pediment.

So, based on the results of a comparative analysis of the plans of stone Baroque churches in Kyiv, the following preliminary conclusions can be formulated:

- a) at a certain stage, each region had its characteristic type of planning: for the Kyiv region, these were three-chamber churches; for the Chernihiv region, cruciform churches;

- b) at a high stage of development of the Kyiv school, a group of church plans of a mixed type emerged;

- c) at a late stage of development of the school, the inheritance of previous types of plans took place: three-nave and plans of a mixed type.

The three-chamber churches include: Church of the Conception of St. Anna (1679); St. Eliah Church (1692); Church of Theodosius of the Caves (1698–1700); St. Nicholas Cathedral (Slupskyi Monastery) (1715–1831); to the cruciform churches: Church of All Saints in the Lavra (1696–1698); St. George Cathedral (Vydubychi Monastery) (1696–1701); St. Andrew's Church (1749–1754); to the three-nave churches: Church of St. Peter and Paul (1610–1640); Epiphany Cathedral (Kyiv-Bratskyi Monastery) (1690–1693); Military St. Nicholas Cathedral (1690–1696); Ascension Church of the Florivskyi Monastery (1722–1732); Church of St. Constantine and Helena on Podil (1757); Trinity Church of the Kitaivska Hermitage (1763–1767); to the mixed type with extensions: Prytysko-St. Nicholas Church (1695–1707); Church of the Nativity of the Virgin in the Lavra (1696); Church of the Exaltation of the Holy Cross in the Lavra (1700–1704); Church of the Intercession in Podil (1766–1772); Church of St. Nicholas on the Embankment (1772–1775).

e. Practical experience in reconstruction of the original appearance of Kyiv churches

An important aspect is the restoration and reconstruction of the outstanding churches of Kyiv. The activities of the Ukrainian Ukrrestavratsiia Corporation, as they have been conducted practically since the establishment of the Budmonument Group, are covered in detail in the doctoral dissertation and numerous publications of the Ukrrestavratsiia Corporation president, Mykola Orlenko. We will focus only on some aspects of the experience of restoration and reconstruction of Kyiv churches [7, 8, 11–13, 16–18].

First, it is worth noting that preserving the original appearance of ancient Kyiv churches—from Kyivan Rus to Baroque—requires a comprehensive set of measures to eliminate the deterioration's causes. Such measures begin with ensuring the building's stability and then strengthening the old foundations.

Accordingly, this requires an understanding of ancient masonry techniques, mortar composition etc. It is also necessary to take into account the fact that in the churches of the Kyivan Rus period, not one but several types of foundation masonry were used and although it was a type of “opus mixtum,” that is, a mixed method, even within this method rubble stone and plinth boulders were combined; there could be separate foundations made of plinth etc.

A specific type of foundation masonry, invented as a result of archaeological research, was the so-called rubble concrete, where in one masonry there were brick dust, cement and lime mortars.

The traditional scheme of building the interior space of a Kyivan Rus church with a system of pillars topped with arches was also not accidental but was determined by the places of intersection of the strips of brick or rubble masonry foundations. Archaeological excavations have proven the existence of other masonry methods for the foundations of parts added to the temples in the Baroque era when all churches were expanded and rebuilt.

In many cases, the original foundations lost their load-bearing properties. In addition, there were examples of partially (the Assumption Cathedral of the Kyiv-Pechersk Lavra) or completely destroyed churches, which required new technologies that would ensure the stability of the building (Fig. 8).

The most common and proven methods were the methods of jacked and bored piles, where piles of different diameters and lengths could be used, depending on the circumstances.

The most common type of ceiling in Kyiv churches is a domed vault with a drum, on squinches providing a transition from the drum to the actual space of the church.

A few objects from Kyivan Rus times have survived in Kyiv. In part of the apses of St. Sophia Cathedral, soundings of ancient masonry of the “opus mixtum” type have been made, with alternating boulders and plinths built on pink mortar.

