Analysis of Traditional Iranian Houses of Kashan, Iran in Terms of Space Organization and Access Design

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ABSTRACT

The traditional houses of Iran have been formed as a result of thousands years of evolution according to the environmental conditions as well as the users' life styles and culture. One of the distinctive features of these Traditional houses is the organization of spaces and the relationship of spaces with each other. Existence of very harsh environmental conditions in a big part of the country and the need for separating the private life inside the house from the outsiders' view have created a very complex set of spatial relationships inside this kind of houses. As well, the same factors have affected the access from the street to the inside of the house. This study tries to analyze the concepts of spatial organization and access design in traditional Iranian houses in general and in houses in Kashan district specifically. The study includes the general definition of house in Iran, the basic features in design of the houses in various regions and the characteristics of Iranian traditional houses considering different parts of the house and also different functions in it, . Also the relationship between the spaces and the relationship of exterior part with interior parts of the traditional houses of Iran are studied in more details.

The research objective of this thesis is to analyze the spatial organization and access design in traditional houses in hot and dry climate city of Kashan. Eighteen traditional houses in Kashan which have been accepted as good examples of traditional houses in the district and renovated by the cultural heritage organization in Iran have been chosen for analysis.

Comparative analyses of these houses in terms of various organization types, public- private space relationship, entrance definition, etc. are done and trough these analyses some

generalizations about the design principles used in design of traditional houses of the region, the way spaces are organized and connected and the way they have connected to the outside (street) has been made.

Key words: access design, space organization, traditional house, Kashan

ÖZ

Geleneksel İran evleri çevresel etmenler ve kullanıcıların yaşam tarzı ve kültürüne göre evrimleşmenin sonucu olarak şekillenmiştir. Bu geleneksel evlerinin en önemli özelliklerinden bazıları mekânların düzeni ve bu mekânların birbiriyle ilişkisidir. Sert çevre şartları ve ev içindeki özel hayatı dışarıdaki gözlerden uzak tutma kaygısı bu evlerin içinde çok karmaşık mekânsal ilişkilerin gelişmesine neden olmuştur.

Aynı zamanda, bu etmenler sokaktan evlerin içlerine ulaşıma da etkilemiştir. Bu çalışma, genel olarak İran geleneksel evlerde ve özel olarak da Kashan bölgesindeki evlerde mekânsal organizasyonu ve ulaşım kavramlarını irdelemeye amaçlar. Araştırma, İran'da ev tanımı, çeşitli bölgelerindeki evlerin tasarım özellikleri, evin çeşitli mekânları ve barındırdığı işlevlerle ilgili geleneksel İran evlerinin özelliklerini barındırmaktadır. Ayrıca, İran'daki geleneksel evlerinde mekânlar arasındaki ilişki ve dış mekân ve iç mekân arasındaki ilişki daha detaylı olarak incelenmiştir.

Bu çalışmanın amacı sıcak ve kuru iklime sahip olan Kashan Şehri'ndeki geleneksel evlerin mekânsal organizasyonunu ve ulaşım tasarımını irdelemektir. Kashan bölgesindeki geleneksel evlerin iyi örnekleri olarak bilinen ve İran Kültürel Miras Kurumu tarafından restore edilmiş 18 ev analiz için seçilmiştir.

Bu evler, organizasyon biçimi, özel ve kamu mekanların ilişkisi, giriş tanımı, vs. açılarından kıyaslamalı olarak irdelenmiştir ve bu irdeleme sonucu bu evlerde kullanılan tasarım prensipleri, mekanların düzenleme biçimi, ve birbirileri ile ve dışarıyla ilişkisi konusunda bazı genellemelere ulaşılmıştır.

Anahtar Kelimeler: Erişim tasarımı, Mekân organizasyonu, Geleneksel evler, Kashan

Dedicated to my Family

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I thank God who gave me the ability to complete this thesis. With the kind supervision of Assist. Prof. Dr. GuitaFarivarsadri and the guides of jury members, Assist. Prof. Dr. Nil Pasaugullariand Assist. Prof. Dr.NazifeOzay, I had the chance to complete my thesis.

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INTRODUCTION

The traditional architecture in Iran like most of the other similar examples in the world is developed based on the needs of users and living conditions in the region. There are several factors which affect the architecture in a region such as climatic conditions, topography, available material and culture (Izgi 1999, Rapoport 1980, Eldemery 2000). Among theses, the ones that have the most profound effect on organization of space and exterior/interior relationship are climatic condition and culture.

Architecture of house can be considered as one of the most important achievements in the traditional Iranian architecture which needs to be discussed and analyzed in different aspects. For starting the discussion about the architecture of Iranian house, there is a need to define the meaning of the house. On the other hand, the importance of the spaces and the relationship between the spaces in the house and also the relationship of exterior/interior spaces can be discussed in more detail.

The house and dwelling can be defined in several ways and it has roots in the history. House as a shelter, from the early days of humankind, has been a worthy place, each culture and race has grown up under this shelter. Dwelling has always been such a

fusion of living habits, environmental condition and cultural boundaries. Home is never created until there is a combination of comfort, fulfillment and a sense of belonging to a dwelling space. The word home comes after house.The house with the sense of belonging and comfort and the place of memories can be called home. (Shabani, 2011)

According to Paul Oliverthe terms *housing* and *dwelling* do need some clarification. In relationship to this subject, he states that:

> "*Housing* as *shelter, lodging, dwelling provided for peopl*e the fact is that *all houses are dwellings but all dwellings are not houses. For many people this implies a permanent structure, for some it means temporary accommodation, while for others it is simply where they live, even if it is little evidence of a building. Dwelling is both process and artifact: it is the experience of living at a specific location and it is the physical expression of doing so*"(Oliver, 2007)

On the other hand, another essential issue to be discussed in relation to house and dwelling is related to their roots in culture. Heidegger (1951) mentions that building and dwelling are single phenomena, the creation by the individual consciousness out of its rootedness in culture, time, and place.

Socialist and economist Mary Douglas (2000) suggests that home is a place where households organize themselves over time by practicing the planning of recourses and by developing household rituals; for Douglas, home is thus an early form of social organization. (Douglas, 2000, Cited in Shabani, 2011)

The purpose of creation of home can be classified as comfort, sense of belonging to a dwelling space and privacy. There are various factors which have effect on the form of

the houses. Sincethe past, the relation between the buildings and user was one of the main issues for Iranian architects. Culture and religious beliefs of the people have caused the division of the house in order to create privacy and by the arrangement of the open and closed spaces these divisions have been formed. (Shabani, 2011)

Talking about culture would lead to another phenomenon which is privacy that can be categorized in different levels according to specific beliefs and backgrounds of the users. Since Islam became the main religion in Iran, the levels of privacy got new meanings and these meanings were applied in the architecture of the house. Although Islam had effects on the architecture of the houses, but some of the main factors in design of the houses such as courtyard belong to the time before Islam.

There are several aspects of human behavior and environment which have effect on the form of the house and organization of the spaces. Thus there are various statements about the most essential factors affecting the design of a building in general and house specifically. For instance, Izgi (1999) suggests that in building design, people try to reach to symbolic, monumental properties together with its functional needs.

According to Izgi (1999) the factors which effect on the building architecture are:

- Geography-topography
- Content
- Climate
- Culture-beliefs

Rapoport (1980) states thatduring the designing of a space, there are four main elements to organize: space, meaning, communication and time. All these four elements have essential roles in design.He also specifies that no matter what the scale is, planning and designing of a space is at the same time the organization of the activities, values and aims of the people. Meaning spreads easily when there are strong and clear reasons and can be repeated several times. (Rapoport, 1980)

According to different ideas in categorizing the influential factors in architecture of the houses the most important issues which have direct relation to space organization and the spaces relationship can be listed as climate and culture of the region.

The architecture of Iranian houses is consisting of a big range of different types of houses, a specific type of climate, has led to creation of a specific type of house. The houses which are located in the hot and dry climate region of Iran share mostly the same characteristics. In this study the characters, which are related to the space organization and access design in the houses located in hot and dry climate region, are analyzed.

There are several sources in literature which discuss the issues related to space organization and relationship of the spaces, and access design but in this study Frank Ching is selected as the main reference as he had the most complete discussion about this subject. According to the classifications of Ching and also the important issues like culture and climate, the spaces of Iranian traditional houses are analyzed.

The tradition of Islam can explain many sources of social organization and behavior of the people in Iran. "These expressions have been firmly fixed by this tradition to make the life of manner equal to its objectives and message. Following these principles, as early Muslim societies did, creates harmonious social and physical environments, but not paying attention to them would violate the tradition itself and harmfully influence the social and physical environment of Muslim life. This seems to be the case in the contemporary Muslim conditions, where non-traditional values and regulations are introduced and followed under the banner of "modernity and it is started new problems as well as, relationship between the residents in a compact building, in an alley and behavior of people with together." (Mortada, 2003)

There is a need to study on the traditional Iranian houses, in order to find some useful features which can be applied on modern architecture. Banhan argues that the modern homes are a set of modern appliance and services, not bound to any location and therefore essentially rootless. (Banham, 1975, cited in (Shabani, 2011)

1.1 Aim of the Research

There are several factors which affect the architectural built environment. In Iranian traditional houses' architecture the main factors which have affected the design are climate, culture and the need for privacy as a sub division of culture. These factors have determined the spatial organization and the access design (the way one gets from the street to the inside of the house and then to the various spaces within the house) in these buildings. The basic design principles in traditional houses in Iran are not changing a lot from one region to another since the culture, and the way of life as the main issue in

determining these principles have many things in common in various regions. By passing the time the culture can somehow change, but the roots remain the same. On the other hand, the climatic conditions of a region rarely change by time. For instance considering Iranian society and comparing it to hundred years ago, it is obvious that when the climatic conditions have not changed much, the culture has changed a lot. But still many issues like need for privacy somehow exist as before and just their degree has changed.

Studying on the traditional architecture may let the contemporary architects to use some of the traditional solutions in current problems. The focus of this study is on space organization and spatial relationship and access design in traditional houses in Iran in order to find the hidden and unwritten rules of architecture in these buildings.

In this research, the architecture of the traditional houses in Kashan region in Iran is analyzed by considering the issues which are related to space organization, spatial relationship and access design.

Analyzing the traditional Iranian houses, leads architects to discover some principles which might help them to design new buildings more consciously.

1.2 Methodology and Limitations

There are different methods which were used for collecting the desired information in this piece of research.

Methodology can be categorized as:

Literature review: in this part of the research most of the possible written materials about Iranian traditional houses are reviewed. The other important part of the collected written

data is driven from the main sources about design principles which are focused on space organization and access design.

Observation: by direct observation from the chosen houses in Iran, and also making sketches from the spaces in these houses and collecting visual information like photos, the other part of the data was collected.

Analysis: according to the information which was collected from literature review and also from observations, the analysis is done.

The study is done on eighteen traditional Iranian houses in Kashan city located in hot and dry climatic part of the country. In Kashan some of the best examples of traditional Iranian houses are preserved and restored by the cultural heritage organization in Iran. These eighteen houses are the ones that are still in a relatively good condition and it is possible to see and feel the spatial organization in them. To analyze the spatial organization, spatial relationships and access design some tables has been designed based on Ching's definitions of these issues. Then the houses are analyzed according to these categorizations. At the end of the process some generalizations about basic facts in design of traditional houses in the region have been made.

Chapter 2

THEORY OF SPACE ORGANOZATION AND ACCESS DESIGN

To be able to study the spatial organization and the relationship of the interior and exterior spaces in traditional Iranian houses the theory of space organization and access design is studied. This study was done to find out the organization of specific functional spaces within the house and also variable type of the relationships of the spaces between each other.

In this chapter of the study the theory of space organization and its classification will be discussed, also the spatial relationship will be explained by its own classification, and the chapter will be followed by the theory explanations of access design. Finally in order to link the space organization and access design in theory, the relationship between exterior and interior of the space will be explained.

In the study of space organization theory and access design the main source, which the needed data are collected, is Frank D.K Ching. Most of the information is gathered from this main source because of the categories which Ching had done is the most

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comprehensive data source on this subject. There are also some other sources related to this subject which are also mentioned during the study.

2.1. Space organization

Space organization is an important subject in the theory of architecture, which can explain a way of living or living habits and culture of a society. In this dissertation, there was a need to have a tool to analyze the selected traditional Iranian houses, for this the categorizations by Ching (1979, 1996) has been used to analyze the houses in a more logical way and as a path to get the desired conclusion.

Architecture uses many different arrangement systems to control the elements and for giving them order. "Order implies the dominance of some unifying concept, while relates the complex elements of architecture in some meaningful way." (ONAT, 1991)

Also Burden (2002) defines order as

"An arrangement of elements or interdependent parts with varied functions into a coherent and functioning entity". (Burden, 2002, p. 226)

This section of the thesis is about the indication of the different ways which spaces can be arranged and organized.

Different organization of spaces in a building can be classified according to the space organizations which are related to several issues like function, accessibility, dimension, hierarchy, and view or natural light source. According to Ching (1979) space organization can be classified as: linear, centralized, radial, grid and clustered organizations. Each of these issues will be explained in detail in the following parts:

- Linear organization

- Centralized organization

- Radial organization

- Grid organization

- Clustered organization

2.1.1 Linear organization:A linear organization consists of a group of spaces which are usually same in function, form and importance and they are organized in a row. The relationship of spaces can be direct or they can be connected to each other through a separate linear space such a corridor. Linear organization states a direction and indicates a movement. In order to finish the linear organization, dominant elements can be used on both ends, for example by making changes in the sizes of each function which are located at both endpoints of a linear organization. (Ching, 1979)

Meiss (1990) have similar explanation about the linear organization: linear organization can be seen more than the other organizations and it is the most basic form of making groups of different spaces, corridor and street can be named as the means to apply the linear organization for several spaces. Giving form and direction to the spaces can be done by using the linear organization especially with beginning and end of them.

Flexibility is one of the features of the linear organization and mostly it is identified as an extension.

Serious of spaces which can be directly related to each other or linked to each other by a linear separate space makes linear organization and sometimes this organization is made of similar spaces in form and size and also function which are repeating. (Salvan, 1999) According to Ching (1979) the spaces can be organized in linear form in different wayssuch as;

Table 1.Space organization in linear form. (Ching, 1996: 96)

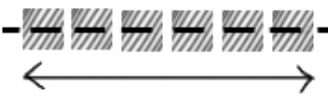|	
• Organized or linked along its length.	
• Surround and enclose within a field of space.	
• Used as a wall to divide a space into two dissimilar fields.
Figure 1. linear organization

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Figure 2. Linear House in Salt Spring Island, Canada by Patkau Architects. (URL 1) |
Figure 3.Linear House in Salt Spring Island, Canada by Patkau Architects. (URL 1) |
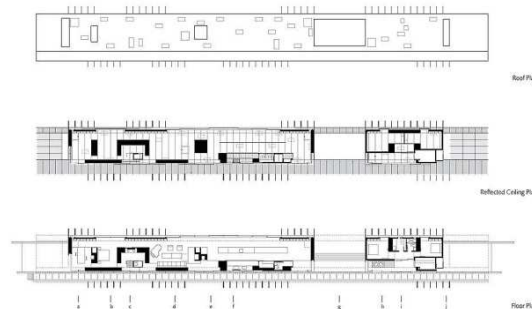
Linear House in Salt Spring Island in Canada is an obvious example which the plan is organized in linear form. This building can be an extreme example since all the floor plans and even the elevation gives the sense of linearity and it is organized in a linear way.

2.1.2 Centralized organization:In central organization usually there is a center point or dominant part which is surrounded by a group of minor spaces. Indeed, there is no directional form in this type of organization. The entrance can be identify by making differences in one of the minor spaces as an entrance part. In this organization the circulation patterns can be circle, spiral or radial. The secondary spaces can get organized in two ways, symmetrically or asymmetrically around the central point.(Ching, 1979)

The courtyard in traditional Iranian building can be defined as a central point and the other parts of the building which are grouped around it can be defined as secondary components.

Central organization according to Meiss (1990) is related to hierarchy of spaces and the most valuable space is dominated in the center and it is surrounded with the secondary spaces. In the same respect Chen (2011) mentions that a large space is dominated with smaller secondary spaces which are surrounding the central space which can be in regular form. The secondary spaces are in the same form and size to each other or in different forms to serve the functional needs. (Chen, 2011)

Table 2. Centralized organization.
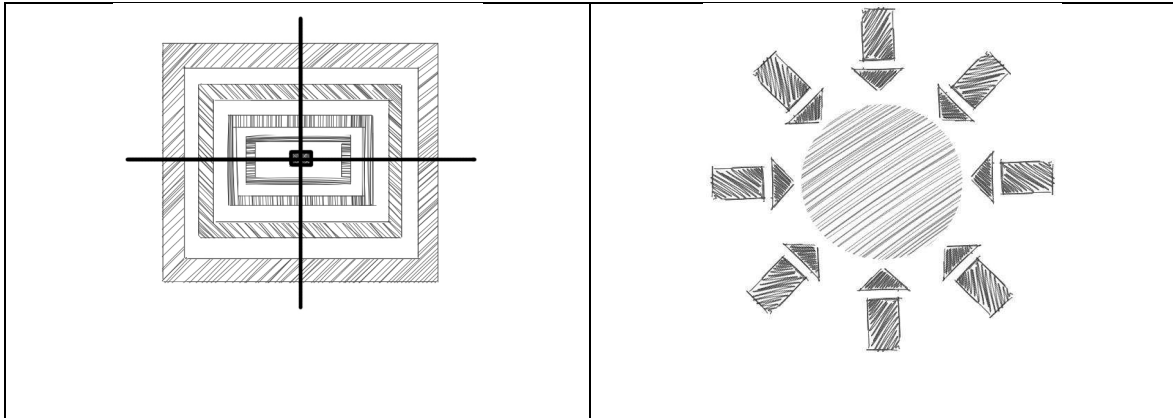
Figure 4.Casa Folla' House. (URL 2)　　Figure 5.Casa Folla' House. (URL 2)

'Casa Folla' House is an example of centralized organization, the roof plan is the most obvious one which is a symbol of leaves of the area and is centrally organized.

2.1.3 Radial organization:In radial organization the components of linear and centralized organization are used.In radial organization there is a central element which a group of linear organizations are expanded in a radial way from it. As a result of sharing the properties of linear and centralized organization, the shape of radial organization can get dynamical forms.(Ching, 1979)

Meiss (1990) gives the name of 'fan' to radial organization and he also believes that this organization happens when linear and central organizations meet; and groups of spaces in linear form are organized to make the centralized main organization.

Salvan (1999) implies that in radial organization, the linear organizations are like 'arms' of the central space and the central space can be named as the 'hub'. These arms can be similar to each other or completely different than each other with their own functions. Another type of radial organization is pinwheel pattern which the arms are extension of a square or rectangular side which is a center. (Salvan, 1999)

Table 3. Radial organization.
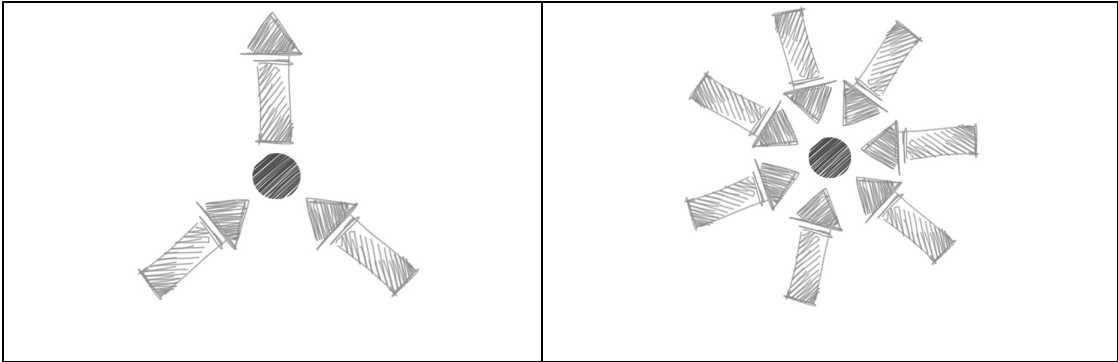
Figure 6.One of the three Torres del Parque by Rogelio Salmona. (URL 3)

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Torres del Parque is an example for radial organization. The different parts of the building are all towards the main core and which make it a radial organization.

2.1.4 Grid organization:A grid organization contains of two different groups of parallel lines, which are perpendicular to each other. A grid organization consists of spaces and forms whose location in space is ordered using a three dimensional grid. Although the grid organization gives the sense of continuity and regularity, but the modules can be different in form, size and function. Sometimes with the aim of adaption of the building to the condition of the site the grid organization can have several subtractions and additions. With the intention of rupture the monotony of the grid organization some parts can be eliminated which is something against their order. (Ching, 1979)
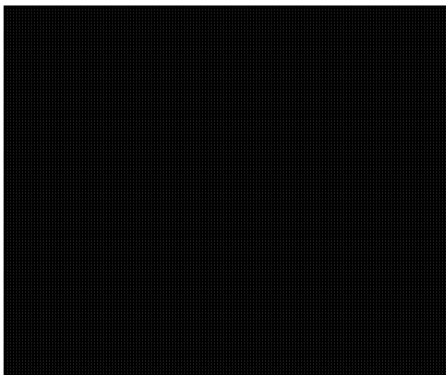
Figure 7. Grid organization   Figure 8. Grid organization
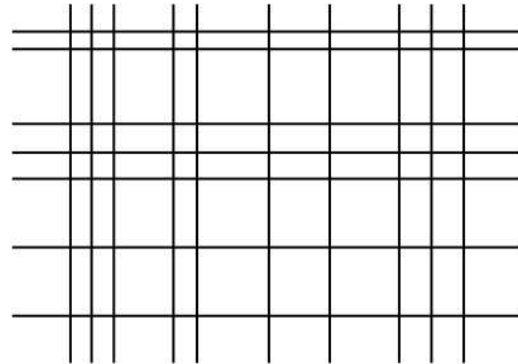
Figure 9.Rietveld's Schroder House. (URL 4)

Figure 10.Rietveld's Schroder House. (URL 4)

Rietveld's Schroder House is organized by grid system in the plan, although it has free plan but still the grid organization can be seen in all the plans and also in the elevations of the building.

As all the fixed furniture is also designed especially for this house, even the grid organization can be seen in the design of furniture too.

2.1.5 Clustered organization:A clustered organization creates the relationship between each unit of space to the other nearest unit. Clustered organization is created by the repetition of the cellular spaces which have familiar functions and share a familiar feature for instance shape or orientation.

By usage of closeness and graphical ordering devices such as balance or an organized axis, there will be relationship between dissimilar spaces in the composition. Due to flexibility of the form of this organization it's able to expand and transform without any changing on its character. Clustered spaces can be organized around of entrance of a building. Generally in the region of the main building entrance or on the side of the movement path through it such as corridor, the clustered spaces can be organized. The spaces can be also clustered around the central point;an example can be a courtyard of a building.(Ching, 1979)

Also other similar explanation of clustered organization is by Salvan (1999), he mentions that Relating spaces together can be done by repeating them while they have similar form and they are directed to the same direction and they can also have same function.

There is also possibility to have clustered organization with the groups of spaces with no similarity in dimension, size, form and function, this type of cluster can be made by using axis and symmetry. (Salvan, 1999)
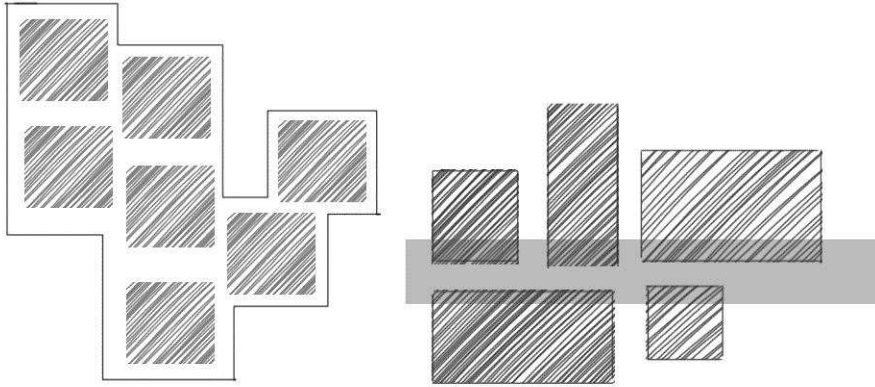
Figure 11. Clustered organization.

Figure 12.Ironbank Building, Auckland. (URL 5)

Ironbank building can be considered vertically clustered as each floor looks like a cube (cluster) which is slightly shifted to the different direction.

2.2 Spatial relationship

Different volumes of space can be created by various designs and organization of forms, also the visual qualities of defined space can be affected by the patterns of solid and voids. Generally buildings are a composition of several of spaces which have

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relationship to each other by function, proximity, or a circulation path. According to Ching (1979), the spaces can be related to each other in basic wayssuch as:

- Space within a space
- Interlocking spaces
- Adjacent spaces
- Space linked by a common space.

The four categories of spatial relationship will be explained in more details in following sections:

Space within a space: In this type of spatial relationship, the larger space contains a smaller space within its volume. Both of the spaces are depended to each other, by making differences in the form and sizes of the spaces different function and forms can be created between two spaces. (Ching, 1979)

There is a need of difference in size for having the concept of 'space within space' (Chen, 2011)
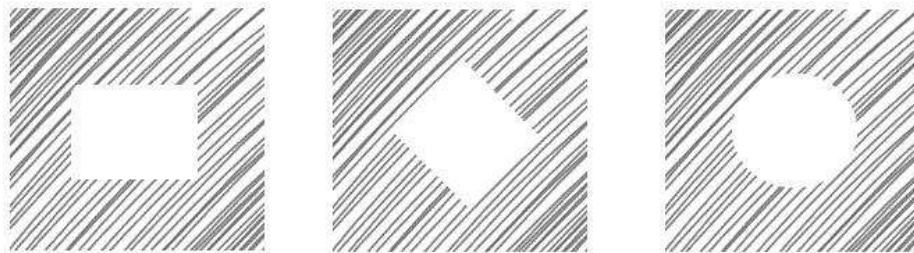
Figure 13.Space within a space.

Figure 14. 'briefcase house' by jimenezlai in chicago, Illinois. (URL 6)
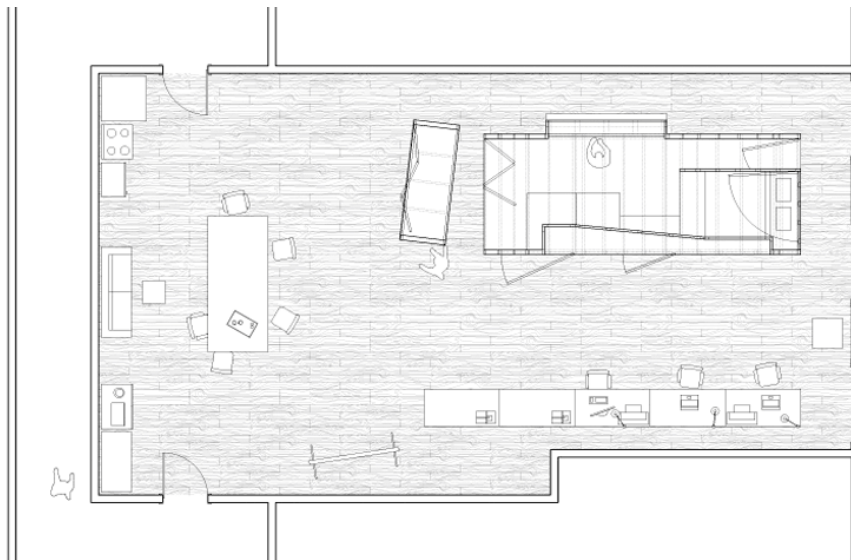
Figure 15.'briefcase house' by Jimenezlai in Chicago, Illinois. (URL 6)

Briefcase house is an interior design project which shows how an space can be totally within another space and has its own subspaces.

