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## Decoding Spatial System Patterns in Sassanian Architecture and Their Continuity in Modern Buildings: A Comparative Analysis

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### Abstract

Contemporary architects often overlook the importance of incorporating past architectural patterns, especially principles of spatial organization, into their designs. This oversight can lead to a sense of disorder in modern architecture. By revisiting and reimagining these tested patterns, architects can discover new avenues for creativity and innovation. This research examines the spatial system patterns of Sassanian architecture, aiming to extract valuable insights for contemporary architectural practice. Thus, the study identifies and presents common spatial system patterns in Sassanian architecture to demonstrate how these patterns can shape modern architectural works and foster a harmonious blend of tradition and modernity. To achieve these goals, the study employs a mixed-method approach that combines historical-interpretive research methodology with comprehensive library reviews and detailed field observations. The research questions guiding this study focus on analyzing and identifying the fundamental elements of Sassanian architectural spaces, understanding the interactions between these spaces, and uncovering the spatial organizational strategies used in their construction. The findings reveal that Sassanian palaces exhibit significant integrity in their spatial organization patterns, characterized by spatial axis, centrality, introversion and extraversion, spatial independence, spatial hierarchy, spatial transparency, intermediate spaces, contrasting spaces, symmetry, spatial continuity, and spatial hierarchy. These common patterns observed in selected Sassanian palaces underscore the fundamental principles that guided Sassanian architectural design. By understanding and incorporating these principles into contemporary architectural practice, designers can create spaces that are not only aesthetically pleasing but also functionally efficient and experientially rich.

**Keywords:** Pattern, Spatial system, Sassanian period, Spatial relationships.

## 1 | Introduction

The Iran, a vast country with a very ancient history, boasts a rich collection of buildings and cities encompassing a diverse range of architectural types, including residential, cultural, service, military, governmental, educational, and ritualistic structures. A review of writings and research related to Iranian architecture reveals that the physical form of buildings, their exterior and interior façades, structural stability,

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or decorative elements have often attracted the most attention from researchers. However, the patterns of spatial organization and their evolution over time have not been as prominently considered. Examining these patterns from various perspectives can be valuable; in the field of architectural design, understanding and recognizing these patterns and their spatial characteristics can lead to the creation of spaces that not only meet contemporary needs but also maintain continuity with the rich architectural heritage of the past [1].

Among the glorious periods in Iranian history is the Sassanian era, which includes buildings that epitomize the architectural creativity that has influenced monumental structures over the years [2]. The recurrence of a consistent geometric and architectural style over a specific period leads to the development of a geometric pattern influenced by that era, which varies across different buildings [3].

Geometry and proportions are mathematical concepts that pertain to the appropriate relationship between components and the overall work in art and architecture [4]. Applying geometry and proportions is particularly important because it creates visual beauty in architecture and visual arts [5]. Thus, it is rightly recognized as a record of the evolution of Iranian architectural history. Therefore, this paper focuses on identifying the patterns of spatial organization in this context. The study employs qualitative, analytical, and interpretive approaches. The researcher aims to use qualitative and analytical methods during the sample collection and spatial pattern analysis stages. Consequently, the variable under study is the architectural remains from the Sassanian period, which will be examined for its role in shaping spatial organization patterns. An inductive reasoning approach will be utilized to assess the impact and analyze and interpret each historical pattern.

## 1.1 | Research Questions

- I. How can the utilization of historical building patterns enhance environmental and cultural quality?
- II. What are the influential patterns of spatial organization and form in Sassanian architecture?
- III. How did the main spaces and key elements of Sassanian buildings relate to each other, and what methods were used in their spatial structure?

## 2 | Theoretical Framework and Literature Review

### 2.1 | Theoretical Framework

In the Mo'in dictionary, space is defined as a vast place, open land, and realm that the Earth occupies in the solar system. In both definitions, the term place indicates that space has a location or place one can enter; thus, space is certainly an empty place [6].

Spatial organization refers to the methods used by our predecessors to introduce, combine, and differentiate spaces in buildings and cities, as well as their awareness of how to interact with these spaces. These methods can be discovered, documented, and taught, teaching us the etiquette of human interaction with buildings and cities. At a minimum, architecture schools should teach the various methods of spatial organization. Knowing and understanding the types of spaces that predecessors organized in different forms and materials is necessary for being an architect. However, creativity and the addition of previous organizational methods are sufficient conditions [7].

