

Ulugbek Period Architecture

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Article History: Received: 10 November 2020; Revised 12 January 2021 Accepted: 27 January 2021; Published online: 5 April 2021

Abstract: Ulugbek continued the tradition of creative work of his grandfather Amir Temur in architecture, involving scientists, engineers and architects in this work. Due to this, rare and complex memorable solutions were discovered. There is talk of many religious, public, educational facilities.

Keywords: architecture; decoration; art; creativity; construction; construction; urban planning; sextant; muarrix; renaissance; concept; lodge, treasury; weapons; workshop; warehouse; office

1. Introduction

Amir Temur's beloved grandson Mirzo Ulugbek, like his great grandfather, was a world-class politician and statesman, although he did not display such great qualities as a famous commander, he made a name for himself as the supreme ruler of Movarounnahr. His highly prestigious research in the field of science, and especially in astronomy, has become a great and immense service to all mankind.

Ulugbek continued the tradition of creative work of his grandfather Amir Temur in architecture, involving scientists, engineers and architects in this work. Due to this, rare and complex memorable solutions were discovered. Many religious, public and educational facilities were built.

The creative work of Temur and Ulugbek was not left out of the eyes of medieval scholars, chroniclers and tourists. Abdurazzaq Samarkandi (15th century), Sharafuddin Ali Yazdi (15th century), Nizamiddin Shami (15th century), Hafizi Abra (15th century), Mirkhand (15th century), Ibn Arabshah (1392-1450), later Zahiriddin Muhammad Babur, Alisher Navoi, In the works of such scholars as Zaynuddin Wasifi, Davlatshah Samarkandiy, Hafiz Tanish, tariffs were given for the monumental buildings built by Temur and Ulugbek [1].

The architectural scientific study of the buildings of the Timurid period began in the second half of the XIX century. Archaeological research has also been added to this work. By studying the buildings that have lost their original condition due to the destruction of periods or subsequent constructions, their initial memorial appearance, the first scientific works on the history of construction were published by V.L.Vyatkin, M.E.Masson, V.V.Bartold, B.N.Zasipkin, While scientists such as Ya.G. Gulomov, V.A. Shishkin published in the early twentieth century, later the architecture of this period became the constant object of research of scientists. Researchers such as G.Pugachenkova, M.Bulatov, V.A.Nilsen, P.Zohidov, Yu.Buryakov, L.Rempel, L.Mankovskaya, Sh.Ratiya, N.Nemtsova, I.Notkin, Yu.Shvab Temur and Ulugbek about their buildings, the history of their construction, memorial solutions.

However, in the architecture of Temur and Ulugbek there are still many unexplored aspects, directions, issues for new research. They stem mainly from the practice of restoring the lost of these monuments, restoring them to their original state. The architecture of the Ulugbek period itself has gone through certain stages. The memorial style at these stages, the determination of the formation of the features of the memorial solution is important in the restoration of monuments of the Timurid period.

2. Main Directions Of Ulugbek Architecture

2.1. Urban planning and memorial complexes of the Ulugbek period

Undoubtedly, Ulugbek's architectural activity is a continuous and important stage of urban planning and memorization of Timur and Timurid period, because the socio-economic policy of the Timurid state and especially the features of urban planning and architectural development arising from the creative work of Amir Temur. The period of the Timurids is sometimes called the "Timurid Renaissance" (Renaissance-Renaissance in the XIV-XVI centuries in the history of cultural development of Western and Central Europe, flourished in

medieval culture, imbued with a spirit of confidence in the incomparable potential, intellect, will and abilities of man. the process of transition to a new stage) [3]. Indeed, the pursuit of perfection in their fields on the basis of the spirit of humanity and ideas of the representatives of science, art and crafts in Central Asia became the main direction during the Timurids.

Amir Temur's constructions in the major cities of Movarounnahr, especially in Samarkand and Shakhrisabz, became huge. Initially, on the scale of urban planning, huge measures were taken to build fortifications, arrange the main streets, create memorial complexes designed according to a clear plan. In ancient urban planning, with the main part of the city meaning "Shahristan", ie the area inhabited mainly by aristocrats, craftsmen, in contrast to the urban system of rabot, where the common people lived, the main part of the cities of Timur and the Timurids was called "Gissar" [3].

