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Comparative Analysis of Qajar Historic Houses in Tabriz, Isfahan, Yazd, and Kashan, Regarding their Architectural Forms and Elements

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Abstract
There are a lot of precious beautiful Qajar houses in many cities of Iran indicating the high quality of talents and wisdom of their architects. Using a row of columns in the main façade, emphasizing on symmetry axis in the entrance, and replacing the new ornamental patterns with the ancient elements are some of the architectural qualities of this era. This article attempts to answer the question that what are the similar characteristics of Qajar houses in different cities of Iran. For achieving this aim, the history of Iranian houses especially in the Qajar period is studied in Tabriz, Isfahan, Yazd, and Kashan cities. The methodology of this historic survey is comparative and qualitative using the reliable books of libraries and first-hand resources. This article concludes that the architects in that era harmonized the culture of other countries to improve their own values according to their own culture and climate.
Keywords: Qajar Historic House; Tabriz; Isfahan; Yazd; Kashan; Iranian Architecture.

1. Introduction

Culture is formed in the continuum of time from the minutes of thought and experience. Just as the study of culture in texts is necessary and valuable for the survival and transmission of the culture of people, the study of each of these cultural institutions has the same value, one of which is traditional architecture (Aziz Amen & Nia, 2018). Among the architecture of different buildings, the architecture of houses has a prominent feature to get acquainted with the creations and spatial innovations of past architects. Houses are living evidence of very important periods in the growth and development of Iran. The traditional houses of Iran in the Qajar period, with their delicate and intricate designs derived from strong cultural and religious traditions, have reached their peak of prosperity and wonder, and are excellent examples of the close connection between architecture and their decorations. For example, muqarnas, plaster, mirrors, murals and frescoes, wood mosaics, wood lattices, and stained glass have been widely used in many buildings of this period. During this period, the lancet arches and shouldered arches are obsolete and are replaced by semi-circular arches on the entrance, door and niche. Non-load-bearing false ceilings are removed from the roof of rooms and attics, and vertical and horizontal sunshades are removed from the building architecture. The present article is an exploration to answer the question of what common features Qajar houses have in Iranian cities. For this purpose, first, a brief study is completed on the architectural elements of the historic houses in Iran. Furthermore, with a brief introduction to the history of the Qajar dynasty and the appearance of Iranian cities in this period, some of the main architectural features of the Qajar period are mentioned. Then two case studies among the Qajar houses of Tabriz, Isfahan, Yazd, and Kashan are examined in detail in each city. The list of some Qajar houses in the aforementioned cities of Iran is mentioned in a separate table (Table 1). For studying the similarities of Qajar houses in Iran, four different tables (Tables 2, 3, 4, & 5) are used for the analogy of their architectural forms and elements, the main interior façades, the main plans, and the elevations and sections. The conclusions of this article can be useful for the architects, researchers, and preservationists who care about historic architecture and especially the Qajar Houses in Iran. The research method used in this study is completely analytical and the research tool is a library study referring to first-hand and reliable resources.

2. Architectural Elements of Historic Houses in Iran

Iranians moved from nomadism to a permanent lifestyle and built houses for the first time in the time of “Keyumars” and "Hushang". “Keyumars” or “Kiomars” was the first king of the “Pishdadian dynasty” of Iran according to “Shahnameh”, which is a long epic poem written by the Persian poet “Ferdowsi”. The name “Keyumars” means “the living mortal”, “mortal human being”, or “people” in the “Avestan” language. The people led by “Keyumars” stopped migration and began to live in the mountains permanently. With the emergence of two structures of life, migration and permanence living styles, clashes and battles were involved between them. In the first wars, the survivors finally defeated the nomads, and with this victory, the background for further progress and the construction of houses was provided. After the death of “Keyumars”, “Hushang” became the king and his era was the time to build houses. The name “Hushang” or “Hoshang” means “to have good houses” or “someone who provides good houses” in the

"Avestan" language. "Hushang" was the son of "Siyamak" and grandson of "Keyumars" and he was the second king to rule the world according to "Shahnameh" of "Ferdowsi" (Vahidi, 1996, pp. 235-236).

According to "Pirnia", the principles of Iranian architecture can be divided into the following five categories:

- Having a human scale: observing the fit between building spaces and human organs and paying attention to human needs in construction work. It can be seen in various elements of traditional Iranian architecture. For example, if we consider the bedroom, its size is considered according to the different needs of a man and a woman, their child or children, the equipment needed, and so on. Similarly, the function of the room and the placement of elements such as doors, windows, and openings have been selected accordingly and carefully. In other elements, this combination of logic and beauty can be seen too. To place items such as mattresses, quilts, and pillows, and for essential items, niches were installed. For example, to prevent the scorching heat of Iran, the wall was made of two shells or the light was taken from the ceiling;
- Avoiding futility: in Iranian architecture, they tried not to work in vain in construction and avoided extravagance. Work in vain wastes funds and time; besides, from an architectural point of view, it is not beautiful or necessary. For example, the installation of a statue in a building which was common in other countries does not exist in Iranian architecture because it is not useful. Another example is the installation of the pond in the courtyards of Iranian houses, which can be seen in most of them, and it was done to cool the interior space. It was not only for its aesthetic aspect but it was installed for its efficiency;
- Static knowledge, building technology and building materials: in Iranian architecture, all the work is done to make the building stable and steady. It is a collection of calculation and static matters, including materials science, and the selection and use of the most appropriate and minimal materials. In the past, architects relied more on engineering, and in their opinion, the building was beautiful when it showed its statistics. The modular design was one of the criteria that was observed to determine the fit between the components of the building. Using a modular system, the three important stages of design, calculation and implementation of buildings were performed in the best way. So that in a beautiful design, correct calculations and execution were simplified;
- Self-sufficiency: Iranian architects had a great effort to get the building materials they needed from the nearest places as much as possible and they built it in such a way that they did not need the building materials from other places and they were "self-sufficient". This means that the builders have tried to obtain the required materials from the nearest place and at the cheapest price, thus the work has been done more quickly and the materials have been more in harmony with the surrounding nature. Likewise, the buildings that had to be repaired over time, with access to the main materials on site, it was possible to repair them in all stages easily;
- Introversion: one of the beliefs of the Iranian people has been to value personal life and its dignity, as well as the self-esteem of Iranians, which has somehow made Iranian architecture introverted. Introversion has been one of the most important principles in Iranian architecture. Introversion means paying attention to beauty and efficiency in building a house by placing physical spaces around a courtyard and accessing the outside space using the yard. In traditional Iranian architecture, the exterior façade was not considered as much important as interior design. Iranian architects separated the building from the outside world by organizing the spaces of the building around one or more yards, and only a porch or a vestibule connected the interior of the house to the outside of the building (Pirnia, 2008, pp. 26-36).

In the traditional society of Iran, the house is a sacred sanctuary and therefore the inhabitants of this holy place should be safe from the view of outsiders and strangers. For this reason, the central courtyard is all introverted and is in fact the heart and centre of the house. The yard provides light and air for the rooms and interior spaces of the house. In the design of traditional buildings, privacy is maintained and entry is allowed through a gradual process and hierarchy. The elements of Iranian historic houses are as follows:

- Platform: a place on both sides of the entrance, to relax while waiting, and to talk to the visitors;
- Gateway: decorative crescent on the entrance door;
- Door knocker: the entrance doors of traditional houses are double-leafed and wooden, and each leaf has a door knocker;
- Vestibule: it is often octagonal or semi-octagonal in shape or more often quadrangular;
- Corridor: indirect route from the vestibule to the courtyard;
- Yard/ courtyard: the courtyard was a place for various ceremonies such as religious ceremonies, weddings and gatherings of relatives, which was usually square and had a small pond in the middle, along which two flower gardens appeared symmetrically to each side. Yard types are:
    - Orange garden: a small garden with citrus trees is usually covered to prevent the freezing of trees in winter;
    - Outdoor yard: a semi-private space that is assigned for guests and non-relatives;
    - Inner courtyard: one of the most private spaces exclusive to the family members and no stranger has the right to enter;

- Porch: a covered area that connects the yard to the surrounding rooms;
- Windbreaker hall: a place for public gatherings, religious ceremonies and summer residences;
- Three-door room: a room with three doors that plays the role of a living room or sleeping or eating room in spring, autumn and especially in winter;
- Five-door room: a room with five doors is used as a reception room, dining room and meeting room in spring, autumn and especially in winter;
- Official room: this room is for special occasions, important gatherings and formal parties. It was mostly used in spring, autumn and winter;
- Chamber: a room between the hall and the windbreak for rest and sleep on hot summer days;
- Indoor entrance porch: a covered entrance porch (with columns) is a space to relax in summer;
- Hall: for public purposes and religious ceremonies;
- Upstairs: for rest and study in summer, autumn and winter;
- Corner room: a private room for sleeping, main bedroom, for privacy and library;
- A room with a heater: it is located next to the winter room and it has no windows. It had a heater in the room;
- Closet: warehouse, storage space especially for bedding and clothes;
- Kitchen: it is usually square or rectangular. It is located near a reservoir and water well, for easier use of safe water storage. Inside the kitchen, there is an area for cooking and wood storage, there is also a baking oven, and, there are shelves inside the wall for cooking tools and food;
- Toilet: it is located below the level of the rooms and usually in the corner of the yard;
- Bathroom: this place is also low level for two reasons: first, ease of use of water and drainage; second, its heat. The bathroom was divided into two parts: a warm space for changing clothes and a shower for washing (Kateb, 2006, pp. 332-340).

