

A Study on Soil Architecture History in Iran

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ABSTRACT

Naturally, soil is the essence, starting point and last stand of both human body and soil. Soil is not only is kind of building material, but also it plays a considerable role in traditional structures as a local material in different climates and regions. The main reasons behind soil utilization as constructing material are its considerable resistance index, easy accessibility, reasonable operational expenses, environmentally-friendly feature, less wastes and use of local resources. In traditional point of view, adobe is not a bare building material, but, it defines specific role to soil and land. The most original and the oldest form of Iran' architecture is soil. Surprisingly, the soil architecture of Iran is some centuries ahead of that of other pioneer countries. The main objective of present research is to study the history of soil architecture in Iran. The searching method used in this work is descriptive -analytic. The case samples mentioned in the article have been represented in a descriptive -analytic table after studying the mass of information. According to obtained data, it can be stated that the study of soil-architecture history in Iran can be of magnificent effect on knowing potent soil-architecture of Iranian's ancestors and also knowing useful effects of soil-architecture in some part of the country and retrieving the method in modern Iran.

KEYWORDS: "Soil ", "Architecture ", "Climate ", "Iran ".

1. INTRODUCTION

Human natural body is soil and his nature is raised from soil and again return to soil. Soil architectural body like human body rises from soil and finally returns to it. During thousands of lives, human leaves a legacy of works which narrates his manner of living [1].

Human started his life in very primary shape and form. Gradually, upon economical revolutions, he reached to new stage in about ninth to seventh millennium B.C; the researchers and archeologists named that stage of life as the era of establishing or residing in villages and interpreted such transformation as Neolithic Revolution in an evolutionary movement. In this stage, human gradually succeeded in establishing and constructing shelters which meet his need for residing at different seasons of the year at a special place. Little by little, the first real architectural samples were made by human upon using more resistant constructional materials like mud and rock [2].

The soil, the valuable material by which human nature is raised, became one of the most important constructional materials in establishing human shelter as time passes. This flexible material in its simplest shape, i.e., strata and clay was used for constructing the first shelters and the first clay houses made by human were construction upon using the. Using soil in shelters goes back to 7th and 8th millennium B.C. [3].

Soil not only is used in constructing house but also it is used in many other arts like conceptual art.

Conceptual art is one the important tendencies of 1960's in west art. In this theory, concept is important not the manner of its presentation, artist's thought is important not the artistic object (image No. 1).

Different artists did diverse arts like garden decoration to land art by soil (image No. 2) [4].

According to classical view, nature is great face and manifestation of the Almighty. Soil is holy due to proximity with human ego. All nature is his signs and on the other hand, there is connection between all the beings. Since soil is the main element of this nature and creator of human nature, it is holy and unique [1].

Prophet Mohammad said: god consider his nation and make the entire world as his place of worship. This is the architecture which shall regenerate the state of peace and calm in crowded places which is found all over the nature. Soil as one of the holiest nature elements causes establishing such spaces for human [5].

Scholars such as Hafez and Mollasadra believe that human growth ground is nature. Work is practice body and soul cannot do anything without body, the body which is raised from pure soil [1].

Particulars of architecture with soil

Architecture with soil rooted in constructing human cities. First human societies started about ten thousand years ago in Mesopotamia with raw brick. This architecture is spread from north Europe- Norway, Sweden, Denmark to England, Germany, France, Spain, Italy, and Morocco, western, eastern and central to South Africa. Nowadays, about one third of human are living in house made from raw brick.

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The most original and oldest figure of Iran architecture is architecture with soil. Courageously, it can be said that the soil architecture in Iran has been progenitor that similar architecture at other world areas. 65000 villages and big and small cities in Iran are mostly constructed with soil or a combination of soil with other materials [6].

