

TRANSITION FROM PHYSICAL ASPECT TO STRUCTURE OF PUBLIC PLAZA, TEKIYEH IN YAZD CITY ESPECIALLY TEKIYEH–E AMIR CHAKHMAGH

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Abstract. *This article studies about effect of physical aspect and its changes on structure of Tekiyeh-e Amir Chakhmagh in Yazd city. Form of building that determines how to be built on land, can create specifications of earth structure and or using an unsuitable specifications of earth or lower layer make a new innovation for that architecture.*

Type of architectural application becomes the main factor of volume-based specifications of a special building. Therefore, external level of volume being equipped to stone benches and entrance

facades and using row at walls that are facing with open space determines form and identity for urban framework. The most important architectural element of Tekiyeh which formed as a brick based frame around the determined places area, have been designed filled and unfilled spaces. How to place structural materials creates a special form in architecture of these buildings that keep them firm against natural events and they are fixed in color and form and resistant against internal forces caused by structure.

Plaza and Tekiyeh located at Iran's deserted plains have appeared at the best physical form assimilated with social and cultural system of the city and ward. A sample of these plazas is Amir Chakhmagh in Yazd which has a common fixed form at this region of the country and it has been changed during the time. Any kind of changes which occurred in physical aspect modified the erosive factors by damaging the structures that we are taking attention to this subject in this assay.

INTRODUCTION

What Iranians could do along with growth and changes of squares near Europeans who constructed Agoras and Forums and after breakup of democratic city of Greece created piazzas, was to create houses of worship (hosseinieh) that provided songs, speeches, colors, scenes, movements and powerful public conversations. Tekiyeh square and hosseinieh have been appeared in the best form at plateau plains and especially plains around deserts in terms of physical body and have been assimilated with social and cultural system of a city or district that is a place for association of local people.

The said places at centers of districts of these cities are surrounded, symmetric and in form of square or rectangular or eight costal. Being surrounded of these spaces brings providing moderate climate conditions at these warm and dry regions.

In Yazd city, Tekiyeh and hosseinieh have been formed at center of districts and beside other elements such as mosque, market, caravanserai, bath, reservoir, etc. and have a specified structural and body graduated form at one side and in other sides, in 2 floor stoic form and sometimes, 1 floor that finally they are created by surrounded plan. Comparative study of Yazd squares and other available samples of the country show presence of patterns similar to stair structure of Tekiyeh.

Some samples of hosseinieh

1- Fahadan hosseinieh

Location: Downtown of Yazd



Figure 1: Interior of Fahadan hosseinieh , Yazd, Iran

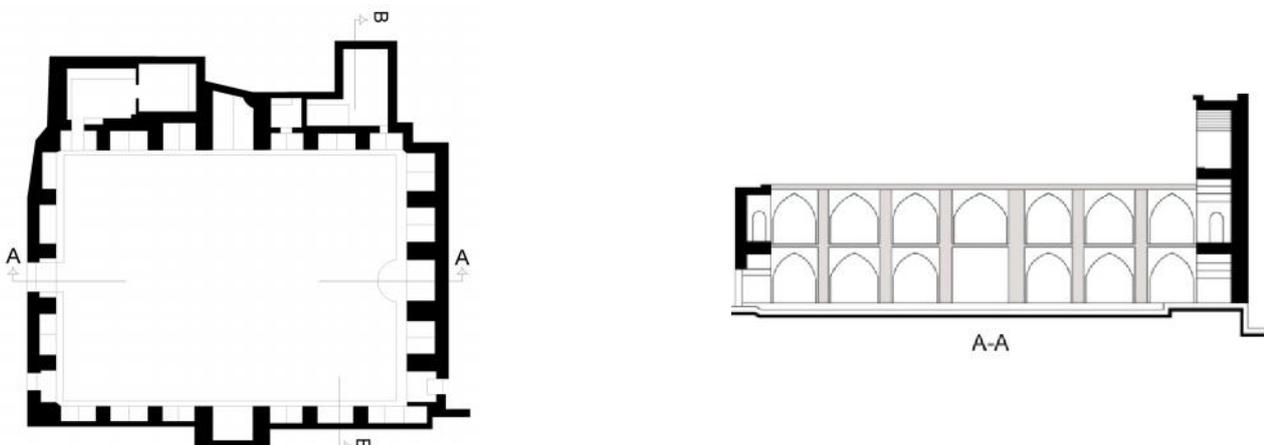


Figure 2: Plan and section-elevation of Fahadan hosseinieh

2- Shah Abolghasem complex

It includes hosseinieh and ShahaboddinSadr School, small square, small bazar, mosque and reservoir. Spatial structure of hosseinieh: plan is in form of rectangular from east to west elongation. Materials and decorations: the materials used in this building are brick and chalk.



