

# Typology of Suburban Caravanserais in Center of Iran Based on the Spatial Combination of the Main Architectural Elements

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## ABSTRACT

**Objective:** The aim of this research is the physical typology and typology of architectural elements of caravanserais in the studied area.

**Methods:** The research method of this study is developmental and applied, and the method of obtaining information is inductive and with an interpretive, historical and comparative approach. The method of collecting information is also based on library studies and field observations. In this study, the main architectural elements such as the entrance, vestibule, porch, verandah in front of the room, courtyard, room, portico, stable and tower have been evaluated and typified from the perspective of their spatial composition, and then the similarities and differences of the caravanseraï have been explained. The main elements of the caravanseraï have been examined according to the historical periodization of the caravanseraï. The sampling method is purposive (non-probability).

**Results:** The practical result of the research will be that a comparative study of architectural elements and their typology will determine which of these elements are common in caravanserais and are related to the spatial or functional structure of the building, and which of the physical elements of the building have changes compared to the other. Identifying common elements and understanding different elements can provide solutions for future restorers to provide more appropriate restoration solutions in caravanserais that have lost parts or damaged parts.

**Conclusion:** It should be stated that physical and metaphysical components such as: climatic, cultural, social, economic, religious, technical, and structural factors have caused various types to form in the overall shape and architectural elements of caravanserais.

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## **Introduction**

Caravanserais are divided into two main types: inner-city and outer-city. Since the scope of this study is outer-city caravanserai, only the architectural features of inner-city caravanserai will be described in the definition of caravanserai architecture. Caravanserai, like other Historical buildings, have elements and components. These elements take shape and identity together and together. Caravanserais have an entrance system that can be one or two stories. This entrance can be raised and recessed or be at the same level as the exterior facade. After the entrance, there is a vestibule space that is square or polygonal in shape. The role of the vestibule is to determine the access to the spaces. After the vestibule, there is usually a long corridor that also ends in a porch. After the porch, there is a central courtyard that can be square, rectangular, or polygonal. The central courtyard provides access to the verandas, chambers, verandahs, and stables. The chambers are located around the central courtyard and usually have a verandah in front of them. Behind the chambers and in the ring surrounding the last caravanserai, there is a stable, which is an elongated, corridor-like space. Inside the stables there is usually a dock and a seating platform. At the entrance to the stables, there are rooms for the shepherds. From the outside, the caravanserais are like an impenetrable castle, with a strong tower and rampart on their exterior. Some caravanserai uses wind catcher technology for ventilation to make the ambient temperature more balanced. Caravanserais usually have a pond or reservoir inside them or a Qanat and a spring outside the caravanserais to provide the required water (Pirnia and Afsar, 1971; Kiani and Klais, 1994; Siroux, 1978). In this study, the physical typology is based on the combination of the main architectural elements. The main elements of the caravanserais have been examined according to the historical periodization of the caravanserais.

The spatial composition of the elements is the presence or absence of the elements and the spatial placement of these elements in the general plan of the caravanserais. In addition to the main elements, the caravanserais also have secondary elements, but these elements are not present in all of these caravanserais. Factors such as physical and metaphysical components such as climate, cultural and social, political, religious, technical and structural factors cause the formation of the main and secondary elements together. Considering the facilities of the intermediate buildings, the caravanserais are of three types: simple, intermediate and combined. Simple caravanserais include only the caravanserai, intermediate caravanserais are a combination of the caravanserai with an independent water tank outside the caravanserai, and combined or complex caravanserais are a combination of the caravanserai with components such as a garden, bath, mosque, bridge, water mill, water tank, and other components. The formation of architectural patterns of caravanserais is influenced by numerous physical and metaphysical factors. Social, climatic, cultural, religious, structural, and economic aspects are among these factors. Each of these aspects has in some way led to the formation of architectural patterns. The

