



Design of Domes in Islamic-Iranian Architecture

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ABSTRACT

The most important feature of architecture at Islamic age has been regarded as strengthening the human history from plurality and unity that such architecture from the artistic dimension and world structure goes beyond the time and place. Dome has been regarded as the major element in Islamic-Iranian architecture that there is no doubt on continuity and evolution of domical buildings since Sassanid age till current age. Mosques with Arabic or column design in Umayyad dynasty have been mentioned as the early styles in Islamic architecture. These mosques follow a square or rectangular map with walled garden and roofed nave. Since 7th century, domes have been the major element in Islamic architecture. By the passage of time, dimensions of domes at mosque developed, occupied a small part of the ceiling in proximity of Mihrab to the entire ceiling above nave. According to the existing texts, the oldest dome which is referred relates to Parthian and early Sassanid era. This dome has been built in Firuzabad to the dimension of 10.16 meter and evolved at Sassanid age, after which construction of domes is exploited as a general pattern. Domical buildings in west differ from domical buildings in Iran. Interesting difference lies on transfer of dome from cylindrical buildings to square buildings in Iranian architecture. Creation of dome and formation of hollow spaces have raised creation of spiritual spaces together with sense of comfort, under which the most important phenomenon of Islamic-Iranian architecture, holy shrines and sacred places have raised. In this research, firstly we will reach to a model of construction of main dome by overview of literature at architecture of domical buildings pre Islam in Iran and formation of them with an emphasis on domical buildings especially at Firuzabad, Fars and Bishapur, then we will review the domical buildings at Islamic age especially mosques and sacred places, ultimately the evolution stages of dome design is examined in Islamic-Iranian architecture.

Key words- *Islamic-Iranian architecture, dome, Sassanid age, mosque*

Introduction

The most important feature of architecture at Islamic age has been regarded as strengthening the human history from plurality and unity that such architecture from the artistic dimension and world structure goes beyond the time and place. Byzantine architecture with the feature of round arches, arches and domes has a huge effect on early Islamic architecture. Numerous forms have been developed from mosque at different regions of Islamic world. The interesting forms of mosque include early Abbasi mosques, t-shaped mosques, and mosques of central Anatolia. The early styles in Islamic architecture include the mosques with Arabic or column pattern in Umayyad dynasty. These mosques follow a square or rectangular map with walled garden and roofed nave. Most of column mosques had flat ceilings in nave (Shabestan) that required for numerous columns and shelter. The Great Mosque of Córdoba (Mezquita de Córdoba) such as a column mosque has been built with over 850 columns. The mosques with Arabic pattern continued till Abbasid dynasty. Ottomans introduced the mosques with central dome at 15th century with a great dome at the center of nave (Shabestan). In addition to a great

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dome at center, there are also smaller domes out of center, above Shabestan or all over the mosque and around the areas in which no one was praying. Dome of the Rock in Jerusalem is the most recognized sample of mosque with central dome. Ivan mosques are more likely drawn into attention due to domical halls and ivans that are spaces opened from one side. In ivan mosques, an ivan or more ivans are in direction with central yard that are used as chapel. This style which has been originated from Iranian architecture has been exclusively used in Iranian mosques. Shah Mosque in Isfahan-Iran has been mentioned as the best sample of Ivan mosque. Since 7th century, domes have been the major indicator in Islamic architecture. By the passage of time, dimensions of domes at mosques developed that a small part of the ceiling in proximity of mihrab to above Shabestan was occupied. However, domes were found with a hemispherical form, yet the Mongols in India developed onion domes in southern Asian and Iran. According to the existing texts, the oldest dome which is referred relates to Parthian and early Sassanid era. This dome has been built in Firuzabad to the dimension of 10.16 meter and evolved at Sassanid age, after which construction of domes



is exploited as a general pattern. To define Firuzabad and the dome at the middle of city, Ibn Balkhi says Ardeshir built city of Firuzabad in a circular form. At the middle of city, Ivan has been built which is called with Tarbal by the Arabs, among which a great dome has been built; along this Ivan, a dome with seventy five Gaz built with granite has been built. at Sassanid age, construction of domes extended and evolved after which construction of domes used to be exploited as a model and instruction.

Materials and methods

A library and field method has been used in the present research as the research method, categorized as a descriptive-analytic research method. In this research, reports, documents, journals, books, domestic and foreign articles pertaining to the subject of research have been collected. Further, the researcher has referred to scientific research centers of universities and administrative centers and organizations to collect data.

