



HISTORICAL – SKELETAL CHANGE IN ISFAHAN MINARETS

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ABSTRACT

Isfahan has been one of the greatest civilization centers of Iran, especially in Seljuk and Safavid era it have had highest numbers of the minarets. All minarets are among three classes: cylindrical, conical or prismatic. Some minarets include a simple square or octagonal end pillar with a round rod in the center (ChehelDokhtaran), and the end pillar is often very simple. Considering cultural and historical parodist related to fifths and sixth centuries of Seljuk era and tenth and eleventh centuries related to Al Mozafar era, the designs are different. For example, minarets of Dar-Olziafah with 38 m height has been among majestic inns or Baqooshkhaneh Minaret in Ilkhan era with 38 m height has been one of the most decorated minarets in terms of Islamic designs, tiling and decorations on brick. However, minaret of Ali Mosque with 52 m height is Seljuk era is the most salient example of minarets. Sareban Minaret with 54 m height in Seljuk era is also superior in terms of height and attraction and artistic grandeur.

Hypotheses: There are three hypotheses for investigation of historical – skeletal changes of minarets including: 1. Height and proportions of minarets are related to the time and height of minarets has been increased over the time. 1. Materials and decorations of minarets have been changed over the time and some progresses have been developed in decorations of minarets. 3. Form and structure of minarets have changed over the time and the structure and forms have become more complicated.

Purpose: Current paper aims at investigating structure, form, materials, decorations and proportions of Isfahan minarets in different eras and finding relationship between these factors and the time and analyzing their relationship.

Methodology: research method in this work is a combination of interpretive – historical methods and correlation of relational type. Firstly proportions, form and other characteristics of minarets will be described and then relationship between these factors and the time will be analyzed and studied.

Keywords: Minaret, decorations, structure, form, crown, bonnet, heeltap

INTRODUCTION

Root of the term Minaret is taken from Nar meaning specific and limited location on which the fire was set. Establishment of minarets indicated location of mosques from close and far distance to the people, but after emergence of Islamic tradition, minarets became a place for muezzins. Although minarets seem to be thick and less balanced elements, they are highly stable. The reason for this stability is in limitation of its roof and less penetration of snow and rains. On the other hand, its conical and cylindrical shapes are resistant against earthquake. In terms of appearance, minarets have one leg from bottom to top and there is a torque above known as bottleneck. There is a form of umbrella at the top of bottleneck. Highest part of their minaret is called crown. If the foundation is also taken into account, minaret can be classified into five parts. In this paper, historical and skeletal change of Isfahan minarets and change in their form, materials, decorations, and structure in different historical periods is investigated using interpretive- historical and correlation methods in the form of tables and

proportions of minarets along with their pictures.

REVIEW OF LITERATURE

Hejazi in his work published in DaneshNama Journal provided proportions and structural analysis of Isfahan minarets along with their pictures.

In Islamic Architecture book by Robert Hillen Brand research is conducted on architecture of minarets in different eras of Seljuk, Ilkhan, Safavid, etc.

Andre Godar, Maxim Siro, etc. in Volume 4 of the book of Iranian Works stated their analysis about structure and decorations of minarets.

Dr. Gholamali Hatam in his book on Islamic architecture in Seljuk era researched on form and architectural decorations of Seljuk and Seljuk Isfahan minarets.

In the current paper, in addition to collection and development of information existing in this area, the information is analyzed in conclusion section and a table of the analysis is provided.

Data Collection and Research Method

Using interpretative – historical method and correlation method of relational type in

this work, change in Isfahan minarets in terms of history, form, structure, decorations and materials is investigated and results are classed as the table using collected information and their analysis. Change of proportions and height of minarets is also expressed descriptively in pictures. Pictures are used for better understanding of the issue.