process of architectural evolution of caravanserais has been gradual. According to the needs of the caravanserai, their architecture has also evolved. For example, early caravanserais lacked a stable or a watering place, but with the passage of time and the needs of the caravanserai, their architectural elements have found diverse patterns in terms of shape, geometry, proportions, structure, and placement. Research shows that all the architectural elements of caravanserais have changed during the emergence of caravanserais, and the physical and metaphysical aspects mentioned above have had a significant impact on the formation of these patterns. The architecture of caravanserais is very diverse, so that a fixed and specific design cannot be explained for all of them. The diversity of caravanserais architectural patterns has resulted from the experience, ability, and high creativity of architects, the physical needs of caravanserais, and the economic capabilities of the builders of caravanserais, including governments, benefactors, wealthy individuals, and related organizations. By examining the architectural plans of caravanserais, one can see both diversity and evolution in them. With the passage of time and the evolution of Iranian architecture, the architecture of caravanserais underwent transformation and changes according to their needs and those of travelers. During the early Islamic period until the fourth century, there was not much change in the architecture of caravanserais, and their pattern followed that of pre-Islamic caravanserais. The architectural evolution of caravanserais began during the Seljuk period and reached its peak in the Safavid period. The design of the transformed caravanserais often included an entrance that was often prominent and had one or two floors, a vestibule that was quadrangular or octagonal, and a long corridor that ended in a porch and entered the central courtyard from the porch. The central courtyard, which was designed as a square, round, polygonal shape, was located at the focal point of the building and was surrounded by rooms. Behind these rooms, camel houses were located, and usually the way to access the camel inns was from the courtyard. The exterior of the caravanserais also had guard towers, a high rampart, and verandahs on the exterior of the caravanserais. After the Safavid era, the architecture of the caravanserais did not change much, and the designs were generally the same and differed in minor details. This research, for the first time, intends to review and explain the typology of the main architectural elements of the caravanserais, which include; the entrance, the verandah, the central courtyard, the porch, the rooms, the verandah in front of the room, the stable, and the tower. In the present research, the physical typology is based on the spatial composition of the main architectural elements. In the present study, the spatial composition of the main architectural elements such as: entrance, porch, room, verandah in front of the room, stable, courtyard, portico verandah of the exterior facade, and tower has been studied and evaluated.

### *Research Questions*

1. How do physical and metaphysical components affect the formation of architectural designs and types?

2. How can the commonalities and differences of caravanserais help in the conservation and restoration of caravanserais?

### **Literature Review**

A number of relevant sources of study are mentioned below. Considering the review of the research background and the present study, some innovations have been achieved in the area of study that completed previous studies. These achievements have been achieved at four levels of architecture, typology, pathology, and restoration and conservation. In his master's thesis, an author has conducted a comparative study of 4 Seljuk caravanserais in Qom, examined their architecture, and expressed their similarities and differences (Hossein Jamal, 2014). In an article, researchers have studied the architecture of 12 Seljuk caravanserais on the Khorasan Highway and compared their architectural patterns (Sultan Ahmadi and Seyyed Hamzeh, 2016). In a study, the authors have studied the entrance space of Safavid caravanserais in Khorasan, such as the front hall, entrance, vestibule, and hallway, and compared them with each other, and compared the entrance elements in the study samples (Nistani and Tatari, 2014). In a study, the layout of the caravanserais in the Isfahan region has been introduced in the spaces of the caravanserais, such as the entrance, porch, room, courtyard, the general form of the study, and the layout used in them (Vali Beig and Vahdat Pour, 2018). In a study, the caravanserais of the Isfahan region have been analyzed and evaluated from the perspective of access hierarchy, spatial circulation, full and empty space, and the geometry and proportions between spaces (Vahdatpour et al., 2019). In a research paper, the authors have examined the evolution and emergence of the architecture of courtyard caravanserais in the central regions of Iran and have studied the historical evolution of the architectural pattern of caravanserais (Kavian and Gholami, 2016). In a book, the author has defined the concept of caravanserais and its related buildings and their functions, and has also examined and introduced other similar intermediate buildings such as the Robat, Sabat, and other buildings (Pirnia and Afsar, 1971). In a detailed book, the authors have presented architectural plans of caravanserais and descriptions of their architecture, and have explained their historical period and presented the typology of caravanserais (Kiani and Klais, 1994). A research paper has defined a caravanserai and its associated buildings, introduced some caravanserai, and studied the architecture and evolution of caravanserai (Ehsani, 2002). A book has examined some Safavid caravanserai in central Iran, described their architectural features, and presented architectural plans of caravanserai (Haji Ghasemi, 2004). A researcher in his doctoral thesis has studied the typology of hot and dry caravanserai and has reached a general classification, which is the presence or absence of guard towers in the corners of the caravanserai. In the typology of caravanserai spaces, he has examined architectural features such as general shape and geometry, spatial arrangement, and access (Ayvazian, 1996). In a research paper, the typology of caravanserai has been based on the number of main and secondary courtyards and their location (Balali Oskoui et al., 2023). In an article, the authors have attempted to recover the lost spaces of

