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THE ROLE OF SOIL AND LAND FEATURES OF IRAN NATIVE ARCHITECTURE &ENERGY MANAGEMENT AND SUSTAINABILITY

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ABSTRACT: *Today, management of consumption energy is important for architecture. Traditional buildings in Iran have employed some ingenious passive techniques especially in hot regions in order to restore thermal comfort and coordinate with the local environment and climate. Architecture soil is ancient Iranian architecture and the use of soil qualities such as high thermal capacity and thermal 7-hour delay in the management of energy consumption and achieves sustainable architecture and green. In this research, study native architecture in order to introducing appropriate solution for achieving sustainability. The methodology of this study is descriptive –analytic and collecting data is done by documents-library.at finally, has been proposed strategies in about mention method in order to achieving sustainable architecture in Iran.*

KEYWORD: *Sustainable architecture, soil, energy, Iran native architecture*

INTRODUCTION

Buildings in every area are products of needs and knowledge of their habitats. Traditional buildings which were formed in a long period consist of many aspects that show a harmony and unity with environmental and local climate. In recent years many qualitative and quantitative Researches focus on traditional buildings to underline functional and aesthetic principles involved in their formation and tried to evaluate their thermal performance (lee et al,1996; Oaka, 2002; Sharples and Malama, 1996; Jingxia, 1996 and Sozen and Gedik, 2007). Reducing energy consumption requirements, using natural resources and providing comfortable, healthier and sustainable living spaces are the aims of a climatically responsive sustainable building design (Hui, 2000). When sustainable design and construction strategies of Iran's traditional architecture are under scrutiny, it makes possible to observe how traditional buildings and settlements in this region were designed in harmony with the local cultural, topographical and climatic conditions and how their design and construction could be integrate in today's design practices (Manioglu and Yilmaz, 2007).

Among the many strategies used in the traditional architecture of Iran, deep underground spaces called *Shavadan* were used in hot and semi-humid area of the southwest of Iran in Dezful and Shoushtar as a passive and natural strategy to provide thermal comfort. After the advancement and development at human being societies' at recent years, necessity of pay attention to human being, nature, natural sources and their sustainability has been increasing. About this matter, the most important aims of experts' efforts are related to the optimal usage of natural sources, ecological features, usage of cultural natural patterns and at the last suitable designing according to present needs. However, according to the some researchers' opinions, pay attention to the qualitative points of architecture and designing has been considerable but it seems necessary the necessity of their continuity. This concentration is related to the continuity of some problems and some mentioned shortcomings at universal scale, especially

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in relation to natural environment and limitation of it resources' and cooperation way with them by architects at specific geographical conditions (Rahbar, 2001).We can investigate at this direction, used methods at native traditional buildings as symbol of sustainable solutions then reconcile them by today's technological advancement to the present new concepts and ideas. At the present age, because of following modern life parameters, it isn't easy to create thermal facilities by non-fossil energy. Anyway, at the least possible space, we should make houses that satisfy the needs of human beings comfort at the all seasons. The best pattern of these houses can be found at our country traditional architecture. In fact, past lifestyle was so human being could reach a peaceable coexistence with his environment so that satisfy his needs and didn't hurt to the nature (sustainable architecture). The houses at the depth of earth, air-trap, domical roofing, thick walls, central court…….. These were the survival secret of previous generations. At the hot and dry regions of Iran, we can see examples of this coexistence with nature and in fact sustainable architecture. At these regions, domical roofing has a unique property and it's related to receive the least of sun radiation that this property can prevent high increase of temperature of building. Also, it creates an internal space that concentrates warm air at high part of house and under the dome. The being of HawzKHane (the part of house containing piscine) (underground) had half-open roofing that at the effect of wind and its hit with water and it created desirable weather. Sometimes Badgir (air-trap) were in place of half-open roofing. The exploitation of half – open roofing.