Interlocking spaces: In this type of spatial relationship, the two spaces are attached to each other by a common space. (Ching, 1979)

Interlocking amount of spaces can be shared with two spaces equally or it can be merged by one or be completely independent (Chen, 2011)
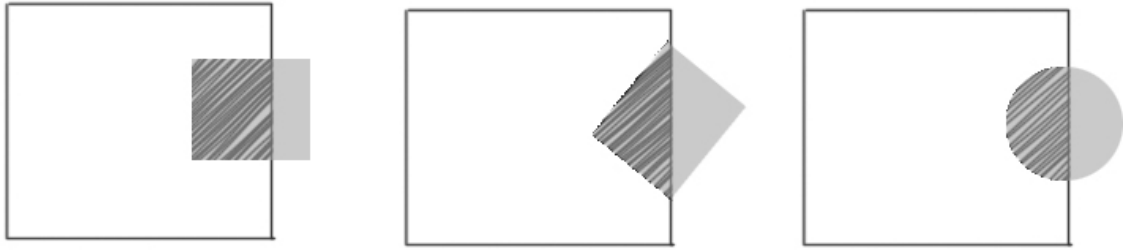
Figure 16. Interlocking spaces.

Figure 17.Manhattan Beach Residences by Aidlin Darling Design. (URL 7)

The concept of interlocking space can be seen in the buildingof Manhattan Beach residence which a visible cubic form is drawn out from the main cube of the building.

Adjacent spaces: In this type of relationship, each space can be defined in itself. They can have a physical and visual access between each other or they can be separated from each other by free standing planes, level differences and line of the column, although all

of them are existing in a single volume. This type of spatial relationship is the most common type of all. (Ching, 1979)

The adjacent spaces can be totally separated or connected with openings or separated with a transparent surface like a net. The spaces which are not one hundred percent separated can be named as 'flowing spaces'. (Chen, 2011)
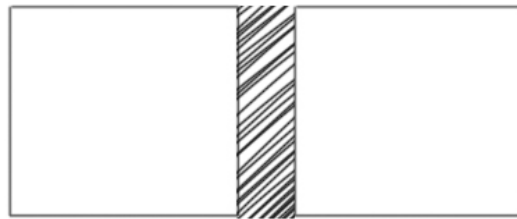
Figure 18. Adjacent space.

Figure 19.Accordia, Cambridge Masterplan with FCB's buildings in orange.

(URL 8)

Spaces linked by a common space: Two spaces which are separated from each other by an interval between can be linked to each other. Accordingly the relationship between these two spaces depends on the linking space. (Ching, 1979)

There can be a common individual space which links two other spaces, this space can be different in form and size with the other two spaces and it is also named as transitional space. (Chen, 2011)
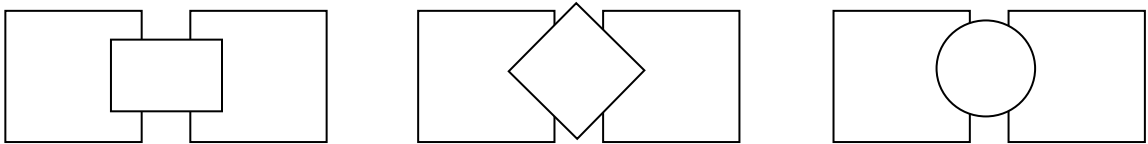
Figure 20.Linking space.(Ching, 1996, p. 186)

The form of transitional space can be remained as it is, and can be specified exclusively by the forms and points of references of the spaces which are linked. (Ching, 1979)
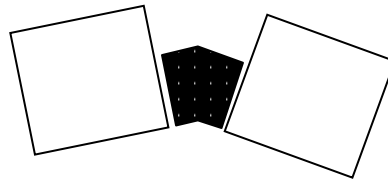
Figure 21. Linking space.(Ching, 1996, p. 186)

Figure 22.Linked Hybrid by Steven Holl. (URL 9)
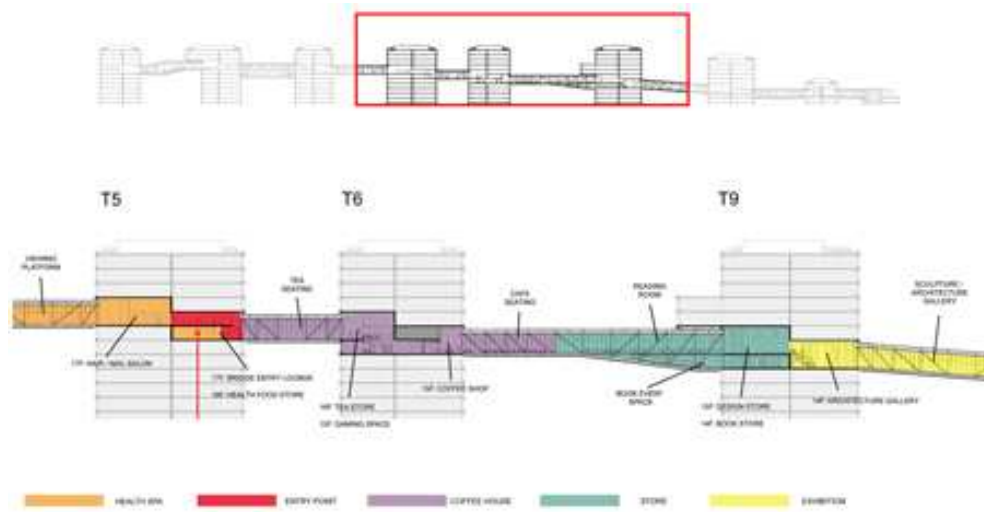
Figure 23.Linked Hybrid by Steven Holl. (URL 9)

Linked Hybrid by Steven Hall, can be an obvious example for linking main spaces by a common space which is a hanged corridor shaped space that links all the main buildings together.

2.3 Access design

Access design creates the accessibility between different spaces of a building and it makes the relationship between different types of spaces. In order to define the access design there is a need to give some explanations about the issues which would be steps to reach the main idea of it. These basic issues can be classified as the definition of the main relationship between the spaces and space itself and also relationships of the interior and exterior. The other important issue which needs to be discussed is the entrances as component relating the exterior world to the interior space.

After defining the access, the circulation in the spaces can be mentioned and this can be named as the secondary access within a building.
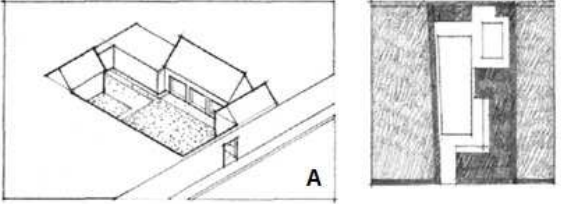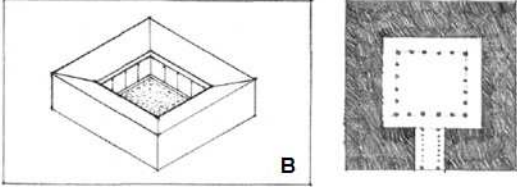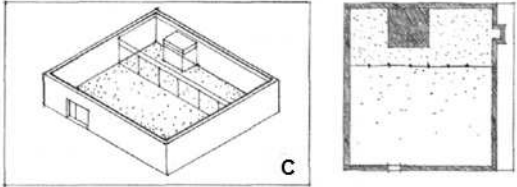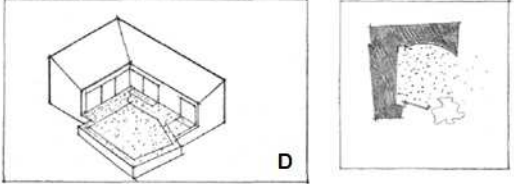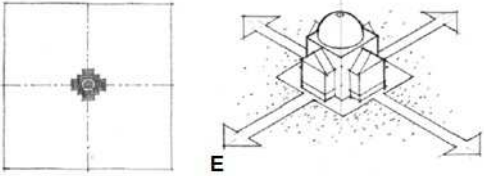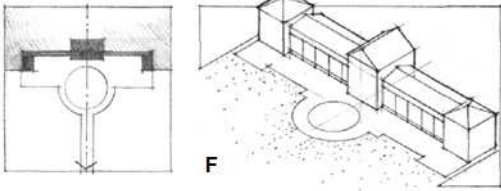
2.3.1 Relationship between exterior and interior of space
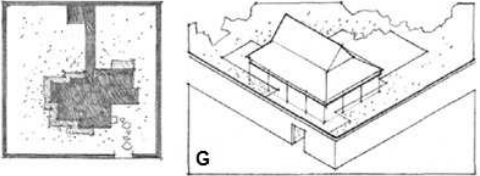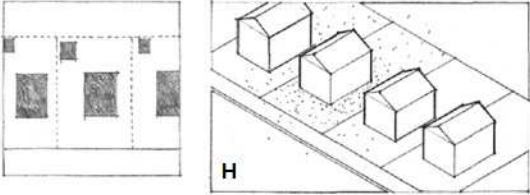
According to Ching (1979) there are several approaches to examine the relationship of the forms of mass and space in architecture, the building can be concerned with the form of itself and also the influence of the building on the surrounded space.

"At an urban scale, we should carefully consider whether the role of a building is to continue the existing fabric of a place, from a backdrop for other building, or define an urban space or significant object in space". (Ching, 1979) At the scale of a building site Ching (1996: 96) defines various strategies for relating the form of a building to the space around it as

A building can:

Table 4. Relationship of building form with its surrounding. (Ching, 1996, p. 96)

A. Form a wall along an edge of its site and begin to define a positive outdoor space.	
B. Surround and enclose a courtyard or atrium space within its volume.	
C. Merge its interior space with the private outdoor space of a walled site.	
D. Enclose portion of its site as an outdoor room.	
E. Stand as a distinct form in space and dominate its site.	
F. Stretch out and present a broad face to a feature of its site.	

G. Stand free within its site but have private exterior spaces which can be an extension of its interior spaces.	
H. Stand as a positive form in negative space.	

The circulation path can be used as a feature for linking the spaces of a building or group of the interior and exterior spaces between each other. (Ching, 1979: 228)

According to Ching (1996) important elements of circulation of the building structure which can effect on our perception of spaces and building's form can be classified as:

- The building approach
- Building entrances
- Path space relationship
- Terminate in a space
- Form of the circulation space

The Building Approach: Beforeentering to the inside of a building, we will face to the entrance of building along a path which is the first point of the circulation system, during which we are ready to see the building's spaces or use it. The approach to a

building and its entrance can be different. It can be in front of the building facade, or at an angle to it. (Ching, 1996)

Building Entrances: For defining entrance there is a need to explain what the act means: Enter to the building, a room in the interior of a building, includes the act of entering a vertical plane that differentiates one space from the other one. (Ching, 1996; 238)
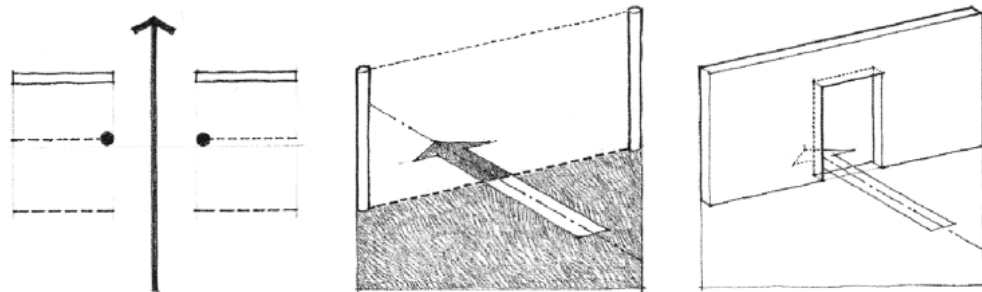
Figure 24. Building approach. (Ching, 1996, p. 238)

Entering act can be performed in other ways more than cutting a hole in a wall. It can be passage through a suggested, instead of real one plan for example created by two columns or an overhead beam. Furthermore making different levelscan alsocreate the passage from one place to another. (Ching, 1996: 238)
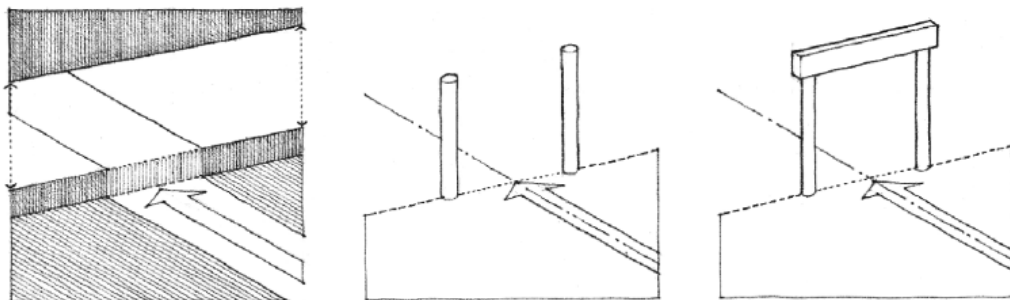
Figure 25. Building approach.(Ching, 1996, p. 238)

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Occasionally changing the form of the building can best signify the entrance of the space.
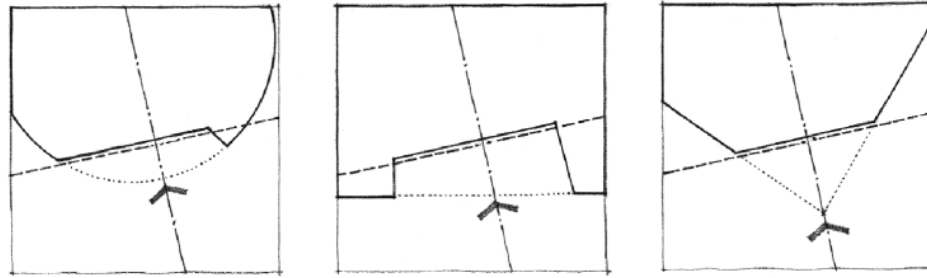
Figure 26. Building approach.(Ching, 1996, p. 238)

According to Ching (1996) entrances to a space can be designed in various ways: as Flush entrance, recessed entrance (using subtraction), or through adding extra elements (addition).

Flush entrance keeps the wall's surface continuity. This approach can be used when the aim is not to clearly emphasize the entrance to the building. Design the entrance or opening parts are different than what is expected (wider, lower).
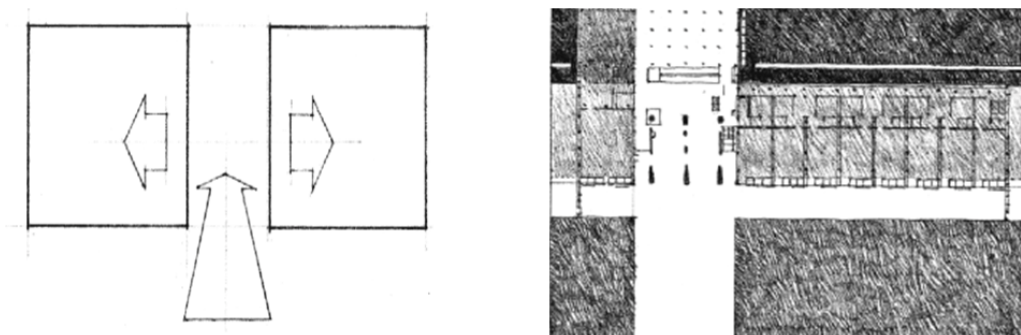
Figure 27. Building entrance.(Ching, 1996, p. 245)

Figure 28.National Air and Space Museum, the National Mall building. (URL 10)

Sometimes the entrance of a space may be defined using an overhead element. The entrance can be also expressed by exaggerated decoration.
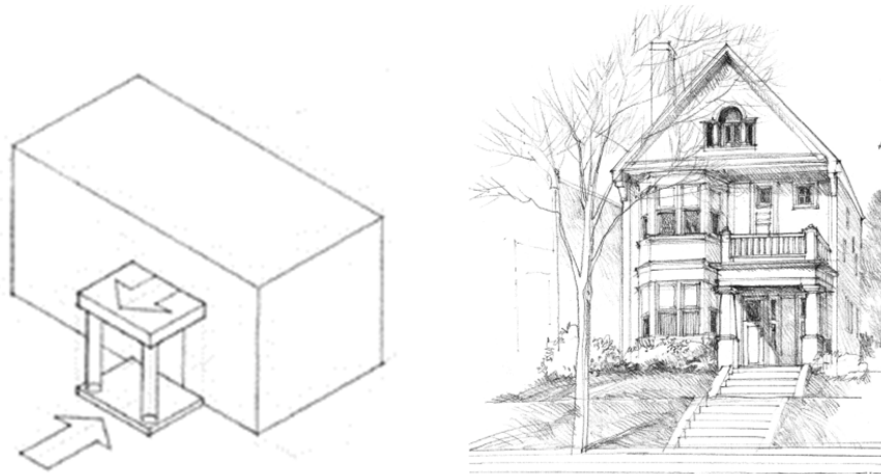
Figure 29.House in Milwaukee. (Ching, 1996, p. 247)

Figure 30.Hill Residence in Texas. (URL 11)

The entrance can be defined by making the entrance extra deep or circuitous as a recessed entrance. In this way it includes a part of the external space to the building and also acts as shelter. (Ching, 1996)
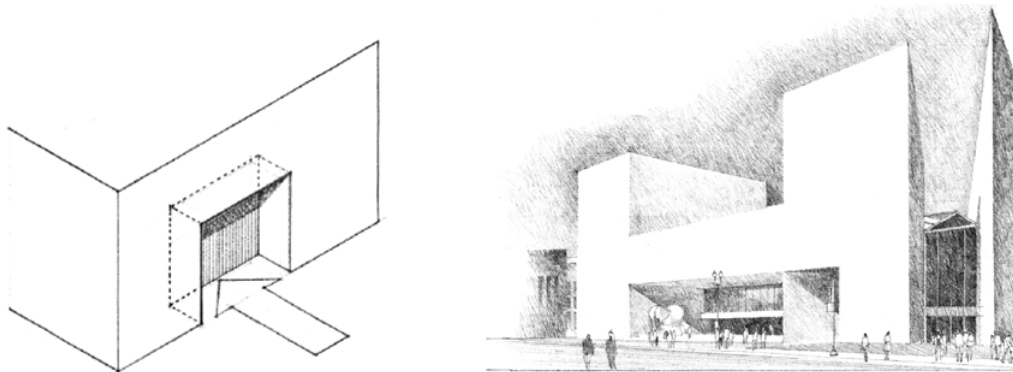
Figure 31. National Gallery of art. (Ching, 1996, p. 249)

Path Space Relationships: The different spaces which are separated from each other can be related by use of a path. The relation of paths to the spaces and their linkage to each other can be categorized in the following ways. According to Ching (1996)the relation of paths to the spaces and their linkage to each other can be categorized as. :

- Pass by Spaces

- Pass through spaces

- Terminate in a space

If the path passes by the spaces without direct touch to the main spaces, it can be called pass by space. In this kind of relationship there would be some issues such as:

• The integration of every space is preserved.

• Path forms and shapes are flexible.

• Intermediate spaces are able to create the relationship the path with space. (Ching, 1996:246)
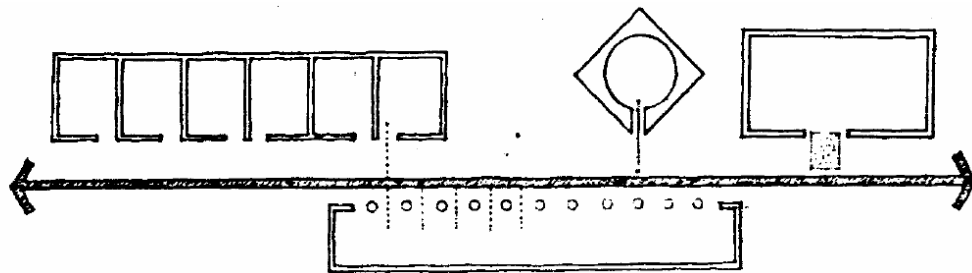
Figure 32. Pass by space. (Ching, 1996, p. 264)

Another way of connecting the spaces together is passing a path through the spaces which would be intersection between the path and all the spaces (**pass through spaces**), then:

• The path can go across inside the spaces, obliquely or along its edge.

• The path makes forms of break and movement inside by cutting through a space. (Ching, 1996:246)

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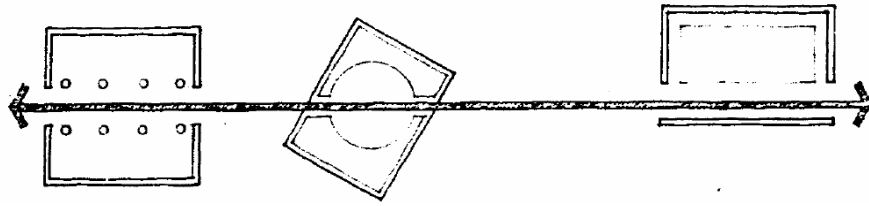
Figure 33. Pass through Space. (Ching, 1996, p. 264)

In terminate in a spacetype of the connection between path and space, the space identifies the path and gives character to it. Also:

• The place of the space creates a path.

• The space of the path connection is used to face and pass in to significant spaces in symbolical and practical ways. (Ching, 1996:246)
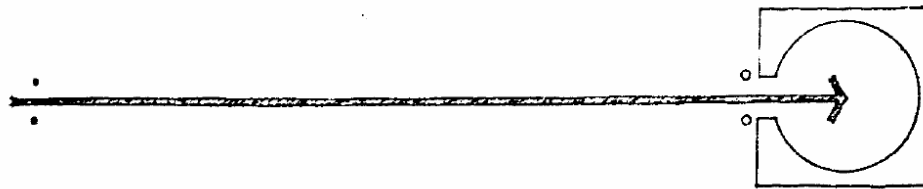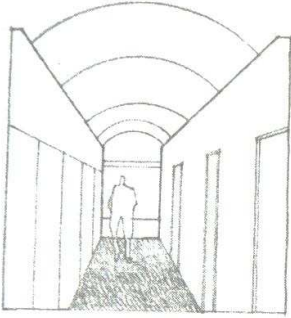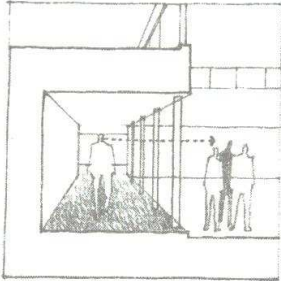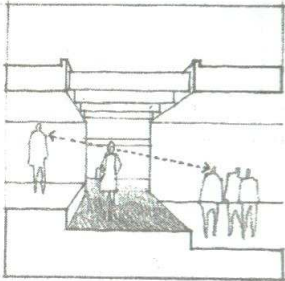
Figure 34. Terminate in a space. (Ching, 1996, p. 264)

Form of the Circulation Space: According to Ching (1996) form of space circulationis an important part of every organization of the space, and lodges a major number of spaces inside the volume of the building. (Ching, 1996)

As stated by Ching (1996) the circulation space can be categorized as:

Table 5.Circulation of space. (Ching, 1996)

Enclosed, establishing a corridor which has relationship to the space and links by the entrance into the wall.	
Exposed in one side, creating a balcony which delivers the graphical and three-dimensional connection with the spaces which it linkes.	
Exposed in both edges, forming the row of pillars walkway that turn into physical addition of the space it passes from side to side.	

Finally it can be said that a space can be defined according to the relationship with its exterior and its surrounding. Since different spaces have different functions, their access design can be formed in variable ways. The main and first access from the exterior of a building can be the entrance of it and the circulation within the main space can be defined as secondary accesses.

For instance, in the design of the house these secondary accesses can be formed in different ways which depend on some issues like the user's needs and their culture which will be discussed in more detail in the following chapter of the thesis.

```
                                              ┌─── Linear
                                              │
                                              ├─── Central
                                              │
                            ┌─── Type ────────┼─── Radial
                            │                 │
                            │                 ├─── Grid
                            │                 │
                            │                 └─── Clustered
Space Organization ─────────┤
                            │                 ┌─── space within a space
                            │                 │
                            │                 ├─── Interlocking spaces
                            └─── Relationship ─┤
                                              ├─── Adjacent spaces
                                              │
                                              └─── Space linked by a common space
```

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                                    ┌──────────────────────────┐
                       ┌────────────┤   The building approach  │
                       │            └──────────────────────────┘
                       │
                       │                                          ┌──────────────────────┐
                       │            ┌──────────────────────┐ ┌────┤    Flush entrance     │
                       │            │                      │ │    └──────────────────────┘
                       ├────────────┤ Entrances definition ├─┤    ┌──────────────────────┐
                       │            │                      │ ├────┤   Recessed entrance   │
  ┌──────────┐         │            └──────────────────────┘ │    └──────────────────────┘
  │          │         │                                     │    ┌──────────────────────┐
  │  Access  │─────────┤                                     └────┤ Decoration (Overhead  │
  │  Design  │         │                                          │     element)          │
  │          │         │                                          └──────────────────────┘
  └──────────┘         │                                          ┌──────────────────────┐
                       │            ┌──────────────────────┐ ┌────┤    Pass by Spaces     │
                       │            │                      │ │    └──────────────────────┘
                       ├────────────┤ Path space relationship├┤  ┌──────────────────────┐
                       │            │                      │ ├────┤  Pass through spaces  │
                       │            └──────────────────────┘ │    └──────────────────────┘
                       │                                     │    ┌──────────────────────┐
                       │                                     └────┤  Terminate in a space │
                       │                                          └──────────────────────┘
                       │                                          ┌──────────────────────┐
                       │            ┌──────────────────────┐ ┌────┤       Enclosed        │
                       │            │   Form of the        │ │    └──────────────────────┘
                       └────────────┤   circulation        ├─┤    ┌──────────────────────┐
                                    │   space              │ ├────┤  Exposed in one side  │
                                    └──────────────────────┘ │    └──────────────────────┘
                                                             │    ┌──────────────────────┐
                                                             └────┤ Exposed in both edges │
                                                                  └──────────────────────┘
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Chapter 3

REVIEW ON HISTORY OF ARCHITECTURE IN IRAN

Iran is one of the oldest countries of the world. The written History of Iran started from the VI c. B.C. when the tribes dwelling at the land of Iran were united by the king Cyrus II into the kingdom of Achaemenids. There are also earlier history such as states-Elam (4th-3rd millennia B.c), Media (IX-VI cent. B.C). Iranians themselves did not use title "Persia". It is received from ancient Greeks who used in relation to the whole empire the title of a single province Fars (Pars). State of Achamanianexpanded from the banks of Nile to Indus and was overthrown in IV century. B.C. by Alexander of Macedonia.In the middle of the III century. B.C. there emerged a new state-Parthia, which successfully dared the Roman Empire. In III century A.D. kingdom of Sassanids which was conquered by Arabs in VII century was included into Arab Caliphate. In XII, XIII, XIV century the country suffered from invasions of Turks, armies of Tchinghis-Khan and Timur. New renaissance took place during the rule of dynasty of Sefevids (XV-XVIII cent.). The new history of Iran starts in the époque of late middle Ages. Dynasties of Sefevids, Afsharians (XVIIXVIII cent.), Zends (XVIII cent.) and Qajars (XVIII-XX cent.) strengthened the country and protected the growth of arts.(Naghizadeh, 2011)

History of Iranian architecture is divided into two periods: pre-Islamic (before VII cent.) and Islamic. Islamization of Iranian society by Arabs in VII VIII century led to essential

changes of in cultural, social and political structure. Despite introduction of Islam older spiritual values did not completely disappear. They caused major influence at new culture, that some writers name Iranian Islam. Many pre-Islamic traditions and rituals are still kept yet in modern Iran. For fourteen centuries after Arabic conquest different rulers tried to revive ancient traditions. Modern and traditional trends are mixed in the culture of the countries of Asia. Without knowledge of the history it is impossible to build a worthy modern society (Hamdouni Alami, 2001).