caravanserais based on a comparative study and typology (Khosravi Javid and Vali Beig, 2024). In a detailed book, the author has introduced the historical Routes of Iran from the Sassanid period to the Qajar period and studied Iranian caravanserais from the Sassanid period to the Qajar period (Siroux, 1949). In a book, the generalities of caravanserais, including history and etymology, the study of the causes of the formation of caravanserais, and the comparison of Iranian caravanserais with other caravanserais in the Middle East have been studied (Helen Brand, 2010). In research, the physical typology of caravanserais based on the spatial composition of their architectural plan (combination of room with stable) has been presented (Khosravi Javid et al., 2025). In a typological study, the Seljuk caravanserais of the Qom region were studied based on shape and form, and the samples were analyzed using a comparative method (Lotfalikhani and Danaii nia, 2017). In an article, the architecture and typology of Seljuk caravanserais in Anatolia, Turkey, were studied and the main and sub-types were presented (Darendeli & Binan, 2021). In a study, the architecture and typology of Iranian caravanserais were studied based on geographical location and geometric form (Andaroodi and Andres, 2018). In a morphological study, the Safavid caravanserais were studied based on the study of form or shape or structure, and the main types were identified and sub-types were also introduced (Shamaipour and Esmali Sangari, 2014). Researchers have studied the architecture and typology of the caravanserais of the Silk Road in an article. The authors of the article first set out to define the Silk Road and its tangible heritage, including caravanserais. The researchers believe that these structures not only represent historical heritage, but also have the potential to understand the impact of trade and culture. The purpose of the study states that this study aims to identify, typify, and characterize the architecture of commercial complexes located on historical routes by studying the major caravanserais of the Silk Road in depth. In order to obtain the findings and types of caravanserais architecture, the components of geometric form and shape, architectural design, the historiography of caravanserais, decorations, and the number of courtyards were studied and evaluated (Volichenko, et al., 2024). Study of Anatolian Seljuk caravanserais in Turkey - examining their architecture and studying symbols of power such as decorative symbols such as: lion and sun, dragon head and lion head symbol, lion, bird of prey (Onget, 2007).

## Materials and Methods

This study is quantitative and qualitative. The data analysis approach is interpretive, historical and comparative. The data collection method is based on library studies, architectural maps and field observations. The sampling method is purposive and non-probability. In the present study, 65 caravanserais were evaluated and a total of 1 pattern was identified and explained in the Sassanid period, 4 patterns in the Seljuk period, 2 patterns in the Ilkhanid period, 5 patterns in the Safavid period and 4 patterns in the Qajar period (Table 1). The studied caravanserais cover the regions of Isfahan, Yazd, Qom, Tehran and Saveh. The sample caravanserais include a variety of

geographical, spatial and historical locations and typologies. The data was initially raw, but was re-read and categorized with interpretive, historical and comparative analyses of the architectural elements of the caravanserais, and then the patterns were explained by comparing the categories and architectural indices of the samples one by one. This study seeks to identify the physical typology of the studied caravanserais. The typology of caravanserais is based on the combination of their main architectural elements. The main elements of caravanserais are elements that are constant and exist in all caravanserais. These elements include the entrance part (portal, vestibule and hallway), porch, room, verandah in front of the room, portico, camel hut, central courtyard, guard towers and verandas on the exterior. The combination and arrangement of these elements together have led to the formation of various types in caravanserais. The software used in this research is the two-dimensional AutoCAD program. Laser meters and professional high-resolution cameras were also used in the field survey. The limitations of the present research are the lack of maps and documented information on some elements and components such as the entrance device, vestibule, stable and room of ruined and damaged caravanserais and the incorrect restorations in the remaining and lost parts of the caravanserais. The method of overcoming limitations includes field observations, documentary photography, extracting information and library documents, and comparing similar caravanserais in the same cultural area.

## Result

### *Main architectural elements of caravanserais*

The main architectural elements of caravanserais (Table 2) constitute their physical nature. Architectural elements have different patterns. These elements are designed linearly in suburban caravanserais and have created a regular access hierarchy. The arrangement of these elements together forms the spatial organization of caravanserais. Each of these elements has its own specific use and, in addition to their substantive characteristics, they have different dimensions and sizes. These spaces, in addition to each having their own spatial independence, are connected and integrated with other elements. The architectural elements of caravanserais cover a wide range, but this research emphasizes the physical elements of caravanserais architecture, which include; entrance, vestibule, porch, central courtyard, room, stable, tower. In the process of recognizing and typifying architectural elements, interpretive, historical, and comparative approaches have been used to recognize, categorize, and analyze the architectural characteristics of caravansary elements and components for one-to-one comparison of samples and explanation of patterns. The method of achieving patterns and types is to use an inductive approach, that is, to analyze information from part to whole. From part to whole, that is, all the architectural details of the caravansary are interpreted and analyzed, and finally general patterns have been obtained based on a comparative study. For example, in the study of entrance types (portals), 65 samples

were examined side by side and one by one, and their inputs were interpreted, read, and compared. As a result, general patterns resulting from the study of details with a comparative approach have been obtained (Table 1).

### **Patterns obtained based on the spatial combination of the main architectural elements and based on the separation of historical periods**

In the present study, the spatial combination of the main architectural elements includes: the combination of the tower with the entrance part, the porch, the verandah in front of the room, the room, the courtyard, the portico, the camel house, and the verandah is the exterior view. In all the caravanserais in this area, these architectural elements are present according to the historical period of the caravanserais. The spatial combination of the architectural elements has been carried out according to the historical period of the caravanserais. Five historical periods, Sassanid, Seljuk, Ilkhanid, Safavid, and Qajar, have been identified in the caravanserais in this area. By spatially combining the main architectural elements in each historical period, patterns have been obtained, which are discussed in the following sections.