Record of using brick and brick in Iran architecture

Table No. 1: record of using brick (source: editor: 2014)

Period	Characteristics	Period	Characteristics
9 th and 10 th millennium B.C	<ul style="list-style-type: none"> Brick and stratum were not invented. The houses are simple holes which are created by excavating the ground. 	8 th millennium B.C	<ul style="list-style-type: none"> Prevalence of hand-made brick. Using mud mortar among bricks and mud plastering for walls coating. Corner building of walls with mud. Prevalence of long and tall bricks.
7 th millennium B.C	<ul style="list-style-type: none"> Using hand-made brick and stratum. Using brick for cutting spread paste on ground. Processing mud paste. Creating troughs in brick for better transfer and connection. 	6 th millennium B.C	<ul style="list-style-type: none"> Probability of using wood for ceilings.
5 th millennium B.C	Using bricking molds (beginning of revolution).	4 th millennium B.C	<ul style="list-style-type: none"> Using molded bricks for construction.
3 rd millennium B.C	Using molded brick and stratum.	2 nd millennium B.C	<ul style="list-style-type: none"> Using micro brick in brick making. Using china technique under heavy floors
1 st millennium B.C Medes	Prevalence of decorative plans with brick	1 st millennium B.C Persians	<ul style="list-style-type: none"> Isolation of clay with tar Using brick for floor making of several spaces Executing flat ceilings with bricks which are put in length
1 st millennium B.C Parthians	Using rock for covering clay volumes	Sasanian	Making concrete domes

Construction methods with soil

Although construction methods with soil have apparent differences in all over the world, from among all of them, two main methods can be recognized. The first method is constructing with mud stratum. In this method, the soil is compressed in lateral molds of thick-set wall for at least 50-cm. these molds are embedded in walls during work progression.

The second method is constructing with straw flower clay. This clay is straw flower which is dried after molding in sun (image No. 3) [6].



Image No. 1: land layout art by soil



Image No. 2: conceptual art on soil

Brick and stratum

The oldest and simplest constructional material is stratum. Stratum is in fact a combination of water and soil which made it as portable parts, put on each other and make wall [3].

Tradition and technology in classical view of brick not consider it merely as a constructional material, but plays a role in architecture via the soil and ground [7].

Considering brick encompasses a range of values, the main its branches include:

Historical, artistic, architectural and technical [8].

Originality of brick and its valuable indices

Static efficiency

Apart from direct responding to pressure forces, brick can have positive response against other forces somehow [8].

Safety and environmental efficiencies

Regarding the discussions on immunization against noise pollution, immunization against increasing or decreasing temperature, having cultural indices of



Image No. 3: brick making as straw flower clay



Image No. 4: brick decorations on wall

classical place is studying [8].



Image No. 5: brick texture



Image No. 6: Bam citadel complex

Decorations and clay texture

Decorations

In architecture of ancient world, considering primary needs of human and building statics were important and decoration had secondary importance. Sometimes, the decorations are for helping building statics and does not have only aesthetic aspect for example, in Zagheh village, the inner surface of wall of a living room are coated with painted tiles, this method of decoration is for helping the wall's statics (image No. 4) [3].

Findings

In clay decorations and facades, we can study two different textures:

1. Individual texture of clay or straw flower
2. Combination texture

In individual texture of clay or straw flower, only these materials are used for decoration and in combination texture, other material apart from soil materials are used in decoration (image No. 5) [3]

Studying case studies

Bam Citadel, the world biggest brick and mud complex (image No. 6)

Bam Citadel is the biggest brick structure in the world which is located near to Bam in Kerman province. This building is related to Sasanians and its foundations were prior than that and have exceptional design [9].

This citadel has an area of about 180,000 square meters. This complex includes governmental, peasant dweller and big and luxury houses. On 26 Dec. 2003, Bam citadel was almost fully destroyed due to severe earthquake in Bam and its suburb. Historical record of Bam citadel goes back to about 2000 years ago according to historical writings like the limits of the world and minister history (image No. 7) [10].



