

A Study on Architectural Characteristics of Traditional Iranian Ordinary Houses in Mashhad, Iran

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Abstract—In many Iranian cities including Mashhad, the capital of Razavi Khorasan Province, ordinary samples of domestic architecture on a small scale is not considered as heritage. While the principals of house formation are respected in all traditional Iranian houses; from moderate to great ones. During the past decade, Mashhad has lost its identity, and has become a modern city. Identifying it as the capital of the Islamic Culture in 2017 by ISESCO and consequently looking for new developments and transfiguration caused to demolish a large number of traditional modest habitation. For this reason, the present paper aims to introduce the three undiscovered houses with the historical and monumental values located in the oldest neighborhoods of Mashhad which have been neglected in the cultural heritage field. The preliminary phase of this approach will be a measured survey to identify the significant characteristics of selected dwellings and understand the challenges through focusing on building form, orientation, room function, space proportion and ornamental elements' details. A comparison between the case studies and the wealthy domestically buildings presents that a house belongs to inhabitants with an average income could introduce the same accurate, regular, harmonic and proportionate design which can be found in the great mansions. It reveals that an ordinary traditional house can be regarded as valuable construction not only for its historical characteristics but also for its aesthetical and architectural features that could avoid further destructions in the future.

Keywords—Traditional ordinary house, architectural characteristic, proportion, heritage.

I. INTRODUCTION

MASHHAD as the capital of Razavi Khorasan province, is located in the northeast of Iran. It has turned into a prominent pilgrimage-economic center since the 11th century, due to having been located on trade routes such as the Silk Road [6]. In the early Islamic ages, it was a village in Tus district where the burial place of Shi'ite Imām, Alī al-Ridā (818-d.C), was located [5]. Since the 14th century, Mashhad became the new habitation of the people in nearby cities and gradually expanded through the development of the sanctuary and creation of residential quarters around it [5]. With establishing the Shiism in 1501 as the official religion of Persia, it became the capital of Khorasan province and started to attract massive numbers of pilgrims [7]. Up to now, the tendency of the country's leaders to the Shi'a religion led to expand the area of the shrine and demolish a large portion of residential properties. Only the wealthy houses managed to survive from this destruction, because of their registration

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among the national heritage of Iran. Therefore, the ordinary dwellings in small scale are at risk of wrecking due to the lack of recognition of their monumental values.

The paper endeavors to introduce three selected houses; Nili, Tehrani, and Bidari, the first of which is partly in ruins and the third one faced a demolition in August 2017, caused by the renovation and improvement project of the texture surrounding the Holy Shrine. Since case studies have been on various occasions, much retouched, altered and modified, it is even hard to guess the date of their construction. However, the application of different brick sizes and restoring operations shows that these houses probably belong to the late 18th century. The two remaining houses are located in the historical district of Paein Khiyaban, where it is in need of rebuilding and renovation based on the City's new Master Plan.

II. THE COURTYARD HABITATIONS IN MASHHAD

Just like each and every traditional Iranian house, almost all habitations of Mashhad follow Iranian-Islamic principles in designing. A high number of traditional dwellings in Mashhad consisted of one central courtyard, and only a few of them presented two yards.

The houses belonging to the rich were usually divided into two living quarters and service area. However, the ordinary ones had only two living sections facing each other. They were oriented in two directions: North-East/South-West or North-West/South-East. Considered by local builders, these kinds of positioning were according to Mashhad's geographical and climatic features which provide a seasonal immigration of the inhabitants during the year. In summer or winter, indeed, the building masses would be inhabited based on their exposures to the direct sun and wind [1].

In traditional houses, there were various rooms that could be identified by their functions or the number and type of openings [12]. In fact, all types of houses, wealthy and ordinary, present similar architectural and decorative components. However, economic condition together with land dimension always obliged inhabitants to use these elements more or less.

III. THE ARCHITECTURAL FEATURES OF ORDINARY HOUSES

A. Nili's House

Among the case studies, Nili is perhaps the most ancient instance of a mini-scale house which has been occupied by pilgrims for many years and which has totally abounded in the last decade. A massive portion of its walls and roofs turned into ruins through a gradual process of human activities and

environmental impacts. At first glance, it appears that the house had almost completely lost its authentic identity. In fact, those changes and renovations performed by homeowners caused damage to various parts of the building, particularly the northeast quarter, the eastern wall and the entrance passageway.

