

Original Research Article

Retrieving the Lost Monumental Architecture at the Entrance of Isfahan *Bāgh-e Zereshk*, Based on Descriptive and Illustrative Documents

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Abstract | *Bāgh-e Zereshk* entrance was a distinctive building of the Safavid, which was located in the southern part of Isfahan's *Chāhār Bāgh* axis and deteriorated over time. An examination of travelogues, newspapers, historical books, pictures, maps, and historical images can be directly influential in retrieving the monumental architecture of the Safavid *Chāhār Bāgh* in Isfahan. Other researchers have examined *Chāhār Bāgh* axis from such perspectives as the analysis of the urbanization principles of the axis according to the design system of the garden city. However, the present study attempts to investigate some of the characteristics of the axis' urban body structure by retrieving the architecture of its surrounding garden entrances. Therefore, this study is the first to retrieve the map of *Bāgh-e Zereshk* entrance by employing, comparing, and analyzing descriptive and illustrative documents. The investigations revealed part of the characteristics of this building including the shape of the plan, the number of floors, the height of the building, characteristics of the elevation (components and materials), location, and its connection to urban elements of *Chāhār Bāgh-e Bālā* axis. Moreover, the evolution of the building (construction, restoration, and destruction) and its application (residential and office-related) based on *Bāgh-e Zereshk's* ownership system and its being influenced by the function of *Chāhār Bāgh-e Bālā* axis from the Safavid period up to the present time were investigated. It was revealed that after three decades, the building was deteriorated by the end of the Qajar period as a result of decay and disrepair. The present procedure can be used in retrieving the form characteristics of other architectural buildings located in *Chāhār Bāgh* historical axis.

Keywords | Garden city of Isfahan; Safavid monumental architecture; *Chāhār Bāgh* tourist axis; *Bāgh-e Zereshk* entrance; Historical documents.

Introduction | In 1596, *Shāh Abbās* the Great chose the city of Isfahan as the new capital of the Safavid state due to its favorable strategic¹, weather, natural and cultural characteristics, and then, by gathering thinkers, craftsmen, artists, and architects from various regions of the Safavid Empire in this city, he carried out extensive activities of architecture and urban planning (Gharipour, 2017). These activities included, among others, the construction of *Chāhār Bāgh* Street, about 3 kilometers long, and the spread of the city to the south. Crossing *Chāhār Bāgh* Street, *Zāyandeh Rood* River divides this street into two parts of *Chāhār Bāgh-e Abbāsī*, in the north, and *Chāhār*

Bāgh-e Bālā, in the south. These two parts are connected through the *Allāhverdi-Khān* Bridge². *Chāhār Bāgh* tourism axis included separate pathways specific to pedestrians and non-pedestrians and connected the Safavid government house from the north-west to the outskirt gardens on the two sides of *Zāyandeh Rood* River. Extended walls and entrances³ of the surrounding gardens—orderly and symmetric—constituted the exterior view of the street. The spatial system of these gardens and the location of their pavilion was influenced by the density of the background context (Alemi, 1997; Wilber, 1962; Al Isfahani, 1989). After the Afghan invasion of Iran (1722), the Safavid government was overthrown. The change of capital cities in the subsequent dynasties⁴ and the outbreak of many

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political, economic, social, and cultural revolutions in Iran, particularly during the Qajar, led to a lot of transformations in Isfahan's system of urbanization and architecture. These transformations also affected the Isfahan *Chāhār Bāgh* axis and the associated buildings. Many of the surrounding gardens underwent gradual decay and destruction; sometimes their site went through a change of application. This process continued to the Pahlavi period when *Chāhār Bāgh-e Bālā* Street turned into an industrial axis due to the establishment of the textile firm (Rajaei, 2013). In the contemporary period, although this axis is still considered to be one of the city's main axes, the constructions made (mainly for business and office-related applications) do not have a meaningful association with its historical background and have caused disturbances to its urban function and look. *Bāgh-e Zerešk* is an example of the gardens in Isfahan *Chāhār Bāgh-e Bālā* Street that underwent damage over time. This building has been established early in the Safavid dynasty with an area of 80,000 m². *Bāgh-e Zerešk* has had a large, majestic entrance facing the street's large pool and entrance staircase (Tavernier, 2004; Holtzer, 1976; Honarfar, 1965). Since this entrance was one of the prominent entrances in *Chāhār Bāgh-e Bālā* street during the Safavid period, it could be helpful to retrieve it based on the descriptive and illustrative documents to understand part of Isfahan's architectural and urbanization characteristics in such areas as the form and functional features of the axis and the entrances of the surrounding gardens at different historical periods. Accordingly, the present study aims at revealing part of the building's characteristics by answering the following questions:

1. According to the descriptive and illustrative documents, what are the form characteristics of *Bāgh-e Zerešk* entrance?
2. According to the historical documents, what is the evolution pattern of *Bāgh-e Zerešk* entrance (ownership and use system)?
3. Where was *Bāgh-e Zerešk* entrance located and how was it related to *Chāhār Bāgh-e Bālā* Street?

Literature Review

Given the importance of Isfahan during the Safavid period, many researchers have introduced the city and its historical, geographical, governmental, religious, and cultural characteristics in the format of local and international travelogues or other historical books and it has been mentioned as one of the great centers of science, trade, art and architecture in the world in the 17th century (Tahvildar Isfahani, 1963; Humai, 2005; Sanson, 1967; Chardin, 2000). In this respect, some researchers have particularly analyzed and categorized⁵ the systems of garden architecture and urbanization in Iran—Isfahan, in particular. According to it, organizing and developing the city of Isfahan in the Safavid period based on the garden city system was conducted to reduce density in the central part of the city (with organic structure) and expand it beyond the old fence, along *Chāhār Bāgh* Safavid

axis (with the structure of geometric regularity) (Alemi, 1997; Shahcheraghi, 2012; Falahat & Shirazi, 2015; Rahbar & Ansari, 2016; Latiff, Yunos & Yaman, 2017). The analysis of *Chāhār Bāgh* axis and its evolution in different historical periods based on historical documents have also constituted one of the research perspectives. According to these studies, some of the characteristics of this tourism axis in *Chāhār Bāgh-e Abbāsi* have been identified and simulated in such areas as architecture (the length and width of the street and its related elements, cultivation system, and water-distribution system), social (activities and recreations), and architecture of some of its associated prominent buildings (Gholipour, 2014; Ahmadi, 2016; Shojaei Esfahani, 2017; Haghighat bin, Ansari, Steenbergen & Taghvaei, 2012). *Chāhār Bāgh-e Abbāsi* axis has also been investigated from the geometric, aesthetic perspective. According to these studies, the shapes employed in the design of this axis are inseparable from the philosophical concepts of math geometrics and geometric shapes, in particular. Besides the quantitative aspect, they have qualitative and symbolic aspects (coordination of spirit and matter, unity, and multiplicity) (Bakhtiyar Nasr Abadi, Pourjafar & Taqvaei, 2015). Among the studies conducted, however, only a few have referred to *Bāgh-e Zerešk* entrance as a part of *Chāhār Bāgh-e Bālā* axis and its entrance door; they have only enumerated some of the characteristics of the building (Al Isfahani, 1989; Jaber Ansari, 1942; Mahdavi, 1969; Honarfar, 1965; Holtzer, 1976; Chardin, 2000; Der Hovhannian, 2000; Tavernier, 2004). Since little attention has been paid to the retrieval of architectural characteristics of the historical axis of *Chāhār Bāgh* in its southern part (*Chāhār Bāgh-e Bālā*) and its surrounding garden entrances, this study attempts to retrieve the architectural characteristics of *Bāgh-e Zerešk* entrance, as one of the distinctive entrances on this axis, based on historical documents.

Methodology⁶

The present study is based on library research including descriptive and illustrative documents in the Safavid, Qajar, and Pahlavi periods⁷ on the one hand, and field observations (interviews and photographs), on the other. The current data were analyzed based on a comparative historical method. The analysis results were used to determine the trend of changes in *Chāhār Bāgh e Bālā* Street and *Bāgh-e Zerešk* Garden over time. Also, this entrance and its relationship to *Chāhār Bāgh-e Bālā* axis, were simulated by drawing two and three-dimension schematic models and some of its physical features were revealed⁸. In this study, descriptive documents consisting of travelogues, historical books, and newspapers were used. Illustrative documents were also of two types: (a) images as documents that can be completely referred to; (b) maps, designs, and drawings whose entirety and details are compared to historical images and descriptive documents to gain more reliability. The illustrative documents in this study were mostly

drawn by foreign and Iranian painters who were employed by travel writers. The images belong to the past 160 years. Maps were also considered part of the illustrative documents, the oldest of which belonged to the late 17th century. Besides, aerial images were helpful in some areas, especially those that were turned into maps. In this study, aerial images used in the process of retrieving information from this part of the city were, unfortunately, not available. Regarding field observations, it should be noted that although past architecture can be mainly studied on their basis, they include some limitations such as:

- (1) Some buildings have transformed over time; some parts have been added to or removed from them;
 - (2) Some parts have been destroyed over time;
 - (3) The building and its surrounding environment have completely transformed in terms of architecture and function.
- Similarly, in the present study, *Chāhār Bāgh-e Bālā* Street had undergone transformations in terms of form and application and *Bāgh-e Zereshk* entrance and its surrounding site had been completely deteriorated and transformed. To determine the location of *Bāgh-e Zereshk* entrance and other prominent elements associated with it, therefore, this study has resorted to field observations to take photographs of the present status of the site under investigation (corresponding to the location and viewing angle of the illustrative documents).

