



A Comparative Study of the Structural and Functional Characteristics of Sasanian Chahār Tāqis in the Isfahan Region

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Abstract: Among the significant and yet controversial archaeological remains of the Sasanian period are the Chahār Tāqis and fire temples of this era. Chahār Tāqis reflect historical and architectural engineering points that, despite their simplicity in construction, have managed to endure for many years. Although the primary function of Chahār Tāqis was mainly religious, in some cases, they could also serve as commemorative monuments or guideposts. Despite being constructed over a long period and scattered across a vast geographical area throughout the Iranian plateau, Chahār Tāqis exhibit very similar characteristics in construction techniques and spatial positioning. The abundance, distribution, and expansion of Chahār Tāqis in the studied region necessitate multiple research topics from architectural, functional, and religious perspectives. Given the prevalence and spread of Chahār Tāqis in the Isfahan region, this study adopts a descriptive-analytical approach to compare the architectural elements of Sasanian fire temples and Chahār Tāqis in Isfahan province, as well as the metric dimensions of each architectural element. In addition to studying the architectural and decorative elements used in prominent Chahār Tāqis of the region, such as those in Niasar, Shirkuh, Nakhlak, and Qal'eh Dar, the reasons for their abundance in this region compared to other areas during the Sasanian period and their potential uses in the early Islamic period are also explored. Furthermore, the positioning of these structures in relation to nearby natural and unnatural phenomena has been carefully examined. Based on the dimensions and surface distribution of the mentioned Chahār Tāqis, it can be concluded that these structures were likely sites for the Aduran or Dadgah fires.

Keywords: Sasanians, Isfahan, Fire Temple, Chahār Tāqi, Architectural Features.

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Introduction

Isfahan, with its favorable environmental and climatic conditions, has long been a significant habitat for human societies. In ancient times, particularly during the Sasanian era, Isfahan enjoyed a privileged status among Iranian cities due to its geographical position. During the Sasanian period, especially in the later years of the empire, Isfahan held a special place. As Hormuzan stated in response to Umar ibn al-Khattab regarding the decision to conquer Iranian cities, "Fars and Azerbaijan are two wings, and Isfahan is the head; if the head is lost, there will be no replacement for it" (Baladhuri, 1958: 198; Masoudi, 2008, Vol. 1: 679; Tabari, 1996, Vol. 5: 1966).

With the ascension of Ardashir I in the 3rd century, the Sasanians made significant efforts to establish a religious-political phenomenon known as Iran. This phenomenon, along with its complex socio-religious and political apparatus, required an ideology and historical perspective, much like any other propagandistic endeavor. Zoroastrianism, the official state religion of the Sasanians, provided the clergy with a means to influence all aspects of people's lives (Daryaei, 2003: 67). Therefore, it is not far-fetched to suggest that the construction of Chahār Tāqis and fire temples in every neighborhood (along communication routes and population centers) was one of the most important propagandistic tools, evident throughout their territory. Given the unity of religion and state during the Sasanian period, fire temples did not solely serve religious functions but also acquired political, social, and economic roles. Thus, understanding the function of fire temples and related structures without considering these factors would be incomplete. Besides, more precise documentation about Chahār Tāqis reveals contradictions between the common view of Sasanian religious architecture and the actual data obtained from excavations of Sasanian religious sites and recent observations of Zoroastrian temples (Huff, 1974: 243).

Therefore, one of the most significant architectural features of this period can be considered the fire temples, particularly the Chahār Tāqis. As a recurring and original form throughout history, the Chahār Tāqi has attained a symbolic meaning, and if its construction was not initially intended for symbolism, its repetition has turned it into a symbol with sacred interpretative potential (Mansouri and Javadi, 2019). The importance of these architectural elements becomes even more apparent when considering that the design of a fire altar or fire temple is depicted on the reverse of all Sasanian coins. The discovery of numerous Chahār Tāqis within the studied region and Sasanian period stone capitals in Isfahan indicates the region's prosperity. The abundance, distribution, and expansion of Chahār Tāqis in the studied region necessitate multiple research topics from architectural, functional, and religious perspectives. Given the region's location between significant cultural and governmental centers of the Sasanians, namely the Central Plateau and Fars, studying and typologizing these cultural materials and comparing them with Chahār Tāqis in other regions can shed light on the extent of cultural interactions between these areas. Examples of these Chahār Tāqis include those in Qal'eh Kohneh, Niasar, Kushk, Abyaneh, Shirkuh, Atashgah, Nakhlak, and Qal'eh Dar (Fig. 1). Given the greater abundance and spread of Chahār Tāqis in the region, this study aims to use a descriptive-analytical method to examine the architectural elements and characteristics of Chahār Tāqis in the region, as well as the reasons for their abundance in this area compared to other regions during the Sasanian period and their potential uses in the early Islamic period.

Research Background

The Sasanian rulers made significant efforts to establish their governance, bring about a ma-

major transformation in the previous governmental system, and lay the foundations for a new order. The founders of this empire were familiar, on one hand, with the legacy of the Parthians and earlier governments, and on the other hand, with the Zoroastrian religious ideas inherited from the dynasties that remained in Pars after the Achaemenids. The primary task of these new rulers was to merge these two aspects, and Zoroastrianism provided them with the means to do so, as it considered kingship and religion inseparable and regarded a king as ideal if he was a guardian of religion. In return for this guardianship, Zoroastrianism provided the necessary tools for the establishment and continuity of kingship. One of these tools was the fire temples and Chahār Tāqis, along with their administrators. The Sasanian kings also used these in various ways for their political interests, such as depicting fire altars on coins, constructing numerous fire temples, establishing the Bahram fire, and destroying temples, churches, and idol houses, converting them into fire temples. Thus, a part of the lives of the kings, clergy, nobility, and people of the Sasanian era revolved around fire and fire temples (Mirzaei, 2010: 125). Therefore, it is neither far-fetched nor illogical to expect religiously functional structures in this period.

