

## Specifics of the long-term study of Khoja Ahmed Yasawi's tomb complex in Turkestan

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### Abstract

Ensuring the process of sustainable development includes special attention to cultural heritage. Effective social strategies are being built on the basis of the use of cultural heritage. Historical buildings are, in fact, the physical preservation of the memory of the development of society in all its diversity. Of particular interest are the “historical scars”, which record phenomena such as a change in the design concept during construction; destruction, restoration, and addition of individual elements; a change and return of the original function; a change in the interpretation of the appearance; reconstruction and renovation. A peculiar illustration of this process is the history of the tomb complex of Khoja Ahmed Yasawi in Turkestan. During the development of the complex, the original idea was adjusted. The complex became more complicated, completed, and rebuilt. A special place is occupied by the innovative approach applied during the reconstruction at the end of the 14<sup>th</sup> century. The grandiose plan of Emir Timur has not been fully realized. The construction resumed at the end of the 16<sup>th</sup> century but did not lead to the completion of the complex. The unfinished building, which has a huge historical and cultural potential, can now be completed. This will illustrate the continuity of the cultural process as part of sustainable development.

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### 1. Introduction

The modern understanding of the concept of sustainable development includes economic, social, and cultural aspects. The preservation and active use of cultural heritage increases the sustainability of social development. The totality of these issues has been considered in many aspects in many works [1-4]. The issues of restoration and reconstruction of architectural heritage are a current topic of research [5-10].

Religious consciousness is an integral part of the culture. Religious buildings occupy a special place among the diverse cultural heritage. These buildings are the most massively preserved monuments of various historical eras. The spatial planning, architectural, and artistic solutions of these buildings trace the specifics of the genesis and evolution of many cultural processes. They illustrate the level of development of productive forces; the specifics of economic activity; the lifestyle and worldview of residents who have different periods of residence in a given area; and the administrative structure of emerging and disintegrating state entities. So, for example, the complex with Khoja Ahmed Yasawi's tomb in Turkestan (43°17'52"N 68°16'15"E) occupies a special place in the medieval architecture of Central Asia.

Reflecting the level of historical and architectural science of the early 20th century, M. E. Masson writes: "According to the plan and plan, the mighty mausoleum created has no successors in Central Asia. [...] But in its ascended mighty bulk, behind the traditional forms developed by the art of Islam, one can involuntarily feel echoes of sentiments consonant with the epoch, drawn, perhaps not by accidental intuition, from the royal style of Percy and the Sassanid era, and the architecture of imperial Byzantium. The palaces of Ctesiphon and Firuzabad are reflected in the characteristic shape of the plan in the form of the letter "U"; the grandiose vault of the audience hall of the Sassanian kings (Tak-i-Kesra) is the prototype of the majestic portal" [13, p.12]. The modern level of historical and architectural knowledge allows us to draw analogies with the architecture of the Ilkhanid period of the 13<sup>th</sup> - 14<sup>th</sup> centuries, which was developed by the Timurids in the 14<sup>th</sup> - 15<sup>th</sup> centuries. The innovative nature of the project of this monument lies in the bold use of floor structures not previously found in the architecture of Central Asia and Kazakhstan. The design scheme consists of many vaulted and arched elements, which were further developed and spread in the first half of the 15<sup>th</sup> century. This building is of considerable interest from the point of view of illustrating the influence of Sufism on the architectural and artistic techniques of Central Asian architecture of the 9<sup>th</sup> – 16<sup>th</sup> centuries [33].

The history of its construction, material, structural, and architectural artistic solutions have long attracted the attention of specialists in various fields of knowledge. The active study that began in the 19<sup>th</sup> century, represented at first by a single study [11], by the middle of the 20<sup>th</sup> century had become complex. The complex with the tomb began to be studied not only by itself but also in the broad context of regional architecture [12] [13-16].

These and other studies formed the basis of a large number of works of the second half of the 20<sup>th</sup> century. Research [17-19] highlighted the typological features of medieval architecture of Central Asia; [20] [21] – problems of studying the medieval architecture of Central Asia; [22] – a summary of information about the monument as of the end of the 1970s; [23] – features of the epigraphic decoration of the monument; [25] – a monument in the context of the history of architecture of Kazakhstan; [26] – description of archaeological research at the site of an existing monument, and other [24] – a collection of architectural monuments of the region). Despite the depth of knowledge achieved, at the beginning of the 21<sup>st</sup> century, new, previously unexplored aspects are opening up [27] – consideration of the monument as one of the foundations of modern national architecture; [28, 29] – summary of the experience of many years of research on the monument; [30] – generalization of the experience of restoration of the monument in the second half of the 20<sup>th</sup> century; [31] – analysis of the form of the monument in the context of similar structures in the region; [34] – the study of the totality of monuments of Islamic architecture of Medieval Kazakhstan; [35] [36] – a monument as a basis for the development of the regional identity of the architecture of Kazakhstan; [37] – a suggestion of an unrealized original 14th-century design; [38] – study of the prospects for completing the construction of the complex; [39] – generalization of new data on the monument obtained in the studies of 2022-2023). Of particular interest are issues related to the incompleteness of the construction of the complex with Khoja Ahmed Yasawi's tomb.

## 2. Research method

The general scientific method of cognition from observation through generalizations to practice is the basis of the conducted research. The collection and analysis of available data on the history of the construction of the

complex with Khoja Ahmed Yasawi's tomb in the Turkestan, including the analysis of spatial composition, allowed us to draw important conclusions with some scientific novelty.

The modern attitude to architectural heritage lies between two poles that emerged in the second half of the 19<sup>th</sup> century. The first is the preservation of intact or conservation of surviving elements (an approach dating back to John Ruskin), and the second is a complete restoration in a historically accurate form (an approach dating back to Eugène Emmanuel Viollet-le-Duc). The desire to make architectural heritage an active part of a modern, sustainably developing culture leads to the expediency of compromises.

One of the characteristic features of the modern understanding of the processes of development of artistic forms is their consideration not in an isolated, sort of “easel” form, but from the standpoint of utilitarian, historical-cultural, and specific-environmental determinacy. This implies an increase in the significance of the factors involved in the analysis, concerning a number of initial functional aspects, the space-organizing role of a particular work, and the processes of actual form-creation, which in aggregate determines a number of parameters of syntheticity.

It is equally important to consider the processes of adaptation of architectural and artistic forms of a work to a certain degree of change in the function of the building and the spatio-temporal context. This implies the methodological importance of considering the history of the creation of the analyzed form and the processes of its physical and semantic transformation as it is actively used. In this case, the final stage can be considered as museumification, which isolates the architectural and artistic form from the spatial-semantic context for passive use without physical change, which is conditionally excluded by periodic restorations.

Of particular importance in such an interpretation is the a priori universality of a number of architectural and artistic forms and the work as a whole, which is present within certain limits, opening up the possibility of a very wide range of its exploitation (adaptation) both in physical and semantic terms. The possibility of conducting a retro-analysis, emphasizing the stages of natural-historical “loss of knowledge” or its deliberate concealment, which subsequently leads to a sharp change in the utilitarian-semantic interpretation of the form, becomes indicative here. Equally interesting in this context are the periods of “restoration of historical memory”, returning the form either to the original or to one of the historically emerged or deliberately given definitions, depending on the ideological commitment of the stage that includes it in active exploitation.