Image No. 7: ruins of Bam citadel after earthquake

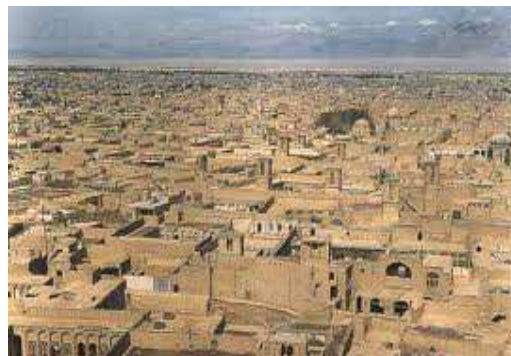


Image No. 8: view of Yazd

Desert capital

Yazd is located at the central plateau of Iran and in the Yazd-Ardakan plain. It is believed that the central part of the Iran plateau, which is located in Yazd and nowadays it is a desert region, was once covering a big sea which gradually transferred to smaller lakes. Since 7000 years ago, the sedimentary coasts of these lakes were transferred to ranges and shrubbery and human residents lived in them. By the 7th century, Yazd had a desired weather and green suburbs while due to climatic changes and unusual use of land, it gradually transferred to a dry region. Yazd is mentioned as a desert city with titles such as desert



Image No. 9: view of brick buildings of Yazd



Image No. 10: view of Bilqis

bride or desert capital (image No. 8-9) [9].

Bilqis as the second brick and mud city in Iran




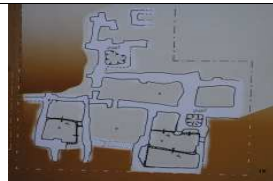

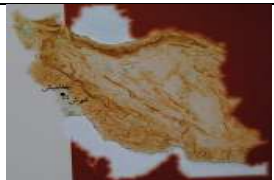



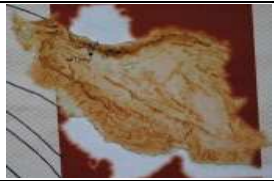










Bilqis is one of the remnants and ruins of Esfahan plain which is put beside its beautiful nature. Esfahan has much prosperity and civilization due to its location on the Silk Road.








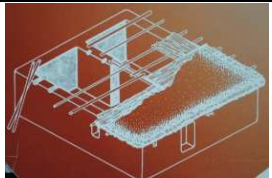



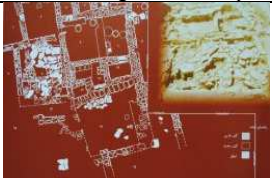
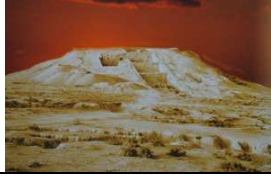



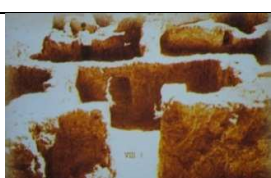
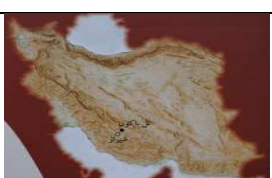




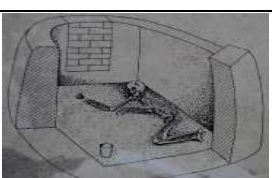

Regarding the antiquity of Esfahan plain, no precise opinion can be said while having studied tiles at chain hills, 40 Dokhtaran, Aminabad, we can realize the antiquity of at least 8000 years of Esfahan history. The antiquity of Bilqis is related to the pre-Islamic era and it is related to the Safavid era.


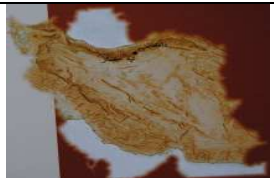















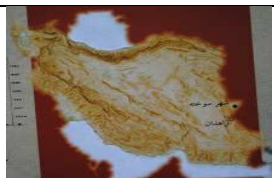

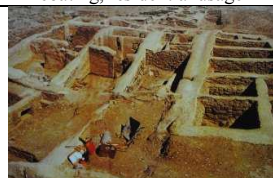




Koloneel Beit wrote in his itinerary: ruins of Bilqis are composed of two parts of citadel and city. Citadel has 360-m length and 135-m width and 48600 sqm area which is located on a surface 6 to 9-m height above the surrounding grounds which created totally 29 towers with different sizes on its surrounding (image No. 10) [10].