RESEARCH METHOD

The methodology of this study is descriptive –analytic and collecting data is done by documents-library. The data are generally gathered from scientific centre libraries like universities, organizations, institutes and research centers such as management and planning organization and internet, official statistics and censuses, urban development plans by consulting engineers, field study and so on.

The methods of using from soil in order to regulation environment

At first, human has been seeking in order to interacting with environment and achieving comfort. Some methods are:

- Nomadic life and move and find better conditions in winter and summer climate and life without the need for the establishment of permanent settlements.
- Live in permanent settlement by using Civil and architectural facilities.

Land and soil in place with all his strengths and weaknesses have been available facilities and existing materials, to creating buildings and spaces. Indeed, native architectural in desert region has been used from soil as the best material in order creating human settlement.

Using from soil in order to creating architectural space

In this method, native architecture use soil as adobe in order to build walls and roofs with various methods. Also, there is high difference between winter and summer temperature and between morning and night, so using native material such as (adobe) have important role in setting condition. The famous sample of using this method is desert region in Iran country that there is high difference temperature.

Making ditch

One of the main methods of natural potential is, Excavation of land. Also, using them in huge scale in order to making adjacent buildings. For example, could be mentioned ditch, barrier,

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reservoirs and refrigerators in historic and old cities. In many village and cities used from ditch as wall of refrigerator.

Figure 1: ZARSIF refrigerator in Kerman city. Iran
Source: Documentation Centre of the Faculty of Architecture and Urban Planning, Shahid Beheshti

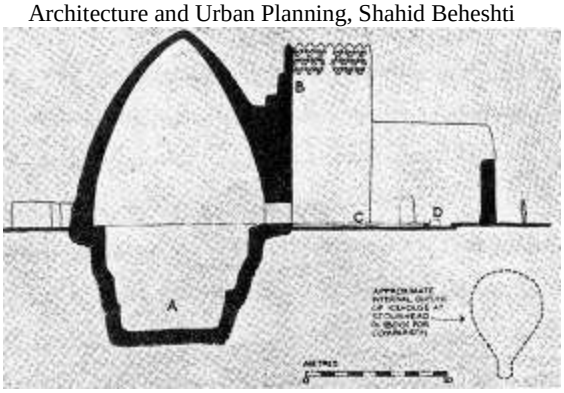

Figure 2: section of refrigerator

Using of drilled Space in an outstanding natural feature of the earth's surface

Often this type of architecture created by drilling holes in the rocky hills and mountains. Rocky architecture is permanent architecture. It has been resulted human struggle with the rock in order to create a favorable climate and serve them.KANDOVAN and MIMAND are famous examples. Also, BEHESTAN castle is other famous rocky architecture in Iran.

Figure 4: BEHESTAN castle

Figure 3: derailed space by human, BEHESTAN castle

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Using of space in underground

One of the logical solution in desert climate is, using basement. There are successful samples as building and basement town in Iran. This architectural has been seen in warm climate in Iran. There is mentioned architected in residential region in Kashan and Abarqu cities.
In abarqo, according kind of soli, hard layout is as roof. In Kashan, there is Conglomerate layout, it is suitable in order to creating especial architected.

The following residential units adjacent to or crossing has developed. Besides brick architecture of these spaces are used as an integrated architectural space is created. The space in the brick architecture was used as an integrated architectural space is created. Even the style of decoration on the walls and ceiling of the space is designed in a way to convey the sense that more help is very noteworthy. Passive in a way that resembles carved complete with brick and brick architectural decoration Dard.gah with plaster forms (often geometric) carved on clay tablets or agenda-setting role has been created on the grouting.

Mainly geometric designs that have been used in the ceiling decoration in the form of an association are brick arch. What was particularly noticeable in the decorations, freedom and diversity of the roles. The architect designs the decoration because of false due to restrictions in terms of decoration, not static, and freely drawn lines more diverse, and sometimes traces of King observed Node's architectural decoration of the constituent's nodes traditional,.