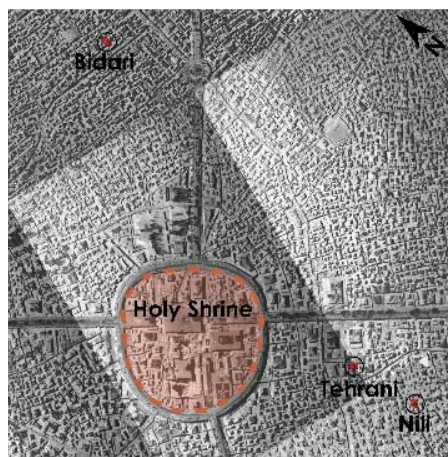


Fig. 1 The location of houses on 1956 aerial photo

The house is placed at the end of a dead-end path and perpendicular to the main route. It is oriented towards Mecca (North-East/South-West) not only to capture the advantage of solar heat but also to align the structure with the neighborhood's lanes. One could reach the house through a narrow and roofed corridor that is currently filled and closed by the collapse of the eastern boundary wall. Nili has a standard design of Iranian traditional houses, two building masses disposed around a rectangular courtyard and no windows open to the outside. Despite a great deal of transformation, the courtyard reflects the concept of paradise with an ornamental pool at the center and accompanying berry trees arranged symmetrically. This integration of nature and architecture affords a natural cooling system that reduces the harsh warmth of the sun and increases humidity during summer days [11].



Fig. 2 The general view of Nili's courtyard and summer quarter

The two-story south-western section of the house was the destination for seasonal immigration of the inhabitants during summer months where there was less exposure to the sun and hot desert winds blowing from the south. There is a combination of openings at a variety of dimensions in correspond to space function. Meanwhile, in ornamental terms, the façade performs a regular rhythm and harmony by deploying rectangles to frame each frontal arch in semi-circular, sharp or denticulate forms.

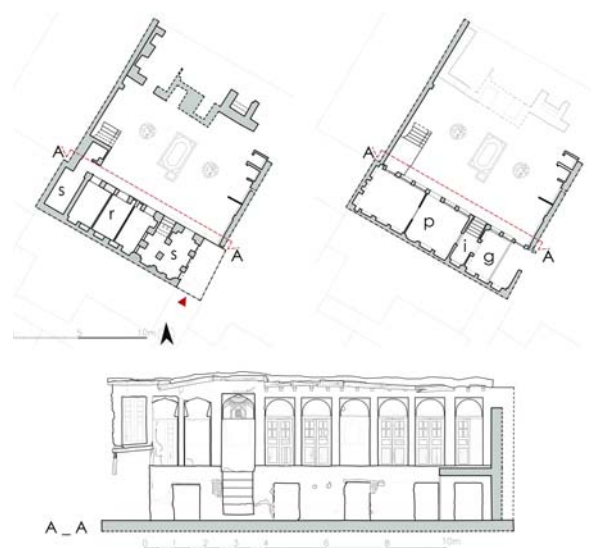


Fig. 3 Nili's House: floor plans and façade, p: principal chamber, s: storage, g: guest room, i: Iwan, r: resting room

The top floor, elevated by a set of stairs from the courtyard, is allocated to the guestroom and living chamber, which are tied together by an *Iwan*, a semi-open corridor. The entrance of *Iwan* is decorated with *Karbandi*, an arched covering pattern. Like many houses, the crawl space, behind the arch with a meter high, is used as a storage to contain the family's valuable objects or even treasures [13].