Figure 35.Achaemenids architecture, Perspolis. (URL 12)

The architecture in Iran goes back to 5000 BC, with characteristic examples distributed over a large area from Syria to North India and the borders of China, from the Caucasus to Zanzibar. Persian buildings vary from peasant huts to tea houses, and garden pavilions to some of the most majestic structures the world has ever seen. The most important

characteristics of traditional Architecture of Iran are: harmony with the nature and environment and taking advantage from natural amenities of the location, and also harmony with the traditions of all provinces of the country.(Ardalan, 2000)

Motif of Iranian architecture had cosmic symbolism "by which man is brought into communication and participation with the powers of heaven". This theme shared by all Asia even in the modern times, gives a unity and continuity to the architecture of Persia and also is a primary source of its emotional characters.(Ardalan, 2000)

Iranian architecture's progress can be divided in two different periods:

- Iranian architecture before Islam
- Iranian architecture after Islam

There are several dynasties ruled in the history of Iran. The architectural style in each dynasty may vary or have similarities with the other periods. Below are the styles of architecture which may relate to one or more of the dynasties.

3.1 Iranian Architecture before Islam

The architecture in Iran before Islam can be divided into two main eras. Each of these eras has some general characteristics which are described below.

The Parsian Style (Achaemenid, Median, Elamite eras)

- Civil buildings usually had square-shaped plans with high columns and painted walls.

- Valuable and durable materials (stone, wood, and cloth) were used in interiors of buildings.

- Buildings were usually situated independently in the center of the square.

- Roofs were built with column-and-beam or false dome systems.(Naghizadeh, 2011)

The Parthian Style (Parthian, Sassanid eras)

- Using of clay and wood as local materials which were cheaper.

- Using of domes arches and arcades in houses which were built by clay.

- Using of internal courtyard *(Hayat);*

- Using of eyvans in sacral buildings;

- Shapes of the plan were mostly a stretched rectangle.(Naghizadeh, 2011)

3.2 Iranian Architecture after Islam

The main styles of architecture developed in Iran after Islam became the main religion of the government and the people are: Khorasani, Razi, Azari and Esfahani (Isfahan) Styles. Below a brief explanation about architectural characteristics of buildings in these styles are given.

Khorasani Style (Tahirid, Alavid,Saffarid and Samanid periods)

- Mass dwelling construction with growing of cities and more simplified architectural forms.

- Stretched in plan rooms with cylindrical or domed ceilings.

- Importance of orientation in Islamic sacral buildings (Kibble-the direction to Mecca).

- Attention to the aspects of urban planning.

- Leveling of living conditions for different social levels according to canons of Islam decades. (Pirniea, 2001) cited in (Naghizadeh, 2011)

Razi Style(Samanids, Ghaznavids, and Seljukids)

- Development of national architecture.

- Great attention was paid to durability of buildings and space composition.

- Buildings had one dome and four eyvans.

- Combined complexes (caravan-saray-madrassemosque etc.).

- Evolution of *Shabestans,* development of their plans and shapes.

- Double-layered domes with the layer of air.

- Interiors and exteriors which were decorated with ornaments. (Pirniea, 2001, cited inNaghizadeh, 2011)

Azari Style(Timurid and Safavid)

- Construction of huge complexes (mosque-madrasseetc)

- Development of radial and rectangle street nets in city planning.

- Clear vertical and horizontal divisions of elevations.

- Introduction of compositions with large Evans and symmetrical minarets.

- Wide use of mosaics and relieves in interior.(Pirniea, 2001, cited in Naghizadeh, 2011)

Esfahani Style (Safavid, Afsharid, Zand, and Qajarid)

- Attention to urban planning; city centers were developed around mosques with Rectangular webs of streets in surrounding districts.

- Large civil complexes including sacral buildings and bazaars.

- Development of structural systems. Modem architecture of*Iran-Enghetat*is influenced by contemporary world architecture.(Pirniea, 2001 cited in Naghizadeh 2011)

Now, after the general review of Iranian architecture as an opening to the subject of houses in traditional architecture, this subject can be discussed in more detail.

In this chapter several issues about the traditional Iranian houses will be discussed such as: management of privacy, different characteristics of Iranian houses and different parts and functions in an Iranian house.

3.3Iranian Traditional Houses

Evolution of architecture is inclined by many factors such as environmental, ethnical, demographical, cultural, and religious factors.(Moradchelleh, 2011)

Two of the main factors which can be mentioned as the reasons of the organization of spaces in the traditional Iranian house are climate conditions and also the culture. In the following section of this thesis, the climate condition and its effects on the architectural houses in Iran would be explained in details.

Also the effect of culture and privacy as a subdivision of it on the organization of spaces in Iranian traditional house would be studied.

Unique beliefs of Iranians had effects on their architecture specially in constructing their living spaces.One of the important points is respecting to private life and reverencing it; also Iranianshave a sense of self-respect in their houses. In such a house internal space was separated from external space by a wall and vestibule (Hashti) was linking space to connect the exteriorto interior parts of the building. (Parhizkar, 2004, translated by author)

3.3.1 Effect of Culture on formation of traditional Iranian Houses

Culture can be called as the identification of the people of each country which they belong to.This influence of the culture can also be seen in people's lifestyles and behaviors in Iran. Islamic religion forms the main part of people's culture in this country. (Asadi, 2012)

According to Rapoport (1995) "first, culture maintains the identity of groups within the single biological species that humans belong to. Second, culture acts as a control mechanism, carrying information that direct how behavior and artifact are to be created. It has been compared metaphorically to both a blueprint and to DNA (which seems preferable, being dynamic), and has been described as a design for living. Third, a major role of culture is to act as structure or framework that gives meaning to particular". (Rapoport, 1995)

About this subject Tyler (1871) also states about the culture in architecture "that complex whole which includes knowledge, belief, art, morals, customs and any other capabilities and habits acquired by man as a member of society". (Tyler, 1871:134)

One of themain transforming factors in the architecture of any country is the historical tradition of that country. In order to form a correct image of Iranian culture we should know the principal stages of evolution of architecture. Iran is a direct inheritor of rich cultural traditions of ancient Persia boundaries of which extended from Mediterranean to Indian Ocean. (Naghizadeh, 2011)

Saqqaf states that aside material and climate, "the factor which represents the religious practices and legal traditions of Iranian Islam and a life style are based on certain rules and traditions in the society. The dwelling unit of the family is the reflection of Iranian Islamic values in architectural design and includes the requirements of privacy, dignity, health and security, within the family means". (Saqqaf, 1987, cited in Eldemery 2000)

There is no doubt that the climatic issues have also their effects on architectural and construction elements. But many architectural elements could be explained by sociocultural condition too.

Following the Islamic rules and also the tradition in the society was one of the important issues which made the entire society act as one and it created a unity in the cities.

Privacy in traditional Iranian houses

The concept of privacy which is highly related to the culture can be explained as a control of connection of inhabitants of the house with outside and also the connection of the outside world with the people who are living in a house. (Gazzeh, 2009)

Privacy is one of the main factors that affect housing architecture. Culture and religious issues in Iranian architecture have concerned the user. Effect of culture on architecture madedivision in the house to create privacy. These divisions by combination of open and closed spaces, has been formed professionally.One of these sub divisions is the public territory, which is containing spaces like Shah- Neshin, Se-dari, and Panj-dari with large measurement and big ceremonies were taking place in these spaces.(Tahir M, 2010)

Traditional Iranian houses are including two different types of privacy: privacy from outside the house and also in next level, privacy from common spaces in the house.

In traditional Iranian architecture the architects were trying to create privacy for the house from outside, this method also can be seen in the interior part of the house: as an example is level rising of the rooms from the courtyard which is the semi-private kind of space to avoid the view from courtyard to the rooms. (Shabani, 2011)

Still there are other different cattegories in the relationship of the building with its sorrunding , most of the traditional Iranian houses were designed in sharing the same qualities which are inaccessible from the street and also are surrounded by high walls.

According to Haerri, In Iranian houses indoor parts (Andarooni) are the private spaces for the family. In traditional culture house was the place for resting after a hard working day. (Haerri, 2010)

Many activities happen in the houses and it is in relation with different life styles of the people. According to the culture and also the needs of the users the privacy sequence in the houses can be categorized as following:

Public area: this area is foractivities like gatherings mostly with guests. This space needs the maximum possibility of expanding. In-between spaces: Family areas include other spaces such as the courtyard, pool-house (Howz- Khaneh), or small sitting rooms. In these spaces the activities like family gatherings of the relatives, and some personal and other activitiesare done. (Tahir M, 2010)

Semi-private(Semi-public) area: is the common area for the family members to gather. This space is for the family only and close friends or special relatives.

Private area: this is a place of individuals. This space has got all the privacy boundaries and creates a specific indoor area. (Tahir M, 2010)

The privacy and also the possible access to the different parts of the house are in relation with each other. "Accessibility to public spaces shows the importance of expanding these spaces. The private spaces and semi-private ones show the importance of

independence of spaces. On the other hand, different spaces have to be flexible in order to include different activities. According to fixed measures of land and designing system, the combination of different spaces shows the flexibility of space besides keeping the privacy." (Tahir M, 2010, p. 275)

3.3.2 Effect of Climate on Design of Traditional Iranian Houses

In today's architecture the ecology of building includes the climatic issues and also use of the energy and resources in a logic way, at the same time the space quality and also the comfort of user should be considered. Traditional architecture of Iran can be called as a sustainable form of architecture. "It is able to response to environmental problems from a long period. Its features are based on climatic factors as well as local construction materials of hot-arid regions". (Soflaee, 2005)

Traditional architecture is the place where the most practical forms and substances of architectural activity have showed up, and also were tested, and approved by looking for harmony with the natural environment. The main factors in traditional architecture are similar to factors of natural evolution in terms of its time period, the durability of the most successful solutions, and no very big changes in the style and solutions. Traditional architecture accrues as result of many years of experience in use and formation of architectural forms in the local environment by local materials, and from one generation to the other generation produces the best functional home and design outlines and systems. (Moradchelleh, 2011)

3.3.2.1Classification of Climate in Iran

Soflaee (2005) explains that Climate can be considered as incorporation in time of environmental factors distinctive in a specific regionand he also mentions about Koppen method which divided the world according to the plants growing. The climatic conditions change the urban planning and architecture of a specific region. In Iran which is a huge country and has very variable climatic conditions, traditional architecture was done in order to make a comfortable condition for the users.Also according to Soflaee (2005) Iran can be considered in four different climatic regions: Mild-Humid Climate-Cold, Climate, Hot-Mild Climate, and Hot-Arid Climate.

Iran is a mountainous country, in this type of land the two point region never can be the same in case of climate. According to Ghobadian (1998) the classifications of the climatic regions of Iran are as below:
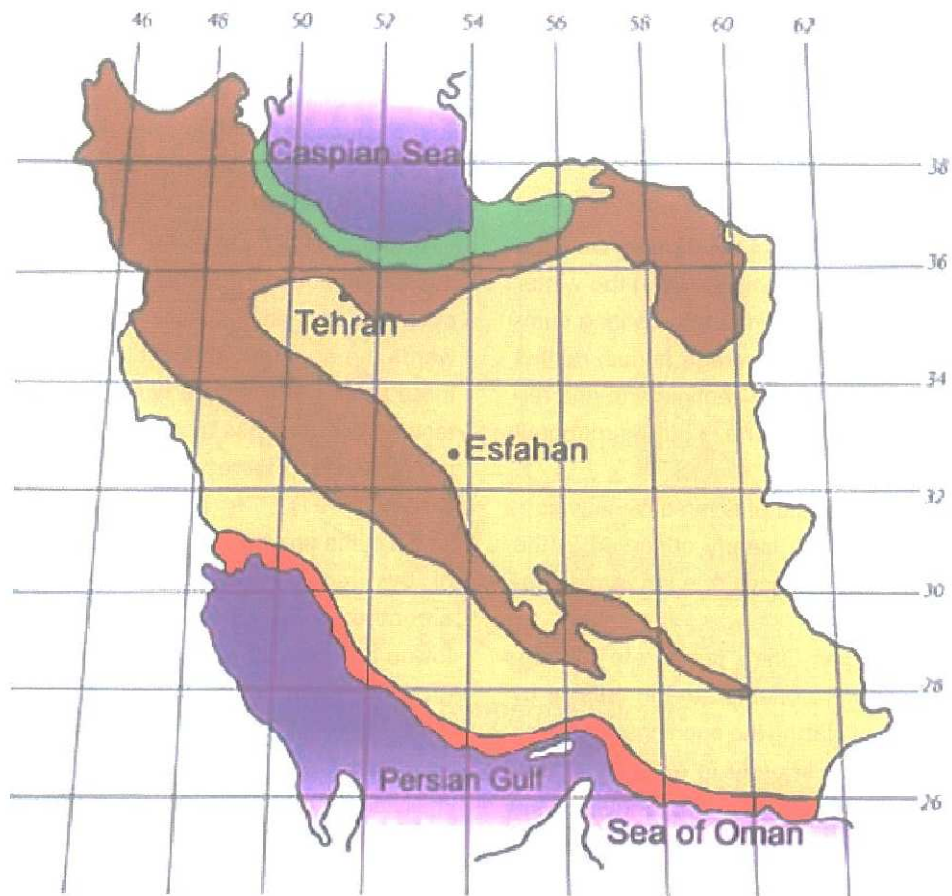
Figure 36.Climatic regions of Iran. (Ghobadian, 2009)

The classification of climates in Iran can be classified as:

Northern Coastal Region- Temperate Climate

The Central Plateau Region- Hot and Dry Climate

The Mountainous and High Plateau Region- Cold Climate

The Southern Coastal Region- Hot and Humid Climate

Architectural Features of region of Temperate and Humid Climates (Northern Coast of the Caspian Sea): This region includes the areas close to the Caspian Sea and also Alborz Mountain and the local architecture in this region has its own special characteristics which can be mentioned as follows: The main material which is used is wood and the reason is to prevent the moisture which existsbecause of the high humidity in this climate. In this area there are long seasons of rain and for protecting the rooms from rain, the wide and porch Eyvanak are built around the rooms of the houses.Houses are mainly built with the light materials and all buildings attempt to use the natural ventilation.For using the maximum flow of air buildings are organized in decentralize and irregular style and because of high rain, the roofs are designed with the high slope to guide the rain water easily down from the roof. (Shaterian, 2008)
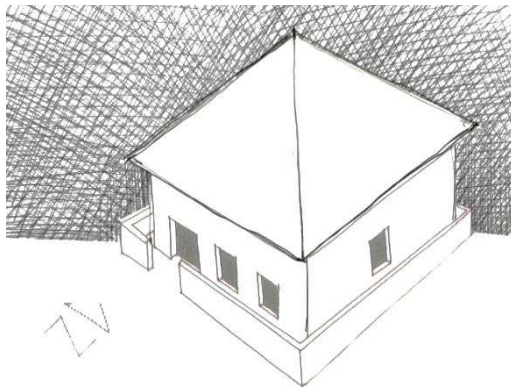
Figure 37.Type of temperate climate houses. (Ghobadian, 2009)

Architectural features of region of hot and dry region: People who are living in this type of weather need to deal with the long hot and dry summer. The architecture in this area is affected by this type of weather and the houses in this climatic condition have these characteristics:

50

Clay and mud is the main used material as they have high heat capacity and the plan of

building is dense and in compact form and the building is designed in a way that the

maximum shadow is created in exterior of the building too.Because of the very short

rain season in this area there is not enough woods, therefore the roofs have the form of

mound, dome or arch which are constructed with mud and clay.The external surface of

the walls is covered with plaster in order to reduce the heat of sunlight and the windows

are located on top of the walls and also the number of them is minimum to prevent the

sun radiation. The internal courtyard with garden and pool are used to create

Moisture.(Shaterian, 2008 Translated by author)
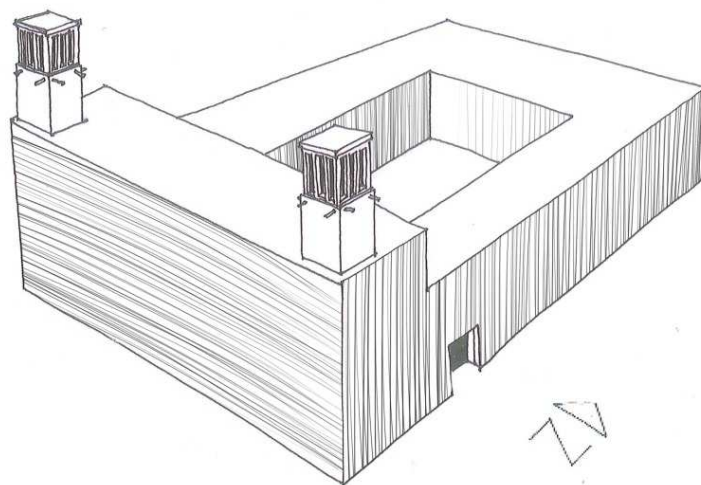
Figure 38.Type of hot and dry climate house. (Ghobadian, 2009)

Architectural features of region of cold climate: Plan of the buildings isdense and

compact.The external surfaces are reduced against the volume coverage. Used materials

have high capacity of thermal insulation to Prevent exiting internal heat to flow from

inside to out.Flat roofs are used to keep the snow and use the snow as a thermal insulator. (Shaterian, 2008 Translated by author)
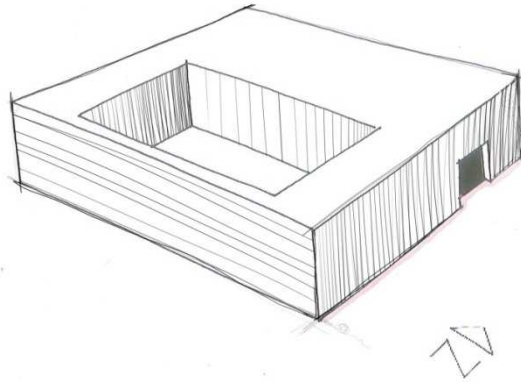
Figure 39.Type of cold climate houses. (Ghobadian, 2009)

Architectural features of region of Hot and humid climate: Low thermal capacity materials are used for the building and areas full of shadow are choosen. Large wind catchers are used in the buildings which are located near to the sea inorder to use the breeze and because of high heat and humidity. (Shaterian, 2008) Translated by author)
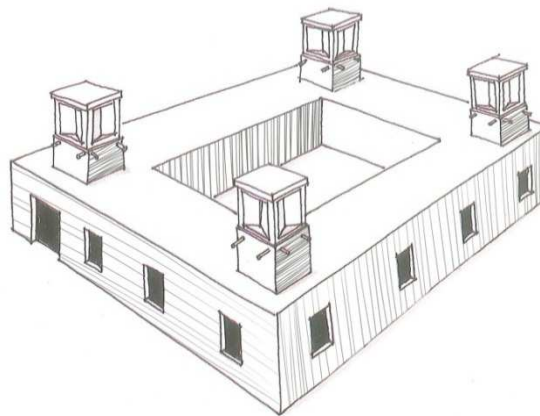
Figure 40.Type of hot and humid climate house. (Gazzeh, 2009)

As can be seen the traditional house in various regions have their own characteristics but there are also some similarities in these houses.

3.3.3. General Principles in Design of Traditional Buildings in Iran

The principles of Iranian architecture are divided into two main categories of physical and non-physical aspects. In this part of the study these two aspects is discussed in brief. There are principles of Iranian traditional architecture which can be somehow considered as non-physical issues. The following is the short explanation of these principals which have important role in the design of traditional Iranian buildings in general and also the houses :

According to Monshizadeh (2009) the classification of characteristics of Iranian traditional house is as following:

Harmony with requirements of people(Mardomvary)

It means concerning peopledemands and functional terms in the design of the house. Total requests of people in a house with variety of social classes must be responded. Therefore the duty is to design for people's needs. It also means that all measurements in a building are in accordance to human scale.

Self-Efficiency (Khod-Basandegy): In traditional Iranian architecture, the use of local material for construction was one of the things to be considered. For instance the soil which was taken from the building site was used to make bricks for the same building. (Monshizadeh M, 2009)

Module Unit (Peymoon): the main unit for measurement in building is Peymoon. This unit (module) is a reference for the other proportion and measurements of the building. Gaz (103 cm) is a unit for measuring different parts of the building.(Monshizadeh M, 2009)

Inward-Looking (Daroon-Garaei):the functions of the houses are based on the very important issue in Iranian culture which is 'privacy', for Iranian traditional families the family activity should be in different parts of the house which is less public and more private. (Monshizadeh M, 2009)

Avoiding Un-necessities (Parhiz az Bihoudegy): the construction of the building was done respecting to consideration of not wasting materials and finishing the construction by reasonable cost, as an example removing the unnecessary dead loads of construction to have a lighter structure. (Monshizadeh M, 2009)

Structural Rigidity (Niaresh): the technology of that time and also the knowledge of the architect were completely used to create a durable structure which can be also strong enough for disasters like earthquake.(Monshizadeh M, 2009)

According to Pirnia (2009) some of the characteristics of traditional houses are listed as following:

- Introspection Architecture

- Symmetric

- Analogy in Architecture

- Autarchy

- Respect to Neighborhood

Introspection Architecture: In the traditional Iranian houses a very simple design in the exterior and a very glorious design for the interior were used. Usually the Interior of the houses was very noble. As it was mentioned before the other characteristic of this architecture is that it is not possible to see inside from outside. The interior of the house

is like a surprise for the one who is entering to the house and observing the simple design of the exterior. (Pirnia, 2009)Translated by author)

Symmetric: In most of the traditional houses if we imagined a line on the middle of houses we could see the symmetric characteristic of the plan, which also helps the building to be more stable against earthquake. This symmetric characteristic can be also considered in three dimensional form of the building.

Analogy in Architecture: In traditional houses of Iran different spaces were constructed based on considering the infrastructure in architecture. For instance, design of the house was done in a way that in any geographical location, there would be a nice air circulation in summer, and also some rooms which are directed to the sunlight for winter time. So in both cold and hot seasons of the year there are some spaces which is suitable for that weather condition.

Autarchy: One of the other features in Iranian architecture was autarchy.Each time, for building a house the material which were used in the construction was mostly the same soil of the site, so the ground was excavated and the same soil from the land was used to make mud for construction of the walls and the other parts of the building.

Respect to Neighborhood: Although each owner of the house had a different financial situation, considering the economical aspect, most of the houses were built in the same level. For instance one owner who had a good financial situation could have more floors on his building and in this case they would have an overhang facing to the next house, but because of respecting to the neighbor they never made the house like that. This as another feature of traditionalIranian architectureshows the morality of architects owners and neighbors. (Pirnia, 2009)

3.3.4. Circulation System in traditional Iranian Houses

In the tradition there was a rule that the men guests needed to be entered to interior parts of the house from entrance and there shouldn't be direct access to the parts of the house which female family members are living. So there was a need to design two different circulation paths that had minimum access to each other, the guest room which was usually the men's reception was close to the main entrance of the house which meant the guests could easily access to this area without entering the most private parts of the house and they never met the female members of the house and this is called "Harim" in the traditional architecture of houses. (Akhtarkavan, 2008)

The guest room showed the economic conditions of the owner, the decoration of the room and the valuable objects which were put in this room was selected in more sensitive way by family members and this room was the room with more decorative elements. The house was somehow the history of family structure in different generations. (Akhtarkavan, 2008)

3.3.5. Specific Elements in Islamic and Iranian Houses (Interior part)

The most striking feature of all, in Iranian Islamic architecture is the focus on interior space as opposed to the outside or facade. The most typical expression of this focus on inner space is in the Iranian Islamic house. Rectangular dwelling units typically are organized around an inner courtyard. The facade of this house offers high windowless walls interrupted only by a single low door. Mostly the courtyard houses are clustered together into a walled complex to have the opportunity of extended families and care

them in arid regions. Entrance to the complex is through a single door that leads to a passageway from which the individual dwellings can be reached. It was said that the traditional courtyard house is never a completed project. As family size may increase, more rooms are built on the lot's unused land. Whenever the land around the courtyard has been covered, expansion happens in a vertical direction. (Akhtarkavan, 2008)

3.3.6.The Role of Light and Color in a Dwelling

Houses are the most important spaces that human responds to his needs there. From the time that people were living in the caves, daylight is somehow the source of the lives of inhabitants, in different times, between night and day; by means of openings or windows letting in light. The history of architecture is the same as the history of the window and day-lighting from the openings, letting in light and air, heat and cold, the window was the tool for the introduction of daylight. (Arjmandi, 2011)

Philips (2004) states that "Dwelling spaces are spaces that interprete the sense of place for human. If there was not any sense of place for human, tiredness and discouragement would appear and house is the place that creates love and warmness for all dwellers". (Philips, 2004, p 74, cited inArjmandi, 2011)

On the other hand, in the traditional architecture of Iranian houses color has an important role and it is mostly used in the glasses of the windows. Except the visual effect, there were also some mental effects on the users of the houses.

As Arjmandi (2011) says about the effects of color on human: "Colors can affect feelings, concentration and even health. Studies undertaken in offices and factories have demonstrated that the use of certain colors calms workers, Reducing stress levels and improving overall efficiency". (Arjmandi, 2011)
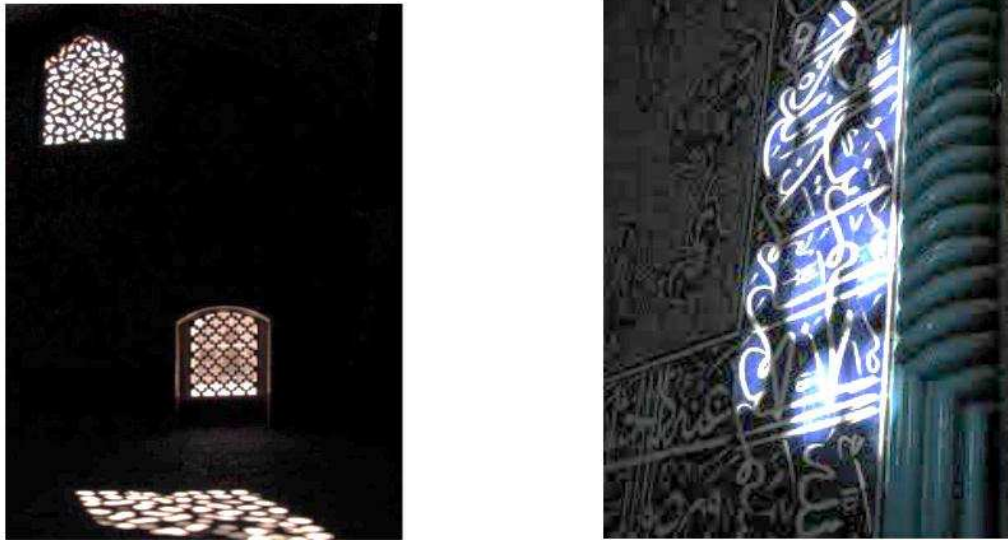
Figure 41.Shadow-light combination in Lotfollah mosque. (Arjmandi, 2011)

Heller (1989) states that the reactions which are created by color are universal and not a personal experience, and are related to cultural, anthropological and biological factors - given that colors develop sign value and this information is passed on through generations over time.(Heller, 1989)

Light, color and also water are the aesthetical elements of Iranian Islamic architecture. Light is one of the unique aspects of Iranian architecture and an element of divine wisdom. Light is the God's face, that the manifestation is appeared in the mosques. Allah is the light of skies and the earth. (Al-Nour Verse of Quran) Color is created from the multiplicity of light and has the essence of unity. Some Islamic scholars believe that,

white is the symbol of god, (the absolute being) and the black color is the color of Kaaba, the house of God, and the main symbol of metaphysical balance that Kaaba is in correlation with it. Blue, turquoise color and golden, in Iranian-Islamic paintings are the luster of color among other colors. These colors are also considered in the holy Quran for example; yellow is a symbol for happiness and comfort. White was the favorite color of the prophet. As a result of these aspects color is really considered as an important issue in Islamic architecture.(Arjmandi, 2011)

Figure 42. The Tabatabai House. Photo by: Naghsh Mard. (URL 13)

Arjmandi (2011) also states that the role of light and color in Iranian architecture is mostly from the culture and the Persian art which has been changed during the time. Using the natural elements in Iranian architecture has been mostly a metaphoric approach. Light and the existing of color from light in traditional architecture were in order to build special spaces and to give distinctive concepts to the place. The colorful

glasses on the windows also help to reduce the interesting of the strong sun light which inter to interior space.