In past eras, design and architecture in the vast land of Iran have always followed a specific and continuous trend, establishing a logical relationship with the time before and after them. However, this trend has not continued into the contemporary period. Among the various historical periods, the Sassanian era has been explored less in terms of pattern recognition and spatial relationships than the subsequent Islamic period. Despite this, the creation of spaces and relationships between spaces in later periods has its roots in the Sassanian period. Due to their grandeur and magnificence in a plan, examining the spatial organization patterns of Sassanian palaces can contribute to a better understanding of such spaces with large masses and vast areas [8].

In this context, the concern for creating quality in architectural spaces, as one of the primary goals of architects and researchers in this field, has drawn their attention to concepts and methods based on human experiences and the continuity of identity achieved by humans with previous generations and pre-existing human knowledge. From this perspective, the role and functions of patterns and other related concepts in the field of architecture are worthy of examination [9]. Providing a suitable foundation for addressing the identity and architecture of the Sassanian period, due to the lack of a standardized pattern for designing the architecture of that period, can help in identifying and introducing the characteristics of architecture from that era, thus enabling principled and effective steps toward discovering suitable geometric patterns of Sassanian buildings and advancing the architectural level of that period and construction in the country.

The term pattern has meanings including model, design, form, template, scheme, manual, and motif. It has been used in various senses. In a simple definition, a pattern or model is a theoretical and simplified representation of the real world [9]. Ali Akbar Dehkhoda defines a pattern as a model, example, paradigm, or template. A pattern usually refers to a small sample of a larger object or a limited set of numerous objects with the important and main features of that larger object or object [10]. Some define a pattern as a part that shows the shape or quality of the whole, while others describe it as a draft or diagram that represents the usual course of an action or behaviour and a perceptual structure [11].

Patterns can be examined in two contexts:

- I. In psychology, it is divided into behavioural patterns and archetypal patterns.
- II. In the context of environment and form, where patterns of space are considered, these two are not separate but complementary. In this research, patterns in the context of environment, form, and spatial pattern are examined, and spatial patterns can be categorized into two main groups: Spatial Pattern and Spatial Organization Pattern, as shown in *Table 1*.

**Table 1. Spatial pattern and spatial organization pattern.**

Space	Pattern	
Iwan (Porch)	Spatial organization pattern	
Courtyard		
Dome roof-vault		
Hall		
Chartaghi (Tetrapylon)		
Corridor		
Cross-shaped spaces		
Characteristics	Principles	
The deliberate alignment and organization of spaces along a specific directional axis, creating a visual or functional pathway that guides movement, sightlines, and attention through a sequence of spaces and establishing a sense of order, direction, and flow within a building or landscape.	Spatial Axis orientation	Spatial organization pattern
Organizing space around a central point or axis, creating a focal point or a dominant core area that all other elements or spaces are arranged around.	Centralization	
The balance between inward-facing spaces that enhance privacy (introversion) and outward-facing spaces that establish a connection with the external environment (extraversion).	Introversion and extraversion	
Ability to use spaces independently, such as porches and rooms	Spatial independence	

Table 1. Continue.

Characteristics	Principles
Creating a sense of dynamism, continuity, or spiritual symbolism in architecture.	Transformation of square to circle      Spatial organization pattern
Connection between interior and exterior, continuity, and coherence.	Spatial transparency
Transitional areas that serve as connectors between contrasting spatial experiences.	Intermediate space
Spaces with different qualities to create dynamic and engaging sequences.	Contrasting space
The ability for smooth and continuous movement between different spaces.	Spatial fluidity
Balance and harmony in the arrangement of architectural elements.	Symmetry in overall spatial organization
Maintaining a seamless and uninterrupted flow of movement or sight across various spaces.	Spatial continuity
Defining the importance of spaces based on a hierarchy, from primary to secondary and tertiary spaces	Spatial hierarchy

### Spatial continuity

Spatial continuity is a feature used in the space structure and the boundary between inside and outside. It can be considered an architectural capability to expand a confined space and connect it with adjacent spaces to allow for greater capacity and the possibility of physical, visual, or mental-spiritual movement. In contrast to enclosed and finished spaces, continuous and fluid spaces are characterized by a seamless path of human movement or gaze. Spatial openings in horizontal and vertical lines create transparency and fluidity within walls and columns. Therefore, continuity in spatial organization gains even greater significance [12]. Additionally, axes, which indicate directions and connect various elements, are also considered factors contributing to continuity and spatial continuity [13]. Simply put, an axis connects and relates spaces like a thread [14].

Most significant and ancient sassanian architectural and palace works:

- I. Palace of Firuzabad in Fars
- II. Palace of Shapur in Bishapur
- III. Taq-e Bostan in Kermanshah
- IV. Palace of Sarvestan in Fars
- V. Taq-e Khasra or Iwan-e Madain
- VI. Khosrow's Palace, known as Qasr-e Shirin
- VII. The Paikuli Tower [1].

