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GRAPHIC RECONSTRUCTION OF THE BUILDING OF THE END OF THE XVII CENTURY - "MADRASAH DOR USH-SHIFO" IN THE CITY OF BUKHARA

Elmurodov B. Kh.
Applicant;

Uralov A. S.
Doctor of Architectural Sciences, Professor
Samarkand State Architectural and Civil Engineering University
email: axtamuralov47@ rambler.ru

Annotation:
A brief information about the history of the formation of madrasas in Central Asia is given, the methodology, design of Bukhara architects of the 17th century is revealed, and on this basis, a graphic reconstruction of the building of the medical center - "Madreseyi dor ush-shifo", built in Bukhara at the end of the 17th century by the Bukhara Khan Subkhankulikhan, the original parameters of the dor ush-shifo building were specified in modern measures of length and the proportional structure of the main parts of the building was established.

Keywords: Bukhara, 17th century, public hospitals, design methodology, modular grid, graphic reconstruction, proportionality of building dimensions.

Аннотация: Мақолада Ўрта Осиё мадрасаларининг шаклланиш тариҳи ҳақидаги маълумотлар, XVII аср Бухоро меъморларининг лойиҳалаш услубияти аниқланиб, шу асосда XVII асрда Бухоро хони Сухонқулихон қурдирган табобат маркази - «Медресейи дор уш-шифо» нинг график реконструкцияси ишланган, ушбу бинонинг аслий параметрлари замонавий узунлик ўлчовларида ва бино меъморий шаклларининг мутаносиблик тизими аниқланган

Калит сўзлар: Бухоро, XVII аср, жамоат шифохоналари, лойиҳаланиш услубияти, модул тўри, график таъмир, бино ўлчамларининг мутаносиблиги.

Аннотация: Приведены краткие сведения по истории формирования медресе в Средней Азии, выявлена методика проектирования бухарских архитекторов XVII века и на этой основе выполнена графическая реконструкция здании медицинского центра – «Медресейи дор уш-шифо», построенного в г. Бухаре в

конце XVII века Бухарским ханом Субханкулиханом, уточнены подлинные параметры здания дор уш-шифо в современных мерах длины и устоновлен пропорциональный строй основных частей здания.

Ключевые слова: Бухара, XVII век, общественные больницы, методика проектирования, модульная сетка, графическая реконструкция, пропорциональность размеров здания.

It is known that in the Middle Ages, in addition to various other public buildings, public hospitals were built in all major cities of the Islamic world [1]. Pharmacies, baths, buildings built on thermal springs (harmobas), as well as obzans (baths) also belonged to the curative class of public buildings in addition to the hospital [2]. Sometimes medical centers were formed on the basis of public hospitals, which mainly included hospital buildings, madrasas, a library and a bathhouse. If the buildings of public hospitals were called "bemoristan" or "dor ush-shifo", then medical treatment centers were called "medresayi dor ush-shifo". One of these centers was established at the end of the XVII century in Bukhara by the Bukhara Emir Subhankulikhan (1680-1702). Subhankuli Khan was an enlightened man, knew medicine well, treated patients himself and wrote the book "Ikhyo at-tibbi Subkhoniy" (Subhankulikhan medicine), which was repeatedly published and translated into European languages. His medical center was located at the main gate of the Bukhara arch on the right side of the Bukhara Registan (Fig.1) [3]. In addition to "dor ush-shifo", Subhankulikhan built many other civil buildings not only in Bukhara, but also in Balkh. Among them are madrassas, mosques, caravanserais, khauzes, and charbagh.

In the photo (Fig.1), which was taken in the second half of the XIX century by Russian missionaries, a part of this center is clearly visible on the left side. In Fig. 2 we see the "Madraseyi dor ush-shifo" and the Ark of the Bukhara Citadel on the Registan surrounded by other public buildings.