Fig. 4 Façade of Karbandi of Iwan

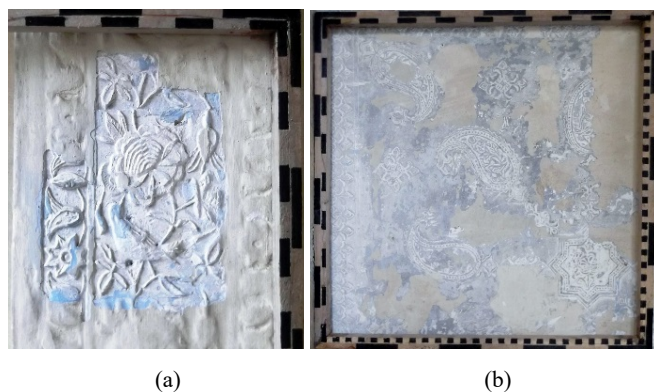


Fig. 5 (a) Stucco from the southern wall of guest room, (b) Stucco from the western niche with paisley pattern

The principal room would serve as a multi-functional place where it would be used for family gathering and dining [4]. It was characterized as *panjdari*, a room with five openings which included a narrow enclosed storage at the end of its composition before its dividing into two separated spaces by a thin spilt wall. The guestroom is featured as *sedari*, a room with three apertures that one of them has been much altered by making of an area above the entrance passageway to keep mattresses. The walls and niches totally ornamented with stuccoworks are currently covered with at least three layers of colors. The implementation of ornamental patterns reflects the Islamic beliefs about hospitality and honoring the guest, as well as representing the owner's living condition [14]. As a result, it is essential to note that how a householder, even middle-class, would intend to form a magnificent location for guests and respect traditions and culture. In addition, the arrangement of the interior niches in the design of each inner space represents a compatibility between the house form and the resident's needs [2]. The builder tended to make the optimal use of an architectural component like walls by digging some parts of it in order to make utilizable shelves, and also a lightweight structure.

Normally, in a double-story house, the lower level is always comparatively cool [4]. In Nili's house, the central chamber of the ground floor was serving as sleeping zone and the first and last rooms were the appropriate areas for food storages to keep them naturally fresh. Like the first level, the adjunctive walls disconnected different rooms from one another. In the past, the passage from an enclosed zone to another one was continuously repeated without any interruption. Today these openings are filled by the square bricks in sight and there is no direct connection among the rooms anymore.

The ruined building mass on the north-eastern side of the court is a relatively recent structure which was built during the (I) Pahlavi era (1925-1979) on the foundation of a previous construction. This section is identified as the winter quarter because of its location contrary to the direction of cool winds coming from the north and northeast. It is impossible to identify and realize the form and design of that due to its disrepair and degraded aspect.

B. Tehrani's House

Unlike the other two examples, Tehrani's house has not been abandoned, but, various occupations other than the housing function have brought many changes to the first composition. Rooms are being utilized as clothing warehouse for some of Hazrati Bazaar's merchants.

The building is oriented from northwest to southeast and its primary entrance has been placed 2 meters below the street level with a passageway which provided a direct access to the courtyard. It has currently lost its functionality and identity as an entry due to having become a small storage. The secondary entrance is formed on the east side of the house in a dead-end alley after closing the primary access. A staircase has been erected to make a direct connection among the current entry and courtyard. Also, to create more spaces, the owner added new disparate structures to the yard as warehouse and bathroom.

Regardless of changes, the basic structure of the dwelling is a combination of a yard at the core and two building masses on the yard's longitudinal axis. Unlike the courtyard of the Nili's house, Tehrani yard presently does not demonstrate any architectural-functional components such as ornamental pool and accompanying flower beds. This representation does not mean that it did not have the same characteristics as the traditional courtyards. This means that human activities changed its features by implementing the current mosaic ground and filling of the pool and beds.

Similar to all Iranian traditional houses, Tehrani's composition represents a tradition of seasonal immigration and optimal use of indoor and outdoor spaces in summer and winter.

At the core of the summer quarter, there is a principal hall on the first floor with a wooden sash window made of seven openings called *Orosi*. The upper part of *Orosi* is immovable, decorated with colored glasses in yellow, green, red and blue. In addition to its decorative aspect, it is also functional as the colored glass leads to having a complete view of the yard, while the inside is invisible from the outside. On the hot days of the year, the colored glasses prevent the entrance of insects into the living chamber. Also, colored glasses direct the sunlight to the room lightly and colorfully [10].

The living hall previously had a cross form and its breadth was almost double the dimension it has today. It is now divided into two separate spaces, with the northern half containing two grocery stores.