A significant aspect is also the existing complexity of attributing artistic forms by types from spatial-parametric and operational-semantic positions. For each time it is necessary to set difficult-to-substantiate criteria for isolating one or another element from a work that is essentially synthetic.

Although, in principle, it is possible to attempt to distinguish periods of “syntheticity” and “easelization” of species, such a distinction is rather conditional, since it relates rather to the peculiarities of the worldview and self-assessment of the era and the role of those “emerging” from the basic species is occupied by “pure” forms, interpreted accordingly. At the same time, there is a desire to solve the entire complex of problems either in isolation within the framework of the “budded” species or proto-forms purified from “random” layers, or vice versa – modeling new types of unity at the level of creating integral architectural and artistic forms.

A look at architectural and artistic forms from such positions turns out to be very productive in certain conditions since it is also important to emphasize the subjective attitude to the process. This, in turn, determines the definition of architectural and artistic forms from the positions of eras and their corresponding application: as a revered rarity in memorials of a cult or museum nature; an element actively exploited “for its intended purpose”; a consciously or spontaneously re-interpreted adaptation relative to its original function or meaning; a spontaneously or purposefully dismembered element of natural or artificial liquidation. Such processes are very clearly manifested in the spatial and semantic transformations of architectural and artistic forms and the works themselves as a whole when the owner changes, in the movement of elements into spatial and semantic contexts of a different significance, and in the restoration or reconstruction of artifacts of past eras that are significant for

the period being experienced, and in many other things. The history of the object in question, the complex with the tomb of Khoja Ahmed Yassawi in Turkestan, is an illustration of the dialectic of this process.

The aim of the study is to confirm the hypothesis of the gradual construction of the complex from the 12<sup>th</sup> to the 14<sup>th</sup> century, as opposed to the view of the simultaneous construction of the entire building in the 14<sup>th</sup> century. An in-depth analysis of the literature of the 1930s – 1950s allows us to do this. A compositional analysis of similar objects from the Timur era allows us to draw an innovative conclusion about the presence of an external dome above the central part of the original plan. The completion of the complex will contribute to the achievement of sustainable development goals in terms of preserving the architectural heritage.

### 3. Results and discussion

Khoja Ahmet Hazreti Sultan Yassawi (1093-1166) was a thinker, mystic poet, and religious preacher, the founder of the Turkic branch of Sufism. Thanks to him, Sufism as a philosophical system played a decisive role in the spiritual understanding of the Turkic peoples. Ahmed Yasawi's mission was to Islamize the nomadic Turks, the free inhabitants of the Great Steppe. And it was difficult to find a city more convenient for this task than Yassy, located simultaneously on the very border of a nomadic and sedentary civilization, and not very far from the Central Asian Islamic centers. The state structure of the nomadic society was built on a hierarchical system, where the ruler was the messenger of God on earth, and his grave served as a link between the divine and earthly worlds. That is why such burial complexes simultaneously served as administrative centers of the nomadic world – unlike the cities of settled agricultural crops, which arose on the basis of the development of natural resources and transport and logistics chains. At the same time, it should be understood that the history of the cities of the Syrdarya oasis, including the Turkestan, dates back to ancient times – the first millennium BC – and is associated with global civilizational processes of interaction between sedentary agricultural and nomadic cultures.

The construction of the complex began with the construction of a single-chamber mausoleum in the second half of the 12<sup>th</sup> century. In the 13<sup>th</sup> and 14<sup>th</sup> centuries, several buildings were built next to the mausoleum. In 1385, by order of Timur (1336-1405), the complex of buildings became a Sufi monastery (a "khanaka"). In general, initially, khanaks were modest shelters of dervishes, but then they turned into whole complexes, thought out in detail and richly decorated. Khanaks played a great social role, serving as places of public and political gatherings; schools; hotels and inns; hospitals; charity centers, etc. There was necessarily a mosque in a khanaka, there could be a mausoleum and a library.

Emir Timur personally visited the construction site in 1397. The customer's idea was presumably part of the overall architectural concept. Describing this concept, Sh. E. Ratiya writes: "In the Timur State, architectural art has reached an exceptionally high level of development. The buildings of this time proudly completed with high spherical domes resting on drums and decorated with stalactites and giant inscriptions, are distinguished primarily by the massiveness of their architectural forms and grandiosity of size. A characteristic compositional technique, known in the art of Central Asia from the 11<sup>th</sup> – 12<sup>th</sup> centuries, is the construction of huge entrance portals, sometimes with tall and slender minarets at the corners. There is a tendency towards exquisite multicolored decoration of buildings, especially from the exterior, and facade side. At that time, all types and varieties of architectural decoration were widely used, of which tiled decor, mosaics and poured terracotta, as well as wall ornamental painting and monumental painting" [16, p. 10].

The main construction period was at the end of the 14<sup>th</sup> century. During this period, the entire construction was supervised by Mawlyan Ubaidullah Sadr, who was responsible for conducting all charity events at the emir's court. The construction work was carried out directly under the supervision of Shems Abd-al-Wahhab. Bricks and tiles for construction were made in Sauran. From there, bricks were transferred from hand to hand to the Iasi construction site. The cladding work was led by Haji Hassan from the Shiraz. The building's cladding figures (glazed tiles and bricks) are based mainly on epigraphic ornament. All the walls of the building are filled with texts of religious content, often arranged in geometric grids – "girihi". Texts from the Koran occupy places

on the domed friezes, framed by the “mihrab”, and are executed in the canonized handwriting of solis, which is characterized by intertwining letters. The hadiths used in the design of window and door openings are particularly highlighted in the building. The carpet filling of the walls with stylized letters contains frequently repeated theological maxims. The only facade of the complex with the tomb that remains uncladded is the southeastern, main facade of the building, designed in the form of a giant portal with corner towers (a “guldasta”).

Part of the construction and repair work was carried out at the end of the 16<sup>th</sup> century. Being typologically mausoleum-khanaka since the 15<sup>th</sup> century, the building occasionally received an additional functional load. From 1431 to 1917, burials of prominent state and public figures were carried out in some rooms. From the second half of the 16<sup>th</sup> century to the 19<sup>th</sup> century, the Khan’s residence was located in the building. Since the 1840s, the building, as a fortress, became part of the complex of city fortifications, and some of the secondary premises were used as warehouses for food and military equipment. In 1846, for several months the building was partially flooded with water from nearby canals during the siege. In 1864, during the historically last siege, about ten cannon shells hit the building.