Architecture and geometric construction of dome

Several stages have been followed in building dome on a square-shaped or polygonal space: firstly square rooms with doors and niches and then the transition between the rectangular room and the spherical dome and finally the leading dome. Iranian architects have built the most beautiful domes on different buildings especially on tombs, mosques and schools. Iranian domes have different forms that some include: conical dome, single-cover dome, double-cover dome, continuous and discrete dome. Beauty of Iranian architecture in Islamic age highly relies on domes which have been decorated with mosaic tiling in Islamic architecture (Sheikh Lotfollah Mosque). According to a geometric definition, dome represents geometric place of the points that emerges by rotating around a vertical axis. Yet, in architecture, dome refers to a coverage settled on a round area. Dome has been developed from three parts: 1-area of dome, 2- Bashan, 3-chapireh. Since we rarely face round tint in Iranian architecture, the ending part of Bashan which is in a square or rectangular shaped transforms to circle, thereby the dome is settled on it. For this, the stage undergoing chapireh in construction of dome is of great importance, because the possibility to have tint paves the way for ultimate execution of dome coverage. In

general, the context is considered in a square shape in the maps in which the coverage is designed as dome so as to transform it to 8, 16 and 32 and finally circle. Construction of dome in Iran has been rarely considered on the context of rectangular or square, under which the rectangular transforms to 6 and 12 and then to ellipse close to a circle, whereby the dome is settled on ellipse. Such dome is called kombize in which the horizontal section appears as ellipse instead of circle. The samples of such dome with ellipse tint can refer to mosque of Haj Rajabali Tehran and Imamzade Zeid ibn Ali in Varamin. Domes are generally made of brick or adobe and arranged in three orders:

1-Gerd-chin

In this method, layers of bricks tend to center of dome, arranged in a radius form.

2-Rag-chin

In this method, layers of brick or adobe are arranged in parallel to the horizon line. Rag domes cannot appear as Gerd chin, thus they are made as Rag chin.

3-Tarkin

In this arrangement, dome is built with plaster mold undergoing fracture geometry, and then the distance between fractures is filled via brick or adobe. Plaster roofs are built on the ground corresponding to the favorable arch and then all the roofs are kept standing at the considered space, and ultimately the space between roofs is filled via brick or adobe. In this arrangement despite a variety of other domes, Shahang and Hanjar are not used. The common method to build dome is the same as building Tapo, which as the tapo maker passes all around tapo and build it, dome is also built in this way, however Iranian domes due to not having mold cannot be built from inside, the devices such as Shahang and Hanjar are used. Shahang refers to a rod which is settled vertically. This rod is generally made of wood and settled at the center of dome such as dome at Rahim khan mosque in Isfahan in which Shahang is settled from all sides so as not to be disturbed. In building term, hedging wood is considered. Eight to ten woods are used to fasten Shahang to two domical walls, and then the Shahang is nailed at two points that must be two focuses of the ellipse to which two delicate chains are connected so as to depict the desired ellipse. The chain is called Hanjar that its delicacy is the same of Ardakani chains.

Constructor of dome arranged everything from the back behind and controlled the dome curve



that must be flat and precise via this chain, that also two grooves were created by him for a better performance at the settlement area of ornamental door nails in which a ring was set to let the Hanjar passes around the Shahang. No mold has been mentioned for Iranian domes, yet most of domes at west are molded. Roman domes were more likely built on centre (a type of mold), that such a wood frame mold has been in form of dome on which the stones were set via masonry. In general, our information on construction, design and other construction affairs at Islamic age is so little and limited. Without doubt, construction of buildings including religious and non-religious centers requires information on sciences such as geometry, mathematics and design, which the masters have enabled to develop masterpieces at art of architecture over the time. Unfortunately, no important texts and images on how to construct buildings can be seen in historical texts at Islamic age. The only significant samples of two paintings attribute to Behzad in 872 AH in Zafar Name and Khamseh of Nizami. These paintings are currently kept in Johns Hopkins University in which how to construct Timur great mosque and Khornaq Palace in a miniature style have been depicted. In these paintings, decorations and means of architecture such as scaffolding, wood norma, saws, rulers, shovel, hatchet, trowel, ladder as well as construction materials such as stone, brick, plaster, mortar and tiles have been displayed.

Literature review concerning architecture of dome

Dome is a leading element in Iranian architecture, that there is no doubt on continuity and evolution of domical buildings in Iranian architecture since Sassanid age till current age. Domical buildings in west differ from domical buildings in Iran. Interesting difference lies on transfer of dome from cylindrical buildings to square buildings in Iranian architecture. Creation of dome and formation of hollow spaces have raised creation of spiritual spaces together with sense of comfort, under which the most important phenomenon of Islamic-Iranian architecture, holy shrines and sacred places have raised. At square-shaped rooms, gable develops from cutting hemisphere in a simple triangle, yet in Iran this gable has appeared as a regular element with decorative aspect in building. How to construct gable is in this way that it transforms to circle by bridging the corner of square room

with semi- conical arches. This attempt to construct artistic forms at architecture at the late of Sassanid age can be witnessed, so far as trompes not just manifest as a construction element at Sassanid age but also as a decorative pattern in expansion and evolution of Islamic architecture. In Iranian architecture, the cube-shaped room under the dome transforms to a building unit.

