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ARCHITECTURAL FORMS AND CONSTRUCTIVE SOLUTIONS OF BUKHARA POOLS

M.Sh.Babaeva

PhD student, Bukhara Engineering Technological Institute

Abstract. *In this article based on the existing works on the topic and the results of the author's personal research, the traditional methods of building artificial water bodies - ponds of Bukhara are considered. The compositional and constructive solutions of pools in urban ensembles and pools in neighborhood centers were considered.*

Key words: *pool, neighborhood center, Bukhara, stone pool, constructive solution.*

In Uzbekistan, a pool is an artificially dug pit, which was used to store water when there was no water in the ditches, as well as to obtain clean water for cooking and drinking. In cities, ponds are monumental constructions, their shores are covered with large stone blocks, the size is significantly larger and the volume reaches up to 5600 cubic meters . In addition, in ancient times, there were decorative ponds in the palaces of rulers and nobles [1]. Unfortunately, they have not been preserved, and the architecture of these reservoirs can only be appreciated by the literary works of their contemporaries.

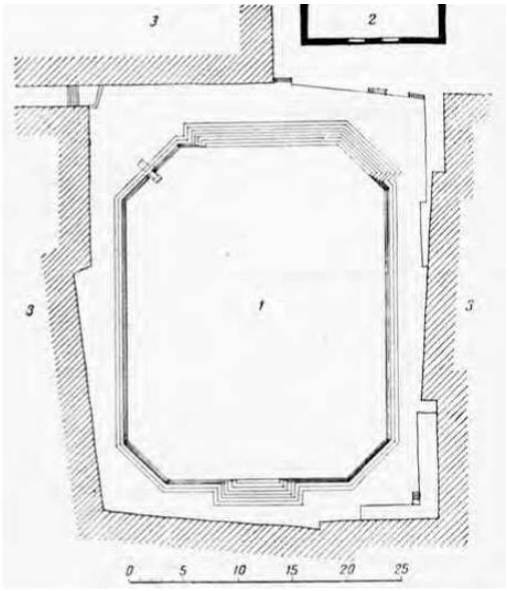

Figure 1. The plan of the ensemble Khodja Zaynuddin in Bukhara

Ponds as a community center that connects neighborhoods have been useful mainly as elements of urban water supply [2]. But the inhabitants of the city, using the shores of the ponds for recreation, decorated them, first of all, they planted broad-leaved trees. In front of the pools, carpeted and unshaded areas are covered with embroideries with bright patterns. There were usually teahouses near the pools. In addition, each neighborhood has a mosque, a school, sometimes a saint's tomb, a minaret, an ablution hall, a tea house, and in many cases, a pool [2].

As an example of such an ensemble, we can cite the "Khoja-Zayniddin" ensemble in Bukhara (figures 1 and 2). Its distinctive feature is that residential buildings are built around the pool. Houses are built at a distance of only 4-5 m from the pool. The banks of the pool are beautifully decorated with trellises surrounded by vines, which create a beautiful contrast with the stone walls of the pool.

In the south-west corner of the pool is a mosque with a tall wooden porch dome and the saint's tomb. The size of the pond with a volume of 2700 m3 is 33 x 25 m, and the depth is 4.2 m. The mosque and the pool were built in 1552. The

pool was renovated at the beginning of the 20th century.

Figure 2. The ensemble of Khodja Zaynuddin

The architectural forms of the pools were formed as a result of the selection of the most reasonable projects that satisfy the functional requirements of the structure and its strength in the process of many centuries of experience, especially in seismic conditions [3]. Figure 3 shows examples of different shapes and shore decorations of stone ponds in Bukhara, all of which have in common that their shape is a regular octagon. The structural connection of the perpendicular walls of the pool at right angles raised doubts about the level of strength during an earthquake. Corner cuts were usually made at an angle of 45 degrees, and only in the Qazi Kalon pool in Bukhara, the angle was 30-32 degrees. The only example of a square pool is that of Bahavuddin, and the failure of this technique is shown by the fact that all the corners are destroyed. A typical form of pool deck is a 1:1 staircase. In narrow and densely populated areas, the walls of the pool were built vertically and lowered into the water through a ladder. All the other forms of ponds depicted in Figure 3 were mainly due to the density and lack of construction space, and for this reason it was necessary to combine the usual