#### ***Sassanid Caravanserai***

A Sassanid caravanserai was identified in this area. The DeirGachin caravanserai is assigned to the Sassanid period and, according to previous researchers, was transformed during the Safavid period. The Deir Gachin caravanserai is one of the most complete Iranian caravanserais. This caravanserai has elements such as the entrance, the tower, the corridor, four porches, rooms, verandahs in front of the rooms, the camel house, the central courtyard, the exclusive royal residence, the bathhouse, the water reservoir, and the mosque. According to the title of this research, the main elements in the Deirgachin caravanserai are the tower, the entrance, the courtyard, the interior verandah, the room, the camel house and the porch (Figure 1 and Table 1).



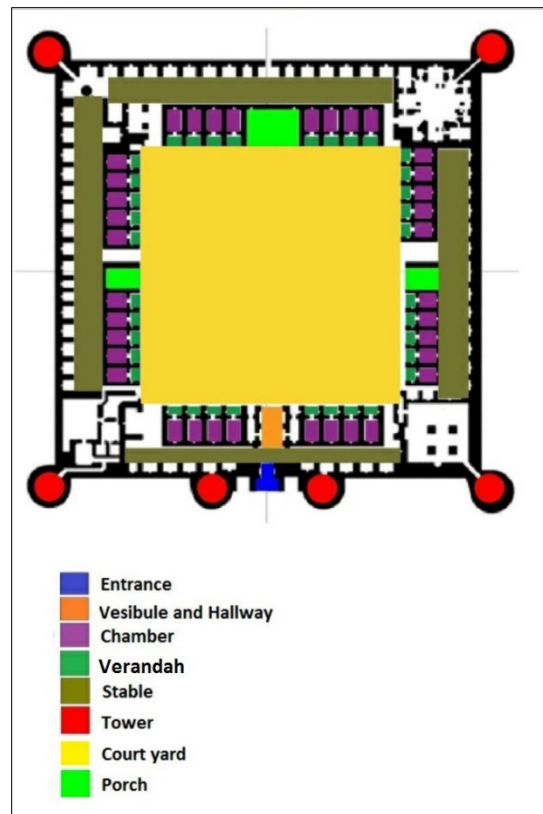


Figure 1. Location of the main elements in the map of one sample (Deir Gachin) Caravanserai (Authors, 2025).

### *Seljuk Caravanserai*

In this area, 12 Seljuk caravanserais have been selected. In most Seljuk caravanserai, the elements of the tower, the entrance, the corridor or vestibule, the room, the courtyard, the verandah, the camel house and sometimes the porch and the inner verandah are seen. Elements such as: the entrance part, the room, the porch, the courtyard, the camel house are seen in all the caravanserais in this area, but the elements of the portico and the verandah are visible in some caravanserais. In the caravanserais of this area, there is no verandah on the exterior. The main shape of the caravanserai of this area is square and trapezoid (Figure 2 and Table 1).



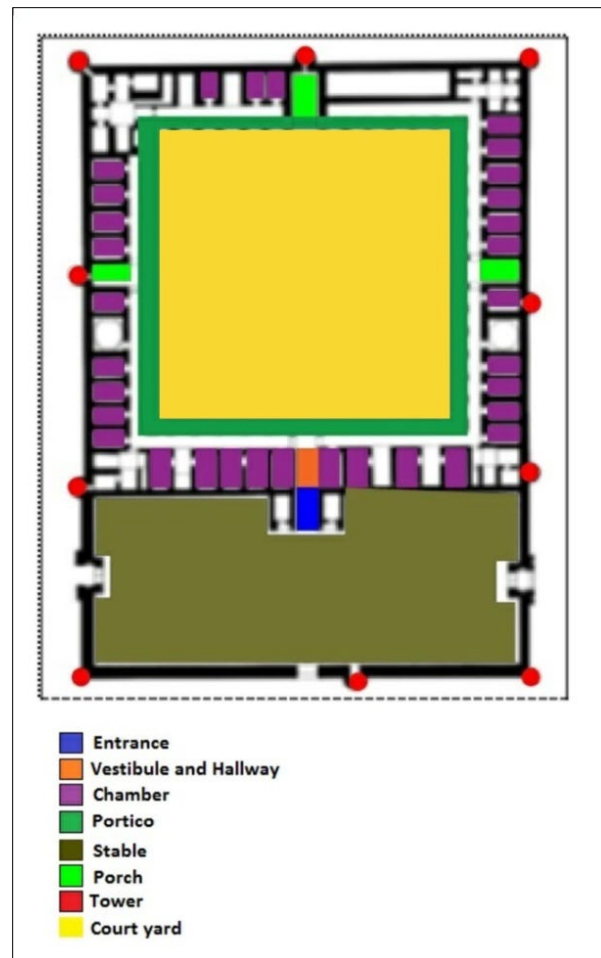


Figure 2. Location of the main elements in the map of one sample (Deir Kaj) Caravanserai (Authors, 2025).