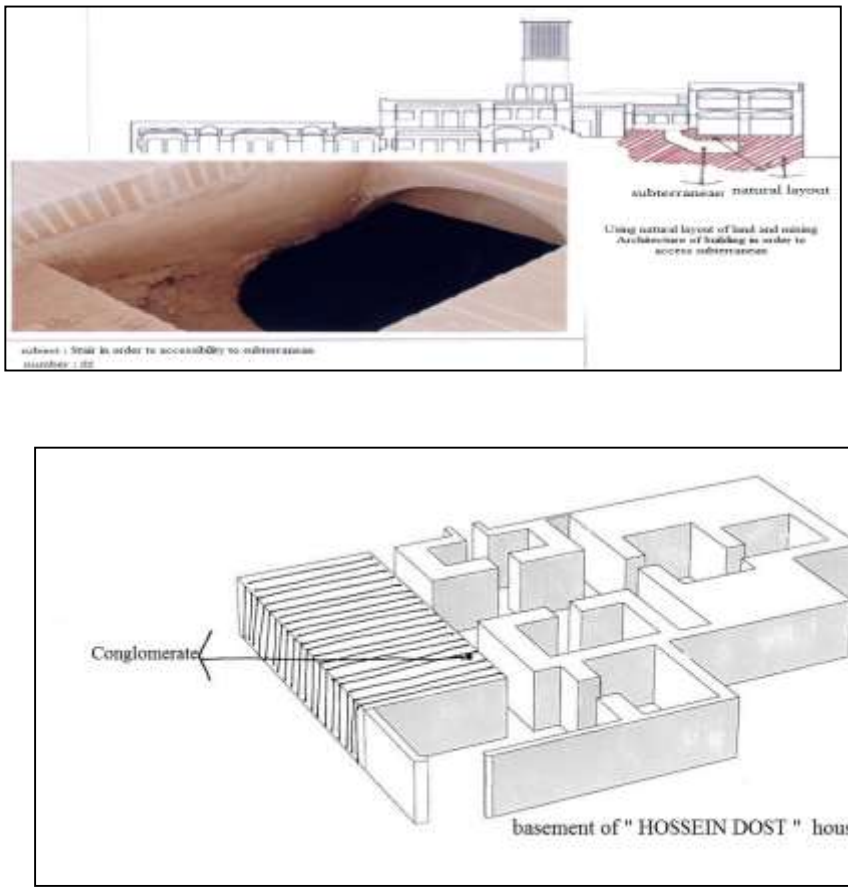

Figure 5: House of the Haj Seyed Ali Agha and Hussein dost, Abrqu,

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Photos of the Documentation Center of Shahid Beheshti University School of Architecture, Urban Planning, Registration No. 6022

Figure 6: An example of the decorations carved out of the earth, Hakim bashi house. Kashan. Iran
Source: Documentation Center of Shahid Beheshti University School of Architecture, Urban Planning, Registration No. 6142

Shavadan in Dezful and Shushtar

Shavadan is an underground space excavated under the buildings in the old regions of the Cities of Dezful and Shoushtar. Its depth is from five to twelve meters which can be reached by many different staircases (Saremi and Radmard, 1997). According to the Geological characteristics of the soil in Dezful area, *Shavadan* is built without the use of structural materials (Ghobadian, 1998). In some cases, the walls of *Shavadan* are covered with gypsum but most of them are not decorated. Most of these *Shavadan*s are interconnected through underground corridors. The typology of *Shavadan* is based on six basic elements: stairs which connects *Shavadan* to the different ground floor spaces (*pella*), stair s rest place (*pellapam*), the main hall (*sahn*), small spaces around the main hall (*kat*), vertical canals which are used as ventilator (*darizeh*) and horizontal canals which connect several *Shavadan* together (*taal*) Table 2. The entrance of *Shavadan*s is placed in different ground floor spaces but most of them were accessed from courtyards. Were possible, entrances from the courtyard helped wind to enter *Shavadan* space and facilitate natural ventilation.