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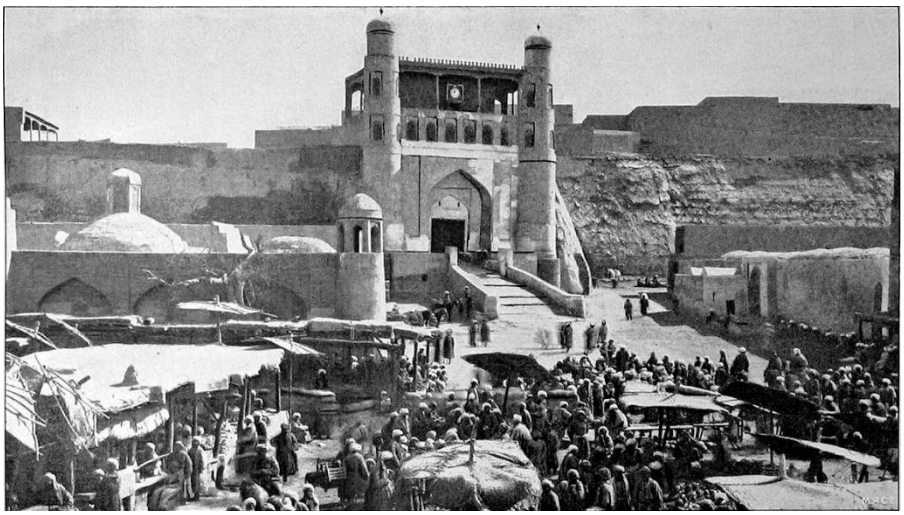

Fig.1. Bukhara Ark and Registan in the 70s of the XIX century. On the left side of the photo, a part of the building of the "Madraseyi dor ush-shifo" is visible.

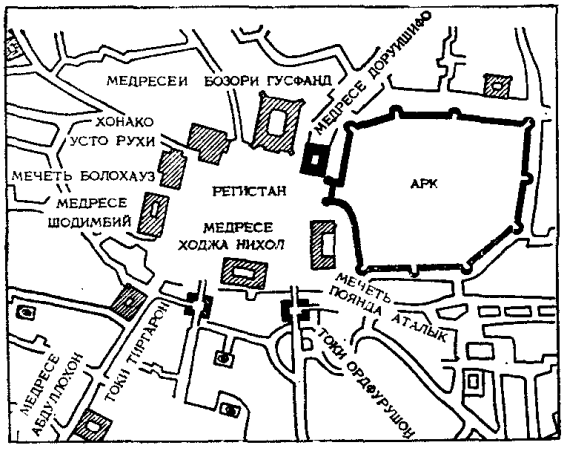

Fig.2. The location of the "Madraseyi dor ush-shifo" on the Bukhara Registan.

The photographs (Figs. 3 and 4) show fragmentary images of dor ush-shifo. The first one shows a view of the building from above, which was taken from the Bukhara Ark. Here we see a courtyard and domes of buildings. Another photo shows the perspective of dor ush-shifo. These photos were taken in the 1930s, when the building fell into disrepair and had a dilapidated appearance.

In all likelihood, the medical center of Subhankulikhan functioned before the conquest of the city of Bukhara by the Russian Tsarist troops. Perhaps it functioned partially and however, it is known that in the 30s of the XIX century, the building of the "Madraseyi dor ush-shifo" was completely destroyed and removed from the face of the earth in connection with the cleaning of the territory of the Bukhara Registan. We managed to find a diagram of the building plan without any of its dimensions and scale (Fig.5) [4].

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The drawing shows that the building had a courtyard symmetrical facade composition with end turrets, which is typical for other buildings of the madrasah of Bukhara.

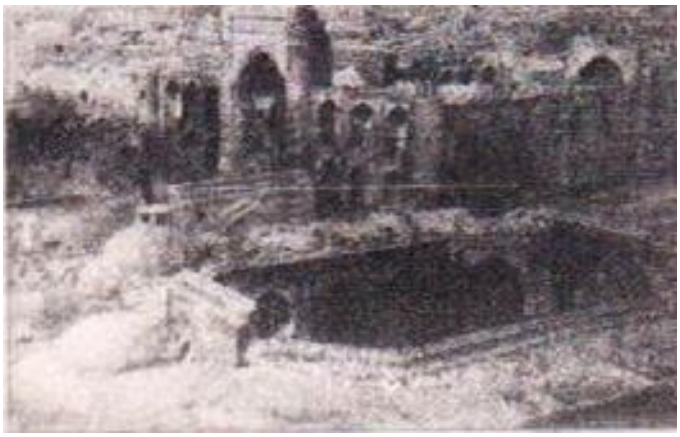

Fig. 3. View of the dor ush-shifo from the Bukhara Ark. Photo of the 30s of the twentieth century.

Fig.4. Perspective view of dor ush-shifo in the 30s of the twentieth century.