Considering the mentioned discussions and sample categorization, the analyzed buildings were selected based on the following features.

- I. Architectural homogeneity: buildings with the highest degree of similarity and shared characteristics.
- II. Homogeneity in scale and function: most samples were palaces, generally possessing significant spatial quality. Thus, only those examples that are in better physical condition and accessible for direct study were selected.

- III. Possibility of direct study and access to information: direct traversal of spaces is essential for understanding the spatial qualities of architectural works. As a result, the Palace of Ardashir in Firuzabad, Qaleh Dokhtar in Firuzabad, the city of Gor, the Palace of Sarvestan, Khosrow's Palace, Takht-e Soleyman, and the Palace of Bishapur are suitable for analysis due to their similar parameters. The Palace of Sarvestan, Khosrow's Palace, and the Ardashir in Firuzabad will be analyzed.

## 2.2 | Literature Review

### 2.2.1 | Historical background

There has been extensive research on the history and architecture of Iran, with many books and articles covering various architectural styles from the earliest to the end of the Safavid period. This includes the first civilizations, the fall of the Achaemenids, Seleucids, Parthians, Sassanids (recreation of Iranian forms), the beginning of the Islamic era (new goals), the Seljuk period (beauty, concept, and function of Iranian decorations), the Mongol era (destruction), the grandeur of the Timurid era (abundance), the zenith of the Safavid period, and a selection of forms and architectural issues [1].

Professor Mohammad Karim Pirnia has examined Sassanian architecture in the third section of his book on Iranian architectural styles [15]. Ibrahim Zarei has provided valuable plans for Sassanian buildings in his book "Introduction to world architecture" [7].

The book "The history of architecture" takes an urban approach, using historical texts, remaining artefacts and documents, and existing morphological profiles to evaluate the spatial and physical transformations of what is now called a city and explain its urbanization [16]. Additionally, Peter Zumthor's book "Atmospheres" includes a dialogue between him and Marie Perle, exploring the influence of historical documentation on the design process of the Zumthor Mine Museum [17].

### 2.2.2 | Typological background (spatial organization)

Spatial organization refers to the methods that our predecessors applied in introducing, combining, and distinguishing spaces in buildings and cities, as well as their awareness of how to inhabit these spaces. These methods are discoverable, documentable, and teachable, teaching us the etiquette of interacting with buildings and cities. Understanding and recognizing the types of spaces organized by our ancestors in various forms and materials is a necessary condition for being an architect. However, creativity and the addition to previous organizational types are also required [18].

Giedion, in his book *Space, Time, and Architecture*, which discusses modern architecture and the reasons for the decline in building art, also talks about architectural design and typology, describing the essential elements of architecture in three parts: interior space, facades, and the floor plan and form of buildings [18]. Additionally, an article on typology and architectural typology describes a pattern recognition method in Iran and explores its social and evolutionary interpretation [19].

Regarding the application of geometry and proportions in architecture, the study focuses on the manifestation of mathematical concepts of geometry and proportions in global architecture and the use of geometry in sacred art and architecture of ancient civilizations like Egypt, Greece, India, and Iran [20]. An article examining the design process of architectural plans through the analysis of historical documents and the role of geometry, history, geography, stylistics, and similar case studies offers new insights into achieving geometric design [21].

Another article evaluating patterns and understanding morphological factors in architecture introduces the principles of indigenous architecture of historic Nishapur houses. It compares existing regulations, solutions, and design patterns for new housing to enhance both qualitative and quantitative aspects of residential buildings [22]. The background of this research is based on two main directions: historical background and spatial and geometric typology.

### 3 | Methodology

This research is qualitative and interpretive-historical, aiming to discover and explain causal relationships among past phenomena. The factors influencing the research have observable impacts that cannot be quantitatively measured or manipulated (added or subtracted) but are traceable. Therefore, the variable under study is the architectural remains from the Sassanian period in the research area. The initial step involves theoretical, field, and observational studies along with inductive reasoning.

The research is conducted in three stages:

- I. Stage one: the researcher studies and examines spatial organization patterns.
- II. Stage two: field studies and direct examination of these types of palaces are conducted by studying available sources on Sassanian palaces. This phase primarily involves library and research studies based on historical *sources and texts*.
- III. Stage three: an analysis of various patterns is carried out. Using previous discussions, solutions are proposed as substructures for design based on spatial organization patterns of the Sassanian period, which can serve as a basis for design. The analysis model consists of closely related concepts and hypotheses. The data obtained from the analysis are presented, and the final results are specified.