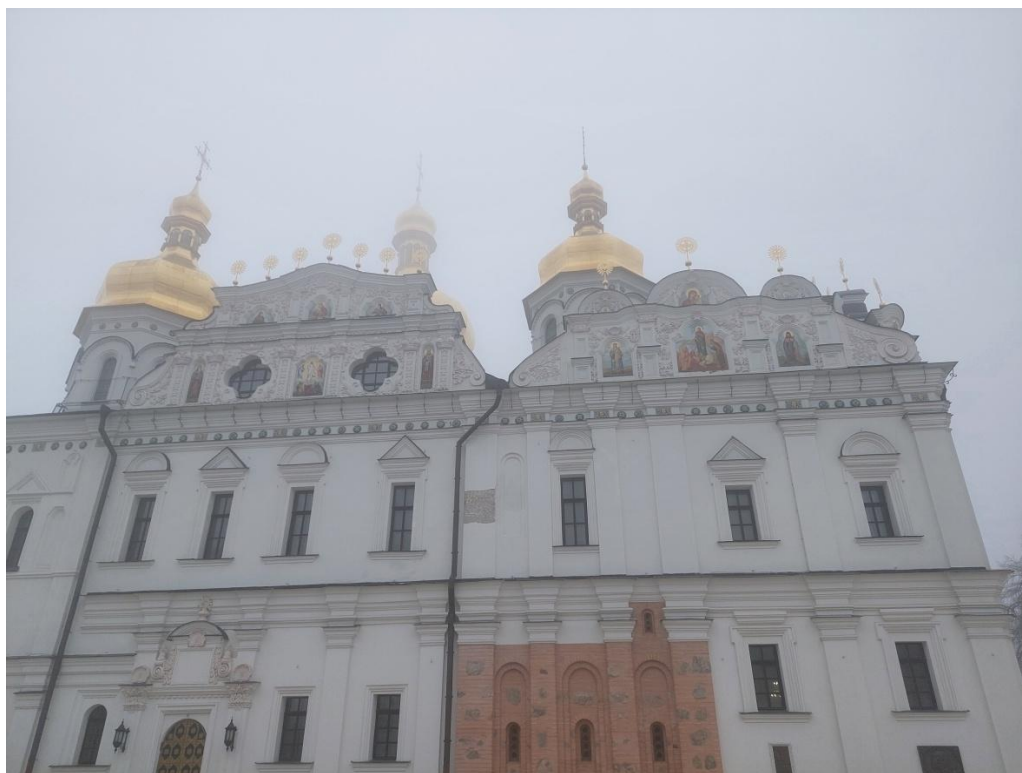


Fig. 8. The reconstructed Assumption Cathedral of the Kyiv-Pechersk Lavra. (Photo by O. Kravchuk, 2024)

Now we come directly to the most complex and, to some extent, controversial issue of recreating destroyed objects, such as St. Michael's Golden-Domed Cathedral, destroyed in the 1930s [16-18, 20].

Such measures are always problematic and controversial because even after the reconstruction of the Old Town ensemble in Warsaw and the official introduction of the restitution practice into restoration circulation, the reconstructed objects are perceived ambiguously by some people.

The first problem that arises when reproducing is the justification for the reproduction: the presence of comprehensive documentation necessary for the reproduction and proof of the period for which the object should be reproduced if it has changed in different periods.

If the question of the need to apply new technologies of foundations and structures did not cause discussion, then the question arose as to what period the St. Michael's Golden-Domed Cathedral should be recreated in, since throughout its history it radically changed its appearance [16, 17, 19]. The problem was solved as follows: such unique objects are recreated for the period of their maximum flowering, which was the Baroque style. By the way, the same decision was made regarding the figurative concept of the recreated Assumption Cathedral.

We will not describe in detail the constructive solutions that were used in the reconstruction; this was thoroughly described by *M. Orlenko* [17]. Instead, we will pay more attention to the issue of the correspondence of forms in the reconstruction. Thus, to achieve an authentic appearance, old photographs were used and the forms of the cathedral were tried to be given the most appropriate forms, since there were no measurements of it before its destruction.

When recreating the St. Michael's Golden-Domed Cathedral, a balance was found between the need for an authentic appearance and the need to achieve this with modern construction methods: although a modern pile foundation scheme, a monolithic slab, reinforced concrete belts, modern vault structures, an optimized scheme for conducting parallel processes etc. were used, modern innovations were "hidden" as much as possible; even the frescoes, made with modern paints, had to correspond to the style of the original wall paintings of specific parts. The cathedral's appearance was tried to be brought as close as possible to Baroque traditions: plastered and painted blue walls, white and gilded facade elements and sparkling polychrome icons in decorative facade inserts. Even the appearance of modern window blocks was tried to be made "authentic."

Even more questions arose during the development of interior designs for St. Michael's Golden-Domed Cathedral. The debatability of this issue is evidenced by the fact that two concepts were developed simultaneously, where it was proposed to decorate the central Kyivan Rus core, where frescoes and mosaics were located, in different ways. In the end, an option was agreed upon with the central part in the Kyivan Rus-Byzantine style of frescoes and the side chapels of the Baroque era—in the Baroque style, respectively. At the same time, the reproduction of the interior decoration was partly conditional, since it was based on existing archival photographs, frescoes and mosaics that have survived, as well as documents. In cases where visual information was insufficient or absent altogether, analogues of this period were used. For example, analogues were used when developing the concept of the murals of the Baroque chapels of St. Barbara and St. Catherine. Instead, the mosaics were reproduced in their authentic form. Fragmentary mosaics were made according to analogues.

