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The status Of The Aiwan Of Aliquapo Palace, Isfahan, In Relation With The Palace Construction And The Surrounding Area From A Structural and operational Perspective

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Abstract

Throughout the whole history of Islamic architecture, the concept Aiwan has indicated deep implicit meanings. Aiwan implies indication and extension of spaces. In Iranian architecture Aiwan is considered as one of the major elements which varies depending on form, dimension and position and performs variety of functions. In fact, in the Iranian architecture, the Aiwan can be considered as a pointing element from the earth to the sky, both from visual and conceptual point of view. Such a reality is mainly magnified in high rise roof Aiwans.

One of the featuring samples of Aiwan in the Iranian architecture, particularly Isfahan style, can be observed in Aliquapo palace, Isfahan, which is known as 'Dolatkhaneh Mobarake Naqshejahan'. The palace had been developed within 5 phases which continued till the end of 17th century. This building is located at the Western side of Naqsh-e Jahan square functioning as entrance of the palace and the assembly place for meetings of the king with people, ambassadors and representatives of other countries during Safavi era. The latest phase of development focused on the Aiwan of the palace. Factors including the function, cultural and historical background of Iranian architecture, specifically Isfahan architecture as a city with a unified structure, had been considered in the construction of such Aiwan.

In this article it has been tried to review The Aiwan of Aliquapo Palace, Isfahan, and to study its form, function and concept as a semi open area and also to scrutinize the palace from the point of view of its identity, concept and functions. For this purpose, through a descriptive – analytical perspective, after reviewing the history of construction of the Aiwan (considering the fact that it was built on earlier structures without estimating the load) and also considering its importance as a semi open area it has been attempted to figure the original reality of this construction and finally the type of structure which has remained stable for over 400 years will be investigated.

Keywords:

Aiwan , Aliquapo Palace , Naqsh-e Jahan square , Iranian architecture , Structure

Introduction

Aliquapo palace, a division of the collection of Naqshe Jahan Square is located in Isfahan. The palace is located at the western part of Naqshe Jahan Square and plays the role of entrance of the Safavi collection of palaces. Since 1967 up to 1970 a group of Italians with the leadership of professor Goldieri from Ismeo Institution, performed a number of repair and maintenance projects on the Aliquapo palace which was stopped after the revolution of Iran. In 2005 Isfahan Organization of Cultural Heritage decided to continue repair and maintenance project of the Aiwan of Aliquapo palace. To achieve this goal, a group of researchers as a part of the team, studied the ceiling and floor of the Aliquapo Aiwan. It should be mentioned that what the Italian group performed was insufficient and there had been no studies done on the ceiling of the Aiwan. So the team of researchers, after studying and drawing structural plans of ceiling and floor and ceiling decorations, and after studying earlier investigations, transferred the required information to the repair group.

This article reviews the Aiwan of Aliquapo Palace, Isfahan, and studies its conceptual reality as a semi open area, and also scrutinizes the palace from a point of view of its identity, concept and functions. For this purpose, through a descriptive – analytical perspective, after reviewing the history of construction of the Aiwan, investigating its formation and its status in the Naqshe Jahan Square, the type of structure will be studied considering earlier studies performed on this construction.

1. Aiwan

In addition to the exterior space, in the architecture of a place, the interior part and also the middling part is significant, since this is the part where they live in. Aiwan means an element at the upper level with the view of the frontal landscape. that is such a place which in addition to being exterior, conveys some interior characteristics as well. Sometimes a place to pass and move, and sometimes a place to stay and realize the landscape around and sometimes functions altogether at the same time.

1.1. Aiwan in the Iranian Architecture

Aiwan is considered as one of the major spaces in the Iranian architecture, particularly Isfahan Style, which can be observed in a large number of traditional houses and buildings with a variety of functions including worship houses of the palace, residential buildings and etc. It varies considering form, dimensions and status and performs a variety of functions. Many other spaces can function synonymous to Aiwan. Without the roof they call it “Spring rest” or “moonlight rest”. Another type with

many columns in front, a height equal to the roof and little width is called porch. It has also been mentioned about the concept of Aiwan as a transferring area between earthly and non-earthly elements.

