

Morphology of the Wind Catchers in the Laft Port

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Abstract

Discussing morphology in one of the traditional architectural element of Iran without analyzing its elements and recognizing its components, forms and colors would be an incomplete matter. The geometry of this architecture is the result of its fundamental components and elements not being formed in the designer's mind all of a sudden in a constructive and unified process; rather it is the result of a gradual practical and constructive method. Its components including physical and geometrical features exert significant effect on the end result of the overall volume. The formation process in nature is often carried out by the help of a structure or some structures. Like nature, formation of volumes in Iran's traditional architecture follows the same rules. The morphologies of the traditional architecture as well as the modern architecture are fundamentally different with each other from this perspective. This means that the former is accomplished through motion of basic, constructive and standardized elements in space while the latter is realized through a mental and abstract process. Nevertheless, recognizing the physical texture of traditional architecture has a considerable effect on its morphology. Physical, chemical, and geometrical bonds maintain the natural forms in the nature and organized them, but traditional architecture follows those natural rules which are mostly in physical and geometrical bonds because its constructional materials are mainly natural elements and less synthetic. A traditional architect is in search for the harmony rules of the standardized constructional components (masonry materials) so that he can find out a relatively stable equilibrium against the applied forces. These rules have become available for architects through experience and observance of the nature and also the introductory geometrical analyses and eventually, his attempt to counter the force of gravity is reflected in the general form of the work. This attempt in the form of the used shapes is perceivable by the viewer of this architectural work and based on this perception, an aesthetical relation is created between the observer and the work. Wind Catcher has been among the historical elements of Iranian traditional architecture in the hot and dry as well as hot and humid regions of this country which consist of a tower higher than elsewhere in houses and being located on the roofs and water storages to fulfill the role of controlling wind flow and conducting it into the inner space of the houses. Existence of various decorative forms and natural colors used in the facades of the wind catchers, the necessity to approach and analyze them, also maintenance and usage of these elements as well as making them known to the researchers at the present time led to the formation of this study being conducted through a field research by attending the context, having interviews with the locals and analyzing and drawing 50 samples of the present wind catchers to meet the main purpose of the study more accurately which was "analyzing the function and recognizing the motifs and colors" used in the wind catchers. Studies on recognition of the motifs and colors used in the wind catchers of the Sothern Iran (Laft) have not been done so far and only a book entitled "Architecture of Laft Port" published by "Tehran University" Publications in 2001 is available. Some general studies have also been conducted sporadically by Iranian and Arab researchers. Therefore, having conducted this study toward completing the studies about this port, in the first part entitled "An Overview on Wind Catcher and its Function", we have dealt with location of wind catcher in the house plans. In the second part, i.e., "Morphology of the Wind Catchers", their constructional elements and components and also classification of their motifs-that are divided in two natural and geometrical groups were analyzed. Finally, the results indicated that since this Port is located adjacent to the Persian Gulf and surrounded by nature, most of the adornments used in the wind catchers are abstractly inspired from nature and sea and their colors are made of vernacular materials.

Keywords: wind catcher, laft port, shape, color

1. Introduction

1.1 Wind Catcher History around the World

Wind catchers have always been observed as ancient structures under different names in most parts of the Middle East including Pakistan, and the Northern Africa (Yarshater, 1989, p. 360). Wind catchers were built in different regions from ancient times with different designs. However, the important point is that despite of different forms they have the same function. In addition to Iran, there are wind catchers in India, Pakistan, Iraq, Egypt, the United Arab Emirates, either. Also, a few number of wind catchers have been seen over some buildings in the Mediterranean, Syria, Lebanon, Palestine and Turkey. This architectural element is called “malkaf” in Egypt and “badkhor” in Pakistan. Archeologists’ searches have remained inconclusive so far, because in their findings from each building, except the lower walls and buildings’ foundations, no information can be obtained from the upper parts of the buildings or little information is achieved. The only useful evidences probably are the remained paintings a number of which show that the history of using wind catchers in other countries refer to some centuries Before Christ. The simplest example of the wind catchers can be found among the Mochica Indians of Peru. They ventilated their houses by using the wind catchers. It is interesting that in this tribe, the image of wind catchers is drawn on the clay jugs on which a house of three floors with a lot of wind catchers. However, today, no wind catcher of any kind can be observed in the building industry of Peru (Mahyari, 1996, p. 44). In Egypt’s civilization and in a map remained from this civilization on papyrus in 1500 B.C, a type of wind catcher is drawn which is triangular and it is located on the rooftop of a luxury house belonging to a new king (Roaf, 1988, p. 4) (Figure 1). The primary information about the way of wind catchers’ function can be achieved from the simple passages which were on the tents of the nomadic tribes in Sri Lanka. In this structure, the weight of the tent is borne by a piece of wood which is protruding from the tent and while the tent is raised, and the side facing the wind is closed, there is a small passage on top of it which is capable to conduct the air flow to the center of the tent (Roaf, 1978, p. 7). Another type of wind catcher is seen in the paintings of the Tomb of Neb-Amoon who was a middle king of Egypt. Roaf asserts that these elements are the stairs leading up to the rooftops; nevertheless, he stated that the ones that the peak of angled roof is crossed by an external wall are most probably the wind catchers.