3. Architectural Characteristics of Iranian Houses in the Qajar Era

The “Qajar dynasty” (1789—1925) was an Iranian royalty of Turkish origin ruled by “Agha Mohammad Khan Qajar” (1789—1797), “Fath-Ali Shah Qajar” (1797—1834), “Mohammad Shah Qajar” (1834—1848), “Naser al-Din Shah Qajar” (1848—1896), “Mozaffar ad-Din Shah Qajar” (1896—1907), “Mohammad Ali Shah Qajar” (1907—1909), and “Ahmad Shah Qajar” (1909—1925) (Bani Masoud, 2009, p. 7). For obtaining more information about the Qajar dynasty you can read the Master thesis of the author titled “The Conservation and Revitalization of Mirza Mehdi Farashbashi’s House in Tabriz” (Asbagh, 2011, pp. 8-37), and the article derived from it by the author with the title of “Adaptive Reuse of the House of Mirza Mehdi Farrashbashi in Tabriz” (Asbagh, 2021, pp. 506-520).

3.1 Architecture in the Qajar Period

The views and perspectives of the ruling Qajar period have a unique resemblance to the French Baroque period. The construction of palaces is a prominent feature of this historic period. There was a large building in the middle of the gardens with lavish decorations, where ceremonies and gatherings were held. The expansion and creation of large parks in the heart of the cities was perhaps the most valuable service of the palace to urban life. The architecture of the Qajar period is highly valued from the point of view of spatial creativity and is in a superior and more developed position than the architecture of previous periods such as “Zandiye” (Zand dynasty 1751—1779) and “Safavid” (Safavid Empire 1501—1736). In the architecture of this period, spatial creations and the variety of spaces increased, new spaces are created, spaces become more open and lighter, and the old patterns of Iranian architecture evolved to expand the space. In short, if we consider the evolution of architecture as the opening, transparency and lightness of spaces, the architecture of this period is considered the stage of evolution of ancient Iranian architecture. On the other hand, when we look at architecture from other viewpoints such as sizes, proportions, shapes and decorations, the architecture of the Qajar period shows a lower status than its previous periods, especially the “Safavid” period. The shapes did not have the previous solidity and new shapes entered the architecture which was superficial and casual. The measurements were not accurate enough, the proportions were in a lower order than the balanced and thought-out proportions of the previous periods (Bani Masoud, 2009, pp. 74-75). During this period, strong towers and fortifications were considered a sign of the city's greatness and the market was the heart of the economy of the city. In terms of the general division of the city, it was divided into three main parts: ancient fortress, county, and suburbs. The fortress was the administrative centre of the city and regulated all the social relations of the city. The mosque, along with other duties, was considered the centre of the city's judicial system. The alleys were narrow and winding and seldom paved, and the old caravanserais were still the main refuge for travellers. The city was divided into different neighbourhoods, and each neighbourhood had its own sheriff who was appointed by the ruler of the city. Aldermen were in charge of the city, and the sheriffs acted as a kind of mayor. New manifestations of urbanization such as gas and electric lights, telegraph wires, and construction and repair of roads had a significant impact on the appearance of cities. The old caravan roads no longer had the capacity to carry European goods. Wide

streets and cobblestones were created with the propagation of carriages (Atazadeh, 2004, pp. 13-14). During the Qajar period, they used semi-circular arches similar to the shape of the handle of a basket which was the Western architectural element. Another example was the removal of insulation in the building. There are many examples in the ancient architecture of Iran, where some roofs and walls were made into two shells to reduce the temperature fluctuation inside the building, the middle layer of which worked as insulation. Such as double-skinned domes, double-skinned roofing, and other examples, but at this time, these methods were abandoned. Another example was the removal of thin walls on the façade of the building. The architects of the past had concluded that the façade of a room should not be exposed to the summer morning sun. Hence, they divided the view of the room with several doors (that is, they made several doors in it, such as three doors and five doors, and a thin wall was built between the doors, which caused a shadow on them). During the Qajar period, the three doors were turned into two doors, and thin walls that were perpendicular to the doors were made obliquely so that the sun shines directly on the doors and the room (Pirnia, 2008, pp. 344-348). The use of a semi-circular arch became more desirable than other composite forms almost from the middle of the Qajar period (Ghezelbash and Abolzia, 1985, p. 9). Architects in Isfahan have been using this shape in the secondary components of the building for a long time. For example, in the main front of houses and residential buildings, semi-circular arches were built above the three-door rooms and door gates. When the semi-circular arch was used more often, it appeared in the main view and became more decorative, and its bearing role is limited and does not reach the level of the previous traditional arches. Semi-circular arches usually appear in regular rows at the edges of porches (Jabal Ameli, 1996, p. 111).

3.2 Architectural Characteristics of Qajar Houses in Tabriz

“Tabriz”, “Tavrez”, “Thavrez”, “Tavres”, “Davrez”, or “Da- i- vrez” which means “this is for revenge” or “the place of revenge” is an ancient city in Iran. The oldest mention of the name of Tabriz is written in the inscription of “Sargon II”, the king of “Assyria” in 714 B.C. as “Taroi” or “Taroei” (Tarighat, 2009, pp. 19-23). Tabriz, the capital city of the province, is located in the central part of East Azerbaijan Province, having two civil areas (central & “Khosro Shah”), three cities (“Tabriz”, “Basminj” & “Sardrood”) and 75 villages on the North-West of Iran (Figure 1). Various opinions are suggested as to the historical background of Tabriz; nevertheless, the excavations of 2003 around the Blue Mosque revealed some clues that date back to the early centuries of the first millennium B.C. Being an important place before the Islamic era, Tabriz continued to be a major city in the Islamic era, too. After the Mogul Conquest in the 13th century and the establishment of the Ilkhanid ruling system, Tabriz became the capital city of the State, and some major monuments such as “Shanbe-e-Ghazan” (Pleasure-Dome of Ghazan Khan) and “Rab’e-Rashidi” (an academic quarter) were founded in Tabriz. These events caused Tabriz to contribute to the development of Islamic culture and civilization. The tombs of numerous scholars, artists and mystic writers in Tabriz highlight the significance of the city in the historical development of the science, cultures, and arts in Iran. In the later historical eras, Tabriz played a major role in the establishment of the Safavid Dynasty (1504—1722), and the rise of the Iranian Constitutional temporary era, Tabriz has always been important in the epoch-making events such as the Islamic Revolution of 1979 and the glorious time of defending the country during the imposed war of 1981-1988 (Polat, 2014, p. 37). Due to the proximity of Tabriz to the borderline and several Ottoman attacks on this city, the rulers of the country decided to select another capital instead of Tabriz. Although Tabriz was the living place of the crown prince and royal family during the Qajar period (Omrani and Esmaili Sangari, 2006, p. 94). For more information about the history of Tabriz, you can read the article written by the author titled “A Short Glimpse to the Urban Development of Tabriz during the History” (Asbagh, 2019, pp. 73-83). The loyalty of the traditional architect to the principles and laws of traditional Iranian architecture makes the Qajar houses of Tabriz valuable. The spaces of these houses are arranged horizontally and vertically according to a completely Iranian pattern, and according to a hierarchy, access is from a public to a private area. The entrance doorway, vestibule, hallway and courtyard are the hierarchy of the spaces that allow access to the interior of the house. On the main axis of the courtyard, which faces South or South-East, there is the main space of a five-door room or a three-door room in the form of a cross. Around these spaces, there is a space that often functions as a room or hallway. In the sub-directions, especially on the Eastern side of the building, on a sub-axis perpendicular to the main axis of the building, all the patterns are repeated. Service spaces, such as kitchens, toilets and stables, and sometimes bathrooms, are located on the West side of the building. According to the houses in the city of Tabriz, the building was usually built in three directions in the form of ΓI or two directions in the form of Γ or in two directions facing each other and in some cases in one direction. In houses that are located in three directions, the main spaces of the building are facing to the South, so that due to the cold weather, the maximum benefit can be obtained from sunlight. The spaces that are second in terms of performance are located on the East side of the building and the service spaces are located on the West side of the house. Buildings that are built in two directions, their main spaces are facing to the South, and functionally secondary spaces, such as bathrooms and kitchens, are located on the East side of the building. Buildings that are built in a South or South-East direction usually have little infrastructure and often have one or two main living and sleeping

areas, a kitchen, and service spaces in the corner of the yard. The evolution of the architecture of houses can be divided into two historic periods; the first period: from the early Qajar era to the middle of it, and the second period: from the middle of the Qajar era to the first decade of the first "Pahlavi" era. The main features of the first period are as follows: a) the fit of the plan divisions with the façade; b) the existence of one-storey houses with a flat roof on the ground floor and with arched roof in the basement; c) the existence of main spaces such as five-door room and three-door room with simple or cross forms and hall and chamber on the main axis of the building and springhouse and storage in the basement; d) simple façades without decorations with the framing of brick inscriptions; e) the loyalty of the architects to local and traditional architecture; f) rectangular and sometimes square courtyards with the placement and arrangement of gardens and fountains according to the geometry pattern of Iranian gardens; g) having an entrance space (gateway, vestibule or corridor); h) ignoring the external façades of the building and the lack of windows and openings in the alley or passage. The general characteristics of the second period are as follows: a) the entry of European elements and decorations in the façade; b) the approach of the columnar porch, capitals, doors and windows, inscriptions and entrances, mirror work in the hall and the chamber, murals and wall paintings in the rooms and the motifs used in the decorations according to the European form and shape; c) the use of stairs as a visible and functional-decorative element in the architecture; d) the use of flowers and plants, curved and oval shapes in brickwork (Bani Masoud, 2009, pp. 168-171). Some of the famous Qajar houses in Tabriz are mentioned in Table 1.