To analyze thermal condition of *Shavadan* four traditional houses in historical context of Dezful were selected. In situ air temperature and humidity measurements were conducted with Lutron HT-3009 data loggers. These houses were selected based on their *Shavadan* differences (Depth, number of canals), their distance to Dez River and their spatial characteristics. In table 2 , has been shown some traditional plan that shavadan is different them .

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Table1: Different parts of Shavadan

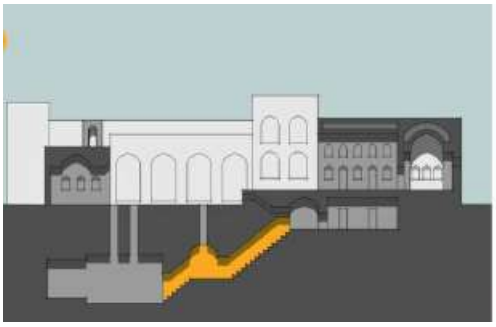
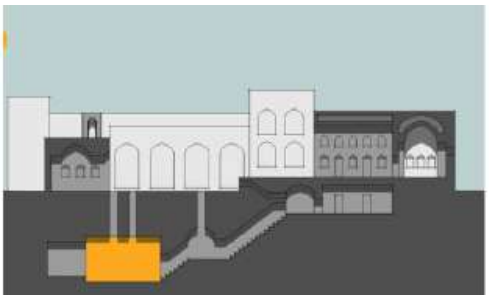
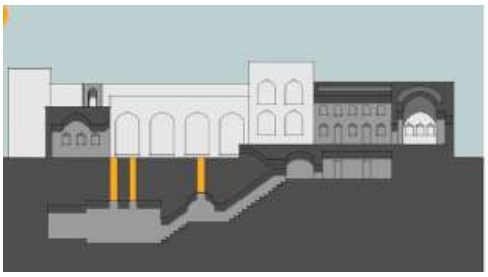
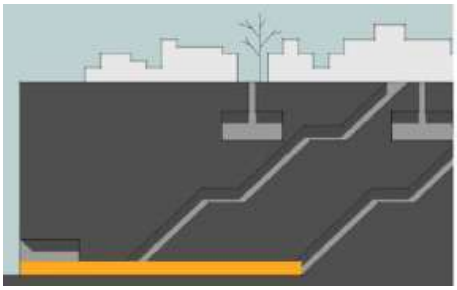
Elements	Description	Illustration
Stairs (pella) and foot-rest (pellapam)	The most common forms Were direct staircase, winding staircase and two way staircase which make access to the *Shavadan*.	 
Main hall (sahn) and surrounding spaces(kat)	It s used as the activities space and Connects different parts of the *Shavadan* together.	 
Vertical canal (darizeh)	These canals were used as ventilator ducts and were connected with different spaces like courtyard, sitting room, entrance and alley.	 
Horizontal canal(taal)	Connects the neighborhood *Shavadan*s together and to the riverfront in order to use air streams.	 