Change in Iranian Minarets

This element was developed in mosques for announcing voice of muezzin and calling people to the proper in the mosques, and its decorative aspect was quickly strong in Iran. for representing, various types of decorative arts such as brick working and tile working as well as coloring the minarets were used which was common since second half of third AH century. Since then the body and all external parts of minaret were decorated using colorful bricks and tiles and Quranic verses. Creation of standing high minarets suggests the fact that minarets were not only used for lighting and praying muezzin and calling for prayer, rather they have been also used for decoration of mosques. Considering height of minarets, which draw look at the top and instill majesty, it can be stated presence of minaret in mosques is the means for approaching to the creator and natural forces, and thus high attention and accuracy has been paid to decoration

and beautifying minarets. Initially there was no specific rule for location of minarets. They were built sometimes in the corners of the mosque, sometimes separate from entrance door, sometimes attached to the body and sometimes in distance to the body of mosque (Hatam, 2000).

Structural Analysis of Isfahan Minarets

Overall the minaret is composed of three parts: foundation, body and crown.

Body shape can be in three ways: cylindrical, conical or prismatic. The body of minaret includes central pillar, spiral stairs and external crust. The body of minaret may become narrow from the foundation to the crown. Narrowing central pillar has polygonal or circular shape, and its diameter is sometimes about 5 meters at the bottom. Spiral stairs around the central pillar moves against clock direction (Fig 1). A few numbers of minarets have two spiral stairs which are independent. The crown at the top is similar to a morning glory flower with 2-3 m height. Total hadith of the minaret in some cases is about 50 m. fig 2 indicates some of the main separate brick minarets in Isfahan. Height varies from 20 m to over 50 m. external diameter in the foundation is between 2.5 to 6 m and it is between 2 to 5 m in the top. Thickness of external crust varies from 4 to 1.8 m in the foundation and 1 to 4 m in the top.

Diameter of the central pillar is between 3 to 1.6 m (Hejazi, 1990).

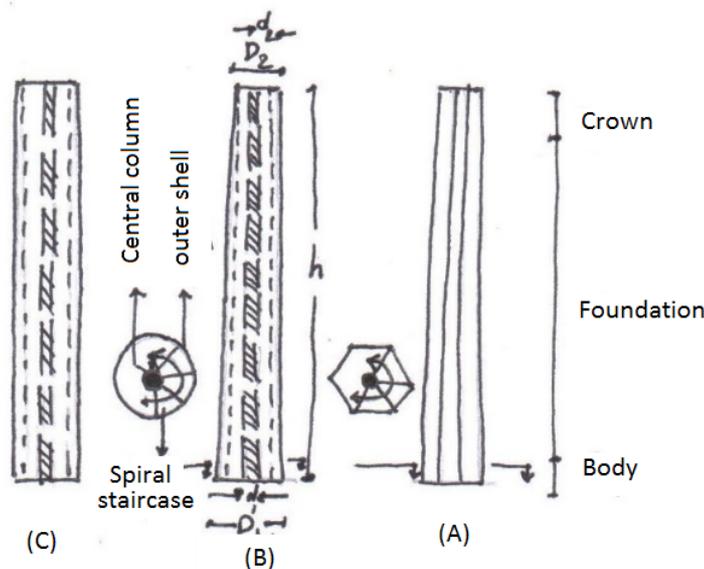


Fig 1. Three types of minaret: (A): cylindrical, (B): conical, (C): Prismatic (source: DaneshNama Journal, structural analysis of Isfahan minarets)