#### Selection of case study samples

To select the minimum number of relevant case studies a method for selecting samples is described, involving the screening of existing examples and selecting case studies based on this:

- I. Step one: refer to sources in the field of Sassanian architecture. A short list of Sassanian buildings deemed valuable by Iranian architectural experts in each period is compiled, and the most important and valid buildings are chosen as case studies.
- II. Step two: identify buildings within the design context. All significant buildings in Firuzabad, Fars, are selected.
- III. Step three: identify parameters of similarity among works. Works are excluded from the selection cycle based on the following parameters:
  - *Architectural homogeneity: buildings with the highest degree of similarity and shared characteristics.*
  - *Homogeneity in scale and function: among various functional scales, most samples are palaces, generally possessing significant spatial quality. Thus, only examples in better physical condition allowing direct study and information access are selected.*
  - *Possibility of direct study and access to information: direct traversal of spaces is required to understand architectural works' spatial qualities. Thus, only examples in better physical condition that allow for direct study and access to information are selected.*

#### historical authenticity

This study considers only buildings distinguished and identified by their historical period. *Fig. 1* shows the selection of case studies for analysis results.

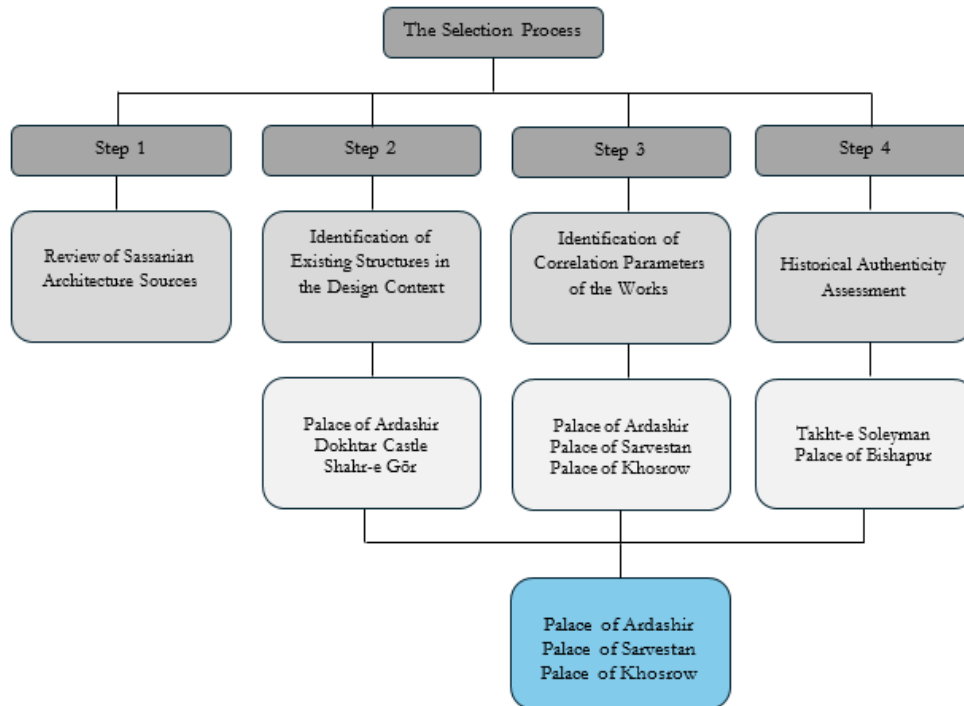


Fig. 1. Diagram of case study selection.

Based on the studies conducted, a general model for the completed and future stages of the research was provided in the first step, giving an overall view of the research. Subsequently, appropriate samples for analysis were selected through four steps. As a result, the following sites were chosen for analysis due to their similar parameters: the Palace of Ardashir in Firuzabad, the Palace of Sarvestan, and the Palace of Khosrow.