As evidence suggests, Isfahan was not of little importance during the Sasanian period. Due to its location on the north-south and east-west communication routes, this province was a site of significant historical events and cultural-artistic interactions, as well as a suitable ground for artistic and technical innovations in architecture (Mohammadifar et al., 2013: 88, Saghari elal, 2024). In Isfahan province, based on the texts of Islamic scholars and geographers, as well as archaeological excavations and research, a considerable number of Chahār Tāqis have been identified.

Rafiei Mehrābādī, in his book *National Monuments of Isfahan*, mentions several fire temples, including the Ādurān Ardashir Fire Temple in Dārak, a village in Khwar; the Mehr Ardashir Fire Temple in Ardastān; the Shahr Ardashir Fire Temple (likely the same as Dezh Mārbīn); the Soroush Āzarān Fire Temple in the village of Harvān near Jay; the Rastāq Anārābād Fire Temple in the village of Mamnūr; the Shāpur Dhū al-Aktāf Fire Temple in Yavān Jaravān in Isfahan; a fire temple built by Bahman ibn Esfandiār in the village of Jaz Jur in Barkhwar; and the fire temples of Amīrān and Jowgand in Ardastān (Rafiei Mehrābādī, 1973: 12-13).

Hamza Isfahani also mentions the construction of fire temples, stating that Ardashir built three fire temples in one day: one at sunrise, another at noon when the sun is at its zenith, and the third at sunset. The first was named "Shahr Ardashir" near the Qal'eh Mārbīn (today's Ātash-gāh), the second was named "Zarvān Ardashir" in the village of Dārak in Khwar (Barkhwar), and the third was named "Mehr Ardashir" in the village of Ardastān (Hamza Isfahani, 1967: 38).

Nahchiri (1991), in his research titled *Historical Geography of Cities*, briefly touches on the historical geography of Isfahan, its etymology, and its climate. Shafaqi (2002), in his book *Geography of Isfahan*, examines the historical geography of Isfahan from ancient times to the present, discussing its origins, etymology, history, and historical monuments.

Mohammadifar et al. (2013), in an article titled *Typological Study of Chahār Tāqis in Isfahan Province*, state that undoubtedly, one of the most influential periods in the history, culture, and civilization of Iran was the Sasanian era. This dynasty, which began its empire with the coronation of Ardashir I in 226 CE, was rooted in the thought, civilization, and culture of its Persian predecessors. Given the importance of studying the cultural and artistic manifestations of a society through its material remains, the study of the surviving Chahār Tāqis from this period is of particular significance. Moreover, Isfahan province, due to its geographical location, has been of interest to various governments throughout history, but due to the abundance of Islamic-era

monuments, it has received less attention from researchers of the Sasanian period.

Qureyshi, in his research titled *Study and Analysis of the Historical Geography of Isfahan during the Timurid Period*, states: Given the references in geographical and historical sources from different periods to the geographical position of Isfahan in the center of Iraq-e Ajam and the geographical center of Iran, it is reasonable to assume that this city must have been of great importance. Additionally, the presence of the Zayandeh-Roud River and its favorable climate, along with Isfahan's strategic location on important communication routes throughout various historical periods, further underscores this significance.

In general, no research with this title has been conducted in the studied area, and in addition to the previously identified Chahār Tāqis, some of the Chahār Tāqis in Isfahan province (such as the Qal'eh Dār Chahār Tāqi) have not yet been studied or researched. Therefore, this study aims to examine the architectural aspects of the Chahār Tāqis in Isfahan province through the design of three-dimensional plans and the presentation of their distribution on archaeological maps. Furthermore, it studies related historical texts, the reasons for their abundance in this region compared to other regions during the Sasanian period, their potential uses in the early Islamic period, and a comparative study of these structures in terms of their positioning or relation to nearby natural and unnatural phenomena.

Research Method

This research adopts a descriptive-analytical approach, studying six Chahār Tāqis in Isfahan province that have relatively intact architectural features. This study is the only one that comparatively examines the architectural elements of Sasanian Chahār Tāqis in Isfahan province with each other and with Chahār Tāqis in other regions of the Iranian plateau to provide a comprehensive understanding of the characteristics of this type of Sasanian religious architecture and, ultimately, their potential functions.

Chahār Tāqi of Niasar

This structure is located in Niasar, 20 km west of Kashan, and is built on a rock. The materials used in its construction include rubble stones mixed with gypsum mortar, carved stones, a mixture of gypsum and gravel, and gypsum mortar mixed with sand. The overall volume of the structure is divided into a harmonious cube, and its dome is a perfect example of a Sasanian-era dome on a square plan, reflecting the Sasanians' taste for using geometry and creating harmonious proportions in architecture (Pirnia, 1999: 115). The structure features a stone platform, and its dome had collapsed in the past but was restored during renovations in 2014, along with the platform and other sections. The approximate area of the structure is 125 m², and its total height is 8.95 m (Fig. 2). According to Godard's analysis, this fire temple is believed to have served as a landmark, visible from the caravan route connecting Delijan to Kashan, located approximately 30 km in a straight line from Kashan (Godard, 1992: 47). The materials used in the construction of the Chahār Tāqi include rubble stones, hand-picked stones, stones carved into brick-like shapes, and a mixture of gypsum and gravel. The mortar consists of gypsum and gypsum mixed with sand. The construction method involves rubble stones immersed in gypsum mortar. The plan of the Niasar Chahār Tāqi is similar to other Chahār Tāqis, featuring a fixed pattern—a four-columned room with four entrances and a domed roof. In terms of architectural style, the execution of the arches and the "horseshoe arches" used in the doorways resemble many Sasanian-era Chahār Tāqis in neighboring regions, including Khormadash in Kashan, Natanz, Shirkuh in Nain, Nakhlak in Anarak, and Navis in Qom. These arches were constructed without the use of formwork, gradually narrowing towards the top until they meet and