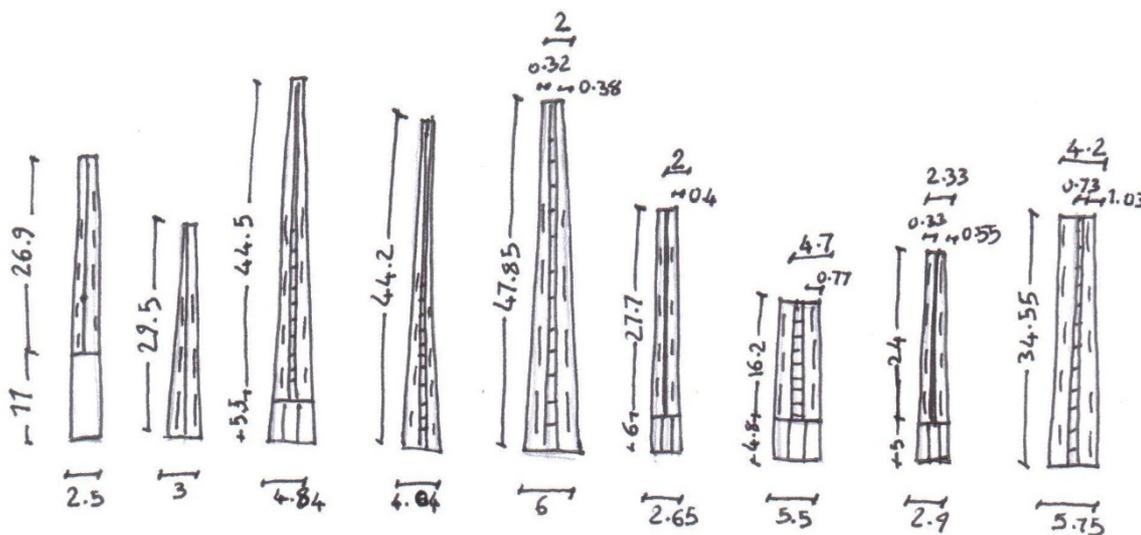


Fig 2. Variety of dimensions in some Isfahan minarets (A) Barsian, 491 AH, (B) ChehelDokhtaran, 501 AH, (C) Gar, 505 AH, (D) Sin, 596 AH, (E) Ali, 5 – 6 century, (F) Sareban, 549 AH, (G) Ziyar, 5-6 century, (H) Rahrovan, 5-6 century, (J) Qooshkhaneh Garden, 8th century, source: DaneshNama Journal, structural analysis of Isfahan minarets

Minaret in Pamanar Mosque

This mosque has a minaret which its bottom part has in level with the roof of the mosque. Remaining of an interesting frieze in Kufi writing made of brick is seen on it. Letters of this frieze are very simple, but they are beautifully designed. These letters

have more manifestation among beautiful decorations of flowers and plants. The word Allah and Date 461 Hijri is observed on it. Thus, this minaret is the second minaret in Iran which has been identified up to now in terms of the oldness (Godar et al., 1989).

Barsian Minaret

This minaret is the third oldest minaret among remaining historical buildings (Godar et al., 1989). Minaret description: it is a single minaret in circular pillar shape made of brick and mud and plaster. It lacks platform or foundation. Its diameter in ground level is 5.75 and it is 4.2 m to above, and its height is 34.55 m. thickness of the wall in foundation is 1.8 m and it is 1.3 at the above. Only its stairs go up in spiral shape. Circular path of the minaret stairs (against clock direction) is around a circle with diameter as 82 m in the bottom and 72 m in the top. Lighting of the stairs is provided three narrow and vertical openings which become wider in the inside. Border of stairs is from a wood in thickness of a brick which ends to middle pillar in one hand, and leading to the minaret wall thickness in the other side (Godar et al., 1989). Decorations: bottom part of the minaret has simple bricks and top parts have brick decorations. In the above parts there is two friezes with little rise acting as crown. No tile is used in the decorations of the minaret. In the narrow borders of the above part of the minaret, diamond and circular shapes have been used. These designs were common in brick working in Seljuk era in Isfahan and it was continued until Mongol era. Decorations of the minaret's crown are different from its body.

There is a frieze in simple brick Kufi writing in this part. The frieze indicates date of 491 Hijri. This minaret is an example of Seljuk buildings in fifth century, which includes the best technical points of brick working (Hatam, 1990).