This implies that the volume and thickness of thick walls are reduced by creating four wide openings which are covered via taqi ahang in order that the area at four sides under dome appears as a rigid-shaped pattern and openings emerge around the area by closing the walls backward the building. Under this circumstance, when we enter into the area from interior rooms in building or corridors, we will find an extensive spatial feeling. This invention of beauty at architecture together with creating sense of spirituality which is followed by maturity of principles has developed the most important phenomenon of Iranian-Islamic architecture, holy shrines of Imams. invention of beauty at architecture together with creating sense of spirituality is an interesting issue under which type and form of domical rooms and buildings with four deep openings have developed, that such phenomenon can be seen at the early age of Ardashir(224-241 AD) in buildings and then at the age of first Shapoor(son of Ardashir)(241-272 AD) in Bishapur, which seem totally evolved works of art. There are almost square-shaped halls in palace of Ardashir, Ghale-Dokhtar and Atashkadeh in which the entrance has been located at the axes of hall and lower-width doors have been embedded at its wall.

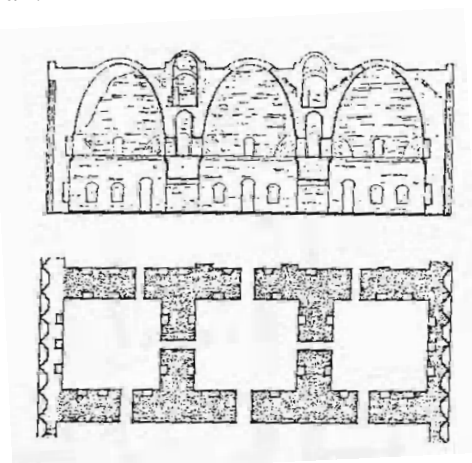


Figure 1. The palace of Artaxerxes I- Firoozabad

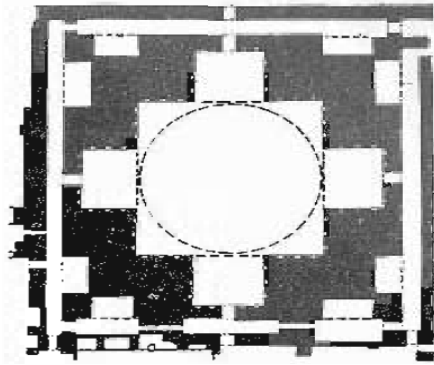


Figure 2. Palace of Shapur I- Bishapur

In these buildings, there is a transition part which includes three simple corners and closed windows, and in another part there is a dome with the windows at top of three corners. In these cases, it can look into the major hall via the windows at the rooms in second floor. These buildings have been still standing, that just their domes have collapsed. These arts of work have been mentioned as the most interesting remnants of Iranian-Islamic architecture, that the collapsed masses indicate the second stage of domical buildings in Sassanid age. The prominent building of Takht Neshin at the central part of city of Firouzabad should have been a temple that has been builder by order of Ardeshir via masonry and brick dome, that both characteristics at the bottom parts of building have been still remaining, witnessed with fractured bricks of the dome. Figure 1 represents the earliest recognized buildings at domical buildings in Iran that there are corridors around it, mentioned as the great building of Bishapur is famous with the first Shapour palace. This building with square-shaped area has been regarded as the greatest sample of this building (figure 2). Anyhow, the most excellent criterion of art of arching has been proven due to a number of works of art such as Hatra in which tube arches are common, and also a square-shaped building like small palace on Zakhak Castle in Azerbaijan that had been provided for a domical coverage has a short tube arch. Among Parthian buildings in Nisa, there is a circular hall which is imagined covered with a dome, however it might had been a building made with wood. Important ruins from Parthian buildings combined of coarse stones in Yazd Gerd castle have not been examined and the evidences from them have not been collected. On the other hand, there are small Parthian temples that have the domes with arching tradition via adobe in which

three corners in addition to tube arch should have been used widely. Yet, about Central Square without lateral rooms and surrounding corridors, there is a long tradition with centralized patterns in Iran. In or Achaemenid or Parthian architecture, there are square-shaped arches that develop an interior campus with four corners enclosed with corridors. There are arch-like openings from three sides in Median temples in Nooshijan, in which the central part and entrance rooms are in the fourth side, under which they can be assumed as a cross-like shape. The oldest type of this building might be seen in Great aristocratic homes that have been excavated in Babajan. Parthian buildings in ghomes area indicate the patterns with cross-like shape from outside, however interior patterns include small rooms and few central halls exist there. Roman architecture in the early centuries AD, particularly in the east and in adjacent areas in West of Iran has developed square-shaped rooms with dome and cross-like patterns. Aegis castle in Jordan (figure 4) is close to building pattern at the early buildings in Sassanid age. Anyhow, cupola or dome even without any arch has been set on a short triangle, under which the interior campus has appeared as a short building. Both types of architecture seem that have been at the same age, that it cannot give a priority to one of them. For this, most of efforts that have been made to call Roman architecture to domical buildings in Firuzabad and Bishapur have remained vain. Development of architecture has been followed with a high linkage between west and east. The clear architecture issues at different cultural areas like what exists in Iran territories and Roman territory undoubtedly approve that different methods of architecture evolution at any area have had special originality and characteristics. Among the works of art pertaining to middle of Sassanid age with specified establishment data, a gap is witnessed.