Figure 1. Dwelling house in Ancient Egypt with windcatcher (Roaf, 1988, p. 5)

2. Wind Catchers in Iran

Finding out the accurate history of wind catchers in the remained architectural works is very difficult, because the first sign of destruction in each building occurs in the ceilings and wind catchers. The ancient types remained from 8th century A.H onward are existed and the previous ones have been destructed. One of the problems of archeologists is finding evidences about architecture in regard to the history of Iranian wind catchers dating back to pre-Islamic era. However, the Venetian traveler, Marco Polo, who travelled to Iran in 13th century AD, talks about the usage of simple and primary wind catchers in Hormozgan cities and says: “in hormozgan, the weather is so hot that it is unbearable; therefore, its residents have tools similar to fans that conduct wind flow from outside to inside of their houses” (MarcoPolo, 1983, p. 228). Among the travel accounts of travelers in 17th century AD in which a description of Iranian wind catchers is presented, one can refer to Thevenot, Sharden, Tavernier, and Jhon Fryer. According to the conducted studies, the history of wind catchers around the world definitely dates back to before Christ of Iranian ancient hills such as Chakhmagh Hill; however, to decipher who devised them for the first time is a little difficult. Therefore, in accordance with Masuda explorations in Chakhmagh hill in northern Shahroud, the

history of wind catchers in Iran dates back to 4000 years B.C. (Masouda, 1974, p. 23). This important matter can be a reason for Iranians to claim that they were the people inventing wind catcher in the world because such kind of history about usage of wind catchers exists in nowhere else in the Middle East.

2.1 Studying the Wind Catchers of Southern Iran (Laft)

In the south part of Iran and Hormozgan Province, there is an Island called “Gheshm” being known as the largest island of the Middle East. A small port is located on the western north part of this island called “Laft” with a historical background which dates back to the Median Empire (Note 1) (Omatali, 2006, p. 45). Geographically, Laft is in a region with very hot and humid summers and moderate winters (Figure 1). Coping with high temperature and sultry weather is very important in these regions. Almost throughout the year, having shadow is necessary. Meantime, in addition to shadow, there is a need to use cooling and dehumidifier appliances for 7 to 9 months of the year (Ahmadi, 2013, p. 89). To solve these problems, the old natives of this port designed square and rectangular-shaped towers which were divided into four channels by some partition-walls which were the main factor in air current of the house and cooling appliance (Bahadorinejad & Dehghani, 2008, p. 94). These towers (Figure 3) are visible as vertical partition-walls on the roofs of the houses. At the first glance to the Laft Port, a large number of these wind-catchers on the top of the houses attract attentions in which their distinguishing feature is the decorative elements used in their facades.



Figure 2. Location of Laft on the world map

Among other features of this region is construction of houses near each other among the very narrow allies. In terms of the direction of their location, the houses are built toward the beach so that wind flow can rotate in the allies. Two types of introvert (Note 2) and extrovert (Figure 4) houses can be observed. The reason behind building these narrow allies is protection of the natives in the shadow of the houses' walls against the scorching heat of the sun.