Although the complexes built by Temur and Ulugbek have not reached us in full, the sources and data from archeological excavations give a certain idea about their formation. Memorial complexes are usually internally interconnected, which generalizes buildings in an almost independent memorial appearance. The above comment is reflected in the analysis of the formation of the Gori Amir ensemble, which was formed during the Timurids.

The architecture of the Ulugbek period is distinguished by the fact that it brings the complex of buildings to a holistic architectural and artistic look. For example, the entrance roof built by Ulugbek, the double-domed mausoleum and the magnificent stairs leading to the second quarter played an important role in the compositional completion of Shahizinda's buildings. Although the architectural, structural and artistic solutions of the subgroups built by Ulugbek of the Shahizinda complex, which formed a long corridor from north to south, to the Gissar wall in Timur's time, are to some extent synchronized with the buildings of Timur's period, Ulugbek's decorative styles are noticeable.

The main roofs of madrassas play an important role in the architectural and compositional solution of the architectural complexes of the Ulugbek period. That is, with the location of the dominant element of the main style of construction, the area of different shapes, architectural ensembles are created around the courtyard, embodying a certain functional urban planning idea. These include the 15th-century Registan Square in Samarkand, the Koshmadrassa in Bukhara, the Abdulazizkhan madrasah built by Ulugbek and later built in front of it.

During the reign of Ulugbek there was an improvement of architectural solutions and methods. While Ulugbek's architecture derives much from Timur's time, it is important to discover new architectural solutions, to unite the creative potential of different regions of the vast territory within a single state, and finally to call it the "spirit of the period" - the "Temurid Renaissance". played a role.

2.2. Memory device system and memory methods

In the Muslim East, even within the strict requirements of the rules of Islamic ideology, the creative freedom of those who are engaged in the spirit of humanity, the passion for creativity has taken a special direction. In general, the ideological solution of the period is always felt in the historical solution of the building, its constructions, memorial hashes.

In architecture, the functional properties arising from certain goals and objectives are combined in spatial-dimensional, historical solutions through building materials.

Pure practical services can also give a certain artistic and aesthetic character to the buildings created for the tasks. In this sense, the Timurid period was a new stage in the art of architecture (especially in the time of Ulugbek). This, in turn, required the performance of complex engineering, technological tasks. New ideas prevailed in the solution of devices, as well as in the decoration of the memory. Baked brick has become the main building material. This is due to the fact that the magnificent structures built by Timur meet the requirements of durability and are strictly controlled. The development of the technique of creating domes of this period was marked by baked bricks.

Clavijo, the Spanish king's ambassador, wrote that when he arrived in Samarkand to inspect the construction of the Gori Amir mausoleum, Timur was dissatisfied with its height and the builders hurriedly rebuilt the dome, raising the height of the dome. At that time, even the main roof of the mosque did not seem glorious enough to Timur and he ordered its reconstruction. The structure of the dome was one of the responsibilities before the architects of the majestic buildings.

According to Sharafuddin Ali Yazdi, "... on the 4th day of Ramadan, 801, the master architects and masters of their art laid the foundation of the building at a happy hour and at a time convenient for the stars. Ozar, Iran, 500 stone-cutters from India were busy working in the mosque itself, while others were busy carving stones in the mountains and sending them to the city. Masters and artists from all over the world gathered in the capital. Timur

entrusted the control of construction to the princes and emirs ... He came to the construction in person and spent most of his time in the vicinity - the Lady Madrasa and the mausoleum of Tuman aga. The height of the building will continue until the skill of the builders reaches the new blue dome and the cleanliness of the courtyard ... until it forgets the beauty of the gardens of paradise. ”

Hafizi Abru, in addition to the description of the mosque, gives the following details: “The altar is made of steel and covered with rare shapes, strange patterns, beautiful inscriptions and elegant ornaments ... Let not the years pass, let not the patterns fade, and let not the whole building perish, and let the world stand still. ”[5]

During the reign of Timur, only two madrasas were built in Samarkand: the small madrasa in the Gori Amir complex and the majestic madrasa of Saroymulkhanim. At that time, most madrasas were built mainly as educational institutions during the reign of Ulugbek. In the architecture of the Temurids, only educational and scientific facilities built by Ulugbek make up the majority.