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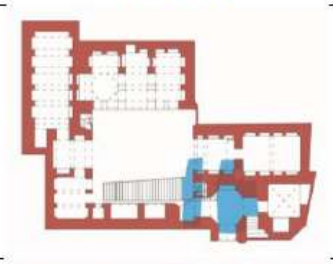
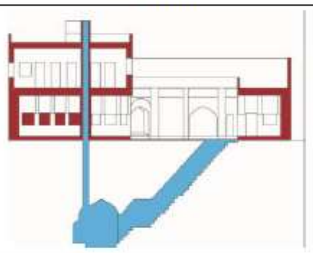
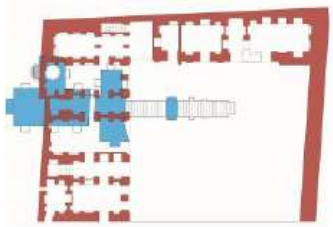
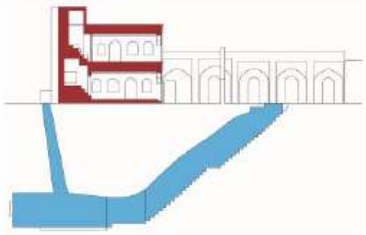
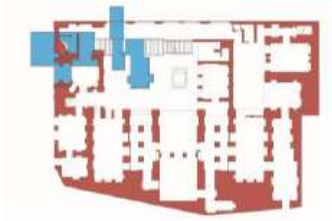
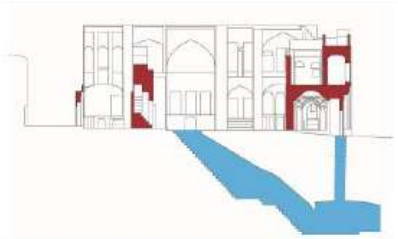
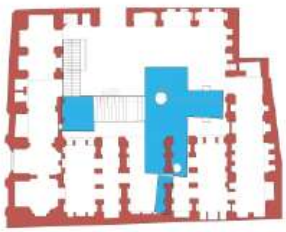
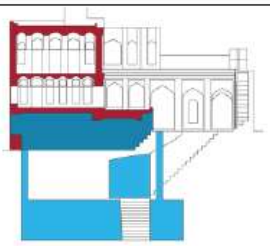
Table 2: Characteristics of Shavadan in selected traditional houses.

	Shavadan characteristic			
	Position	Depth	Canal(Darizeh)	Section
1		8.25 m	single canal: Connect upper space to the *Shavadan* main hall.	
2		11.40	single canal: Connect *Shavadan* main hall to the adjacent alley.	
3		11.40	single canal: Connect *Shavadan* main hall to the entrance.	
4		10.22	double canals: one connects *Shavadan* main hall to the courtyard the second connects *Shavadan* main hall to the basement	

DISCUSSION

By studying samples of soil above it is clear that the most original and the most ancient architectural architecture Iran. Art springs from the genius of indigenous technologies are continuing and lasting yet natural architectural structures such as the Supreme sustainable principles that make up the structure with minimal material nature is. Architecture of Iran like in other part of the world's leading multi-century architecture. What is more based on harmony with the environment and productivity of the design of an appropriate climate for the comfort of residents, recognizing the gravity and the compressive strength of a continuous structure is built.

Another reason is that in most cultures of the world mesh architecture used for shelter and useful structures, often outdoor, the architecture of the native soil not only responded to the need for housing needs, but also art, culture, religion and mysticism combined and based on

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the experience of the urban tissue has been established, which included the creation of the environment that introspection and unity of body and soul of the story.
Sixty-five thousand villages and towns and cities of Iran, which is often just dirt or a mixture of soil and other materials have been used to indicate a profound manifestation of the unique elements of earth, water, wind and fire.

CONCLUSION

There are many lessons of experiences that we can learn from traditional architecture to review and improve our energy consumption patterns in contemporary architecture. Sustainable architecture necessities encourage us to re-think and synchronize traditional passive and low-energy design techniques. The aim of such investigations should be finding guidelines and solutions in traditional architecture and integrate the elements and principles into the contemporary architecture. In this paper one of the passive design strategies used in vernacular architecture of traditional buildings of Iran such as , Refrigerator , (*Shavadan*) was discussed. Thermal condition of *Shavadan* comparing with different spaces of traditional houses in Dezful historical context were investigated through temperature and humidity measurements. Despite the high diurnal temperature range of outdoor environment, *Shavadan* has very low temperature variation ranges between 21°C to 24 °C and has RH fluctuation from 48% to 52% which is placed in the boundaries of comfort zone. Using a proper induced air flow, this underground space can be used as a cooling and heating source in reducing energy consumption of building.

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