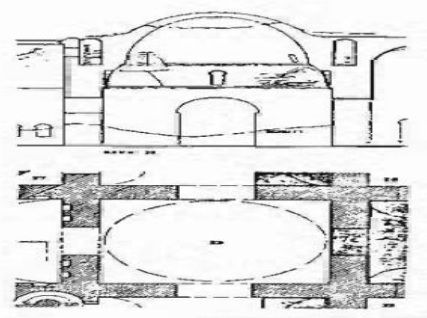


Figure 3. Ardeshir Palace

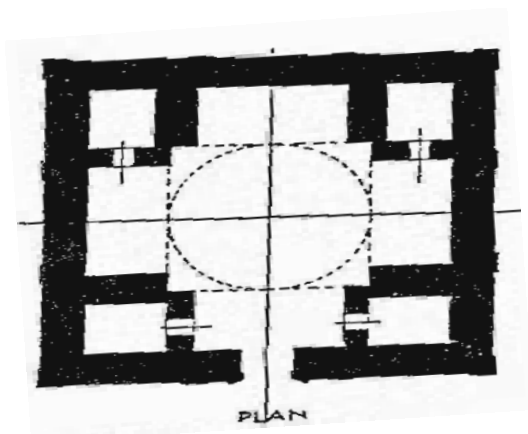


Figure 4. The palace in Jordan

During the late Sassanid age, domical buildings in Firuzabad and Bishapur are found for a

sufficient extent, representing their continuity till Islamic age. Adobe domes general belong to the late Sassanid age, recognized in Mount Khajeh(Sistan and Baluchestan) and Sorkh Katal(Afghanistan) as well as Chinese Turkestan. Among Ruins of Takht-e Soleiman (Azerbaijan) that date back to the first half of the 6th century AD, domical room with four corners and four openings has been seen as temple and also for the non-religion purposes, yet domical buildings with corridors have been being used for religious purposes(figure 5). In addition to the samples without corridors excavated in Yazd Gerd and Tureng Tepe, it can find numerous ruins well known with four arches throughout Iran which are widely available in Fars and Kerman. This building with its specific features raises different problems.

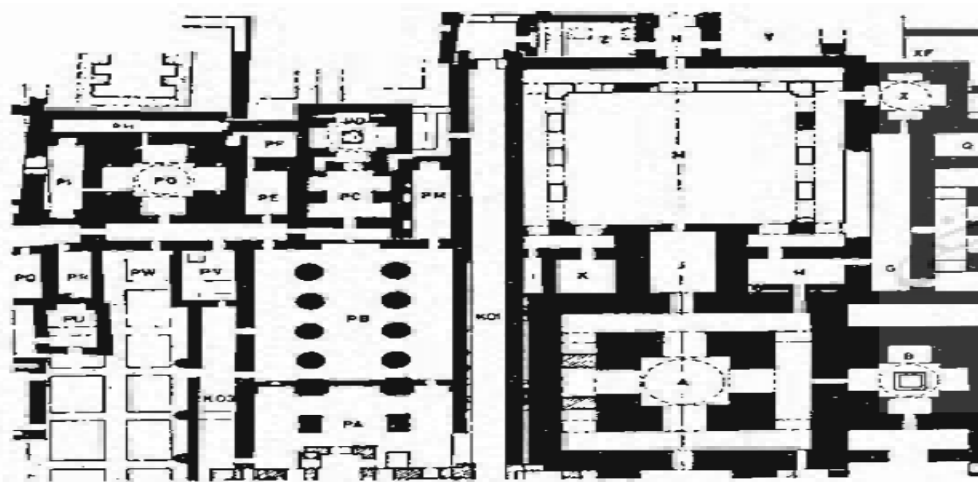


Figure 5. Takht-e Soleiman plan - Urmia - the late Sassanid era

Analysis of dome form in Islamic-Iranian architecture

The construction term "Chahartaq" is called to a building with four corners ended in four walls. The interior space has been generally covered with dome which has been set on trompes. According to evidences, the four arches as the result of the induced issues such as scientists' statements (André Godard & Aardman) are the remaining of the ruins of Sassanid temples expecting that their plan serves as a shelter at temple, which is visible from a distance away. Theories of André Godard were widely accepted despite early criticisms, however, the scholars such as Ullman, Herzfeld and Reuters have acquired more accurate definitions for old buildings. Archaeological excavations as well as religious recommendations in Zoroastrian

buildings approve that ancient Iranian temples have been closed than the space outside, that there is no reason for umbrella-like temples that are obviously mentioned as historical and artistic issues at the early 20th century. If the ruins of Chahartaq buildings that have been the major reason for such assumptions undergo studying, they will be found as a reason to reject hypothesis of canopy-like temples. This building can be classified to four groups. Some samples are generally open canopies that can be recognized as any state especially in Muslim graves. For instance, the building well known with Karateh Chahartaq between Meymand and Jahrom or Islamic buildings well known with palace such as Isfahan temple, Shah Morteza Ali in Shiraz (figure 7) and other Chahartaqs as common canopy in square-shaped temples can be

named that have four doors instead of four arches. Another sample is well known with Ashpazkhane at the back of great palace of Firoozabad and many other buildings. Most of four-arched ruins are the remaining of greater

buildings that everything around them has deteriorated, and what remained from these buildings have been also divided into three groups.