"In other buildings like dwelling spaces, color not only had the ornamental functionality, also other elements were used instead of color to make the space colorful. Utilizing broken mirrors in space reflects the color of the environment into the interior area. Light with different qualities affected on the psychological and social place of human in life." (Arjmandi, 2011)

Figure 43. Tabatabaeiha house. Photo by author

3.3.7. Different Parts of Iranian Traditional House

Traditional Iranian houses consist of two internal (Andarooni) and external parts (Birooni). These houses include the following parts.

- Entrance (including Platform (Sakoo) and head of entrance (Sardar))

- Vestibule (Hashti)

- Corridor (Dalan)

- Ivan

- Courtyard (with pool and gardens)

- surrounding rooms (talar, seh-dari, panj-dai, Kitchen, Services) (Pirnia, 2009)

Figure 44 shows a typical plan of a traditional Iranian house (Boroujerdiha house) and its different components.

1	Path to building entrance
2	Entrance (Voroodi)
3	Vestibules (Hashti)
4	Corridor (Dallan)
5	Porch (Ivan)
6	Courtyard (Hayat)
7	Pool (Houz)
8	Stair to basement
9	Basement (Sardab)
10	Living room (Talar)

Path to building entrance

Entrance (Voroodi)

Vestibules (Hashti)

Corridor (Dallan)

Porch (Ivan)

Courtyard (Hayat)
Pool (Houz)

Stair to basement
Basement (Sardab)

Living room (Talar)
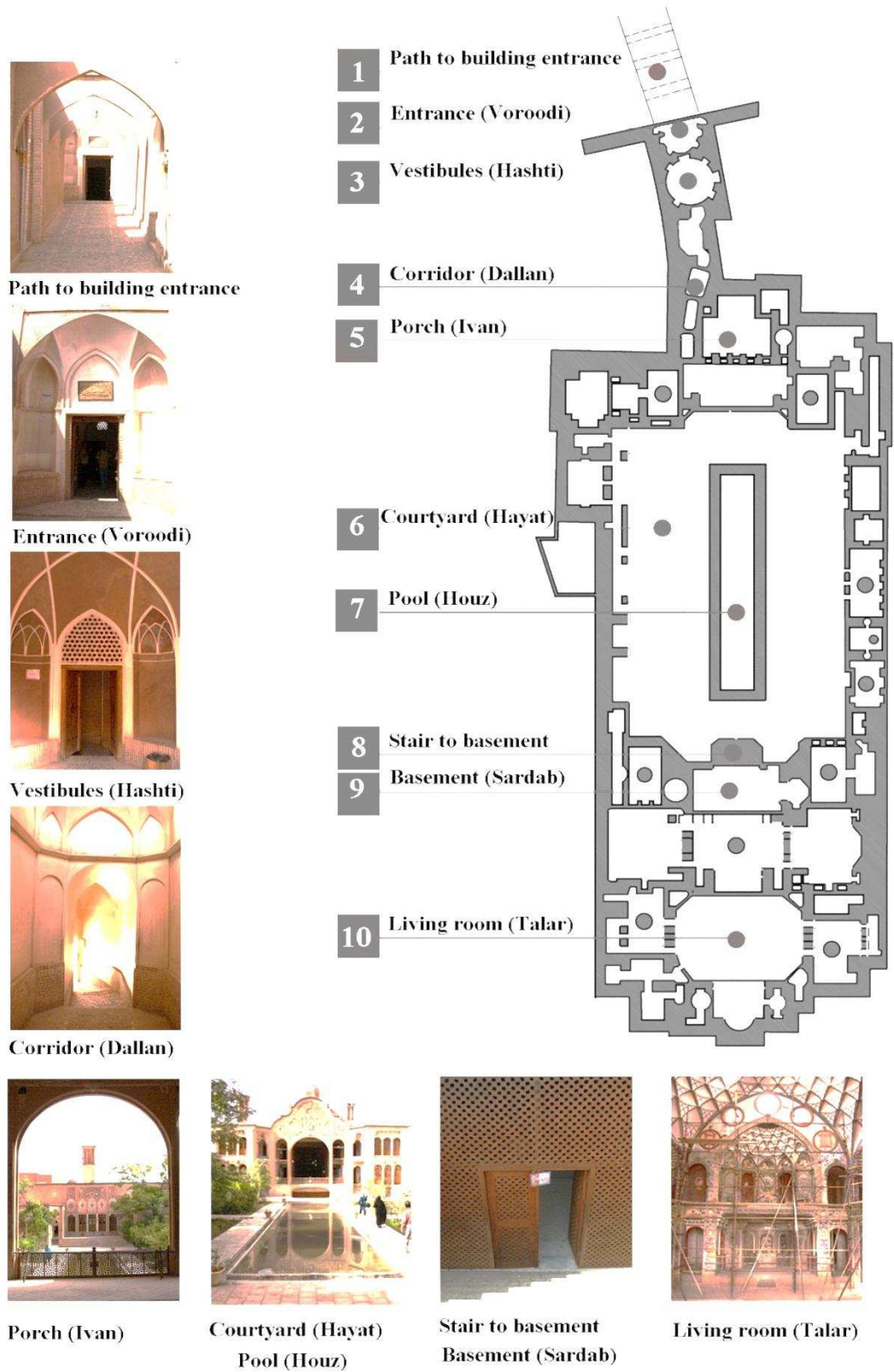
Figure 44. Plan view of Tabatabaeiha house.

Entrance (Voroodi):in most of the traditional houses, there is twin type of entrance doors and on each of them there is door knocker which each belongs to men or women, the one which is for women use has a lower sound of the one which belongs to men. By identifying these two different type of knocker people in the house could understand the one who is knocking the door is a man or a woman.

Platform (Sakoo):platforms are seat like elements which are at the both sides of the main entrance of the house. These platforms could be used as a seat for waiting or for resting, or for door chat with neighbors.

Head at the entrance (Sardari): decorative crescent on the outside of the house and the only part that mostly tile is used.. Occasionally above the main entrance there are writings from Koran or some other religious statements and mostly it is written to protect the people who are entering or exiting from that entrance.
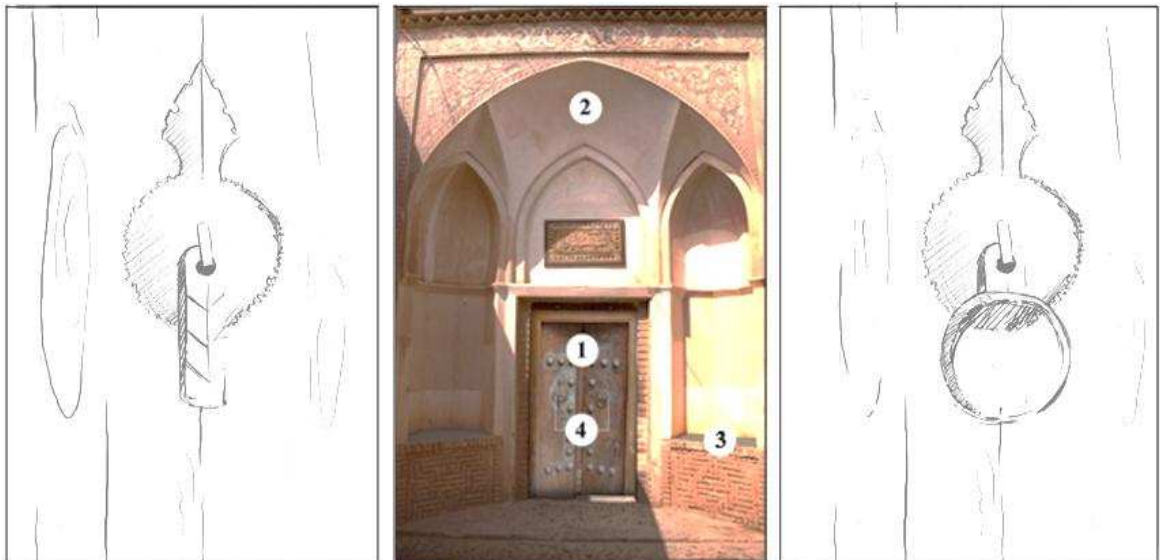
Figure 45.Entrance of traditional Iranian house and the knockers for men and woman.

(Photo by author).

Table 6.Entrance of Traditional Iranian Houses. (Pirnia, 2009)

1	Entrance (voroodi)	Generally twin type of doors is used.
2	Head at the entrance (Sardar)	Prevent radiation of the direct sun,generally there are writings from Koran or some other religious statements and design by tiles.
3	Platform (Sakoo)	At the both sides of the main entrance of the house, for sitting and dialog with neighbors.
4	Door knocker	High sound (Men's knocker), lower sound (Women's knocker)

Vestibule (Hashti): the first space after the entrance is the vestibule which mostly has the shape of octagon or semi octagon or sometimes square. In this space there is a porch with a low ceiling and sometimes the ceiling is in dome shape. This space is used to distribute the different access to the parts of house.

Corridor (Dalan):it is a narrow corridor that guides the entrant from porch to the yard. This maze corridor makes privacy to the house and never gives an immediate understanding to the activities which are happening in the house.

Courtyard (Hayat):mostly, courtyardislocated at the center of the house and act as the heart of the house. Central courtyard with a veranda on each side, which was characteristic of the distant past, is a tool to present an Iranian architecture.

In some houses more than one familywere living, so this yard was used as a small local yard for them. Local yard was used for gathering in various events such as religious festivals and weddings. The courtyards were usually in rectangularshape. Every yard usually had a pool and several gardens.

Pool and garden (HouzvaBaghcheh): for designing the courtyard in old houses pool and garden were the most important elements.Depending on various conditions such as local climate and cultural factors the pool and gardens were in different forms.

Hall (Talar): is a space with beautiful decorations in the traditional houses. A Forum with a cornice, decorated with mirror work, paintings on plaster, Mogharnas and paintings on wood. The Front yard and Hall were connected with five doors room or seven doors room. Hall was used to welcome the distinguished guests.

Living room (Sedari): living room was less important than Hall but more important than simple rooms, living room was used for gathering people of the houses and close family members or even the neighbors as guests. The decoration of the living room was simpler than the saloon (Panj-dari).

Guest room: The location of the guest room was close to the entrance. It was separated from the family domain to maintain the privacy of women. The existence of a space for hosting guests is necessary in the Iranian traditional house. This need is derived from the feeling of maintaining strong relationships with society members (neighbors, relatives outside the family, and friends).

Kitchen (Matbakh):was usually in the form of square or rectangle and located near the water wells. In kitchen there were places for cooking, storage and baking bread and also a wood oven. On the wall there were several shelves for putting the kitchen equipment.

Bathroom and Toilet (Mostarah): usually, it was located in the lower level of the house. Bath was divided into two parts: one for changing clothes (head weakly) and another part for showering.

In the past each city had the specific direction for itself (rown) which was chosen from direction of the sunrise and wind and the houses were located toward this direction. Any part of the house was appropriate for a special season of the year in the majority of traditional houses in hot and dry region, the main axis is directed to northwest-southeast as this axis was the best location to get shade in summer days and heat in winter.(Pirnia, 2009)

Chapter 4

CHARACTERISTICS OF TRADITIONAL HOUSES IN HOT AND DRY CLIMATE REGION

Most parts of the central region of Iran have got this type of climate. In hot-arid climate there is no rain and it is hot and dry. In the other hand, the winter is so cold and hard. There are no clouds in the sky in most of the months of the year and there is no humidity. The temperature is variable in this district. In the summer, maximum of temperature is 50-70c but at night it is reducing to 15c-25c. Traditional architects found ways to bring comfort for human beings in such a weather conditions. "Early men built houses to keep out the elements-rain, wind, sun and snow. Their purpose was to produce an environment favorable to their comfort and even to their survival."(Shokouhian, 2007)

Figure 46. Desert land. Photo by Grant Johnson. (URL 14)

There is almost no humidity in the air and the reason is the distance to the sea and ocean. In all seasons there is a big change of temperature between day and night because of the lack of humidity. There is also the prevalence of sandstorms from desert that canhappen during all months of the year in places which are near to the central desert part of the country. (Hyde, 2008)

The characteristics of traditional Iranian houses reveal natural, geographical, and cultural needs. A main feature of the traditional Iranian house is the adaptation to the harsh climate of the central parts of the country. Climatic problems are severe sunlight and temperature in the summer; fluctuations of temperature; low humidity; limited water supplies; and dusty, sandy winds. In hot and arid climate parts of Iran, traditional architectural designs found solutions to these problems. So, the urban design and architectural style representsthe evidence of these solutions (Tavassoli, 2002).

Climate condition has influence on the design of Iranian traditional houses. Hot and dry climate has a relationship to winter condition; building form can spread toward the east - west axis. But as a result the summer conditions houses were designed in compact shape, it's necessary to construct the houses in cubic form, and the general plan of construction in these areas will be focused toward inside. Some of the historical courtyard buildings are the best possible form to adjust in these climate regions and all the Rooms of these houses are opened only into one central courtyard. (Behbood, 2010)

In Iran, in hot and arid climate, the most preferred plan type is the courtyard houses. In order to reduce the area affected by the solar radiation, compact forms are chosen. Shady

areas can be obtained by arranging those forms with courtyards. In courtyards, with the help of plants and water for evaporative cooling, shady areas can be obtained, the floor temperature can be reduced by the high walls surrounding the courtyard, and the open areas can be used during the day, water Channels poured out from the pool are important elements for cooling.(Behbood, 2010)

The recommended shape is a compact block detached to the other blocks, House plan and orientation should be directed towards the northwest-southeast. Two story buildings which also have basement are mostly preferable. The south side of the building can be transparent with shading elements in order to get the heat for winter time and block the summer rays of sun. There are trees or something that creates shade on the east and west to protect the building from the sun. In the north there is minimum opening to keep the warmth of winter time and let the cross-ventilation in summer time. (Hyde, 2008)

Table 7. Air temperature. Tamaki Fukazawa. (Hyde, 2008)
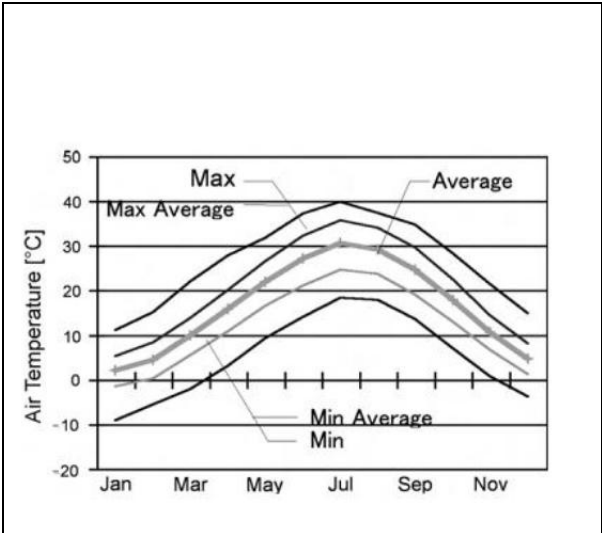
To cope with these environmental conditions not only the buildings but also the overall layout of the cities in the region is developed with special characteristics. Ghobadian (2009) defines these characteristics as:

- Urban spaces are enclosed

- Buildings are adjoined

- There are convex roofs

- Ground floor is lower than natural ground level

- Buildings are inward oriented

- There are central courtyards

- Construction materials are brick, adobe and mud

All these characteristics together with other means of using passive energy to acclimating the buildings makes the traditional Iranian architecture a sustainable one. On this subject Soflaee (2005) states that: Traditional architecture of Iran can be considered as a sustainable way of architecture. It is easy for dealing with the environmental problems in long period of time. Climatic factors as well as local construction materials of hot-arid regions and natural cooling systems are the area which the sustainability is obvious. (Soflaee, 2005)

Environmental conditions and architectural characteristics of hot and dry climate cause creating of some elements in the buildings. These elements are the tools which make life easier in such climate.

The elements which deal with hot and dry climatic conditions in traditional architecture of Iran can be categorized as: (Soflaee, 2005)

- Wind Catcher (Badgir)
- Walls
- Windows
- Cellar-Shabestan
- Material
- Khishkhan
- Courtyard
- Roof
- Planting

These elements and the way they are developed to reduce the effects of the harsh environmental conditions in the residential spaces are explained below:

Wind Catcher (Badgir): Wind catcher is one of the main elements in Iranian traditional architecture. Wind catcher can be seen in hot, hot-dry and hot-humid climates. Wind towers are like chimneys in the sky line of most of the ancient cities in Iran. Wind catchers are vertical shafts with vents on top to guide the wind to the interior spaces. Badgir as an architectural element shows the compatibility of architectural design with natural environment. There is a conversion of energy and it is an example of sustainability in Iranian architecture. (Ghaemmaghami and Mahmoudi, 2005)

It is necessary to mention that the wind tower examples can be seen in the other countries with the similar environmental conditions.

Wind Catcher has been used for centuries in several countries of hot arid and hot-humid climates, mainly in the Middle East countries. Usually a wind catcher contains a tower and a head projecting above the roof of the building. The tower head have vents on the side which is facing the predominant wind. Though, two or four sides of the tower can be open to let the wind in all possible directions. The tower can be divided into two or more groups of shafts. This division let the air move separately up and down the tower all at once and provides more surface area in contact with the air. (Soflaee, 2005)

Soflaee (2005) also states that the breeze from the roof top goes to the summer living zones and on the other hand the hot air of the house goes up and changes its place with the breeze. The structure in the bottom of the wind catcher makes the wind cooler by the means of humidity sometimes the temperature would be 25 centigrade in the summer time.
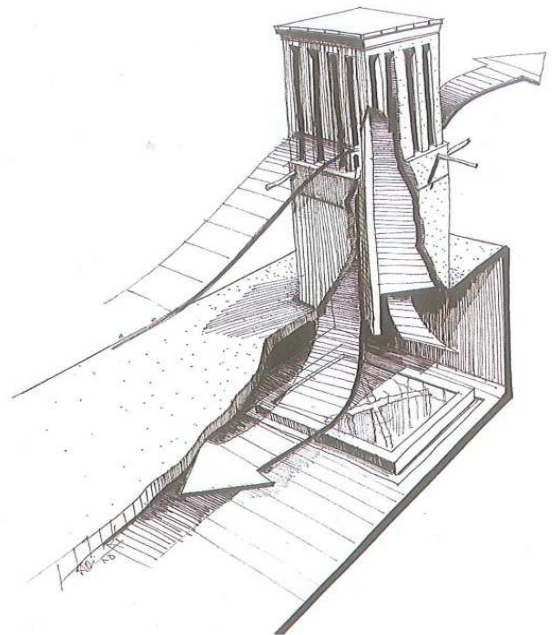
Figure 47. Four-sided wind tower. (Gazzeh, 2009)

Salehipoor and Yasrebi (2005) describethat "in most of the houses of hot-arid regions of Iran, wind catcher has a direct connection to parch and this space is used for diversity of functions from morning to noon and inhabitants use the underground in the afternoon and roofs at night, which have colder weather, for sleeping. In fact, this act of changing daily space is called local-regional correspondence."(Salehipoor and Azami, 2005)
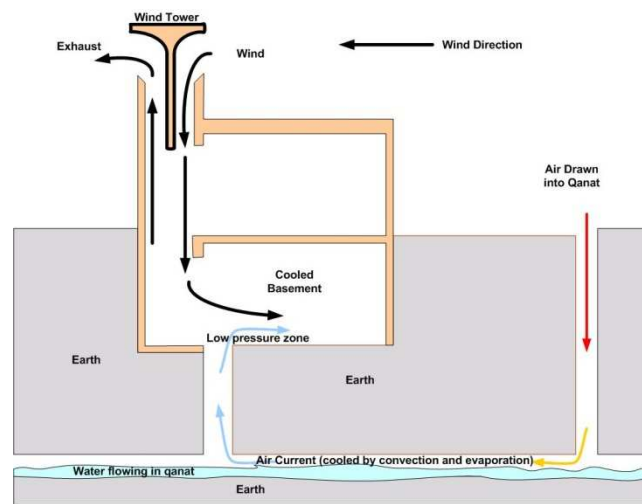
Figure 48. Ways of wind-catcher function for ventilation. (URL 15)

Walls: One of the most important elements of architecture in the hot-dry climate region is the wall. The walls with the thickness of one meter make the heat transferring difficult. In this way, the heat from outside cannot easily transfer to the interior space of the building during the day time. At the same time, the heat of the interior cannot transfer easily to the outside at the cold time of nights and provides enough comfort for the users.(Salehipoor and Azami, 2005)

Figure 49.Exterior view of traditional Iranian house.Photo by Mostafa meraji. (URL 16)

Windows: External walls do not have many windows and there are enough number of windows which are facing to the yard. Ventilation Passing is done by these windows as same as wind catcher which also helps to the internal ventilation.(Salehipoor and Azami, 2005)

Figure 50.Window's frame.Photo by author.

Cellar-Shabestan: In all Iranian vernacular houses basement(Shabestan) could be seen, it can be called semi basement but with some differences. A basement (Shabestan)covers with the entire surface below the ground floor of the building. It has a

ceiling about one meter higher than the surface of courtyard and the rest of it is designed to be underground. (Soflaee, 2005)

Material: The common used material for constructing the huge wall in hot & dry regions are mud, mud brick, stone, brick, mortar, lime and wood. The thermo-physical specifications of these materials are the important issues in hot & dry regions. 'These materials have thermal resistance, high heat capacity and they absorb the sun radiation by their external surfaces. The microscopic and many pores of the mentioned material, which are filled with air, change them to a material similar to thermal insulator.'(Salehipoor and Azami, 2005)
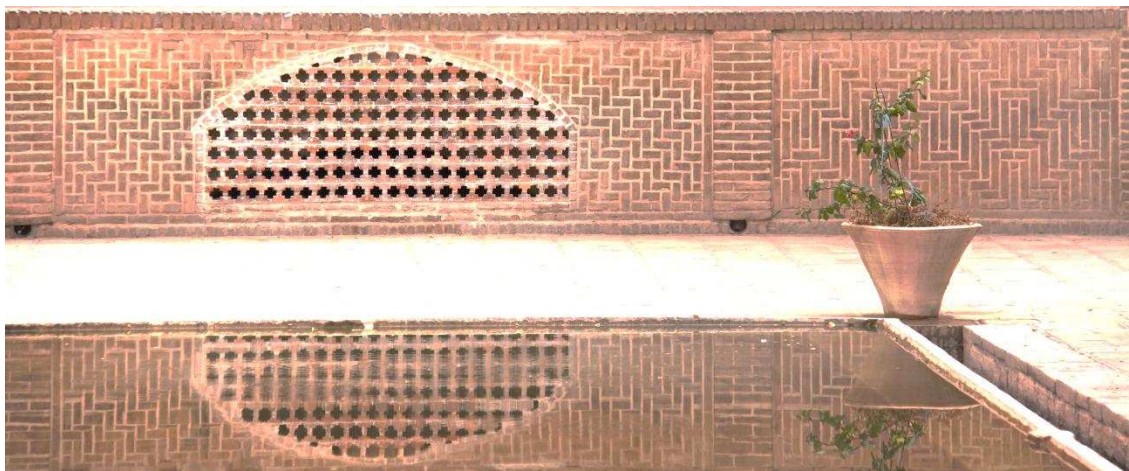
Figure 51. Brick wall. Photo by author.

Khishkhan: The other cooling element in the traditional architecture of Iran in the hot arid climate is Khish or Khieshkhanwhich was used since a long time ago. 'It was look a hut or "Dar Aferin" that was encircled up with mats, tiles or thistles and splashed with water now and then so that cool air is conducted in to the room with the wind blow. This space- Khishkhan - was more often used out doors in hot summer.'(Soflaee, 2005)

Courtyard: The courtyard in a hot dry climate is the heart of the house in two aspects of social issues and also environmental issues. The size of the court yard is in relation with the total size of the land which house is built in it. They are narrow enough to create a shaded space during the day in summer, at the same time wide enough to get solar rays in winter. A courtyard can be a secure, private, and a comfortable place in the house. There are mostly trees, flowers and shrubs in the court yardto provide comfortable condition and also make an attractive setting. The greenery also creates some shade and increase the humidity of the courtyard space.

Figure 52. Abbasian courtyard. Photo by author.

There are rooms which surround the courtyard and the light and air flow can be easily reached by these rooms. In hot – arid areas, the courtyard operates in three usual cycles to use the maximum of a usual summer day. In cycle 1, the night cold air run down into the courtyard and fills the surrounding rooms. In this condition walls, roots, columns, ceilings and furniture get cool at night and keeps it for longer time. The courtyard can be used as a sleeping place at night in the summer time. During the cycle 2 around mid of the day, when the sun shines directly on the surface of courtyard, the existing cool air of

the courtyard and rooms goes upward. During cycle 3 the surface of courtyard and the surrounding of house become warmer and all cool air as exists within the house begin to drawn-out by the evening. Therefore the role that a courtyard plays as factor to provide micro – climate must be taken into consideration.(Soflaee, 2005)

Roof: Instead of flat roofs dome and arched roofs are mostly used in hot and dry humid regions. The domes, which were used as covering roof for mosques, water reservoirs and Bazar (traditional shopping center), are another type of roof in hot and dry regions. The dome shape of the roofs of buildings in this region had some thermo-physical reasons. Because of the convex and unbalanced surface the impact angle of sunbeam on dome and arched roof is different from one point to another, and a part of the roof always stays in shade during morning and afternoon. If the flat roofs are used in hot & dry regions it is usually paved with square shape bricks called paved bricks. These bricks receive the most radiations of sun. Early morning it starts to increase and late afternoon it decreases gradually. This action causes the change in sun radiation intensity and radiation angle.(Salehipoor and Azami, 2005)

Figure 53. View of arched roof of Kashan house. Photo by Hamzeh Karbasi.

(URL 17)

Planting: In desert regions the rate of planting depends on water the accessibility to water. In hot and dry region the herbal space lots of effects on the small surrounding regions because of the following issues: (Maleki, 2011)

Table 8. Planting. (Maleki, 2011)

Decreasing the direct radiation of sunbeams in the yard space.
Shading on ceiling, walls, windows, and yard space.
Decreasing the dust in the surroundings of the building.
Decreasing the undesirable wind speed in building surroundings.
Concentration of wind blow and increasing its speed in a desired direction.
Increasing the humidity in these regions.
Decreasing the temperature in building surroundings.

Chapter 5

ANALYSIS OF TRADITIONAL HOUSES IN THE CITY OF KASHAN

In this chapterof the thesis the important issues which was concluded from the litreture review is analysed on the eighteen chosen traditional houses in the city of Kashan. These eighteen houses are selected because these are accepted as good examples of traditional houses in Kashan by Iran Cultural heritage and also because these are the most preserved examples of houses in this region.

Inorder to guide the study in a straigh path, first five houses are chosen with almost the same characteristics of design such as smilarity in general order of spaces and organization to be studied in detail. On the other hand there are also some differences which make each house unique by itself. These houses are chosen as the symbol of the wide range houses in Kashan to find the best cases which are renovated and qualified for analysis and apply the outcome of litreture review. Then, all eighteen houses are analyzed in respect to kind of space organization, spatial relationship, definition of entrance, access design and other organizational matters.

To analyse the houses the main issues such as access and relationship of spaces and their organizations and the important elements are discussed. There are graphical tables which make the similarities and differences of the houses easier to percieve.