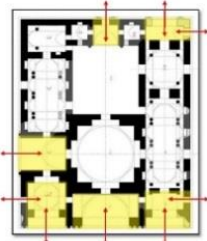
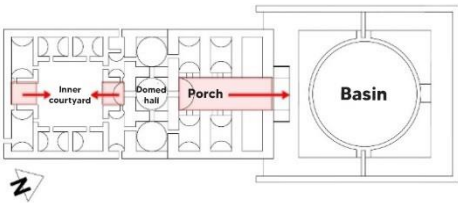
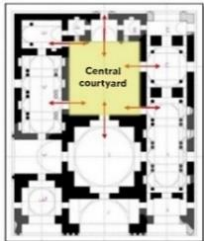
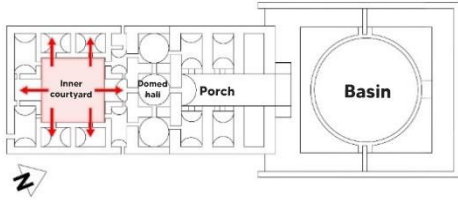
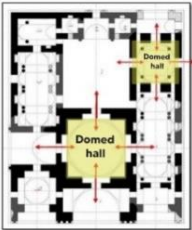
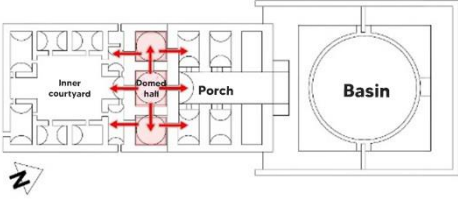
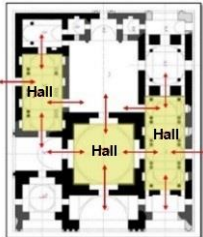
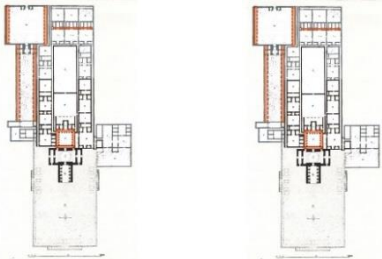
This section is divided into four parts:

- I. The first part focuses on examining and analyzing Spatial organization patterns in the Sassanian palace samples based on the explanations provided regarding Spatial patterns and Spatial organization and their structures in Sassanian architecture. For this purpose, several prominent Sassanian buildings with the most similarities in spatial structure to other samples will be analyzed.
- II. The second part includes the analysis of selected Sassanian Garden samples and identifying common patterns in landscaping.
- III. The third part involves understanding the site context, including natural and geographical features, climatic characteristics, vegetation, and animal life.

## 4 | Case Study and Findings (Identification of Space Functions)

Among the buildings of the Palace of Firuzabad and the Palace of Sarvestan, four spatial patterns — porch, courtyard, dome roof-vault, and hall—can be subject to further analysis and critique, as shown in the table below.

Table 2. Comparison of spatial patterns in sarvestan and firuzabad palaces.

Sarvestan	Firuzabad	Spatial Pattern
		Porch
		Courtyard
		Dome roof-vault
		Hall/ Portico/ Corridor

By examining the Spatial organization patterns of selected samples extracted from the Sarvestan palace, the Palace of Ardashir, and the Palace of Khosrow and comparing them, the common patterns among them are as follows:

- I. Spatial axis: strong emphasis on a central axis that organizes and manages the spatial layout.
- II. Centrality: the presence of a central core or focal point stabilizing the spatial arrangement.
- III. Introversion and extraversion: balance between inward-facing spaces that enhance privacy and outward-facing spaces that connect with the external environment.
- IV. Spatial independence: distinct and identifiable nature of individual spaces within the overall architectural composition.
- V. Spatial hierarchy: clear demarcation of spatial significance, creating a hierarchy among different spaces.
- VI. Spatial transparency: use of connections and visual apertures to enhance fluidity and spatial continuity.
- VII. Intermediate spaces: integration of transitional areas that mediate between contrasting spatial experiences.



- VIII. Contrasting spaces: deliberate juxtaposition of spaces with different qualities to create engaging and dynamic spatial sequences.
- IX. Symmetry: harmonious arrangement of architectural elements to achieve a sense of balance and order.
- X. Spatial continuity: seamless flow of movement and experience within architectural spaces.
- XI. Spatial hierarchy: clear distinction between primary, secondary, and tertiary spaces, creating a hierarchy of spatial importance.

**Table 3. Further examines the details of the mentioned patterns in each building individually, indicating their placement and impact on the floor plan.**

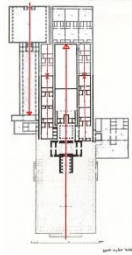
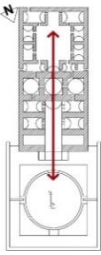
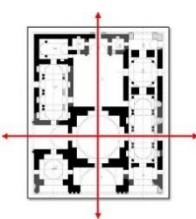
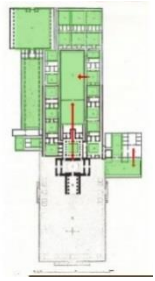
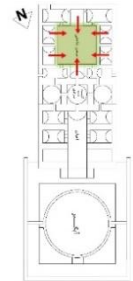
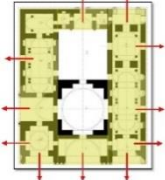
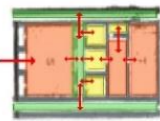
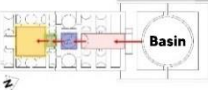
Comparison	Khosrow	Firuzabad	Sarvestan	Principles
All the examples follow this principle.	The principle of spatial axis orientation is evident in this palace.	The principle of spatial axis orientation is evident in this palace.	The principle of spatial axis orientation is evident in this palace.	Spatial axis orientation
				