Results

Bāgh-e Zereshk entrance as a part of the urban structure of *Chāhār Bāgh-e Bālā* axis was in direct connection with some of the architecture and urbanization characteristics of this axis including structural design format, land allotment system, and its function. Therefore, in the retrieval process of this building, the characteristics of *Chāhār Bāgh-e Bālā* axis and *Bāgh-e Zereshk* entrance were investigated, respectively, from the Safavid up to the Pahlavi period based on the historical documents. It should be noted that in an attempt to determine the location of the building and identify its transformations (construction, restoration, and destruction), some of the characteristics were identified through a study of the entrance's ownership history in each historical period.

• Analysis of *Chāhār Bāgh-e Bālā* axis according to descriptive and illustrative documents

The descriptive documents show that the design and construction of the Safavid *Chāhār Bāgh*, under the order of *Shāh Abbās the Great*, began in 1596 and ended in 1602. The northern part of the street (*Chāhār Bāgh-e Abbāsi*) was connected to the southern part (*Chāhār Bāgh-e Bālā*) through the *Allāhverdi-Khān* Bridge and it extended to the royal garden *Hezār-Jarib* located at the foothills of *Safa Mountain* (Humai, 2005); (Fig. 1: a). *Chāhār Bāgh-e Abbāsi* started from *Jahān-Namā* Palace⁹ and was in the vicinity of the Safavid government house from the north and east sides. The exterior view of *Chāhār Bāgh* Street consisted of extended walls on both sides of the river and garden entrances surrounding it, in

a particular order on both sides of the street (Five buildings in the west and five buildings in the east of the street), which were under the ownership of the government and until the time of destruction, their names were relatively stable¹⁰. In the final years of the Safavid reign (1714), *Chāhār Bāgh* Caravanserai and school were also constructed in the vicinity of the building (Sansón, 1967; Della Valle, 2005). Amid *Chāhār Bāgh* Street, a stream was flowing that, at certain intervals, spilled into a number of pools (With a square or octagonal shape) located in front of gardens entrances. These streams formed small waterfalls at some points because of different pathway levels. The streams were surrounded by stone-paved pathways for pedestrians. Along the sidewalks, there were lofty trees. At a distance between the trees and the surrounding garden walls, there was a bridle path (Fig. 1: b).

Concerning the physical characteristics of the entrance portals in the *Chāhār Bāgh-e Abbāsi* Street, it could be acknowledged that these structures underwent various functional and physical changes, and endured many interventions until completely vanished over the past centuries; however, some of the general characteristics in the aforementioned constructions could be investigated through historical documents¹¹. Studies show that *Jahān-Namā* entrance gate had a quasi-square-shaped plan. As a three-story edifice with an elevated exterior façade towards the movement path, it provided a focal viewpoint at the end of the *Chāhār Bāgh-e Abbāsi* Street (Fig. 1: d). Whereas although most other entrance portals in this Street had rectangular plans, they generally had two stories (with an overall cuboid shape), and their buildings were set back compared to the street façade. Additionally, the entrance portals in this street were adorned with blind arcades¹² with pointed arches¹³ and other decorative elements, such as niches¹⁴ or recessed frames. In each entrance building, the upper story had lattice doors/windows (orosi) and porches on the corners, providing views towards the axis of *Chāhār Bāgh* Street and their surrounding gardens from inside. The type of arches and vaults in these porches was different depending on the adjacent building¹⁵. In these conditions, the adornments and materials were mainly brick (wide use in the walls), stone (plinth and sitting platforms on the sides of entrance gate), tilework (corners of blind arcades or lachaki, porches, and entrance inscriptions), painting (porches and blind arcades), and wood (lattice doors/windows and railings). In some of the entrance portals, the ceilings of blind arcades and porches were covered by *kārbandi*¹⁶ and *muqarnas*¹⁷ (geometrical and ornamented vaulting elements); (Fig. 1: c, e & f).

The examination of the historical documents of the southern part of *Chāhār Bāgh* Street (*Chāhār Bāgh-e Bālā*) shows that the under the order of *Shāh Abbās the Great*, majestic mansions were constructed in *Chāhār Bāgh-e Bālā* by the nobles and dignitaries. This axis extended to *Hezār-Jarib* Garden and, all along the way, there were seven gardens on the west and seven more on the east side of *Chāhār Bāgh-e Bālā* Street. Also,



Fig. 1. View of *Chāhār Bāgh* Street in Isfahan and the entrances of the surrounding gardens. Source: Authors based on: Khansari, Moghtader & Yavari, 1998, Gholipour, 2014, Holtzer, 2003, Shojaei Esfahani, 2017, Honarfar, 1975, Yuzukchian, 1999, Holtzer, 1976. Chardin, 2000.

the luxurious entrance of a garden named *Bāgh-e Zereshk* was located at the northernmost point of this axis. Except for *Bāgh-e Zereshk* and *Hezār-Jarib* garden, which were under the ownership of the king, there were other gardens under the names of the owners who constructed them and in the following historical periods, their names were changed to the names of the new owners of the gardens in that period (Wilber, 1962; Chardin, 2000; Della Valle, 2005); (Fig. 2). According to historical documents, *Chāhār Bāgh-e Bālā* street had a length of approximately 2200 feet (equivalent to 1628 meters), which was higher compared to the length of *Chāhār Bāgh-e Abbāsi* (approximately 1620 feet, equivalent to 1200 meters¹⁸) (Kaempfer, 1984). However, the width of *Chāhār Bāgh-e Bālā* street (about 23 meters) has been said to be lower than that of *Chāhār Bāgh-e Abbāsi* (about 50 meters) (Wilber, 1962; Holtzer, 1976). From the river up to the end of the axis (at the foot of Suffa Mountain), *Chāhār Bāgh-e Bālā* street had a steep slope, which was used to construct a small waterfall, at a 400-foot distance (approximately 296 meters) from Allāhverdi-Khān Bridge. This waterfall was near *Bāgh-e Zereshk* plane tree¹⁹ and flowed into a pool in front of the mansion. On each side of the waterfall, there were 12 steps. After stepping up the stairs, one could see how *Chāhār Bāgh-e Bālā* Street and the stream flowing in the middle (With a number of ponds) extended up to *Hezār-Jarib* garden located at the end of this axis (Honarfar, 1965; Sanson, 1967; Tavernier, 2004).

Investigating the physical characteristics of the entrance portals in the *Chāhār Bāgh-e Bālā* Street revealed that the *Hezār-Jarib* royal Garden gate was located in the southernmost part of this street and had a different architectural style compared to other entrance portals in the *Chāhār Bāgh* axis. According to historical documents, the accessibility hierarchy to the *Hezār-Jarib* Garden gate had three levels: the separating walls, a central courtyard, and the entrance building. Accordingly, from the *Chāhār Bāgh-e Bālā* Street, a wall separated the *Chāhār Bāgh-e Bālā* region from this garden. This wall was decorated with blind arcades and had an entrance gate in the middle section, which was higher than the wall itself, and was also aligned with the movement path. The distance between this wall and the garden gate included a wide central courtyard with an overall rectangular-shape plan, followed by the garden's main gate also built with a rectangular plan, consisting of a three-story building in the central part of the façade and two-story structures beside the high entrance portal. From the interior side of the garden (southern side), this entrance gate was connected to space with a square plan, which had a massive dome. The dome was built on a wide span based on a non-pointed semi-elliptical arch (*māzédār-e biz*)²⁰, rotating around the vertical axis. The arches on the façades of this entrance gate were mostly the pointed Panj-o-haft²¹ arch. Based on the existing Illustrative documents, the construction materials and decorative elements included the use of bricks (façade), stones (plinths), wood (doors, windows, and railings), as

well as tilework and paintings (ceiling, corners of recessed frames, porches, and inscriptions); (Fig. 1: i, j & k). Surveying the architectural characteristics of other entrance portals on the eastern and western sides of the *Chāhār Bāgh-e Bālā* axis demonstrated that these buildings had a simpler architectural style compared to the *Hezār-Jarib* royal Garden gate and the entrance portals in the *Chāhār Bāgh-e Abbāsi* Street (Honarfar, 1965; Al Isfahani, 1989). Based on the historical documents, these entrance gates were mostly two-story buildings on a square-shaped plan. They had openings (lattice ones and porches) at the level of the first-floor façade. Therefore, they had a panoramic view of the surrounding environment in all four directions. The gate in each entrance portal was aligned with the movement path in the *Chāhār Bāgh-e Bālā* Street; however, their construction was featured by strategies, such as height level elevation in the middle of the façade and/or change of dimensions for the central opening (in the entrance). Similar to the entrance portals in the *Chāhār Bāgh-e Abbāsi* Street, pointed arches were used in the construction of these entrance portals. In addition, according to Illustrative documents, these structures were constructed using the materials and decorations, such as brick and stone in the façades and plinths, respectively. However, their other architectural characteristics are not identifiable due to various reasons, including a lack of relevant descriptive documents, lack or low quality of Illustrative documents, and various interventions and changes over time, particularly during the Qajar period (Fig. 1: g & l). Similarly, another entrance portal in the *Chāhār Bāgh-e Bālā* axis was the *Bāgh-e Zereshk* Garden gate, which was located at a lower height level than the *Chāhār Bāgh-e Bālā* axis with its fourteen entrance gates on both sides. Despite having two stories (like other portal gates on this axis), it offered a different architectural type in terms of plan, façade, and connection to the movement axis in *Chāhār Bāgh*. This will be, therefore, discussed in detail in the following paragraphs.