Another major factor in the use of Aiwan with variety of forms in Iranian architecture is the design which is affected by climate of different areas. In Iran, with a warm and dry climate, Aiwan can help reducing the extra light, heat and purifying it for the interior spaces.

In the architecture of Safavi Era, they have considered significant value for the element light and the sun, particularly the sun, which can originate in beliefs of ancient Iranians.

In the climate of central parts of Iran, including Isfahan, the intensity of sun light is so high that the east and west light rays should be controlled. For this purpose, in the eastern part of Safavi palaces including Chehel Sotoun, Kaque Aine quane and Ali quapo, the eastern light is controlled through the use of large Aiwans which play the role of shades that reduce the intensity of entering light.

2. Isfahan Aliquapo Palace

The Aliquapo building in fact had been the entrance of Safavi palace which has been constructed from 1592-1597A.H before changing the Capital of Iran from Quazvin to Isfahan. “Quapo” or “quapi” in Turkish means door or entrance and “Ali” means magnificent.

Fig.1: Naghshejahan Sq.

Fig.2: Aliqapu palace in the west of the square.

2.1. Formation of the building

This building had gained its present appearance within 70 – 100 years in 5 phases. The building is located at the western part of Naqshe Jahan Square, across from Sheique Lotfollah Mosque.Abbasi Mosque and the portal of Isfahan bazaar are located at Southern and Northern parts of the square, respectively. It is said that the original foundation of Naqshe Jahan square dates back to Teimouri era (around 13th century); however professor Goldieri rejects such a claim and believes that the origin of this collection dates back to the first phase of construction of Naqshe Jahan Square (between 1592-1597).

Safavi palace is a collection of buildings which was located in the middle of green gardens surrounded with a fence. This collection served ceremonial, administrative, judicial purposes, and also served places for living of Sultan, kitchen, stable and hospital.

The primary construction, entrance of the palace, called Aliquapo, used to be in line with the raw of shops at the bazaar behind the internal part of the square.

In the first phase of construction, that was a single building, free at all four sides, 20*19M, 13M height in 2 storeys. It should be mentioned that at that era, Naqshe Jahan square was built one floor, with herringbone roofs with annexes added to it later on the second floor.

The decision to make the first major changes in the building had been together with developing primary false arches from around the square towards inside and adding another floor to the top of the porch of Naqshe Jahan Square. At that time, the Aliquapo building which was on the second phase of development, after adding the same height and dimension to the previously existing building became two times bigger than the previous construction. This changed the building from a simple entrance to a ceremonial location with the view of the square, where guests of the king were assembled for servings and watching soldiers marsh and competences and other ceremonies.

On the third phase of development, a new floor with an open plan, without considering the place of inferior pier, was added to the building which was called “the music hall”.

On the fourth phase of development, the square had a more displaying role. For this reason and since the Aiwan of Aliquapo was not in front, it wasn’t possible to observe the ceremonies of the square easily. As a result, it was decided to build a platform in front of the Aiwan which was pushed at the front area of the Square, passing the edge of the square. There was also one step on the southern part and a water tank on the northern part to fill in the pond and fountains which were in the middle of the platform.

At the end of the phase 4, the building faced two deficiencies which required some measures to solve them. One of these problems was the bad form of the stairs. And the other problem was that the annexed Aiwan with the vast area still didn’t deserve the king. Therefore, modeling other Safavi palaces in Isfahan including Chehel sotoun or Aine quane palace, they constructed a wooden roof which was held by a number of columns. Also the stairs which moved directly upward changed into a roofed stairs with 3 stair landings.

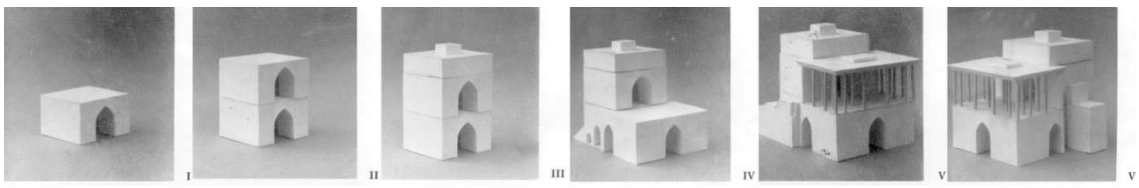

Fig.3: Different phases of development of Aliqapu palace.