3.3 Architectural Characteristics of Qajar Houses in Isfahan

Isfahan is one of the very old cities of Iran, the suitable geographical and natural location of this city on the plateau of Iran and the fertile soil and the existence of the famous River, "Zayandeh Rood", have allowed it to be one of the important activities centres of "Aryan" race living in this region in all past eras. Isfahan is a relatively mountainous and vast region in the centre of the plateau of Iran, which is limited to "Kashan" and "Golpayegan" from the North, "Abadeh" and "Behbahan" from the South, to "Yazd" from the East, and to "Chaharmahal Bakhtiari" and "Khuzestan" from the West (Figure 1). "Jean Chardin" (1643—1713), a French jeweller and tourist, has lived in Isfahan for many years (1664—1670 & 1671—1677) and claims that Isfahan is as populous as London (Chardin, 1983). "Jean-Baptiste Eugène Napoléon Flandin" (1809—1889), a French orientalist, painter, archaeologist, and politician visited Isfahan in 1840 and claims that "Isfahan is as big as half of the world". "Adam Olearius" (1599—1671), a German scholar, mathematician, geographer, and librarian who was sent to Iran by "Frederick III, Duke of Holstein-Gottorp" as the secretary to the ambassador published two books about the events and observations during his travels and wrote about Isfahan at the end of the 17th century. "Louis-Francois de Ferrieres-Sauvebeuf" (1762—1814), who was recruited to take charge of secret missions in the Middle East under the "Vergennes" ministry went to Isfahan in 1784, where he recorded his observations and experiments there. "Henry-René D'Allemagne" (1863—1950), a French librarian and historian who was a specialist in decorative arts, visited Isfahan in 1907 and mentioned the general condition of the city and its population in his travelogues (Honarfar, 2008, pp. VII, 1-5). In the houses of the Qajar period of Isfahan, many elements such as the entrance, vestibule, corridor and central courtyard are completely the continuation of previous architectural traditions and have been built as an interior and exterior complex. Sometimes the interior and exterior spaces are designed along the North-South axis and more than one entrance is foreseen in this type of house. Nevertheless, it mainly has the main entrance and a doorway that leads to a special corridor and from there by sub-entrances, it is connected first to the exterior spaces and then to the interior spaces. The main interior and exterior rooms are on the Northside facing the sun. Most of the time, there is a basement on this front and therefore the building in this part is on a higher level than the rest of the sides. The official room, which is located on the North front of the main axis of the building, is the most important architectural space of the house and has played a significant role in creating the rest of the spaces. To create the official room, even, if necessary, the construction of rooms on the East and West fronts is avoided or they are made as minimal as possible. The height of the building on the East and West sides of the yard is shorter than the height of the building on the Northside, and due to the lower height of the building in these two parts, their roofs are sometimes used for terrace uses in spring. There is a central official room on the Southside of the courtyard in some houses, such as the Northside, and there are rooms on either side of it, but it is not high. The Southern front sometimes lacks living spaces. In this case, the springhouse and warehouse are provided in that part. There are spaces in the four corners of the house that light does not enter from any side of the yard. These spaces are mostly less important and are dedicated to second and third-degree uses. In most old houses, kitchens, storerooms, toilets, bathrooms, and staircases are built on these sides and corners. The porch is located in front of the main façade of the building and solves many old problems such as sunshine and rain and the installation of curtains and heavily stained glasses. To make more use of the building on the North front and create double space in that part, the main room rises above the ground and the basement becomes more visible so that the old basement space becomes a ground floor with a yard or slightly descended. The main room is above the level of the courtyard and two stairs will be built on the sides

of the Northern front on the East and West sides of the courtyard to access it, and both stairs will reach the porch. By creating a porch, the first surface is in the main view of the outer edge of the porch, and windows are located on the ground floor in the lower space, and the opening spaces of the porch are located in the upper part to cover the porch roof which is the most logical solution to have a narrower opening that is the width of the porch. Therefore, it is necessary to install a beam on the outer edge of the porch to place a transverse beam on it. This beam itself requires vertical load-bearing elements, and the best solution is the choice of columns. These columns are placed on the brick or stone piers of the ground floor and in addition to ensuring stability and balance in the building, they also become decorative components. Plaster and decorative paintings on plaster are mainly used to cover these wooden columns. In early experiments, only two columns were built in front of the porch in front of the rafters on either side of the middle room, and because the openings of the two columns required a strong load-bearing beam, reinforcement components were installed on top of the beam to prevent bending between them which has a truss-like shape, but because it does not create a suitable and beautiful view, the architects have tried to cover the truss by creating a brick panel in front of it, which gives it a semi-circular form in the middle with a wide and lofty forehead for the view of the upper edge of the porch. This forehead, which was originally reinforced and static, becomes a decorative element, and even when the number of columns exceeds two and becomes a row of columns, this element becomes artificial in the middle which is made only for decoration. The main decorations of this forehead are plaster and painting. The second surface of the façade is located in the main direction at the end of the porch and there are openings for the rooms on that surface. The ultimate façade of the porch consists of a central hall and stained-glass windows or three-door rooms, five-door rooms, and seven-door rooms. Classification and importance of different spaces, creating order in the whole space of the house, using modules in creating scale, observing the main axes, diversity in public and private spaces, caring about the privacy of the surrounding houses and avoiding disturbing and upsetting the neighbours, and the use of local materials are the general features of these houses. In the late Qajar era, houses were usually built on relatively large land so that the courtyard could revolve around it. The buildings of these houses sometimes have one or two floors. The main view usually faces the South and the entrance porch is located in the middle, while the rooms on both sides are located symmetrically on both sides. Indigenous materials such as brick, wood, and sometimes glazed tiles have been used in the decoration of these buildings. The main space or living room and guest room are located in the middle and sometimes receive light from several directions (Jabal Ameli, 1996, pp. 113-127). The iconic houses of “New Jolfa” (an Armenian quarter) in Isfahan belonged to great merchants, clerics and nobles. These houses usually consisted of two parts, summer residence and winter residence, and most of them had a basement in the shady front (behind the sun) where food and beverages were stored. Some of these houses had three floors (Karapetian, 2006, p. 7). Common points of Isfahan (Islamic) houses and “Jolfa” (Christian) houses: a) introverted architecture; b) the entrance and courtyard of the house; c) main façades facing the courtyard (exterior decorations and proportions); d) circulation and connection between rooms and courtyards; e) the combination of main and secondary spaces in ground floor; f) the architectural identity that is dependent of Iranian and Islamic architecture of the same period. Interior decorations in Christian “Jolfa” houses are completely different from Islamic houses in Isfahan. The reason is related to religious issues; in the “Shia Islam” religion, it is not permissible to draw pictures of the human body and face completely (Ayvazian, 1999, pp. 482-483). The name of some of the Qajar houses in Isfahan (both Islamic and Christian) are listed in Table 1.

3.4 Architectural Characteristics of Qajar Houses in Yazd

During the “Achaemenid Empire” (549—331 B.C.), the city of Yazd, central Iran, became a trade city at the crossroad of two important commercial routes of the ancient world: one extending from the Far East and India to the heart of the Empire in Susa and the road, branching from the Silk Road, stretching from the Northern part of Empire to the Persian Gulf. According to some historians, the new city of Yazd was founded and given the name of “Eazadan” (Easatis in Greek) or “Yazdangerd” by command of “Emperor Yazdegerd I” (A.D. 339—421) in the “Sasanian” era (224—651). The city was conquered by Muslims in 642. Unlike many historic cities in Iran, the old quarters of Yazd have been relatively conserved and despite the construction of new routes and buildings, there are still thousands of historic residential buildings in the city. The city also contains the largest uninterrupted historic urban fabric in Iran. One of the oldest and most important historic quarters of Yazd is the “Fahadan” quarter. In this quarter, there are still many historic residential and commercial buildings, dating back from at least 200 years to one thousand years (Abouei, 2009, p. 230). All the Qajar houses of Yazd face inwards and their outer walls are left amorphous, poorly cut and borderless, or they are covered by the walls of the neighbours. Another basis of the design of these houses is the connection and fusion of closed spaces of the house with the open space. The decisive dominance of pure geometry over the design of these houses is one of the important common features in them. Geometric order has a clear and explicit effect on all levels of the design, from whole to part. The spaces of the house, while being connected and in harmony with each other in the whole design, have complete independence and to maintain this