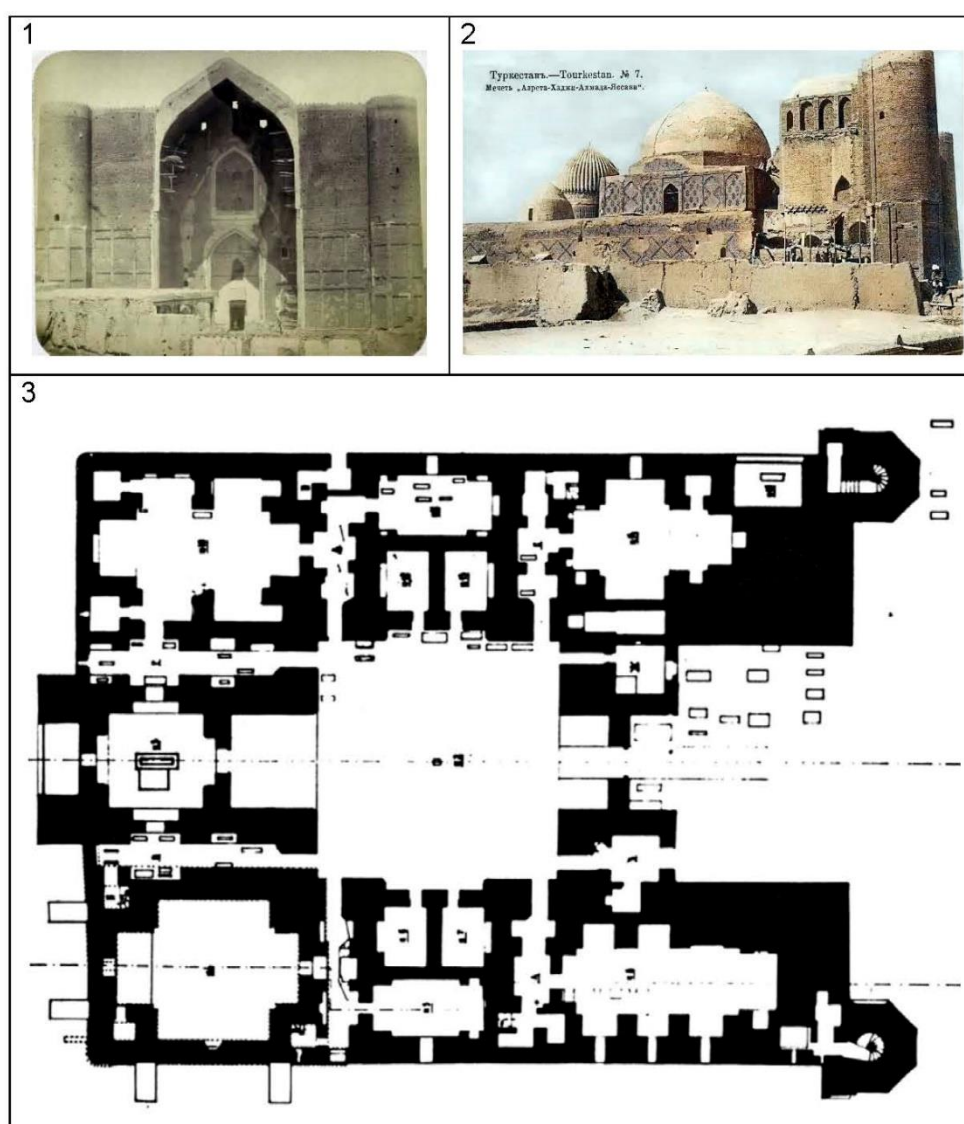


Figure 1. The complex with Khoja Ahmed Yasawi tomb in the Turkestan (the beginning of active study of the complex: the end of the 19<sup>th</sup> – beginning of the 20<sup>th</sup> century): 1 – Southeastern facade, the photo of 1871 [42]; 2 – Southwestern facade, the postal card of 1915 [43]; 3 – First level plan, measurements by A. V. Pechenkin, 1884 [29]

In the early 1870s, the first major renovation and cleaning of the premises from accumulated debris was carried out since the end of the 16<sup>th</sup> century. A larger repair was carried out in 1884. The cladding of the outer surface of the main dome with special bricks was started. The western corner of the building, which began to sink, was reinforced with four buttresses on the southwestern and northwestern sides in 1886-1887. Various repairs were carried out in 1888, 1899 and 1910. From 1922 to the present, the building has been regularly undergoing renovation and restoration work. Since 2003 “The Mausoleum of Khoja Ahmed Yasawi” has been included in the UNESCO World Heritage List.

Currently, the object under study is a two-story multifunctional building under construction. Dimensions in plan 45.8 x 62.7 m, height 38.7 m. There are twelve rooms on the ground floor and twenty-three rooms on the second floor. The main rooms are the central hall, the tomb, the large ceremonial hall, the small ceremonial hall, the library, the well room, the dining room, and rooms for pilgrims. Some of the rooms have domed ceilings of various shapes. The domes are single and double. The largest is a single dome above the central hall. The dome has an internal diameter of 18.2 meters (according to the “stalactite” type cladding). The results of the beginning of active study of the complex in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries were the appearance of a large number of pictures, photographs, and drawings (Figure 1). One of the first precise plans and sections of the complex was carried out on the basis of measurements by A. V. Pechenkin in 1884. The position of many gravestones was recorded on the ground-level plan.

The multi-stage construction of the building forms a number of issues related, in particular, to the volume of work performed in a particular period. One of the first who noted the peculiarity of Timur’s stage of construction at the end of the 14<sup>th</sup> century was M. E. Masson. He suggested that a significant amount of work was associated with the reconstruction of the existing buildings of the complex [13]. In the early 1950s, when examining the foundations, T. S. Karumidze discovered that the foundations of the complex consist of parts of different construction times. This allowed B. N. Zasytkin to conclude that there were completely new materials for the history of the origin and construction of the monument [29].

Accordingly, it was concluded that at the end of the 14<sup>th</sup> century, a completely new building was not built, but the existing buildings were combined and reconstructed with an extension of the portal on the southeastern side.

However, not all researchers support this view. For example, A.K.Muminov supports the previously formed opinion that “the construction of the mausoleum complex was preceded by the destruction of buildings that previously existed on its territory in the 12<sup>th</sup> – 14<sup>th</sup> centuries. The first stage of construction began in 1389-1391 and ended in the mid-90s of the 14<sup>th</sup> century. The height of the building reached 14.63 m on the Main portal, 12.8 m in Kazandyk, 11.8 m in gurkhana from the day surface of the 15<sup>th</sup> century. [...] At the second stage of construction, which apparently began in 1397, smooth high-rise parts of the main portal, the domes of Kazandyk and gurkhana were built, and the room in the north-western corner of the building was turned into a mosque. The decorative moment was strengthened: the domes of the main halls were covered from the inside with ganch stalactites, the side rooms with plaster” [32]. However, if a completely new construction were underway, the corridors would be much wider, and the pylons in the corridors between the mausoleum, the mosque, the large “ak-sarai” (the large ceremonial hall), the small “ak-sarai” (the small ceremonial hall) would have a regular character, and would not be different-sized inserts which inconveniently narrowing the passages.

