

# A Survey about the role of geometry in Iranian landscape architecture

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*Abstract:-*The east has been always well-known in the stories and myths for its evergreen gardens and sites, which The plain sample can be the suspending Gardens of Babylon. The eastern people have always had an special attention toward green sites. Among them, Persian people have a very long history in gardening and designing open-air spaces. In fact many believe that the gardening styles in Iran and China are the oldest ones in eastern landscape architecture. (Iranian Gardening style was adapted(used) by many other nations later, which the examples can be seen in "Taj Mahal" site in India and the "Lion yards" of "Alhamra palace" in Spain.)

The most important researches in the field of Iranian gardening is generally related to old and traditional gardening methods of this country and there's less attention toward contemporary works, whereas landscape design has kind of differences from traditional style, but it also has the same characteristics which have been derived from eastern viewpoints. For example, a sort of geometry (which is inspired by Iranian philosophy) has a great role in both traditional and contemporary "space creating" and "landscape architecture" of this country. This paper is to survey the Iranian landscape architecture style, from previous to current works, and to explain some features of this style, especially the role of geometry in its forms.

*Keywords:-* Landscape Architecture, Persian art, Geometry, Gardening, Char Bagh, Bagh, Axis

## 1 Introduction

In Penguin dictionary of architecture there is a definition of landscape architecture: "The Art and Science of creating open-air spaces as environments of human-life"[2]. therefore it can be said that Persian people are of the first ones who found the importance of open-air & green spaces and their role in promoting the quality of life.

According to Iranian old myths, Iranian ancestors had lands covered with green surface and jungles and rivers but little by little it shifted into a dry place. Due to the same reason, Persian people were always founding their homes (and even their cities) enclosed by gardens and green sites [4].

The word "Paradise" used in many European Languages, is basically a Persian word consisting of two parts:"pairi" and "daeza". "Pairi" means Around and "Daeza" means culturing (and constructing walls). According to this, "Paradise" is defined as:"culturing flowers and trees around the building". Today this word in Greek is used as "Paradeisos" meaning park and in French is "paradise" as same as its English Meaning(heaven gardens)[4]. Persian people have another word for this kind of beautiful and green spaces, and that is "bagh".(which is similar to word "garden" in the west)."Bagh" is a metaphor of heaven green

spaces.(an area with a high and green surface where paradise rivers exist). Iranian style of creating "bagh" inspired many other nations such as Arabs, Indians and Europeans(especially in medieval times).

## 2 Problem description

Iranian "bagh" has special features which has made it different from other kinds of open-air and green spaces of other civilisations. Some of these features are:

- Garden construction in Sloping surface
- Surrounding by wall
- Symbolic and metaphysical meaning of existing elements in "bagh". (pointing to paradise )
- Respecting water as one of the main elements of landscape. ( in the climate of Iran, water is rarely found, therefore the designer shows water in different ways in which the depth of water seems more than it really is. This exaggeration in the water exposure is achieved by using stones called "Sineh Kabki"; which cause the sound of flowing water to be heard too).
- Using a lot of trees instead of covering sites with grass. (because tree has the features of making shadow and is more suitable for dry and hot climate of Iran).

- Close relation between architecture and nature. It can be said that building and environment complete each other (which is similar to Chinese garden).
- "Bagh" is not made only for aesthetic purposes ;but it is a place for agriculture specially culturing fruitful trees.

But what really distinguishes Iranian "Bagh" from other kinds of landscape, is it's caring about geometry. Basically one of the main features of Iranian architecture is the role of geometry in it. This has a root in Iranian philosophy. According to Abonasr Farabi, Philosopher of 10<sup>th</sup> century(AC) architecture is based on Mathematics and "Heial". Farabi's definition of "Heial" is:"Artistic work with geometrical forms"[3]. So we can call Farabi as "Iranian Vitruvius".

