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Review

## Structural identities of Siirt Cas Houses in Anatolian traditional architecture

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## ABSTRACT

**Objectives:** Siirt is a city in Turkey with a rich history and has hosted many civilizations since the Neolithic period. Siirt Cas Houses date back to the 19th and 20th centuries, located in the historical city urban texture of Siirt, formed by the cultural heritages of different civilizations, showing original characteristics in plan-space organization, material selections, construction systems, cover systems, mass forms, facade layouts, floors, and ceiling details.

**Methods:** The 'architectural', 'socio-cultural' and 'climatic' identities formed by the effects of cultures, religions, lifestyles, local materials, climatic factors, local natural products, and societies lived at different periods in history, together built the structural identity of Siirt Houses. **Results:** These houses have been shaped according to this structural identity with unique characteristics. In this research, which aims to reveal the architectural, socio-cultural, and climatic analyzes and structural identities of Siirt Cas Houses, firstly information from the literature about Siirt's brief history and historical urban texture was given. Then, Siirt Cas Houses are described in detail with architectural characteristics based on our field study findings. Then, the formation of the 'architectural', 'socio-cultural' and 'climatic' identities that make up the structural identity has been comprehensively explained under the title of "structural identity" of Siirt Cas Houses, which forms the basis of our study. The formation of the structural identity of the Siirt Cas Houses, which have unique characteristics shaped by the local and climatic effects of the cultures in its history, has been evaluated and presented in the conclusion part.

## 1. Introduction

Reusing a building involves considering a variety of factors, including its location, architectural advantages, historical significance, and current market conditions. With time, the purpose of building conservation has evolved from preservation to inclusion in a larger plan for urban renewal and sustainability. According to a growing body of research, adaptive reuse is an effective method for managing the change (Bullen and Love, 2011). The transmission of the cultural identity to future generations depends on heritage buildings. When historic buildings can no longer serve their original purpose, a new use must be proposed to maintain the historical relevance of the building (Misrihsay and Günçe, 2016).

Climate is a key environmental component that influences how traditional architecture develops around the world. Old settlements and traditional homes in traditional architecture have different designs depending on environmental elements like climate, building materials,

topography, and sociocultural variances (Mashhadi, 2012).

Stones, adobe, or bricks joined together by dry, or mortar joints make up the heterogeneous material known as masonry (Eslami et al., 2012). The oldest structural system—and arguably the foundation of constructed heritage—is masonry construction. Masonry has been employed in many various kinds of structures over the years, largely because the material is readily available where it is needed. However, most conventional masonry constructions were solely intended for vertical loads. In fact, this prompted the building of enormous walls to provide both vertical and lateral stability. Empirical design guidelines based on this methodology were addressed in the early versions of building codes for masonry structures. The massive dimensions that result from planning a masonry structure in this manner, nevertheless, are incompatible with both aesthetic and architectural settings as well as financial resources. However, unreinforced masonry structures are prevalent in many nations around the world (Valente et al., 2019).

Most masonry projects constitute up the historical architectural

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foundation of numerous cities around the world (Gattesco and Boem, 2017). Gypsum mortar predominates in many historical brick masonry structures in Iran (Moayedian and Hejazi, 2021). For instance, the use of this mortar has been noted in Assyrian Parthian structures, the Taq-i Kisra in Ctesiphon's third century A.D. foundation, the Sassanid palaces of Damghan and Sarvestan, the cross vault in Neissar, the Sassanian period vaults (224–642 CE), and most Islamic brick-masonry structures, including the Bastam minaret (Hejazi et al., 2015). Most traditional buildings in Europe are constructed of masonry. Masonry walls operate as both a structural barrier and a divider. Indeed, every building is prone to ongoing structural and energy performance degradation because of human activity, the environment, and endogenous ageing (continuous degradation) (Sassu et al., 2017). The resistance behavior of adobe masonry is significantly influenced by factors like geometry, the characteristics of the soil foundation materials, reinforcing (fibres), and the compaction procedure utilized. The weakest part of the material are its joints (Sánchez et al., 2022).