The two places are introverted, but the sarvestan is extroverted due to the function of the belvedere. Introversion is prioritized over extraversion.	he Khosrow Palace is introverted.	It is introverted, and extraversion is less pronounced.	Extraversion is more pronounced.	Introversion and extraversion
				
In the palaces of Ardashir and Khosrow, this principle is almost similar and has reached its peak in Qal'eh Dokhtar, but in the Sarvestan Palace, it is followed to a very low degree.	The principle of spatial independence is more evident in this palace because it has immediate space.	The principle of spatial independence is more evident in this palace because it has immediate space.	In this palace, the principle of spatial independence is less evident because there is no intermediate space, and the separation of spaces is achieved through buttresses.	Spatial independence
All the palaces adhere to this principle.	This principle is exemplified to its fullest in this palace.	The accessibility between spaces is direct.	It lacks spatial hierarchy and spatial accessibility.	Spatial hierarchy
				

Table 3. Continue.


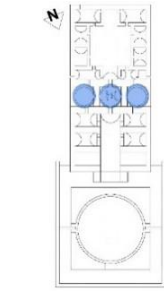
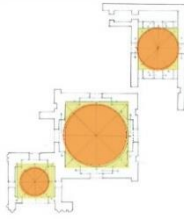

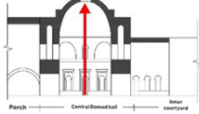
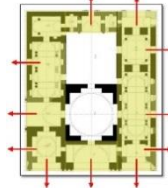
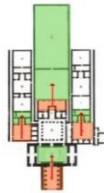
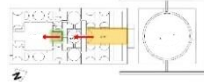
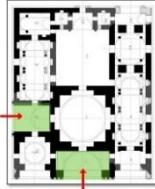
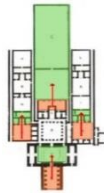
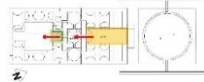
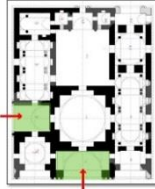
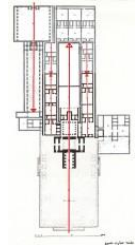
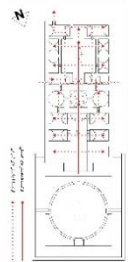
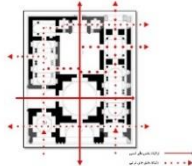
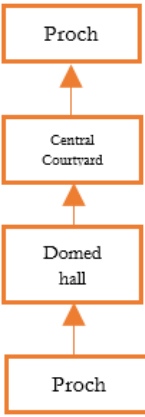
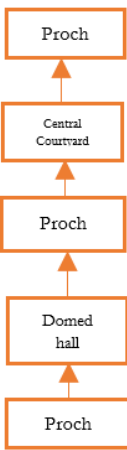
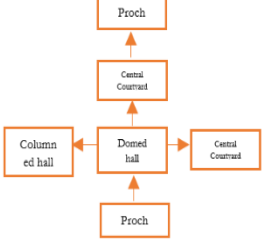
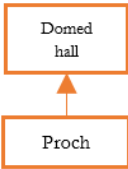
Comparison	Khosrow	Firuzabad	Sarvestan	Principles
All the palaces adhere to this principle.	It incorporates this principle. 	It incorporates this principle. 	It incorporates this principle. 	Transformation of square to circle
All samples display some degree of spatial transparency, but the palace of sarvestan has a higher degree.	It is introverted and exhibits a low degree of Spatial Transparency. 	It is introverted and exhibits a low degree of spatial transparency. 	This principle is evident due to the presence of extraversion. 	Spatial transparency
All samples incorporate this principle, though to varying degrees.	It includes Intermediate Space. 	It includes Intermediate Space. 	A lower degree of Intermediate Space is utilized. 	Intermediate space
All samples incorporate this principle, though to varying degrees.	The masterful application of contrasting spaces is observed in the palace of khosrow. 	The principle of contrasting space is evident, though less pronounced compared to that of the palace of sarvestan. 	The entire space is rectangular in form and geometry, but each has unique characteristics. 	Contrasting space
All samples incorporate this principle, though to varying degrees.	The spaces are arranged so that movement between them is smooth, fluid, and continuous. 	The sequential arrangement of spaces includes this principle. 	Fluidity is used to a limited extent. 	Spatial fluidity

Table 3. Continue.