Kashan is a city in the central part of Iran and it belongs to the province of Isfahan. As was mentioned beforethe climate of central region of Iran is hot- arid climate and this region represents a hot and dry area with a high temperature change between day and night. Considering the traditional buildings, it can be seen that designers have found out the best designs and examples of settlements suitable for each climatic in three; macro, medium, and micro scales. (Behbood, 2010)
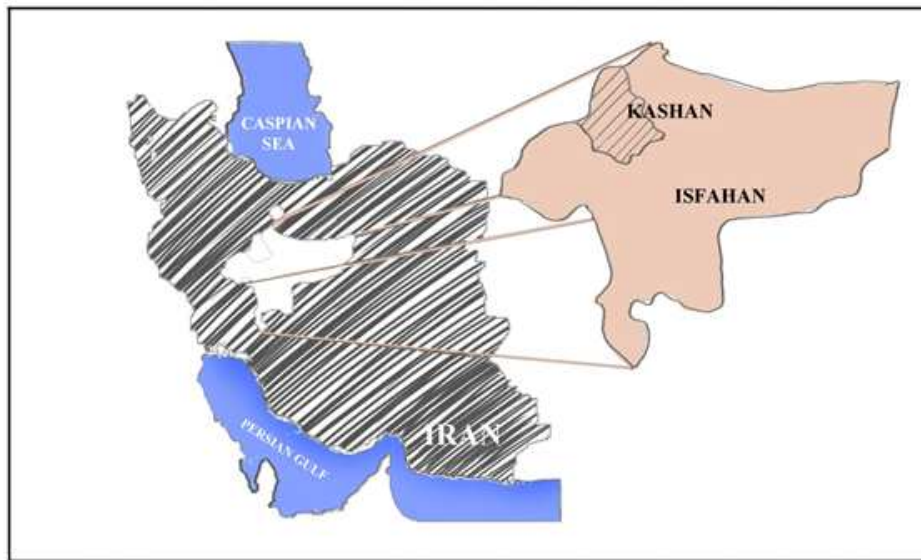
Figure 54.Location of Kashan.

According to Behbood (2010) climatic responsive design strategies of traditional architecture of Kashan houses in various levels can be summarized as:

Table 9. Strategies design approaches in hot climate. (Behbood, 2010)

Scales	Climate responsive design strategies
Macro	Distance between buildings; Enclosed urban environment; Narrow and irregular streets.
Medium	Building form- Building envelope- Self- Efficiency in materials; Optical and thermo physical properties of the building envelope.
Micro	Module Unite; Eyvan and Revak; Wind catcher. (Air trap)

Topography is one of the main issues that define the architecture of the hot arid region in Iran. In city of Kashan, houses are located according to the slope of a hill of the city and the buildings are all oriented to the South-East. In Kashan, terraced and row houses are in a way that their shadows never fall over the next house or on the one facing or behind them.(Leylian, 2010)

By passing the passages in the old part of the city of Kashan, we reach to theTraditional housesdesigned for this hot and dry climate. These houses are known as four season houses as it was mentioned before and the structure and other parts of the house even the decorations are designed to fulfill the climatic needs of this region. The north and south parts, as the most suitable directions for buildings are for summer and winter dwelling. The northern part of the building or "Panah" that is directed to the winter sun is the sitting room of family. In south part "Nesar" backs sunshine and it is a veranda with tall roof and wind catcher which is the sitting place of family for the summer time. Generally the basement is built below this part. In hot seasons, the temperature of cellar-

being underground- is less than other parts. For instance, in "the Broujerdis" house in Kashan, at 11:30 AM of September 25th, the temperature in alley is 36 centigrade degree, 32 centigrade degree in yard and 24 centigrade degree in cellar.

The height of summer sitting places in the houses is high so the hot air could rise up. In some buildings, a dome is established in two-shell form on the ceiling in order to insulate it from direct sunshine. (Zaimi, 2010)

Following sections include a more detailed description about five mentioned houses in terms of functional and spatial organization. Before the description of the house it should mention some explanation of some of the specific architectural elements of the traditional Iranian house includingyazdi-bandi decoration, Orosi and mahtabi.

Yazdi-bandi decoration: the houses in Kashan are decorated in many different ways but one of the most used way is Yazdibandi decoration.In terms of Iranian architecture, Yazdibandi which is a specific decoration of dome is elegant and miniature arches within bigger arch.

Figure 55.Yazdi-bandi decoration in Boroujerdiha house. Photo by author

Orosi: one of the architectural elements of Iranian houses is Orosi. Orosi is a door which is designed by geometrical shape with wooden frame and colored glasses which are mostly located in five-door rooms (panj-dari).
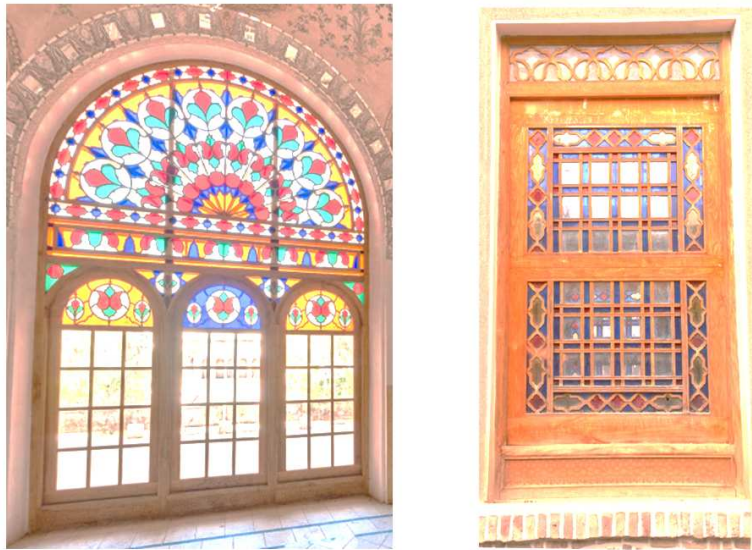
Figure 56. Orosi door. Photo by author

Mahtabi is an arch in the roof of the houses which have decoration on corners from interior and in some cases they are opened to sky.
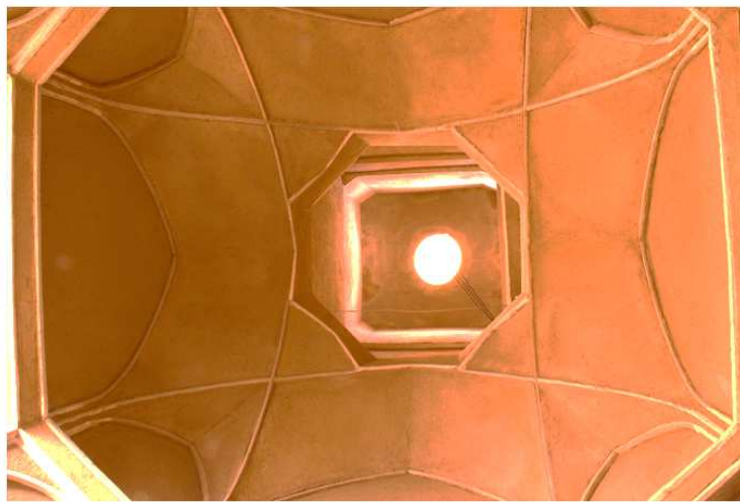
Figure 57. Mahtabi. Photo by author

Figure 58 and table 10 shows the location of these five house in the city and the relation of these houses with the street in more detail.
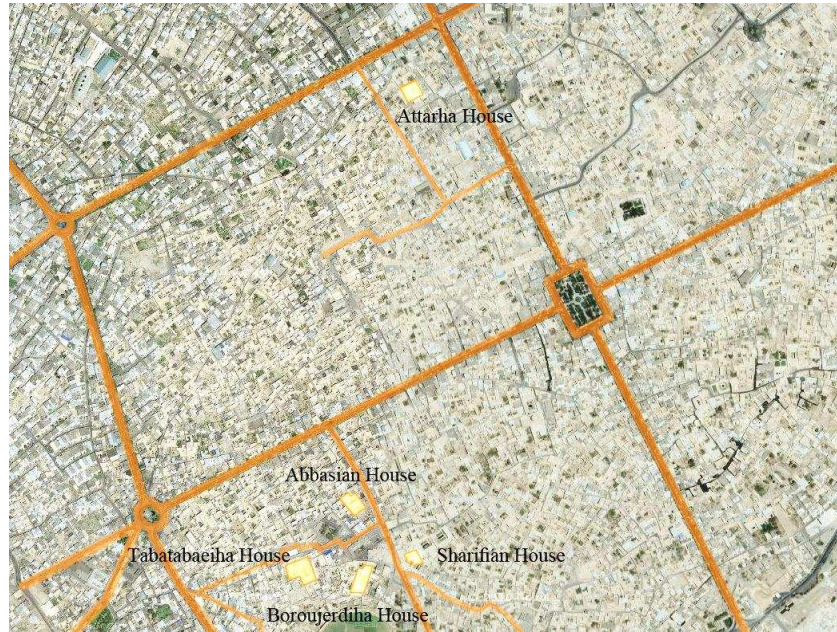
Figure 58.Location of houses.

Table 10.Location of Houses.
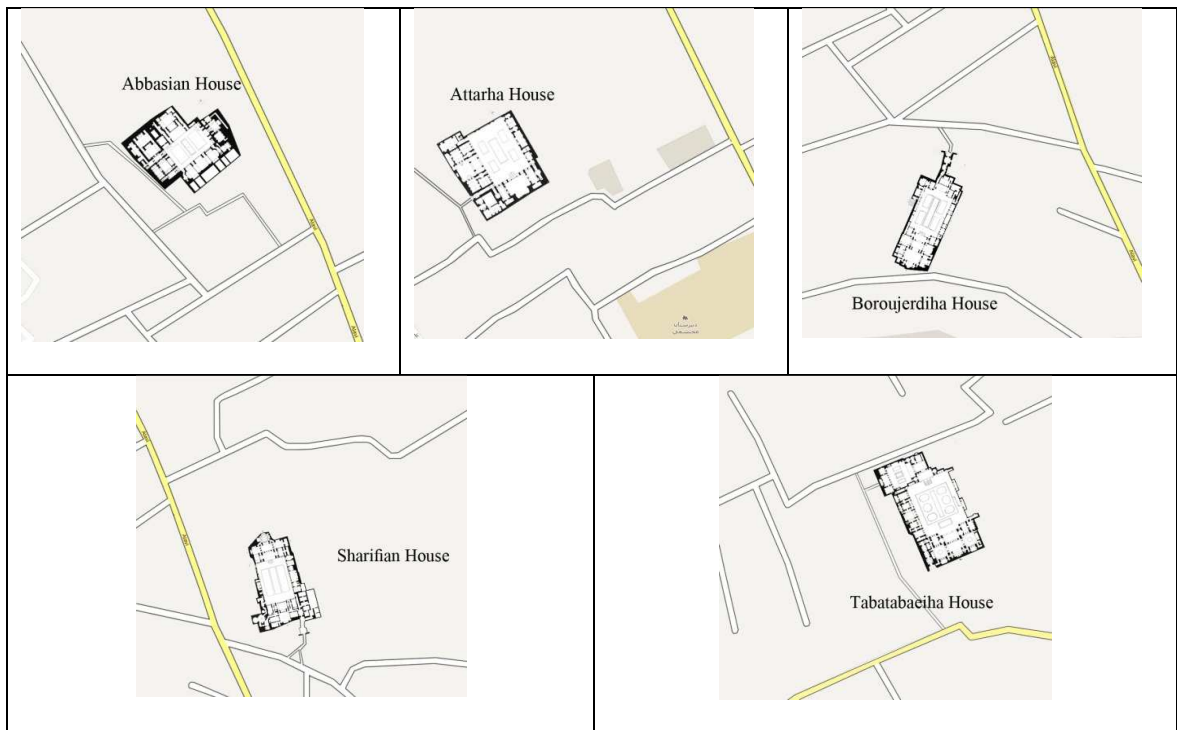
Abbasian House

Entrance (Voroodi)

Corridor (Dalan)

Vestiblue (Hashti)

Living roon (Shah-neshin)

Pool house (Howz-khaneh)

Porch (Eivan)

Saloon (Talar)

Corridor to lead to courtyard

Entrance (Voroodi)

Vestiblue (Hashti)

Corridor (Dalan)

Abbasian House

Courtyard (Hayat)

Five doors room (Panj-dari)

Three doors room (Seh-dari)

Three doors room (Seh-dari)

Five doors room (Panj-dari)

Courtyard (Hayat)

Courtyard (Hayat)

Mahtabi
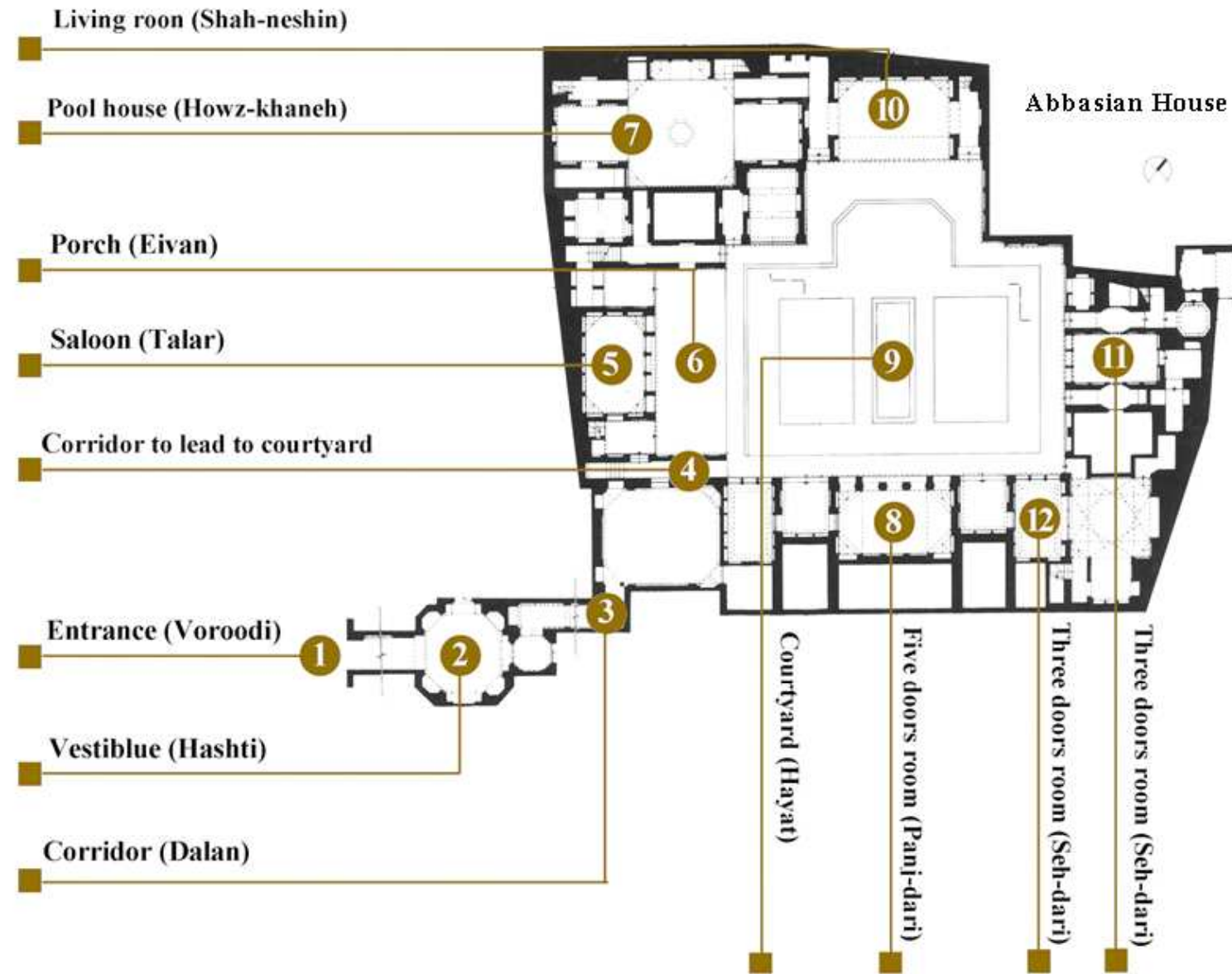
5.1Abbasian House

The following explanations are according to the written documents by Ranjbar (2009) and also are based on the author's own observation on the site.

This is one of the most interesting examples of the traditional houses in Kashan. The variety and the number of spaces in this house are different than the other houses in Kashan, and their quality is also somehow different than the other houses.
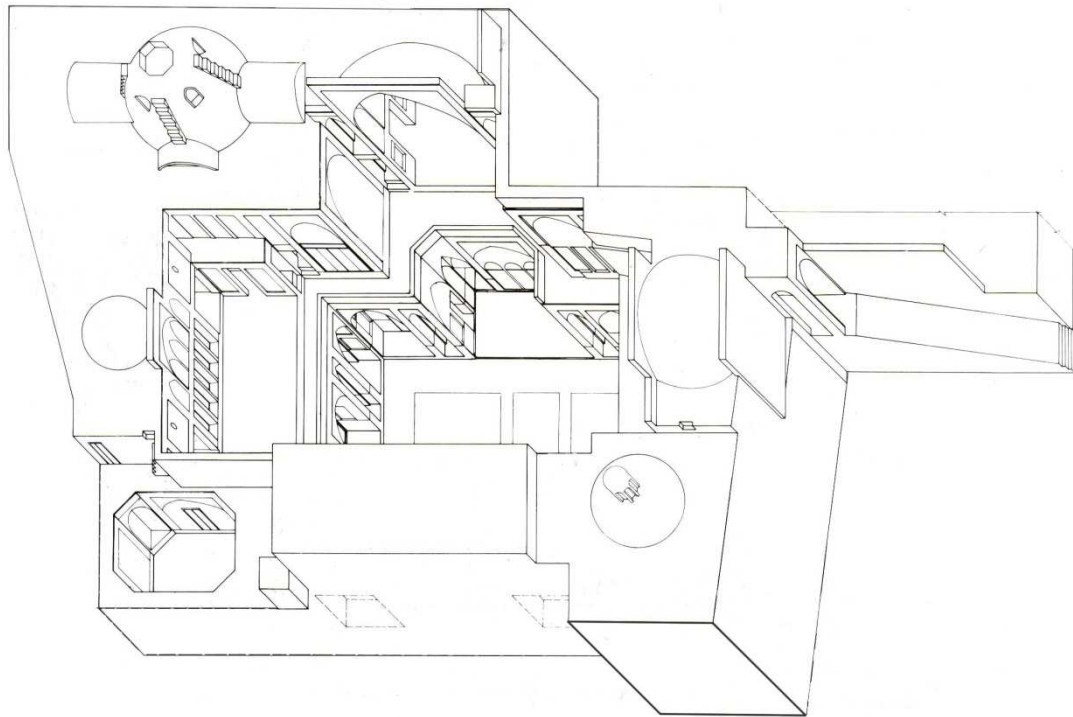
Figure 59.Perspective view of Abbasian house.

- The variety and the number spaces and their quality in this house are different than the other houses in Kashan.
- The house has two important entrances.

- One entrance is situated at the southern part of the courtyard and it contains two corridors, two vestibules (Hashti) which one of them is bigger, and an open yard.

- The other entrance which is at the north part of the house similarly includes an open yard, a vestibule (Hashti) and a corridor, leading to the northeastern platform of the courtyard.

Figure 60. Abbasian House.

- The house has a small courtyard which is elevated and looks widened at higher level.

- The reception halls are on the southwestern and northeastern parts of the building

- The porch (eivan) is decorated with delicate Yazdi-bandi decoration.

- The porch is higher than the rest parts of the house.

- Behind porch (eivan) there is a large cross-shaped reception hall which with eivan makes the most important part of the building.
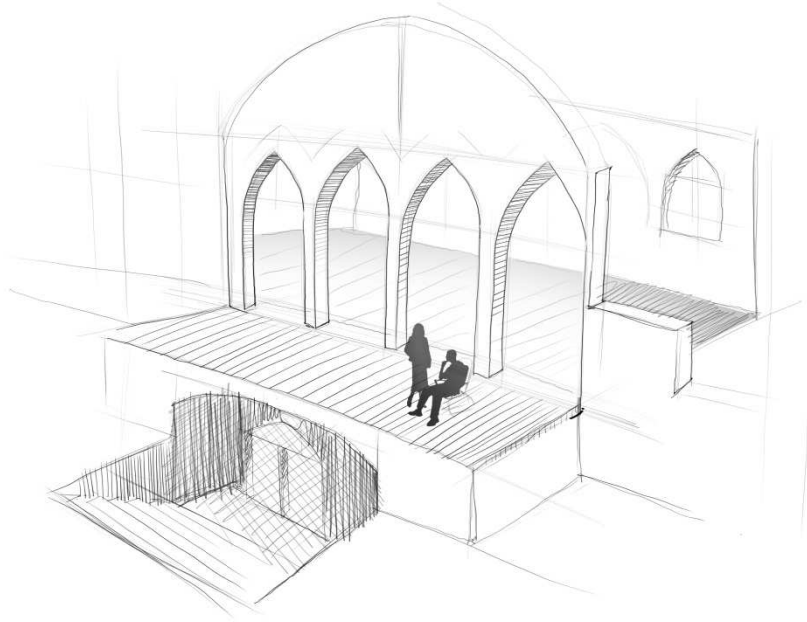
Figure 61.Poarch and Reception hall views.

- In the southeastern part of the building at the same level of the courtyard there are one reception hall and two seh-dari rooms which are connected to each other with orosi door (door designed by wood and colorful glasses), whenever these doors are slide up there is a huge space made by these three spaces.

- Above this space, on the upper floor, there is a panj-dari (five doors room) and also two seh-dari rooms (three doors room) which are separated by two porches (eivan).

- Half floor upper, there are two narrow spaces on top of the porches (eivan), which are getting light from the courtyard through some small openings.

- At the ground level of the western part of the building there is a reception hall which is connected to the bigger reception hall from the back.

- On top level of this part there is a panj-dari room (five doors room) which has two eivan on sides and one platform in front.

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- On the center façade of the panj-dari room there is an arc which is higher than the other parts.

- On the northeastern part of the house is a totally different

- The façade is exactly similar to the one which is facing to it. This part is lower than the courtyard's level.

- In the upper level of this part there is one seh-dari room (three doors room) with two kafsh-kan (the space for putting the shoes) and half-floor upper there is a reception hall, so this part is higher than the rest parts.

- At the western corner of the house, there is an elevated pool house (howz-khaneh) which is surrounded by two floor important spaces of the house.
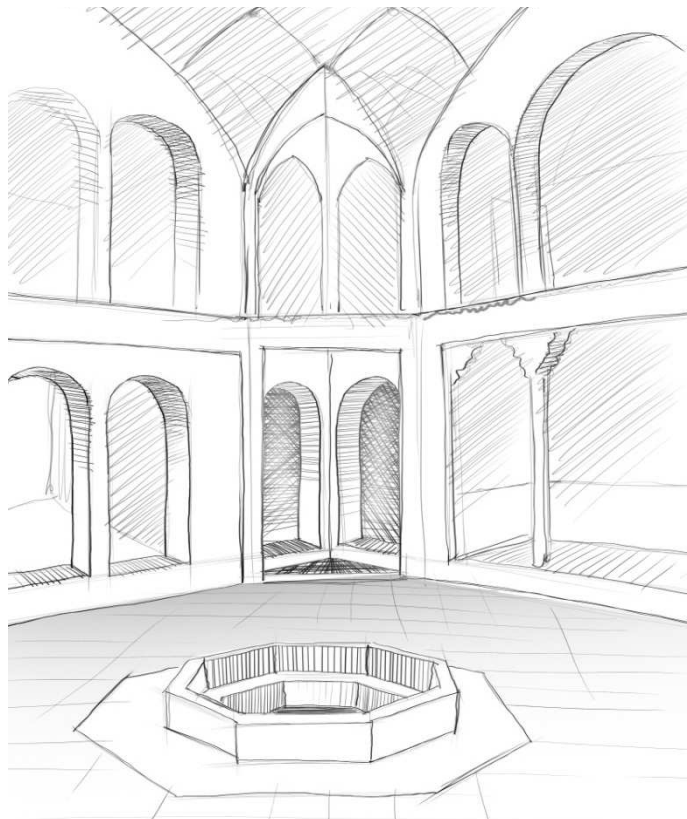
Figure 62. House pool (Houz Khaneh).

- There is a dome on howz-khaneh and there are barrel vaults on top the surrounding spaces of the howz-khaneh and these changes in roof are visible from exterior of the building.

- In the eastern corner of the building there is an space with a rasm-bandi decorated ceiling and it is connected to a seh-dari room (three doors room) through an orosi door (door design by wood an colorful glasses).

- Most of the rooms have yazdi-bandi decoration, and the reception hall also have colored stucco carving and mirror works as a decoration parts.

- There are several half-floor spaces in this house and some of them are shared with the neighbor houses like the one in the southeast part of the house because the close family the owner of the house was living in neighbor house.

Attarha (Attars) House

Facade view

Living roon (Shah-neshin)

Mahtabi

Entrance (Voroodi) ❶

Corridor to lead to courtyard ❷

❿

❷

❾ ❺ ⓫ ⓬

Courtyard (Hayat) ❸

Living roon (Shah-neshin) ❻

❹

Two doors room (Do-dari) ❼

Three doors room (Seh-dari) ❽

Pool house (Howz-khaneh)

Porch (Eivan)

Five doors room (Panj-dari)

Pool (Howz)

Three doors room (Seh-dari)

Staircase (Peleh)
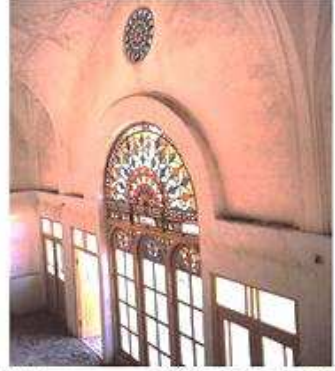
Courtyard (Hayat)

Three doors room (Seh-dari)

Courtyard (Hayat)

Three doors room (Seh-dari)
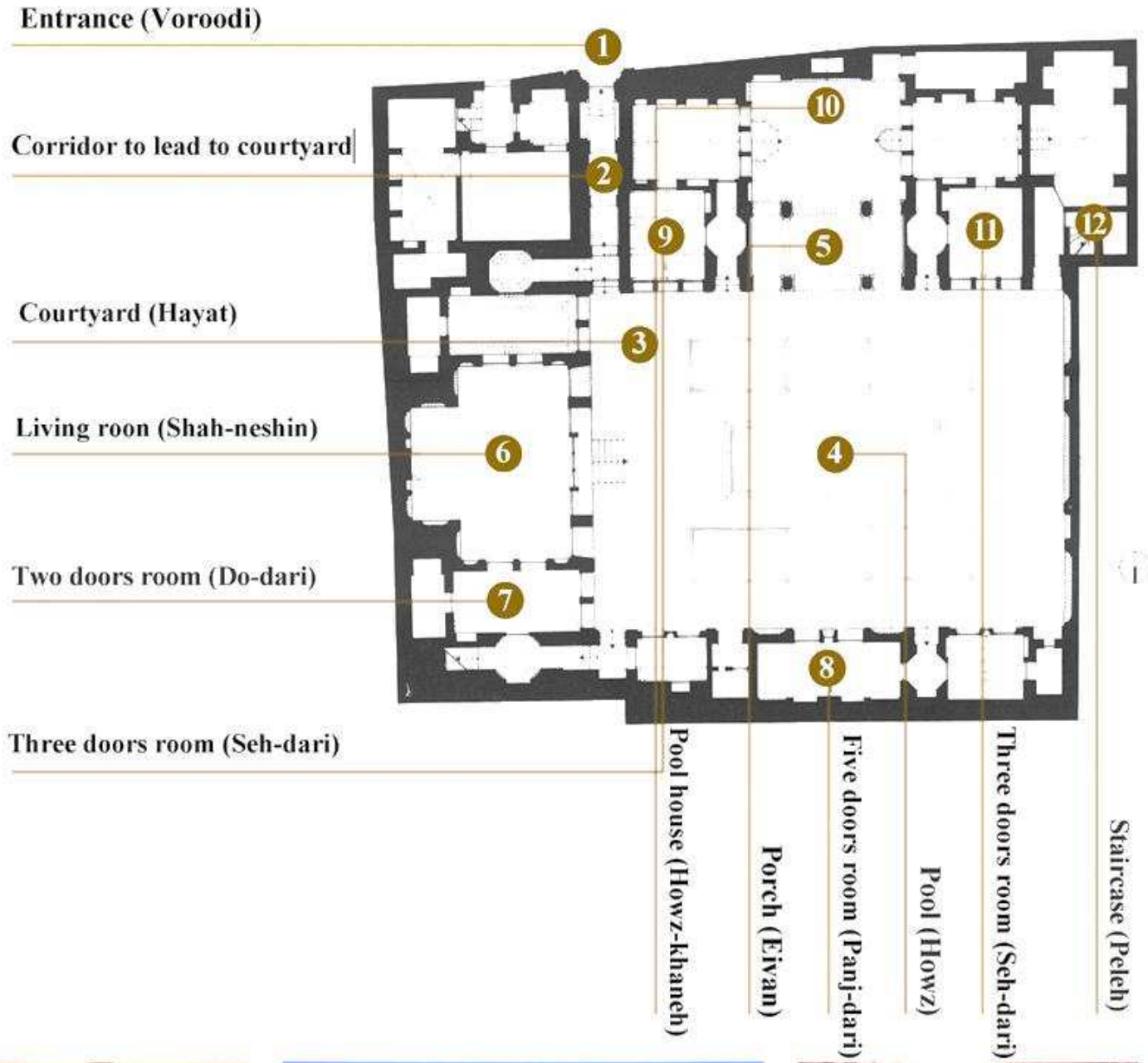
5.2 Attarha (Attars) House

The spaces of Attarha house are organized on three sides of its main courtyard on east-west axis. The western fronts of the building is two floors, but the northern and southern part are one floor and the wall of the west part is also as high as a one floor , that's why the courtyard gives the sense of open space and looks wide. (Ranjbar, 2009)
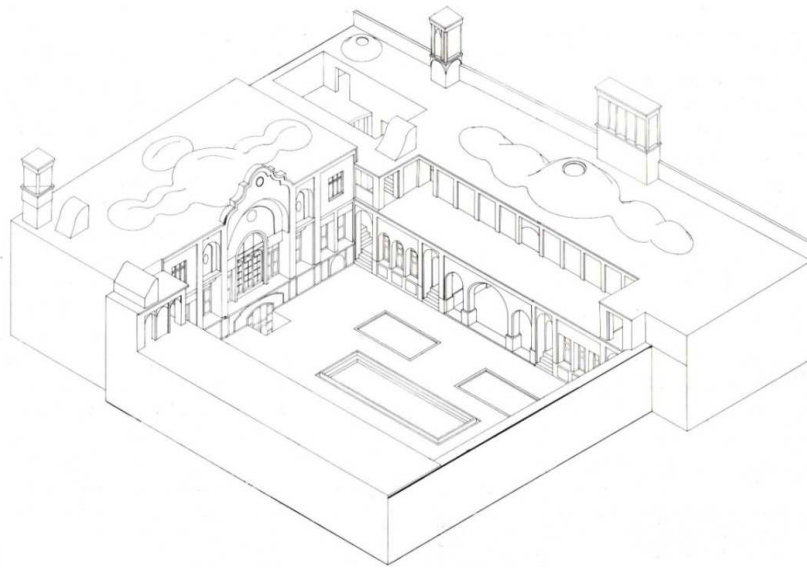
Figure 63.Perspective view of Attarha (Attars) house.