### *Ilkhanid Caravanserai*

In this area four Ilkhanid caravanserais have been selected in this area, two architectural patterns were explained based on the combination of architectural elements. In these caravanserais, there are elements of tower, entrance part, corridor, porch, room, verandah, camel house and courtyard. In the caravanserai of this area, there is no verandah on the exterior. The main shape of these caravanserais is octagonal and square. There is no portico in the caravanserais of this area (Figure 3 and Table 1).

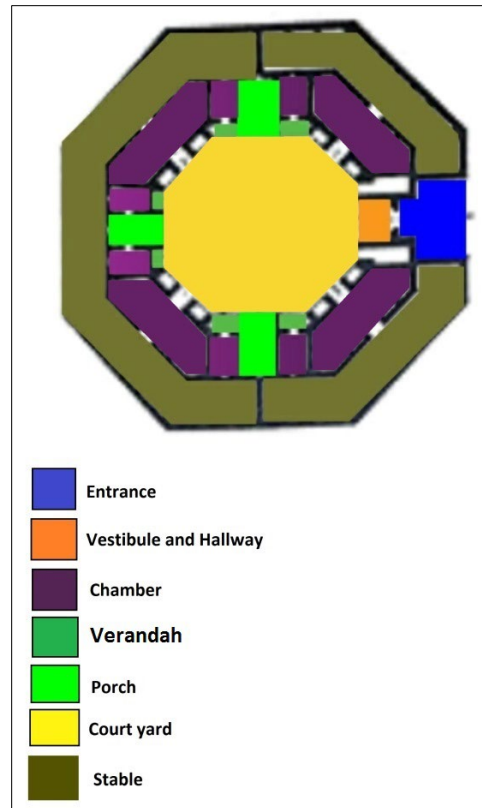


Figure 3. Location of the main elements in the map of one sample (Chahar Abad) Caravanserai (Source: Authors, 2025)

### *Safavid Caravanserai*

In the caravanserai of this area 35 Safavid caravanserais have been selected in this area, architectural elements such as towers, entrance part (portal, corridor, vestibule), porches, rooms, verandahs in front of the rooms, courtyards and camel houses can be seen. In the caravanserais of this area, there are no porticos inside courtyard and also verandahs in front of the room in some of the caravanserais of this area. In the caravanserais of this period, towers can be seen in some of the caravanserais. The main shape of these caravanserais is circular and square. Five patterns were identified in the caravanserais of this area (Figure 4 and Table 1).

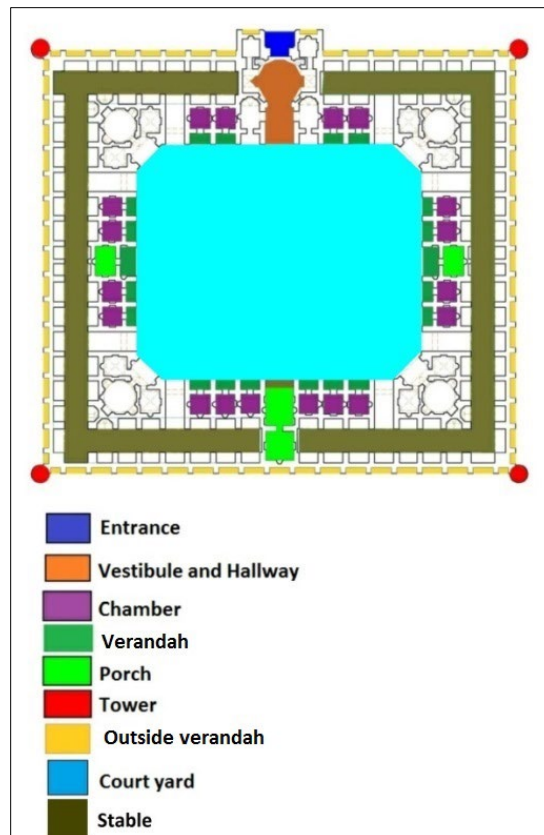


Figure 4. Location of the main elements in the map of one sample (Gaz) Caravanserai (Source: Authors, 2025)

### *Qajar Caravanserai*

In this regions, 13 Qajar caravanserais have been selected in this area, the main architectural elements are: the tower, the entrance, the corridor and vestibule, the verandahs, the rooms, the courtyard and the camel house. There is no portico in the caravanserais of this area. In some caravanserais of this area, there is no verandah on the exterior. In some caravanserais there is also no tower. Some caravanserais of this period also do not have verandah in the outside of caravanserai. In the caravanserais of this period, 4 patterns were identified (Figure 5 and Table 1).