In Shahrisabz, Timur built a complex called Dor us-Siyodat with a huge roof for the mausoleum and its foundations for the mausoleum for his sons. Today, Jahangir and Umarshaikhs, sons of Timur, were buried in this complex, where one of the foundations of the roof and the foundations of the mausoleums have been preserved. Later their lands were transferred to Samarkand, Gori Amir. That's probably why the building was left unattended and turned into a ruin. Only the mausoleum, associated with the name of the Imam, covered with a high tent-like dome at the base of the roof, has come down to us. It is known from the sources that Khorezmian masters took part in the construction of this mausoleum, the appearance of which is similar to the Khorezm buildings [2]. During Ulugbek's reign, he built a large mosque in the Dor ut-Tilovat area near the complex.

In the architecture of the Timurid period, there was an increase in the solutions of administrative buildings and public buildings. About the Oqsaroy he built in Shakhrisabz, Babur wrote:].

No matter how magnificent, huge and luxurious the buildings of the Amir Temur period, the discovery of devices that fit into these large volumes and guarantee their durability is a bit behind. This process turned in a positive direction only in the time of Ulugbek. However, the architectural solutions of the buildings built by Timur in the time of Ulugbek gave a certain impetus to the creation of new construction technologies, systems of devices. The purpose of the above detailed description of the buildings built by Timur is that the foundation stone of the general methodological directions of architecture of the Ulugbek period was laid during the Timur period. And by comparing them with the buildings built by Ulugbek, it is necessary to distinguish the peculiarities of the architecture of his time.

3. Fundamentals of architecture in the ulugbek period.

3.1. Composition of memorial complexes.

The reign of Ulugbek began with his father Shahrukh on July 20, 1410, when he was appointed governor of Movarounnahr and Turkestan. Although the state system has not changed since the time of Timur, science and construction have developed. Herat, Tabriz, Shakhrisabz, Samarkand, Bukhara, Gijduvan, Tashkent have developed as cultural centers. Shahrukh and Ulugbek paid great attention to the construction of the city. In addition to many mosques, madrasas, and khanaqas, the construction of caravanserais, rabot, sardoba, bridges, baths, and other public buildings was in full swing. Due to Ulugbek's high passion for science and culture, he was able to gather around him famous intellectuals of the kingdom, who were more scientific than military policy, and creative people.

The first work on the memorial complexes was in the direction of the formation of the complexes, which began in the time of Timur, and was continued by Ulugbek. Of course, in the initial period in the Ulugbek state there were not enough opportunities for the reconstruction of large-scale urban planning, but high results were achieved in the creation of memorial complexes.

Although not as large as the buildings of Timur, in any case, in the southern part of Shakhrisabz, in a magnificent architectural style, Ulugbek built the above-mentioned Dor ut-Tilovat complex. The complex began with a mausoleum built over the tomb of Sheikh Shamsiddin Kulol in the time of Timur and a majestic but small structure next to which is buried the father of Timur Taragay. In 1435-36, Ulugbek built the Kokgumbaz mosque-prayer hall in front of the mausoleum on behalf of his father Shohrukh. The Dor ut-Tilawat madrasah was also located on the side of the courtyard that appeared in the middle. Now, there is a row of small cells instead of this madrasa. They were built later and surround part of the courtyard.

The formation of Registan Square in Samarkand also plays a special role in Ulugbek's architectural activity. Samarkand Registan is still known as a masterpiece of world urban art. However, it is not the Registan, which was built during the reign of Ulugbek and whose only madrasah has come down to us, but its appearance, which was re-formed in the XVII century. His idea of a beautiful and glorious, but memorable-dimensional and reciprocal location is reflected in a somewhat simplified form of the general historical composition of the 15th century

Ulugbek Registan. Judging by the data in the sources, it is conceivable that the Registan of that period was much more perfect than it is now.