- The main entrance of the house is located on the southern façade and it is connected with a straight corridor to the courtyard.
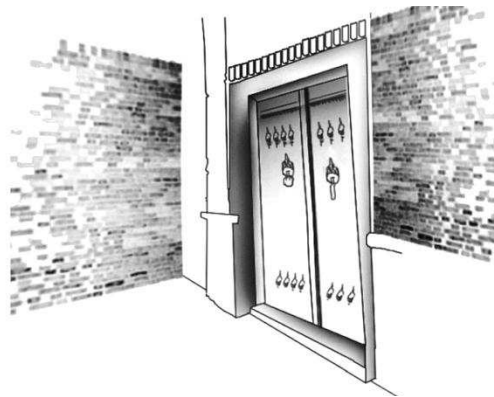
Figure 64. Entrance view.

- There is a secondary entrance which has an access the stable.

- The spaces of Attarha house are organized on three sides of its main courtyard on east-west axis.

- The western fronts of the building is two floors, but the northern and southern part one floor and the wall of the west part is also as high as a one floor .

- The main part of the house is located on the eastern side of the courtyard

- The main part includes a large reception hall with a shah-neshin and two do-dari rooms which have access to the hall and the courtyard.

- The reception hall has a dome shape celling and its ceiling and shah-neshin are decorated with yazdi-bandi decoration.

- The main façade of the house is the front one, with a unique shape of an arc in the middle of the façade.

- Important element of the façade is the simple orosi door (door design by wood and colorful glasses) in the central arc of the reception hall.

Figure 65. Attarha House.

- This house has a big basement (Sardab), which has access to the courtyard. The ceiling of the basement also has yazdi-bandi decoration.

- Two wind catchers, connected to the basement spaces, are at the northern and southern parts of the house.

- At the center of southern part, at the courtyard's level, there is a pool house (Howz-Khaneh) which has a columned porch in front (Eyvan).

- The pool house (Howz-Khaneh) which defined as semi open space.

- In two sides of pool house there are seh-dari rooms and there are also two seh-dari rooms in two sides of Eyvan.

- The ceiling of howz-khaneh has a dome shape and the ceiling has got yazdi-bandi decoration.

- A very tall, wind catcher is located behind the howz-khaneh, which is a dominant element in the center of southern part of the building.

- There is a stable in the western corner of this part of the building and this stable includes a small yard and a small closed space.

- The northern part of the building includes three seh-dari rooms and two corridors which connect the rooms and the room which is located in the middle is the biggest one.

- The façade has the same proportion as its opposite façade(Ranjbar, 2009)

Boroujerdiha house

Path to building entrance

Entrance (Voroodi)

Vestibules (Hashti)

Path to building entrance **1**
Entrance (Voroodi) **2**
Vestibules (Hashti) **3**
Corridor (Dallan) **4**
Porch (Ivan) **5**
Courtyard (Hayat) **6**
Pool (Houz) **7**
Stair to basement **8**
Basement (Sardab) **9**
Living room (Talar) **10**
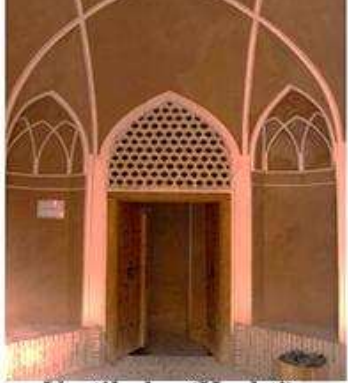
Corridor (Dallan)
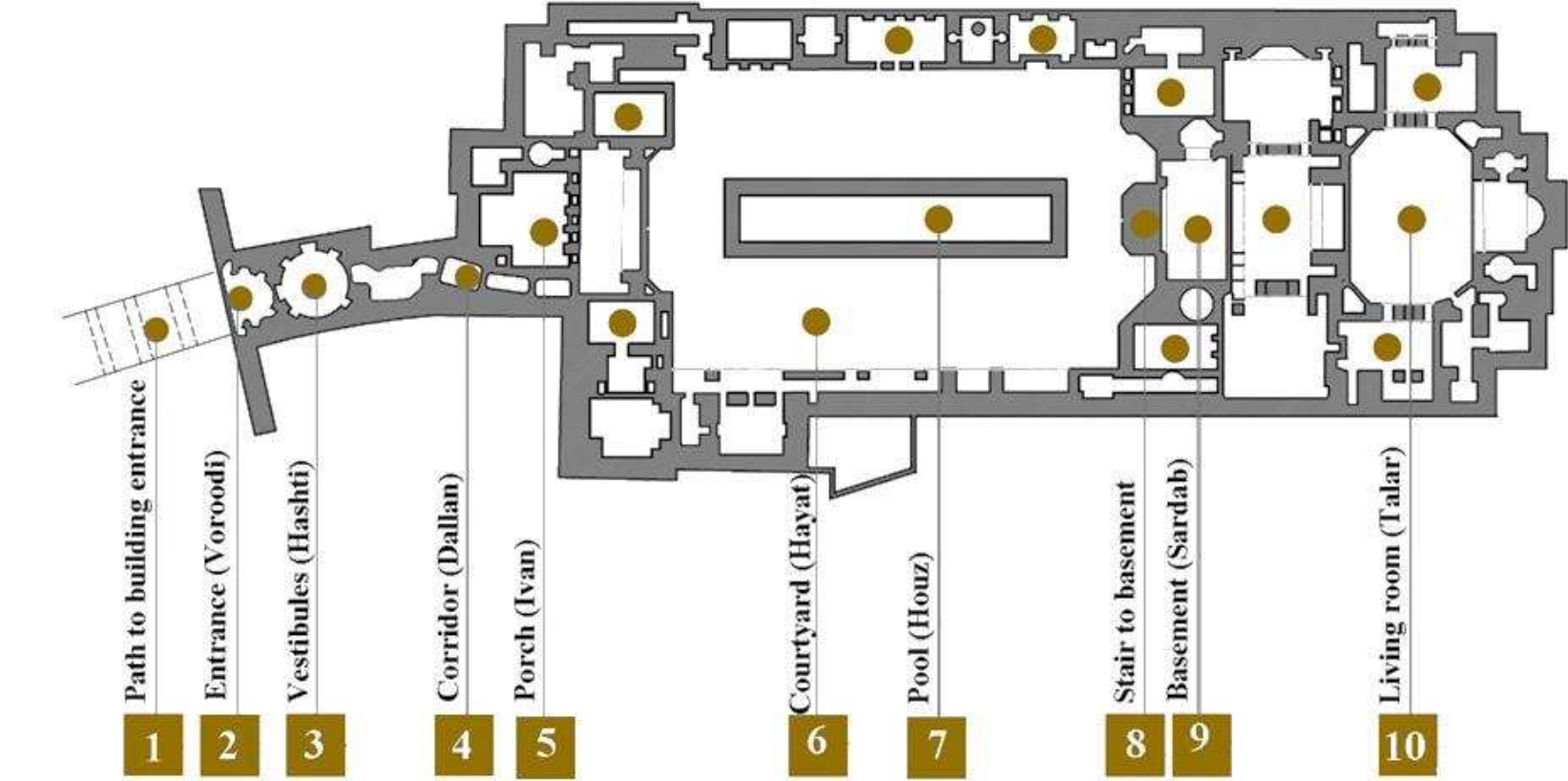
Porch (Ivan)

Courtyard (Hayat)

Stair to basement

Living room (Talar)

5.3 Boroujerdiha House

Boroujerdiha house is a traditional house which was used in four-season in the central part with hot arid climate of Iran. The house was built about 130 years ago and now it is a while that the house is used as the cultural heritage office in Kashan. The building is an example of a traditional house in Iran. The house was built by architects Ali Maryam. (Ghobadian, 2009)
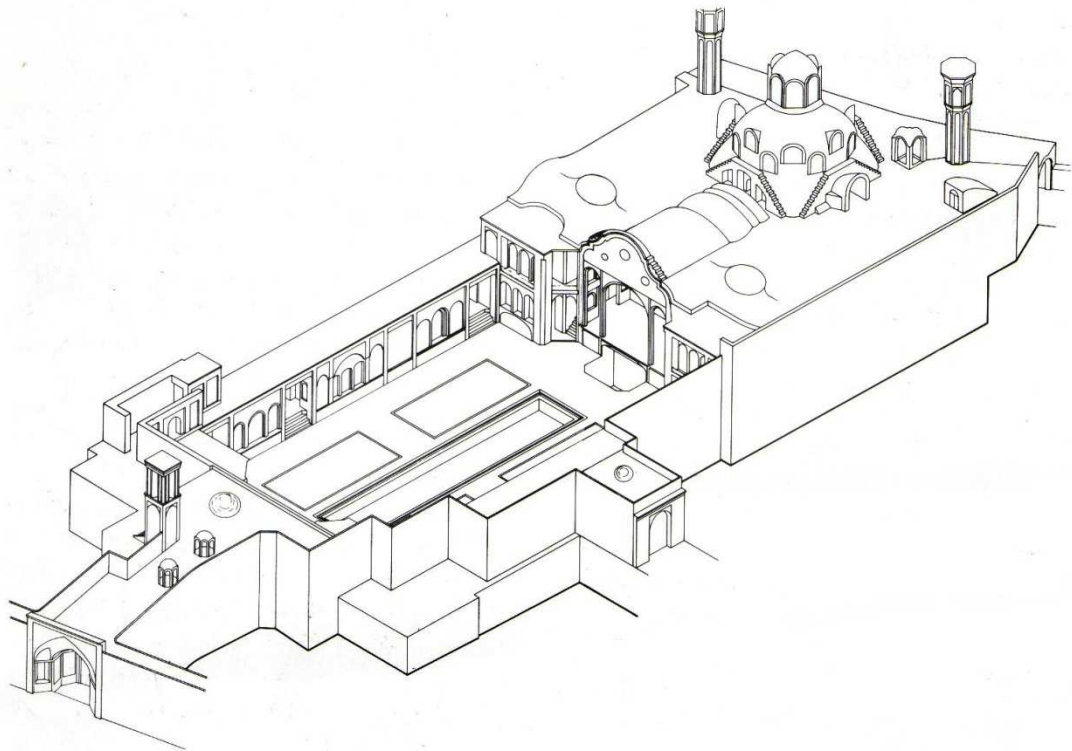
Figure 66.Perspective view of Boroujerdiha house.

The lot is 1700 square meters in the old city of Kashan, 34" N latitude, 955m above sea level. Like the other hot arid climates the city has cold winters an hot and dry summers, with dusty winds from the desert on the eastern site of the city. The house is in the old

neighborhood of the city and all of the old houses in this area are detached or semi-detached, with central courtyards. (Hyde, 2008)
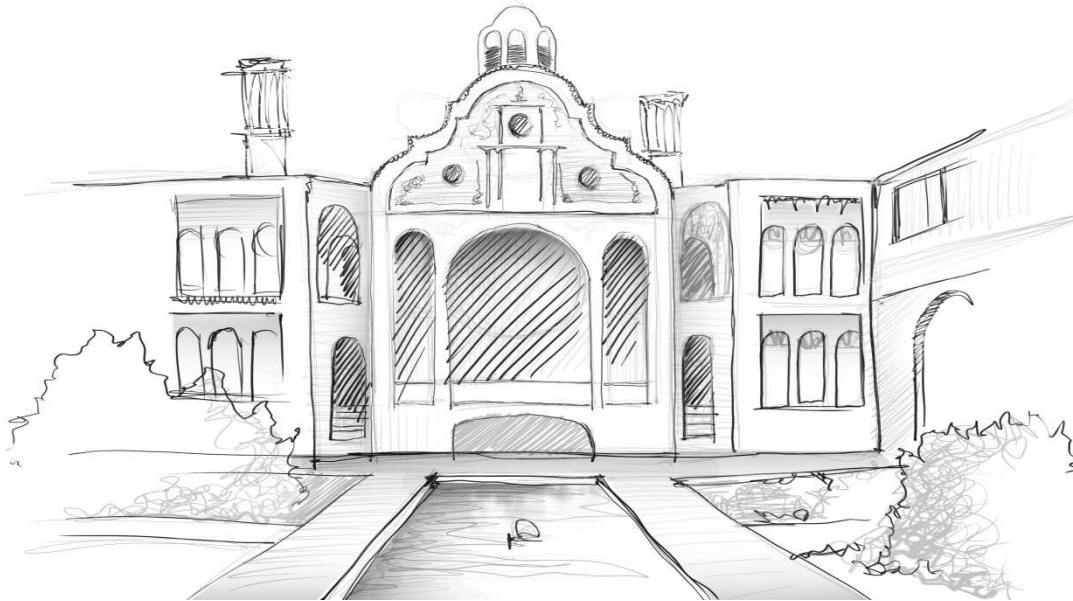
Figure 67. Boroujerdiha House.

- Boroujerdiha house has a central courtyard

- The house has only one opening to the outside of the house and that opening is
  the entrance door and all the other openings open onto the central courtyard.
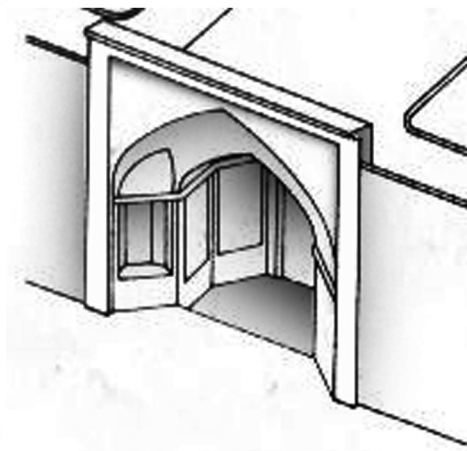
Figure 68. Entrance view.

- In order to enter the house, one has to pass through the entrance door, a circular lobby, and a long corridor, then reaching to the courtyard.

- Boroujerdiha house is divided into two parts, the winter living part on the north, and the summer living part on the south.

- The building has a ground floor and also a basement.

- The basement is usually used during the summer, especially in the afternoons, since at this time the basement is cooler than the ground floor and also the other parts of the building.

- The materials which are used in the building are adobe and brick, which can be easily reused for new construction.

- The external surface of the building is covered with exposed bricks and the interior is covered with plaster.

- When there is wind, it is taken inside through the wind towers.

- When there is no wind, towers act as flues, providing vertical ventilation as a result of the chimney effect. By this way the building is kept cool in summer time.

- In the winter the residents live in the northern part of the house (winter living quarter), which gets the direct sunlight and heat; so the northern part is warmer than the other sides of the building. At summer, the residents live in the southern part (summer living quarter), because this part is always in shade and is a cooler than the other parts of the house.

- The building itself surrounds the central courtyard and protects the courtyard from the unwanted climate outside, mostly from the dust storms which are happening time to time.

- Inside of the courtyard, there is a pool, with a fountain, and plants and trees.

- In the summer quarter, even the interior of the building is somehow warm in the afternoon and evening during the hot season of the year; therefore all of the activities of the residents are happening in the courtyard from sunset to dawn.

- In the evening, people sit, rest, socialize, eat, and sleep on wooden platforms (takht) in the central courtyard.

- Then they go inside of the building in the morning as the building became much cooler.

- In the winter, people live in the winter living part, which is warmer and protected against cold winter winds.

Sharifian House

Entrance (Voroodi)

Entrance (Voroodi)

Porch (Eivan)

Plan labels:
- Five doors room (Panj-dari)
- Pool house (Howz-khaneh)
- Entrance (Voroodi)
- Vestiblue (Hashti)
- Corridor to lead to courtyard
- Stable
- Courtyard (Hayat)
- Five doors room (Panj-dari)
- Pool (Howz)
- Three doors room (Seh-dari)
- Porch (Eivan)
- Living room (Shah-neshin)

Porch (Eivan)
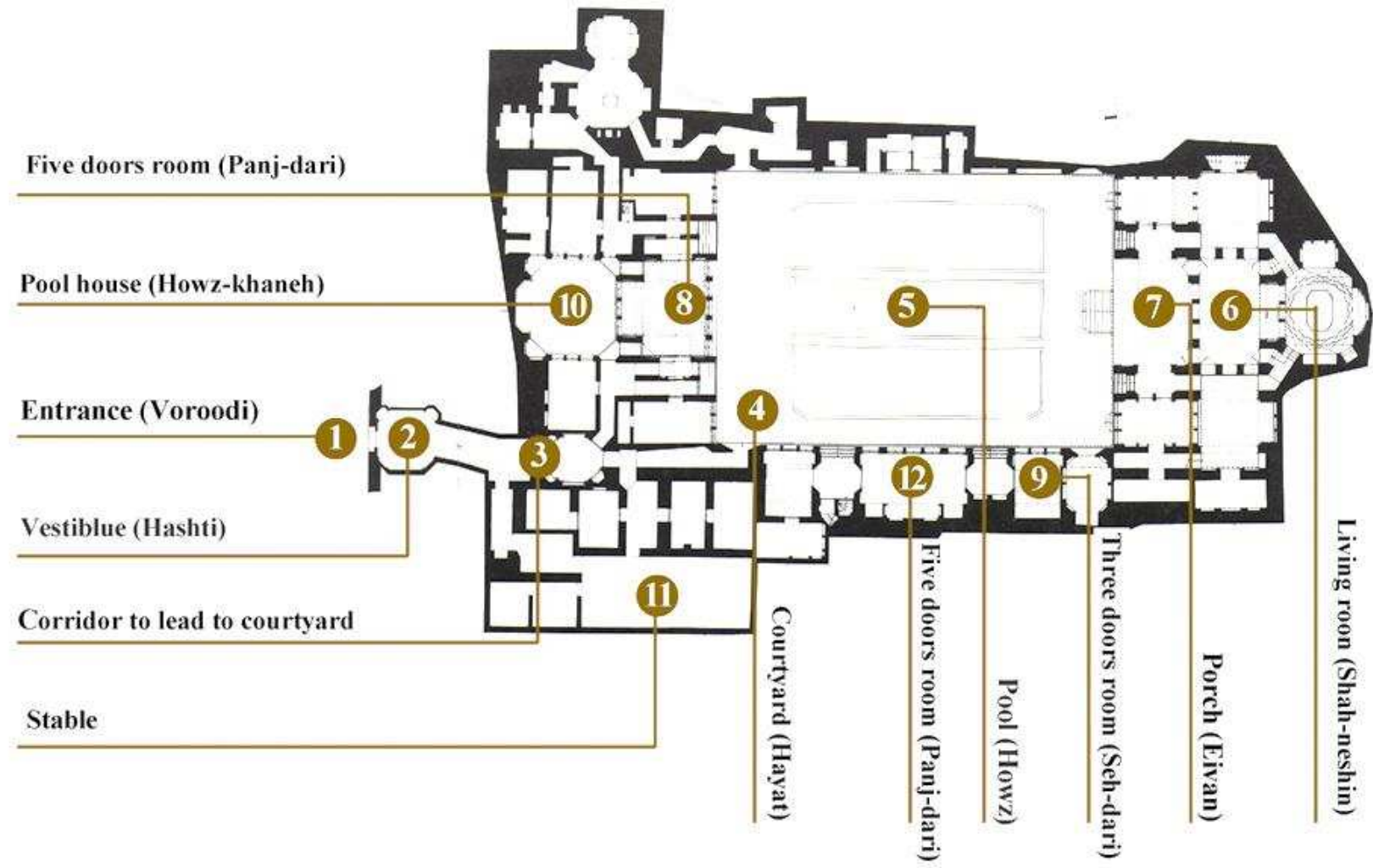
Courtyard (Hayat)

Courtyard (Hayat)

Courtyard (Hayat)

5.4 Sharifian House

The construction of this building dates back to 1880 AD and the owner of the house was

Haji Mohammad-Hassan Haji Sharif. (Naraghi, 1969)
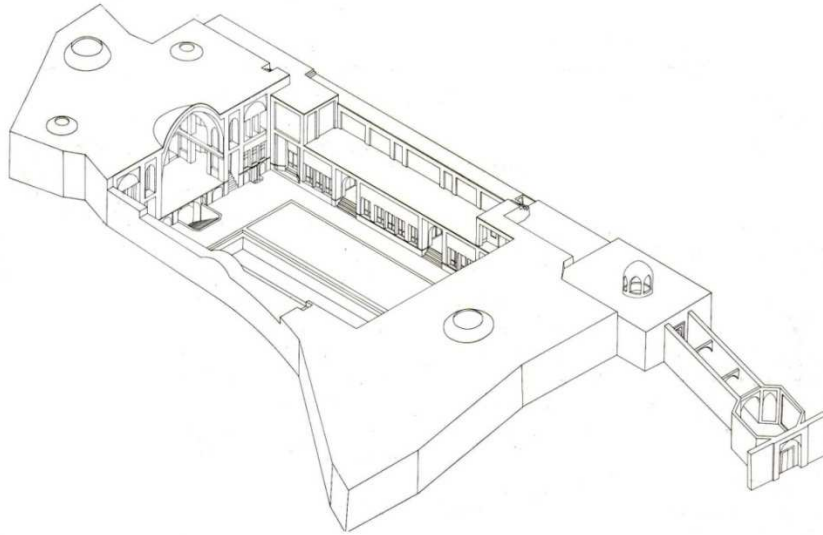
Figure 69.Perspective view of Sharifian house.

- The entrance of the house is on the northern front and for entering to the

    courtyard there is a need to pass a jelo-khan, a hashti and a corridor.
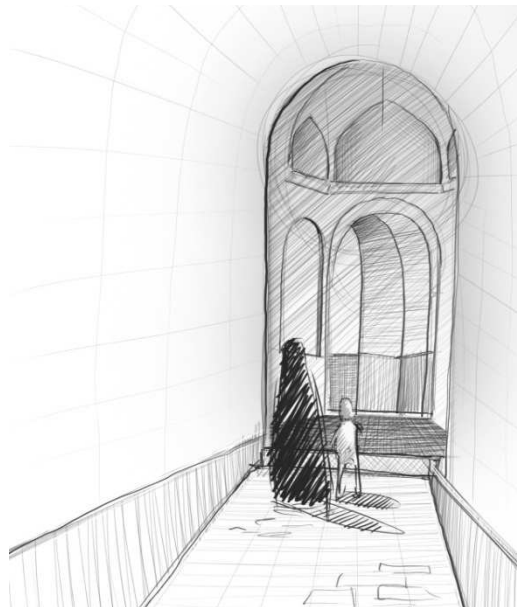
Figure 70.Corridor (Dalan) view.

- The building includes three different spaces, and the main two parts which are two floors are in the northern part and southern part of the courtyard.

- In the southern part there is a large reception hall with a shah-neshin, which is connected from south to a west shaped howz-khaneh and from the north it is connected to a vast eivan that has direct access to the courtyard.

- The arc of the eivan is higher than the rest of the façade and that makes it the most dominant part of all the façade of the building.

- The ceiling and the side surfaces of the eivan are decorated with delicate yazdi-bandi and stucco carving decorations.

- On two side of the eivan there are two seh-dari rooms, and on two sides of the reception hall there are two covered spaces which are connected to the hall.

- Under the hall there is a sardab which is accessible with a stairway from eivan and it is located at the center of this facade.

- On the northern front of the courtyard, there is a panj-dari room and a shah-neshin in the middle, and behind of this space there is a covered area

- The ceiling is decorated with yazdi-bandi and painting on plaster.

- Two she-dari rooms are connected to the reception hall with two kafsh-kan (space for putting shoes) spaces.

- The kitchen and other service spaces are located at the eastern end of this part of the house.

- The western front of the courtyard consists of one panj-dari room with a shah-neshin and two seh-dari rooms which are accessible from two kafsh-kan (space for putting shoes) areas on two sides.

- There is a long pool which has flower-beds at the sides in the middle of the courtyard.

- On the North West corner of the building there are few stables and an open space.