In the Sassanid caravanserais, one pattern was identified, in the Seljuk caravanserais, 4 patterns were identified, in the Ilkhanid caravanserais, 2 patterns were identified, in the Safavid caravanserais, 5 patterns were identified, and in the Qajar caravanserais, 4 patterns were identified. In total, 16 patterns were seen in 60 caravanserais in this area. The Timurid caravanserai was not identified in this area.

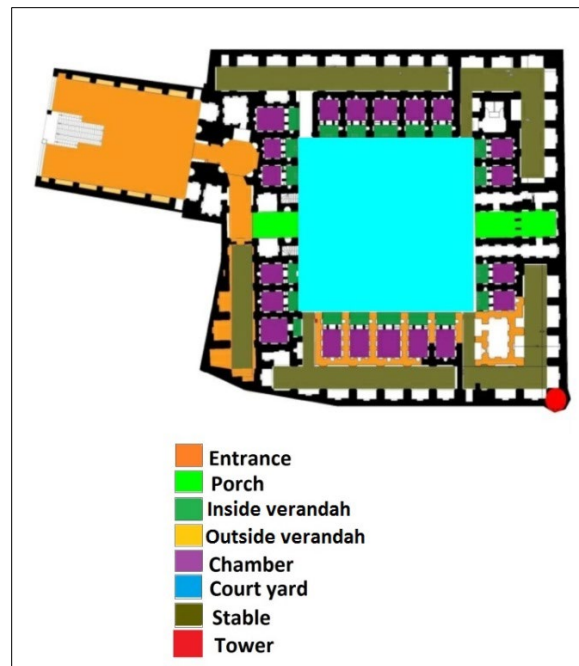


Figure 5. Location of the main elements in the map of one sample (Haj Kamal) Caravanserai (Source: Authors, 2025).

### *Analysis of Result*

(Table 1), An interpretative and comparative approach was used to analyze the findings. The results show that the pattern of architectural elements of caravanserais is a function of climatic conditions, common architectural styles, cultural and social aspects, spatial geography, historical periods, physical and functional aspects, and the creativity and innovation of architects, and these architectural elements have undergone a gradual evolution to optimize the spaces. The findings show that, considering the evolution of caravanserais in the historical period and the evolving trend of caravanserais, the main architectural elements of caravanserais as their main structure have also undergone a gradual evolution. For example, in caravanserais of the early Islamic and Seljuk centuries, the rooms usually did not have verandah in front of them and had portico instead of verandah. The geometric shape of the rooms was also often rectangular. In Seljuk caravanserais, there were often towers, these towers had structural and defensive properties. In Seljuk caravanserais, the entrance part usually included portal and hallway, and the vestibule element is less visible in the maps of this period. In Ilkhanid caravanserais, the portico element is gradually eliminated and the verandah is placed in front of the room. The caravanserais of this period had entrance and hallway. In Ilkhanid caravanserais, the camel house element finds a specific location. In Safavid caravanserais, architectural elements become more complete. In this period, the caravanserais have a more complete entrance and included portal, vestibule, and

hallway. The rooms also often have verandah in front of them. The tower element is also seen in most caravanserais of this period, and the verandah is also seen in the exterior of the caravanserais. In this period, the camel house and access to it have also changed. In Qajar caravanserais, the caravanserais usually have tower, entrance part including (portal, vestibule and hallway), room, verandah in front of room, camel house and also verandah in the exterior. In the caravanserais of this period, the evolution of the Safavid caravanserais continues and no major changes occur in the architectural structure of the caravanserais of this period.

The findings of the research are: in the Sassanid caravanserais, one pattern was identified - in the Seljuk caravanserais, four patterns - in the Ilkhanid Caravanserais, two patterns - in the Safavid caravanserais, five patterns - in the Qajar caravanserais, four patterns were identified. In the present study, one pattern was identified in the Sassanid period and 1 Caravanserais from that pattern. In the Seljuk period, 5 caravanserais were identified in the first pattern, 1 caravanserai in the second pattern, 3 caravanserais in the third pattern, and 3 caravanserais in the fourth pattern. In the Ilkhanid period, 1 caravanserai was identified from the first pattern and 3 caravanserais were identified in the second pattern. In the Safavid period, 5 Caravanserais were identified in the first pattern, 17 caravanserais were identified in the second pattern, 3 caravanserais were identified in the third pattern, 8 caravanserais were identified in the fourth pattern, and 2 caravanserais were identified in the fifth pattern. In the Qajar caravanserais, 3 caravanserais were identified in the first pattern, 4 caravanserais were identified in the second pattern, 3 caravanserais were identified in the third pattern, and 3 caravanserais were identified in the fourth pattern. Sassanid caravanserai has only one pattern. In the Seljuk period, the first pattern has the highest dispersion of the number of caravanserais. This pattern has the following spatial composition: entrance - porch - room - portico - camel house - courtyard - tower. In the Ilkhanid period, the highest dispersion is related to the second pattern. This pattern is the spatial composition: entrance-porch-room- verandah in front of the room-courtyard-camel house-tower. In the Safavid period, the highest dispersion of the number of caravanserais was in the second pattern. This pattern has the following spatial composition: entrance - porch - room - verandah in front of the room - courtyard - camel house - tower - outer verandah. In the Qajar period, the most widespread pattern is the second pattern. This pattern is the spatial composition: entrance-room-interior verandah -exterior verandah -courtyard-stable.