In place of stores, there was a *Shahneshin*, a semi-closed space where the head of the family would rest or be seated [3]. It was surrounded by two small storages on either side. The walls of the hall are decorated with niches in two levels. The upper one is a rectangular hole covered by a semicircular arch. The lower part contains two small semi-open shelves in its two upper corners holding by the triangular angles.

In the ground story, there is another cross-shaped area as the upper hall was allocated as *Hozkhaneh*, a pool room [3]. According to the householder's statement, this room has been used as a place to take siestas during summer days. Here, the pool was being employed as an architectural and aesthetical

component in collaboration with natural elements namely the water and wind to manage their energies and form a sustainable architecture [11]. It generally provides a high amount of humidity and relaxed atmosphere with air conditioning. Even *Hozkhaneh*, as other internal areas, has

undergone many additions and transformations, and lost its characteristics completely. A 9-cm thick wall has divided the room into two unequal sections and the rectangular basin of water is filled up.

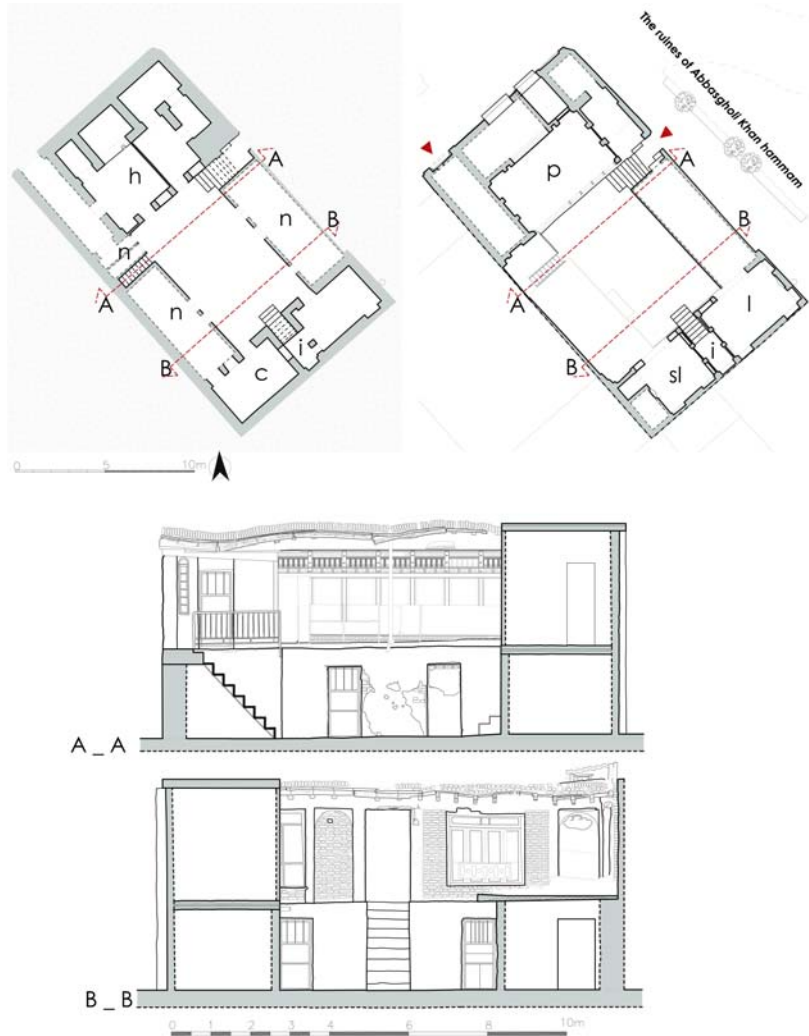


Fig. 6 Tehrani's House: floor plans and façades, h: *Hozkhaneh*, n: new constructions, c: cooking room, p: principal chamber, sl: sleeping room, i: *Iwan*, l: living room



