

RESEARCH ARTICLE

The Sardobas Of Qarshi: Historical Development, Construction Features, And Their Role in Caravan Routes

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Abstract

Sardobas, traditional covered water reservoirs constructed along caravan routes, played an important role in the economic, social, and cultural development of Central Asia. These structures were particularly significant in arid regions where reliable sources of drinking water were scarce. This article examines the historical development, geographical distribution, construction technology, water-supply systems, and functional significance of sardobas located in the Qarshi oasis and Qarshi Desert. The study is based on written sources, archaeological investigations, travel accounts, hydrological observations, and previous scholarly research. Particular attention is paid to the sardobas of Qarshi, Kasbi, Yakka, Yusuf, Fatto, Begicha, Ashun, Shorcha, Nishon, Talimarjon, Egizak, and O'rachi. The analysis demonstrates that the construction and placement of these reservoirs were closely connected with caravan routes, settlements, caravanserais, and the natural geographical conditions of the region. Archaeological evidence indicates that local builders employed fired bricks, stone, alabaster, and other binding materials, while the reservoirs were supplied by rainwater, snowmelt, canals, and, in some cases, underground water systems. The Qarshi sardobas therefore represent not only hydraulic structures but also important elements of the infrastructure of medieval and early modern trade routes in Central Asia.

KEY WORDS

Sardoba, Qarshi oasis, Qarshi Desert, caravan routes, Great Silk Road, water reservoir, medieval Central Asia, hydraulic architecture, caravanserai, historical geography.

INTRODUCTION

For centuries, the Great Silk Road connected the economic, cultural, and intellectual worlds of East and West. Its functioning depended not only on cities, fortifications, and caravanserais but also on a network of water-supply facilities. Among these facilities, sardobas occupied a particularly important position. Constructed mainly in arid and semi-arid regions, they provided drinking water for merchants, travellers, and pack animals and consequently contributed to the continuity of long-distance caravan movement.

The importance of sardobas became particularly evident in the desert regions of Central Asia. Caravan routes crossing deserts, steppes, and semi-arid territories required reliable water points at regular intervals. According to archaeological and historical research, sardobas were often located approximately 25–30 kilometres apart, corresponding broadly to the daily movement capacity of caravans [1; 2].

The decline of the Timurid state at the end of the fifteenth century and the subsequent political conflicts affected the

intensity of trade along some branches of the Great Silk Road. Nevertheless, caravan communication continued across Central Asia. During the Shaybanid period, particularly under Abdallah Khan II (1557–1598), considerable attention was paid to the restoration of infrastructure and the development of trade routes. The construction and renovation of water reservoirs along caravan roads formed an important part of this process [3; 4].

The Qarshi Desert occupied a strategically important position in the caravan network of southern Central Asia. The severe climatic conditions of the region made water infrastructure indispensable. A number of sardobas were therefore established along routes connecting Qarshi, Kasbi, Bukhara, Balkh, and other important centres.

The purpose of this study is to analyse the historical significance, geographical distribution, construction characteristics, and water-supply systems of the sardobas of the Qarshi region and to determine their role in the functioning of caravan routes.

METHODS

The research is based on a combination of historical, archaeological, architectural, geographical, and comparative methods.

The principal sources include medieval and early modern written materials, travel accounts, archaeological reports, hydrological observations, field diaries, and scholarly publications devoted to sardobas and irrigation history. Among the most important sources are the works and research records of M.E. Masson, M.M. Reshetkin, I.L. Yavorsky, M.H. Pardayev, S.S. Suyunov, and other researchers [5–10].

A comparative historical method was employed to examine the development of sardoba construction from the medieval period to the nineteenth and twentieth centuries. Archaeological and architectural descriptions were used to identify common structural characteristics, including reservoir dimensions, wall construction, dome architecture, ventilation openings, entrances, stairs, and water-inlet systems.

Geographical analysis was applied to establish the relationship between sardobas, caravan routes, settlements, caravanserais, and natural water resources. Particular attention was paid to the Qarshi Desert, where the scarcity of permanent surface water required the development of artificial water-storage systems.

The study also compares different methods of filling sardobas. These included the collection of rainwater and snowmelt, the diversion of canal water, and the use of underground water systems such as qanats.

RESULTS

1. Sardobas as elements of the caravan-route infrastructure

The term sardoba is generally associated with the Persian words sard ("cold") and ab ("water"), referring to the preservation of cool water inside a covered reservoir [1]. In Central Asia, similar structures were also known as gumbaz or mola, while in Iran and Khorasan related structures were commonly referred to as ab-anbar [2].