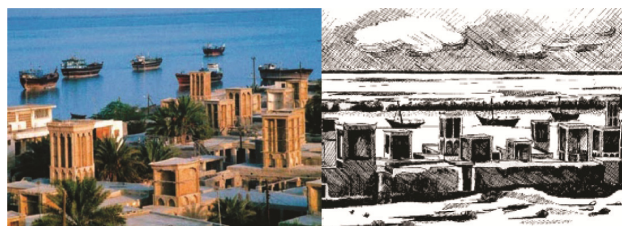


Figure 3. Right: landscape of Laft Port at Qajar period (source: Ghobadian, 2001, p. 43); Left: a view from Laft (source: authors, 2014)

3. A Brief Acquaintance with Wind Catchers of Laft Port

In terms of lexicon, wind catcher is attributed to a hatch or hole that is built in a house for wind (Dehkhoda, 2011, p. 46) (badger). It is also defined as: Wind duct in wall or roof of the house; a passage that is built on roofs or in walls of the house for air flow (Amid, 2010, p. 32) (Figure 4). Physical classification of the wind catchers has been carried out based on the numbers of their openings and holes. The roofs of all wind catchers are flat except one of them which has a domed roof and in order to drain rainwater, a water channel is provided on the roof of the wind catcher. In accordance with Figure 5, the wind catchers are built of three parts including: 1. Foundation, 2. Body, and 3. Harness. The Loft wind catchers were built with plans of about 3*3 m on a roof of the house which is used for taking rest, gatherings of family members, and sometimes for eating meals. Proportionate to the number of the wind catchers of a house, there are rooms. Typically, there are two wind catchers in everyhouse and only for small houses one wind catcher is provided (Malone, 2002, p. 120). Unlike the houses of the hot and dry regions, because of the high groundwater level, the houses here lack basements and mostly they have one storey while in some cases two storey houses could be observed either. There is a wind catcher room in the second floor of the two storey houses. The lengths of the wind catchers under the study ranged from 4.5 m to 8.6 m. In most of the cases, the channel of the wind catcher has been placed only over a part of the room (Figure 6) and this part was technically called the pipe room which was distinct from other rooms in different ways by mats, floorings and paintings of the plinths. In comparison to another part of this room, this difference creates a different physical feeling for a person under the channel. Also, in comparison to the wind catchers in the hot and dry regions of Iran, the wind catchers of Laft Port are shorter and they do not exhibit themselves with various heights but probably it could be said that most of the wind catchers in Laft Port have the same height or at least they have little height difference with each other. Their height from roof to harness is 4.69 m and from the ground it is 7.86 m.

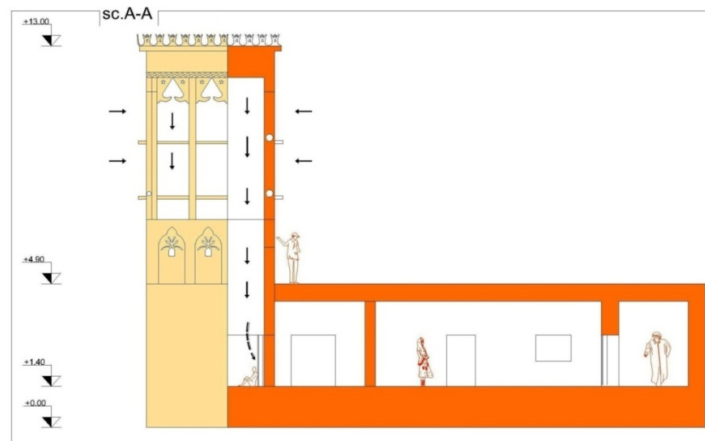


Figure 4. The function of wind catcher and air flow: the authors, 2004

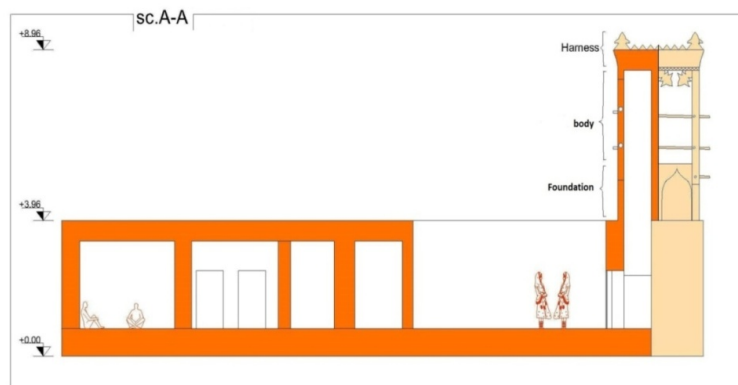


Figure 5. Display of general components of wind catcher, source: the authors, 2004.