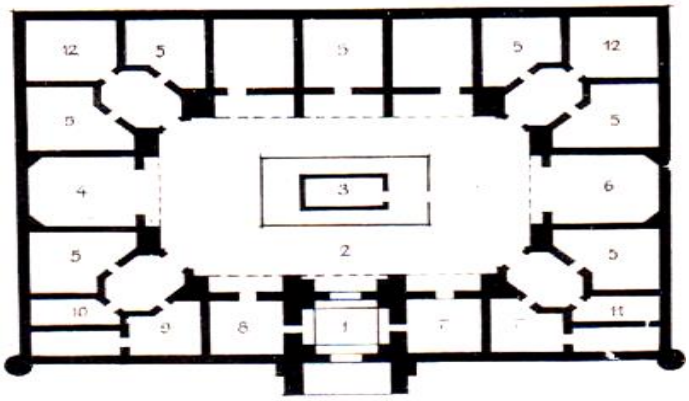

Fig.5. Schematic plan of "Madraseyi dor ush-shifo"

But unlike other civil buildings, this building has a very interesting composition in the courtyard. The corners of the courtyard are dissected by halls that allow to enter the interior of the premises. Such a composition of the plan is rarely found in Central Asia, it can sometimes be seen in the buildings of madrasas of the countries of the Near and Middle East[2].

The Bukhara Medical Center in the plan had such premises as an auditorium, which are presented as large semi-covered summer aivans, then a library, pharmacy, outpatient clinic, waiting room, wards, kitchen, rooms for doctors and medical staff rooms. A sardoba (covered khauz) was located in the courtyard.

It is known that Subhankuli Khan visited this medical center every week and was aware of the situation in the madrasah.

We tried to graphically reconstruct this interesting building of the XVII century that has not reached us through the use of modern graphic computer programs on the basis of existing old photographs and the scheme of the "Dor ush-shifo" plan.

Our goal was not to recreate once again the existing scheme of the building plan, but to clarify its true parameters and establish a proper structure of all parts of the building, that is, to look for harmony of its architectural forms. And only in this way, in our opinion, it is possible to correctly recreate the graphic reconstruction of the medical center building. To do this, we puzzled ourselves first to understand the design methodology that was used in the XVII century by the architect of this building. . The key to solving this problem was a roll of paper discovered by Prof. N. Baklanov in the archive of the Bukhara architect of the XVI century [5]. The papers depicted architectural drawings of buildings, the construction of which was then the most widespread. These were drawings of a caravanserai, a work, that is, an inn, a khanak and a sardoba. There were eight such drawings in the bundle. N.Baklanov, having studied these drawings, published them and came to the conclusion that they were the documents that reflected the methodology of architectural design of the Bukhara architect of the XVI century [5].

The meaning of this method was that the architect, before imagining the plan of the future building, drew a cell on paper, which consists of a modular grid. Figure 6 shows a copy of one of the drawings of the Bukhara master. In this case, it is a drawing of the plan of the khanak (Sufi building). The construction of the architectural form in it is based on a modular system, with the help of which the proportions of plans, facades, interiors of buildings were determined, as well as the proportionality of parts and the whole when developing architectural details (Fig.6) [6].

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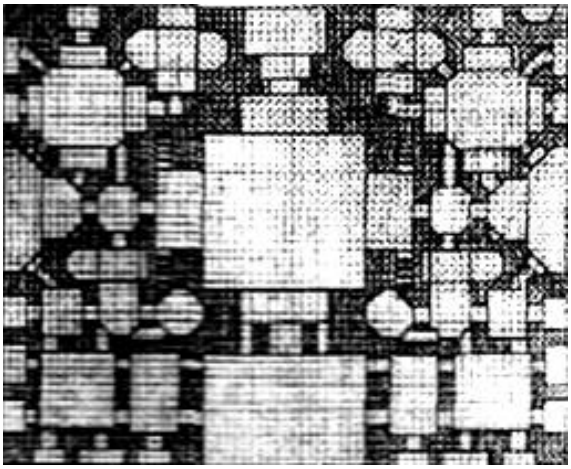

Fig.6. The plan of the khanak. Drawing of the Bukhara architect of the XVI century discovered by N. Baklanov

The dimensions of some important or basic element of the building plan were taken as a module. These were most often the span of the arch portal or the internal dimensions of the main room of the building. For the facade module, half of the span of the longitudinal arch was often taken [6].

The functions of the module in Central Asia were performed by a medieval measure of length (gyaz), which was usually a multiple of the enlarged module. Numerical proportionalities based on simple integers made it possible to simply and reliably establish any proportional relations, and this was the perfection of this architectural method.