Despite the maximum preservation of the murals' stylistics, their technologies were modern. They used the KEIM technique, where soluble potassium is used as a binding agent. Since the cathedral's operation involves the presence of a large number of people, this could harm the murals made with traditional techniques.

The mosaics have an authentic appearance, but they were also made using modern smalt manufacturing technologies; the old technologies were not preserved. This was the first case of such complex work in modern restoration practice when the palette was selected following the preserved mosaics and the smalt spread in the funds of the St. Sofia Reserve. Although the new smalt was made using new technologies, its authenticity was given by the correspondence of the palette, the dimensions of the smalt and the correspondence of the composition and the plot. The complex elements of the largest mosaic plots were made in the restoration workshop and mounted on the wall in assembled form. It was not noticeable that the main difference between the new smalt and the old one was that the old smalt had a multi-colored base, while the new one was transparent. However, when installing the mosaic images, as in ancient times, no chemical components were used.

The central iconostasis was reproduced according to photographs and preserved fragments that were previously studied. Since some of the elements of the iconostasis were lost and their original appearance was unknown, analogues were also used with appropriate justification for the choice. The theme of the rows of the iconostasis was chosen according to archival sources. The iconostases of the central volume and the aisles were designed in the Baroque style.

Conclusions

There is an inequality in the study of brick and wooden churches in Kyiv: while brick architecture has always been the focus of researchers' attention, wooden churches in Kyiv are much less well known, which is explained primarily by the fact that, firstly, they did not play such an ideological or architectural role in the urban structure of Kyiv as brick churches and secondly, no wooden church from the Kyivan Rus' or Baroque periods has survived to our time, so all their characteristics are rather conditional, based on schematic images and archival evidence.

Also hypothetical are the versions of the reconstruction of the original appearance of Old Russian churches and cathedrals, which were massively rebuilt during the Ukrainian Baroque era. We can speak more specifically about the original appearance of churches of the second period, in contrast to churches of the first period, such as the Tithe Church, for which there are several reconstructions.

The vast majority of Kyiv's surviving churches date not from the Kyivan Rus period but from the Baroque era. Against the backdrop of the active development of Kyiv in the second half of the 17th century, church construction in the "Cossack Baroque" style also intensified. The dominant role in this process was played by the Kyiv-Pechersk Lavra, which turned into a spiritual, cultural and artistic center with the support of the hetmans, who supported it financially.

The characteristics of the architecture of Kyiv churches of the High Baroque period generally correspond to the general characteristics of churches of this period on the territory of the Hetmanate. Its main features are as follows:

- greater similarity to wooden architecture based on a faceted log cabin than to oval European Baroque, which gave another name to this style in the lands of the Hetmanate—"faceted" Baroque";
- the spread of churches with a tripartite and cruciform plan in the form of an equal-armed Greek cross in both wooden and brick construction; however, in wooden construction the type of tripartite church dominates;
- the presence of three-nave churches with the structure of a cross-in-square basilica is explained by three factors: the reconstruction of existing Kyivan Rus churches with such a structure, the construction of churches when the author of the project is a foreigner and the influence of existing churches with such a structure on new construction;
- the variety of plans for newly built churches, with the dominant type in the regional schools of the Left Bank, while in the Kyiv school, it is essentially absent;
- borrowing from wooden church construction the principle of volumetric-spatial composition, which consists of several separate high-rise volumes, opened inside to the zenith of the dome, connected to each other into a single whole (the origin of this type of composition is from wooden construction, when the base was a log cabin and the tower volume consisted of several log cabins that were prospectively reduced upwards;
- the presence of characteristic pear-shaped domes of various sizes with an interception—a "*kovnir*" (examples of similar domes are noted in the architecture of Poland; however, these are smaller domes and of different outlines; however, this indicates the mutual influence of cultural traditions);
- harmony of the volumetric-spatial composition with an emphasized vertical vector of development, verified proportions and metro-rhythmic relationships;
- characteristic coloristic scale: white walls, green or gilded domes;
- contrast of restrained decor on the outside and decorated polychrome interior with murals and multi-tiered iconostasis;

- development and implementation of ornamentation, which was a transformation of folk-style motifs but in the character of Baroque;
- modification of the order, which often acquires a folk-style character;
- creation of an impressive effect from the combination of a multi-tiered iconostasis of small plastic and an internal space opened to the zenith of the dome.

Thus, in Kyiv, as in other cities of the Hetmanate, in brick construction the type of church plan with three domes is not the dominant one, as it was in the village wooden churches of all counties of the Kyiv province, except for the southernmost ones.

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