2.2. investigating the Aiwan of Aliquapo from an architectural point of view and its relation with surrounding areas

The primary drawing of Naqshe Jahan Square had been generally based on the North south conjunction axis. As stated earlier, the original foundation of Aliquapo palace was considered as the entrance of the collection of palaces; being behind the square and being in conjunction with the entrance of Sheique Lotfollah mosque in front of it while it was on the other side, the palace conveyed to be inviting.

After adding other annexes to from the current formation, which was the result of changing application and the need for a more expanded area for soldiers to marsh and for polo-stick game and for necessity of creating a space for the king to communicate with people and speak for them, the entrance of Aliquapo palace moved forward from its earlier position. Even for increasing the connection and view of square from the palace Aiwan, the palace Aiwan and entrance surpassed the internal edges of the square and form a limiting shape.

The reason for formation of the Aiwan with the present appearance can be the general style of the halls of Safavi palaces in Isfahan. As it can be observed, almost of them are connected to the exterior area through a large Aiwan with columns. Thus, the general form of Aiwan architecture has the present shape modeling other palaces of Safavi era.

This was when Aliquapo palace gained its current look symboling the government's power and influence, in the largest square of the town with a dominant featuring shape.

3. Investigating the Aiwan of Aliquapo palace from a structural perspective

3.1. The structure of the roof

3.1.1. The use of advanced engineering technologies in the structure of the roof

Generally, the major reason of stability of this heavy wooden structure during centuries is the use of advanced engineering technologies in the wooden structure of Aliquapo Aiwan, which has been applied by architectures of Safavi Era while advantages of many techniques in the structural engineering including roof truss and wind braces have been discovered very recently.

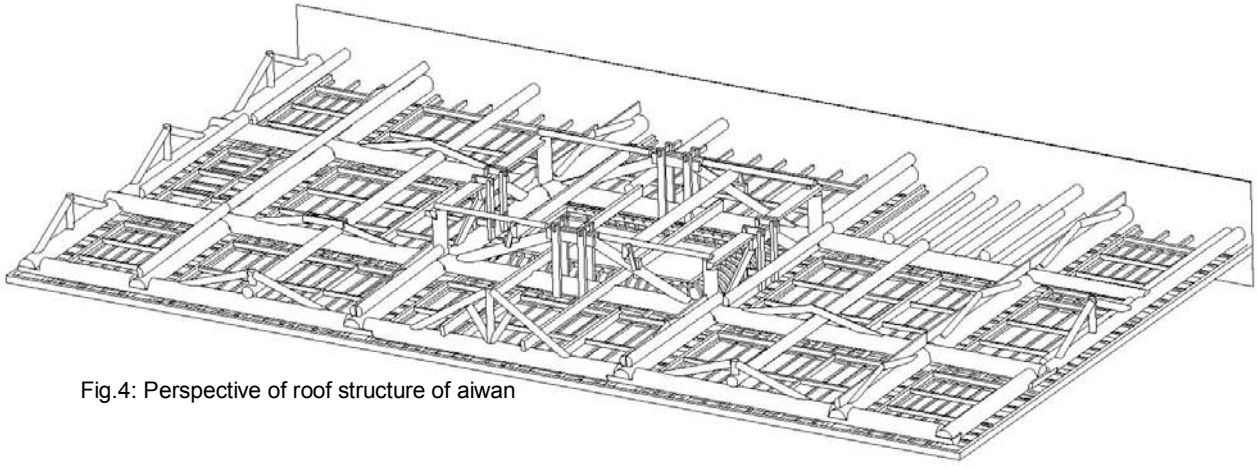

Fig.4: Perspective of roof structure of aiwan

3.1.1.1. The Use of wooden roof truss

In order to transfer the load of the ceiling to columns and to avoid transferring the heavy load of upper roof to the wooden beam underneath, they have places roof trusses between columns to transfer the maximum load of the roof to the nearest leaning supports of each opening. The form and structural complexity of these roof trusses depends on different positions of them, whether they are next to the ceiling or in middling openings or other critical positions. In fact many of these roof trusses are compatible with principles of modern engineering.