Fig 3. Barsian Minaret (source: www.30vil.net)
Chehel Dokhtaran Minaret

It is one of Seljuk era works in Isfahan which was founded by Abolfath Nahooji in 501 Hijri (Honarvar, 1993). Minaret description: at northern level, ground level is a little low and 3.5 m of the minaret foundation is made of rock and cement. Foundation of the minaret is square and only its southern corner is circular. Beneath this building there is brick foundation in 5 m hadith which is entrance of the stairs. This foundation is in irregular octagonal shape. This high minaret, which is made of brick, is a rod in circular shape and 25 m hadith. It has overall 29 m hadith considering the rod. Diameter of the minaret is 2.9 m and its thickness is 55 cm and diameter of the octagonal pillar in venter is 33 cm. the situation of the stairs is normal and the plaster is used in it (Godar et al., 1989). Decorations: body of minaret

has been decorated with different brick designs and in the topmost part of the minaret, the crown of minaret is observed with little rise. Frieze of the top minaret was in salient Kufi writing in brick. First verses of Taha Surah are observed on the brick ground, and Thulth writings are observed at the above part or platform of the minaret. It is one beautiful brick ground in plaster (Hatam, 1990).



Fig 4: ChehelDokhtaran Minaret (source: esfahantour.com)

Gar (Qar) Minaret

This mosque is from Seljuk era. The mosque has been ruined, but its minaret yet has good situation and according to frieze in 515 Hijri it has been built by SeyedRoaasaAbolqasem. 515 Hijri is concurrent to fire in Isfahan Jome Mosque (Honarvar, 1993). Description of minaret: it is a circular rod made of brick and with destructed top. It is founded on octagonal foundation. Rock foundation of the minaret, which 2 meters of which is evident, has brittle mortar which has made of sand, cement and ash. Foundation, that its thickness is reduced gradually, has 4.8 m height. Entrance of the stairs is in the south east of the foundation and it is in the

height which previously was ground level. Diameter of the minaret rod is 5.5 at bottom. Diameter of its top is 4.7 m in current situation and thickness of minaret wall is 74 cm. height of foundation and rod of minaret is currently overall about 21 m. at the beneath of the minaret top and toward Qibla, there is a wide window. No trace of tile working is observed. The mortar used is combination of sand and plaster (Godar et al., 1989). Decorations: there is frieze in Kufi writing at the top part of four corners which is made of mosaic brick, and it starts from north east leading to the east. It dates back to 515 Hijri. At the bottom of this frieze, there are wide bricks in depth of about 5 mm which have been bound by the plaster, so that a frieze in Noskh wiring is provided in vertical form. These writings have 45 degree distortion. Other corners of the foundation are covered by the simple bricks. In the angles of the foundation, corner of bricks has been accurately cut so that they have been placed in 45 degree toward each other and Noskh writing in vertical form are seen between bricks (Hatam, 1990).



Fig 5. Gar Minaret (source: www.rasekhoon.net)

Sin Minaret

It is from Seljuk era. Minaret of Sin Mosque was built in 526 Hijri by Abu Ismaeel Muhammad (Honarvar, 1993). This building is among oldest Islamic buildings with history and tiling appearance which has been built in Iran. It is a high foundation which is attached to the other building in square shape. One corner of it is circular. It is based on a foundation in octagonal shape with high hadith which becomes narrow from bottom to top. There is round rod going to the sky and its diameter is decreasing gradually. At the middle of the minaret rod, toward Qibla, there is a wide window (third window of this type) which has balcony. It is similar to window of Gar Minaret. Natural entrance of minaret stairs is in east south corner on the octagonal foundation. Second entrance is observed a little above distance. The techniques used in building of this minaret are similar to Gar Minaret (Godar et al., 1989). In the above part of south east side of foundation, there is a frieze which is installed by the brick. It includes four lines of simple Kufi writings which shows its construction date at the end part. Tip of the minaret, which has been damaged, has simple Kufi frieze. This frieze is made of turquoise tile in mosaic form. Only external part has glaze which include letters of frieze. Decoration on the body has specific

design. It seems it has spiral and wave bricks beside each other which rows cross each other, and they represent evident centers with angle 45 degree.