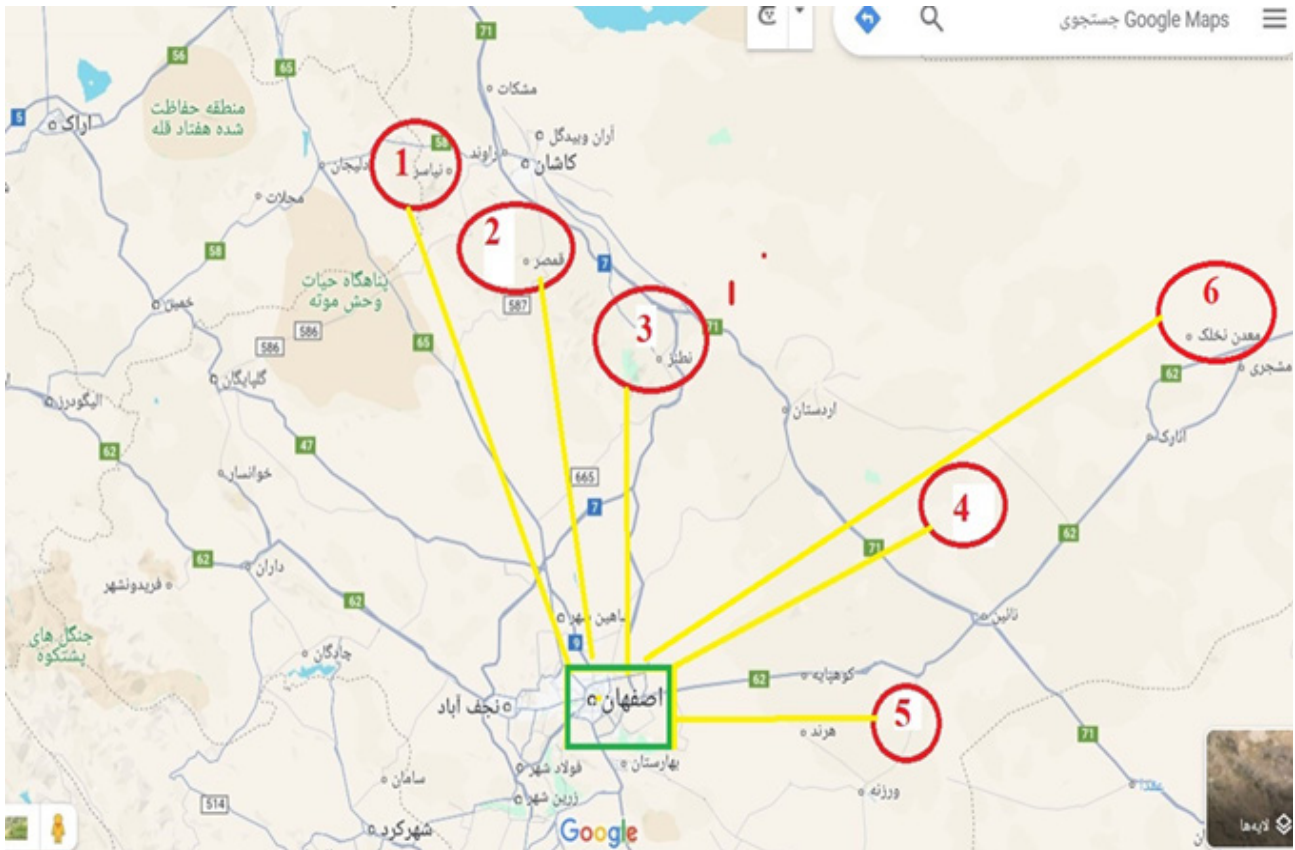


Fig. 1: Location of Chahār Tāqis or Fire Temples in Isfahan Province: Chahār Tāqi of 1. Niasar; 2. Khormadash; 3. Natanz; 4. Shirkuh/Sepru; 5. Qal'eh Dar; 6. Nakhhlak (Google Earth).

close at the apex. The springing of the arches also has a slight projection. The Niasar Chahār Tāqi is most similar in dimensions to the Natanz Chahār Tāqi (Godard, 1992: 73-244), the Khormadash Chahār Tāqi, and the cruciform room B at Takht-e Soleyman (Von der Osten and Naumann, 1994: 92). A unique feature that distinguishes this Chahār Tāqi from its neighboring counterparts is the presence of a transitional zone or a square-shaped dome base. At this stage, four skylights, each measuring approximately 0.65 by 0.32 m, have been installed. According to Rezaeinia (2018), the dome was reconstructed in an unprincipled manner in 1955. Ignoring the original arch, the dome was rebuilt in the style of Islamic-era domes, using cut stones and eight semi-arches with thin gypsum mortar at regular intervals between the stones, which does not harmonize with the structure. The dome was constructed with cut stones in a brick-laying pattern. However, based on the surviving Sasanian-era domes, particularly those in the Chahār Tāqis of Fars and Kerman, it seems that uncut stones and gypsum mortar were used in their construction (Rezaeinia, 2018: 146).