The authors of this article believe (based on the conclusions of M. E. Masson, T. S. Karumidze, B. N. Zasytkin) that no new building was built at the end of the 14<sup>th</sup> century. By the beginning of work in 1397-1399, there was a group of buildings forming a courtyard. This courtyard, later covered with a dome, formed the ceremonial hall (“jaamathana”). This room has dimensions of 18.2 x 18.2 m. In it, as before in the courtyard, there were ritual meetings of dervishes who performed the “zhikr” (a spiritual exercise in order to feel the divine presence inside themselves – rhythmic, repeated remembrance of God to achieve a state of spiritual concentration).

Subsequently, the cauldron (a “kazan”) was placed in this hall on the site of the filled-in well, and the room became known as the “kazandyk”. The Kazan is a symbol of unity and hospitality. This “taykazan” was cast

from an alloy of seven precious metals in 1399 in the Karnak village, located 25 kilometers from the city of Yassy (Master Abd-al-Aziz ibn Sharafuddin from the Tabriz). The height of the cauldron is 1.583 m; the largest diameter along the rim of the corolla is 2.433 m. The cauldron's own weight is about two tons; it could hold three thousand liters of water. The cauldron was specially made for the complex with Khoja Ahmed Yasawi's tomb by the order of Timur. Sweetened water was poured into the cauldron, which was distributed at the end of Friday prayers. The size of the cauldron is dictated by the ancient beliefs of the Turkic tribes; the edge of the cauldron should be approximately at the height of the mouth of the person who is heading towards it.

The surface of the cauldron is decorated with three belts of relief inscriptions of religious content on a background of floral ornament. The inscriptions also mention the name of the customer, the date of manufacture, and the signature of the master.

The most ancient walls have a room in which the mosque is located. It is located in the northwestern part of the complex. The main southeastern portal with towers is attached to a previously existing building. To install the dome over the central room, the walls of the former courtyard were reinforced with linings. The corridors (a "yulyak"), which used to be open passages between individual buildings, were blocked and became narrower [29, p. 146].

One of the indicators of the different construction times of individual parts of the complex is the difference in the size of bricks in these blocks (from 24x24x6 cm to 28x28x6 cm) noted by researchers (for example, M.E.Masson [13, p. 13]). This difference in size could not have happened with a one-time construction, because it contradicts the logic of a large order received by a brick factory in the Sauran.

There are also questions about the construction of the foundations of the complex with Khoja Ahmed Yasawi tomb, the small size and simplified design of which do not correspond to the widespread regional practice of the second half of the 14<sup>th</sup> century. In the Timur era, relatively deep foundations of large stones on a solution of lime and ash were always used for large buildings.

For example, describing the construction of the foundations of the complex of the Bibi-Khanym cathedral mosque in Samarkand (1399-1405), Sh. E. Ratiya writes: "In Central Asian cities, including Samarkand, where earthquakes of considerable force are not uncommon, the masonry of walls made of flat bricks on plastic ganch mortar has been tested by centuries of experience. Such masonry fully satisfied the requirements of seismic stability and strength of structures. The foundations of the mosque are laid out of ragged stone of various hard rocks on a solution similar to that used in the masonry walls of the entire complex. The depth of the foundations, according to excavations conducted in 1896 by the architect-artist N. Shcherbina-Kramarenko, varies in different parts of the complex: at the minarets of the portal of the main building, this depth reaches 4.50 m, under the inner walls of the main building – 3.75 m. The foundations were laid in trapezoidal pits, tapering downwards, which is why the foundation walls turned out to be inclined. Due to this shape of the foundation, the load from the walls is distributed not only on the sole of the foundation of the excavation but also on its lateral planes" [16, p. 56-57].

However, this design did not save the building from seismic impacts, and by the middle of the 19<sup>th</sup> century, the complex was already in a dilapidated state. One of the reasons was the poor quality of work on masonry walls and dome-vaulted ceilings. Part of the destruction was caused by the looting of bricks and stones during the period when the complex ceased to function and was not guarded. According to confirmed data [41], seismicity in the territory of Samarkand is 8 points, and in the territory of Turkestan is 5 points. However, the construction of the foundations of the complex with the tomb is insufficient, even taking into account the low seismicity. In the complex with the tomb in question, most of the foundations are sloppy brickwork in a trench 25-30 cm deep with clay fillings. In the southeastern part, where the main portal with towers is located, the foundation is a compacted mixture of pebbles and soil. This inexplicable structural negligence, committed at the end of the 14<sup>th</sup> century, led to constant subsidence and minor damage in subsequent years.

The different timing of the buildings is also indicated by the fact that errors were made that distorted the orthogonal shapes and sizes of the corner towers on the main facade: they differ from each other in width by 50 cm. There are also errors in the geometry of the main rectangle of the plan (fractures and ledges in the perimeter of the facades). Therefore, there is an assumption [29, p. 147-148] that in the description of the project conceived by Tamerlane, the parameters of an already existing building are fixed. That is, we are talking about combining or rebuilding previously built premises. This description is given in the “Zafar-name” (the “Book of Victories”), written by Sharaf al-Din Ali Yazdi in 1425 (28 years after the events described and 20 years since Tamerlane’s death). Based on the text of the “Book of Victories”, it can be assumed that it was during Timur’s stay in the city of Yassy that the order for the reconstruction of the complex with the tomb followed. The will of the customer was fixed by a decree providing for the general plan, the main dimensions, and, in part, even some decorative details of the building itself and interior decoration.

However, the two-year construction period indicated in the mentioned “Book of Victories” is questionable. It is assumed [13, p. 6-7] that the work began several years earlier. It is possible that active construction began as early as 1385 when the Sufi monastery was formed. That is, Tamerlane, who visited Yassy in 1397 for the purpose of solemn worship of the grave of the saint (a “ziarat”), observed the construction work already underway. Moreover, in the order (the “Vakh-name” – the “Deed of Gift”) given by Timur to the sheiks of the tomb in 1397, the existing order of the internal life of the temple complex was sanctioned, in accordance with long-established rules and customs. These rituals began to take shape after the death of Khoja Ahmed Yasawi when the tomb of a popular Sufi preacher was erected on the necropolis of Yassy. This document contains a list of irrigated lands and canals, the income from the operation of which was used to ensure the functioning of the memorial; the costs of maintenance and operation are regulated; hereditary property managers and preachers leading Friday prayers have been appointed; the number of service personnel, including Koran reciters, cooks, water carriers, gardeners and cleaners, has been determined; the number of products used to organize charity meals on Fridays and Mondays has been indicated.

Uniform cladding of the rear and side facades visually united buildings of different construction times. Archaeological research of the late 1990s [26] confirmed the hypothesis of the 1950s. The scheme of strengthening the walls of existing buildings and attached structures, made at the end of the 14<sup>th</sup> century (suggestions by the authors of this article), is shown in Figure 2.