Fig 6. Sin Minaret (source: www.rasekhoon.net)

Ali Minaret

This building is located beside Ali Mosque in old square of Isfahan, date of its construction is not clear, but according to evidence it should be built in sixth Hijri century. This minaret is also known as minaret of Sultan Sanjar Mosque (Honarvar, 1993). This building is one of the most famous minarets in Isfahan and it is situated in the north west of the Ali mosque. The main body of minaret is made of brick. It is composed of three rods, each of which placed on each other in narrow and thinner form. Each of two rods in the bottom are decorated by crown. Current height of the minaret until the first crown is 40.35 m, the middle part is a bout 7m and the remaining on the top part is 0.5 m height. Thus, overall hadith of the minaret is 47.85 m. it is thought that its original height has been above 50 m. the diameter of minaret body in the bottom part is 6 m and it is reduced to 2 m in the top (Jenab,

2007). Decorations: in the bottom part of the minaret, it includes crosses, flowers, cross flowers, six- and eight-side stars, and fine diamond shapes. The middle part of the body includes cirrhosis diamonds which include left and right brands inside small cirrhose diamonds. Are of these diamonds versus body of the minaret is lower, which becomes narrower due to its conical situation. There are two brick friezes with vertical Nuskh writing which create special variety between bottom geometric designs and top crown. The crown includes 93 cm of the minaret body. It instills radial shape similar to clove flower with placement of large bricks on cross and vertical directions. At the top part of the crown, there are such designs as middle part. The frieze beside the second crown has special beauty with placement of tiles and vertical Nuskh writing. It is in turquoise color. The second crown and its top rod are currently destructed and probably it had decorations similar to the bottom part (Zamani, 1972). This minaret includes five frizzes which most parts of which have been destructed. The first one is in Kufi writing with turquoise tile on brick ground, the second and third ones are in Kufi writing and turquoise tile. The fourth one is in Banaee writing in plaster on chess shaped ground with large square. The fifth one is in brick Banaee writing on plaster ground with is in

the same level as the roof of Ali Mosque (Hatam, 1990).



Fig 7. Ali Minaret (source: www.esfahantour.com)
Sareban Minaret

This is one of the most beautiful minarets of Seljuk era in Iran and it is situated at the northern end of Joobar district near ChehelDokhtaran Minaret (Honarvar, 1965). It is a single, circular minaret at three stories without any foundation. Height of the minaret is currently about 44.2 m. about 36 m of it is in the lower part of minaret, 6.2 m of it is in middle parts and 1.5 m of it is in above part. Diameter of minaret is 4.04 m in the bottom. In the entrance of stairs, thickness of minaret wall is 72 cm and middle rod of the minaret has diameter as 87 cm. width of the stair entrance is 68 cm. entrance of stairs is in 7 mere distance to the minaret rod and it is attached to the minaret by a bridge from another building, which is not ruined (Godar et al., 1989). Decorations: decorations of minaret body are in seven distinct parts from bottom to top. These divisions include beautiful brick decorations, brick Moqarnas as well as turquoise tiles. Two crowns of minaret with

its beautiful Moqarnas in the above part of body makes this minaret among one of the most beautiful minarets with Moqarnas in sixth century. In the second side of minaret crown there are two nice friezes in the best turquois color of time. Sareban Minaret is decorated with three Kufi friezes. The first one or above one is written by blue tile. The frieze below Moqarnas is in turquois Kufi writing on brick ground. Verse 33 of Fosehat Surah can be observed on it. And the third one is decorated with square Kufi writing or Banaee writing using bricks (Hatam, 1990).