In Iranian "Bagh",such as its architecture, there was a close attention toward geometrical forms which was shown in designing spatial coordination and creating 3D geometrical forms and 2D ornaments of "Bagh" buildings. In Iranian Architecture the system of coordination (where the main numbers are used) is based on geometrical characteristics of square, semi Square, Equilateral triangle and pentagon. but in "Bagh" designing (Iranian landscape Architecture) the main attention is toward square (and other rectangular forms). (As mentioned before, square has a symbolic role in philosophy and Islamic Culture and points to four rivers of paradise described in Quran. It is also a reminder of four holy elements : water,wind,soil and fire).

The form of square is suitable for garden design practical challenges; because it shows the distance between garden elements obviously.either Iranian "Bagh" consists of square units(modules) called "carets". In each "caret" certain kinds of plants or trees were raised .while culturing trees there was a great consideration to determine exactly the place of culturing from each side; hence "carets" with regular rows of trees would be created .

The first samples of this type of gardening could be seen in Pasargad royal "Bagh". This garden was founded in process of making a capital for the dynasty of "Achaemenian" (about 500 years BC)[4]. It is considerable that the main form of this "Bagh" is rectangular.(in spite of carets which are generally in square forms). This form has a lengthwise and a widthwise axis, and this sort of geometry based on different axes can be the main feature of Iranian Gardening style.

In Iranian Gardening, in the main lengthwise axis of garden there is always the main flow of the water and at the intersection of this axis with the widthwise axis, the main building of the garden called "Koshk" is located. This building has various functions in Iranian different "Baghs". In some it is residential and in others is used

for official or governmental purposes; it's plan can be square, rectangle or hexagon.



Fig.1 View from Pasargad royal "Bagh"

In front of "Koshk" (and on the lengthwise axis of "Bagh"),there is a long street located in the main view ; which ends to the entrance building of "Bagh". In this space, some kind of trees were planted which wouldn't become too tall(as visual obstacles) but were always beautiful [1].

Lengthwise and widthwise axes of the "Bagh" divide it's space into four parts and this is the base of word "Char Bagh" (meaning four Gardens), which is one of the main key words of Iranian landscape Architecture.

"Char bagh" as one of the most important persian landscape styles, in the period of Islam grew to top and many examples were founded in different cities. Some of them are: "Kashan Finn Bagh" , "Dolatabad bagh" , "Shiraz Jahannama Bagh" and Etc.

It should be considered that however gardens, all more or less are having common specifications, but depending on the place of "Koshk" (intersection place of lengthwise and widthwise axis of garden) have had differences too. For instance, sometimes the main building was in the middle of garden and was seen from four sides (like Shiraz Jahannama "Bagh") and the subsidiary and entrance buildings were around it; or the main building was in one side and the subsidiary buildings were around and the main view was along the



lengthwise axis of the garden (like Narenjestane Ghavam).

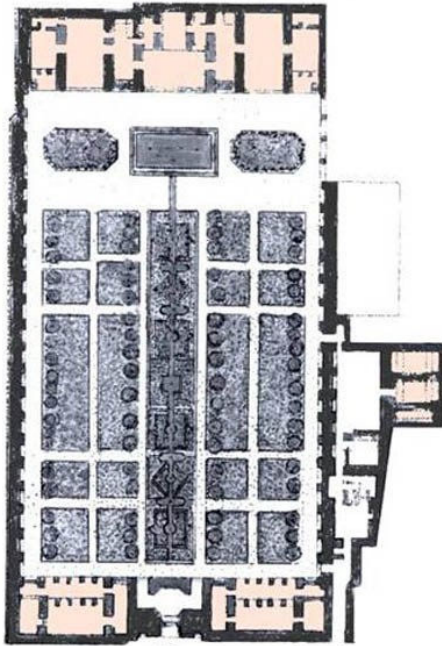


Fig.2 A sample plan of Iranian traditional "Bagh"(Narenjestane Ghavam)

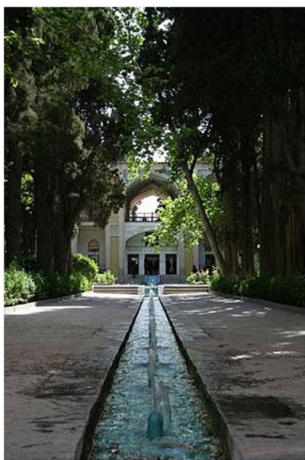


Fig.3 View from main street of a sample "Bagh" to "Koshk" building

The components mentioned are seen more or less in all Iranian gardens after Islam before the contemporary period(620-1750AC). However, since two centuries ago remarkable changes occurred in Iranian art and architecture and following that in "landscape architecture". Simultaneously with westernization of traditional society of Iran, Persian art and architecture was not away from this issue too. In Qajar era(1750-1921), Iranian architecture was impressed by prevailing styles of that time in Europe (like Neo-classic and art-

nouveau); and this issue continued in next periods (especially in Pahlavi era( 1921-1978 )).