Figure 4: Shah Abolghasem hosseinieh,
Yazd, Iran

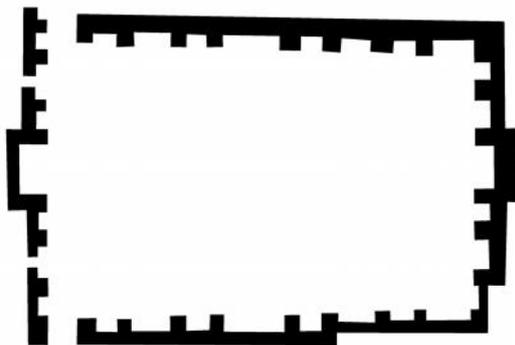


Figure 5: Plan of Shah Abolghasem hosseinieh

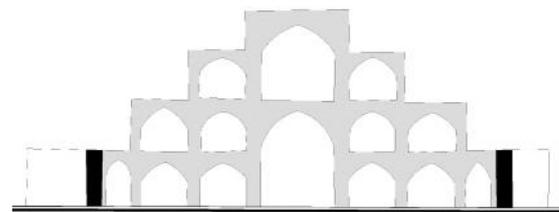


Figure 6: Elevation of Shah Abolghasem hosseinieh

Selection of measures and environmental scales determination

Measure of volumes and totally, relation between measures and physical proportions are determined case by case for Iranian architects unlike what is imagined and sometimes stated seriously.

Considering to applied pattern namely more or less limited communication system that considers only to functional and determines applied hierarchy of construction but what is important is the presence of Iranian architect between applied pattern and functional pattern, therefore, we can not find any construction which have structural similarity such as measure, form, volume or configuration. According to what we said, we can not find two equal constructions anywhere in Iran even at a short time and in constructions made by unique architects.

Special studies of complex-construction and its base

Amir Chakhmagh square related to 9th A.D and Shah Tahmasb Square related to 13th A.D have been two important urban spaces that connected main passages and markets to each other. Amir Chakhmagh complex, as one of the most important complexes of Yaz city, has had places such as mosque, caravanserai, monastery, well of cold water, reservoir, bazar, monument and Tekiyeh at different historical times.



Figure 7: Aerial Photos of Amir Chakhmagh Sq. (a) and Shah Tahmasb Sq. (b)

After making streets at Pahlavi era, form of square is changed. Walls of square is going to be destructed and small square opposite of Amir Chakhmagh mosque is merged with the square opposite of hosseinieh and after many changes, the only remained wall becomes body of east south side which is main body of Amir Chakhmagh Tekiyeh. These changes are mostly related to Reza Shah Era and after that.



Figure 8: Existence elements of Amir Chakhmagh Sq.

Physical form of Amir Chakhmagh Tekiyeh

Main wall of Amir Chakhmagh Tekiyeh (which is the only remained wall) includes some booth that have formed the rind in three floors and placed in stair form on each other. These booths have been designed in four vertical rows in two floors and one vertical row and the booths that are placed at main way, in form of three floors.

Terminal booths of the building have less depth than other booths at arm of Tekiyeh and every two floors. Ground and first floors are connected to each other by the staircase at ground booth, 5th row of western arm. This staircase is the only access between ground and first floors that finishes to roof of Hajighanbar bazaar and back of Tekiyeh.

In Tekiyeh, the most important booths are middle booths that have been placed over door of Hajighanbar bazaar.

This baldachin of the construction has more height and more detailed decoration of tiling. This part is probably a place for grandees of the city in order to be placed at the center of Tekiyeh as highest governmental authorities and watch morality play which was performed at central area. Minarets of Tekiyeh have been constructed over these middle booths.