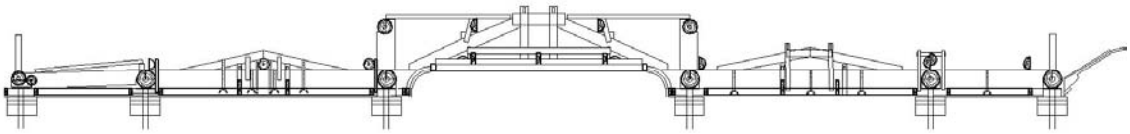

Fig.5: Section of roof aiwan structure.

3.1.1.2. The use of horizontal wooden braces

In the ceiling structure of Aliquapo Aiwan, there is a network of angular wooden fibers in the middle of each frame, surrounding by four wooden beams, that varies in form and complexity depending on the importance and critical position of the structural frame.

The function of these wooden fibers is to prevent the horizontal movement of the frame which may result in damage in primary form and angles of the frame when they bear side loads. Analogues to this old function in the modern engineering technique can be the use of horizontal and vertical braces which were invented in the contemporary era.

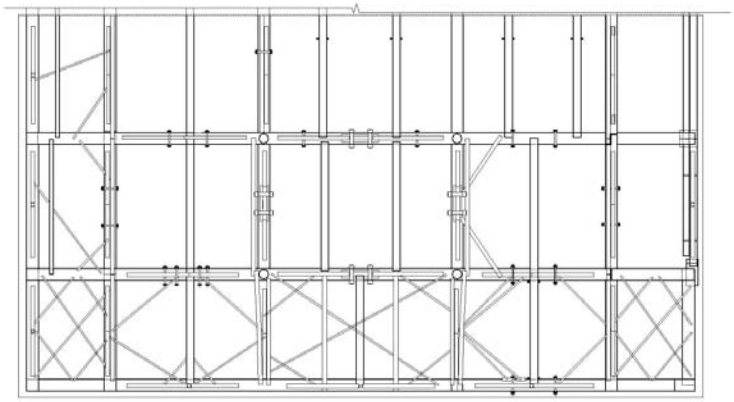

Fig.6: Horizontal wooden braces in roof structure

3.1.1.3. Connection to the body of the building

There is no column in the connecting area of body of the palace to the Aiwan and wooden beams are placed on the body of the palace. During the construction of the ceiling, without adding more beams to the beams of the ceiling, they drilled the pier and inserted the beam inside. This prevented equal distribution of the load of the ceiling over the wall and caused the pier to subside where it was connected to the beams.

3.2. The floor structure of Aliquapo

As stated in the developmental procedure of Aliquapo, the floor was constructed in the fourth phase while the roof was built in the last phase of construction and development. In order to apply the roof they had to decide on where to place the columns, the best place had been sides of the Aiwan. In the middle part, a number of columns weren't placed on proper piers. To reinforce these columns, wooden beams were used to transfer the load of columns to stronger piers.

Professor Goldieri, realized the weak column in his researches and the group of researcher could distinguish the other two columns which were reinforced in a more different way.

All columns are connected through wooden beams in checkered positions, which connect the foot of columns and frames to the floor, ceiling and column in order to achieve a unified structure to prevents columns from separate uncontrollable movements.

Unfortunately, because these major beams and reinforcing beams aren't observable, many of them are damaged by termites which caused them not only to lose their efficiency but also to leave empty spaces which resulted in subsiding and movement of the columns and the ceiling in later eras.