Studied case studies constructed from soil in Iran surface at different centuries (table No. 2)

Table No. 2: architectural case studies with soil in Iran (source: editor, 2014)

City or village	location	Antiquity/ history	Explanations
Cekhmagh Rock area	8-km north of Shahroud	End of 8 th millennium to first of 5 th millennium B.C	Type of building is residential and probably religious, the walls are straw flower and floor is coated by soil
			
Cheghmayesh	Khuzestan, south Dezfool, north western part of Shoosh plain	4 th , 5 th and 6 th millennium and 1 st Achaemenian millennium	Type of building is residential-general, wall made of brick in 40, 50, 60-cm thickness
			
Zhagheh Hill	60-km south of Qazvin	Half of 7 th millennium by end of 6 th millennium	Compressed texture having lane, street and squares, buildings made if brick and stratum, the oldest curve cover of 7000-years old
			
Ganj Darreh Hill	10-km west of Harsin	6 th and 7 th millennium B.C	Rectangular rooms with circular angles, walls without foundation, walls made if straw flower
			
Alikesh Hill	Northern Side of Khouzestan plain	7 th millennium B.C	Rooms size are very small, wall are irregular and bricks in 15 and 25 dimensions and thicknesses between 5 to 10-cm
			
Silk	3-m south western of Kashan in Fin Rd.	6 th to 8 th millennium B.C	Mud houses without foundation with residential usage made if molded mud and brick with finger print and stratum floor

			
Haji Firouz Hill	2-km Souldouz, west Azerbaijan	Neolithic era, 6 th millennium B.C	Using stratum in wall and compressed mud and brick in floor with residential usage
			
Goudin Hill	Between Hamadan and Kermanshah	5 th millennium B.C	Brick and stratum in wall with residential usage and chariot path
			
Yahya Hill	Soghan plain, 225-km south of Kerman	4 th millennium B.C	Raw brick in wall and soil in floor, residential usage or castle
			
Tell Bakon	30-km south eastern of Takht Jamshid in Marvdasht plain, Fars	4500 to 3400 B.C.	Walls made of straw or brick with residential usage, open area between houses for connecting them to each other
			
Tel Iblis	Mashiz valley, Kerman	4000 to 3000 B.C	Brick walls with residential, warehouse and religious usage, signs based on exchanging Iblis copper with Mesopotamia tile
			
Hesar Hill	3-km danghan	5 th to 2 nd millennium B.C and Sasanians	Using stratum in main walls and raw brick in side walls with residential usage

			
7Tavan hill	North west of Uremia lake, Salmas	4 th millennium B.C, Sasanies	Irregular bricks arranged on wall with residential, warehouse and bazaar usage
			
Zigvart Chegazanbil	Khouzestan- Shoush plain	3 rd millennium B.C	Using three kinds of raw, cooked brick and raw brick mixed with broken cooked brick
			
Shah Hill	13-km north of Gorgan	3200 to 1000 B.C	Using stratum for wall, raw brick for foundation and kneading mud for floors, residential usage
			
Burnt city	50-km Zahedan to Zabol	3200 to 1800 B.C	Walls made of war brick and a coating layer of straw flower and brick floor with straw flower coating, residential usage
			
Korshahi castle	20-km north of Doroud along desert	Qajarid era	Building fully constructed from brick which is elected as the most beautiful global brick building after Bam citadel
			

3. CONCLUSION

From among the advantages of brick, we can mention the easy construction, accessibility, low cost, esthetic characteristics and positive thermal characteristics which causes their spread use.

Restoration and keeping brick buildings do not need much cost, meanwhile brick is one of the proper environmental materials which is composed of natural elements like soil and water and is recyclable that means when building life ends, it can be returned to land with crushing or wetting easily without creating destructive environmental effects.

Brick has several disadvantages which limits and in several cases makes it impossible for using in today's architecture. Low mechanical resistance, low resistance against humidity, wet, pressure and also severe contraction in drying cause reducing its use.

Iran's last architecture is valuable and honorable, give honor to the soil and gives dignity to human, it passes the efficiency, and aesthetic and think for greatness. Translation of signs was divine, Unity, respect and knowledge and wisdom is manifested in brick, and rock. Last architecture was Iran architecture.

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