After Afghan's attack and the collapse of the Safavid (1722), Isfahan and consequently its architecture and urbanization became stagnant. *Chāhār Bāgh* axis and its surrounding gardens deteriorated and, in some cases, were destroyed. However, during the Qajar, despite the recession in the city and major transformations of the government system, *Chāhār Bāgh* Street and the belonging buildings underwent renovation a number of times, and in some cases, were transformed in terms of form, application, and ownership system. According to the descriptive documents related to this period, *Manuchehr-Khān Mo'tamad al-Dawle* (the governor of Isfahan)²² attempted to renovate the palaces and *Chāhār Bāgh* Street (*Bālā* and *Abbāsi*) in 1841 (Der Hovhanian, 2000). However, in 1885, under the order of Zell-e Soltān (the governor of Isfahan), new trees were planted in *Chāhār Bāgh* and some of the buildings were restored and renovated. Also, the surrounding gardens were relegated under his order. In 1914, moreover, the revitalization of the street in front of

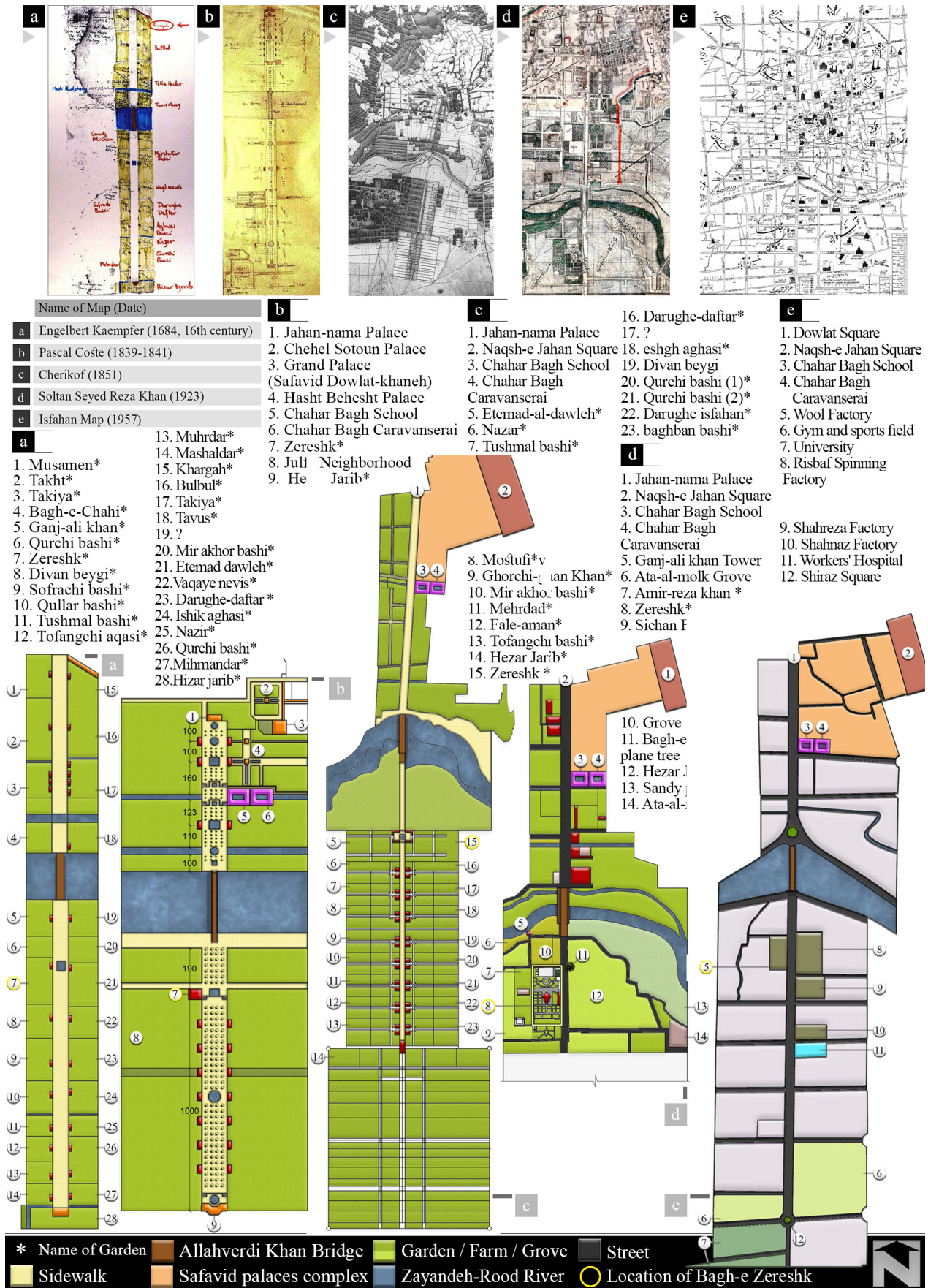


Fig. 2. Historical Maps of *Chāhār Bāgh* in Isfahan. Source: Authors based on: Ahmadi, 2016, Mehryar et al., 1999, Isfahan Municipality's Vice-Chancellor in Urbanization and Architecture, 2011.

Bāgh-e Zerezhk (*Chāhār Bāgh-e Bālā*) was done under the order of *Amir-Mojāhed Bakhtiāri* (the governor of Isfahan), and eventually, *Chāhār Bāgh-e Bālā* and *Abbāsi* axis were turned into flat, plain western avenues (Rajaei, 2004, 2006). However, in the first two decades of the Pahlavi, the lands surrounding *Chāhār Bāgh-e Bālā* Street were allocated to textile firms (Rajaei, 2013). In the contemporary era, this axis has been allocated to the pedestrian lane and vehicle lane purposes on the north and south sides, respectively, mainly for business and office-related applications (Figs. 2 & 3).

• **The characteristics of *Bāgh-e Zerezhk* Entrance based on descriptive and illustrative documents**

• **The Safavid (1501-1736)**

The studies conducted and the descriptive documents in the Safavid period have chiefly examined the role of *Chāhār Bāgh* axis in the development of Isfahan and enumerated some of its form characteristics. However, on the characteristics of the garden entrances surrounding this axis, particularly gardens with non-governmental ownership, they have only referred to the names, ownership system, and/or their connection to the urban structure. *Bāgh-e Zerezhk* entrance has been no exception. The analyses show that Jolfā church (in the Isfahan Armenian neighborhood located on the west side of *Chāhār Bāgh-e Bālā* street) was constructed in 1614 at the rear of *Bāgh-e Zerezhk* under the order of *Shāh Abbās the Great* (Der Hovhanian, 2000). Therefore, *Bāgh-e Zerezhk* must be constructed around the late 16th century coincident with the construction order of *Chāhār Bāgh* axis and the belonging buildings). Opposite the entrance of this garden, there was a big pond at the beginning of the *Chāhār Bāgh-e Bālā* axis,

and in its vicinity, there were a waterfall and *Chāhār Bāgh-e Bālā* entrance staircase, which have been depicted in some of the illustrative documents of the period (Fig. 4). On the map, moreover, the approximate location of *Bāgh-e Zerezhk* has been specified to be on the west side of *Chāhār Bāgh-e Bālā* street (Fig. 2: a).

- **The Qajar (1796-1925) and Pahlavi (1925-1978) periods**

In the Qajar period, coincident with the reforms of the 19th century in Europe and the advent of science and technology, many transformations in the documentation way of events and the world's, and consequently, Iran's communication system took place. As a result, the descriptive and illustrative documents related to this period encompass a wider scope because of newspapers, telegraph-related documents, photography cameras, and even aerial mapping. In the descriptive documents related to this period, researchers have referred to the restoration and renovation of the Isfahan *Chāhār Bāgh* axis. In only one historical document, they found some of the form characteristics of *Bāgh-e Zerezhk* entrance. According to this document, the *Bāgh-e Zerezhk* entrance, located at the beginning of the street (from the north), was the biggest entrance in *Chāhār Bāgh-e Bālā* and had a large garden with berry trees and barberry bushes. On the top of *Bāgh-e Zerezhk*'s upper chamber, which had a four-side view (*Zāyandeh Rood* River, *Suffā* Mountain, *Julfā*, and the eastern gardens), there were halls and passageways. The mansion, moreover, was surrounded by trees and colorful flowers. The height of this building was approximately equal to that of *Chāhār Bāgh* School, *Abbāsi* Mosque, and *Āli Qāpu* Palace²³ (Holtzer, 1976). What is more, in the documents related to this period, reference has been made to the ownership system