Tabatabaeiha House

Entrance (Voroodi)

Three doors room (Seh-dari)

Porch (Eivan)

Three doors room (Seh-dari)

Pool house (Howz-khaneh)

Living roon (Shah-neshin)

Porch (Eivan)

Entrance (Voroodi)

Vestiblue (Hashti)

Corridor to lead to courtyard

Major Courtyard (Hayat)

Three doors room (Seh-dari)
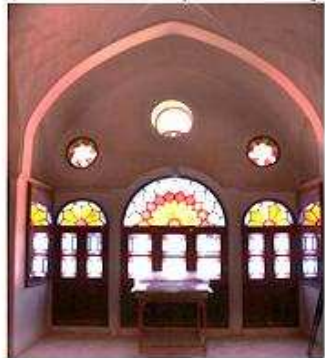
Pool (Howz)

Porch (Eivan)

Minor Courtyard

Major Courtyard (Hayat)

Minor Courtyard

Pool house (Howz-khaneh)

Major Courtyard (Hayat)
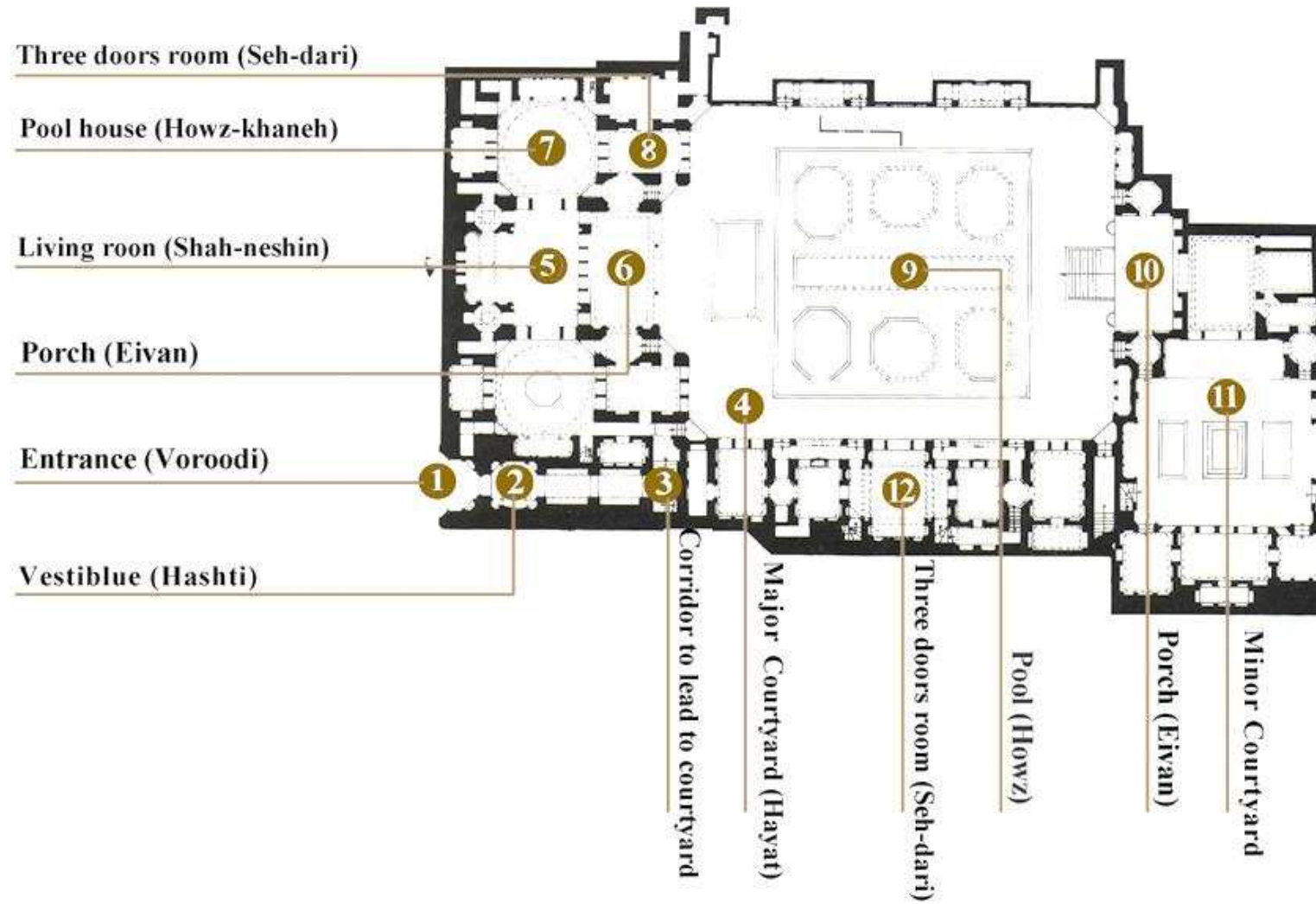
5.5 Tabatabaeiha House

According to the inscription which is in shah-neshin of this house, the construction dates back to 1880 AD. (Ranjbar, 2009)
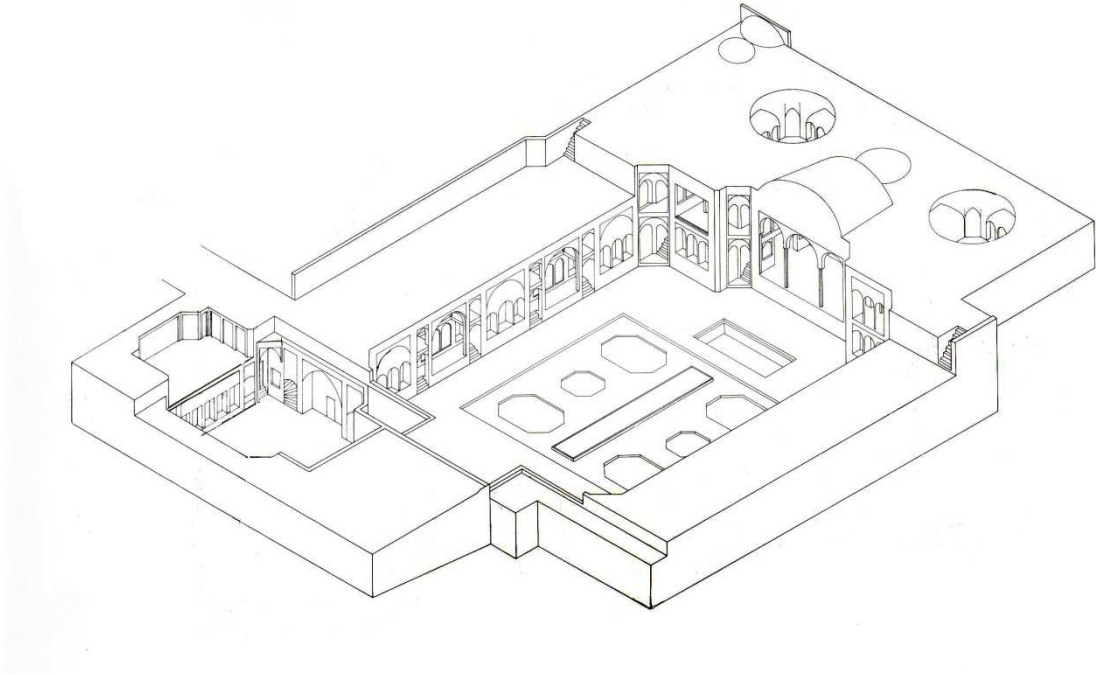
Figure 71.Perspective view of Tabatabaeiha house.

- The main entrance of the house is situated on its southeastern corner of the building
- The entrance is including several serial spaces which link the entrance to the courtyard.
- The house is including two main sections, which were in fact two different houses that connected together.
- The larger section has a rectangular courtyard with small chamfer at the corners.
- The most important part of the building is in the southern part of the house.
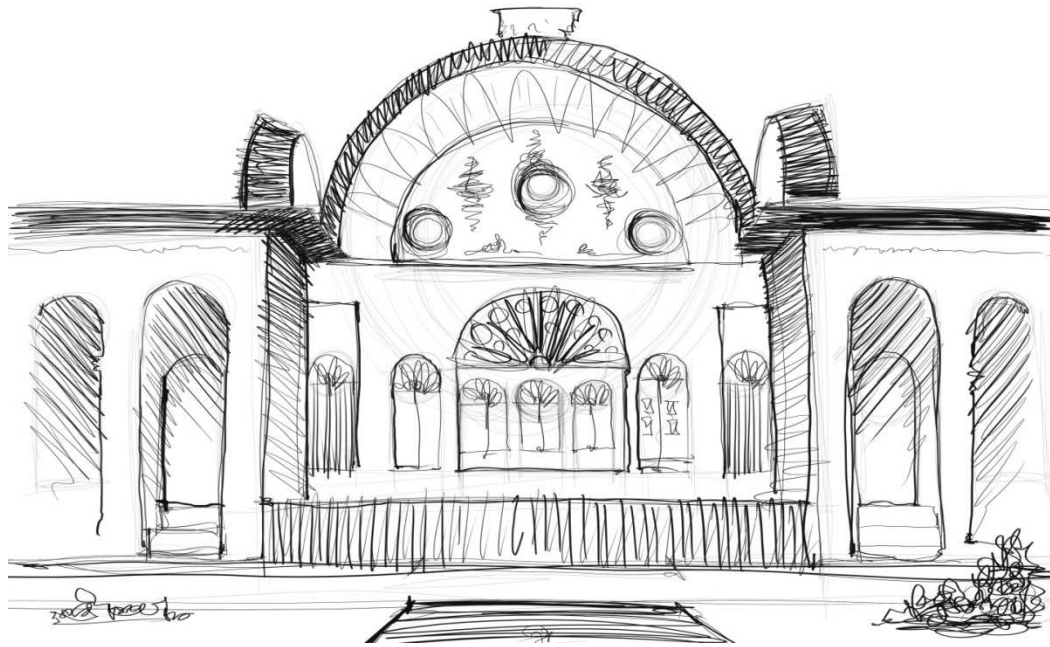
Figure 72. Tabatabaeiha house.

- Southern part is taller than the other parts there is a semi-circular form on its façade which is the highest point of the building's skyline.

- The decorated column and the colored stucco carvings of the walls and ceiling of the porch (eivan) emphasize on the importance of this part.

- Behind the porch (eivan), there is reception hall with shah-neshin which is connected to secondary small yard at each side.

- The ceilings of the reception hall and the shah-neshin decorated with yazdi-bandi decorations.

- The small courtyards which are located at the two sides of the hall, are Surrounded by two floor spaces and there are small octagonal shaped pool in the middle of each yard.

- On northern and southern part of each courtyard there are three doors room (Seh-dari) and she-dari rooms are in two floors.

- In the eastern part of the house there is a reception hall and four seh-dari rooms (three doors room), which are all aligned and connected to each other.

- There is a composition of small and large arcs in this façade.

- Symmetry is generally visible in every detail of the house.

- The facades which faced the courtyard are decorated with stucco carvings.

- The large, impressive basement (Sardab), located under the mahtabi of the northern front, and it has a central part which is surrounded by various spaces.

- The second part of the house which is smaller and more private part of the building has a small courtyard

- On the northern and southern fronts of the courtyard there are colonnades small porches (eivan).

- On the eastern side there is a five doors room (Panj-dari) with two smaller rooms on sides.

There is a reception hall which is located behind mahtabi, so the reception hall is linked to both the large and small courtyards of the house with the means of two mahtabi. (Ranjbar, 2009)

5.6 Important issues driven from study on the selected houses in Kashan

According to the observation of the houses of Kashan and also the studies on the details and characteristics of space, some important issues can be mentioned as sum up of this

study. These issues are simply categorized in different parts of the houses which are explained in following parts.

External part (Birooni) – Inner part (Andarooni)

External part includes: North section - South section (summer quarter) – wind catchers

Inner part includes: North section-South section.

5.6.1 External Parts

1. Vestibule (Hashti)

2. Hallway and atrium (Rahro–Dehliz).

3. Courtyard with a rectangular shape.

4. The main part of the building as the summer quarter (the most decoration is done in this part)

5. Basement cellar (Sardab): the temperature in the summer is around 20 degree lower than the temperature in the higher floors. There is vertical and horizontal channel system which is connected to two wind catchers. The surface of Cellar is made of plaster and bricks and in some of the houses there is yazdi-bandi as decoration.

6. Warehouses and Kitchen: This is located in the north part of the building except the Attarha house.

7. Wind catcher (badger): located in north and south external part of the building.

5.6.2 Inner Part (Andarooni)

1. Including of different rooms with different functions

2. Five door room (panj-dari), closet (sandoghkhane), living room and one big basement cellar.

3. Central courtyard and a guest room.

5.6.3 Light sources in the Houses

Light of vestibule (Hashti): hole in the roof

Basement light: in some part of the walls and under the balconies or niches there are some netted windows which make the air circulation in the basement easier and also light up the basement.

Kitchen light: the kitchens and warehouses of the buildings are generally located in the corners of the building where the need of light and ventilation is less.

Light of the main hall: the light is provided by the upper light from the ceiling or orosi (door and window which are designed with colorful glasses and wood).

5.6.4 Analysis of the main façades

- Emphasizing on the main part of the house by making it higher than the other parts of the building.

- Emphasizing on the entrances by stairs or notch on the façade.

- Creating the welcoming sense by the organization of small gardens and the pool.

- In general, the geometric form of the buildings induces the welcoming sense.

- Symmetry and repetition in windows and also the use of arches creates a sense of spirituality.

- The dark and bright spaces.

- Use of the small pool to create the sense of mirror.

- Water purity creates a sense of beauty and calmness.

- The lattice work shows the order and accuracy in the architectural design.

- Continuity in the façades by using symmetry and generally same arch and same color.

- Use of natural colors.

- Balance and symmetry is quite clear.

- Use multiple windows creates a sense of lightness in the home.

As the result of the analysis of traditional houses of Iran which have done, some principles are driven and it became obvious that all the houses have some similarities and in all the houses order and proportion (Peymoon) are the most important issues. Although these houses have some difference in size but all of them share the same rule in space organization which these rules have been mentioned in the section of the characters of traditional Iranian houses.

5.7 Analysis of eighteen selected traditional houses of Kashan

There are eighteen selected houses in Kashan which the detailed analysis is done in terms of space organization, space relationship and access design. Because of the earthquake and harsh climatic conditions most of the traditional houses in Kashan are almost demolished and they are in bad conditions, but these eighteen selected houses are renovated and qualified for this study.

The analyses which are done in this study are focused on the main floor of the building, although there are some parts of the building in upper or lower level of the main floor. It should be mentioned that the order and organization of spaces in other levels than the main floor are following the same rules.

There are seven tables which are designed according to the main issues in space organization, spatial relationships and access design. The plan of the main level of each house is analyzed and is located in its place according to the issues which are mentioned in the table.

In the first table which is showing the space organization, plans are located according to the categories of central, grid, symmetry and clustered organization. The plans represent its organization characteristic and show the way that this characteristic is existing.

The second table indicates the spatial relationship of spaces in each house. The relationships between the interior spaces of the house are shown and the linking spaces are shown in each plan which can be in different forms.

The other table is about the entrances of the houses. This table shows the relationship of exterior and interior of the house and this is about the sequences of spaces in this relationship from exterior to interior.

There is also a table which shows the differences in the sequences of spaces from exterior to interior parts of the house and also the same for the interior spaces which shows the sequence of privacy and open-closed spaces.

At the end the façade of the houses are categorized according to the symmetrical or non-symmetrical characteristics which the section elevations are representing these issues.

Table 11. Space Organization.
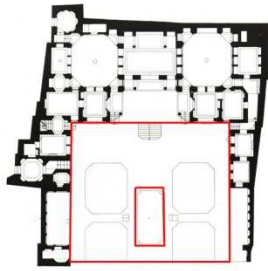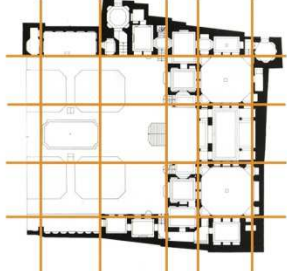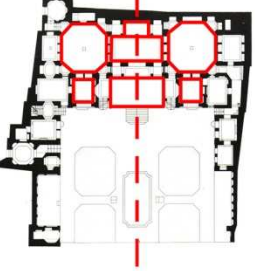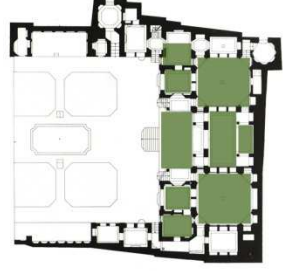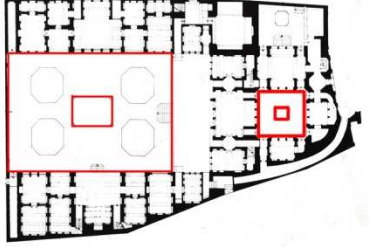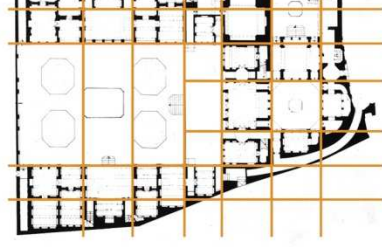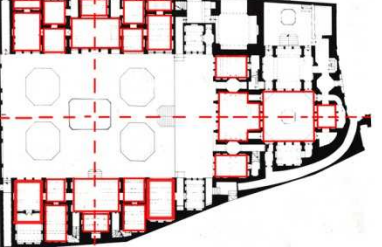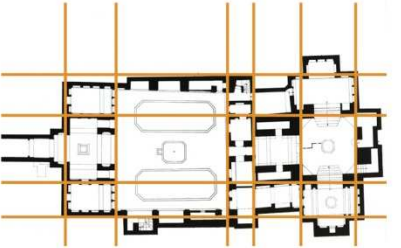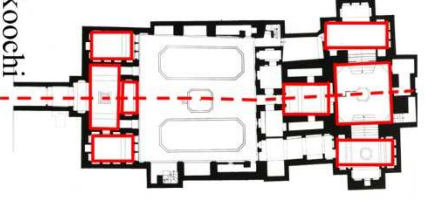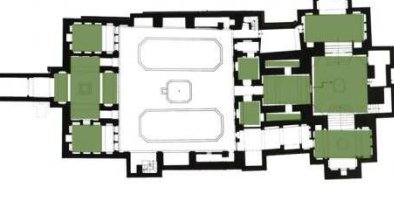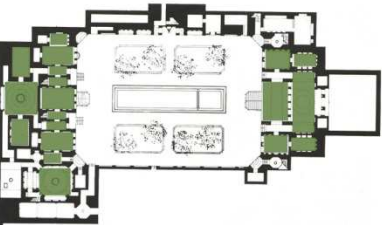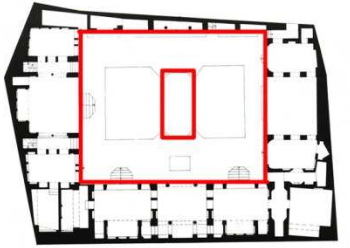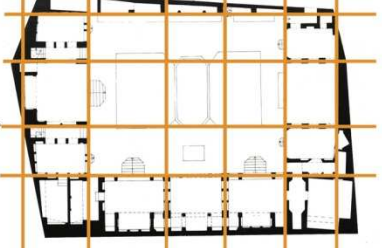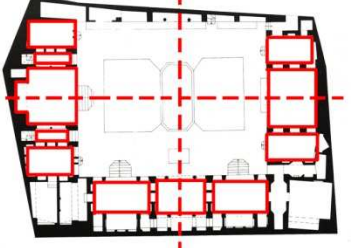
Space Organization				
HOUSE	Central organization	Grid organization	Symmetry organization	Clustered organization
Alagheband House				
Aleyasi House				
Bakoochi House				
Bani Kazemi House				
Dastmalchi House				

Table 12. Space Organization.
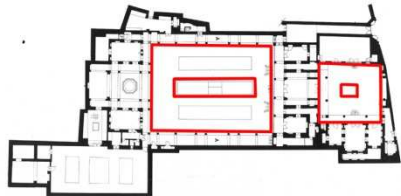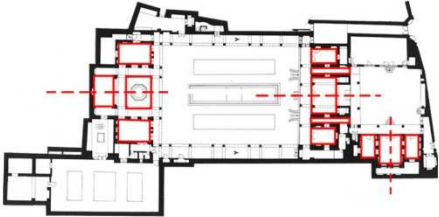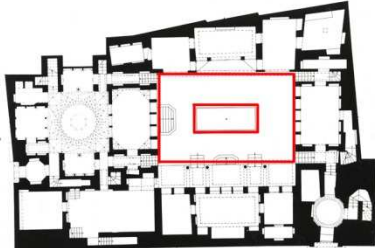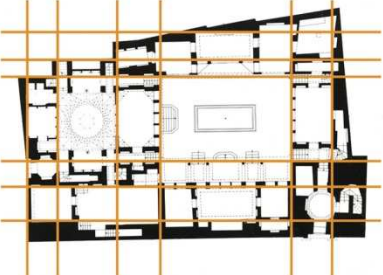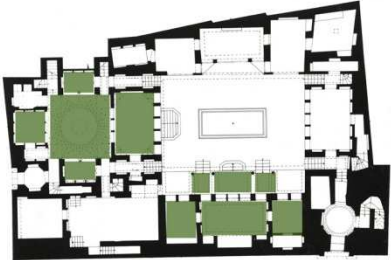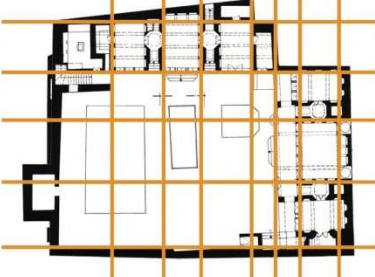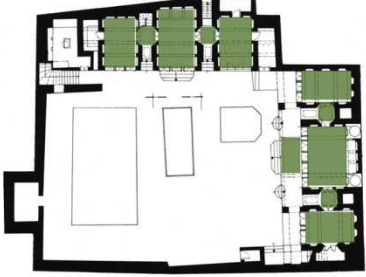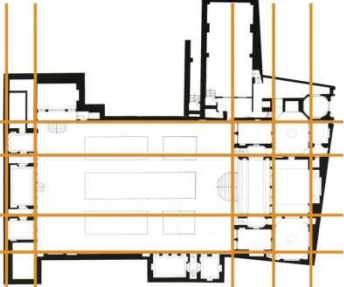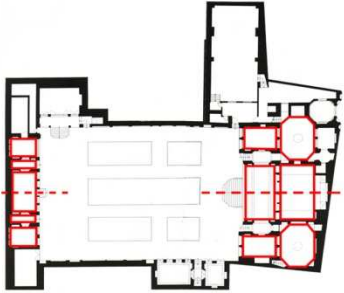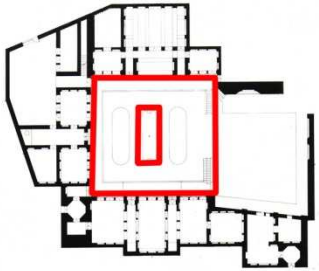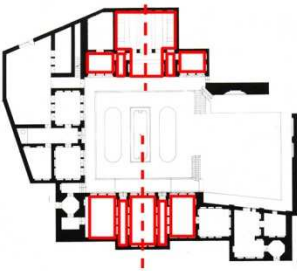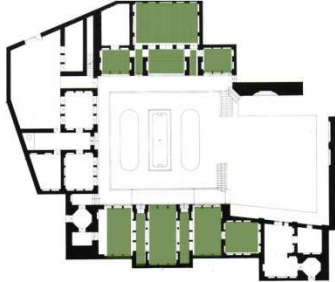
Space Organization				
HOUSE	Central organization	Grid organization	Symmetry organization	Clustered organization
Esfehani House				
Jahan Araei House				
Karkhnechi House				
Kheirieh House				
Mortazavi House				

Table 13. Space Organization.
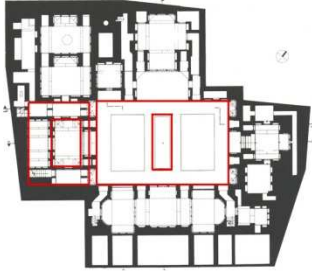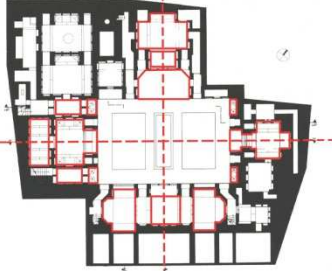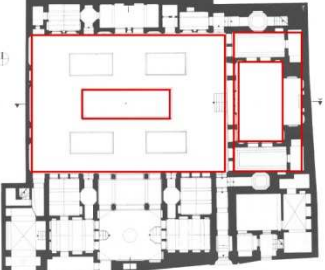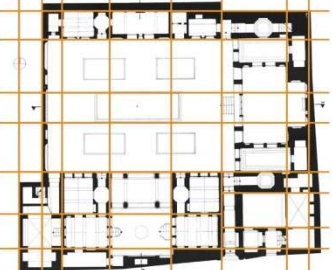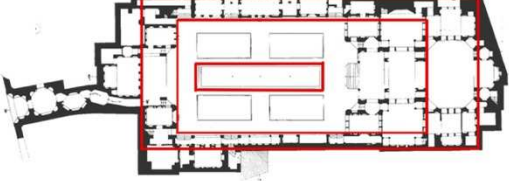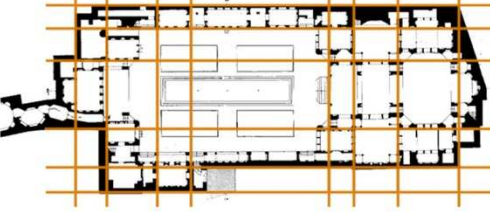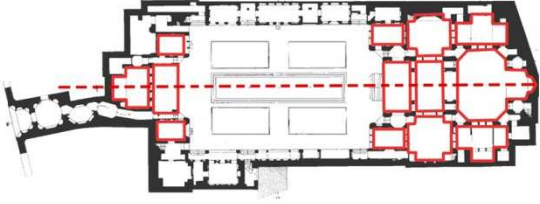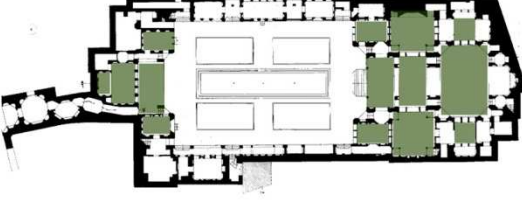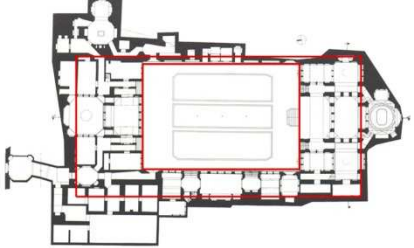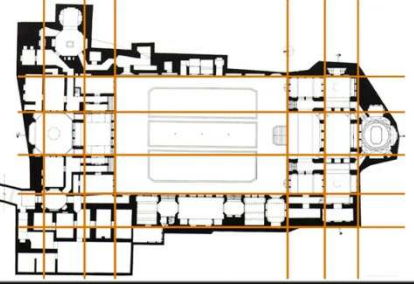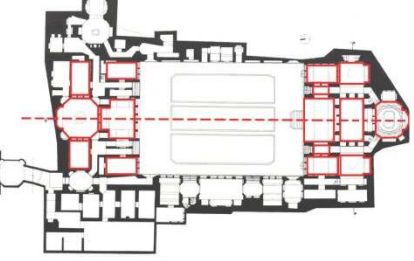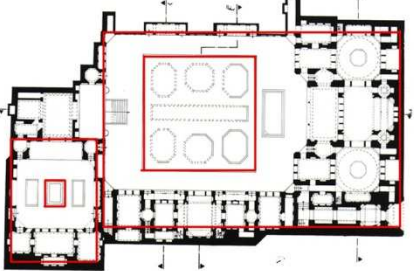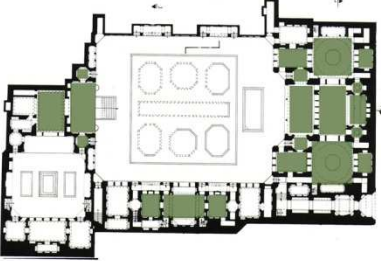
Space Organization				
HOUSE	**Central organization**	**Grid organization**	**Symmetry organization**	**Clustered organization**
Abbasian House				
Attarha House				
Boroujerdiha House				
Sharifian House				
Tabatabaeiha House				

Table 14. Space Organization.
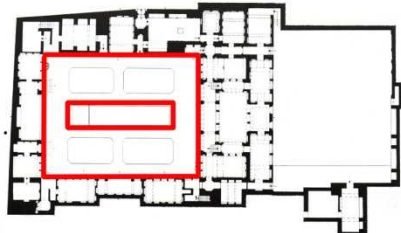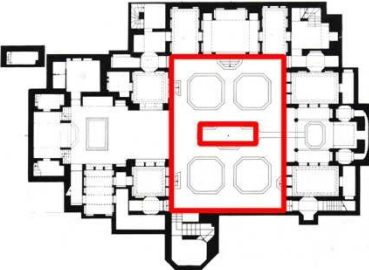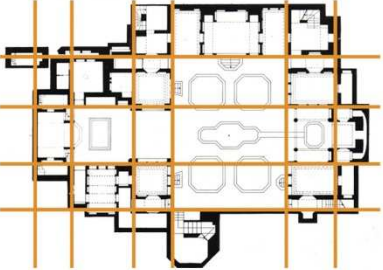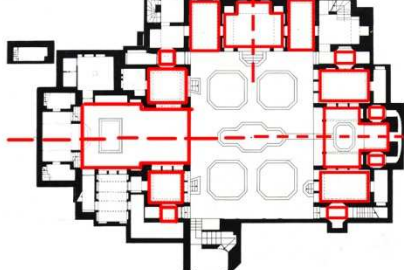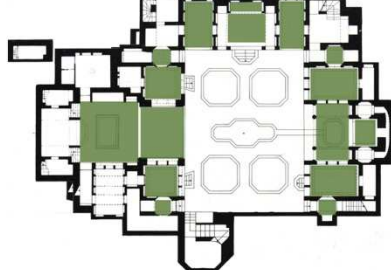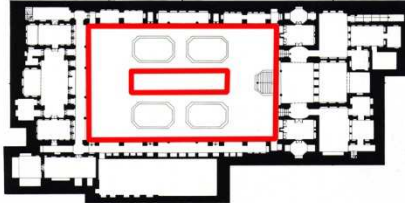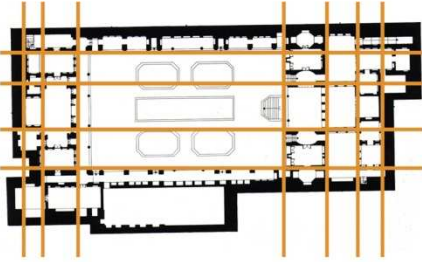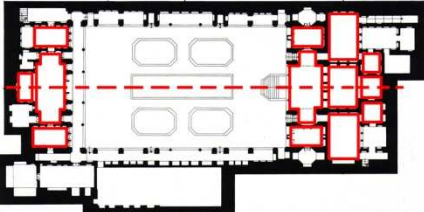
Space Organization				
HOUSE	**Central organization**	**Grid organization**	**Symmetry organization**	**Clustered organization**
Reza Husseini House				
Sajadi House				
Saleh House				

Table 15. Spatial Relationship.