4. Decorative Elements and Colors in Loft Wind Catchers

What is discussed as decoration includes two types of forms: firstly, the decorations that are added to the body of the wind catchers because of aesthetical reasons, and secondly, the forms that not only are important in terms of aesthetical dimensions but also are practical. Whatever under the title of decoration is used in the body of the wind catchers is called plaster work decorations that can be seen on the foundation, body and harness of the wind catcher. The majority of decorations used in Loft wind catchers have aesthetical purposes. The stalks of the wind catchers in Loft Port are integrated and they have no other horizontal dividers. The only cases that divide the stalk horizontally are the ones in which a wooden rafters can be seen which is used to provide stability of the tower. The vertical dividers are simple or with circular arcs having decorative purposes with no practical function. The penumbra made on the body of the wind catchers by these vertical dividers add to their beauty in the urban environment. This decoration has been used in those wind catchers that in their shelves the openings are divided by subsidiary partition-walls. It should be mentioned that lines are among the most prevalent motifs used in the wind catchers. The Loft wind catchers range from the simplest modes, in that they are only practical, to the cases in which abundant and various decorations can be observed. These motifs are attached to the body of the wind catcher after building the superstructure. By making inferences in the motifs of the wind catchers, different types such as arabesques, quadrants, shamrocks, heart motif, moon, sun, zigzag lines, sharp-end and undercut arcs and many other abstract designs were recognized and most of them are resulted from abstraction of the nature and a clear and direct relation with this abstraction. The ceilings of the wind catchers are rarely decorated by motifs. They have elevated and upward modes and some of them are only decorated in the corners. Most of them have multilayered and simple ceilings but in regard to the openings and external body of the wind catcher channel, more various decorations can be observed. In general, most of the decorative elements used in the wind catchers are divided into two groups of natural and geometrical motifs.

5. Natural Motifs (Abstracted)

In ancient Persia and Zoroastrian religion (Note 4), the nature and its elements were deemed to be sacred and sometimes they had divine features. In the message of Zoroaster (Note 5), respecting the nature, and protecting the earth, water, soil and plants could be perceived more than anything else (Mohammadi, 2008, p. 53). The mostly used motifs in the decorations of the wind catchers are the natural motifs which are divided into seven groups including: 1) Sun, 2) Moon and star, 3) Mountain, 4) Flower, 5) Helm, 6) Palm, and 7) Human which are presented in Table 1.

6. Geometrical Motifs

Geometrical motifs are among the traditional motifs used in the decorations of the wind catchers that are divided into three groups including: 1. Triangle, 2. Tangent circles, and 3. Lines which are explained in Table 2 one by one.

7. Colors in Loft Port

Loft Port is one of the most ancient residential places of human. When looking at this Port afar, the urban landscape seems to be white. Passing through the allies, these residences are located in longitude 55° and 5 minutes of eastern, and latitude of 26° and 54 minutes of northern. In fact, the geographical longitude and latitude and also the shining angle caused by it are the determinants of legibility degree of the colors in the region (Swinoff, 2002). The geographical longitude and latitude and also the shining angle caused by it are the determinants of the environmental quality degree, too and their value is not less than the works related to Cultural Heritage (Lenclos, 2000). The natives of this region stated that the colors of the context have recently been changed; as a result, it is possible that the extracted colors be a little different with the main colors (Bahadori, 1978, p. 238). To the majority of the citizens, these colors are relaxing and appropriate to the weather conditions of this region.