Fig. 7 Tehrani's House: façade of summer quarter

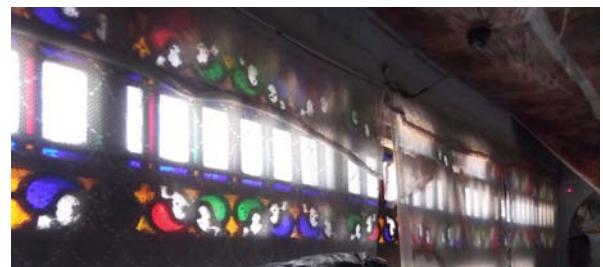


Fig. 8 The colored glasses of *Orosi*



Fig. 9 The view of grocery stores and the primary entrance

The winter section is laid on the opposite side of the summer one, currently having a facade far from the usual harmony and symmetry. This building mass is much less extensive in comparison with the summer part and consists of two identical rooms on each floor and a central staircase. This living quarter can be considered as a secondary area used only in the cold seasons based on its land percentage occupation and the simplicity of the rooms. In this case, *Iwan*, facing the yard from the first level, connects the living room and bedroom. Both rooms have the same semicircular niches and the central decorative fireplace where a hot coal brazier is placed to heat the room. Apart from the closure of some lateral niches, the three eastern sides of the east, west and south of the rooms have not undergone any other alterations. Only the southern facade presents an inadequate and inharmonic appearance. The permanence of arches remaining from the first surface can indicate that the current facade is entirely far from the primary one. In Islamic-Iranian architecture, repetition, harmony and symmetry are the most critical factors considered to create a building. Hence, the use of inappropriate long windows and implementation of the thickest bricks to fill the former apertures cannot correspond to the principles of a traditional uniform architecture.



Fig. 10 Tehrani's House: façade of winter quarter

The ground floor rooms of the southwestern building mass may be recognized as the most damaged part of the complex. The brick walls are covered by at least two plaster layers and nylon fabric. The current appearance of these chambers does not match to what is described by the householder as a cooking area and bathroom at all. According to the owner's declaration, the cooking room composed of an oven on the western corner with a chimney and millstone. Lately, it has been converted into a warehouse, and no trace presents its identity apart from the chimney structure on the roof. As a rule of thumb in Iranian house designing, the room intended for cooking has been allocated in the winter section to heat the surrounding areas [13].

C. Bidari's House

The third type that belonged to this group is Bidari's House which was entirely abandoned in recent years, and wholly demolished in August of 2017. In comparison to the other samples, this house has undergone various changes and more manipulations that have caused destruction and vulnerability of the building. The 1956 aerial photograph affirms that the house was much larger than the current site and that has been divided into separate sections in order to create another residential building. The habitation was oriented to Imam Reza shrine and Mecca and its original entrance was placed at the end of an inclined dead-end path. However, it has been removed after the division of the building, forming a passageway to the recent house. The new entry faced the alley laterally and directly connected to the courtyard.

The courtyard is an L-shaped space with service area constructions on its western side. The lack of a rectangular shape for a courtyard, the non-central position of the reflecting pool and the accompanying trees all represent irregularity and disharmony which are so far from Iranian philosophy and architecture. This remark would still approve the separation of the upper part and existence of the southern living quarter.



Fig. 11 The courtyard of Bidari's House

The northeast building mass has been the only remaining living quarter of the entire house until its demolition in 2017. According to its orientation towards sunlight, this portion was probably reserved for the cold months, but there are no

obvious or specific elements that can confirm this building mass as a winter living quarter.



Fig. 12 Bidari's House: floor plans and façade, s: storage, c: cooking room, p: principal chamber, sl: sleeping room, i: *Iwan*, g: guest room, r: resting room



Fig. 13 *Shahneshin* of principal room

The ground floor, that accommodated general gathering and cooking, has three different spaces, internally connected by apertures with one of them being recently closed. Accessibility between them from the inside was impossible and only available from the courtyard. The eastern room configured the shape L and its niches were regularly arranged with a distance of a pillar. Unlike the other two cases, a central only opening provided the connection between the courtyard and the ground floor. Even though there are no specific elements to indicate the functionality of the lower rooms, this area probably functioned as the secondary zone and was allocated to cooking, service area and storages.

The first level was raised about 2.7 meters higher than the level of the court with four rooms and an *Iwan*. The plan is remarkable for the dividing of the spatial area into the householder and guest zones. The room on the west was reserved as a reception where guests could be lodged without entering the area reserved for householders. On the north, in the longitudinal direction of this room, there was a relatively small space that functioned as a sleeping-guest room.

On the opposite side, in the family zone, there was a chamber with a cross shape and a *Shahneshin* circulated by two semi-closed storages together with a rectangular room for resting.