Vertical connection is performed by two round staircase which is inside the minarets and prolongs under encasement. From here, there isn't any staircase and connection to top of minaret is by some bricks which are drawn out.

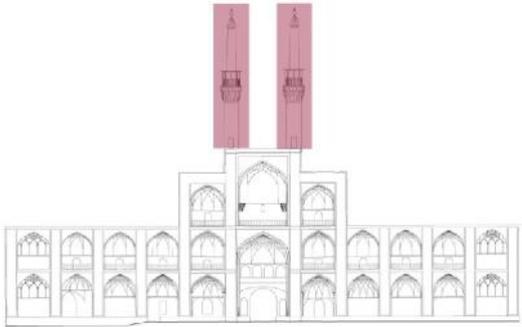


Figure 9: The position of Minarets of Amir Chakhmagh structure



Figure 10: The stairs

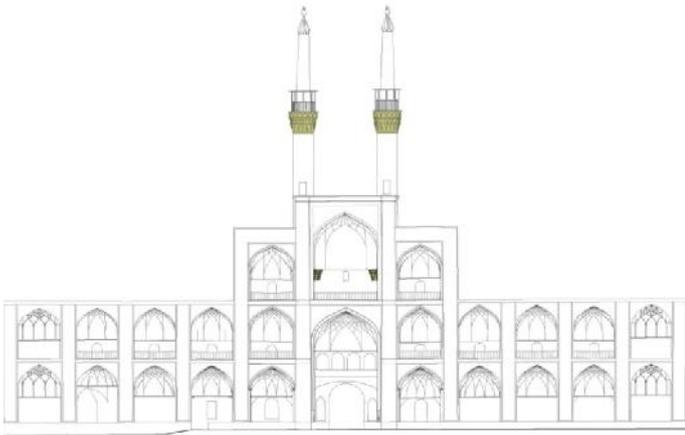


Figure 11: Front elevation

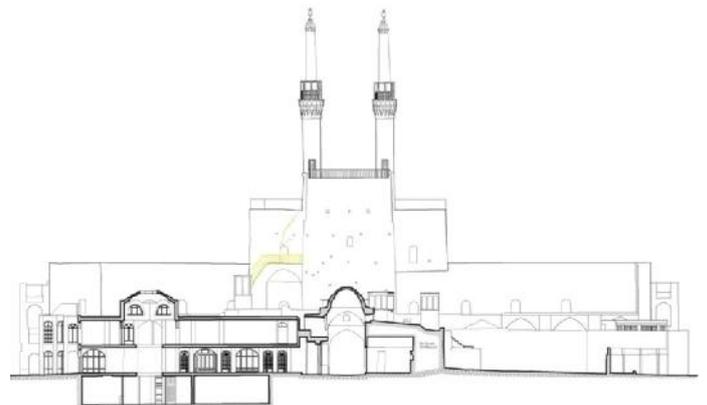


Figure 12: Back section-elevation

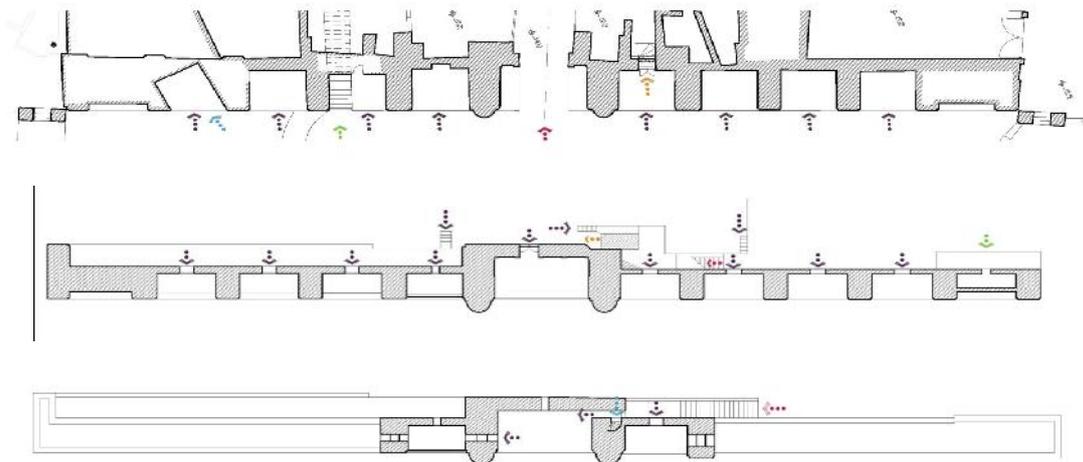


Figure 13: Plan of access way to the floor

First floor (Top), Second floor (mid), Third floor (down)