Chahār Tāqi of Khormadash

The Khormadash Chahār Tāqi is located near the village of Khormadash, at kilometer 17 of the old Kashan-Natanz road, at an elevation of approximately 1,182 m above sea level. The structure is built on a stone platform on one of the hills east of the village. There is limited information available about the research background of the Khormadash Chahār Tāqi, as it appears that this fire temple has not been mentioned by geographers or travel writers throughout history, or no information about it has been published (Fig. 3). The construction materials include locally sourced, uncut stones, rubble stones, and well-proportioned stones for the facade. The mortar consists of gypsum. The structure is situated on a stone platform on one of the hills east of Khor-

madash village, extending approximately 2.5 m around the base of the Chahār Tāqi, which archaeological evidence suggests may have formed a circumambulation corridor (Naraghi, 1969: 47). The circumambulation corridor of this Chahār Tāqi can be compared to that of the Navis Chahār Tāqi. In the central space of the Khormadash Chahār Tāqi, as mentioned earlier, a relatively sunken circular space is observed in the center of the interior floor, similar to features found in the Niasar, Natanz, Mel Heiram, and cruciform room A (square-shaped) at Takht-e Soleyman Chahār Tāqis. Regardless of the arch form, this Chahār Tāqi bears a visual resemblance to the Natanz Chahār Tāqi. In terms of the occupied area (the Chahār Tāqi itself without additions), it is roughly comparable to the Niasar and Natanz Chahār Tāqis (Kleiss, 1999: 205).

Only the four main piers of this Chahār Tāqi remain. The dome, arches, and even the squinches have been lost. However, in recent years, the arches have been reconstructed, though unfortunately, due to the inappropriate materials and construction methods used, irregularities are evident. The shape of the arches, based on the reconstruction, appears somewhere between egg-shaped and elliptical. In the center of the structure, a circular space is observed on the ground, likely the location of the fire altar base. This circular space contains two concentric circles with diameters of 140 and 96 cm. Similar features are observed in the Niasar and Natanz Chahār Tāqis. A wall surrounding the structure creates a corridor around the Chahār Tāqi, with the wall's height approximately 90 cm. The primary construction materials are stone and gypsum mortar, applied by immersing the stones in the mortar. In the northeast corner of the structure, remnants of various architectural spaces are observed, with construction materials similar to those of the Chahār Tāqi, including stone and gypsum mortar. The stones show no signs of carving, and only in the facade of the piers have well-proportioned and shaped stones have been used to create a uniform appearance. The foundation of the piers is filled with rubble stones, and the stones are mixed with gypsum in various shapes without any restrictions. Only about 50 cm of the height of the architectural spaces in the northeast remains, but it appears that the overall plan of the structure included three rectangular halls built parallel to the Chahār Tāqi's piers. Since the central hall aligns with the Chahār Tāqi's entrance, it likely served as a pathway to the circumambulation corridor and ultimately to the Chahār Tāqi. The roof type was probably barrel-vaulted (Mohammadifar et al., 2013: 91).

Chahār Tāqi of Natanz

Natanz, the center of Natanz County, is one of Iran's historic garden cities, located in Isfahan province at the foothills of the Karkas Mountains. The Natanz Chahār Tāqi is situated on Malek Ashtar Street, in the Jameh Mosque neighborhood, in the Qasabeh district. Near the Jameh Mosque, within a garden and private property named Imam, a two-meter-high platform from the ground level reveals modest yet intriguing ruins that, in terms of the delicacy and proportion of the columns, bear a complete resemblance to Sasanian period structures. The main structure is built with rubble stones coated with plaster. Of the original Chahār Tāqi, the four columns, the southern arch, and a small portion of the dome's edge remain intact, while the other three arches and the domed roof have collapsed (Godard, 1992: 248). In 2015, the Cultural Heritage Organization decided to fully restore the fire temple by purchasing the ruined houses nearby. The restoration of this fire temple and its damaged sections was carried out in several stages and completed in 2017 with the construction of 2 out of 4 arches. The area of the structure is 127 m², and its maximum height is 8.55 m (Fig. 4).

The construction materials include rubble stones of various sizes, and the mortar is gypsum. The construction method, like other Chahār Tāqis, involves rubble stones immersed in gypsum mortar. This Chahār Tāqi is located west of the Jameh Mosque, along an alley that narrows at its

northern end and leads to a corridor. At the end of the corridor, two eastern and western passageways branch off, with the eastern passageway ending at a platform with four thick stone columns on its sides after a landing and several steps filled with soil. The sides of the structure align with the four cardinal directions, and the area of the Chahār Tāqi itself is approximately 128 m². The current maximum height of the structure is approximately 8.55 m.

Godard has compared this structure to the Farashband Chahār Tāqi (Godard, 1992: 248). Similar platforms are found in the Shian fire temple in Islamabad-e Gharb, Chenzheh in Ilam (Vanden Berghe, 1977: 175), and the Tureng Tepe fire temple in Gorgan (Boucharlat, 1987: 11). Decorative elements may have existed in the Natanz Chahār Tāqi, but they have disappeared. Examples of the four-centered entrance arches (horseshoe arches) can be seen in the Bazeh Hur fire temple (Labaf Khaniki, 2014: 87). Similar to the circular space in the center of the structure, features are also found in the Niasar and Khormadash Chahār Tāqis, Mel Heiram, and cruciform room A at Takht-e Soleyman (square-shaped), likely indicating the location of the fire altar base. The occupied area of the Chahār Tāqi, excluding additions, is roughly equivalent to that of the Niasar and Khormadash Chahār Tāqis. Based on the restoration method, it appears that this Chahār Tāqi, like those in Niasar, Jereh Kazerun, Tang Chah Chah Darab, Naghareh Khaneh Farashband, Rahni Farashband, Khairabad Gachsaran, Deh Sheikh Kerman, and Bazeh Hur Khorasan, features a transitional stage from the cubic Chahār Tāqi to the dome. Regarding the decorations, no definitive conclusions can be drawn, but traces of paint on a thin layer of plaster remain. Beneath this plaster layer, a thick layer of thatch mortar is observed. These paint traces and thatch mortar likely belong to later periods when the fire temple lost its original function, possibly around the time the Buyid period mosque was built nearby. The proximity of these two structures suggests that the mosque may have been constructed on land belonging to the Chahār Tāqi (Azam Vaqfi, 2017: 42).