The Sherdor, Tillakori madrasas, which were later built, did not undermine the complex integrity of the majestic roofs facing the Registan, each of which was different, as it retained the overall composition.

Ulugbek madrasah has a magnificent roof, corner towers and domed domes. Behind the roof of the inn was a tall, beautiful dome. The style of the Mirzai caravanserai was probably similar to the facade of Tillakori built in its place. The central roof consists of rows of arches, towers and corner towers. Only the roof of the Kokaldosh mosque is covered with a roof. The columnar porches of the Muqatta Mosque were clearly visible. Medieval authors gave different descriptions of the buildings of the Ulugbek period in Registan. However, the description of Zahiriddin Babur allows us to get more accurate information.

Zahiriddin Muhammad Babur tells about the buildings built by Ulugbek in Samarkand in 1497-98, in his rare work "Boburnoma" - "...Ulugbek Mirzo's buildings are a madrasah and a khanaqah inside the Samarkand fortress. The dome of the khanaqah is a very large dome, and it is said that there is no such great dome in the world. He also built a good bath for this madrasa and khanaqah, Mirza is famous for his bath, he made carpets of all kinds of stones. I don't know many baths in Khorasan and Samarkand. He also built a mosque to the south of this madrasa, which is called Muqatta. In this regard, I would like to say that Muqatta, by cutting the wood from time to time, added Islamic and Chinese patterns, and the finishing touches and ceiling are this moss. This is a big difference between the qibla of a mosque and the qibla of a madrasa. The victor followed the direction of this mosque's qibla according to the astrologer's history." [6]

If Registan is considered an example of a regular memorial ensemble, then the foundation of the Shahizinda complex, formed to the south of the Afrosiab ruins, can be called a scenic stack of structures along the axis of the corridor extending from south to north. Formed in the XI-XII centuries, this complex has a unique historical and volumetric compositional solution with the buildings of the Timurids and Ulugbek period [7].

In the architecture of the Ulugbek period, in the formal-historical solutions of the mausoleums, there are creative researches that are different from the one-room roof system of the Timur period. This inevitably affects the architectural appearance of the dahmas. For example, an octagonal mausoleum was built in the Shahizinda complex in Samarkand. It is noteworthy that the style drawn from each side of it is in the form of an arched window. The octagonal mausoleum, the top of which is covered with a dome, and its internal and external forms, are no longer to be found.

During the reign of Ulugbek, the construction of caravanserais was in full swing. It is known from sources that even he built the Mirzoy caravanserai on the site of the present-day Tillakori madrasah in Registan Square. There is also information that the proceeds from the caravanserai were donated to the foundation of a madrasah built by Ulugbek Registan. On the south-eastern side of the square, a pre-Mongol Friday mosque was in ruins. During the reign of Ulugbek, this mosque was rebuilt. A luxurious mosque with wooden pillars, ceilings and an altar.

Babur describes the garden built by Ulugbek as follows: "...Again, Pushtai planted a garden to the west in the area of Kokhak, the garden is a season. He built a high building in the middle of the garden. They say chilsutun, this kitchen, the columns are full of stones. There are four manor-like towers in the four corners of this building, and the roads to the top are these four towers. Elsewhere, they are stone pillars. Some of them were morpech cucumbers. The four sides of the upper kitchen are porches, and the pillars are made of stone. The middle is a chordara house. The chair of the building was completely covered with stone. He built another garden in the domain of Pushtai Kokhak, and at that moment he built a great porch, a great stone throne in the porch, about fourteen or fifteen years old, seven or eight years old, and one year old. They have brought this great stone a long way. There is a crack in the middle. They said it must have been cracked after you brought it here. There is another chordara in this garden, the insulation is completely porcelain. They say china. Someone from China is sending it." [6]

3.2. General memorial principles of Ulugbek madrasas.

The main feature of the architecture of the Ulugbek period is that the influence of functional requirements is strong. In the construction of scientific institutions, these requirements also determined the memorial solution. For example, the shape of the Ulugbek Observatory, its historical and volumetric structures depended on the sextant structure for observing celestial bodies.