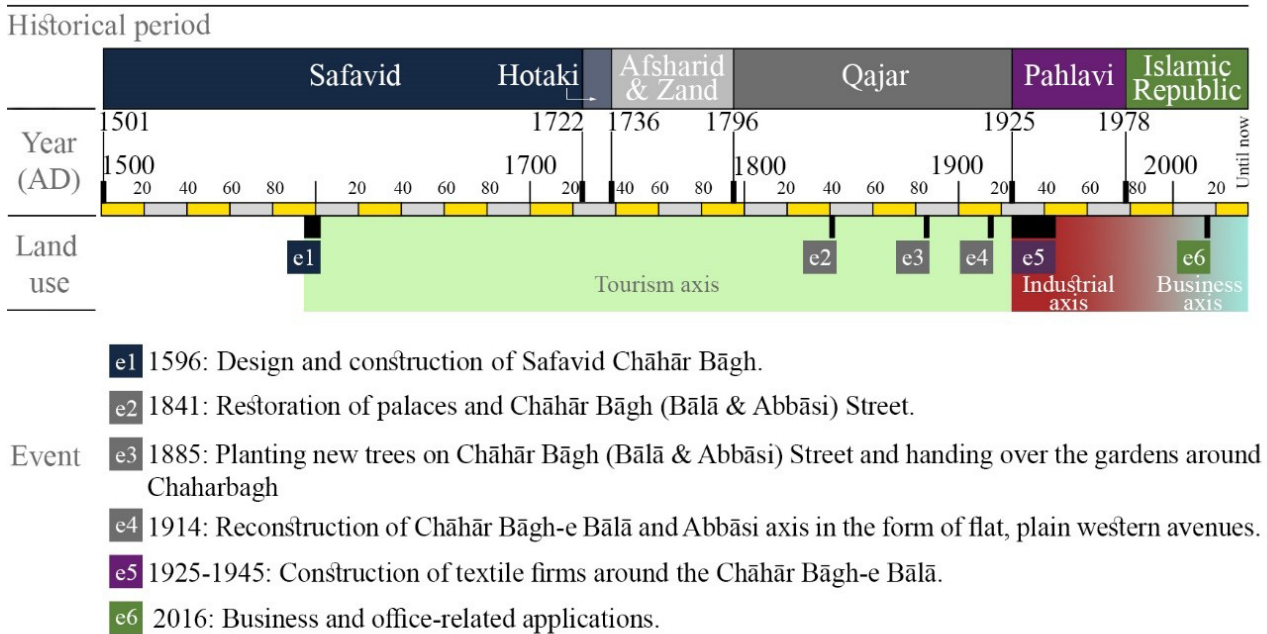


Fig. 3. The Course of Historical Developments on *Chāhār Bāgh-e Bālā* Street. Source: Authors.

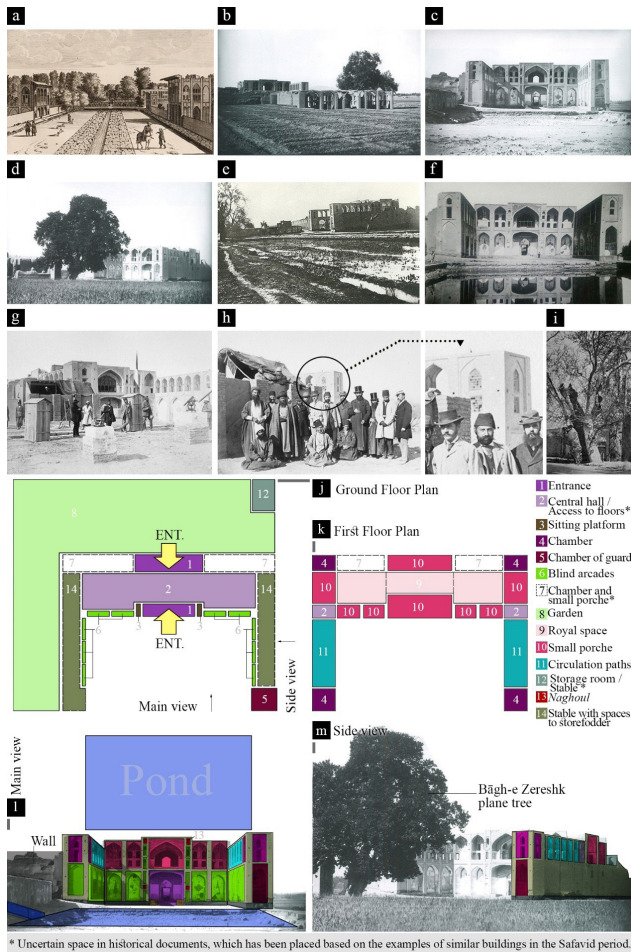


Fig. 4. Chāhār Bāgh-e bālā Street and Spatial Relationship Analysis of Bāgh-e Zerešk Entrance. Source: Authors based on: De Bruyn, 1732, Holtzer, 2003, Pictorial Documentation Center of Golestān Palace, 2018, Honarfar, 1975, Orchiston, Sule & Vahia, 2018.

and the application of *Bāgh-e Zerešk* entrance. According to these documents, in 1841, *Manuchehr-Khān Mo'tamad al-Dawle* (the governor of Isfahan) paid special attention both to the renovation of Chāhār Bāgh-e Bālā Street and its belonging buildings and the adornment of the mansion of *Bāgh-e Zerešk* entrance (the residential application of the building) (Jaberi Ansari, 1942; Der Hovhanian, 2000). The mansion was considered the primary location of the Iran-English Telegraph Office (Indo-European Telegraph Office) and was restored in 1865. However, restorations were canceled and the building was used as a printing house instead. In 1874, moreover, the mansion was used for German observers' temporary residence, known as the Venus Group, to observe the transit of Venus across the Sun (the office-related application of the building). Around 1885, when some buildings and gardens surrounding Chāhār Bāgh were relegated, *Bāgh-e Zerešk* was also transferred to private owners²⁴. However, the restoration of the entrance was done with negligence resulting in the gradual decay of the building, which was ultimately destroyed around the first decade of the 20th century under the command of the governor of Isfahan, *Zell-e Soltān* (Holtzer, 1976; Mahdavi, 1969). By the end of the

Qajar period (1914), *Amir-Mojāhed Bakhtiāri* (the governor of Isfahan) constructed a new building on the same ground following the neo-classical style²⁵, which was later dispossessed when the Pahlavi came to power. Eventually, in this period, the application of *Bāgh-e Zerešk* site changed and turned into one of the textile firms along the southern edge of the river (industrial application of the site). In some documents, the firm has been referred to as *Risbāf* textile firm, established in 1932 and located on the east side of Chāhār Bāgh-e Bālā Street. Others, however, referred to it as the wool industry firm, established in 1935 and located on the west side of Chāhār Bāgh-e Bālā Street (Honarfar, 1965; Jaberi Ansari, 1942; Rajaei, 2006; Seifpour Fatemi, 1999). The site is now dedicated to the construction of a complex with commercial and office-related applications (Negin e Sharq) (Fig. 5). Regarding the illustrative documents in the Qajar period, it should be noted that besides the images and historical maps, photography at that time made the attainment of valuable information about the history of Isfahan possible. About Chāhār Bāgh-e Bālā axis and *Bāgh-e Zerešk* entrance, moreover, a number of historical photos have been recorded, which help to identify some of the characteristics of this building and its connection to Chāhār Bāgh-e Bālā (Fig. 4: a to i). Based on these photos, the entrance of the *Bāgh-e Zerešk* Garden had a U-shaped plan and a two-story building (with approximately equal height levels at each floor level). The entrance gate was set back in the portal, facing the movement axis in Chāhār Bāgh-e Bālā, and its height equated to one story height only. The entrance gate was covered by a barrel vault (locally known as *tāq-e āhang*)²⁶, based on a Kalil arch (with several pointed spikes). It was also featured by a pointed Panj-o-haft arch on the surrounding blind arcade (as its frame). There were sitting platforms on both sides of the entrance gate. The narrow wall panels around the entrance gate extended up to its roof and were adorned with symmetrically positioned arcatures and recessed frames. There were large deeply recessed blind arcades with barrel vaults on the other parts of the main façade, on the ground floor and lateral sides. At the beginning part of the right side, a chamber-like space could be seen, which was covered by a dome-like vault (i.e., *tāq-e Kolonbou*)²⁷; this space was probably a place for the guard. Based on the analyses in this study, it is likely that the interior spaces on the ground floor had a central hall and a stable with spaces to store fodder on the side passage. These spaces were connected to the first floor through a staircase. Moreover, investigating the physical characteristics of the first floor demonstrated a royal space (*Shāh-neshin*) with large porches on all four sides, around the central area, while the other connecting spaces had smaller porches and surrounded this central area; therefore, the movement axis in Chāhār Bāgh and the garden's main space could have been viewed through these spaces. The first floor received sunlight and had beautiful views through its wooden lattice doors and windows, providing a spectacular viewpoint. The side passages on the first story had circulation paths (*Gholām-gardesh*) leading to small chambers