Chahār Tāqi of Shirkuh Nain

This structure is located in an area called Shirkuh or Kuh-e Zard in the village of Sepru, which is why it is also known as the Sepru Chahār Tāqi. Sepru is one of the 239 villages of Nain city and is located approximately 25 km from Nain. The construction materials include rubble stones and a mortar of gypsum and clay (Shah Hosseini, 2003: 328-329). The structural elements of this building include a bulbous dome, piers, arches, vaults, and squinches, with the arches and columns still standing. During the restoration in 2009, the initial sections of the columns were repaired. The area of the structure is 90 m², and its height is 10.30 m (Fig. 5).

Unfortunately, during the restoration in 2009, the ends of the piers were repaired in a rectangular form. Due to the lack of scaffolding and protective coverings, the dome of the structure has eroded due to precipitation. The positioning of the Chahār Tāqi is such that the platform and the castle can be seen. The construction technique and the transformation of the square plan into a circle in this Chahār Tāqi are noteworthy. According to Pirnia, when viewed from a distance, the remains of four walls and possibly a tower around the Chahār Tāqi on a hill can be seen, indicating the presence of an enclosure around the Chahār Tāqi to separate it from the surrounding natural environment (Pirnia, 1983: 240).

The architectural elements of this Chahār Tāqi include piers, arches, squinches, and a dome. The materials used in the construction include rubble stones and gypsum mortar, which are visible in various parts of the structure, consistent with the foundation. Currently, the four bases of the structure, except for the dome, have been restored. The transformation of the square plan into a circle in this Chahār Tāqi is achieved through the use of squinches. No specific dec-

orations are observed inside the Chahār Tāqi, except for some remnants of plaster on parts of the squinches. Due to its remote location away from main routes, the Shirkuh Chahār Tāqi has suffered from both human and natural damage. The site has been encroached upon by looters. Additionally, factors such as rainfall have facilitated the erosion of the dome and destroyed the plaster coating (Baghsheikhi et al., 2019: 12). By comparing and analyzing the structure and the pottery collected from the surface of the site, this Chahār Tāqi can be identified as a Sasanian-era structure. Selected pottery samples include a jar with a flat everted rim, comparable to a sample from Hajiabad (Azarnoush, 1994: 174), and a bowl with a simple flat or rounded rim, samples 2 and 7, comparable to samples from Chal Tarkhan, Tell Abu Sharifa, and a jar with a rounded rim, sample 4, comparable to samples from the Farsan region survey (Khosrozadeh, 2014: 83).

The four corners of the structure align with the four cardinal directions, similar to the Nakhlak and Farashband Chahār Tāqis. In terms of appearance, the dome of this Chahār Tāqi is comparable to the dome of the Nakhlak Chahār Tāqi. The overall form of its arches is similar to the Niasar Chahār Tāqi (in terms of the arch form, where the width decreases as it moves from the base to the apex). Three-line plaster decorations on the squinches are also observed in the Nakhlak Chahār Tāqi. Similar skylights in the dome of this Chahār Tāqi are also seen in the Chahār Tāqi of Tang-e Chak-Chak of Darab. In terms of occupied area, this Chahār Tāqi is smaller than those in Niasar, Khormadash, and Natanz.

The Shirkuh site, in addition to the Chahār Tāqi, includes a castle, a stone platform, the Shirkuh cave, and a stone wall. The Shirkuh castle is located at an elevation of 1,886 m above sea level on a hill north of the Shirkuh site. The castle has an irregular form and, like the Chahār Tāqi, is constructed of stone and gypsum mortar with a plaster coating. In the center of the castle, a rectangular structure made of stone and gypsum is visible. On the southern side, there are two doors of different sizes. The larger door has a semicircular arch, executed in a semicircular style with the rear of the central structure's roof, more than 60% of which has been destroyed. On part of the eastern wall of the enclosure, remnants of several mazghals (towers) are visible. There were likely mazghals around the castle's enclosure that have been destroyed over time. Given the height of the mazghals, it seems that the internal structures of the castle were two stories in this section, though no evidence remains today (Haji Mohammadalian, 2007: 33, 18; Baghsheikhi et al., 2019).

The Shirkuh platform is located at the foothills of Zardkuh at an elevation of 1,897 m above sea level and is constructed of rubble stones. The existing soil mounds suggest that the structure(s) built on the platform have been lost. Based on a surface survey of the platform and parts of the space revealed by illegal excavations, it can be concluded that there were spaces made of mud-brick and plaster with semicircular roofs in the Sasanian style on the platform. This platform is positioned to fully overlook the Chahār Tāqi and its surroundings. However, due to its accessibility from the heights on either side, it does not seem illogical to consider a military use for it (Haji Mohammadalian, 2008: 21, 32).

Chahār Tāqi of Qal'eh Dar

The Qal'eh Dar site is located 43 km southwest of Nain on the route from Nain to Varzaneh, near a village called Qal'eh Dar. The Chahār Tāqi is situated on a hill overlooking the southern part of the village. The remaining architectural elements of this structure include two standing piers, one collapsed pier, and a stone wall. The structure is made of rubble stones and gypsum mortar, with an approximate area of 37.69 m² and a maximum remaining height of 4.20 m (Fig.