independence, they sit next to each other only with an intermediate space. In the composition and arrangement of the spaces, the principle is based on diversity, so that the people of the house are faced with a new space and a place with a different atmosphere at any time. Another feature of the general plan of Yazd houses is the harmonization of their architecture with the harsh climate of the region. Creating deep and shady courtyards in the middle of the building, merging and connecting living spaces with open space, especially emphasizing semi-open spaces in the house, building tall windbreaks, various sun breaks, thickening the walls and arches, placing full-of-water ponds and gardens full of green plants in the yards, laying beds on the ponds and also establishing the scaffolding in the yards, the frequent use of large roofs and basements, are all the arrangements to provide a suitable living environment in the heart of the desert. Separating service spaces from living spaces causes all service spaces, such as kitchens, sanitary spaces, warehouses, and stables, to be out of sight so as not to disturb the peace and comfort of living spaces. Houses in Yazd are divided into several groups in terms of design: in some houses, closed spaces such as a fixed volume are constantly circling around the yard, and in others, important spaces of the house become an independent and distinct part and are usually located on the front of the yard which is full of shadow and the rest of the less important spaces are placed on the other fronts. Sometimes, the main spaces of the house are located in the North and the South of the yard such as two separate buildings, and other spaces in a simple combination are replaced on the Eastern and Western fronts. In several houses, there is evidence of a larger open space (garden) adjacent to the house, which makes the combination of open and closed spaces of the house more pleasant. In all of these houses, the shady front of the yard (the South or the South-West front) is usually the location of the most important spaces of the house, especially its large porch. The fundamental spaces of houses in Yazd always have almost the same form, which has appeared in various combinations. Elements such as porch, hall, three-door room, five-door room, and vestibule maintain their fixed form in various combinations, especially porches, which are often wide and high, have a special character among other spaces and replace the usual halls of the traditional houses. Order and symmetry are the principles of design of each of the mentioned elements both in the general assembly and in the composition of internal components, such as niches, shelves, doors and windows. In houses in Yazd, garden pits are in the middle of the yards which double the beauty of their appearance. The courtyards, which represent the main architectural element of the house, have a simple volume as if a rectangular cube has been pulled out of the total volume of the building, and a simple space has been created with flat interior views without indentation or protrusion inside the building mass. In this case, the architect focuses on the interior, instead of the external volume, and the atmosphere of the yard depends on these views. The design of the façades is based on order, repetition, variety, play with fixed and limited elements, frames and nested frames, and the beautiful combination of repeated frames and arches. The combination of frames with each other, with different sizes, dimensions and shapes in a façade, and the way they locate which appear in different ways up and down or left and right on both sides of the central element of the façade, determine the attractiveness of the courtyard façades. Designing a variety of arches, with narrow and wide openings and various repetitions of an arch in all façades is also one of the tricks that give prestige and charm to façades that do not have more than a few simple elements; and this is a preparation that has been used a lot in the houses in Yazd. Interestingly, the combination of these views does not necessarily coincide with the arrangement of the spaces behind them, and sometimes they are different. The presence of large porches in the form of empty volumes in the middle of the main façade is one of the distinguishing features of houses in Yazd. In most of these houses, in different yards of the house, we encounter the different modules and sizes, which adds to the spatial diversity of the houses (Haji Ghasemi, 2004, pp. 7-8). The traditional interior courtyards of Yazd generally have a square or rectangular shape, stretched along the longitudinal axis of the pond, which is decorated with two gardens symmetrically on either side of the pond. The location of the spaces around the yard also has a special order depending on their uses in the four seasons. Typically, the spaces around the courtyard are living rooms for day and night use, and other spaces such as the kitchen, storeroom, vestibule, and barn are located in the back layer of the rooms facing the courtyard. The function of the spaces around the yard is not based on a specific basis, but responds to different needs according to the different times of the day, month and year. On the other hand, each room has a specific climatic function, and can have a different function, although the following functions are known for different rooms: a) hall and windbreak: congregational room and religious ceremonies, summer residence; b) three-door room: study room, bedroom, dining room, spring residence, autumn residence, and especially winter residence; c) five-door room: family gathering space, party, dining room for family, spring residence, autumn residence, and winter residence; d) official room: guesthouse, dining room, the congregation of elders, spring residence, autumn residence, and winter residence; e) chamber: sleeping room, for resting and relaxing (room located between the two rooms of the hall and the windbreak), summer residence; f) yard: the venue for annual celebrations, weddings, and religious ceremonies, although a five-door room is also used for parties and table setting (Ghezelbash and Abolzia, 1985, pp. 24-25). Some of the famous Qajar houses in Yazd are mentioned in Table 1.

3.5 Architectural Characteristics of Qajar Houses in Kashan

Kashan is a city in the northern part of Isfahan province in the centre of the plateau of Iran. Linguists have different ideas about the meaning of the name Kashan; some claim that it means a place full of summer houses built from wood and straw. “Kashaneh” means house in the Persian language and “Kashan” means a type of building like a house. “Pietro Della Valle” (1586—1652), an Italian tourist, wrote about Kashan in his travelogue: Kashan is too hot that it does not have any winter but it has unboreable hot summers. “Sir Thomas Herbert” (1606—1682), an English Nobleman, described Kashan in his travelogue as the second most beautiful and prosperous city in Iran with huge decorative houses, baths, mosques, and bazaars (Khorshidi Fard, 2008, p. 11). “Jean Chardin” (1643—1713), a French jeweller and tourist, believes that Kashan has the best Satin fabric, embroidered woven velvet, gold and silver silk in Iran. “Edward Granville Browne” (1862—1926), the famous British orientalist and Iranologist, who has visited the alleys and bazaars of the historic neighbourhood of Kashan described their beautiful and sturdy copper utensils. “Jane Dieulafoy” (1851—1916), wife of “Marcel-Auguste Dieulafoy” (1844—1920), the French Archaeologist and civil engineer, has visited Kashan and wrote in her book that Kashan is one of the most prosperous and rich cities of Iran with artist people, beautiful houses, and paved alleys (Shateri, 2008, pp. 5, 7, 8). Kashan houses can be divided into three categories based on the construction situation: a) houses that are built as a complex include exterior spaces, interior spaces, crew houses, and spring spaces. Due to the vastness of the building and the high cost of construction and maintenance, these types of houses usually belong to specific and wealthy people in the community who, in addition to the ability to build and construct, also can maintain and preserve them; b) houses that have construction on four fronts. They are built facing the qibla (the direction towards the Kaaba in the Sacred Mosque in Mecca, which is used by Muslims when saying their prayers toward it) and back to the qibla, and on the other two sides, ordinary rooms and warehouses and other secondary importance simple and ordinary places are built, but the height of the building on the two fronts is more than the other parts. There are Often two platforms and a porch and relatively long corridors adjacent to the front door that are residential parts of the house that also have an external aspect. In addition to the courtyard, they also have access through the corridor, so that if a guest or a newcomer, depending on the degree of closeness or friendship, is not allowed to see the courtyard, he will be guided directly into the building from the same access inside the corridor; c) houses that have construction on two fronts facing the qibla and behind the qibla. The general plan of these houses is a tall building facing the qibla (including a five-door room and two corner rooms on either side of the five-door room), the lower floor of which is also underground and always has a rectangular courtyard with a pond and two or four gardens and another building in the opposite direction or behind the qibla, and it has been built either roofed in the middle surrounding with two to four rooms on both sides, or a roofed springhouse with two or four rooms on both sides. The entrance doors of most houses face the qibla, and it never happens that the entrance door leads directly from the alley to the courtyard (Aminian Arai, 1996, p. 254). Common features of Kashan Qajar houses are: a) building the house around the central courtyard; b) construction of the house in the form of a garden pit; c) using the basement as an essential component of the house for living; d) use of porch and open space on the Southern front; e) use the springhouse to relax in the hot season; f) use of moisture from the pool in the middle of the central courtyard to soften the air; g) using the backyard usually behind the Southern front; h) using the vestibule for entering the house; i) use of local materials, clay and mud in the building; j) the plan of the buildings is designed dense and compact; k) all the windows and entrance doors are opened to the central courtyard and there are no windows facing to the outside; l) urban planning method with dense or organic texture; m) use of dome-shaped roofs; n) using a space called the basement in the underground of the house; o) in Kashan houses, examples of local architectural measures for cooling are more visible than heating; p) the use of windbreaks and the important role of the wind in adjusting the temperature inside the house; q) use the terrace to rest and sleep on cool nights in the hot season; r) the direction of the houses in the Northeast-Southwest, North-South, or Northwest-Southeast and even in the East-West direction (Arvin and Niazi, 2006, pp. 85-106). The name of some of the Qajar houses in Kashan are listed in Table 1.

4. Common Features of Architectural Forms of Qajar Houses in Iran

For comparing the architectural characteristics of ajar houses in Iran, two case studies are selected in each city. In Tabriz, Behnam house (early Qajar era) and Qadaki house (late Qajar era) are selected. The two case studies in Isfahan are Charmi house and Dr Alam house. Rouhaniyun house and Mortaz house are the selected Qajar houses in Yazd. In Kashan, Bani Kazemi house and Boroujerdiha house are studied. Furthermore, the list of some of the other Qajar houses in Tabriz, Isfahan, Yazd, and Kashan is mentioned in Table 1. Afterwards, the analogy of the architectural forms and elements of the Qajar houses in the aforementioned cities of Iran are compared in detail in Table 2. Then, the main interior façades of each case study in each city are shown in Table 3. Subsequently, the main plans (grand floor and basement or first floor and second floor) of each building are indicated in Table 4. Finally, the elevations and sections of Qajar houses in Tabriz, Isfahan, Yazd, and Kashan are compared in Table 5.

Table 1. The List of Some Qajar Houses in Tabriz, Isfahan, Yazd, and Kashan (Developed by Author).