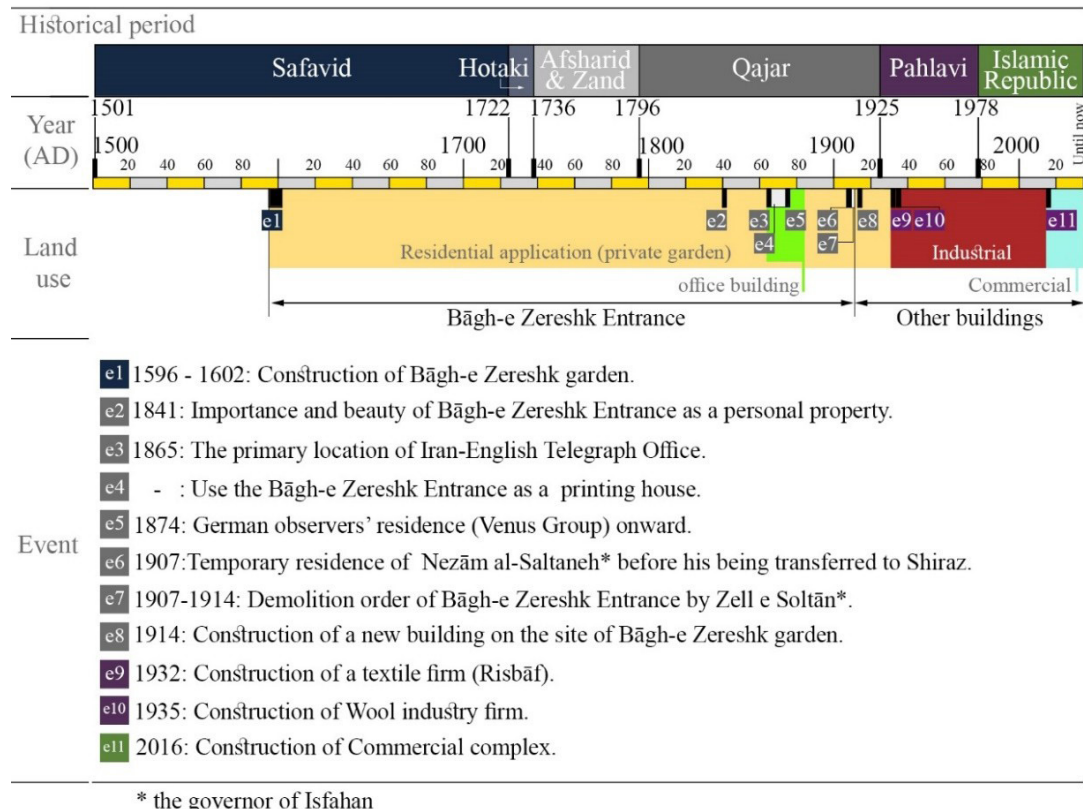


Fig. 5. Isfahan Bāgh-e Zerešk's Historical Evolution and Ownership History. Source: Authors.

with dome-like vaults on both sides. Furthermore, a small building (probably a storage room), which was connected to the roof through a staircase and room was located along the connecting wall to the passage (on the right side); (Fig. 4: j to m). Based on Illustrative documents, the royal chamber's ceiling was decorated with *kārbandi*, and the porch facing the central *Chāhār Bāgh* axis was covered by a combination of barrel vault and a more complicated vault type, *tāq-e kazhāhvē*²⁸. However, the other porches of the royal chamber were covered by *tāq-e kazhāhvē*. Also, these porches stood as decorative arcatures on the façade of the interior space. Under these conditions, the other porches in the building were adorned with another type of *tāq-e kazhāhvē*, known as cloister vault²⁹. According to the present study, the majority of the arches used in the blind arcades, arcatures, and vaults in the *Bāgh-e Zerešk* entrance building had pointed Panj-o-haft arches (Tables 1 & 2). Furthermore, the materials used in the façade consisted of brick (mostly), stone (plinths and lateral sitting platforms), tilework (corners of blind arcades, porches, and possibly the entrance inscriptions), painting (entrance gate, porches, and blind arcades), and wood (lattice doors and windows, as well as railings). According to the mentioned documents, *Bāgh-e Zerešk* entrance was distinguished from its surrounding environment through:

1. A backward lean (U-shaped plan) in relation to the body of *Chāhār Bāgh*,
2. Its higher height in relation to the surrounding walls,
3. Its location in the vicinity of distinctive urban elements

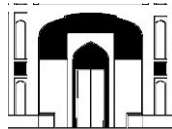

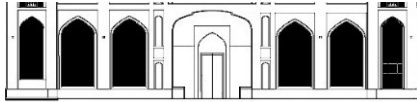

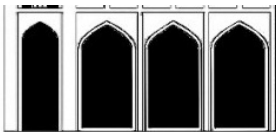

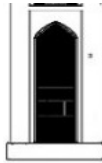

(the pond on the front of the mansion, *Chāhār Bāgh* entrance staircase, and *Bāgh-e Zerešk* plane tree).

On the other hand, on the maps belonging to the early Qajar period, *Chāhār Bāgh* axis and some of the urban elements (ponds, trees, and staircase) and its distinctive buildings such as *Bāgh-e Zerešk* (Fig. 2: b); on the west side and on (Fig. 2: c): on the east side of *Chāhār Bāgh-e Bālā* have been depicted. On the map belonging to the end of the Qajar (Fig. 2: d), moreover, *Bāgh-e Zerešk* plane tree and a new building, which had been constructed after the destruction of *Bāgh-e Zerešk* entrance, can be observed on the east and west sides of *Chāhār Bāgh-e Bālā* street, respectively. According to this map, *Chāhār Bāgh* pond and staircase have been destroyed during this period, this axis has turned flat, and the land allotment system of the axis has changed. The transformations made to the application and land allotment systems of *Chāhār Bāgh-e Bālā* Street during the Pahlavi period can also be observed in the remaining maps of this period (Fig. 2: e).

• Finding the location of *Bāgh-e Zerešk* entrance according to a comparative study of descriptive and illustrative documents:

Since the location of *Bāgh-e Zerešk* has been reported to be on the west side of *Chāhār Bāgh-e Bālā* street according to some of the historical texts and maps, and on its east side according to other historical texts and maps, two- and three-dimensional schematic models were drawn based on a comparison between descriptive and illustrative documents and field observation

Table 1. Typology of arches and vaults used in the facade of the ground floor of *Bāgh-e Zereshk* Entrance. Source: Authors.

No.	Space Title	Arch Type	Figure	Vault Type	Figure
1	Entrance gate	<i>Kalil</i>		Barrel vault (<i>āhang</i>)	
2	The blind arcade of door frame	<i>Panj-o-haft</i>		-	
3	<i>Neghul</i>	-		-	
4	The blind arcade of the main façade	<i>Panj-o-haft</i>		Barrel vault (<i>āhang</i>)	
5	The blind arcade of Other façades	<i>Panj-o-haft</i>		Barrel vault (<i>āhang</i>)	
6	Chamber of guard	<i>Panj-o-haft</i>		Dome-like vault (<i>Kolonbo</i>)	

studies. Accordingly, the location of *Bāgh-e Zereshk* entrance in relation to *Chāhār Bāgh-e Bālā* axis was identified.

The analysis of the graphical images revealed that these documents are not only incomplete as to the names of all the depicted buildings but also, at times, include such errors as errors of proportions and errors in determining the viewing angle and depth of field. The reason is that today pictures are drawn based on scientific principles of perspective and mathematical proportions while, in the past, painters put an effort into reflecting as many pieces of information as possible in their pictures. Therefore, it may be the case that while drawing a building, painters did not have an appropriate viewing angle of other surrounding buildings. In an intentional effort to present more illustrative details in a single frame, however, they drew other buildings in proportions that were contrary to their actual proportions. In photographing the current status of the site with a viewing angle similar to those of the images and redrawing them, it was revealed that in the image (Fig. 6: a), the painter has depicted *Chāhār Bāgh-e Bālā* axis from Allāhverdi-Khān Bridge up to the end of Hezār-Jarib garden entrance. Moreover, in the image (Fig. 6: b), a wide viewing angle of *Chāhār Bāgh-e Abbāsi*, Allāhverdi-Khān Bridge up to the foot of Suffa Mountain, and Hezār-Jarib garden tower has been depicted. Therefore, in both images, the real distance and viewing angles of the design elements have been disregarded. However, photos—though regarded mainly as documents that can be completely referred to—can also create visual errors through technique and shooting angle in identifying the proportions of the components of the image and assessing the depth of field. The analysis of the orientation of the building on the site, moreover, indicates that the shooting angle had been in

a way that only in one photo the building had a distinguishing background from the mountain (Fig. 7: a). Considering the natural and geographical characteristics of the area in focus in Isfahan, two assumptions are possible:

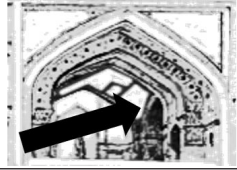
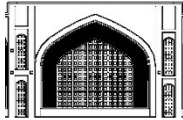
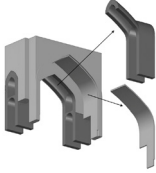




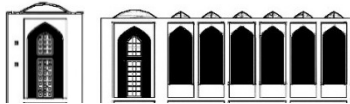
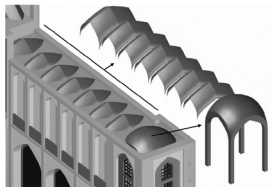
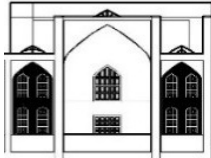
1. The building has been located on the east side of *Chāhār Bāgh-e Bālā* (with the wings to the west) and the representation of *Qezelbāsh* Mountain (located on the east of Isfahan) in the background (Fig. 7: b & c).
2. The building has been located on the west side of *Chāhār Bāgh-e Bālā* (with the wings to the east) and the representation of *Mahmoud Ābād* Mountain (located on the northwest of Isfahan) in the background (Fig. 7: b & d).