Table 1. Analyzing the natural motifs used in Laft wind catchers

Natural motifs	Sun	<p>Has had a particular status in Iranian culture and has been taken into consideration by human beings because of its brightness and shining that grant life to the earth (Jobs, 1991, p. 56). However, sun is more important for the inhabitants of the tropical regions and deserts, because it is their permanent companion. Without withholding and away from a mass of cloud it shines from dawn to dusk. It is one of the main and unforgettable elements of the daily life of the island's people and it is an embellishment of many of their handmade artifacts. In Laft, sun as circles and semi-circles (circles like sphere) is a symbol for the universe, heavens and the almighty God in east and west. It has been represented by wheels and few-petal flowers.</p>
	Moon and stars	<p>Are the symbols of celestial bodies and heaven (Samadi, 1367, p. 62). Due to the act that the job of a large number of native people is fishing in the islands, ports and coastal cities, because of great influence of moon on the tide, this motif is in priority. Water is related to the moon and this relation has a direct influence on the life of the region's people. Another symbol of the moon is a plant called Hooma (Note 6) which has sacred aspects in Iran and it is assumed to be grown on the moon. The motifs of stars are mostly in four-petal, five-petal and six-petal forms.</p>
	Mountains	<p>In the oldest legends, they have been known to be created first. This type of motif which is used as triangles and in single and multiple forms can be seen in decorations of the wind catchers (Coper, 2007, p. 53). Mountain is symbolized by zigzag lines and triangles. This motif is seen as a decorative element in lots of the wind catchers because there are some mountains in this portal village and the people of this region have used this motif in the decorations of their doors and wind catchers (Tazhibi & Shahbazi, 2006, p. 140).</p>
	Flower	<p>Rosette motif is one of the natural motifs which have been used on wooden doors. This motif was being used a lot in the art works of Achaemenian era. It appears that this motif is an integration of Dahlia (Nowruz Flower), Rose (the well-known flower of Iran Literature), Chrysanthemums, asters (having 200 species in blue and white colors) and Jonquil. Some other multi-petal flowers have been used either, and some of them in combination with the moon have made a circle being among the important motifs in Sasanian artworks. It is said that these three-petal and four-petal flowers represent a compass which are formed diagonally and this is because they show directions (Badban, 2013, p. 35). The motif of a four-petal flower that is reminder of the protection flower can be seen on some doors that are presented in a profile form with leaves. Hara Flower is highly significant to the island's people because it is one of the few flowers growing in the island. The motif of this flower can be observed above a triangle or in a vase on the doors.</p>

Rudder	Rudder is one of the motifs that could be observed in the wind catchers and doors of this port. Rudder is deemed to be an important object in the island because as a symbol of ship and barge it is reminder of the profession of many sailors and fishermen (Badban, 2013, p. 35). Also, in some way, rudder evokes the wheel of universe that is reminder of continuity and repetition and it has been the symbol of the sun and the wheel of fortune (Bakhtourtash, 2001, p. 195).
Palm	One of the motifs worked in some of the wind catchers is the motif of palm tree being surrounded by an altar-like framework. Palm is the symbol of life and religion in Gheshm Island and it plays a pivotal and valuable role in livelihoods of the local people. Also, it is used for flourishing conditions and greenness of the house, as well as for keeping the evil forces way (Badban, 2013, p. 35).
Human	In cosmology, human is the symbol of small cosmos and formed by the four elements in a small scale (Nasr, 2010, p. 98). Several men are hand in hand representing unity in Islam, unity mystery, shaking hand and swearing allegiance.

Table 2. The geometrical motifs used in the Laft wind catchers

Geometrical motifs	Triangle	Triangle is the symbol of mountain. Here, it is in the form of cypress which is the symbol of knowledge and eternal life after death (Hal, 2004, p. 293). Equilateral triangle is the symbol of the earth, isosceles triangle the symbol of fire, right triangle the symbol of water and scalene triangle is the symbol of air (Doburkour, 1994, p. 240). Wind also takes existential form as circulating air in the sky and it is shown in the wind catchers as a symbol of the sky by one or two triangles. Triangle is also known as signs of Mercury, Venus and Persian Divinities and all cuneiform characters (Note 7) are triangles leading to word formation (Eghtedari, 1970, p. 975). Triangle is the symbol of the triple nature, either (Hal, 2008, p. 17).
	Tangent circles	The motif of circle or rotating wheel is another symbolic motif in the wind catchers which represents some concepts such as perfection, integrity, unity, spirit of the time, balance, sun, cosmos and life. The history of this design dates back to thousands of years ago. This motif sometimes can be seen as multi-petal flowers and stars. At a confluence with each other, these circles create some four-petal flowers which are known as Canna or Madonna Lily (Badban, 2013, p. 35). In fact, since there is no beginning and ending points in the circle motif, it implies the eternity. Half-crescent is the symbol of arch in architecture (Rasouli, 2007, p. 23). Curves demonstrate power of flexibility and it is a beautiful element among visual elements. Altar is the symbol of servitude and worship and it is rooted in religious beliefs (Sadr, 2011, p. 71).
	Lines	Lines are considered to be visual elements in drawing. Various types of vertical, straight, horizontal, zigzag, and curved lines are used in architecture of the wind catchers. The sign of sand motion is wind or even sea waves. Sea wave is the symbol of water, fertility, and clearness (Doborkur, 1994, p. 76). In different civilizations, sea wave is the first element of creation from which all other things are created and it is the symbol of a cosmic ocean before creation of the world (Hal, 2004, p. 273).