**Table 1. Patterns of caravanserais in each historical period (Source: Authors, 2025).**

Period	Patterns	Number of caravansaries	Name of caravanseraies
Sassanid	Deirgachin caravanserai has the tower, porch, entrance, courtyard, porch, room, camel house, porch and verandah	1	Deirgachin caravanserai
Seljuk	First pattern: Spatial composition of the entrance organization with corridor and porch and portico and room and camel house and tower	5	Kaj, Haji Abad, Dehchi Morche Khorat, Koh Namak and Ali abad Caravanserais
	Second pattern: Spatial composition of the entrance organization with corridor and porch and portico and room and camel house	1	Chah Siah Kohneh Caravanserai
	Third pattern: Spatial composition of the entrance organization with corridor and porch and room and camel house and tower	4	Sangi Parand, Robat Turk, Robat Sultan and Robat Sangi Natanz Caravanserais
	Fourth pattern: Spatial composition of the entrance organization with corridor and porch and portico and room	1	Tarlab Caravanserai
Ilkhanid	First pattern: Spatial composition of the entrance with interior verandah and room and porch and camel house	1	Chahar Abad Caravanserai
	Second pattern: Spatial composition of the entrance with porch and interior verandah and camel house and tower- room	3	Dombi, Stone Castle and Chahar Borg Caravanserais
Safavid	First Pattern: Spatial composition of the entrance with porch and room and interior verandah and camel house and tower	5	Agha Kamal Payin, Bahjat Abad, Maranjab, Vandadeh and Amin Abad Caravanserais
	Second Pattern: Spatial composition of the entrance with exterior verandah and room and porch and camel house and interior verandah and tower	17	Gaz, Agha Kama, Chah Qadeh, Deh Rabat, Zavareh, Soh, Ghahrud, Gebrabad, Madar Shah, Morche Khort, Natanz, Sadrabad, Masjid Abad, Bagh Sheikh, Dodehak, Kuhpayeh and Belaabad Caravanserais
	Third Pattern: Spatial composition of the entrance with room and interior verandah and porch and camel house	3	Aveh, Zizeh and Kenargerd Caravanserais.

	Fourth Pattern: Spatial composition of the entrance with room and porch and camel house and exterior verandah and interior verandah	8	Khoshkroud, Sardahan, Sheikh Ali Khan, Moteh, Pole Delak, Kenargerd, San San, Sheikh Ali Khan and Mahyar Caravanserais
	Fifth Pattern: Spatial composition of the entrance with porch and camel house and tower and exterior verandah and interior verandah	2	Vardeh and Pasangan Caravanserais
Qajar	First pattern: Spatial composition of the entrance with room and porch and interior verandah and Camel house	3	Deh Nar, Reza Abad and Alborz Caravanserais
	Second pattern: Spatial composition of the entrance with tower and exterior verandah and room and porch and camel house and interior verandah	4	HajKamal , Ali Abad, Qale Shoor and Atabaki Caravanserais
	Third pattern: Spatial composition of the simple entrance and room and porch and camel house and tower	3	Bagher Abad, Asgar Abad and Delak Caravanserais
	Fourth pattern: Spatial composition of the entrance with exterior verandah and porch and room and camel house and interior verandah	3	Khatun Abad, Hoze Sultan and Neistanak Caravanserais