The figure illustrates the construction stages of the complex. Scheme 1 illustrates the 1<sup>st</sup> phase, which occurred during the second half of the 12<sup>th</sup> century (the small mausoleum with dome construction); 2 – 2<sup>nd</sup> phase: the first half of the 13<sup>th</sup> century (two meeting halls construction - later these are the mosque with dome and the large ceremonial hall with two domes; the well construction); 3 – 3<sup>rd</sup> phase: the second half of the 13<sup>th</sup> – the middle of the 14<sup>th</sup> century (the library and the small ceremonial hall construction; the courtyard forming); 4 – 4<sup>th</sup> phase: 1389-1399 (existing buildings walls strengthening; the main dome over the courtyard construction; external domes over the mausoleum and the mosque construction with ceramic cladding; the main portal with utility rooms and corner towers beginning of construction; the uniform ceramic cladding of the side and rear facades); 5 – 5<sup>th</sup> phase: 1580s (the continuation of the construction of the portal); 6 – 6<sup>th</sup> phase: 1590s (the completion of the arch, the crenellated crowning of the top of the corner towers, walls, and arch); 7 – the scheme of the first level: the dark green color – previously built buildings, the violet color – new construction of walls and dome; the strengthening of existing buildings walls (1389-1399).

The main construction works of this stage of the development of the complex stopped in 1399. In 1405, due to the death of Timur, the construction was completely stopped. As a result, the main portal with an arch remained unfinished and unpainted. In addition, according to the authors of this article, the main dome remained unfinished. This assumption is based on the fact that historically close analogs of the complex with Khoja Ahmed Yasawi’s tomb in Turkestan, the main dome consists of two parts: internal and external. The crown of the Dome is located at a height corresponding to the height of the portal. For example, the Mausoleum of Guri-Emir (1403-1404) and the Main Mosque of Bibi-Khanim (1399-1404) in Samarkand (interestingly, the Main



portal in the mausoleum of Guri-Emir also remained unfinished and unpainted). In addition, the domes above the tomb and the mosque are double in the complex with Khoja Ahmed Yasawi's tomb.

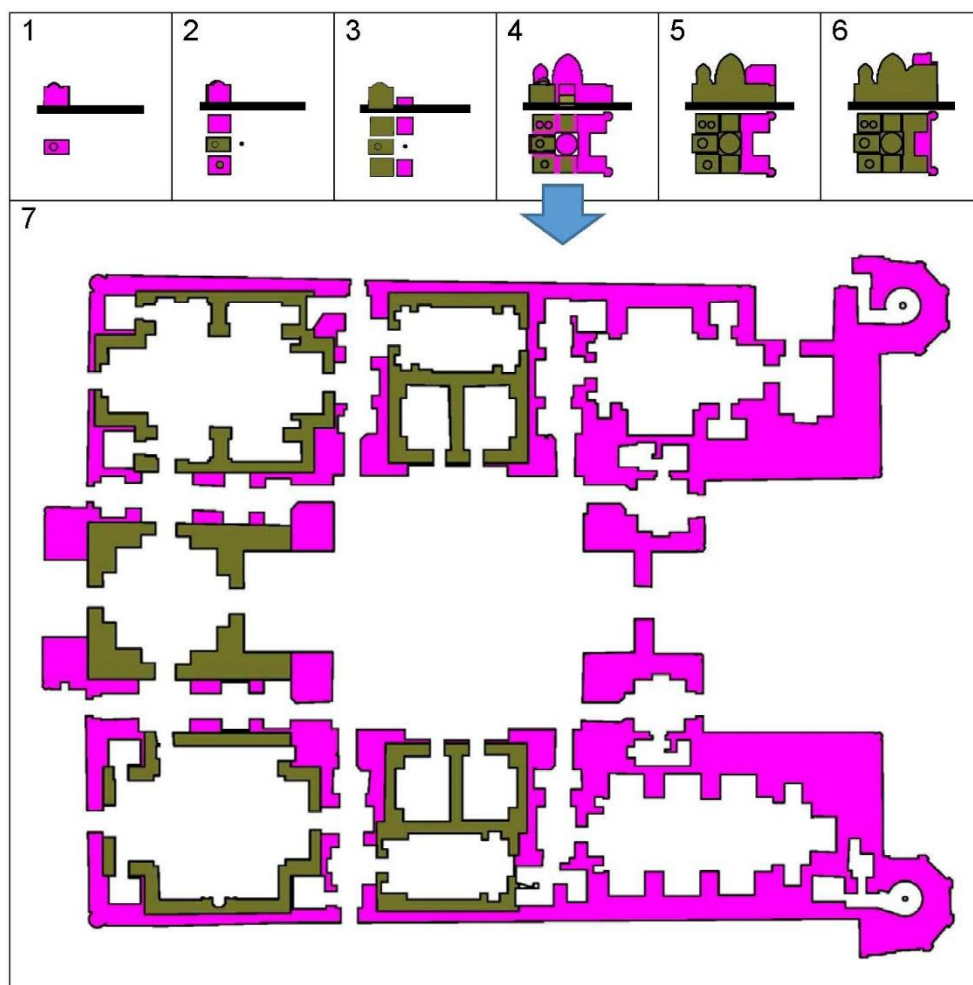


Figure 2. Complex with Khoja Ahmed Yasawi tomb stages of construction phase – from the second half of the 12<sup>th</sup> century to 1596 (the author's resource)

The inner dome above the mausoleum ends at a height of 17.0 m from the floor, and the folded outer dome ends at a height of about 28.0 m. Compositional analysis of the side facades of the mausoleum-khanaka (if we imagine the presence of a fully constructed portal) also leads to the conclusion that there is a second, external dome over the central part of the building in the design plan of the 14<sup>th</sup>-century. This is indicated by the “The Book of Victories” [13, p. 5]: the dome was supposed to have a size of 41 “gyazs”.

One “gyaz” (analogous to a measure of length known as an “elbow”) is approximately 62 cm. This means that the main dome was provided with a diameter of approximately 25.4 m. This size corresponds to the design that would need to be performed over the inner dome, which has an outer diameter of 22.0 m. Graphic materials substantiating this are shown in Figure 3.

After a significant break, the construction of the complex with Khoja Ahmed Yasawi's tomb continued at the end of the 16<sup>th</sup> century by the Supreme Khan of the Sheibanid's State Abdullah Khan II. In this phase, the arch was completed, and the construction of the walls and corner towers of the main portal continued.

However, it was not possible to complete the portal by implementing the project idea of the 14<sup>th</sup> century. At the end of this phase, battlements were built along the top of the walls, corner towers, and arches, providing convenient defense of the building, which was increasingly used as a fortress. This phase of construction turned out to be the last one at the moment.