Relative transformation of Iranian architecture

Structural-technical features of architecture change during time (even during life of an architect who is continuously observing his/her handmade and others) and vary construction materials transformation, construction elements and structural system of construction. This transformation is not necessarily and always negative or reducer of structural and stagnation value of construction.

Geographic phenomena and factors (and also climatic) have forced Iranian architects of last periods to devise within macro and micro scales: first scale demands for selection of constructional materials, special aspect and structural system for construction; the issues that should be able to be answerable against small changes of earth or environment of construction, know ways of underground waters and possible slide underneath layers of earth and define and draw structural system of construction emphasizing on foundation system related to it. At second scale, they look at the states that are created by vicinity or combination of two different materials.

The materials used in construction

This research studies features of materials used in construction. This section studies about structure of bricks used in construction and their compressive resistance, composition of mortar, *adobe*, *brick* used in foundation.

Adobe

Adobe is the main material of Tekiyeh. Aside different sizes of adobe, some old adobes have selected for test in order to study compositions of main adobe. Considering to suitable tolerability of adobe at some parts of construction, it is expected that some percent lime and plaster are used in it.

Mortar

Two types of mortar have been sampled in studying the mortars used in construction. The first type is the mortar used in performing brick covers. The second type is mortar of adobes. This mortar has been used in main body of construction and within adobes. Precise studies show that the mortars of external walls have similar compositions but the mortars from adobe of second floor have some Andradite (mineral clay) and plaster and this difference can be related to periods of construction.

The mortar used in construction is lime clay which is provided by composition of 50% clay (mineral clay, dolomite, feldspar (sodium, potassium)), 33% sand (quartz), and 17% lime.

Environment of construction: Transforming and transformable existence

The place which is allocated to an exceptional construction accepts its changing: its soil is changed; dampening ability of its land is changed; resistance of its plants is changed against rain, snow and wind; its potential resistance against pressure power over its surface is changed to statistic field. Therefore, according to geotechnical studies and considering to type of bed place of construction especially at tension bulb (maximum up to 15 meters depth)

consisting sand with clay and clay and also according to 5 bores excavated around construction, bed of construction has been formed from fine layers up to 30 meters depth.

Therefore, layers of bed have high asymmetric subsidence potential following low changes of environmental conditions. The most important damages of the construction is balance disturbance, change of soil features, infiltration of water to bed soil and washout and its consequences that is created in form of asymmetric subsidence in construction. But what we can say after continuous change of environment and its effect on architecture is continuous but slow changes of construction and decrease of construction stability against natural events.

Construction of Amir Chakhmagh Tekiyeh has been placed on a bed that has had potential of subsidence during its life. This potential is along with effects of factors that result in change of soil features or due to loads of bed result in imbalance disturbance of construction. Due to these changes, foundation of the construction and balance of foundation change and the most important one is descending west part of basis and upheaval of its east part. This change can be increased in north minaret due to interventions. In addition of above subjects in direction of effectiveness of land on foundation and materials of construction, land can create another phenomenon by time category and instant changes. The land while accepting more or less high construction accustoms with shadow phenomenon and shows system of turning around the sun by an element that his high.