## Discussion

The spatial combination of the main elements of caravansary architecture forms their overall shape. Physical and metaphysical factors such as climatic, cultural, social, political, religious, technical, and structural factors are influential in the formation of different types of caravansary architecture. The existence of cultural and social routes such as the Silk Road, Atbat, and pilgrimage routes has an impact on the formation of similar types. In addition to the main physical elements, some caravansary have other elements such as a special royal residence, a bathhouse, a mosque, a bazaar, a water tank, and a water pond. Geographically, they have been on the main and secondary highways, and the high traffic on the route has been one of the main factors in the formation of simple, intermediate, and complex or combined caravansary. For example, the caravansary in the Isfahan region offered more facilities due to Isfahan being the capital during the Seljuk and Safavid periods. And in addition to the main elements, there were also secondary elements. Many royal caravanserais have been formed in this region. These caravanserais were designed for the elite, such as the Jolegir, Madar Shah Morchekhord, Sheikh Ali Khan, Neistanak, Mahyar, Robat Sultan, and Robat Turk caravanserais. All of the above factors have caused some caravanserais to have more and more complete facilities and some to be simpler. The architectural elements of Iranian caravanserais have similarities and differences. These differences and commonalities have led to the formation of a diverse architectural and



physical typology. Architectural elements have undergone changes and evolution following the needs of the caravanserais. This transformation in the architectural form of the caravanserais has been subject to conditions and components such as climate, culture, common practices, local construction methods, the skill of architects, and the existence of an efficient military. Despite the similarity of the architectural elements of caravanserais, they have differences, which has caused that there are no caravanserais that are completely similar to each other. In addition to the main spaces and elements of caravanserais, this research examined secondary components such as the prayer house, the exclusive royal residence, the pond, and the platform in the middle of the courtyard, which are not considered to be the main ones and may or may not exist in every caravanseraei. The main architectural elements of caravanserais include; the entrance, the porch, the central courtyard, the rooms, the portico, the verandah in front of the room, the camel huts, and the guard towers, which are present in almost all caravanserais, depending on the historical period.

This research is based on the review of architectural elements. The results show that the evolution of these elements has been gradual and significant changes have been made in them in each historical period. Given the importance and necessity of protecting and reviewing the architectural features of caravanserais, it is necessary to identify their physical nature so that a step can be taken towards their preservation. The analysis and evaluations obtained showed that one or more caravanserais could have had a common architect and founder. By examining the architectural plans of the caravanserais, it can be said that there are caravanserais that were built in a historical period close to each other and on the same historical route, and their architectural features are very similar to each other. For example, the similarity of the architectural features of the octagonal caravanserais of Amin Abad, Khan Khoreh and Deh Bid on the one hand and the similarity of the caravanserais of Chah Qadeh and Gaz on the other hand, which were all built in a historical period close to each other and even on the same historical highway, is evidence of this claim. Recognizing these common features can be a guide in recovering the lost spaces of the caravanserais and restoring them. In the present study, physical features such as geometric proportions, the general form of the plan, and the spatial organization of the caravanserais were examined and evaluated. These physical features are visible in the combination of the main architectural elements of the caravanserais. In general, it can be said that the architecture of Iranian caravanserais is orderly and codified, follows specific principles and methods, and is subject to its previous and current common traditions and methods. Given the breadth of the statistical population studied in terms of architecture, climate, spatial geography, historical periods, their current status, and selected samples, these results and findings can be generalized to other caravanserais in the identified statistical population. By comparing the caravanserais, their differences and similarities are revealed.

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## Conclusion

In response to the first research question, it should be stated that physical and metaphysical components such as: climatic, cultural, social, economic, religious, technical, and structural factors have caused various types to form in the overall shape and architectural elements of caravanserais. For example, the climate of the region causes the formation of covered caravanserais or the presence of only a verandah in the caravanserais and the absence of rooms is due to the climate of the region. The caravanserais of Wardeh and Pasangan have no rooms and have a verandah. This type of design has emerged due to the hot climate of the region. The formation of the upper room above the entrance in some caravanserais is due to the economic, cultural and political importance of that historical route and the caravanserais. Caravanserais that had strategic locations and were in important geographical locations usually offered more facilities. The existence of spaces such as: mosque, bathhouse, coffee house and market next to the caravanserais is due to the influence of economic, political and cultural components on the design of the caravanserais. Among the influential cultural factors, we can mention the use of two courtyards, a public courtyard and a private courtyard, the separation of private and public space by designing a dedicated space for the royal residence. The use of indigenous materials and architectural elements such as: stone and brick and brickwork decorations, plastering and tiling caused.

In response to the second research question, it should be said that research findings show that caravanserais have common and different features. A comparative study of their architectural elements and typology will determine which of these elements are common in caravanserais and are related to the spatial or functional structure of the building, and which of the physical elements of the building have changes compared to the other. Recovering common elements and understanding different elements can provide solutions for future restorers to provide more appropriate restoration solutions for caravanserais that have lost parts or damaged parts. One of the uses of physical typology is to provide solutions for recovering lost parts and restoring caravanserais. By studying the patterns, the differences and similarities between caravanserais will be determined. As a result, caravanserais that are more similar to each other and share a common social, geographical, and historical path and physical and architectural features can recover lost parts and help them in future restorations, and will have the ability to be protected in the same way.

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All authors contributed equally to the conceptualization of the article and writing of the original and subsequent drafts.

**Data Availability Statement**

Data available on request from the authors.

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