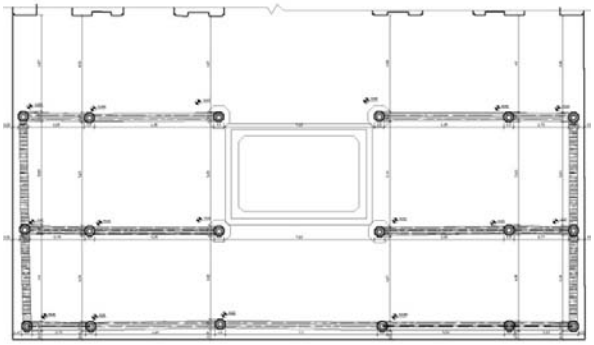

Fig.7:Wooden beams of aiwan floor

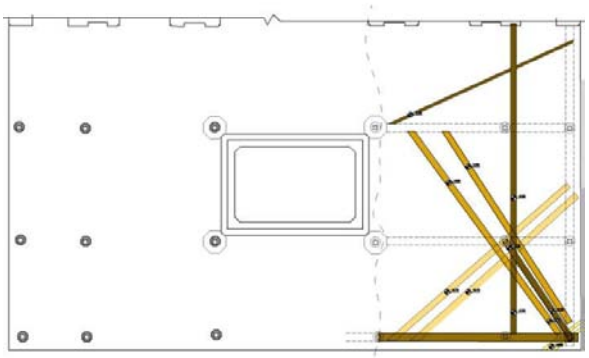

Fig.8: wooden beams to hold the pillar weight ..

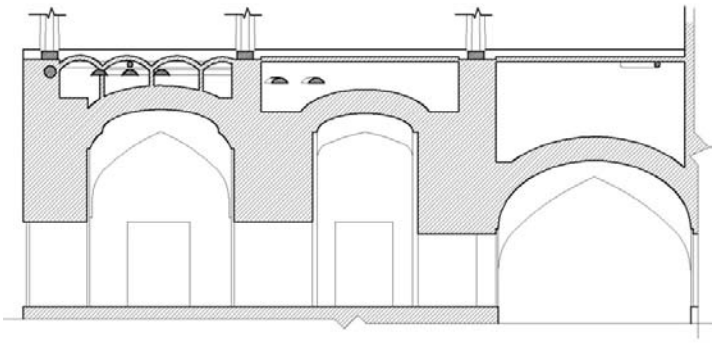

Fig.9: East-west section of aiwan floor

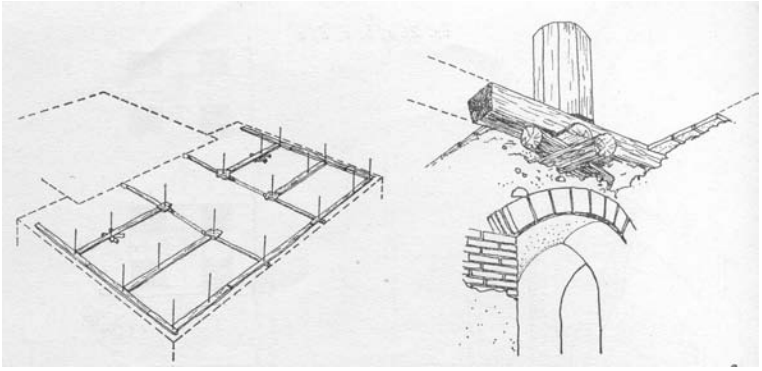

Fig.10: Detail of wooden beams to hold pillar weight in weak points

3.3. The structure of columns of Aliquapo Aiwan

Columns of the Aiwan are made from plane trees that are cut octagonal and are 10.3M high. The diameter of columns is 47,000 at the bottom and 22,000 at the top. Because of thinness of columns and damage by termites, these columns have bent about 50mm which has intensified the movement of the ceiling outward.

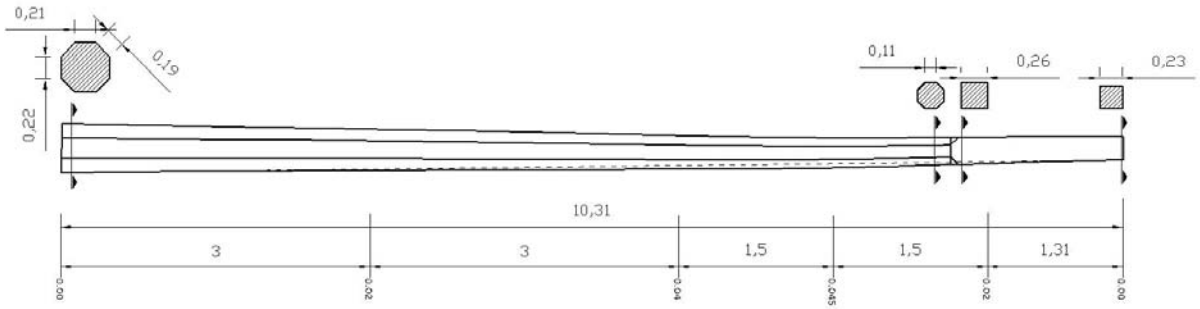

Fig.10:form of the columns.