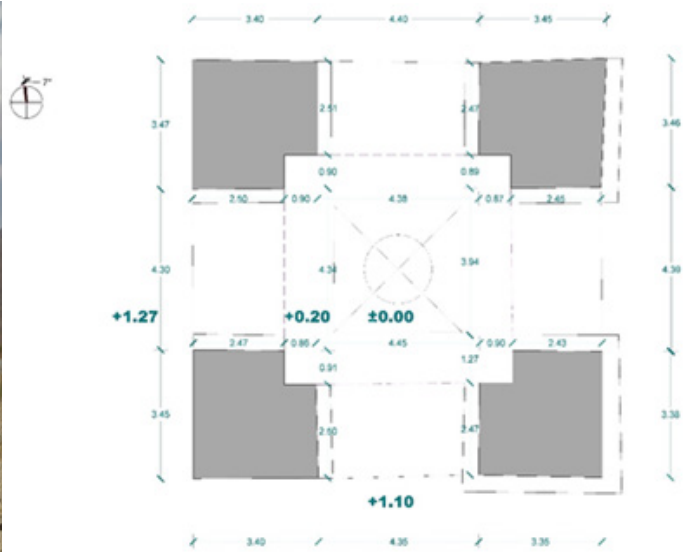


Figure 2: Plan and image of the Niasar Chahār Tāqi (drawn by the author).

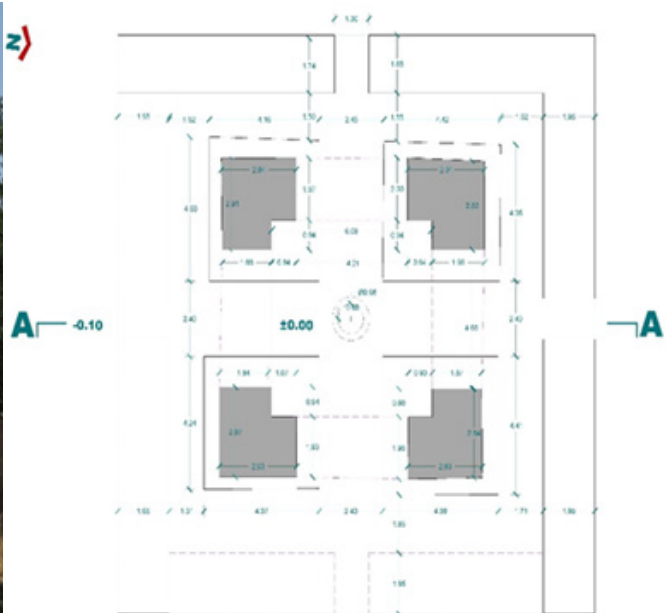


Figure 3: Plan and image of the Khormadash Chahār Tāqi (drawn by the author).

6). Siroux, in his book *Ancient Roads of the Isfahan Region and Their Associated Structures*, mentions areas and routes leading from Varzaneh to Nain and Yazd, such as "Toudasht," "Masrizi," "Gusht Khan," and others. Based on local accounts, he refers to places associated with Zoroastrians and a location where the sacred fire was lit near a village on a high ground, but it is unclear whether he encountered Qal'eh Dar on his journey (Siroux, 1978: 43-46).

The construction materials include rubble stones immersed in gypsum mortar. The stones are locally sourced and available in slab form, with two flat surfaces that naturally eliminate the need for stone carving. Given the structure, the architect only broke larger pieces. In part of the pier, smoother and more uniform stones are observed at the base. The remaining architectural elements include two standing piers, one collapsed pier, and a stone wall. The sides of the structure are roughly aligned with the four secondary cardinal directions (northeast, northwest, southeast, and southwest) with slight deviations. Smoother and finer stones were used

in the squinches compared to other parts of the structure, likely for ease of construction. In other parts of the structure, larger stones were used without any specific order or arrangement, and the gaps between them were filled with smaller stones before being coated with a layer of plaster. In some areas where plaster remains, the fingerprints of the architect are visible. This technique was used in the Sasanian period to create a strong bond between the underlying plaster and decorations. In part of the pier, smoother and more uniform stones are observed at the base. The structure is made of rubble stones and gypsum mortar, constructed using the immersion method, similar to other Chahār Tāqis of this period.

Remnants of a wall made of stone, gypsum, and clay are visible around the western and southern parts of the Chahār Tāqi. The stones in this wall are not uniform in size, and no specific pattern is observed in their arrangement. The wall is level with the Chahār Tāqi's surface. Unfortunately, due to the lack of further evidence, the exact function of this wall cannot be determined.

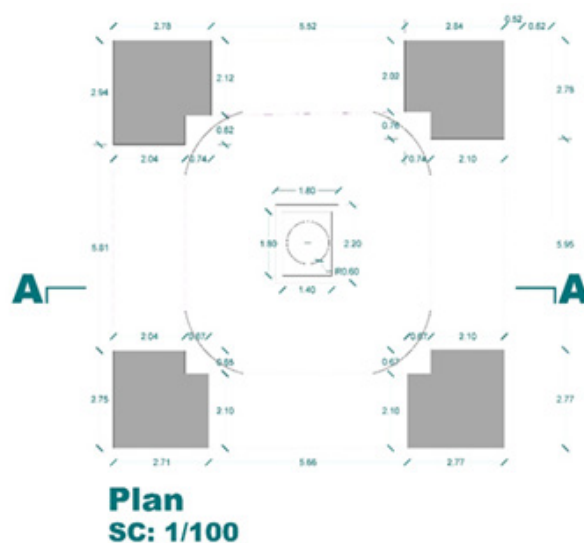


Figure 4: Plan and image of the remaining piers of the Natanz Chahār Tāqi (drawn by the author).