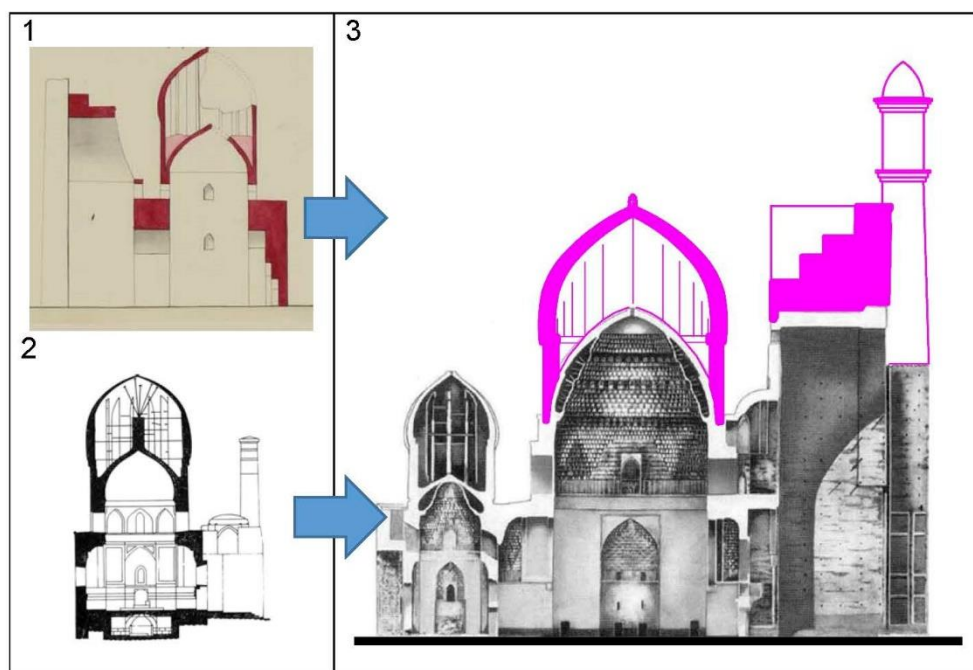


Figure 3. The Justification of the presence of a double main dome in the complex with Khoja Ahmed Yasawi tomb in the design plan of the 14<sup>th</sup> century (based on historically close analogs): 1 – the Bibi-Khanim Main mosque in the Samarkand: the section [44]; 2 – the Guri-Emir mausoleum in the Samarkand: the section [45]; 3 – the complex with Khoja Ahmed Yasawi tomb in the Turkestan: the section with a proposed double main dome and the completed Portal [46 + the author's resource]

The current level of material, technical, and ideological development of the Kazakh society suggests the expediency of completing the construction of the complex with the Tomb, which has great historical and cultural significance both for Kazakhstan and for the whole of Central Asia. Accordingly, the evolution of the complex with Khoja Ahmed Yasawi tomb can be structured as follows:

1<sup>st</sup> phase: the second half of the 12<sup>th</sup> century (approximately in 1167) – the mausoleum with dome construction.

2<sup>nd</sup> phase: the first half of the 13<sup>th</sup> century – two meeting halls construction (later these are the mosque with the dome and the large ceremonial hall with two domes); the well construction.

3<sup>rd</sup> phase: the second half of the 13<sup>th</sup> – the middle of the 14<sup>th</sup> century – the library and the small ceremonial hall construction; the courtyard forming.

4<sup>th</sup> phase: 1389 (or 1395)-1399 (1405) – existing buildings walls strengthening; the main dome over the courtyard construction; external domes over the mausoleum and the mosque construction with ceramic cladding; the main portal with utility rooms and corner towers beginning of construction; the uniform ceramic cladding of the side and rear facades.

5<sup>th</sup> phase: 1582 – the continuation of the construction of the portal.

6<sup>th</sup> phase: 1596 – the completion of the arch, the crenelated crowning of the top of the corner towers, walls, and arch.

The completion of the construction raises the question of the shape of the Main portal. Analyzing the main facade of the tomb complex M. E. Masson writes: “In its general appearance, it is impossible not to notice the similarity with the front entrance of Timur’s Ak-sarai palace in Shakhriyabz, which was started much earlier, namely, in 1380. Most of all, they are brought together by the nature of angular minarets, faceted from below, turning into cylindrical ones from a certain height. The wonderful scenery of the ruins of the ak-sarai and the surviving skeleton of the portal of the mausoleum of Khoja Ahmed in comparison complement each other in mental reconstruction. In order to restore the appearance that the “peshtak” of the Turkestan monument should

have, it is necessary to imagine, instead of the ugly battlements late in time, the continuation of the portal walls upward, embracing the castle of the arch that was brought down under Abdullah Khan with a rectangular frame, now restlessly piercing into the air. The boundary where the original masonry ends and the completion of the 16<sup>th</sup> century begins has not yet been precisely traced, but according to a number of observations it lies near the level of the faceted parts of the minaret” [13].

However, there is some conflict in this reasoning. If at the end of the 16<sup>th</sup> century, the completion of the portal began from the level of the top of the faceted corner towers and their shape was changed from prismatic to cylindrical, then it is possible that this was a simplification of the design and not the realization of the idea of the 14<sup>th</sup> century. The idea of the 14<sup>th</sup> century could well imply the prismatic shape of the corner towers to the full height (the prismatic shape of the towers has the same height as the fully constructed and lined walls of the side facades adjacent to it).

Appropriate detailed surveys of bricks and mortar are needed, but if this turns out to be the case, then the entire upper part of the existing portal with cylindrical corner towers (and not just the castle arches and battlements) is the result of work from the end of the 14<sup>th</sup> century.

Moreover, the cladding with glazed brick panels was no longer planned, since this requires appropriate cells (as it is done in the lower, faceted parts of the corner towers). That is, the full implementation of Timur’s design plan was not envisaged. For some reason, these works were hastily stopped before the previously anticipated completion of the full-height portal. This is indicated by the relative carelessness in the masonry of the castle and the crowning teeth. Accordingly, the design concept of the 14<sup>th</sup> century presumably implied the shape of a portal with corner towers having a faceted section at full height.

An example of such a solution is the portal of the Main Mosque of Bibi-Khanim in Samarkand (the building that collapsed at the beginning of the 19<sup>th</sup> century has now been almost completely restored on the basis of the reconstruction project of Sh. E. Ratiya in 1950 [16]. Accordingly, this building can be considered as the closest analog, and not the portal of the Ak-Sarai palace in the Shakhriyabz city (now there is a model and 3D-restoration of this building, which was destroyed by the 17<sup>th</sup> century). In addition, the prismatic shape of the corner towers of this portal ends at about two-thirds of the height of the walls adjacent to the towers.

In the complex with Khoja Ahmed Yasawi tomb, the lower, prismatic sections of the corner towers and the walls adjacent to them have a coffered-like solution designed to accommodate cladding panels (similar to the rear and side facades fully lined in the 14<sup>th</sup> century). The overlying parts have a smooth surface. It is likely that at the end of the 16<sup>th</sup> century, given the real financial and construction capabilities of Abdullah Khan II to continue construction, the portal was no longer paneled. The remaining logs of the scaffolding support for the builders, which were not removed from part of the facade, suggest that the cladding with separate small tiles was in the original plans of the customer. However, these plans have changed for some reason. Construction had to be accelerated dramatically. The masonry of the top of the arch contrasts with the masonry of the lower part. The haste of construction is also confirmed by the displacement of the arch lock relative to the longitudinal axis of the building. This acceleration led to the deformation of the right part of the archivolt. The masonry of the crowning part in the form of battlements and a parapet also differs from the masonry of arches, walls, and towers.