Architecturally, a sardoba normally consisted of a circular or approximately circular underground or semi-underground reservoir covered by a dome. The design was adapted to local climatic conditions. The underground position of the water tank and the thick masonry walls reduced the impact of high external temperatures, while openings in the dome facilitated ventilation.

Sardobas were commonly established near caravanserais or directly along important caravan routes. Their distribution was not random. The distance between water points was determined by the requirements of caravan movement and the geographical conditions of the region. Research on Central Asian sardobas indicates that distances of approximately 25–30 kilometres were common [2].

The Qarshi Desert was particularly dependent on such infrastructure. Its arid climate, limited permanent water resources, and importance as a transit region made the construction of sardobas an essential component of caravan-route organisation.

2. Historical development of the Qarshi sardobas

The development of sardoba infrastructure in the Qarshi region should be considered within the broader history of Central Asian trade routes.

During the Timurid period, the construction and renovation of water facilities along caravan routes received considerable attention. After the political fragmentation that followed the decline of the Timurid state, some existing infrastructure deteriorated. During the reign of Abdallah Khan II, however, efforts were made to strengthen political and economic

integration and restore important communication routes.

Historical evidence indicates that the construction and repair of sardobas formed part of these broader infrastructure activities [3; 4]. In desert regions, the transportation of construction materials could itself be a complex logistical undertaking. Fired bricks, alabaster, qir and other materials could be transported by caravans to selected construction sites. At the same time, because of the enormous quantity of bricks required for large reservoirs, bricks were frequently produced locally in temporary open kilns.

The available evidence indicates that several sardobas in the Qarshi Desert were either constructed or reconstructed during the late medieval and early modern periods. Their distribution corresponds closely with historical caravan routes and settlements.

3. Geographical distribution of sardobas in the Qarshi region

Historical and archaeological research has identified twelve surviving sardobas in the Qarshi Desert: O'rachi, Talimarjon, Egizak, Chorchak, Yusuf, Qarshi, Yakka, Fatto, Ashun, Begicha, Shorchak, and Nishon [2].

These structures formed a network of water points serving travellers moving through the desert. Several sardobas were situated on routes leading toward Kasbi, one of the historically important settlements of the lower Kashkadarya region.

Kasbi was an important urban centre of southern Sogd. Written sources, including the works of al-Istakhri and Ibn Hawqal, mention Kasbi and emphasise its significance in the regional settlement and trade system. It was located on a route associated with communication between Nasaf and the Bukhara–Balkh direction.

The presence of a large sardoba near the citadel of Kasbi is particularly significant. Its location suggests that the water requirements of both the settled population and travellers were considerable. The association between the settlement, caravan route, and water reservoir illustrates the interdependence of urban development and hydraulic infrastructure.

On the road toward Kasbi, the Yakka, Fatto, and Begicha sardobas were located at strategically significant points. Among them, Yakka sardoba has survived in comparatively well-preserved form and provides important architectural evidence for the study of Qarshi's hydraulic heritage [3].

4. The Yakka sardoba

Archaeological research conducted in the Qarshi region provides particularly valuable information about Yakka sardoba. The structure was built in the desert zone of the oasis and has a semi-domed external appearance.

The walls and dome were constructed from fired bricks measuring approximately $24 \times 24 \times 5$ cm and $26 \times 26 \times 5$ cm. The total height of the structure was approximately 9 metres. The walls were constructed in seven circular tiers.

Four arched windows were incorporated into the structure, each approximately 1.10×0.80 metres. Smaller arched openings were located beneath them. These openings played an important role in ventilation and helped maintain appropriate conditions inside the reservoir.

The reservoir itself had a diameter of approximately 14 metres and a depth of around 4 metres. Access to the water was provided through an arched entrance approximately 2.60 metres high. A circular opening in the upper part of the dome allowed light to enter the reservoir.

The architectural characteristics of Yakka sardoba demonstrate the adaptation of traditional engineering solutions to the environmental conditions of the Qarshi Desert [3].

5. Water-supply systems

One of the most important characteristics of Qarshi sardobas was the diversity of their water-supply systems.

Depending on the location and natural conditions, reservoirs could be filled by:

- rainwater;
- snowmelt;
- water diverted through artificial canals;
- surface runoff;
- underground water systems.

Historical observations made in the nineteenth and twentieth centuries demonstrate that some Qarshi sardobas suffered from declining water supplies. I.L. Yavorsky, who travelled through the region in the late nineteenth century, reported that several sardobas in the Qarshi Desert had deteriorated and were no longer functioning effectively. He also noted that reservoirs were traditionally supplied by melted snow and

rainwater [4].