City	**Name of the Qajar Houses**
Tabriz	Salmasi, Behnam, Ganjeh-i-Zadeh, Haj Sheikh, Alavi, Mojtahedi, Mashruteh, Qadaki, Sharbat Oghli, Haidar Zadeh, Savjobolaghi, Amir Nezam Garousi, Kalantari, and Mirza Mehdi Farrashbashi House (Key Nejhad & Shirazi, 2006, p. 189).
Isfahan	Islamic Houses: Angurestan Malek, Charmi, Dr Alam, Wasiq Ansari (Haji Ghasemi, 1998, p. 5). Imam Juma, Shakeri, Salehi (Mehryar), Akaf and Sharif, Kahrangi, Amin, Roghani, Alafchi, and Yazdian House (Jabal Ameli, 1996, pp. 99-127). Armenian Houses in "New Jolfa Quarter": Khajeh Hosp, Karam Khan, Vartans Abkar, Aghanour, and Leon Vakil Al-Dowleh (Zulian or Plasher) House (Karapetian, 2006, p. 6).
Yazd	Aghazadeh (in Abarkooh City of Yazd Province), Kolahduzha (Water Museum in Yazd), Haj Kazem Rasoulian (Yazd Faculty of Art and Architecture), Nawab Vakil, Mortaz (Yazd Faculty of Architecture and Urban Planning), Shafi'pour (Faculty of Conservation), Solat, Lariha (Museum of Historic Documents), Shoukouhi (Yazd *ICHHTO Research Center), Salar (*ICHHTO Research Center in Meybod City of Yazd Province), Tehraniha (Fahadan Museum Hotel), Golshan (Laleh Hotel, Yazd), Adib al-Mamalik (House and Hotel), Malekzadeh (Converted to a Hotel), Malek-ol-Tojjar (The Queen of Merchants), Akhavan Sigari, Ardakanian, Rouhaniyun, Rismanian, Semsar, Arab Houses Complex, Ouloumiha, Fatehha, Farhangi & Mozaffari, Koroghlu, Gerami, Mehraban Goudarz, Mashruteh (Museum of Photography), Meshkian, and Malek House (Haji Ghasemi, 2004, p. 5). *ICHHTO: "Iranian Cultural Heritage, Handicrafts, and Tourism Organization".
Kashan	Al-Yasin, Isfahanian, Bakuchi, Boroujerdiha, Bani Kazemi, Tahami, Jahan Arai, Kheyriyeh, Dastmalchi, Reza Hosseini, Sajjadi, Sharifian, Saleh, Tabatabai, Attarha, Alaqheband, Karkhanechi, Mortazavi (Haji Ghasemi, 1996, p. 5, & 2018, pp. 200-255). Ebrahim Khalil Khan Ameri, Hakim Bashi, Haj Ali Kaffash, Daeizadeh, Roin Tan, Golizadeh, Abrisham Chi, Taghavi, Ayatollah Alavi Boroujerdi, Masoudi Far, Shah Yalani, Hashemian, Lajevardi, Mohseni, Ali Soudouri, Haj Mohammad Iraqi (Bagheri), Jahan Arai, Tahami, Refahi, Haj Meshki (Aminian Arai, 1996, p. 268) and Abbasian House (Khorshidi Fard, 2008, pp. 11-54).

Figure 1. The Map of Iran Indicates the Location of Tabriz, Isfahan, Yazd, and Kashan (Polat, 2014, p. 30).

Table 2. The Comparative Analogy of Qajar Houses in Tabriz, Isfahan, Yazd, and Kashan with the Analytical Approach of Architectural Forms and Elements (Developed by Author).

Subject	**Tabriz**	**Isfahan**	**Yazd**	**Kashan**	**Description**
Loyalty to traditional and indigenous architecture	**√**	**√**	**√**	**√**	Continuation of previous architectural traditions
Considering the hierarchy entering the house	**√**	**√**	**√**	**√**	Entrance: gateway, vestibule, corridor, courtyard
Symmetry in the main and secondary axes	**√**	**√**	**√**	**√**	Symmetry in all of the views and façades

The main front of the building	South/ South-East	North	South/ South-West	North/ South	The location of the main spaces in the house
Building orientation	North-South or East-West	North-South	Northeast - Southwest	All the directions	The main direction of the building on site
Basement	Southern front	Northern front	√	√	Connecting the house to the ground
Official room	Southern front	Northern/ Southern front	Southern front	√	For special occasions, important gatherings and formal parties
Five-door room/ Three-door room	√	√	√	√	living room/ sleeping or dining room
Sitting place on the roof	Not used due to the cold climate	East/ West front	-	On one of the 4 sides of the house	It is usually used in the spring season for cooling
Springhouse	Northern front	Southern front	√	Southern front	A room with a pool in the middle
Spaces with no light in 4 corners of the building	Kitchen, storage, toilet, bathroom	Kitchen, storage, toilet, bathroom, staircase	Kitchen, storage, toilet, bathroom	Service spaces	Service spaces
Introversion	√	√	√	√	Just an extroverted entrance
Diverse and unique entrances	√	√	√	√	Distinguishment between the entrances of houses
2-leaf wooden entrance door with two door knockers	√	√	√	√	One door knocker is for men and the other one for women (different sounds).
2 platforms on both sides of the main entrance	√	√	√	√	It is designed for old people to sit & wait until the door of the house is opened.
Entrance vestibule decorations	Arching	Muqarnas/ Arching	√	√	Octagonal or semi-octagonal or more often quadrangular
Seeing the main view immediately after entering the courtyard	√	√	√	√	The best view of the building is seen after the light explosion.
Roof Coatings	Dome/ Flat	Dome/ Flat	Dome/ Flat	Dome	Due to the climate
Porch	Southern front	Northern front	South front/ South-West front	Southern front	A covered area that connects the yard to the surrounding zone
Subject	**Tabriz**	**Isfahan**	**Yazd**	**Kashan**	**Description**
Order and modular design in the whole space of the house	√	√	√	√	Using modular design
Use of indigenous materials	Brick, wood, clay, plaster, straw	Brick, wood, clay, plaster, straw, tiles	Straw, brick, clay, plaster	Clay & mud from the soil of the garden pit	Always using native materials in building the historic houses of this era.
Dense and intensive plan of the building	√	√	√	√	Prevent heat exchange

Central courtyard	√	√	√	√	In the shape of a square or rectangle
Garden in the inner and outer courtyard	√	√	√	√	The geometric pattern of the Persian garden
Pond in the courtyard	√	√	√	√	In different forms
The importance of the spaces on the Southside	Grade 1 Main spaces	Grade 2 Official room	Grade 1 South/ South-West	Grade 1	Grade-1 spaces are more important than Grade-2 spaces.
The importance of the spaces on the Northside	- (Dominant wind direction)	Grade 1 Main spaces, Official room	Grade 2	Grade 1	Grade-2 spaces are less important than Grade-1 spaces.
The importance of the spaces on the Eastside	Grade 2 Kitchen & service rooms	Grade 3 Rooms	Grade 3	Grade 2	Grade-2 spaces are more important than Grade-3 spaces.
The importance of the spaces on the Westside	Grade 3 Service rooms	Grade 3 Rooms	Grade 3	Grade 2	Grade-3 spaces are less important than Grade-2 spaces.
Ignoring the exterior views of the building	√	√	√	√	The interior views are more important than the exterior elevations except for the main façade & gateway.
Lack of window into the alley & passage	√	√	√	√	Due to the privacy & hierarchy of spaces
Decorating & ornaments	Brickwork, flowers & plants, oval curve, mirror work, painting, plastering, moulding	In the guest room: painting, moulding, mirror work, Muqarnas plastering	-	-	The arrival of European decorations in the late Qajar era and the tendency to Simplicity in decorating & ornaments
Fireplace	√	√	-	-	In the cold climate, there are beautiful fireplaces in the main room of the house.
Windbreaker	-	-	√	√	For cooling the air
Outdoor Yard Location (Public for men)	South	North	-	North	In the shape of a square or rectangle
Inner yard location (private for family)	North	South	-	South	Usually smaller than the outdoor yard
Subject	**Tabriz**	**Isfahan**	**Yazd**	**Kashan**	**Description**
Orange Garden (for citrus trees)	-	-	√	-	Can be covered on the cold days or due to the raining/ snowing
How to access water	Aqueduct/ Water Well	“Madi” from “Zayandeh Rood” River	Aqueduct/ Water Well	-	Each branch of the “Zayandeh Rood” River is called “Madi”.
Garden pit	-	-	√	√	A garden pit is always under the level of the building which gives access light to the basement rooms.

Narrow passages in organic texture	√	√	√	√	For security and climate reasons
Trees and plants	-	-	Pomegranate, fig, red & yellow rose, blackberry	Pomegranate, fig, grape	The yards with trees and plants look like a garden in heaven.
Energy needs	High (2011, V19, p.72)	Medium (2011, V19, p.70)	Medium (2011, V19, p.79)	Medium (2011, V19, p.76)	Based on National building regulations of Iran, Volume 19, Energy Saving (2011).
Dominant thermal requirement	Heating (2011, V19, p. 72)	Heating (2011, V19, p. 70)	Heating & cooling (2011, V19, p. 79)	Heating & cooling (2011, V19, p. 76)	Based on National building regulations of Iran, Volume 19, Energy Saving (2011).
Type of climate	Very cold in winter & hot and dry in summer (2003, pp. 98, 99)	Cold in winter & hot and dry in summer (2003, p. 98)	Medium and dry in winter & very hot and dry in summer (2003, p. 98)	Cold in winter & hot and dry in summer (2003, p. 98)	Based on the book "Climate and Architecture" by "Kasmaei" (2003).
Dominant wind direction	North-East / South-West (2003, p. 164)	West/ South-West (2003, p. 152)	North-West/ South-East (2003, p. 191)	North/ East/ South/ North-East (2003, p. 186)	Based on the book "Climate and Architecture" by "Kasmaei" (2003).