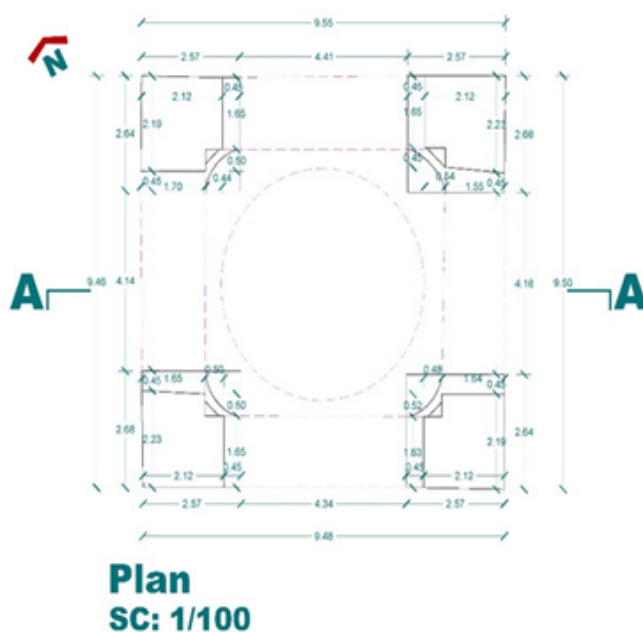


Figure 5: Plan and image of the Shirkuh Chahār Tāqi (drawn by the author).

One possibility suggested by Haji Mohammadalian is that it was used for platform construction (Haji Mohammadalian, 2011: 117).

Since only two piers of this Chahār Tāqi remain, it is not possible to definitively compare it with other Chahār Tāqis in terms of the overall form. The only common feature it shares with other Chahār Tāqis of this period is its construction method (rubble stones and gypsum mortar, plaster coating). Another interesting feature is the presence of a plaster cornice on the remaining pier. The dimensions of the remaining structures of the Qal'eh Dar Chahār Tāqi are smaller than those of neighboring Chahār Tāqis.

Discussion

During the Sasanian period, Chahār Tāqis were sometimes used as domed structures, consisting of a dome resting on a square base supported by four arches, and in other cases, they were surrounded by additional spaces and buildings. Generally, they can be classified into two types: simple and complex. Simple examples lack circumambulation corridors and other annexes, such as the Borzu Chahār Tāqi in the southwest of Salfeghan, the Khairabad Chahār Tāqi on the Behbahan-Dehdasht road, the Pol-e Hayan Chahār Tāqi in Pol-e Dokhtar (Azad, 2005), the Jereh Chahār Tāqi in Kazerun, Fars, and the Julian Chahār Tāqi in Ilam province (Mohammadifar and Motarjem, 2012: 1-12). Complex examples include the Muk Chahār Tāqi in Firuzabad, the Zohr Shir Chahār Tāqi in southern Fasa, and the Farashband Abravan Chahār Tāqi in Fars province (Huff, 1974: 245, 251, 252).

Regarding the chronology of Sasanian fire temples, it is difficult to make definitive statements. Among the excavated examples are Kuh-e Khwaja, whose original structure was rebuilt in the 2nd century CE, Takht-e Soleyman dating to the 6th century CE, Bandian Dargaz from the time of Bahram V, Tureng Tepe from the 7th century CE, Mel Heiram from the 2nd and 5th centuries CE, Shian from the late Sasanian period, and Mil Milge, which has been dated to the mid-to-late Sasanian period (Moradi, 2009: 155-183).

Recently, in the Vigol archaeological site, located 10 km southeast of the modern city of Aran and Bidgol in northern Isfahan province, a fire temple has been discovered that provides fascinating insights into Sasanian-era fire temples. The Vigol fire temple features a cruciform plan.

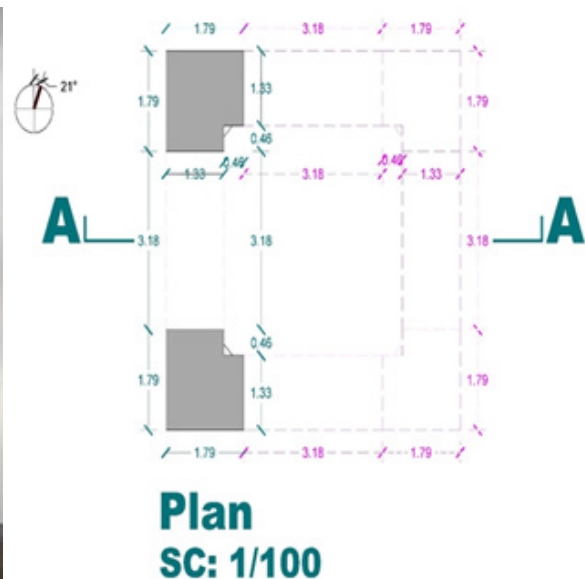


Figure 6: Plan and image of the remaining piers of the Qal'eh Dar Chahār Tāqi (drawn by the author).

The entire structure was constructed using mud as the sole building material. The building plan includes four entrances, whose dimensions and sizes do not match, giving it a plan similar to other Sasanian Chahār Tāqis. Among the most interesting findings from this site are fire altar bases with lotus flower motifs, tables and benches, a Pahlavi inscription on one of the walls, heart-shaped plaster decorations on the walls, and a collection of pottery, particularly stamped pottery with various designs (Javeri and Baghsheikhi, 2021: 1-16).