Considering the shape characteristics of the mountain in the background of the photo and the paintings remaining from *Bāgh-e Zereshk* entrance (Fig. 7: e) and comparing it to the geographical characteristics of Isfahan, the researchers could solve this problem. Furthermore, some of the other signs existing in the illustrative documents helped to verify the location of the building, i.e., on the west side of *Chāhār Bāgh-e Bālā* axis. These signs are:

1. The presence of urban architectural elements on the left side of the photos and the painting remaining from this mansion and comparing it to the geographical characteristics of Isfahan (pond, waterfall, entrance staircase of this axis, and *Bāgh-e Zereshk* plane tree) (Fig. 7: e & f).
2. The presence of walls with the visual characteristics of the wings of *Bāgh-e Zereshk* entrance at the farthest end of the historical photo of *Allāhverdi-Khān* Bridge (Fig. 6: c).

Interviews conducted with the architects also helped to identify the location of *Bāgh-e Zereshk* entrance and its distinctive plane tree (Mahmoud-Abadi, 2018; Mousavi Faridani, 2018). The

Table 2. Typology of arches and vaults used in the facade of the first floor of Bāgh-e Zerezhk Entrance. Source: Authors.

No.	Space Title	Arch Type	Figure	Vault Type	Figure
1	Royal space	؟	؟	Kārbandī*	
2	The large porches of the royal space	Panj-o-haft		Barrel vault (āhang) And kazhāhvē vault	
		Panj-o-haft			
3	The porches of the chambers	Panj-o-haft		Kazhāhvē vault	
4	Circulation paths	Panj-o-haft		Cloister Vault**	
5	The blind arcade of Other chambers in sub-sections	Panj-o-haft		Kazhāhvē vault and Dome-like vault (Kolonbo)	-

* Non-availability of comprehensive historical documents (Drawing based on painting, Laurens, 1846).

**a type of kazhāhvē Vault

investigations done in the present study revealed that Bāgh-e Zerezhk entrance was located on the west side of *Chāhār Bāgh-e Bālā* axis. This shows that the documents indicating the location of the entrance on the east side contain writing errors on the part of their writers. Moreover, in the map of *Chāhār Bāgh-e Bālā* (Fig. 2: c), errors in the names of the districts can be seen on the part of either the writer or the translator. It should be noted that the southern wing of the mansion of *Bāgh-e Zerezhk* entrance appeared to collapse according to the historical documents. Three-dimensional modeling revealed that the positioning of the camera had caused an overlapping error in the perspective of the building (Fig. 7: a & f).

• Schematic modelings of *Bāgh-e Zerezhk* entrance and its connection to *Chāhār Bāgh-e Bālā* axis

According to the studies done, the final model of *Bāgh-e*

Zerezhk entrance was presented at this stage. Moreover, the location of some of the distinctive urban elements in the vicinity of this building, such as the pond, the artificial waterfall and the stream that was connected to it, the entrance staircase, the pathway for pedestrians, the ramp, and the pathway for non-pedestrians, the space for planting *Chāhār Bāgh-e Bālā* trees, and *Bāgh-e Zerezhk* plane tree were identified and simulated (Fig. 8: a, b & c). As to the modeling procedure of the western wing of the building, no information was found by the researchers. The remaining pictures also imposed some limitations. The type and quality of the camera and photographic paper, printing styles, photo maintenance conditions (chemical changes and changes in form over time), and reprinting and copying styles can cause disorders (disappearance of details in the light background



Fig. 6. Recognizing the Characteristics of Bāgh-e Zerešk Entrance Based on Historical Designs and Photos. Source: Authors based on De Bruyn, 1732, Pictorial Documentation Center of Golestān Palace, 2018.

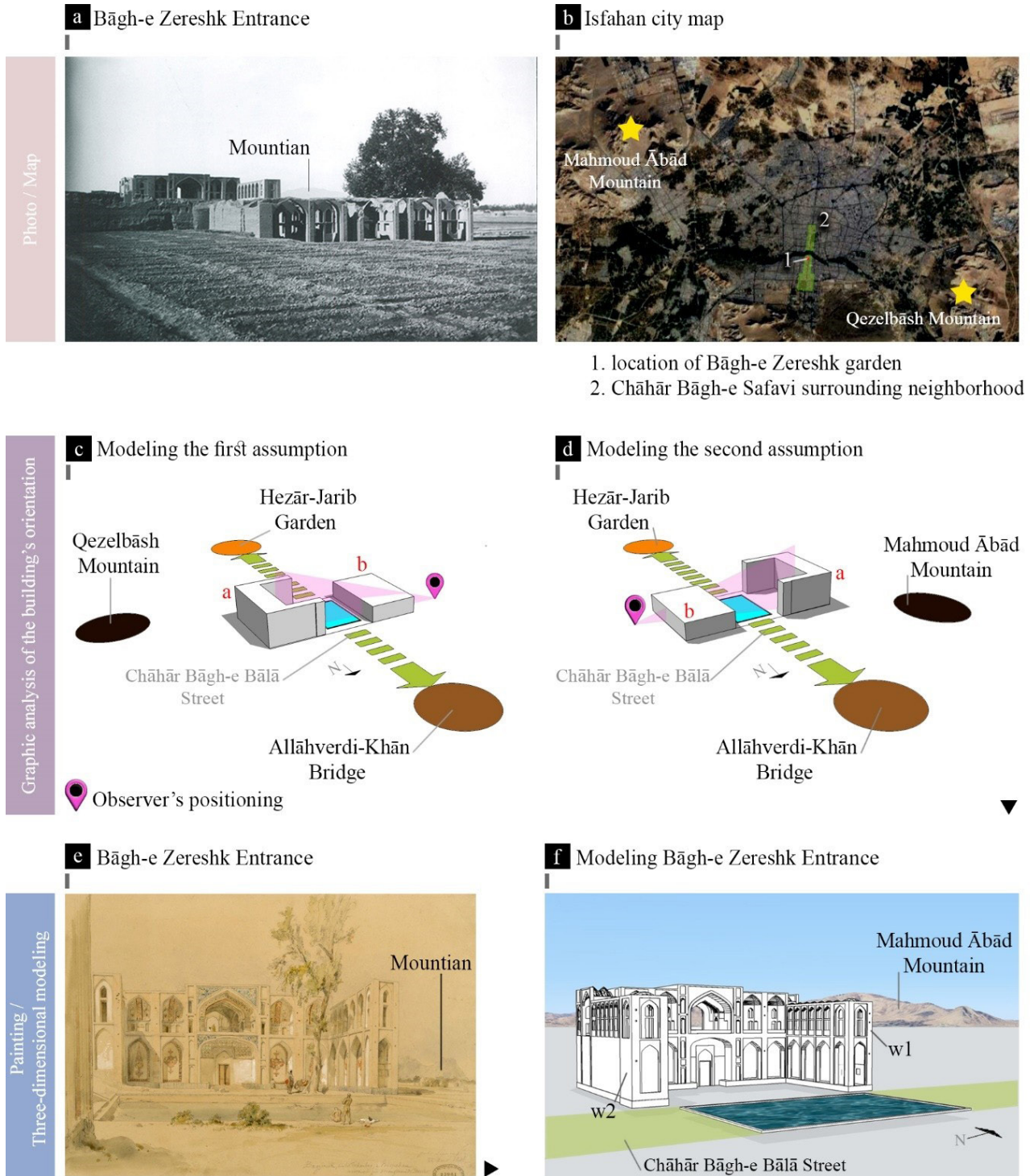


Fig. 7. Location of Bāgh-e Zereshk Entrance Based on Historical Photos and Drawings. Source: Authors based on: Holtzer, 2003, Laurens, 1846.

and/or disappearance of details in the dark background). In an attempt to solve these problems, this study resorted, to the extent possible, to more reliable sources that have the slightest amount of changes. According to graphical modeling, *Bāgh-e Zereshk* entrance had an approximate area of 470 square meters and was located at an approximately 296-meter distance from *Allāhverdi-Khān* Bridge, on the west side of *Chāhār Bāgh-e Bālā* axis (at the bottom-most level of elevation

and the start of *Chāhār Bāgh-e Bālā* Street stairway and ramp toward *Hezār-Jarib* garden). This building was located at the top-most part at about 14.95 meters height from the ground. Some descriptive documents have considered this building to be at the same height as other distinctive buildings of the Safavid because of the natural slope of the city (the southern part being higher), causing a visual error for the observer (Fig. 8: d & e).