In this period, although a group of Iranian landscape planners were to copy western samples (like Saad Abad garden); but another group of them took efforts to combine western landscape design with Iranian gardening principles. This group were loyal to principles of Iranian "Bagh", moreover entering some positive components of western parks into their works.

One of the best examples of this approach can be observed in "Azadi square" in Tehran(1965). This square that today has become symbol of Tehran, capital of Iran, is an extraction of common squares in English style of landscape architecture.

In design of "Azadi square", wide range of grass has been used as green space ; hence it is different to Iranian traditional gardening based on planting trees and creation of shades. In fact, the green space used in this square has aesthetical aspects and no specific function can be considered for it. Around the site no wall is seen and it is open.



Fig.4 Aerial view from "Azadi square"

But, the geometry as the main principle in Iranian gardening is clearly observed in designing this square. although the form of "carets" is not square, but still regular geometric forms are used. The main structure of work is based on a lengthwise and a widthwise axis (that is along the main street of city called "Azadi Street"). At the intersection of these two axes, the main building is located with post-modern style. Although the building is different to traditional "Koshk" palaces in terms of form, but prevailing proportions of Iranian traditional architecture are observed in its design. The architect of this building (Hossein Amanat) has applied traditional elements (like arch) and details in his design. The function of this building is not residential or governmental like old palaces and it is used as a cultural center. Use of water zone as one of the fixed elements of Iranian landscaping is seen in design of this complex.

Jamshideh Park (bagh)(1991) at north of Tehran is another example of Iranian modern gardening. This garden has been constructed on the ruins of an old Iranian "Bagh" by conservation of the old structure. Full adjustment with ground topology and stone face of surrounding nature is among specifications of this garden, while taking efforts for compatibility with its today use as a park (with western concept and as a place for recreation).



Fig.5 Plan of Jamshideh park

In Jamshideh park(Bagh), after drawing the main idea on the ground, the design method during performance for details has been selected. In this method, the details are designed without previous plans and added part to part. The material used in the construction of elements and floor of the pathways were from stone(of adjacent mountains). So this garden is considered as a sample of western organic architecture.

Flowing of water in Jamshideh park is one of the important principles taken from traditional Iranian gardening. The water is provided from the fountains in neighboring valley and is flowing by the force of gravity in the streams and finally reaches to the lake that is seen from the park's entrance.



Fig.6 The main lengthwise axis of Jamshideh park

Although general plan of the park is seemed as a kind of libre plans taken from modern architecture, the prevailing geometric principles in Iranian traditional gardening are observable in it. Axing as the most important indicator of this planning has the main role. The main axis which has been designed as a ramp is from north to south.( It is a green colonnade that starts from the southern gate of the park. It is the main landscape and the axis of the old garden and is currently the main pathway of the garden).

The other axis with an interesting design, is almost parallel to main axis and is a mixture of stairs ,ramp and water flowing. Three east-west widthwise axes are completing the main structure of the garden. But the important point in geometry of the park is that transforming of main paths to free paths and geometric spaces of "carets" to organic and natural ones have caused spatial diversity in this park. Natural slope of the mountain and its spatial divisions have helped this issue too.

### 3 Conclusion

The art of Iranian gardening derives from traditions, beliefs and culture of Persian people. And during the time it has always had a common formal and structural characteristics disregarding some differences. Caring about geometry (especially based on regular forms like square, hexagon, etc.), full attention to axing, designing main landscape in the lengthwise axis of the "Bagh" that is extracted from Iranian philosophy are among the fixed items in Iranian landscape design.

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