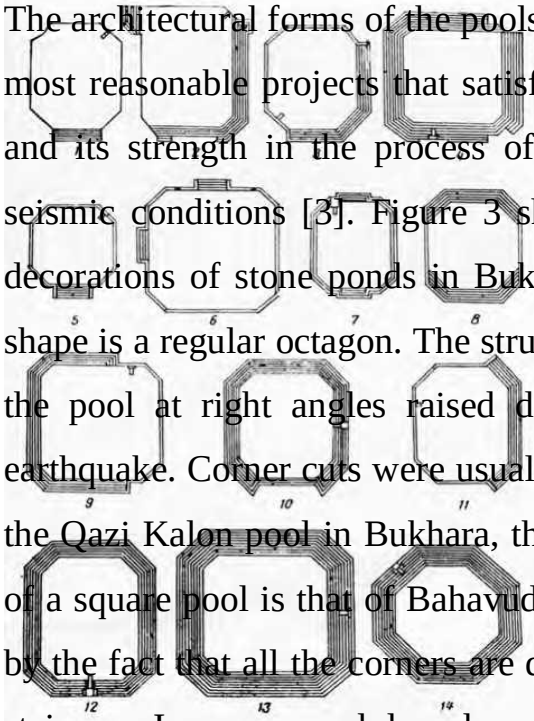

Figure 3. The shapes of ponds in Bukhara:
1 - Nazarcha; 2- Mullah Ashur; 3 - Kaplen; 4 - Sheikh Sho; 5 - Bolov; 6 - Kirgiz ohim; 7 – Khodji Tuygun; 8 – Djafar Khodja; 9 – Farmonkul-bek; 10 Ishon Imlo; 11 – Qozi Fayzi; 12 – Atolik; 13 – Rashid; 14-Djalol Khan; 12, 13 ва 14 – the most widely spread type of ponds

stepped wall with a vertical wall. In addition, the shape of the pond was influenced by its location in relation to the stream supplying it with water and the location of the water pipe. All these factors sometimes led to the asymmetric state of the form, and as a result, it created a unique composition environment, becoming a single ensemble with the surrounding buildings and green area. The steps of the walls were determined by the fluctuation of the water level. Stairs with a height of 30-35 cm also served to descend into the water. The sizes of the ponds were also different. In Bukhara, the smallest pond - the pond in the courtyard of the Mirakon madrasa has an area of 144 m ^{2}, the largest Devon-Begi pond occupies an area of 1552 m ^{2}; 75 percent of the ponds in Bukhara were up to 400 m ^{2}, 25 percent were over 400 m ^{2}.

In 1925 there were 96 ponds in Bukhara, 58 of them were covered with natural stone. Except 2 sardobas – top covered water reservoirs (one is in the yard of Khalifa Khudoidad mosque and the other is besides Ishon Imlo khanaka) there were a lot many artificial ponds in Bukhara. Both sardobas were located near Korakul gate and was the main source of water for caravans.

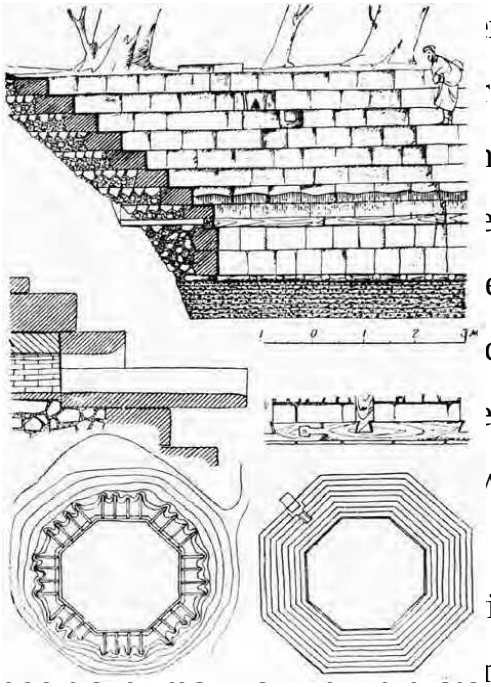

Figure 4. Stone construction of ponds (Bukhara)

rspective as a strengthening measure trees were oots grow, they wrapped the pond with a special ı stones and dense fillers helped to increase the ed the consistency and strength of ponds so much ey remained untouched. The walls of the pool are constructions. The materials used in this process types: wood, wood-brick and natural stone. was used, the task was always to create a solid to create a foundation that was elastic enough to ibrations and not to crack. In addition, it was an ne ponds to prevent water from seeping into the e methods mentioned above are not found in

Bukhara. Wooden construction was mainly used in mountainous areas, and wood-brick frame construction was mainly used in the construction of Samarkand ponds. These two constructions used in the construction of pools solve a number of structural and functional problems, but their architectural expressiveness is low. The height of the water level in Samarkand ponds hides its stepped character. But one more thing can be observed in Bukhara reservoirs. Water storage was the main problem here. The construction of Bukhara stone pools, shown in Figure 4, and their amazing architectural composition make them prominent among other monumental structures of the city.

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3. Babaeva Madina Shamsiddinovna – 2nd year PhD student, Department of Architecture, Bukhara Institute of Engineering and Technology (Bukhara, Uzbekistan); + 998974879939 ; timasofia 1909 @mail. ru;

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