The Niasar Chahār Tāqi, in terms of architectural style and the execution of the "horseshoe arches" used in its doorways, resembles many Sasanian-era Chahār Tāqis in neighboring regions, such as the Khormadash Chahār Tāqi in Kashan, Natanz, Shirkuh in Nain, Nakhlak in Anarak, and Navis in Qom. The Niasar Chahār Tāqi is most similar in size to the Natanz Chahār Tāqi (Godard, 1992: 73-244), the Khormadash Chahār Tāqi (Vanden Berghe, 1965: 131-133), and the cruciform room B at Takht-e Soleyman (Von der Osten and Naumann, 1994: 92). André Hardy has suggested that this Chahār Tāqi may have had a tall, "Khagi"-type dome. If this hypothesis is correct, its dome can be compared to those of the Shirkuh and Nakhlak Chahār Tāqis.

Regarding the Khormadash Chahār Tāqi, its circumambulation corridor can be compared to that of the Navis Chahār Tāqi (Kleiss, 1999: 205). In the central space of the Khormadash, Niasar, and Natanz Chahār Tāqis, a circular space is observed in the center of the interior floor, similar to features found in Mel Heiram and the cruciform room A at Takht-e Soleyman (square-shaped). This space was likely the location of the fire altar base. Regardless of the arch form, this Chahār Tāqi bears a visual resemblance to the Natanz Chahār Tāqi. In terms of the occupied area (the Chahār Tāqi itself without additions), it is roughly comparable to the Niasar and Natanz Chahār Tāqis.

Godard has compared the Natanz Chahār Tāqi to the Farashband Chahār Tāqi (Godard, 1992: 248). Examples of platforms similar to those in this Chahār Tāqi can be found in the Shian fire temple in Islamabad-e Gharb, Chenzheh in Ilam (Vanden Berghe, 1977: 5), and the Tureng Tepe fire temple in Gorgan (Boucharlat et al., 1987: 11). Decorative elements may have existed in the Natanz Chahār Tāqi, but they have disappeared. Examples of the four-centered entrance arches (horseshoe arches) can be seen in the Bazeh Hur fire temple (Godard, 1992; Labaf Khaniki, 2014). Similar to the circular space in the center of the structure, features are also found in the Niasar and Khormadash Chahār Tāqis, Mel Heiram, and the cruciform room A at Takht-e Soleyman (square-shaped), likely indicating the location of the fire altar base. The occupied area of the Chahār Tāqi, excluding additions, is roughly equivalent to that of the Niasar and Khormadash Chahār Tāqis. Based on the restoration method, it appears that this Chahār Tāqi, like those in Niasar, Jerreh Kazerun, Tang-e Chak-Chak of Darab, Naghareh Khaneh Farashband, Rahni Farashband, Khairabad Gachsaran, Deh Sheikh Kerman, and Bazeh Hur Khorasan, features a transitional stage from the cubic Chahār Tāqi to the dome.

The four corners of the Shirkuh Chahār Tāqi align with the four cardinal directions, similar to the Nakhlak and Farashband Chahār Tāqis. In terms of appearance, the dome of this Chahār Tāqi is comparable to the dome of the Nakhlak Chahār Tāqi. The overall form of its arches is similar to the Niasar Chahār Tāqi (in terms of the arch form, where the width decreases as it moves from the base to the apex). Three-line plaster decorations on the squinches are also observed in the Nakhlak Chahār Tāqi. Similar skylights in the dome of this Chahār Tāqi are also seen in the Chahār Tāqi of Tang-e Chak-Chak of Darab. In terms of occupied area, this Chahār Tāqi is smaller than those in Niasar, Khormadash, and Natanz.

Conclusion

Based on the analysis of researchers' opinions and the examination of Chahār Tāqis and their evidence, the author believes that the mentioned Chahār Tāqis were not standalone structures but had annexes that have been lost over time. Considering the dimensions and spatial distribution of the remaining architectural evidence, the author suggests that these Chahār Tāqis were likely sites for the Aduran or Dadgah fires, as the population density in these areas during that period does not seem to have been significant enough to require multiple administrative hierarchies. Additionally, the author does not support the idea that these Chahār Tāqis served solely as guideposts or calendrical structures. Further archaeological excavations and studies are essential to gain more precise information about the functions of these Chahār Tāqis.

Chahār Tāqis represent historical and architectural engineering points that, despite their simplicity in construction, have endured for many years. The innovative and unique construction techniques, combined with the use of locally sourced materials, have contributed to their longevity. The precision in geometric symmetry and the purposeful use of numbers have added to their grandeur and beauty. Although the primary function of Chahār Tāqis was religious, they could also serve as commemorative monuments or guideposts in some cases. Despite being constructed over a long period and scattered across a vast geographical area throughout the Iranian plateau, Chahār Tāqis exhibit very similar characteristics in construction techniques and spatial positioning. The abundance, distribution, and expansion of Chahār Tāqis in Isfahan province necessitate multiple research topics from architectural, functional, and religious perspectives.

All the Chahār Tāqis mentioned in this study, regardless of their classification, share similar damages. Moisture due to climatic factors is the most common type of damage to these structures, followed by various additions caused by human factors. The remaining damages are superficial and reversible, but some have suffered severe structural damage due to neglect. The approach to their conservation and restoration is crucial, and risk mitigation and organization options should be considered based on comparative studies. Care should be taken to avoid improper interventions, and the structures should be reinforced and restored according to existing regulations. Additions should be reversible, and the historical authenticity of the structures should be preserved. Site development and the creation of a cultural platform for public presentation with a suitable and environmentally compatible physical structure can be part of the efforts to achieve dynamic balance in the Chahār Tāqis of Isfahan province.

Conflict of Interest:

The authors declare that they agreed to participate in the present paper and there are no competing interests.

Authors' Participation:

This article was written by Gholamreza Sadeghi, and the analysis of data was done Mohammad Ighbal Chehri and Maryam Kolbadinejad

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