In addition to the madrasas of Ulugbek in Samarkand, Bukhara and Gijduvan, which have come down to us, many such facilities have been built in large and small towns of Movarounnahr. Ulugbek brought to Samarkand a unique academy of science and culture, bringing together famous scientists, engineers and architects of the Near and Middle East. As a result, the desire to build each memorial structure on the basis of in-depth research, careful

calculations, that is, scientific achievements, is growing. In this regard, the history of the construction of the famous observatory building will be a proof example.

There was a certain balance between the size of the buildings built by Ulugbek and the system of devices. The size of each memory element is derived from the solution of the device. For example, the bearing capacity of crossbars and double-storey domes developed during this period led to the dimensions of its general style elements, as well as the shape of decorative coverings, pattern paths, belts, borders, and especially muqarnas around the circle. It was observed in Timur's constructions that the heights and large diameters of the domes based on sailboats led to their rapid deterioration.

The madrasah built in Bukhara is probably the first of the madrasahs built by the order of Ulugbek, because its date is 820 AH. According to P. Zahidov's analysis, the results of his study of the information provided by Abdurazzaq Samarkandi indicate that the madrasah was built in 1419 [8]. According to this medieval author, he came to the "madrasah built by the memory of his greatness" and shared his beliefs with students and the needy. So, in 1419, the teachers and students of the madrasah were appointed and began to study.

Although this madrasah is relatively simpler than Samarkand in terms of its historical and volumetric solutions, but the basic architectural and historical principles of this type of construction, formed during the reign of Ulugbek, are preserved. That is, cells were placed around the square-shaped courtyard, and two awnings were made along the arrows. Unlike the madrasa in Samarkand, there is no awning between the adjoining rooms. It is also distinguished by the fact that the roof leads directly from the arched door to the wide courtyard.

However, the overall memory solution of the appearance is not drastically different. The same, high arched roof and side wings are finished with a bouquet-towers. These bouquets are located in the four corners of the building and also serve as a buttress. In the historical solution in front of the madrasa, there is an entrance and a mosque. In the net of the longitudinal axis was made only a deep and wide canopy, the roof of which was synchronized with the canopy roof facing the courtyard of the opposite entrance. There are rooms on either side of the net porch, and in the corner sections there are smaller classrooms or teacher rooms.

The madrasa is slightly smaller than Samarkand and has fewer rooms. Probably due to the large number of madrasahs in Bukhara during this period, the number of rooms probably corresponded to the demand in Bukhara at that time. The decorations of the madrasa were luxurious and were considered to be the most beautiful among the buildings of that period in Bukhara. The hashams in their present form have been preserved after the renovation of Abdullah (1586).

Although the madrasah built in Gijduvan is small, its grandeur and memorable solutions do not lag behind the building in Bukhara. Although the general principle is based on a square courtyard and a developed high-entrance entrance, the historical system of Bukhara and Samarkand madrasahs, the number and location of rooms are somewhat different. However, the construction of a classroom and a mosque in the four corners, and the location of arches with arched roofs along the longitudinal axis indicate the generality of the solution of Ulugbek madrasahs. From the entrance roof you can go straight to the courtyard and the mosque and classroom, which are covered with domes placed in rows of arches on both sides.

The fact that the closure of these two rooms is done in a row of arches and the windows that illuminate the rooms from above is a new interpretation of the interior of the room, halls, ceiling. This indicates that each of the Ulugbek madrasahs reflects the creative research of architects.

In general, each of the madrasahs built by Ulugbek is a unique example of memorial art with its architectural features, form and structure. These madrasahs became the basis for similar buildings to be built in later periods. It is known from the history of architecture of Uzbekistan that madrasahs were built before this period. There is no doubt that their memorized structural solutions met the requirements of the scientific development of the period. However, during the reign of Ulugbek, madrasahs in Samarkand, Bukhara and Gijduvan served as dorilfun, where many famous scholars worked. This, in turn, was reflected in the construction of madrasa buildings, as well as in the memorial solution. The structure of the first madrasahs, consisting of classrooms and rooms, was complicated by the Ulugbek madrasahs, rooms for many and different tasks were created, and their formation was also improved.