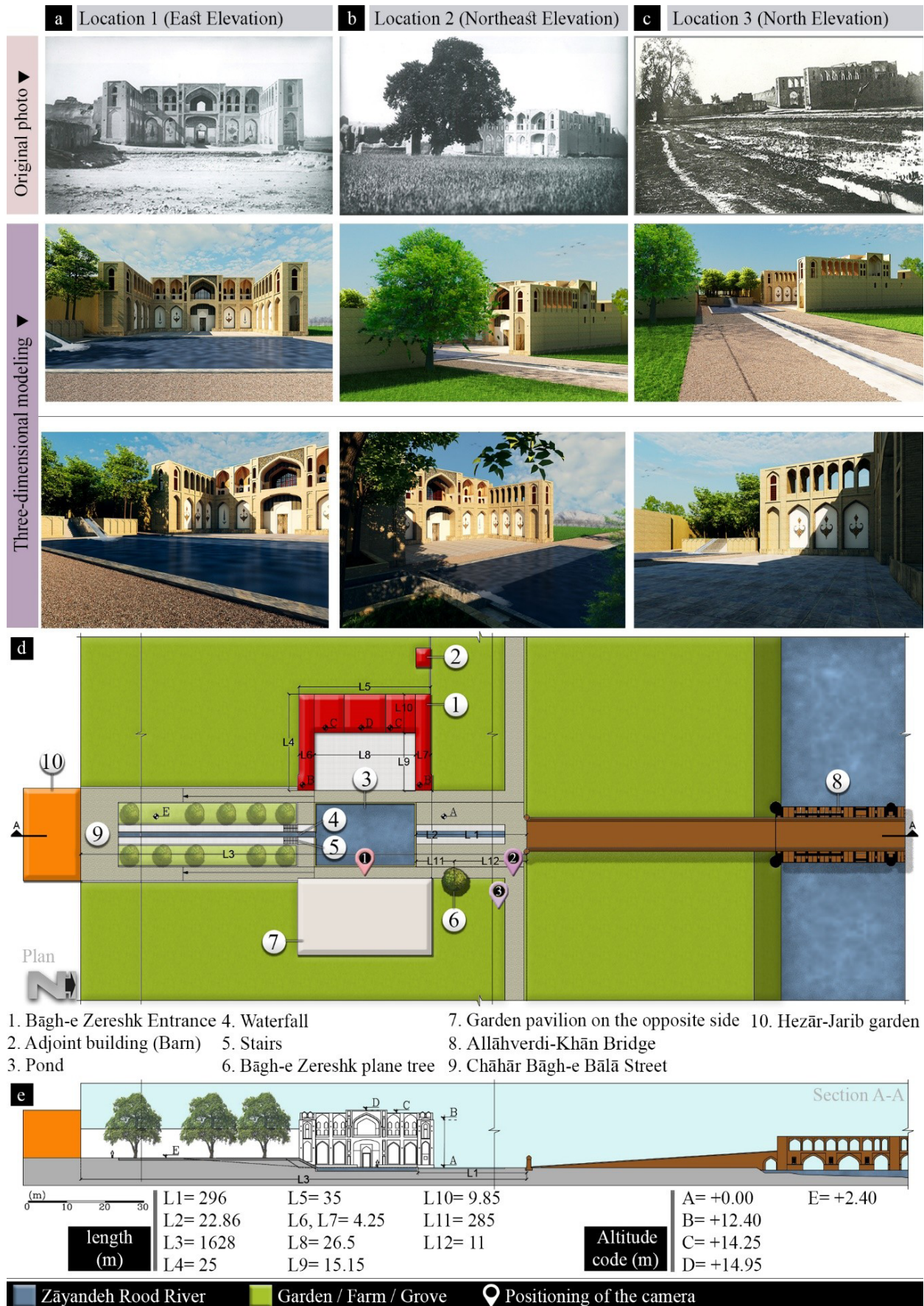


Fig. 8. Modeling Bāgh-e Zereskh Entrance Based on Descriptive and illustrative Documents. Source: Authors.

Conclusion

The present study revealed that the descriptive and illustrative documents alone cannot be referenced since there might be some errors in the descriptions and pictures; in the process of comparative studies, these errors, when put side by side, have the potential to be resolved. This was done by first making some simple models of the building upon comparing the documents. After juxtaposing the pictures and studying them comparatively, more details about *Bāgh-e Zereshk* entrance were revealed and modeled. The analyses revealed that *Bāgh-e Zereshk* entrance was a two-floor building (of an approximate height of 15 meters) and had a U-shaped plan. It had an area of around 740 m². The building had a planned direction toward north and south (the building's main view was on the east overlooking *Chāhār Bāgh* axis) and had a view of the surrounding environment from the four main sides. Although there are no specific historical documents related to the interior spaces of this building, based on the analysis done on the external walls of the building, it seems that the spaces forming the entrance to the *Bāgh-e Zereshk* entrance on the ground floor were: The entrance gates (one facing the upper *Chāhār Bāgh* axis and the other facing the main garden), large deeply recessed blind arcades in facades, central hall, a staircase, a stable with spaces to store fodder on the side passage and guard chamber. Also, a small building (probably a storage room), which was connected to the roof through a staircase and room was located along the connecting wall to the passage (on the right side). The first floor of the building also consisted of the royal space (*shāh-neshin*), chambers, circulation paths, and porches. The entrance gate was set back in the portal, facing the movement axis in *Chāhār Bāgh-e Bālā*, and its height equated to one story height only. The entrance gate was covered by a barrel vault, based on a Kalil arch. There were sitting platforms on both sides of the entrance gate. The narrow wall panels around the entrance gate extended up to its roof and were adorned with symmetrically positioned arcatures and recessed frames. Moreover, investigating the physical characteristics of the first floor demonstrated a royal space (*shāh-neshin*) with large porches on all four sides, around the central area, while the other connecting spaces had smaller porches and surrounded this central area; therefore, the movement axis in *Chāhār Bāgh* and the garden's main space could have been viewed through these spaces. The first floor received sunlight and had beautiful views through its wooden lattice doors and windows, providing a spectacular viewpoint. The side passages in the first story had circulation paths. According to the present study, the majority of the arches used in the blind arcades, arcatures, and vaults in the *Bāgh-e Zereshk* entrance building had pointed Panj-o-haft arches. The types of vaults used at the *Bāgh-e Zereshk* entrance are *kārbandi* (in the inner of the royal space), barrel vault (at the entrance of the building and blind arcades of ground floor facades and a part of the royal space's porch on the eastern side), *kazhāhvé* and cloister vault (in the

direction of covering the north and south porches of royal space and a part of the eastern porch, the porches of the chambers, circulation paths) and Kolonbou vault (to cover the guard chamber and the chambers on both sides of the circulation paths). Furthermore, the materials used in the façade consisted of brick (mostly), stone (plinths and lateral sitting platforms), tilework (corners of blind arcades, porches, and possibly the entrance inscriptions), painting (entrance gate, porches, and blind arcades), and wood (lattice doors and windows, as well as railings); (Figs. 4 & 8). On the other hand, an analysis of the evolution pattern of Isfahan *Bāgh-e Zereshk* in terms of its ownership and application during different historical periods revealed that this Safavid building has been constructed in the late 16th century (coincident with the establishment of *Chāhār Bāgh* axis) with a residential application. During the Qajar, moreover, it was restored at several points. In this period, the building had first a residential application and was then used as an office building. Eventually, in the early 20th century, it was destroyed due to decay, and its site was relegated. After the destruction of the entrance, a building following a neo-classical style was built on *Bāgh-e Zereshk* site with a residential application. Early in the Pahlavi period, the application of the site changed to industrial (the wool industry firm) and later in the contemporary period to commercial (Figs. 3 & 5). Regarding the location of the entrance and its connection to *Chāhār Bāgh-e Bālā* axis at an urban scale, it was revealed that the mansion was located at an approximate 296-meter distance from the south of the *Allāhverdi-Khān* Bridge and on the west side of *Chāhār Bāgh-e Bālā* street. Because of a backward lean against *Chāhār Bāgh-e Bālā* axis, it had a higher height in relation to the surrounding urban body (the extended walls of the surrounding gardens). Also, the entrance was distinct compared to its surrounding environment for its vicinity to distinctive urban elements (pond, waterfall, staircase, *Chāhār Bāgh-e Bālā* entrance ramp, and *Bāgh-e Zereshk* plane tree) on this street (Fig. 8), (Table 3).

The present study was the first to model *Bāgh-e Zereshk* entrance mansion on the basis of descriptive and illustrative documents and retrieve its characteristics at two levels of architecture and urbanization, which, in turn, helped to identify some characteristics of the historical axis of Isfahan *Chāhār Bāgh*, especially in its southern part. Although at present, this axis in the northern part (*Chāhār Bāgh-e Abbāsī*) is dedicated to a special pedestrian tourism route with a dominant commercial function, and its southern part (*Chāhār Bāgh-e Bālā*) is one of the dynamic city streets, where there is the possibility of pedestrian and car access. and the function of its spaces is mostly commercial-administrative, but due to the major changes in the architecture and operation of this axis (demolition of the gates in the past and successive changes in the functional system, ownership of buildings and related lands), It is not possible to reconstruct the entrance of the gardens of the Safavid period in this

street. This is while the current research process can lead to completing the information about the garden city of Isfahan in the course of history and revealing its functional and physical characteristics and reveal its functional and physical features and also improve the quality of infill design based on

the continuity of historical architectural experiences of this city, it should be used. On the other hand, presenting two and three-dimensional representations of past monuments in the form of city replicas, digital presentations, etc. can be effective in developing the tourism industry of Isfahan and introducing its cultural heritage to tourists.