When recreating the plan of the "Madraseyi dor ush-shifo" of the XVII century, we were based on this historical method and determined that the Bukhara architect used a modular grid not only to determine the composition of the building plan, but also to harmonize the architectural forms of the facade and its individual details. To develop the plan, the main module M was adopted, which was equal to half of the portal arch "dor ush-shifo" (Fig.7). And for the harmonization and proportionality of the forms of the elements of the plan and facade of the building, a small module equal to one quarter of the main module was also used. In addition, an intermediate module M1/2 equal to half of the main module was adopted for the construction and sizing in gyaz. Bukhara gyaz averaged 60-62cm. In addition, Shah's gyaz equal to 120-124 cm was also used, i.e. doubled Sharia gyaz [6]. The most common measure of length was half of the Sharia gyaz (30-31cm). At the construction site, a measuring stick of 180-186 cm was used, divided into 6 parts of 30-31 cm, followed by dividing each part into 4 strands, i.e. "tutam" [7,8].

The measuring stick was a universal tool on the construction site. The drawing, i.e. the modular grid, was executed on an arbitrary scale, but the architect knew exactly how many dimensional units the module contained, so the dimensions were not put down on the drawings. When detailing the plan and facade elements, their proportionality was adjusted using a small module and a grid of weights. The length of the gyaz usually corresponded to the width of one or more burnt bricks.

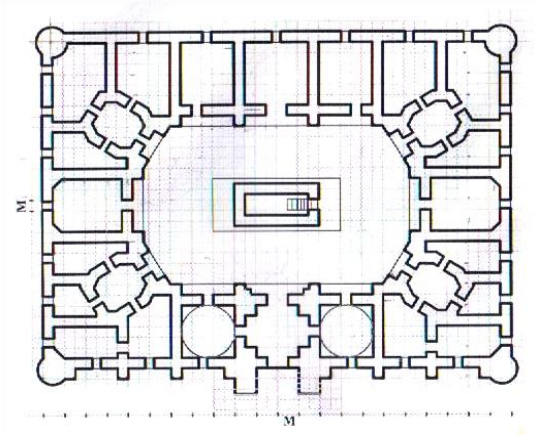

Fig. 7. The plan of the "Madraseyi dor ush-shifo" on a modular grid.

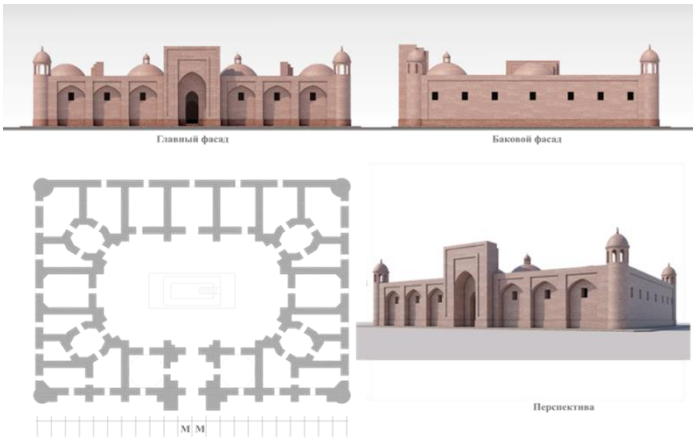

Fig. 8. Computer development (plan, facades, perspective) of the building under study.

Thus, based on the use of the above-mentioned dimensional units in gyaz and the modular system characteristic of medieval Bukharan architecture, we determined that the proportionality of the side of the building plan of the "dor ush-shifo" under study is 16:22 (Fig.8), which is very close to the proportions of the golden section.

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Fig.9. Axonometric view of "dor ush-shifo" on a computer.

If this is converted into modern measures of length, then it is 29.76 by 40.92 m, which is specified 30 x 41 meters. The proportions of the courtyard on the axes are 8:13, which is very close to the proportionality of the "golden section". In meters it is 15x24 m. The proportionality of the height of the portal to its width in the intermediate module is expressed in 8:12, which is also close to the golden section. The ratio of the two sides of the facade to the length of its portal is 9:4:9.

Thus, our research made it possible to clarify the true parameters of the dor ush-shifo building in modern measures of length and to establish a proportional structure of all parts of the building and on this basis to develop a complete graphic reconstruction of the Bukhara dor ush-shifo, including its axonometric image (Fig.9) on the computer.

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