Judging by these battlements crowning the portal, one of the goals of the accelerated continuation of construction was to turn the building into a fortress, since the connection of the arch provided a “battle course” along the top of the walls between the towers. Over the next two and a half centuries (until the second half of the 19<sup>th</sup> century), this additional function of the complex with the Tomb was often used.

Thus, it can be assumed that the design concept of the portal of the complex with Khoja Ahmed Yasawi tomb of the late 14<sup>th</sup> century occupies a kind of intermediate position between the portal of the Ak-Sarai complex and the portal of the Main Mosque of Bibi-Khanim [33]. The scheme of formation of the proposed composition of the main facade of the complex with Khoja Ahmed Yasawi's tomb in the context of historically close analogs

is shown in Figure 4. Clarification of details is possible with further investigation of the problem using various methods and technologies of virtual reconstruction of architectural monuments [40].

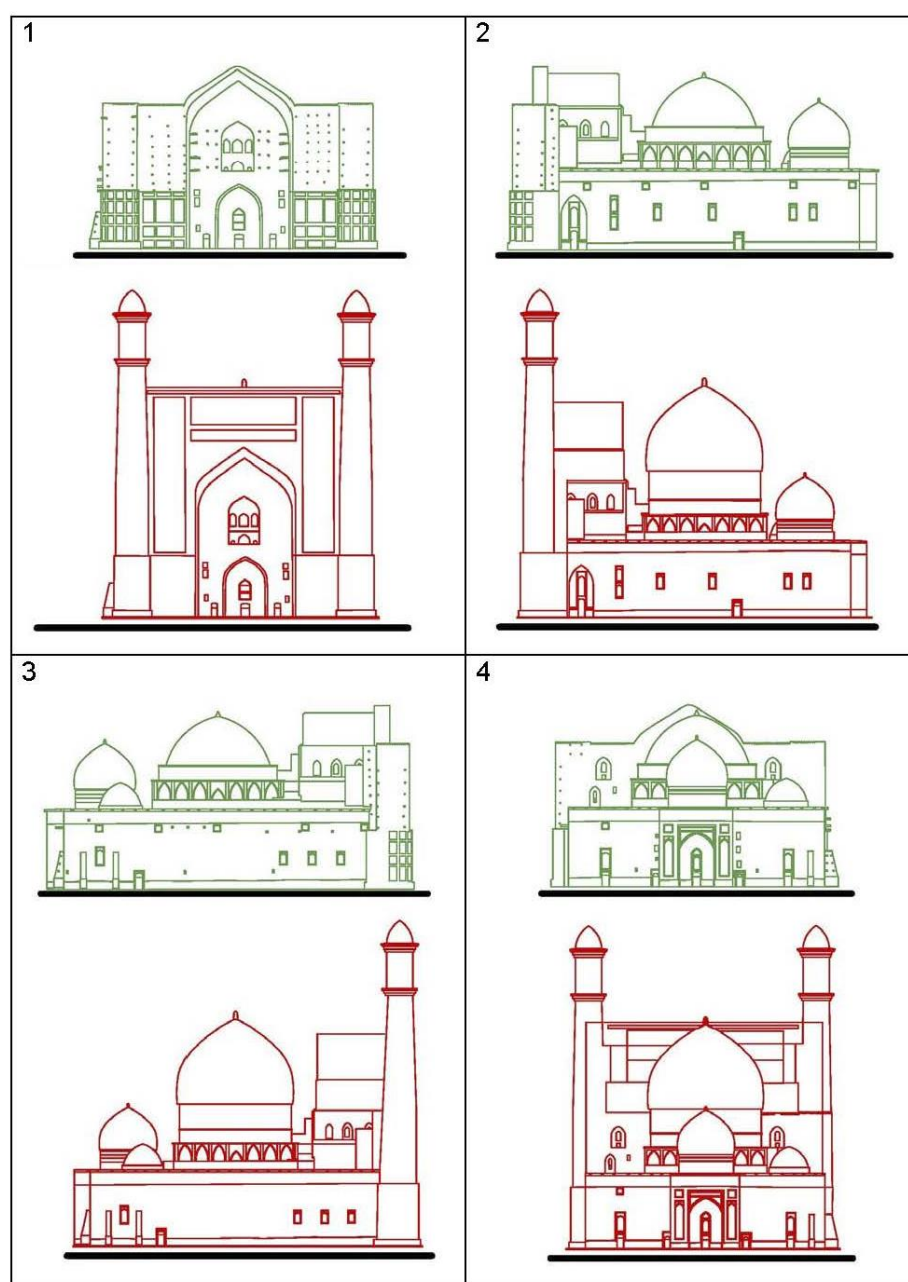


Figure 4. Facades of the complex with Khoja Ahmed Yasawi's tomb in Turkestan city (author's resource)  
The current state (green) and the design concept of the 14<sup>th</sup> century (red) – assumption: 1 – The southeastern facade; 2 – the northeastern facade; 3 – the southwestern facade; 4 – the northwestern facade

It is advisable to urgently consider the scientifically sound prospect of completing the construction of the building: completion of the main facade; construction of the main external dome with ceramic cladding; ceramic cladding of small domes; ceramic cladding of the main facade with corner towers. Since the end of the 16th century, the building has been in an unfinished, dilapidated condition. This is gradually destroying it. The complex of repair and restoration works does not solve the problem. It is of interest to develop a construction completion project in accordance with the initial design plan [38]: “The basis of the project for the completion of the construction of the building can serve as research materials on the alleged initial design. The completion of the multi-year construction involves solving a number of tasks related to the state of the structures of the unfinished building. The main task is to determine the possibility of using existing structures as part of new structures. In the situation under consideration with the mausoleum-khanaka of Akhmed Yassawi, the active

construction of which ended more than four hundred years ago, the existing structures are of little use for supporting the new, overlying parts of the building. In addition, due to various natural and anthropogenic factors, the structures of the existing building are still susceptible to getting wet from both atmospheric and groundwater.

Accordingly, the first priority is measures for waterproofing and lowering the groundwater level. Waterproofing from atmospheric influences is solved by the completion of glazed brick cladding of domes and parapets in existing and newly erected parts, as well as film-membrane insulation of the roof. The elimination of groundwater suction is solved by helium insulation of the walls and lowering the level of the territory adjacent to the building. New constructions of the main dome are solved on the basis of a metal frame based on independent reinforced concrete foundations. The completed upper part of the portal with corner towers also has a steel frame, which in the lower part fixes the cracked walls of the existing building and a deformed arch. Independent reinforced concrete foundations also serve as a support”.

Presumably, the complex of these events will not only save an outstanding work of cultural heritage from destruction. The completion of the construction eliminates the obvious moral and aesthetic damage caused by the sight of an unfinished, crumbling building. A positive social effect will be part of the solution to the problem of continuous sustainable development of the region.