Table 3. Physical characteristics of the entrances to gardens on Chaharbagh Street in the Safavid period. Source: Authors.

No.	The name of the entrance to the gardens	Location:	Plan shape:	The shape of the entrance relative to the street	Building facade materials and decorations*								
		a. <i>Chāhār Bāgh-e Abbāsi</i> b. <i>Chāhār Bāgh-e bālā</i>	Square (S) Rectangular (Re)		a. Brick b. stone c. Wood d. tilework e. painting f. <i>kārbāndi</i> & <i>muqarnas</i> g. Dome h. blind arcades & <i>Neghul</i> i. Arch Type								
		Ownership type Royal garden (R) Noble Garden (N)	Number of floors	Kind of visual communication									
1	<i>Jahān-Namā</i>	a	S	sitting in front									
		R	3	porches - windows - circulation paths	*	*	*	*	*	?	-	*	
2	<i>Shir-khāneh</i>	a	Re	sitting back	*	*	*	*	*	*	-	*	
		R	2	porches - windows									
3**	Other entrances of the northern axis	a	Re	sitting back									
		R	2	porches - windows	*	*	*	*	*	?	-	*	
4	<i>Hezār-Jarib</i>	b	Re	Three part combination									
		R	3 floors in the middle & 2 floors around it	porches - windows	*	*	*	*	*	?	-	*	
5**	Other entrances of the southern axis ***	b	S	to be equal									
		N	2	porches - windows	*	*	*	*	*	?	-	*	
6	<i>Bāgh-e Zereschk</i>	b	(U) shape	sitting back									
		R	2	porches - windows - circulation paths	*	*	*	*	*	-	-	*	

* brick (mostly), stone (plinths and lateral sitting platforms), wood (lattice doors and windows, as well as railings), tilework (corners of blind arcades, porches, and possibly the entrance inscriptions) and painting (entrance gate, porches, and blind arcades).

** They only have image documents with a general perspective and low quality.

*** A collection of gardens belonging to the nobles, which have had different names over time depending on the owner.

? No descriptive or pictorial documents for diagnosis

Endnote

1. The city of Isfahan is located in the central region of Iran and during the Safavid period, due to its distance from the country's war zone, it enjoyed more security and stability with the Ottoman governments in the west and Uzbekistan in the east (Gharipour, 2017).
2. This bridge with a length of 360 meters and a width of 14 meters has been constructed over the *Zāyandeh* Rood River during the reign of *Shāh Abbās the Great* (Honarfar, 1965).
3. In general, the elements of Iranian gardens comprised an entrance mansion, a pavilion (a mansion inside the garden with an open surrounding space), spaces that provided service, and other subsidiary spaces. The entrance is the entrance gate of the garden where the guards or other garden forces stayed. In some gardens, this space was built in large proportions so as to be used by the residents of the garden in their reception of guests (Pirnia, 2008).

4. The Iranian dynasties after the Safavid up to the present time (i.e., the Islamic Republic) were Hotaki (Afghan), Afsharid, Zand, Qajar, and Pahlavi.
5. Iranian gardens have been categorized according to the application scale and use, elements of form and garden design styles, location, historical period, and the reciprocal effect of the garden, environment, building, and specific elements. In the present study, the categorization is based on application scale and use, which is, in turn, divided into three parts: architecture, part of nature, and urban scale (garden city and garden in garden) (Shahcheraghi, 2012).
6. The classification and introduction of the research method in this article are based on: (Eshaghian, 2013).
7. Since *Chāhār Bāgh* axis and the entrances of the surrounding

gardens belonging to it have been built during the Safavid period, this period has been selected as the starting point in the present study. On the other hand, since the major changes to the form and functional characteristics of *Chāhār Bāgh* axis and *Bāgh-e Zerezhk* site (establishment of the industry firm) have been made during the Pahlavi period, the time interval in this study has been between these two periods.

8. All drawings have been done by the author using AutoCAD 2017, Photoshop 2018, and Vray 2016.

9. The name of this headland appears in the historical documents of the Safavid period in the form of a hut or a royally owned house, and the origin of the name *Jahān-Namā* for it can be traced back to the Qajar period, based on the travelogue of *Saif al-Doulah* (the ruler of Isfahan during Fathali Shah) searched (Shojaee Esfahani, 2017).

10. In most of the historical documents, the names of these gardens and their gardens are given as follows: *Jahān-Namā*, *Khargāh*, *Hasht-Gosh*, *Bulbul*, *Takht*, *Tut*, *Mo*, *Davish Nematalāhi* and *Heydari* guesthouses, *Shir-khāneh* and *Tāvus-khāneh*.

11. In describing the physical characteristics of the entrance to the gardens of *Chāhār Bāgh* Street in Isfahan, an attempt has been made to consider the characteristics of these buildings in their original form (belonging to the Safavid period) and to consider the encroachments and occupations of later historical periods (especially the Qajar period), has been ignored in their analysis process.

12. Ornamental frames with lancet or pointed arch.

13. Iranian arches are divided into various categories based on their shape, load-bearing capacity, combination, and slope. In this passage, arches could be divided into two categories based on their shape: pointed (where two curved lines intersect at a sharp angle) and non-pointed (or semi-elliptical, where two curves reach smoothly at a tangent); (Mimarian, 2018).

14. Ornamental frames in elevation with no arches (Blind window).

15. Due to the insufficiency of historical documents, it is not possible to recognize the type of arches used in all the entrances to the gardens on *Chāhār Bāgh* Street. However, based on some historical documents (Fig. 1), the most used vaults of these buildings are Barrel vaults (*āhang*) and *kazhāhvē* vaults. Also, most of the arches used in the architecture of this building were of *Panj-o-haft* arch type.

16. *Kārbandi* is a type of roof covering that is formed by the intersection of several vaulting ribs (*tavizē*). These ribs would be arranged next to each other based on special divisions (Rafiei Sereshki et al., 2016).

17. A kind of Iranian Decoratal vault.

18. According to the descriptions of this document, the length of *Allāhverdi-Khān* Bridge was 490 feet. Compared to its present status (a length of 360 meters), which has remained the same from the Safavid Period up to the present time, the length of each foot has been approximately taken equal to 74 centimeters in this study.

19. From the Safavid period, *Bāgh-e Zerezhk* plane tree (Shāh Abbāsi plane) was located south of *Allāhverdi-Khān* Bridge and to the east of *Chāhār Bāgh-e Bālā* axis. During the Pahlavi period, workers made food and tea inside its trunk. Around 1990, the tree was rooted out due to decay and was transferred to the Chehel-Sotoun garden (Ghazali Isfahani, 2008; Mahmoud-Abadi, 2018; Mousavi Faridani, 2018).

20. A type of oval arch (Fereshteh-nejad, 2010).

21. The *Panj-o-haft* arch type is a pointed arch. The term is derived by combining the two Farsi words "*panj*" (hole, opening) and "*o-haftan*" (to cover); however, this term has no connection to a false assumption that it should be related to another homonymous phrase (a mathematical ratio of "five to seven" would also be transliterated as "*panj-o [va]-haft*") (Mimarian, 2018).

22. During the 150-year reign of the Qajar, several individuals were appointed as the governor of Isfahan (at times, one governor governed at different times).

23. According to the present study's field observations, the average height of floors in *Chāhār Bāgh* School is about 12 meters and the height of its vault is 35 meters. The field observations also indicate that the average height of the *Abbāsi* Mosque is about 14 meters and the height of its vault is 54 meters. *Āli Qāpu* Palace, moreover, has a height of 48 meters from the surrounding passageway (Bazaar's floor).

24. During the reign of Zell-e Soltān (1850), Shahāb al-Din Mahdavi (one of Isfahan's clergymen) possessed the garden and its mansion entrance, which was then relegated to Ali Aghābāshi (the government's broker). During his time, the mansion was used as Nezām al-Sāltāneh's (the governor of Isfahan) temporary residence before his being relocated to Shiraz (1907). After *Ali Aghābāshi's* death, *Bāgh-e Zerezhk* was transferred to his nephews, *Amir-Mojāhed Bakhtiāri* (the governor of Isfahan) and *Mohāseb al-Dowle* (a member of Isfahan's Velayati association) (Rajaei, 2006; Jaber Ansari, 1942).

25. The new building of *Bāgh-e Zerezhk* has been used at several points as a temporary residence place for such important individuals as Major Felek (head of the first equipped gendarmerie in Isfahan) in 1914 and Rabindranath Tagore (Indian philosopher and poet) in 1932 (Rajaei, 2006; Seifpour Fatemi, 1999).

26. This arch is obtained from the movement of an arch on two walls of the same size and parallel

27. Kolonbou vault (otherwise spelled as Kolombo) is a dome-like structure, mainly without transitional zoning, pendentives, or squinches, and is usually built on top of four walls or pillars in a square-shaped plan (Farzaneh & Alipour, 2005).

28. *kazhāhvē* vault is a type of Iranian arch that consists of two small and large arches and covers the rectangular space of the background by arranging the bricks along the smaller arch.

29. Naming based on the classification of Iranian architectural arches by Godard (French architect and archaeologist); (Godard, 2009).

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