

## TRADITIONAL RESIDENCES ARE AN EXAMPLE OF SUSTAINABLE ARCHITECTURE.

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**Annotation:** *The paper presents exterior appearance of a traditional dwelling and volumetric-spatial solution of the inner courtyard in a traditional dwelling. The problem of the basic factors in organization of volumetric spatial solutions of the Bukhara traditional dwelling is considered.*

**Key words:** *traditional dwelling, volumetric-spatial solution, Islamic culture, courtyards, Shahristan, Zhoybor district, Bukhara*

The appearance of the traditional settlement of Bukhara, formed from the Middle Ages, was distinguished by its limitations from the environment. The style of the settlement consisted mainly of closed plains. In a society dominated by Islamic culture, family life was hidden from the public eye. The style of residential buildings was as simple as in Islamic culture, and the interior atmosphere was complex and harsh. A traditional residential building consists mainly of a 2-storey girth, the outer walls of which are plastered with straw clay. The wall surface is mostly flat. The house formed a volume with a clear, closed shape, if it was not compressed by the surrounding buildings (Fig. 1). The entrance was marked by carved doors, sometimes with a colonnade or pedestal protruding from the wall. The protrusions of the covering of the first and second floors are visible on the flat surface. This appearance not only gave the flat, simple style the same rhythm, but also justified itself from a constructive point of view. In the case of an earthquake in the horizontal direction, the wall did not collapse due to its excessive protruding part moving along the longitudinal surface of the “bolor”.

Often small square or long and narrow holes in the flat wall of the pelvis are attached to sincha pillars (bodkash or bodaro), mainly used for ventilation of enclosed spaces. Such transverse windows were sometimes closed with a thin hook mesh, often found open. Usually the window illuminated the hut (rakhrau) or stable (saikhana), which was located after the entrance door. On the flat walls of the second floor there are 1 or 2 windows on which a closed window is installed, (if there is a courtyard or a closed gallery inside the House). The outer wall planes are devoid of any architectural decoration that manifests the function of certain fragments of the building (cornice, tyaga, etc.z.). The interior of the building, in a view consisting of 2 courtyards from above, is surrounded by an outer and inner, flat and flat roof

covering.

The courtyard is a brick-lined courtyard surrounding the lower part (taftod) in the middle [3]. Dandona, that is, the brick was laid out on the side roof – the surface on which the brick laid was limited to the middle of the courtyard, in the middle part there was a small flower flowerbed, on one side there was a well, and on the other side there was a tashnav. Since there is no running water in Shahristan, wells were opened in the courtyards.

The ceiling of the taaftode and brick-lined courtyard is surrounded by rooms. A large room built high up is often oriented to the north with a taghana, half of which goes into the ground, and for the summer season this was considered the best room. Smaller than on the other side of the yard – this includes winter quarters, utility rooms and verandas. In two-story houses, Dandona was chosen as a ribbon. The Dandona was surmounted by a wooden carved catarac (ballyustrade), above which the first floor of the flat roof lies. On the corners are small rooms (a bolo shed), among which a semi-porch runs along the entire perimeter of the roof, which are raised by small wooden posts on silent consoles.

The result is a system with a clear, constructively based artistically elegant look.

Lifting structures, columns, connecting closing elements are not all closed, but rather open to the display. The building has acquired the appearance of a full-fledged organism, everything in this organism is purposeful, thoughtful, taking into account the great experience of the brilliant ancestors and is glorified by the subtle sense of taste and moderation inherent in the Masters of the world.

The volumetric-spatial image of the settlement analyzed above was only a scheme of the courtyard, which is typical for Bukhara in particular, the Zhoybor district. Such schemes are very diverse in the residential area of Bukhara. Representatives of different social groups (poor, rich, etc.). Each of the houses had an architectural identity that reflected the taste and home lifestyle of representatives of different strata of Bukhara society. All this is expressed in a multi-method solution of the yard, a solution of volumetric-spatial compositional. When finding a solution to the volumetric-spatial composition of each dwelling, technical and economic indicators, climatic conditions and other influences were taken into account together.

Bukhara's sharp-continental climate, low precipitation, as well as the rarity of wood raw materials, led to the development of a flat roof covering laid on bolors. In the volumetric-spatial composition of houses, these indicators are considered an important condition, which in a certain sense predetermined the shape of the building.

Another important factor in the volumetric-spatial composition of the settlement was the direction of the sun. Local Masters made good use of solar energy when heating and cooling rooms. The spatial solution of the dwelling decided from which side of the room to look at the Sun.