The research of M.M. Reshetkin provides additional information. According to his observations, water was supplied to Yusuf sardoba through an artificial canal from a source approximately 15 kilometres away. Similar artificial water channels were reportedly constructed to supply the Qush and Bozachi sardobas from the Kashkadarya river system [5].

This evidence indicates that sardobas should not be regarded simply as passive reservoirs dependent exclusively on precipitation. In several cases, they formed part of a broader hydraulic system involving canals, river water, and artificial channels.

6. Construction technology and architectural characteristics

The construction of sardobas required considerable technical knowledge. Before construction, the selected site was levelled and the foundation was prepared. The circular plan of the structure could be established using a simple geometric technique resembling a large compass: a central stake was fixed in the ground, a rope was attached to it, and a second pointed stake was used to mark concentric circles.

These circles determined the dimensions of the reservoir, walls, and external structure. The diameter of the water reservoirs generally ranged from approximately 5 to 7 metres in some examples, although larger structures also existed.

The walls were usually built of fired bricks and sometimes stone. Alabaster, gypsum, and other binding materials were used to strengthen the masonry. The dome served several purposes: it protected the water from direct sunlight and contamination, moderated the internal temperature, and provided structural stability.

Ventilation openings were incorporated into many sardobas. These openings also helped maintain the quality of stored water. Historical descriptions mention that small fish were sometimes introduced into reservoirs, apparently as part of traditional methods for maintaining water quality [5].

The architectural evidence from Qarshi and other regions indicates that the builders possessed substantial knowledge of geometry, masonry, water collection, ventilation, and adaptation to climatic conditions.

DISCUSSION

The evidence examined in this study indicates that sardobas

were an essential component of the infrastructure of caravan movement in Central Asia. Their importance extended beyond the simple provision of drinking water.

First, sardobas contributed directly to the continuity of long-distance trade. In desert regions, the availability of water determined the practical feasibility of caravan movement. A network of reservoirs at relatively regular intervals therefore functioned as a supporting infrastructure for commercial communication.

Second, sardobas were closely associated with the development of settlements and caravanserais. The example of Kasbi illustrates how a water facility could be integrated into the spatial organisation of an urban and commercial centre. Similar relationships can be observed at other sites along the historical caravan routes.

Third, sardobas demonstrate the adaptation of architectural technology to environmental conditions. Their underground reservoirs, thick walls, domed roofs, ventilation systems, and carefully planned water-inlet mechanisms represent a coherent technological response to the arid climate of Central Asia.

Fourth, the Qarshi sardobas demonstrate the importance of human intervention in managing limited water resources. The use of artificial canals to supply some reservoirs indicates that the operation of sardobas could involve complex hydraulic networks rather than simple rainwater collection.

The broader Central Asian context further confirms this interpretation. Historical research has documented numerous sardobas in the territories of present-day Uzbekistan and Turkmenistan. Their distribution along major caravan routes indicates that water infrastructure was an integral component of the historical geography of trade.

At the same time, the existing historiography remains incomplete. Some sardobas have been archaeologically investigated in detail, whereas others are known primarily from historical references or field observations. The destruction of several reservoirs, including sardobas in the Jizzakh–Syr Darya region, demonstrates the urgency of systematic archaeological documentation and preservation.

CONCLUSION

The historical and archaeological evidence allows several conclusions to be drawn concerning the sardobas of Qarshi.

First, sardobas constituted an important component of the infrastructure of historical caravan routes. Their locations were closely related to the geography of deserts, settlements, caravanserais, and trade routes.

Second, the Qarshi Desert contained a significant network of sardobas, including O'rachi, Talimarjon, Egizak, Chorch, Yusuf, Qarshi, Yakka, Fatto, Ashun, Begicha, Shorcha, and Nishon. These reservoirs provided essential water resources for travellers and local communities.

Third, the construction of sardobas reflected a high level of engineering knowledge. Builders adapted the dimensions, foundations, walls, domes, ventilation openings, and water-inlet systems to local geographical and climatic conditions.

Fourth, several water-supply methods were employed. Depending on the local environment, reservoirs could receive rainwater, snowmelt, canal water, surface runoff, or underground water.

Fifth, the history of the Qarshi sardobas demonstrates the close relationship between hydraulic infrastructure and the development of trade. Their existence made long-distance caravan movement through arid territories more sustainable and contributed to the functioning of settlements and commercial routes.

Finally, Qarshi sardobas should be regarded as an important component of the historical and architectural heritage of Central Asia. Their systematic archaeological, architectural, and hydrological study may provide new information about the organisation of medieval and early modern caravan routes, water management, settlement geography, and economic interaction in the region.

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