Comparison	Khosrow	Firuzabad	Sarvestan	Principles
All examples share a common feature of spatial symmetry in the overall design and are generally more balanced.	Symmetry is present in the spaces on the façade.	The overall spatial organization exhibits symmetry.	Almost symmetrical	Symmetry in overall spatial organization
The common pattern among the palace of ardashir, the palace of sarvestan, and the palace of khusro				Spatial organization pattern
The common pattern among all samples				

Most palaces and temples from the Sassanian era are introverted due to their massive and thick walls, which often resemble fortress walls and lack openings. In these buildings, rooms are generally isolated from the surrounding area, and their internal or external openings do not adhere to aesthetic or nature-oriented principles. The introversion and disconnection between the palace/temple and its garden are evident in many examples from this period, such as the Khosrow Palace, the Fire Temple of Firuzabad, and Takht-e Soleyman. A solid wall encircles the palace/temple rooms in these structures, creating a completely introverted complex. The only connection between these belvederes and their surroundings is through the porch, which often overlooks a vast platform. However, some structures have numerous openings on the belvedere's facade, like the Garden of Sarvestan Palace. Despite these multiple openings, this palace exhibits a stronger introverted nature compared to an extroverted one, as these openings primarily serve as access points. Belvederes from the Sassanian period do not establish a strong visual connection with their surroundings.

In most Sassanian palaces, the porch facing the garden is the only opening and access route to the building. Porches are functionally categorized into two groups: first, porches are used as a main space, and second, porches serve as a transitional space. These porches might connect a courtyard to an enclosed or architectural space to an urban space. Transitional iwan (porch) structures were often referred to as pre-iwan [22].

In all external facades, there are common features that can be used for facade analysis, which are detailed as follows:

- I. Reduction of rigidity: using openings like porches and niches, as well as column facades, attempts to reduce the rigidity and uniformity of facades.
- II. Creating unity and integration: the presence of arcade forms and the visibility of the main dome roof-vault from all directions develop a sense of coherence and strive for continuity and unity in the structure.
- III. Conveying a sense of grandeur: utilizing column facades and dome roof vaults to evoke a sense of magnificence.
- IV. Creating light and shadow on the facade: using recesses made in the facade to produce light and shadow effects, adding variety to the rigid structure of the building.

**Table 4. Suggested patterns used in sassanian architecture for contemporary design.**

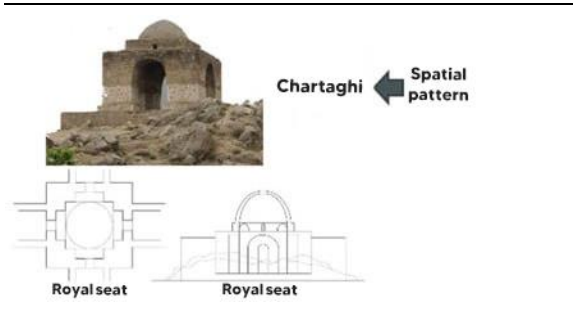
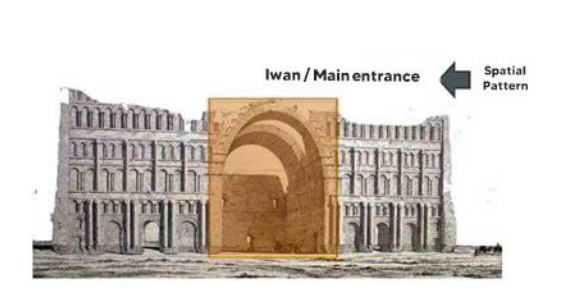
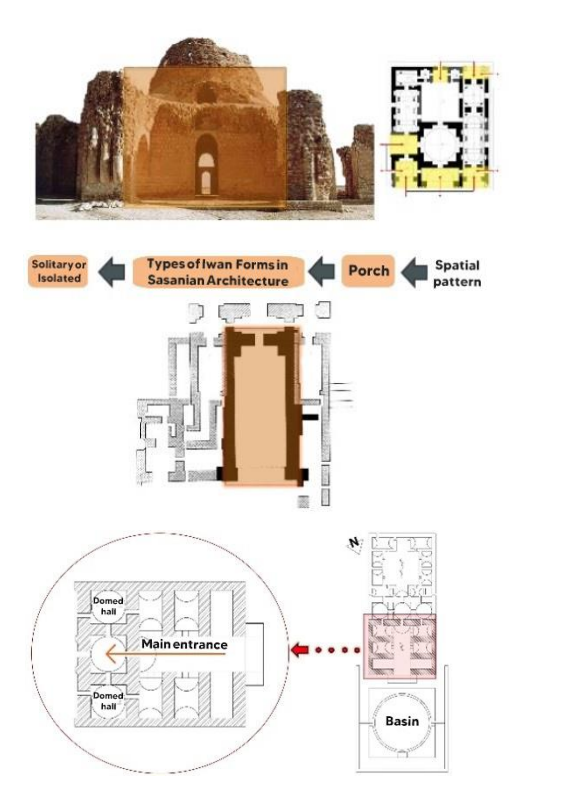
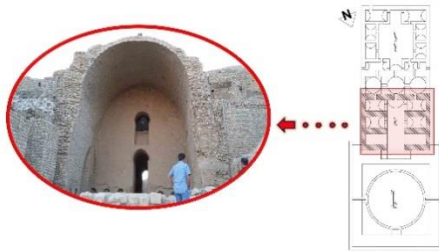
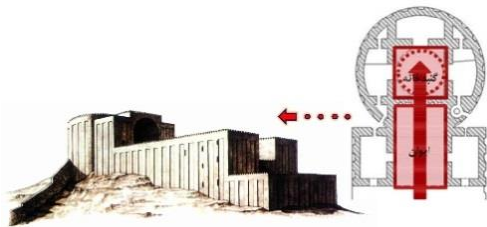
Spatial Pattern	
	<p>Utilizing the four-iwan pattern in the overall design</p>
	<p>Using the iwan spatial pattern to emphasize the main façade and reduce rigidity.</p>
	