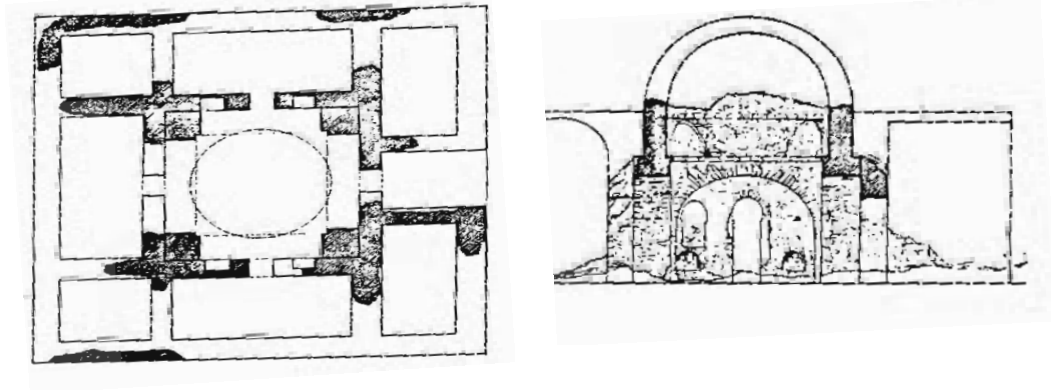


Figure 6. Four arches of Meymand-Fars

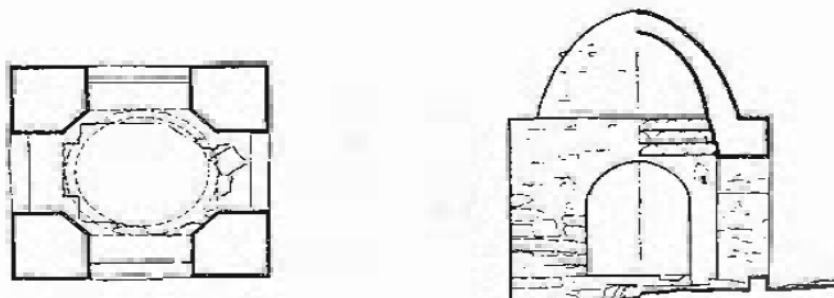


Figure 7. The prominent building of Shah Morteza Ali Shiraz

Domical quadrilateral with four openings under arch has been closed via the walls across the open space. The prominent sample is found in Tureng Tepe, Yazd Gerd castle and Bishapur. Such buildings are consistent with the second stage of evolution of arched-rooms at Sassanid age, which it can never trust on Chahartaq as the separated building. Extra rooms that have deteriorated thoroughly might also exist. These four-arched buildings appear as buildings with one room, linked with square-shaped temples such as Ashpazkhane building. It can refer to domical square-shaped building with four openings that has enclosed other rooms such as Karāneh chahar taq. All these buildings represent a clear continuity of Sassanid buildings in throne of Firouzabad and other four-arched rooms in Takht-e Soleymān. Domical square-shaped building with four openings in corridors can be also remembered. This building is the most specific type of Chahartaq that belongs to the buildings such as Shapour Palace in Bishapur

and major building of Takht-e Soleymān. The openings of these buildings at corridors remain closed except for the gates at Bishapur building, expecting that their opening has been being opened towards corridor. A prominent sample for other types of four-arched buildings is found in Zar shir, Mok, Negar Tang Chak Chak, Kenar Siah and most of Chahartaqs around Farashband and Soghon areas.

Research findings

After studying and defining a variety of Chahartaqs, determining the date and interpreting its application are much more difficult, so that it cannot attribute any ruined Chahartaq to the periods before Islam. Rough broken stones as the materials used more than any other materials at Sassanid age have kept being used in Islamic age. Yet, wishbone arches that can be known as a tangible sign at architecture in Islamic age have been also witnessed in some of the Sassanid artworks such as museum of Qasr-e Shirin (figure

8). For this, it can immediately deduce that any semicircular arc represents the diagram for construction of a Sassanid building. Engineer Pirnia has confirmed importance of this local architecture style in different parts of Iran. If the homogeneity in Islamic civilization is considered with substantial changes in evolution of architecture, it will be specified that southern regions of Iran especially Fars have evolved the cultural development at early Islamic centuries, expecting that most of Chahartaqs as the ruins of Sassanid age are the buildings that have been built after victory of the Arabs.