Fig 8. Sareban Minaret (source: www.esfahantour.com)

Ziyar Minaret

It is one of Seljuk minarets situated in Ziyar village in 40 km to Isfahan in southern border of Zayande Rood (Honarvar, 1993). Importance of this minaret is due to the fact that it is the single example of three-story minarets in Isfahan which has kept its original state and no manipulation has been taken in it (Hatam, 1990). This minaret is placed on singly brick foundation and it is in three stories. The materials used in its building are similar to foundation of brick minaret in addition to turquois tiles, and

each story is shorter than its previous one. Two top stories have cornice which is made using training method. Cornice at the top has strange base which is similar to box. Foundation of minaret, stairs and its skylights are all ordinary. Octagonal foundation of minaret, which narrows from bottom to top, has 5.5 m height. Diameter of first part of minaret, which is cylindrical, is smaller than diameter of foundation and it is 4.8 m. thickness of wall in this part is 86 cm and diameter of middle rod of minaret is 1.5 m. height of this part up to its top platform is 33 m. minaret starts with a diameter of 2.67 m. diameter of the minaret rod in this part is 55 cm and thickness of minaret wall is 46 cm. height of minaret is overall 50 m (Godar et al., 1989). Decorations: various brick and tile working decorations are observed in this minaret. In the lower rod part, these brick decorations are with various geometric designs along with small and square turquois tiles and rectangular Nuskh friezes, and friezes in Kufi writing and turquois tiles on the brick ground are observed in the top part. There is a belt of cut brick above and bottom of this frieze and there is narrow border of turquois diamond and circular tiles beneath. Circular pieces are concave and their glazing is stronger and darker color in the middle part. Bottom of minaret in second story is decorated in four parts. The lower

part has simple decoration and second part has crossing and rectangular Nuskh friezes. Third part includes diamond shapes and seven- or nine- color flowers. Fourth part includes repetitive rectangular Nuskh friezes from turquoise tiles, which are written on brick squares. In the third story, i.e. in the body of minaret, there are four narrow windows with Toranj design or crossing design. Fourth window, which is taller, acted as door. At the end of minaret bottom, there is brick booth and a frieze in Nuskh writing from turquoise tile is observed around it (Jazab, 2007). Frieze of this minaret, which is in Kufi writing with turquoise tile on simple brick ground, is situated at top part of minaret. This minaret can be attributed to middle years of sixth century (Hatam, 2000).



Fig 9. Ziya Minaret (source: 30vil.net)

Rahrovan Minaret

It is one of the Seljuk minarets and the closest one among minarets outside the Esfahan from sixth century. Date of this building goes back to after Ali Mosque minaret and Sareban Minaret (Honarvar, 1993). This minaret has about 30 m height.

Minaret has a brick foundation which is small and square and this foundation has circular body of brick in two stories. Above first story, there is crown which is made using training. Body of this minaret is simple in the bottom parts and it includes rectangular and crossing ordinary Nuskh frieze with designs of flower and diamond. They are made of turquoise tile in mosaic form. Minaret decorations: rod of minaret is divided into five parts. Lower part is made of simple brick rows. Second part has vertical wide rows among bricks and the third part includes a frieze in vertical ordinary Nuskh writing. Fourth part is composed of ordinary diamond shape and last part includes a frieze in collar shape which is made of turquoise mosaic tiles (Godar et al., 1989). Frieze of this minaret is in Nuskh writing and it is made of blue color tiles (Godar et al., 1989).

Jonban (Moving) Minaret

There is a village called Karladan in six km to west of Isfahan on the way of Isfahan – Najafabad (Honarvar, 1967). These two small minarets, which are located in sides of porch of Baba Abdullāh Tomb, are the most famous minarets of Isfahan (Godar et al., 1989). The porch belongs to sixth Hijri century and it is concurrent to late kingdom of Aljayto Khan, Muslim Mongol king. The minarets later in unknown date were added. They were added probably at the late

Safavid era (Honarvar, 1993). The interesting point is movement of minarets. By movement of one minaret, the movement in the other one is also evident. Movement of minarets is not strange in the view of technical experts, and according to them, this quality is present in all minarets, but since these minarets are lighter and narrower, their movement is more evident. In addition, wooden hanks at the top and lower parts are also effective factor in completion of movement of minarets. The more interesting point is that not only when one minaret is moved the other one is also moved, but also the movement is transferred to whole other points of this building. Decorations: style of building of this porch, which has tile working decorations, is style of buddings in 8th century. Turquoise tiles in four-corner stars along with other shapes in turquoise decorate porch rocks and its surrounding (Honarvar, 1967).