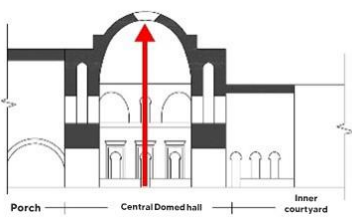
Table 4. Continue.



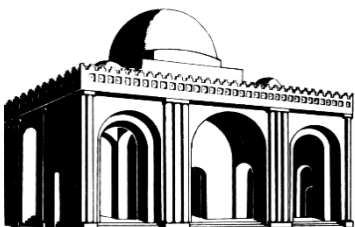
Spatial pattern of the porch in the Palace of Ardashir



Connection between the main space and the porch at the entrance and site plan



Spatial pattern of the dome roof-vault in the lobby and main entrances



Cross-shaped space in the site plan and floor plan

## 5 | Conclusion

After examining the spaces of the palaces, it is clear that common elements exist across all these structures, with Sassanian architecture effectively utilizing spatial organization patterns. Through a detailed review of case studies and the preparation of comparative tables, it has been determined which spatial organization patterns were most frequently used during this period. Some patterns, such as using the porch element and its repetition, took on unique forms specific to each building.

Patterns such as rhythm, focus on entrances, emphasis on symmetry and axis alignment, legibility of wayfinding, spatial continuity, hierarchy, transparency, fluidity, reduction of facade rigidity, creation of unity and coherence, evocation of grandeur, light and shadow effects on facades, and adherence to rectangular form and geometry, reflect the distinctive design and organization of each building from the period. While sharing common features, each building also exhibits unique characteristics that contribute to its identity.

Thus, buildings with a well-defined and cohesive spatial system can be considered more successful and enduring. They leave a lasting impact and can be revisited and reinterpreted throughout history as effective models. This represents a lost path in contemporary architecture, which can be addressed by studying historical architecture and employing innovative architects who can integrate traditional architecture with modern practices or at least adapt ancient architectural principles for contemporary use. Based on the author's analysis, some patterns have been suggested for optimal use in modern constructions.

## 6 | Limitations and Future Research Directions

- I. Insufficient attention to preservation: lack of adequate attention to preserving and maintaining historical buildings can lead to their rapid deterioration, hindering comprehensive study and understanding.
- II. Limited access to geographic areas: many Sassanian structures are located in remote or difficult-to-access regions. Geographic and access issues can impede field research.
- III. Natural erosion and damage: many Sassanian buildings have suffered from natural erosion and damage due to time, earthquakes, floods, wind, and rain, making it challenging to access architectural and structural details.

For future research, allocating funds for standard investigations and excavations and providing advanced facilities and technology can assist researchers. Despite these limitations, researchers and archaeologists continue to study and preserve Sassanian structures using modern methods and international collaborations. Efforts to address these challenges and utilize new technologies can improve research conditions and enhance our understanding of this historical period.

## Author Contributions

Ramin Houshyar conducted the conceptualization, design, and execution of the research. He was responsible for data collection, analysis, interpretation, and the writing of the original draft of the manuscript.

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## Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## Conflicts of Interest

The author declares no conflict of interest regarding the publication of this paper.

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