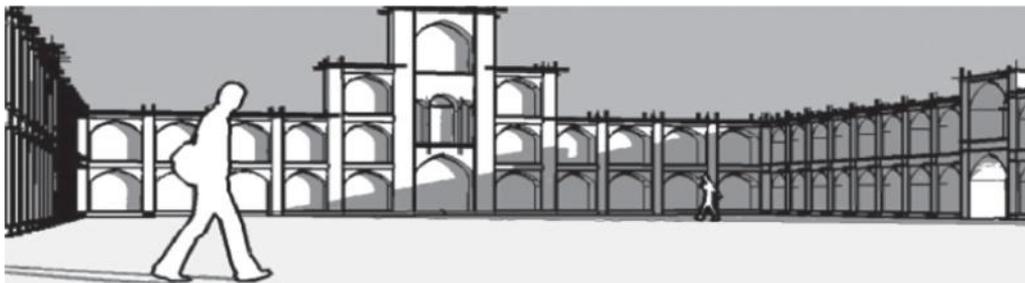


Figure 14 : Formation of shadow

The structural component

Structure of architecture can enforce some parts of physical body to a special statistic work and, it leaves the physical body and returns it to after returning to normal status.

Body of construction has combined with its structure so that its existence is stipulated to traffic of powers. Although structure of construction is an entity different physical body of construction but there is need to evaluation of Amir Chakhmagh Tekiyeh construction statistically in the events that body of construction is under new and asymmetric powers and or when body of construction accepts powers that have special weight on some parts of construction and also due to some changes of its foundation.

This issue can be seen in the studied construction. During last years, construction of Amir Chakhmagh Tekiyeh due to omission of some southern pillar that seems to be main pillar of the construction and would transfer the loads to the land, has been changed to a shop and there is increase of tension in pillars and this has unbalanced foundation of construction and indicated subsidence at these pillars and around the construction.

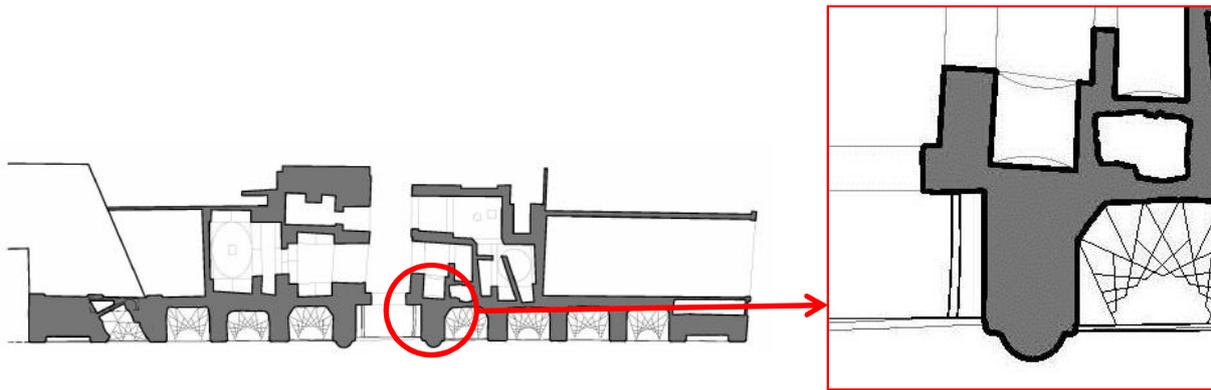


Figure 15: omitted southern pillar

If we want to study architecture of a construction from view of three components of physical, structural and forming combination, we will gain a common aspect that is material and each one isn't made without material. Material is a connection between architecture and environment. Material is a quantitative and qualitative measurable source that affects on body existence of architecture. When material is in form of amorphous or in combination with other materials, it makes construction materials and this body form is made along with construction materials. Internal world of material which is continuously changing includes also external change of material which cause chemical, physical and statistic change of its features and a phenomenon is the difference between chromatic colors of external form of architecture.

A considerable point about material and architectural body is that construction material that constitutes construction elements and body of construction use energy for keeping stability of structure during time. Therefore, we face with aging of construction.

Figurative component

Form of body determines how to be established on land and shows its volume. Iranian architects have not constructed a building that shows external face of its body clearly up to end of Qajar dynasty. In roofed and semi-roofed places, vertical levels have been retreated by bulkheads, veranda and arched works. These parts could show volume of construction by distinct and antithetic mainland; stair form of construction at one of face that includes one side of construction according to climate and geographic position affects on power transfer and also reflects these powers from foundation and also conformity between architecture and construction technology by using bricks by traditional methods so that it affects on the wall itself structurally, the work that is realized by turning the bricks in old brick buildings of Iran. Also way of placing stair with wooden structure helps to transfer of power inside minarets. Power goes from z axis to x and y axis and finally to brick body of minaret and in fact the powers rest on wooden statistic role and move on these three axis and decrease destruction due to earthquake. Width and length and height of different places by help of using depth can keep self-service and unity of building and this case is fully clear in Amir Chakhmagh Tekiyeh and other hosseinieh and Tekiyeh of Yazd city.