Fig 10. Jonban Minaret (source: www.30vil.net)
Jorjir Great Mosque Minaret

It is in a district in the same name in the north of Deylamijorjir Mosque (current location of Isfahan Hakim Mosque) which is from era of Sahib Ismaeel Ben IbadVazir, famous Diyalameh Minister (Honarvar, 1993). This building is related to 361 – 385 Hijri which its trace is not left. This building was famous among the artists of the world due to its nice majesty and decorations of its minaret with about 100 foot height. Seemingly the mosque and minaret all were made of raw clay (clay dried in sun). This mosque was in the current location of Hakim Mosque (Godar et al., 1989).

Dardash Minarets

Two Dardasht minarets are placed in façade of a majestic school from Sultan Mahmoud al Muzaffar era. Part of tiling decorations of the minarets and its surrounding faced and the entire frieze have been destructed. This work is placed in the location of Isfahan Nezamiyeh (KhajehNezamOlmolk School) in Dardasht, which is one of the great residential districts of Isfahan Shafe'ies. It is from sixth Hijri century (Honarvar, 1993). This shape of building, i.e. establishment of two minarets on a gate or attached to its sides, is often in buildings of Mongol era. Dardasht minarets have no specific date, but the way of building and their decorations are of Mongol era (Godar et al., 1989). Old and second-hand bricks

were used in its building. Raw clay and mosaic tiles have been also used in them. The tiles present designs in spiral form. In the northern minaret there is a Nuskh writing frieze and it is designed on the minaret rod as collar. It seems date of these minarets is half of 8th century (Godar et al., 1989).

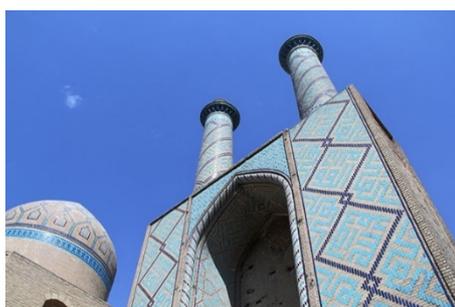


Fig 11.Dardasht Minarets (source: www.esfahantour.com)

Qooshkhaneh Garden Minaret

This building is called also as Toqchi and it is called Ali IbnSahl Minaret due to its proximity to Ali IbnSahl Shrine. It is from 8th century buildings which is tiled (Honarvar, 1993). The minaret which as fascinating view provides a series of spiral designs in green and while colors on its light blue ground (Godar et al., 1989). This minaret is based on part of a ruined building with about 11 m hadith and with a

short octagonal foundation. There is two-story minaret on the foundation. Total hadith of it is about 37.9 m. it has sound and ordinary stairs and healthy building. In the center of three parts of minaret, there are spiral designs which are decorated by wide borders including letters of Nuskh writing in between distances. The minaret is decorated with a collar frieze, part of which is sound and it is in nuskh writing. It is made of mosaic tiles in white, light blue and turquois colors and non-glazed tiles. It is from 8thHijri century buildings and its top cornice is made in training manner (Godar et al., 1989).