Table 3. The Comparison of the Main Interior Façades of Qajar Houses in Tabriz, Isfahan, Yazd, and Kashan (Developed by Author).

City	**Case Study Number 1**	**Case Study Number 2**
Tabriz		
	Qadaki House (Late Qajar era) (Photo by Author).	Behnam House (Early Qajar era) (Photo by Author).
Isfahan		
	Charmi House (Haji Ghasemi, 1998, p. 23).	Dr Alam House (Haji Ghasemi, 1998, p. 65).

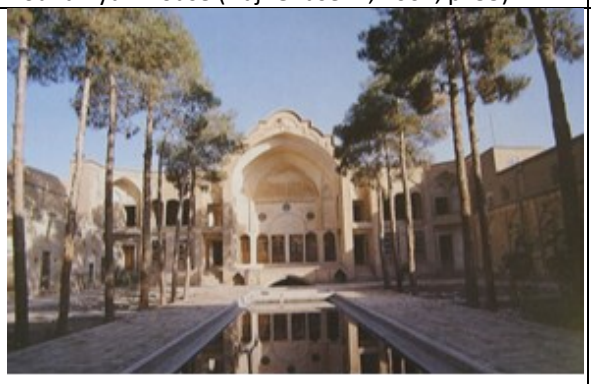
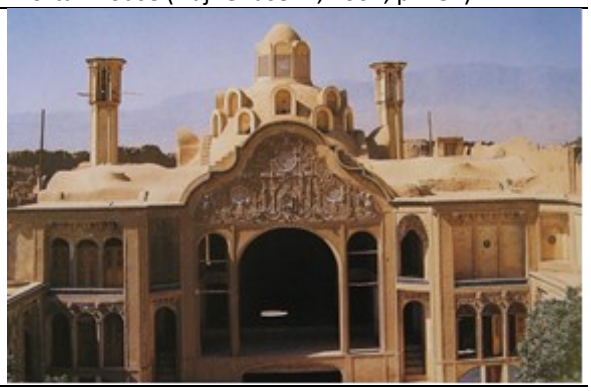
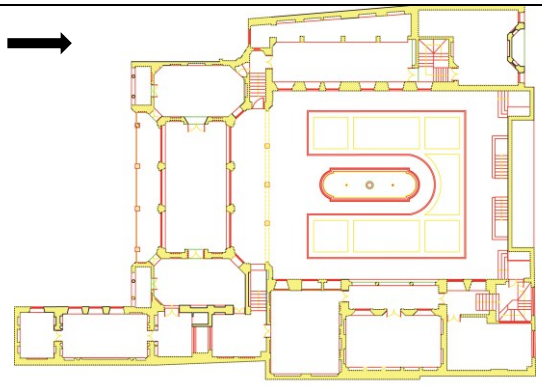
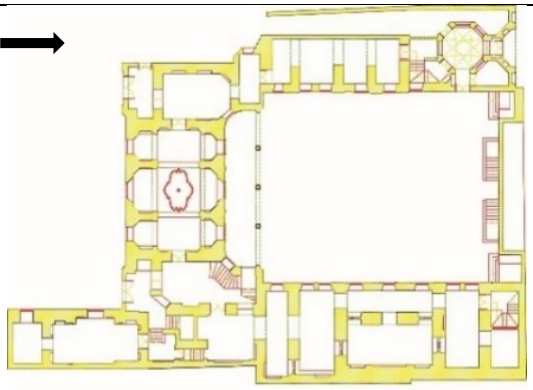
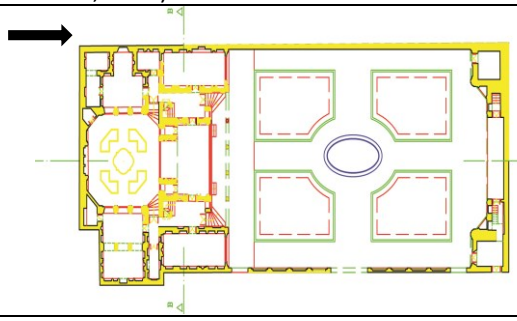
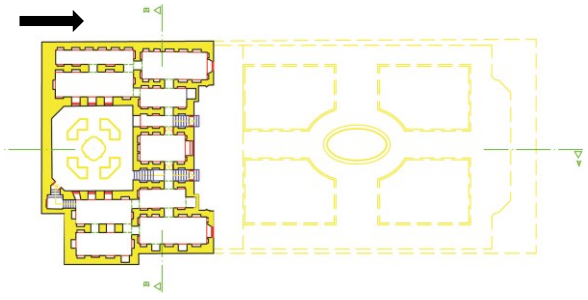
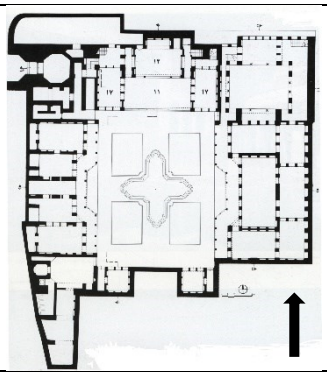
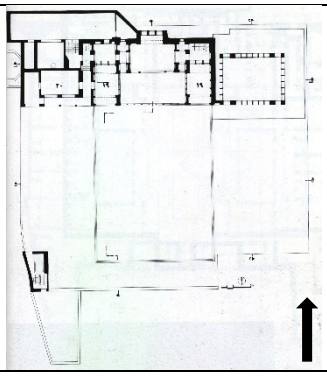
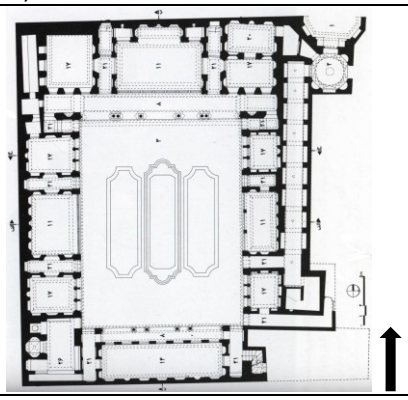
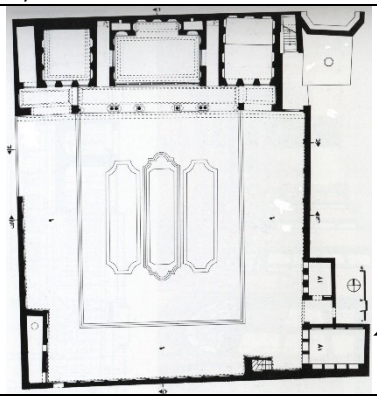
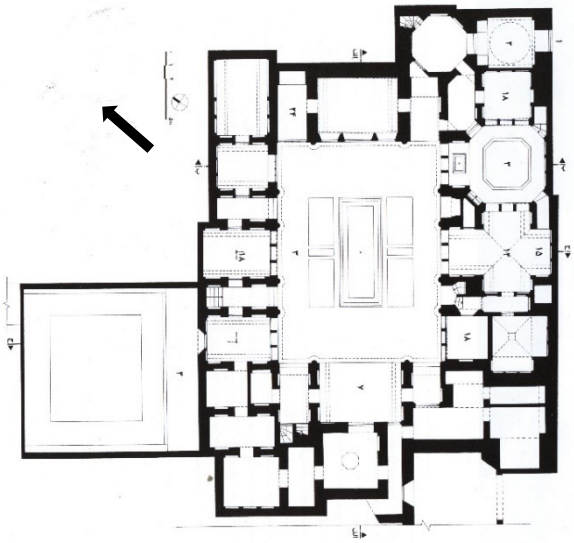
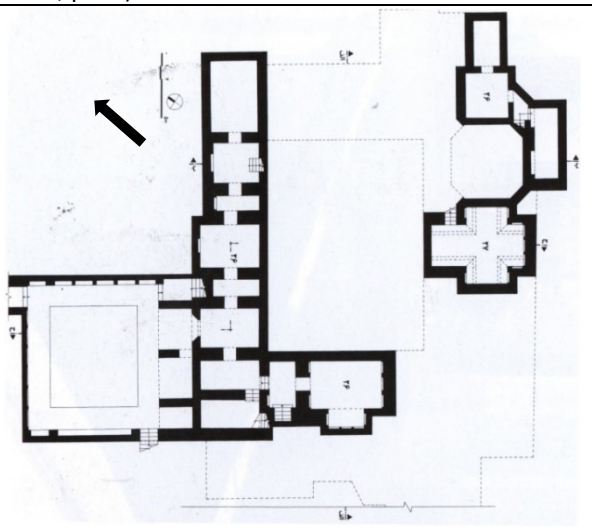
Yazd		
	Rouhaniyun House (Haji Ghasemi, 2004, p. 55).	Mortaz House (Haji Ghasemi, 2004, p. 181).
Kashan		
	Bani Kazemi House (Haji Ghasemi, 1996, p. 47).	Boroujerdiha House (Haji Ghasemi, 1996, p. 35).

Table 4. The Comparison of the Plans of Qajar Houses in Tabriz, Isfahan, Yazd, and Kashan (Developed by Author).