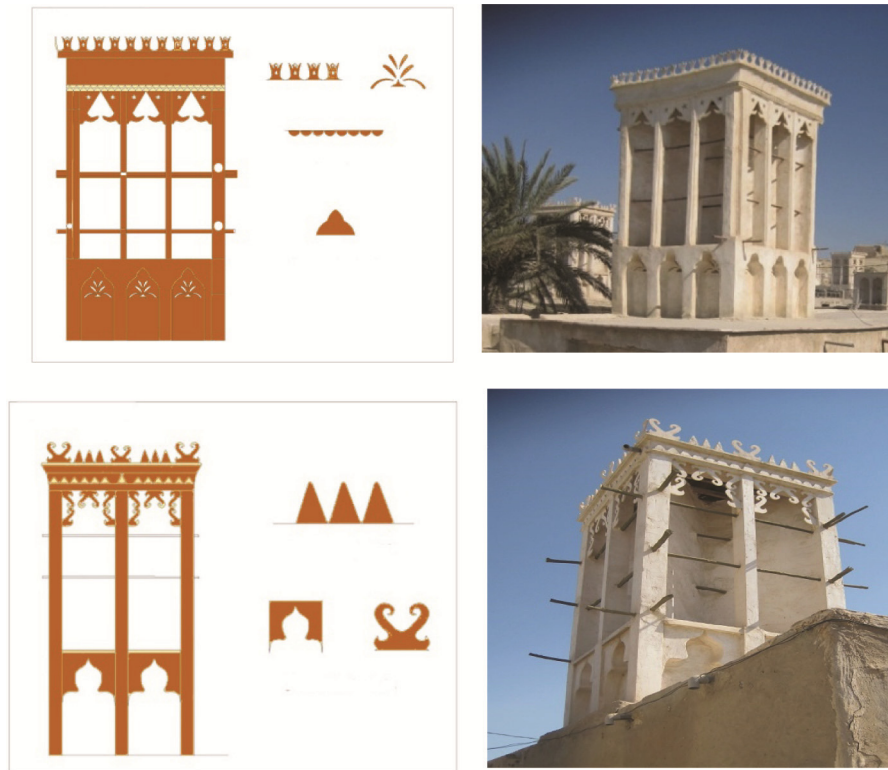


Figure 6. Adoption of the used motifs in 2 types of Laft wind catchers

8. Conclusion

The present paper dealt with analyzing the wind catchers of southern Iran (the historical port of Laft) and the decorations used in them. In addition to having a cooling application in houses of this port, wind catchers are conspicuous on top of the houses as decorative elements in appearance of the village. Typically, wind catchers are four-sided and its particular place in the houses' plans is the living room and the room used mostly in summers. Since this village is alongside of the Persian Gulf, the majority of the motifs used in the village's architecture have been abstractly taken from the sea while they have been divided into two natural and geometrical groups in this study. Most of these elements are natural including the moon and stars and the elements being adopted from mountains, sun, and sea waves. As the second factor effective in the architecture of Laft, color is considered as a visual element. The majority of the colors used in the environment of this village are white, cream, grey, and blue of the sea which provide feelings of security, tranquility and coolness for people. Accordingly, the authors came to this conclusion that due to the significance of the environment and its constituent elements in architecture and urbanization as well as the resulted tranquility from the positive effects of this architecture and indigenous decorations on human, extracting and analyzing these traditional motifs and their usage in modern architecture and art can be helpful for the designers and specialists in regard to architecture science and urbanization to disseminate and preserve human culture and civilization.

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Notes

Note 1. The name of Iranian Dynasty and Lineage in ancient times. The kings of this dynasty were from Persians.

Note 2. The houses with their yards at the center and the residential building is around the yard.

Note 3. The houses with their building at the center and the yard is in front, behind or around the building.

Note 4. The religion of the Persian prophet, Zarathushtra Asptman, Mazdayasna is adjective and it means.

Worshipper of Ahouramazda. Mazda is the One God. Mazdayasna was founded around 1200 B.C to 1000B.C from the Persian prophet, i.e., Zarathushtra Asptman.

Note 5. Zarathustra, Zoroaster, or Zarathushtra was the prophet in ancient Persia who founded Mazdayasna. He is also the composer of Gathas, i.e., the oldest part of Avesta. The time and place of his birth is not clear; however, speculations and documents have conjectured a time period between 600 to 6000 years before Christ for him.

Note 6. A sacred plant in Zoroastrianism without intoxicating features (Yahaghi, 2007).

Note 7. Cuneiform is attributed to those characters which have symbols like nails. Cuneiforms include various forms being used to write in different languages (Malvan, 1993).

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