#### 4. Conclusions

The problem of long-term construction is a common occurrence. As the economic or ideological situation changes completely or partially, certain buildings are quickly completed, continue to be built and rebuilt according to the changed concept, or stop building altogether. Sometimes the continuation of construction is postponed for a certain period. In rare cases, long-term or even centuries-old construction is carried out according to the original plan. For example, the Cologne Cathedral was built in two stages with a significant break between them (in 1248-1531 and in 1842-1880); the Redemptive Sagrada Familia Church in Barcelona has been under construction since 1882. In most cases, the unfinished construction is completed either immediately (in a simplified form, such as the “Broken” Pyramid in the Dahshur, ~2596 BC), or after a break, but in other forms – for example, the Cathedrals of Our Lady of Chartres (1194-1260) and the Cathedrals of Our Lady of Amiens (1220-1528), which have differently solved the paired towers of the main facade.

It was in this situation that the complex dedicated to Khoja Ahmed in the Turkestan city (until the 16<sup>th</sup> century, the city was called Yassy) turned out to be. The gradual formation of the complex from the small tomb of the 12<sup>th</sup> century, which became part of the ensemble in the 13<sup>th</sup> and 14<sup>th</sup> centuries, to a grandiose building at the end of the 14<sup>th</sup> century, was disrupted. Tried to finish the building at the end of the 16<sup>th</sup> century, using an adjusted project. However, this also failed. Since then, the building has been in an unfinished, disrepair. Ongoing repairs, and since the beginning of the 20<sup>th</sup> century, restoration work has not completely solved the problem of preserving the building. New reinforced concrete foundations ensured the stability of the building. But the unfinished and unglazed main portal gets wet in the rain, and has cracks and emergency deflections of structures. An unbuilt outer dome over the central part creates a problem of the preservation of the inner lining.

However, before making a decision on the start of construction work, it is advisable to determine the specifics of the design plan of the 14<sup>th</sup> century. Some difficulty lies in the fact that the complex with Khoja Ahmed Yasawi’s tomb, according to a figurative solution, occupies an intermediate position between the Portal of the Ak-sarai Palace in Shakhriyabz and the Main Mosque of Bibi-Khanyim in the Samarkand city. The composition of corner towers with a prismatic lower part and a cylindrical upper part is a development of the idea of the ak-sarai portal. However the character and material of the upper cylindrical masonry differs from the lower prismatic part.

There is an assumption that the entire cylindrical part was built at the end of the 16<sup>th</sup> century according to a modified project. This means that the design plan of the 14<sup>th</sup> century could imply a prismatic solution of the corner towers at full height, as it was done in the Main Mosque of Bibi-Khanyim. The fact that the main Dome

is essentially internal is proved by comparison with historical analogs and other domes of the mausoleum-khanaka itself. However, was the unfinished outer dome smooth, like in the Main Mosque of Bibi-Khanym, or folded like in the mausoleum of Guri-Emir? These issues require further study, which determines the prospects of the ongoing research.

Numerous examples demonstrate the successful completion of work on the completion of previously unfinished or collapsed buildings. Two methods are usually used. One defines the completion of construction in other forms corresponding to a new view of architectural and artistic shaping. This method has historical value, as it shows the dynamics of changing stylistic preferences. The second option seems interesting from a historical point of view. This is the completion of construction in forms presumably consistent with the original plan. Examples of Kazakh practice buildings constructed in the Middle Ages include the Aisha Bibi Mausoleum (2005, the Aisha-Bibi village, Dzhambul region), the Rabiga Sultan Begim Mausoleum (1980-2022, the Turkestan), the Begim-ana tower and the Saraman-Kosa tower (1984, the Kyzylorda region). Accordingly, the prospect of developing a design solution is of interest, which implies the completion of the construction of the mausoleum-khanaka of Khoja Ahmed Yassawi. This will continue the work of the ancestors, realizing their grandiose plan.

Since the time of Khoja Ahmed Yassawi's life and educational practice, the city in which he lived has gradually become more and more significant in the context of the spiritual unity of the inhabitants of the Central Asian region. The symbol of this unity is represented by the complex with Khoja Ahmed Yasawi's tomb. The Turkestan city was the capital of the Kazakh Khanate, and the complex with the tomb was the State residence. Despite the difference in religious understanding, the rulers of neighboring states from the Samarkand, the Bukhara, the Kokand, the Tashkent, the Ferghana, the Kalmykia, and the Russian Empire, who occasionally captured the city, treated the memory of the outstanding spiritual leader with reverence and supported the functioning of the memorial with their gifts and authority. The Soviet Union, despite the atheistic nature of the spiritual organization, paid great attention to the study of the cultural heritage of Khoja Ahmed Yasawi as part of the world religious culture. Significant funds were allocated for research repair and restoration work to preserve the complex with the tomb. In modern Kazakhstan, which is a secular state, the Government of the Republic of Kazakhstan pays great attention to the development of the city of Turkestan and the preservation of the memorial. The completion of the complex with Khoja Ahmed Yasawi's tomb is one of the important aspects of the development of spirituality in a huge multinational and multi-confessional region. This is, in fact, an element of cultural continuity and sustainable development.

Several outstanding structures embody the medieval architecture of Central Asia. One of them is the complex with the tomb of Khoja Ahmed Yasawi in Turkestan. The peculiarity of this structure is, among other things, the long history of construction. The complex is still not completed. It is significant how, in the process of centuries-old construction, the main idea of perpetuating the memory of an outstanding religious figure was interpreted depending on the specifics of the historical context. Now there is a question of determining the possibility of completing the construction. But to do this, you first need to determine what the design plan of the 14<sup>th</sup> century was. Several examples of similar buildings from this period allow us to make an assumption. This is important in the context of the modern understanding of Turkestan as the center of spiritual unity of a multinational and multi-confessional region. This, among other things, will contribute to the sustainable development of the region.

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The authors declare that they have no known financial or non-financial competing interests in any material discussed in this paper.

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## Author contribution

The contribution to the paper is as follows: K.Samoilov, B.Kuspangaliyev, G.Sadvokasova, Y.Aidar and L.Nurkusheva: conceptualization; Y.Aidar, K.Samoilov, B.Kuspangaliyev and G.Sadvokasova: methodology; K.Samoilov, L.Nurkusheva and Y.Aidar: software; K.Samoilov, L.Nurkusheva, G.Sadvokasova and Y.Aidar: validation; K.Samoilov, B.Kuspangaliyev, G.Sadvokasova: formal analysis; L.Nurkusheva, K.Samoilov, B.Kuspangaliyev, G.Sadvokasova and Y.Aidar: investigation; K.Samoilov, L.Nurkusheva, B.Kuspangaliyev and Y.Aidar: resources; L.Nurkusheva, B.Kuspangaliyev and K.Samoilov: data curation; K.Samoilov, B.Kuspangaliyev, L.Nurkusheva, G.Sadvokasova and Y.Aidar: writing-original draft preparation; K.Samoilov, B.Kuspangaliyev, G.Sadvokasova, L.Nurkusheva: writing-review and editing; L.Nurkusheva, Y.Aidar and K.Samoilov: visualization; K.Samoilov, Y.Aidar and G.Sadvokasova: supervision; L.Nurkusheva, K.Samoilov and B.Kuspangaliyev: project administration; L.Nurkusheva, K.Samoilov and Y.Aidar: funding acquisition. All authors have read and agreed to the published version of the manuscript.

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