Spatial relationship			
HOUSE	**Spaces linked by a common space**		**Adjacent spaces**
	Abbasian	Attarha Dastmalchi	Bakoochi
	Boroujerdiha	Sharihan Esfehani	Mortazavi
	Tabatabaeiha	Bani Kazemi Saleh	Kheirieh
	Alagheband	Sajadi	Jahan Araei
	Aleyasin	Reza Husseini	Karkhanechi

Table 16. Different kind of Entrance

Houses	View	Recessed Entrance	Flat Entrance	Additional	Houses	View	Recessed Entrance	Flat Entrance	Additional
Abbasian House					**Jahan araei House**				
Alagheband House					**Karkhanehchi House**				
Aleyasin House					**Kheirieh House**				
Attarha House					**Mortazavi House**				
Bakoochi House					**Reza houseini House**				
Bani Kazemi House					**Sajadi House**				
Boroujerdiha House					**Saleh House**				
Dastmalchi House					**Sharifian House**				
Esfahaniha House					**Tabatabaeiha House**				

Table 17. Sequence of entrance space
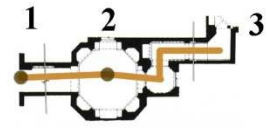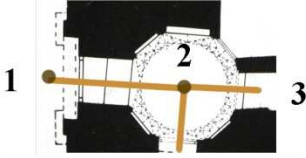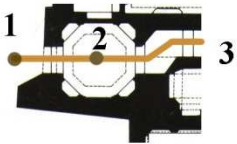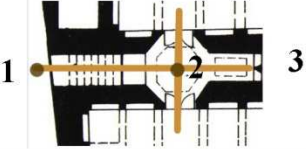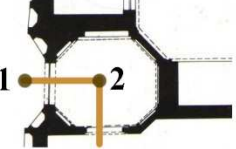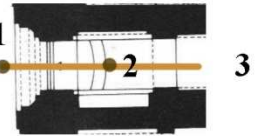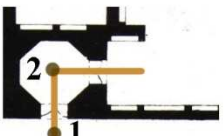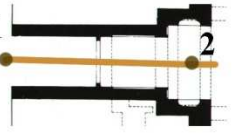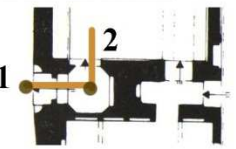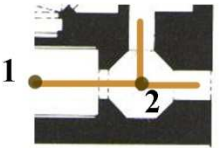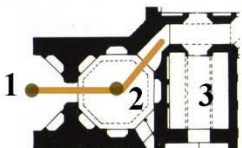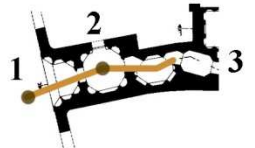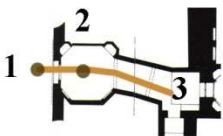
Sequance of Entrance Spaces

Houses	Entrance . Vestibule	Entrance . Corridor .Vestibule	Houses	Entrance . Vestibule	Entrance . Corridor .Vestibule
Abbasian House			Jahan araei House		
Alagheband House			Karkhanehchi House		
Aleyasin House			Kheirieh House		
Attarha House			Mortazavi House		
Bakoochi House			Reza houseini House		
Bani Kazemi House			Sajadi House		
Boroujerdiha House			Saleh House		
Dastmalchi House			Sharifian House		
Esfahaniha House			Tabatabaeiha House		

Table 18.Sequence of Open-Closed space.
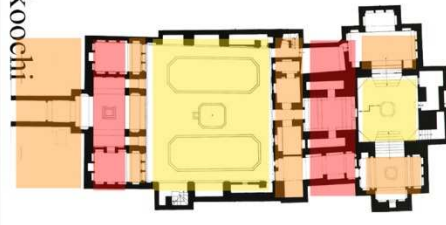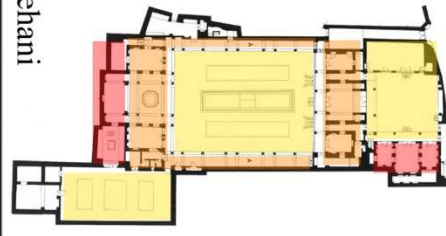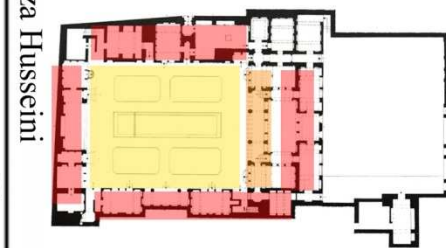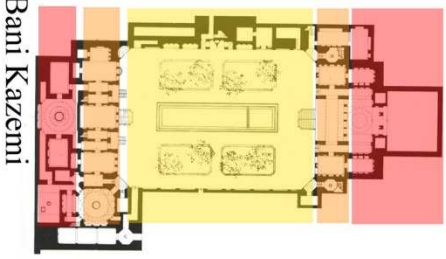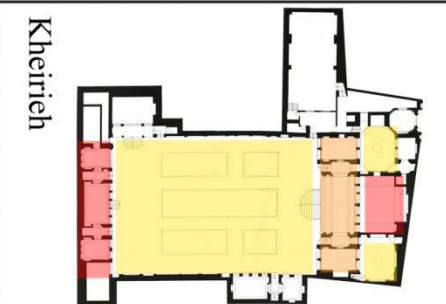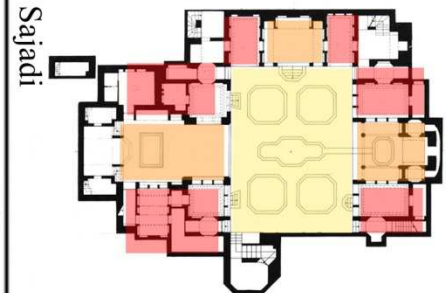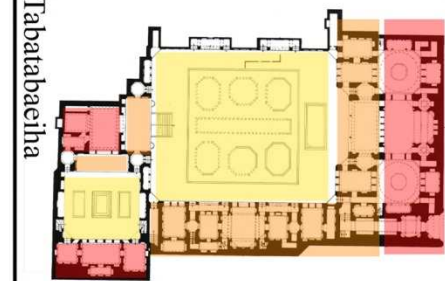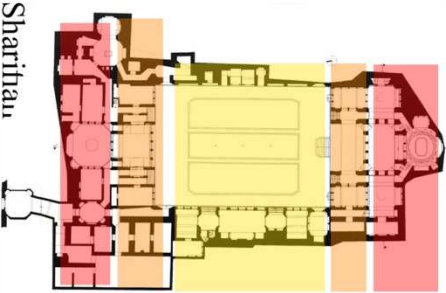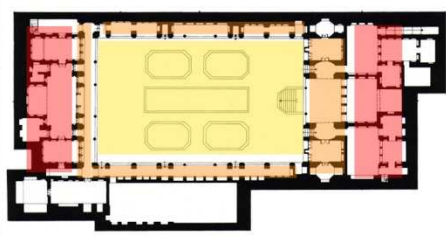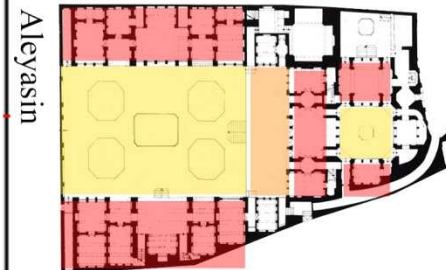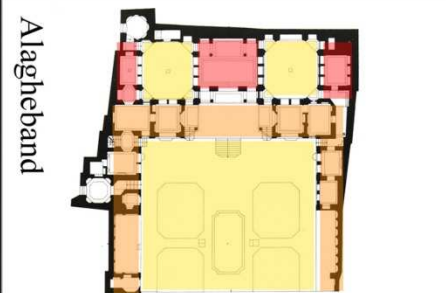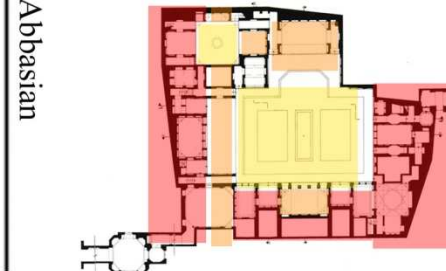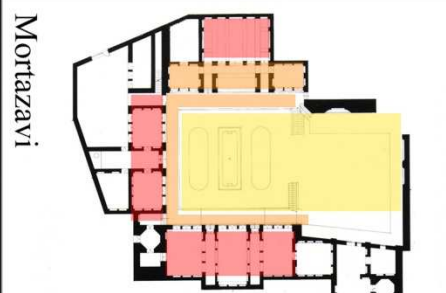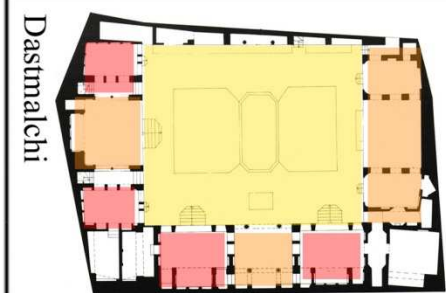
Sequance of Open-Closed Space					
House	**Linear organization**		**Central organization**		
Open Space / Open Space / Open Space	Boroujerdiha	Bakoochi	Esfehani	Reza Husseini	Attarha
	Bani Kazemi	Kheirieh	Jahan Araei	Sajadi	Tabatabaeiha
	Sharifha	Saleh	Karkhanechi	Aleyasin	
			Alagheband	Abbasian	
			Mortazavi	Dastmalchi	

Table 19. Central Point.
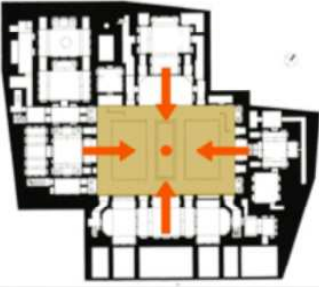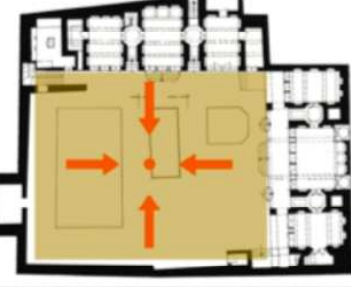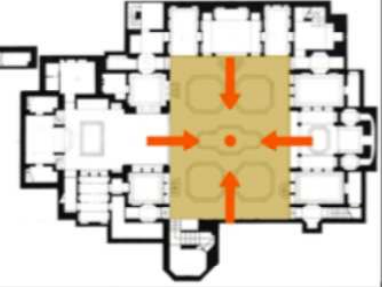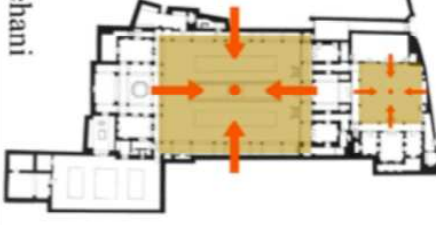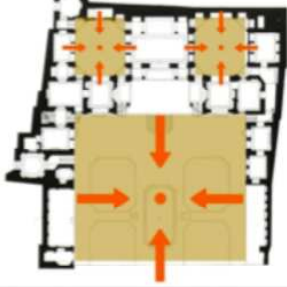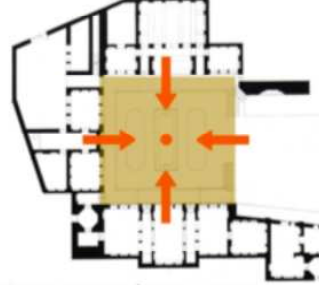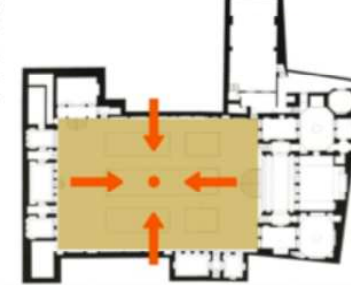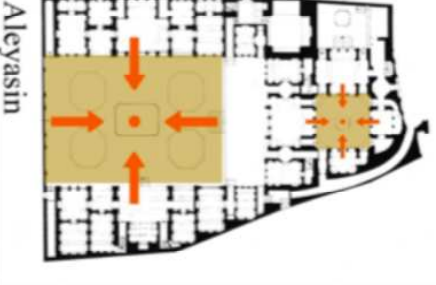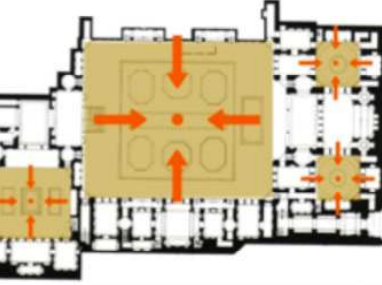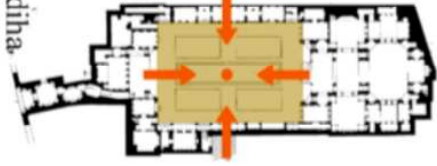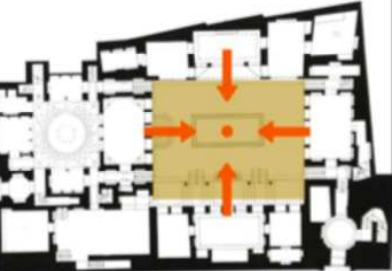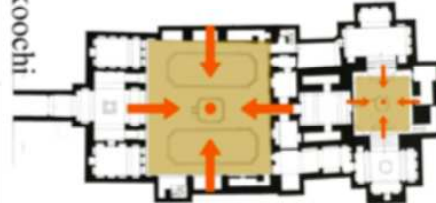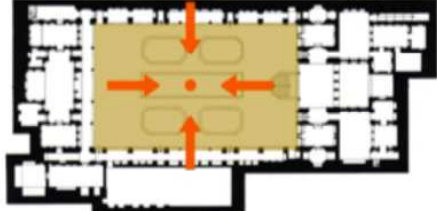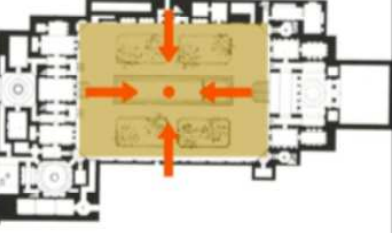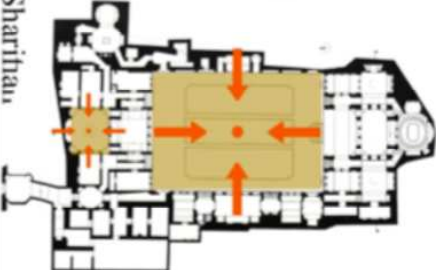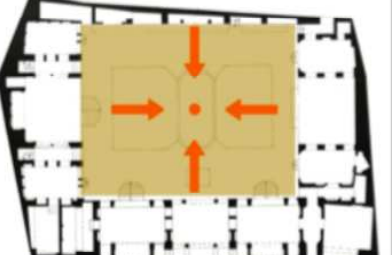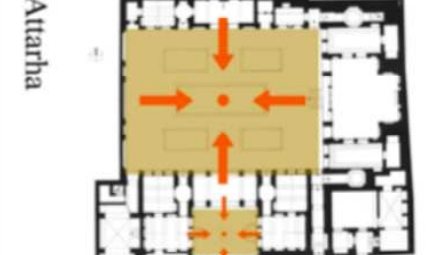
Central Point					
HOUSE	**Single Central Point**			**Double Central Points**	**Triple and more centerPoints**
	Abbasian	Karkhanechi	Sajadi	Esfehani	Alagheband
	Mortazavi	Kheirieh		Aleyasin	Tabatabaeiha
	Boroujerdiha	Jahan Araei		Bakoochi	
	Saleh	Bani Kazemi		Sharihn	
	Reza Husseini	Dastmalchi		Attarha	

Table 20. Summer and Winter quarter parts.
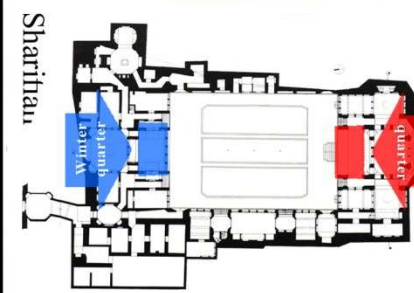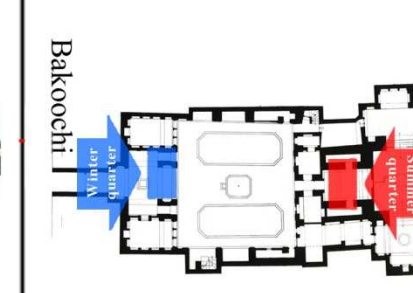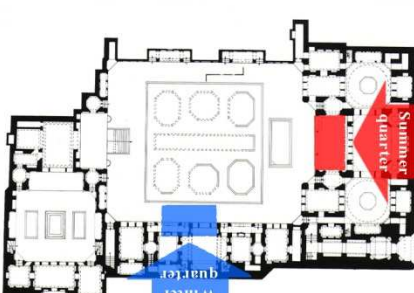
Summer and Winter Quarter parts				
HOUSE	**Perpendicular axis**		**Simmilar axis**	
	Abbasian	Alagheband	Boroujerdiha	Saleh
	Attarha	Aleyasin	Esfehani	Bani Kazemi
	Karkhanechi	Jahan Araei	Sharifian	Bakoochi
	Sajadi	Reza Husseini	Kheirieh	
	Tabatabaeiha	Dastmalchi	Mortazavi	

Table 21.Symmetry form of facades.

SYMMETRY IN KASHAN HOUSES

| HOUSE | Symmetry from section views | | | | | |

According to the table which shows space organization, centralorganization in houses are the most used one which can be seen in fourteen houses. In these fourteen houses the courtyard is usually the center point and the other parts of the house such as porches and rooms are in the surrounding of the court yard, and the direction of the spaces are also toward the central point.

Grid Organization is used in twelve houses which cannot be seen in the whole plan but the spaces of the house are located in grid organization.

Clustered organization can be seen in plans of ten houses. These clusters are mostly created in winter and summer quartersof the house and each quarter includes several rectangular spaces in different sizes such as three doors room (seh dari) and five doors room (panj dari) and porches.

Symmetry Organization in plans can be seen in twelve houses. This can be seen in some parts of the house such as in summer and winter quarters but the whole plan of the house is not following the symmetry rules.

The relationship between the interior spaces of the house is created in two main forms; corridor which is an adjacent space and the other one are small spaces such as reception halls which links two spaces.According to the table which shows the spatial relationship, there are thirteen houses which two forms of space linkage can be seen and in five house the connection of spaces are with adjacent space.

From the urban point of view, the design of the houses is generally divided in three main parts from exterior to interior: public space, semipublic space and private space.

In urban scale the passage from street to the house is done through several stages from the most public to the private. The spaces can be defined from street to mahale (neighborhood) and then to the house which can be categorized in urban scale. The sequences of spaces are from street to alley which is completely public space, then bystreet which have the less pass by than street and alley and can be named as semipublic space and at the end the entrance space.

After passing these narrow streets, there is the entrance of the house which can be named as private space; this category of the spaces is from urban design point of view.

The same principle can be applied in a smaller scale. The narrow street which the house is located in it can be considered as a public space. The building of the house is surrounded with high walls which makes it impossible for the people who pass in the narrow street to see inside the house. It was one of the characters of traditional architecture which the owner of the house didn't want to show the luxurious of the house to the other people. As Pirnia (2009) mentions before one is not entered to the house cannot estimate the glorious and luxurious of the house.

According to the analysis of eighteen houses the sequences of open to closed spaces are organized in two different ways of linear and central form, in six houses the linear form can be seen and in other twelve houses it is organized in central form.

In the analysis of the eighteen selected houses in Kashan, twelve of them used recessed entrance, six of them have flat entrance and six of the houses have additional parts to the entrance and there are also seven houses with overhead elements in the entrance.

These numbers shows that most of the entrances of houses are recessed which is shown by a nail on the wall and in some cases despite recession some parts are extracted out of the wall and are not in same level with it. In some entrances over the door there are some decorations which are usually calligraphy of Koran with colorful tiles. In some of the recessed entrance there is a level different between the street and the entrance. These levels are connected with stairs.

In order to enter to the houses, there is a sequence of spaces which are shown in the analysis and generally it can be considered as linear access. After main entrance door there is a linear corridor end to a different form of space which is a vestibule (Hashti). In some cases it has another function which is a waiting area of guests of the house owner. Hashti were also used as a connection space to the neighbor houses. So the level of privacy of vestibule (Hashti) depends on its function. After passing the vestibule (Hashti) space there a linear space like a corridor (dalan) which leads the guests to the courtyard or to the reception hall.

The only connection of the interior and exterior of the house is the entrance. Passing through the entrance wouldn't lead the direct access to the main part of the house. The

following is based on the author's observation and explains the spaces which one should pass to access the house.

As a result of the analysis of the entrances of the houses in Kashan, it can be said that recessed entrance is used the most in Kashan. Another important characteristic of entrances are the use of decoration on top of the door and the top corners. These are generally sentences from Koran made with colorful tiles. In the design of entrances use of over heading can be seen with yazdibandi.

Arrangement of spaces in the houses is different from each other, but in general there is a sequence from open space to semi open space and ends to closed space.

After passing through the entrance door which was opened by the servant of the house, there is a small space called vestibule (Hashti) which a space for waiting and resting of guests till the house owner arrive to for welcoming. After vestibule (Hashti) there is a corridor (Dalan) which guides the guest to one of two spaces of five-door room (panj-dari) or salon. Panj-dari was a space for entertaining the guest and it can considered as a semi private space since it has no visual access to the other private parts of the house. That corridor also ends to the courtyard of the house which will be open on one of the corner of the courtyard the other parts of the house are surrounding the courtyard.

This type of space organization can be seen also within the house which is including the open space, semi open space and also closed spaces. As it is shown in the analysis part

of this study, these spaces can be called in order from open space to closed space as courtyard, balcony (eivan) and rooms.

The design of the spaces and their arrangements are centralized which all the rooms and porches are located around a major point which is mostly the central courtyard. But in some houses there are some other minor points or there are houses which are semi centralized or triple centralized.
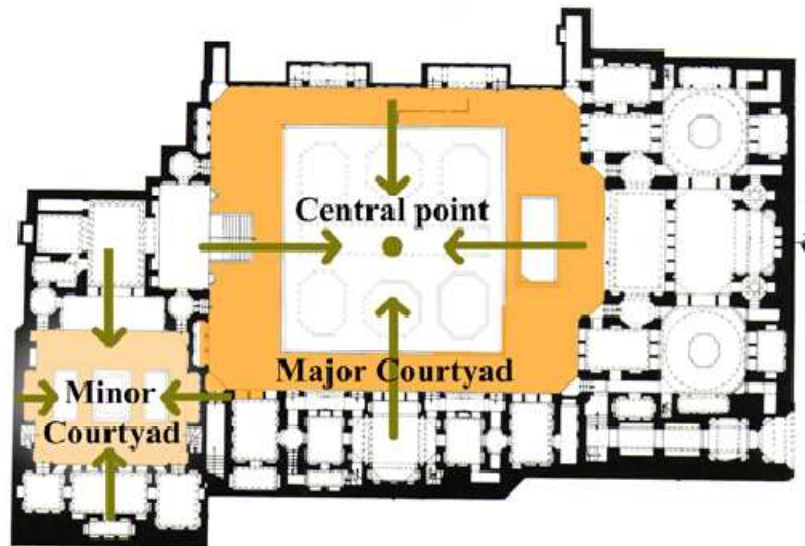
Figure 73.Central point of Tabatabaeiha house.

The facades of the exterior of the houses are mostly the plain high walls with no openings and decoration but the interior facades of the courtyard are almost symmetry. According to the table which shows the symmetry and non-symmetry facades all the eighteen houses have symmetrical forms in elevation and also the section elevation of the houses.

Chapter 6

CONCLUSION

Space organization and access design are two important architectural features of the Iranian traditional houses. The life style and the culture of the user of the space have affected the. Way spaces are designed and connected. The number of users and their approach to privacy also has affected the space organization and the access to different spaces in these buildings.

The designs of interior and exterior spaces of the houses follow almost the same rules and their differences are in their scales. The sequences of spaces in the house are also similar to the spatial sequences in urban scale. Culture and climatic issues have caused some of the distinctive characteristics of Iranian architecture such as designing the introverted houses.

An important issue in design of Iranian houses is the relationship between exterior and interior of the house.

Especially the level of privacy is strongly related to the access ways to different parts of the building. The perception of privacy and the level of privacy needed in a house has roots in the culture.The respect to the neighbors is another issue which can be seen in traditional house architecture of Iran. Since the privacy and way of living are driven

from the culture, and mostly the culture of people in a region is almost the same so its effect on architecture of the houses is also the same in most of the houses.

The relationship between the exterior and interior of the houses are created through the main entrance which is usually a recessed entrance with decoration and level differences with the street.

From the exterior point of view, the houses have very simple design and the glory of design of traditional Iranian houses can be seen in the interior design, this characteristic of the house have roots in the culture.

According to the studies and analysis of the houses, the most visible issue in design of the houses is centralized space organization. The central point of each house is usually the courtyard which connects different parts of the spaces and makes unity. Space organization of the house interior is following the grid form and the relationship of the spaces can be corridors which are driven from the grid of the plan.

The other important issue is the climatic conditions which leads the architects to find architectural solutions in order to use the natural energy to ease living in the harsh climatic conditions, such as using wind catchers in the houses of hot-dry climate region.

As it was mentioned in the case study section of the thesis there are similarities and differences in the chosen houses in the same place. These similarities are mostly rooted in the climatic conditions and culture of that region and the differences which are mostly minor and not major are related to the desire of personalizing the living spaces. The economic conditions of the users were also a reason to make these differences such as the size of the house or the number and quality of the decoration elements.

According to the study which was done on the access design and space organization of the traditional houses in Iran, the need for applying the outcome of reasons for the special design of these houses can be mentioned. This outcome can be used in today architecture. In short, respect to the climatic conditions and culture of a region make the living spaces more useful and there won't be any need that the users apply their own changes in the space to adapt it to their own life style.

The analysis of the houses shows the importance of space organization, with understanding the characteristics of space organization of each house and importing this concluded results in designing of new houses. Unfortunately the space characteristics according to the specific organization in traditional Iranian houses are somehow forgotten in today's architecture of Iranian houses.

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