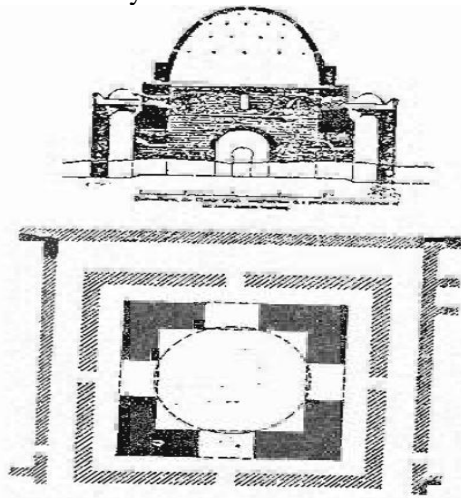


Figure 8. Chahār Qāpi

Yet, there are signs for approximate dating. For instance, the details in trompes and founding dome in some Chahartaqs represent a clear way towards more thorough geometric solutions, yet the transition at early domes in Firoozabad represents the vertical continuity of wall at cubic-shaped wall that is cut via a raised edge. In most of Chahartaqs, width of wall between trompes has been curved outside, developing a part of

circle at the bottom, ending in backwardness at the back of lower wall at the middle of axes of room. A triangle at the edge of trompes can be properly seen at Chahār Qāpi building in Qasr-e Shirin that everyone knows the date for establishment of this building at the age of rule of Khosrow II (590-628 AD), especially a stair-like triangle likewise one of the general features of trompes is seen in architecture at Islamic age. In this way, these explanations pave the way to acquire a date at the late of Sassanid age or the early of Islamic period, yet a more precise conclusion is not possible. The issue to determine application of Chahartaqs is distracting. An uncertain interpretation for Chahartaqs as Sassanid temples is never true, because some buildings might be built at the early Islamic periods for this purpose. Anyhow, without a careful study of archeology and a close commonality of Sassanid temples to holy shrines, a precise conclusion will be difficult. This issue can be represented in a beneficial way via aforementioned Chahartaqs in desolate valley in South East of Fars (figure 9). This relatively well-preserved building belongs to Chahartaq-type 3 that the technical details of its environmental rooms are consistent with the technical details of other Chahartaqs in Fars, representing a reasonable complexity that informs us about the evolution of these patterns in Islamic architecture. In addition, this building has been enclosed with great Islamic tombs and warehouse, that it is more likely that the aforementioned Chahartaq has been the settlement of the saints that become a tomb in future. If accuracy of this conclusion is confirmed, Chahartaq will be assumed as a key at all Fars Chahartaqs.

Ahmadi

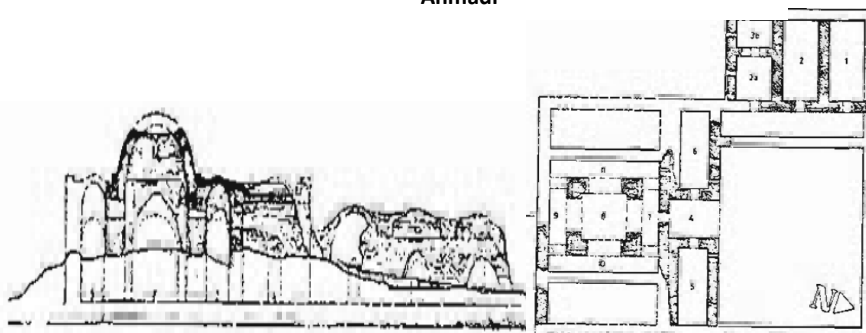


Figure 9. Chahartaq-Farashband

Sarvestan Sassanid building has been mentioned as one of the most complicated buildings in Iranian architecture (figure 10). This building

with two domical rooms and greater room with dominance on all the building and surrounding rooms belongs to Chahartaq-type 3. The smaller

room with unique pattern has four openings that have been developed at ground floor, including a corridor that has been located under the greater dome. The special plan of these buildings and details of buildings has caused comparing them with the buildings at Islamic age such as Khazan palace in Jordan, Okhidar in Iraq, and raised doubt on Sassanid age and function of building. Indeed, construction techniques make impossible this fact that these buildings have been built at Sassanid age and make impossible this fact that the map of these buildings have been prepared at Sassanid age and also makes impossible this fact that the map of these buildings has been assumed as map of palace. Some have assumed that these buildings might date back to Islamic age, yet each of interpretations is challenging. Yet, there is an interesting similarity between Sarvestan building a building at Safavid age such as Mir bozorg Amol mosque. This indicates an interesting formal tradition undergoing Iranian architecture over the time. Continuous continuity of domical buildings before Islam can be shown in the Islamic architecture till current age in two simple buildings around Bishapur-Fars. Herzfeld has been the first one who publishes the ruins of a Chahartaq in 1941 and called it "Imamzade Seid Hussein" and considered it as a building in Sassanid age. Apparently, this building has annihilated since that time till today and appeared as a village at three kilometers to Bishapur-Fars.