In general, the new structural solutions that were tested in the buildings of the Ulugbek period, the different forms of architectural forms were later used in architectural practice.

There is no doubt that the rich memorial and construction experience and heritage of Ulugbek madrasahs are still reflected in modern memorial buildings. To do this, this heritage needs to be studied from different angles, from different perspectives.

4. Ulugbek Period Architecture And Science

4.1. Ghiyosiddin Kashi is the sultan of engineers

According to twentieth-century researchers, the development of medieval Movarounnahr architecture lay mainly in the experience of ancient masters passed down from generation to generation, in the interaction of local builders with masters from other countries. Subsequent research has shown that both scientific works on the history of education and science of the Ulugbek period have created examples of architecture and construction based on scientific achievements, as well as design solutions based on accurate calculations of scientists and engineers. In folk architecture, according to P. Zahidov [9], the titles of architect and engineer were applied to highly experienced, well-known and famous architects who had a deep knowledge of the science and art of construction. In his opinion, the only historical plan that coordinates the work of these masters in the creation of huge and majestic structures, their intricate decorations, projects should be created in precise calculations, subject to certain geometric laws.

One of Ulugbek's closest allies was Said Jamshid ibn Masud ibn Mahmud Ghiyosiddin Kashi, the head of the Samarkand Observatory. One of the representatives of the Ulugbek school of astronomy, Nizamiddin Abdul Ali ibn Muhammad ibn al-Husayn Birjani, described his teacher, Ghiyosiddin Jamshid Kashi, as "Sultan al-Muhandisin."

Ghiyosiddin Kashi also gave a table for determining the size of the odd and arches by multiplying the outer surface by their thickness, commenting on the calculation procedures and rules. He even showed the way to find the dimensions related to the length of the curved arcs using trigonometric functions (sine, cosine). It is clear from this work of Ghiyosiddin Kashi that in the XV century scientists created a manual for folk masters on the solutions of the calculation of curvilinear volumes, which still causes some difficulties in the practice of architecture. The second section of his work is devoted to the shape and measurement order of domes, domes.

The information about the use of scale-module unit in the construction of Kashi muqarnas is interesting and is one of the methods used in modern memorization practice. The method of creating muqarnas forms on the basis of scale-ratio measurements created by scientists of the Ulugbek period is still widely used in the art of national memorial decoration in the buildings of independence.

Ghiyosiddin Kashi calculated the 17-digit value of the number P as a ratio of the length of a circle to its diameter two hundred years before European scientists. Cauchy was the first in the history of mathematics to introduce decimal fractions into arithmetic. His research forms the main theoretical parts of the science of architecture. There is no doubt that Kashi's calculations were based on the project plan in the creation of the famous buildings built by Ulugbek, and especially the observatory buildings. The reason why he was awarded the title of "Sultan of Engineers" is that Ulugbek played an important role in his creative work.

4.2 Ulugbek Observatory

In the architecture of the peoples of the East, science-related buildings have been built since ancient times. Educational institutions, libraries, observatories for the study of celestial bodies were built, and at different times there were also academies of science. These academies emerged in Europe centuries after the Eastern countries. In ancient Greece, the centers of science known as academies existed in Baghdad during the reign of Caliph al-Mamun (818-833), and later in Khorezm (10th century). In the 15th century, a similar center was formed in Samarkand during the reign of Ulugbek. Dozens of famous scientists, such as Qazizoda Rumi, Ghiyosiddin Kashi, Ali Kushchi, worked under the leadership of Ulugbek and made many discoveries at this academy.