City	**Main Plan**	**Other Floor's Plan**
Tabriz (Qadaki House)		
	Ground Floor Plan of Qadaki House (Archive of the Cultural Heritage Organization of East Azerbaijan Province, 2011).	Basement Floor Plan of Qadaki House (Archive of the Cultural Heritage Organization of East Azerbaijan Province, 2011).
Tabriz (Behnam House)		
	Ground Floor Plan of Behnam House (Archive of the Cultural Heritage Organization of East Azerbaijan Province, 2011).	Basement Floor Plan of Behnam House (Archive of the Cultural Heritage Organization of East Azerbaijan Province, 2011).

Isfahan (Charmi House)		
	First Floor Plan of Charmi House (Haji Ghasemi, 1998, p. 24).	Second Floor Plan of Charmi House (Haji Ghasemi, 1998, p. 26).
Isfahan (Dr Alam House)		
	First Floor Plan of Dr Alam House (Haji Ghasemi, 1998, p. 66).	Second Floor Plan of Dr Alam House (Haji Ghasemi, 1998, p. 67).
Yazd (Rouhaniyun House)		
	Ground Floor Plan of Rouhaniyun House (Haji Ghasemi, 2004, p. 52).	Basement Floor Plan of Rouhaniyun House (Haji Ghasemi, 2004, p. 54).

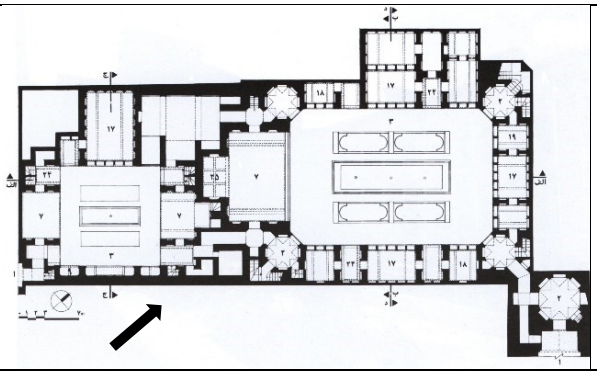
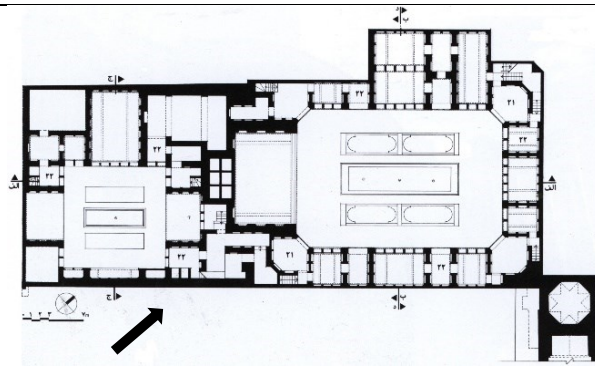
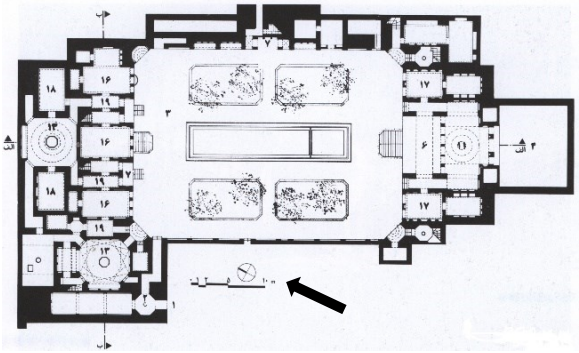
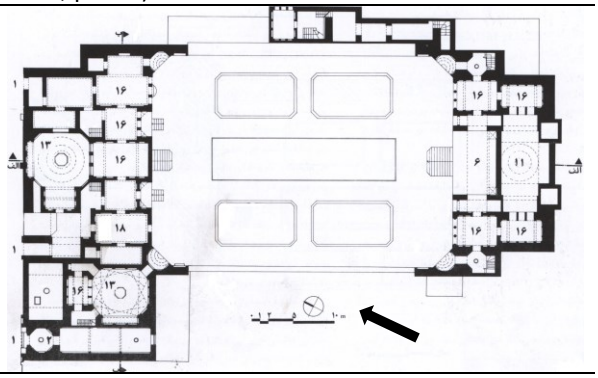
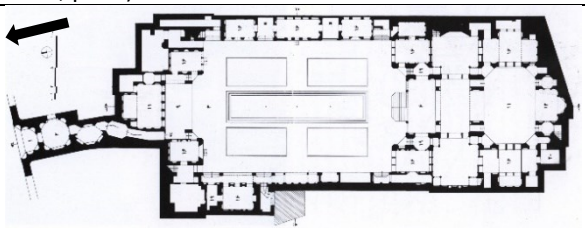
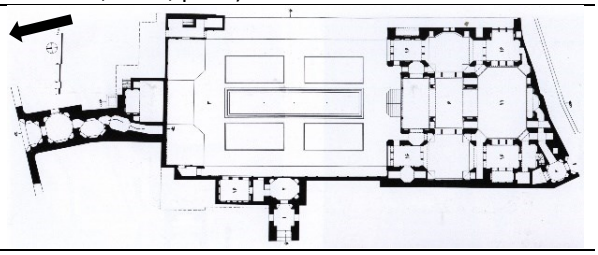
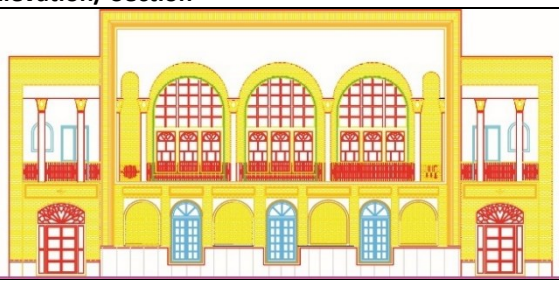
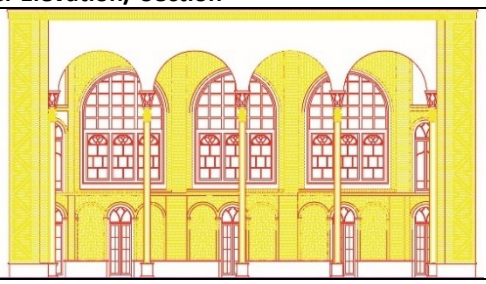
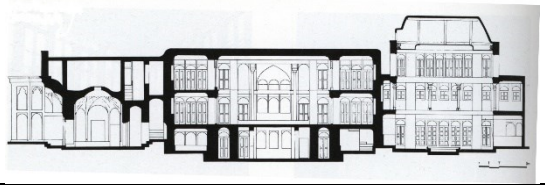
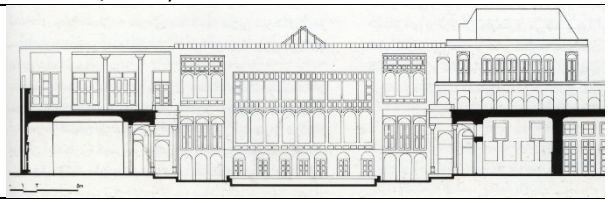
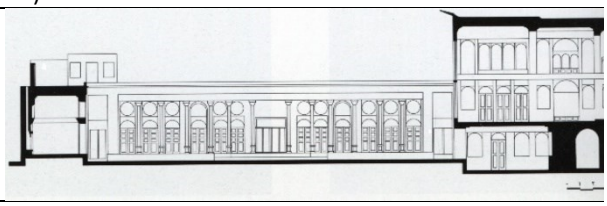
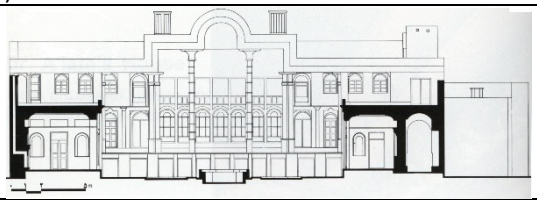
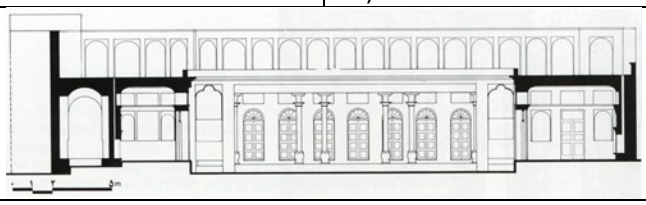
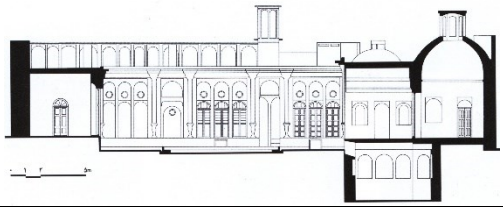
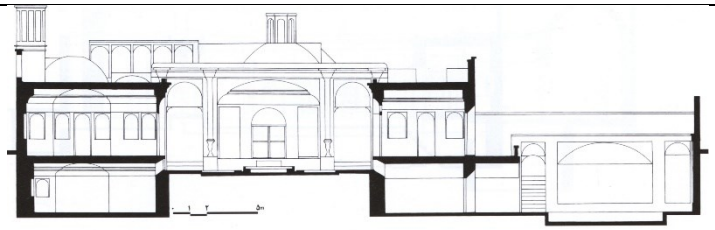
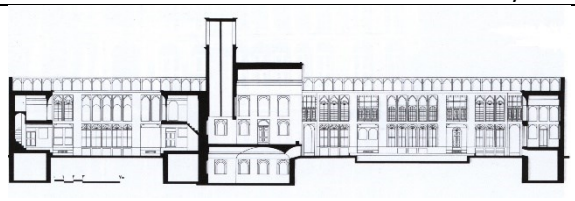
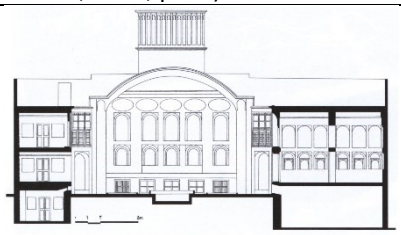
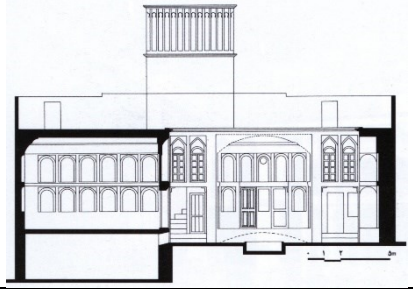
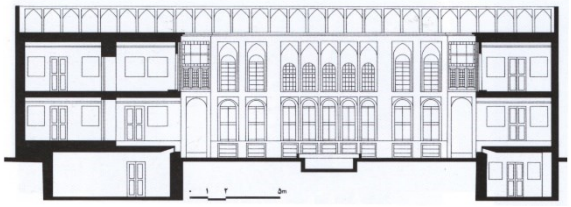
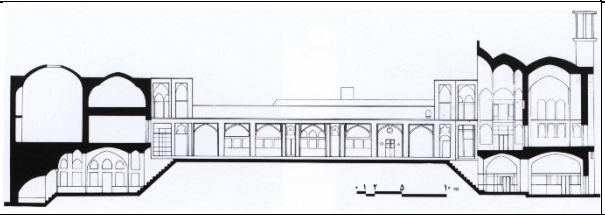
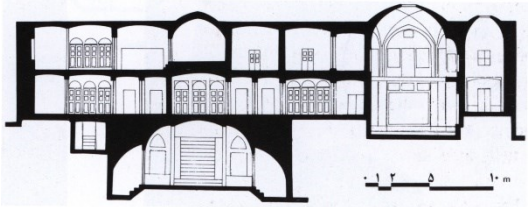
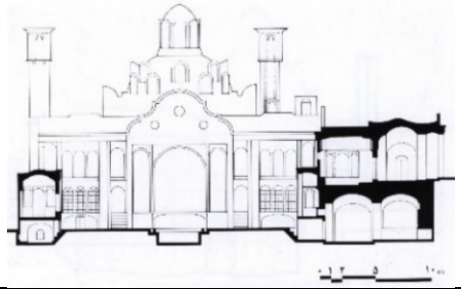
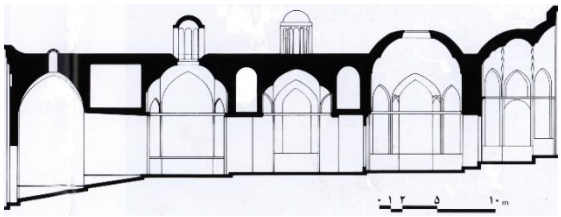
Yazd (Mortaz House)		
	First Floor Plan of Mortaz House (Haji Ghasemi, 2004, p. 180).	Second Floor Plan of Mortaz House (Haji Ghasemi, 2004, p. 182).
Kashan (Bani Kazemi House)		
	First Floor Plan of Bani Kazemi House (Haji Ghasemi, 1996, p. 48).	Second Floor Plan of Bani Kazemi House (Haji Ghasemi, 1996, p. 48).
Kashan (Boroujerdiha House)		
	First Floor Plan of Boroujerdiha House (Haji Ghasemi, 1996, p. 36).	Second Floor Plan of Boroujerdiha House (Haji Ghasemi, 1996, p. 37).