It is known that south-facing walls experience less heat deposition in summer compared to east-facing and west-facing walls. For rooms where the summer does not require almost heat, the most convenient route is the northern route, for winter rooms with maximum heat demand-the eastern, western and Southern routes. In Bukhara, where solar radiation is stronger than in Tashkent, this direction became more desirable and remained the main one [2].

In addition to the heat of the sun (geleometry), Masters also took note of illumination. Summer rooms are illuminated enough all the time, because the longest and lightest days are in the summer.

For winter rooms, it was necessary to choose such a direction so that they use the maximum of the light and heat of the day. According to the guidelines of the Central Asian Geophysical Observatory in Tashkent at 41° north latitude on December 23, the length of insolation (Sundown) is 0 hours 00 min for north – facing walls, 4 hours 37 min for east-facing and west-facing walls, -7 hours 58 min for South-West and South-East, 9 hours 14 min for South [1].

From this, the most continuous lighting occurs in winter when the walls facing south, and the most heat is received by the walls facing east and west. The builders of Bukhara focused on the duration of the sun's lighting, and not on the fact that it gives more heat in their construction experience. Winter rooms are usually oriented to the south, only reserve rooms are oriented to the East and West. These factors are important for the volumetric-spatial composition of the building.

There is an opinion that ventilation with gloves is absolutely necessary in hot climates. In fact, in tropical countries where the air is saturated with humus vapors, it is absolutely necessary to ventilate the permanent rooms with gloves.

In Central Asia, when the weather warms up, the window shutters are quickly closed to prevent hot air from entering the room. Often, fresh water is sprinkled on the brick floor and the dry air is moistened.



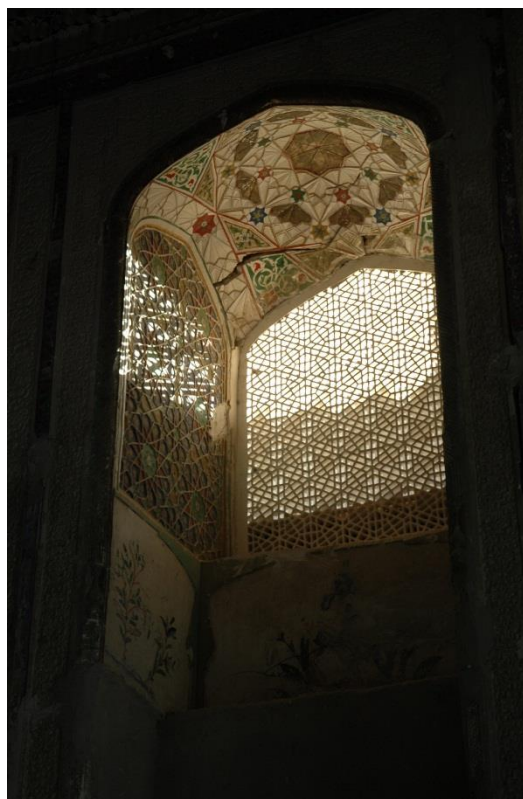
**1 picture. As the traditional residential style developed towards the inner courtyard, facing the street in reverse, the street architecture was instead closed and plain.**

At night, these areas are noticeably cooler, and houses are not only protected from hot air, but also adapted to quickly release compressed air from the room at night. Most of the holes in houses in Bukhara can be justified only in this way.



**2 picture. Window casings in a traditional dwelling.**

Windows and doors were of the same size, summer rooms did not have window frames, because they could prevent the evening coolness from entering the room. The window shutters were opened and closed not for light, but for more air (Figure 2). The banisters installed over the doors of the summer rooms "sifted" the light coming into the room, softening it as if passing it through a flower cloth (photo 3).



**3 picture. A ganch grill installed on the window.**

The larger patterned grids were covered with gauze to keep out insects and dust. On the other hand, in local conditions, it was necessary to carry out ventilation with gloves together with hermetic sealing. It is the peculiarity of the climate that led to the appearance of the original room called "Chordara", which was closed during the day and wide doors opened to the north and south at night.

Even so, despite all the advantages of the Bukhara residence, the problems of lighting and ventilation of the rooms cannot be completely solved.

Therefore, the style of the traditional settlement of Bukhara consisted mainly of closed plains. Square or oblong holes were found in some places of the wall. An ornate wooden door leading into a simple and plain courtyard was decorated. Thus, as can be seen from the colors used in the roof. They gave rhythm to a boring-looking style. The solution of volumetric-spatial composition is based on such factors as the heating, direction of the sun, roofing raw materials and, of course, the social background of the owner of the dwelling.

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