The *Iwan* here had the same characteristics of the Nili's one with an ornamental arch and a space for the storage of precious objects. The inside has not changed much, and its outer space, including the façade, has experienced several additions and reforms.

The guest room has completely lost its original outward appearance. The openings and their pillars have given their place to iron doors and windows, and it is impossible to express the number of their precedent apertures. In addition, the openings of the western room on the ground level have been demolished as well and replaced by an iron door.

Despite the transformations undergone, we can realize that the house followed asymmetry and regularity. The plan could be having a rhythm of R: I: P: I: R before its separation, in which the I section acts as *Iwan*, and sections R and P as guest or living rooms.

IV. PROPORTION AND GEOMETRY

Proportion and module are both essential factors considered by Iranian builders to design architectural spaces in a house and provide a harmony among different areas [1]. The yard and chambers in a traditional house follow the proportion of Iranian Golden Rectangle which contains a rectangle drawn in a regular hexagon [1]. In fact, the employment of this specific shape could constitute a harmonious geometry and a balanced ratio between the internal and external areas. The presence of this specific pattern in designing of case studies can be seen in Fig. 14. It is interesting to note that through this geometric system, the architect has managed to divide the land in a balanced way and then distribute the spaces in a proportionate and regular mode. Although, in internal zones, the proportion of Golden Rectangle does not conform to the plan, it is sufficiently close to it. Moreover, in order to create appropriate spaces for householders, Iranians applied specific units of traditional measurement, derived from human scales [8]. These units create a system of modulation called *Peimoon* which divided into submodules: Minor and Large. The units of Minor and Large form respectively are equal to fourteen *Gerehs* and sixteen *Gerehs* [9]. In fact, *Gereh* is defined as the basic unit which means node and equals to 6.66 cm, but *Gaz*, made of 16 or 14 *Gerehs*, has been considered as a specific unit to determine the proportion of outdoor areas, indoor areas, and facades [1]. The studies carried out on the selected houses highlight that the Minor *Peimoon* was utilized as module to make large-scale areas such as courtyards, chambers and

Iwans. Gereh, on the other hand, was applied to elements on a smaller scale such as pillars, openings and niches.

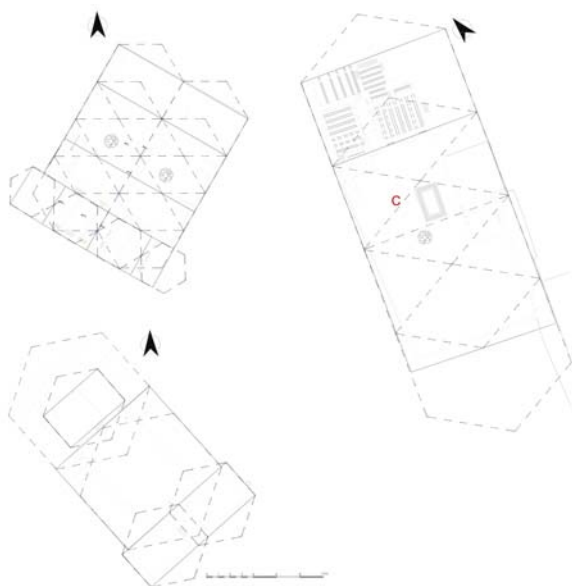


Fig. 14 The analysis of Iranian Golden Rectangle

TABLE I
 TRADITIONAL UNITS FOR DESIGNING

Unit	Amount	CM
Gereh		6.66
Minor Gaz	14 Gereh	93.24
Large Gaz	16 Gereh	106.5

V. CONCLUSION

Traditional mini-scale houses are facing changes and destructions more than any other well-known mansions due to their unknown values. Lack of study on architectural-historical features of ordinary habitations has led to their not being recognized as part of heritage. As a consequence, they cannot be registered in the list of the National Monuments. Although the registration cannot completely prevent the demolition of a private building, it may delay the process of elimination and allow the owner to cooperate with the Cultural Heritage Organization for possible utilizations and revitalizations. Moreover, the existence of limitations and regulations for the National Heritage can hinder non-standard reformations and innovations that cause the more variability of the building. It seems clear that urgent action needs to be taken to safeguard the existing dwellings before their demolition.

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