The original state of the Ulugbek Observatory has been hotly debated for the past century. Although this monument, which disappeared in the 16th century and became a hill, was discovered by Russian local historians in the 70s of the XIX century, only excavations by archeologist VL Vyatkin in 1908-09 and 1914 revealed its foundation and a trench deep in the rock. It is known from the researches of Academician TN Qori-Niyazi and astronomer Giyas Jalilov that this is a sextant remnant used in the observation of celestial bodies and that it was clearly built meridional from north to south. Their opinion was also confirmed by the investigations of VN Kastalsky and VP Shechlov. The main weapon of the observatory here is a very large angle measuring instrument (vertical circle) with a radius of 40,212 meters. The now-preserved part of the tool was found to have been carved into a narrow deep semicircular depth by carving into a rock at the bottom of the hill. Collected baked bricks in the ditch, two parallel bows were worked and hardened by adding ganch solution.

The bow is covered with 10-20 cm thick marble slabs, and the symbols of the western bow are written in convex with Arabic letters. The marble arches are covered with a copper strip with minute and second divisions. This copper strip was needed to accurately measure the time it took for the lamp to pass through the meridian.

The monument was studied for many years by VA Shishkin, the location of the observatory was fully opened at the level of the foundation. Studies show that the observatory was built on a rocky hill. The history of the building is circular, the walls starting straight from the rock. (DM-48 meters). In 1948, the remains of the building, i.e. the history of the first floor, were completely determined in research and excavations. The outer circle wall was also initially assumed to be a device made for any measurement.

From the analysis of data provided by Abdurazzaq Samarkandi and Zahiriddin Babur, researchers give different ideas about his memorial solution. Built in 1428-29, it is believed that the building was circular, three-story, 30.4 m high. The main part of the observatory was a huge sextant with a radius of 40.2 m (some scientists consider it a quadrant). This may be close to the truth.

It is understandable that the observatory was a building for scientists only, and not everyone tried to use its equipment, so the building was left unattended and turned into a ruin. It was during this period that the Ulugbek Madrasah and the roofed quarters he built in Shahizinda were preserved. There are also speculations that the ruined observatory bricks were carried away by the surrounding population. Therefore, the case of the fanatical governor Hajibiy Otalik cannot be condemned either.

Of course, when this building came to us even in ruins, it would allow us to study its original architectural appearance, its devices in more depth, to have a real imagination.

In the 1940s, BN Zasiipkin suggested that the building be a three-story building with a circular shape. However, he thinks his three-story history has the same look. In 1955, astronomer G. Jalilov suggested that the observatory consisted of a 1.7-2 m high wall surrounded by a circular courtyard, in the center of which there was a sextant, and around it were placed solar clock devices. He likens the observatory to the forms of observatories built in later centuries in India. According to the results of research conducted by archeologist Yu. Buryakov in 1967, G. Pugachenkova commented on the shape and location of observation devices in the observatory, assuming that the building was circular, with high walls, arches, windows, some rooms were open on two or three floors. The location of the rooms, on the other hand, suggests that it depends on the observation devices and the main meridional sextant.

MS Bulatov "reflected the concept of a seven-story sky in the form of an observatory and proposed a seven-story version. According to Abdurazzaq Samarkandi, a tall circular tower with seven muqarnas.

P. Zohidov's researches can be the basis for some assumptions close to the original architectural appearance of the observatory. He analyzes the dimensions of the observatory's main observation instrument, the Sextant Remnant (i.e., the Court of Honor), and concludes that the observatory building consisted of a single-story circular cylindrical volume consisting of three parts.

The modest size of the Ulugbek Observatory's hashish may have allowed it to be built quickly and accurately. Considering that Jamshid Kashi came to Samarkand in 1416 and the main work in the Ulugbek madrasah was completed in 1419, the observatory was completed in 1420. It is also known that the name of the master of the observatory construction was Ustad Ismail and Tahir ibn Mahmud al-Bannoi al-Isfahani from Jamshid Kashi's letter to Kashan and his father.

5. Conclusion

The fact that the architecture of the period of Ulugbek and the Timurids in general has been studied for centuries, is due to the fact that the buildings created during this period have a high place in the world cultural heritage. The majestic, luxurious buildings that have come down to us still amaze people.