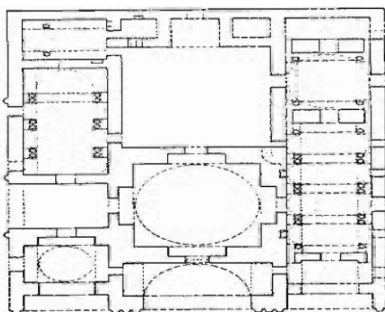


Figure 10. Sarvestan building

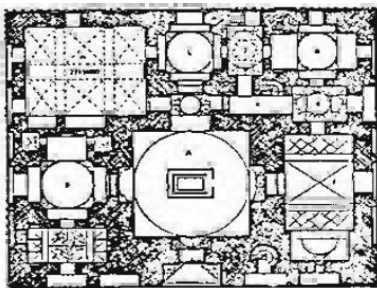


Figure 11-Mir bozorg mosque-Amol

The corridors around plan of building which has differed from the proper plan of Herzfeld belong to the Chahartaq-type 4. The only mistake in Herzfeld's plan that remained as secret lied on this fact that Imamzade Hussein is a newer tomb located near to this building, seemed that such building has been Chahartaq-type 2 or an open canopy which belongs to Chahartaq-type 1. Anyhow, during recent times, this building has substantially developed and appeared as a building with Chahartaq-type 4 with environmental corridors which seem similar to another old ruined building. The similarity between them cannot be intentional, but it is due to the forces governing Iranian architecture.

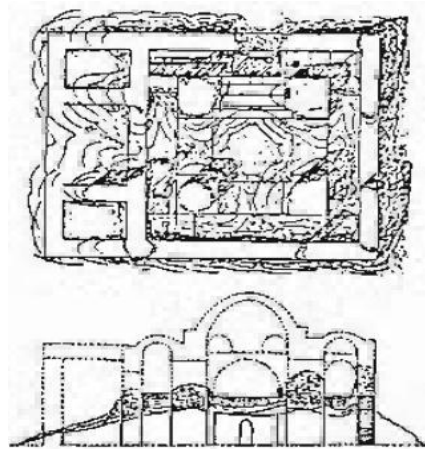


Figure 12. Imamzade Seid Hussein- Bishapur

Explanatory analysis of domical buildings in Islamic-Iranian architecture which seems impossible at current age is a huge diversity seen in domical buildings. Yet, domical room in Islamic architecture has been pursued more than any other styles, which a column Shabestan has replaced with it in Seljuk age. Great dimensions of mosques have largely resulted in changed in four-arched system, in which huge lateral piers are used instead of arch, that samples of them can be seen in domes at Jameh Mosque of Isfahan, Jame mosque-Urmia, Great Mosque of Ardestan and etc. Anyhow, in most of cases, the piers are arranged with construction areas of the wall in a way that the four-arched system with smaller passages develops around the arches, that the sample for it can be the smaller dome, that is, the dome at Jameh Mosque of Isfahan. Hoping to find more practical solutions for domical buildings with wide scale resulted in emergence of polygonal plans instead of square-shaped plan. Such domes can be seen in domical building of

Natanz Jame Mosque with eight corners, that such type of dome might be originated from the buildings in West at the early age of Islam, including Saliba dome in Samereh and Alsakhreh dome in Jerusalem. Another type of round and polygonal domical buildings represent as tower-like tombs that their origin is thoughtful, yet they are far from our discussion. The issue that separates domical towers from other types of towers is totally different. Among a variety of tombs, the square-shaped dome at all tombs can be witnessed. There are also other samples of tombs in which four arched openings have appeared as a gate, including Ismaeil Samani's tomb in Bokhara, Ashpazkhaneh building in Firoozabad, or Alavain dome in Hamedan, Sorkh

domes and Ghafarieh domes in Maragheh with small changes, that such domes are more likely seen out of the cultural area of Iran. Anyhow, square-shaped dome with four lateral openings under the arches, Chahartaq-type 2, can be considered as the common type of tombs. The simple sample refers to rural buildings such as Imamzade Jafar in Firoozabad, Ardeshir khoreh or Imamzadeh Taher in Tadoan.

Further, this type of architecture can be seen in tombs of Khatoon Ghiamat, Bi bi dokhtaran in Shiraz, Gour Amir, Bi bi khanom, Agh sara in Samarghand, Imamzadeh Rabieh Khatoon in Ashtar jan, Zein al din tomb in Taybad, Khaje rabie tomb in Mashhad and etc.