Fig 12.Qooshkhaneh Garden Minaret (source: www.esfahantour.com)

Table 1. Change in Isfahan Minarets (source: author)

	Frieze	Decorations	Structure	Form	Material	Height	Date
Barsian	1 frieze in Kufi writing	Brick and diamond designs	Without platform or foundation, spiral stairs	Circular & single	Brick & mortar plaster	34.55m	401 Hijri
ChehelDokht aran	3 friezes, 2 in Kufi writing & 1 in Nuskh writing	Brick	With foundation of rock and cement mortar	Circular on octagonal foundation	Brick & mortar plaster	24m	501 Hijri
Gar	1 brick frieze in Kufi writing	Crossing brick working	Rock foundation, 2 stairs, spiral & single	Circular on octagonal foundation	Brick & mortar plaster sand	16.2m	515 Hijri

Sin	1 brick frieze & 1 tiling frieze in Kufi writing	Tiling appearance	With foundation	Circular & conical on octagonal foundation	Brick & tiling appearance	27.7m	526 Hijri
Ali	5 frizzes	Brick with crown	Without foundation, three stories	Conical	Brick & mortar plaster	47.85m	6 th Hijri century
Sareban	3 brick friezes & tiling	Brick Moqarnas Crown, with turquois tile	Without foundation, three stories	Circular, conical, single	Brick	44.2m	6 th Hijri century
Ziyar	Tiling frieze in Nuskh&Kufi writing	Brick & tile with geometric designs	With foundation, three stories	Circular on octagonal foundation	Brick & tile	44.5m	6 th Hijri century
Rahrovan	Tiling frieze in mosaic and Nuskh writing	Brick working in diamond shape & tiling frieze	Two stories	Circular & single on square foundation	Brick	29.5m	6 th Hijri century
Jonban Minaret	There is no info in frieze	Tiling in Mongol style	Wooden hank in top and lower parts of minaret	Circular & pair	Brick & tile	17m	716 Hijri
Qooshkhanhe Garden	Tiling frieze in Nuskh writing in collar shape	Spiral tile designs in green & white color	With foundation, two stories	Circular on octagonal foundation	Brick & tile	26.9 m	8 th Hijri century
Analysis	Number of frizzes increased over the time and before 6 th century they were made of brick and then the tile was also used.	Decorations of minarets were simple and in brick since 6 th century and then they were more complicated & tile was also used.	Since 6 th century minarets were built in several stories. No specific trend is observed in using foundation	Since 6 th century cross section of minarets reduced & they got narrowed in top part and crown of minaret got importance	Since 6 th century, use of tile is reduced. After 6 th century all minarets contained tile.	Since the start to 6 th century the height is increased & then it is reduced.	

CONCLUSION

Considering studies and using Fig 2, change in Isfahan minarets are analyzed as follows, which are also presented in the form of table (Table 1).

Height: until 6thHijri century, height of minarets increased and then it reduced.

Materials: initial minarets have very simple materials of plaster mortar and brick, and they have been best samples of brick minarets. Since sentry 6, the tile was gradually added to materials of minarets and then all minarets included tile working.

Form: almost all Isfahan minarets are in conical form and they are narrow in top side. The cross section of minarets reduced from century 5 then. And the minarets were narrow. It seems that its reason was saving material and decorations. Since century 6, minarets had crown and top part of minaret was important. External wall diameter of minaret was reduced over the time.

Structure: no specific trend is observed in using minaret's body. Stairs of all minarets were made in ordinary manner (Fig 13), except for Gar minaret which has two

stairs. Over the time, several- story minarets were made (since century 6).

Decorations: initial minarets were too simple and they contained geometric or spiral designs and since century 6 tile was gradually used along with brick and then (century 8) colorful tiles and spiral lines of tiles were observed in minarets. The designs got more complicated over the time and tile Moqarnas were also observed.

Frieze: the number of friezes increased over the time. Initial minarets' friezes were from plaster or brick, and then tile with brick and band friezes were observed.

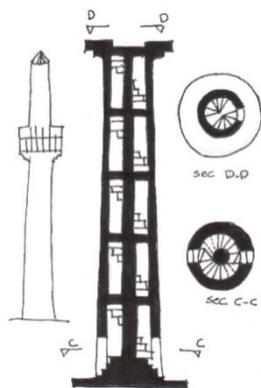


Fig 13. Minaret stairs (source: author)

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