Table 5. The Comparative Analogy of the Elevations and Sections of Qajar Houses in Tabriz, Isfahan, Yazd, and Kashan (Developed by Author).

City	Elevation/ Section	Other Elevation/ Section
Tabriz (Qadaki House)		
	East Elevation of Qadaki House (Archive of the Cultural Heritage Organization of East Azerbaijan Province, 2011).	South Elevation of Qadaki House (Archive of the Cultural Heritage Organization of East Azerbaijan Province, 2011).

Tabriz (Behnam House)		
	North Elevation of Behnam House (Archive of the Cultural Heritage Organization of East Azerbaijan Province, 2011).	South Elevation of Behnam House (Archive of the Cultural Heritage Organization of East Azerbaijan Province, 2011).
Isfahan (Charmi House)		
	A-A Section of Charmi House (Haji Ghasemi, 1998, p. 27).	B-B Section of Charmi House (Haji Ghasemi, 1998, p. 22).
		
	C-C Section of Charmi House (Haji Ghasemi, 1998, p. 26).	D-D Section of Charmi House (Haji Ghasemi, 1998, p. 27).
Isfahan (Dr Alam House)		
	A-A Section of Dr Alam House (Haji Ghasemi, 1998, p. 69).	B-B Section of Dr Alam House (Haji Ghasemi, 1998, p. 68).
		
	C-C Section of Dr Alam House (Haji Ghasemi, 1998, p. 69).	
Yazd (Rouhaniyun House)		
	A-A Section of Rouhaniyun House (Haji Ghasemi, 2004, p. 52).	B-B Section of Rouhaniyun House (Haji Ghasemi, 2004, p. 53).

		
	C-C Section of Rouhaniyun House (Haji Ghasemi, 2004, p. 54).	
Yazd (Mortaz House)		
	A-A Section of Mortaz House (Haji Ghasemi, 2004, p. 182).	B-B Section of Mortaz House (Haji Ghasemi, 2004, p. 186).
		
	C-C Section of Mortaz House (Haji Ghasemi, 2004, p. 184).	D-D Section of Mortaz House (Haji Ghasemi, 2004, p. 186).
Kashan (Bani Kazemi House)		
	A-A Section of Bani Kazemi House (Haji Ghasemi, 1996, p. 50).	B-B Section of Bani Kazemi House (Haji Ghasemi, 1996, p. 50).
Kashan (Boroujerdiha House)		
	B-B Section of Boroujerdiha House (Haji Ghasemi, 1996, p. 42).	C-C Section of Boroujerdiha House (Haji Ghasemi, 1996, p. 40).

5. Conclusions

In general, the architectural features of the houses of the Qajar era can be summarized as follows: a) obsolescence of lancet arches, and shouldered arches, and their replacement with semi-circular arches in the entrance, door inscription, and niche; b) elimination of the non-load bearing false cover from the ceiling of the rooms; c) removal of the attic and corner rooms; d) removal of the vertical and horizontal sunshades; e) use of columns aligned with the outer surface of the main façade; f) creating an element emphasizing the vertical axis of symmetry above the entrance and or on the main façade; g) elevating the building by changing the proportions; h) removing traditional elements and replacing them with similar types; i) using new decorative patterns; j) using semi-circular arches in the

main façade as a decoration and limiting its load-bearing role. In all Qajar houses of Tabriz, Isfahan, Yazd, and Kashan, the loyalty of architects to traditional Iranian architecture can be seen. The architecture of Qajar houses is introverted so that no windows are exposed to the alley and passage, and all the beautiful views of the house are around the inner and outer courtyards. The entrance to all these houses is following the hierarchy, and the vestibule space prevents a direct view into the privacy of the house. After the main entrance, passing through the vestibule and the corridor, we reach the courtyard, which at first glance shows the main view of the building. Due to the darkness in the vestibule space and corridor, when entering the main yard, the visitor experiences the explosion of light and observes the most elaborate decorative elevation of the building. The yard is the heart of the house, which, with its pond and gardens, softens the interior of the house like a small paradise. Around the courtyard, first-class spaces that need light, such as the hall, official room, three-door rooms and five-door rooms, are arranged in an orderly manner, and service spaces such as the kitchen, staircase, storage, barn, toilets, and the bathroom are located in the back layer of the rooms facing the yard or in the four corners of the house that has no access to direct daily light. Symmetry, order, and modular design have been observed in all these houses and factors such as water, sunlight, wind and climate have been considered. In Yazd and Kashan, with a hot and dry climate, they adjust the hot air of the house by using windbreaks, and in Tabriz and Isfahan, with a cold climate, we see beautiful decorative fireplaces in the wall of the main spaces of the houses. Also, the construction of a garden pit in Yazd and Kashan is a solution for accessing aqueduct water at lower depths. In Tabriz, the Northeast-Southwest direction has been used for the axis of the houses. Nevertheless, In Isfahan, the Northwest-Southeast direction has been used, while In Yazd, the Northeast-Southwest direction has been used for the axis of the houses. In Kashan, no specific direction can be considered, because the houses have been built inside the ground and the internal temperature of the earth in combination with the cooling resulting from the transfer of the wind flow by the windbreaks to the basement has been used to adjust the temperature and provide natural comfort conditions which are less affected by sun radiation. Altogether, it can be concluded that the architects and artists of the Qajar era did not merely imitate the principles of Western architecture and art, but also adapted and applied those principles to the principles of Iranian architecture, which is one of the valuable approaches of Qajar art and architecture.

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Conflict of Interests
The author declares no conflict of interest.

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