4. Ceiling decorations of the Aiwan of Aliquapo palace

The ceiling has been decorated with a variety of modular wooden ties. These decorations are placed in structural frames which are connected to the underneath beams of roof trusses of the ceiling through metal belts. In some places, since these decorations didn't fit the size of the frames of the ceiling, they have changed the modules in the edges and sides of the frame in order to fill in the margins of the frames at the ceiling.

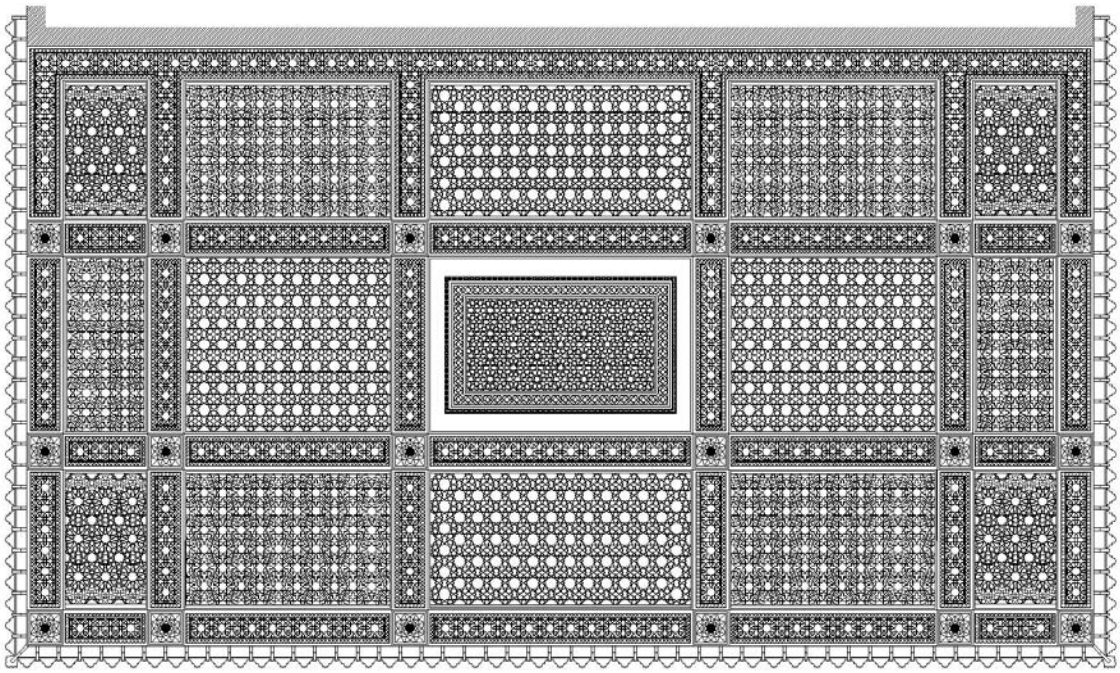

Fig.11: Map of the ceiling decorations of the Aiwan

Fig.12:Ceiling decorations of the Aiwan

Fig.13:Structure of the ceiling decorations of the Aiwan

Conclusion:

The outside and inside figure of the Aliquapo palace of Isfahan, particularly the Aiwan, is significant from two major perspectives.

1. Appearance and architecture of Aliquapo palace: Investigations on the palace implies that the palace has gained its current form throughout a multi stages process without any primary general plan. The process of construction had developed stage by stage as a result of needs of its time at each phase and considering history of Iranian architecture and older palaces of Safavi era.
2. Structure of Aliquapo palace (Aiwan)
3. Despite the fact that lacking a primary general plan for the whole building of the palace had negative threatening impact on the structure of Aliquapo palace, yet the innovation and wisdom of architectures and constructors of the building which in some cases surpassed the knowledge of their time caused this palace to remain stable after above 4 centuries.

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