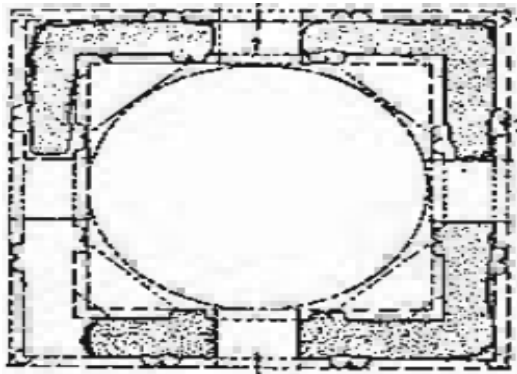


Figure 14. Taybad tomb

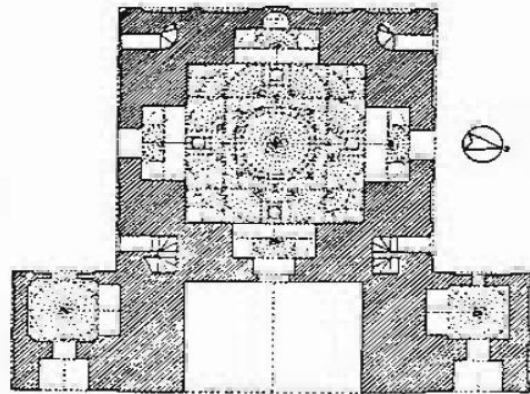


Figure 15. Ashpazkhaneh building

Holy places that appeared as the places for pilgrims have been being developed, that the rooms and buildings around them have been being established. More specifically, during the Timurid and Safavid age, beautiful places such as Algh Beig and Abdol razagh tombs around Ghazaneh, Eshrat khan in Samarghand, and holy places in Mashhad and Qom and Mir bozorg mosque in Amol were developed. These places have been built with previous map and plan or magnified and appeared as environmental rooms undergoing Chahartaq-type 4. Chahartaq-type 4

is rarely seen. The central dome is enclosed with corridors at hall from three sides at mosques that blue Mosque, Tabriz and/or Meydan Mosque; Kashan can be mentioned as samples. Another type of Chahartaq-type 4 with four regular corridors can be seen between other Chahartaqs in Amir Malik shah's tomb in Mashhad and beautiful building of Pir Bokhara tomb in Khafr (figure 14). The building evolution and decoration of dome can be mentioned as one of the major artworks in Iranian architecture.

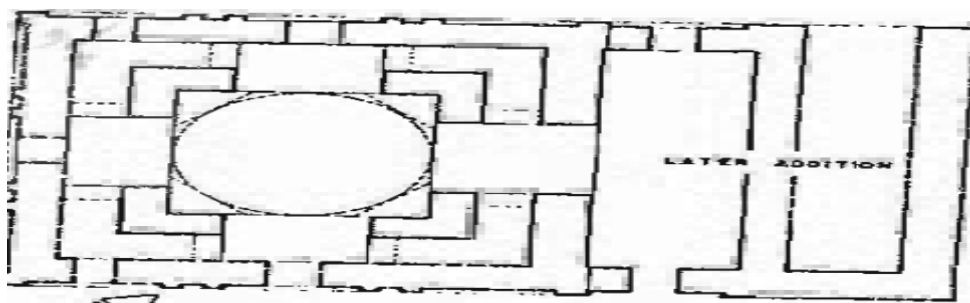


Figure 14. Sheikh al khalifa imamzade-Khafr

Construction

Constructing dome as a decorative plan that can be formed via roof and arches includes the principles of construction, starting from trompes and considering in constructing the walls. This has been concurrent with Gothic architecture in Europe in which the four-sectional arch was mentioned superior to dome. Isfahan dome has been mentioned as the more valuable sample at classic stage, progressed as domes of the Ilkhanid and Timurid Mogharnas later. The apparent form of domes definitely has developed to a better artwork as a shorter dome and an onion-shaped dome out of building. Timurid and Safavid architecture can be seen in the buildings such as Gour Amir, and Safavid mosques of Isfahan can be mentioned as the best sample of this architecture. Anyhow, these changes represent a formal decoration, indicating beautiful expectations at that period, followed by reasonable facilities. Yet, we look into the comprehensive plans at closed domical spaces in recent buildings, we will not neglect understanding this issue that all the plans represent continuity of old traditions in which the buildings such as the early buildings at Sassanid age are found in Firuzabad, Fars and Bishapur.

References

- Kiani, Mohammad Yousuf , architecture of Iran, the Islamic period , Jahad , 1989
- Maheral Naghsh , Mahmoud , Iranian Tile Works , publication of the Museum of Reza Abbasi ,
- E.herzfeld , " Damascus " , Ars Islamica , 1942 , P .17
- Dietrich Huff. "Archaologische Mitteilungen aus Iran" . 11, 1978,P.117- 127
- O.Reuther in A.Pope, "A survey of Persian Art " , Vol, 1, 1938. P, 493- 531
- D.Huff." Archaolog Mitteil aus Iran". 1972 , P. 517- 519.
- R.Ghirshman , " Bichapour" , Vol 2, 1956
- W. Kleiss , " Archaolog Mitteil aus Iran".1973 .P. 163-175
- D.Stronach and M. Roaf ,"Iran 16". 1978, P. 10 -35
- C. Watzinger. "Denkmal Palastinnas" . 1933 .P. 101- 112
- Pop. A, and Sadri. Gh. 2006. "Iranian Architecture Third Edition".
- Hillen, R,1999, "Islamic architecture ".Fourth Edition.
- Cokelemans, J. Heideger , H. 2009. First Edition, Isfahan.
- Mought clift ." urban desingn dimensions butter worth", 1996.