CONCLUSION

Old architectures of Iran have the following features such as constructions that have been built from old time up to Qajar dynasty:

- They rest on local executive experiences
- Measures of construction elements along with designs of their form have been realized;
- Effort for determining construction elements for stamina of structure have resulted in their lightening; vertical construction elements have been lightened at their place;
- Determination of form of elements is based on knowledge of architect about behavior of construction materials so that he knew the flows related to their statistic life correctly;

Form of Tekiyeh shows the quantitative indicator of structures (in totality of volume, in width and height of construction and communication system of construction from outside to inside and ground floor to roof). Angel 45 at two sides moves pressure powers to downward and then, work of middle part is decreased while middle part is the answerable for similar weight on top of it. We can see form of Amir Chakhmagh Tekiyeh and other similar hosseinieh in Yazd that how it could keep its structure stable by this determined principle.

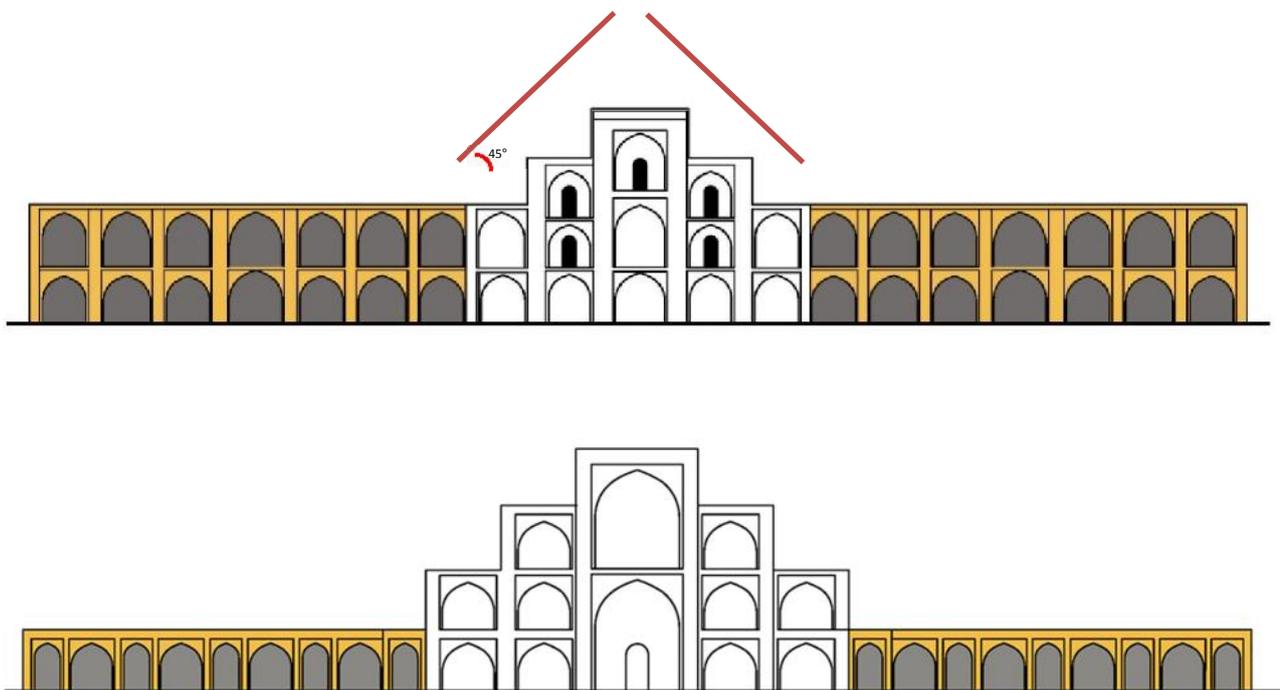


Figure 16 : Effect of physical aspect to structure

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