Among the scholars who studied the architecture of the Timurid period were M. Masson, G. Pugachenkova, P. Zohidov, B. Zasiipkin, L. Rempel, M. Bulatov, K. Shishkin, N. Nemtsova, Yu. They analyze the architecture, the general direction of development in the XIV-XV centuries, the buildings built by Temur, Shohrukh, Ulugbek and later Babur. However, although it is noted that the period of Ulugbek itself was a separate stage in architecture, this topic was not studied separately. Of course, some works, articles about the buildings he built, a description of the architectural solution, methods. In particular, the special research and projects in the practical direction for the repair of these buildings are also distinguished by their completeness, purposefulness. Nevertheless, there is no doubt that the architecture of the Ulugbek period marked a certain stage in the history of the industry.

As a successor of Timur's works in architecture, Ulugbek led a separate direction of Movarounnahr 15th century architecture, ie scientific achievements in the construction of buildings, based on well-thought-out, well-thought-out calculations of famous scientists, engineers and architects. Throughout the history of each structure, scientists have tried to determine the degree of strength of each element in mathematical methods. This, in turn, allowed Ulugbek to preserve many of his buildings for almost 500 years, ensuring their resistance to earthquakes and adverse natural influences.

The analysis of Ulugbek's madrasas in Samarkand, Bukhara and Gijduvan revealed original, unique methods of many memorial solutions embodied in these buildings. Of course, Ulugbek in his time built other types of buildings, public, religious, administrative buildings. However, most of the memorial and structural solutions used in these constructions became known from these three madrasas that have come down to us. The high development of the exact sciences under the patronage and participation of Ulugbek is clearly reflected in his memorial buildings. Devices, materials and their rational use, the improvement of their new types are associated with a high level of organization of the construction process.

The relatively large number of classrooms in the historical solution of the madrasas of the Ulugbek period (especially in Samarkand) indicates the strong focus on secular sciences in the educational process of this period. The selection of scholars and intellectuals for Mudarris, the creation of conditions for students to conduct research in secular sciences other than religious sciences, in turn, led to a change in the historical solution of these madrasas. This solution is later observed in the devices of 16th century madrasas as well.

In the scientific center built by Ulugbek, they conducted scientific research in the field of science and culture. Among these all-encompassing scientific works, astronomical research has not lost its practical significance even today. Ulugbek built an observatory that was perfect for his time to conduct large-scale astronomical research. This observatory was famous for measuring astronomically constant magnitudes, the position of planets and stars with extreme accuracy. The calendar and star chart compiled here is no different from the calculations based on calculations performed with equipment created using current high technology. The observations made at the observatory under the leadership of Ulugbek, "Ziji Koragoniy" or "Ulugbek Ziji" are the most perfect in the world. It covers calendars, timing, planetary motion, and other information in detail, extensively, and accurately.

One of the unique structures built by Ulugbek for the development of science is the observatory. Although the architectural solution of this structure, the foundation of which has only come down to us, has been debated for many years, it is impossible for any researcher not to acknowledge the contribution of this structure to the science of the fifteenth century. Ziji Koragoniy, a table of celestial bodies with an invaluable contribution to world science, was compiled here. The observatory of the observatory, the memory structure is so perfect that the calculations in this table, created with the help of Ulugbek's genius, do not differ from the results obtained with the help of modern perfect technical means.

The main, clear reference to the memorial solution of the observatory is its circular shape with a diameter of 48 meters and the remains of a sextant, half of which is carved in rock in the center. Excavations carried out by experts revealed the foundation of the lower part of the building and the historical appearance of the rooms. Decorative tile fragments found in the excavations indicate that the interior and exterior of this building were decorated. Although there are many hypotheses about its original appearance, no valid, evidence-based conclusion has yet been reached.

The main directions of Ulugbek's architecture were reflected in the architecture of the following centuries. Among them are the madrasas in Bukhara built during the reign of Abdullah, the Tillakori and Sherdor madrasas in the Registan Square in Samarkand in the 17th century. Some solutions of Kokaldosh and Barakkhan madrasas in Tashkent can be considered as an echo of the architecture of the Ulugbek period. Ulugbek's architectural heritage is huge, and studying them in separate, different perspectives, their rationality, the use of experience in achieving architectural harmony in modern architecture will be an important factor in the further development of national architecture of Uzbekistan.

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