Since ancient times, brick-and-mortar masonry has been a common method of building, and it is still widely employed today for new structures (Sassoni et al., 2014). As an example, adobe masonry is the main type of building material in the city of Cusco and other areas of the Peruvian Andes. Because it is inexpensive, has good thermal qualities, can be built with by unskilled labor, and is in line with highland traditions in Peru, adobe is still used to build homes. According to the Peruvian National Statistics Office, adobe masonry makes about 67% of the rural housing in Cusco (Sumerente et al., 2020).

A common building material that can be used specifically for plastering walls is gypsum mortar. Gypsum mortar can be restricted in its use for building and statue construction due to three significant flaws in this material. First, it has low compressive strength. Second; it has high water absorption, and third; it has low setting time. This material is intricate and sensitive to work with. So, it requires specialized knowledge and techniques. It is employed to decorate various surfaces by covering them (Hashempour et al., 2021). A tight microstructure of squat gypsum crystals retaining firing products as leftovers from the calcination process is a typical characteristic of high-fired mediaeval gypsum mortars (Dariz et al., 2017).

Gypsum mortar was an essential structural component of the construction of traditional jack arch floors up until the first part of the 20th century, before concrete structures were widely used, notably in the eastern half of the Iberian Peninsula. Gypsum is widely available here. By combining the use of sockets, eaves, and copings, among other things, this structural use has been extended in some locations even to structural pillars to provide protection from atmospheric agents and prevent capillary moisture rising from the ground (Vegas López-Manzanas et al., 2013).

Because gypsum plaster with siliceous fine aggregate lacks the required binding property, gypsum mortars have the major disadvantage of being highly porous. The cohesion and internal stability of the gypsum mortar were increased by the consolidation products, such as lime water, barium water, ammonium oxalate, polymethyl methacrylate, and epoxy resin, which also proved to be extremely beneficial in terms of mechanical and water resistance properties. The cognitive findings were significant in determining the optimal method for treating gypsum mortar, which has the potential to be a viable method for the renovation of old structures and in upcoming aesthetic builds (Ramamurthi et al., 2022).

In the study by Luo and Wu (2018), desulphurized gypsum was used as the cementitious ingredient for developing sprayable gypsum-based mortar. The density of the sprayable, gypsum-based mortar was decreased, construction efficiency was increased, and spraying equipment wear was lessened by adding 3% of lightweight aggregate. Sprayable gypsum-based mortar displayed a high rate of water retention and tensile bond strength at 0.2% cellulose ether concentration. The requirements for construction were met by adding 0.03–0.07% of starch ether to the mixture, which increased sagging resistance and lubricity

and improved operational performance. The sprayable gypsum-based mortar's performance satisfies the benchmark requirements when made with the combination ratio discovered through application tests.

The usage of building materials and architectural techniques up until the 20th century was influenced by the resources available in the nearby region, which explains why the same material is employed in a broad variety of construction systems throughout the built heritage. Building materials have altered as architectural buildings have advanced, growing while also thinning out their walls. The "Talavera Gypsum Formation" is an Oligocene-aged geological formation that may be found in the La Segarra area of the province of Lleida (Spain). This material is used in the construction of the regionally distinctive buildings, and its applications range from decorative accents to intricate structural systems. Gypsum is generally used in the traditional patrimony of the region, including in defensive towers, churches, castles, and private residences, among other patrimonial components of the landscape. There are numerous ways to build walls, from masonry using gypsum mortar as a bonding agent to rammed earth walls using gypsum concrete to thin mass plaster walls or walls with stone slabs inside. Plaster was typically used to cover the brick walls, though only a small amount is still visible now, primarily around door jambs, door edges, and window frames. These were constructed with a thinner, tougher plaster that also functioned as a guide to make the plastering process easier (González-Sánchez et al., 2022).

The Rincón of Ademuz in Valencia, Spain, is a mountainous area distinguished by its endogenous folk architecture, which, while being in poor condition, is still largely unchanged today. The use of gypsum as the only mortar to construct pillars, walls, floors, larders, and even to render the outside facades of structures that may have up to three or four storeys is one of its features. The primary causes of this widespread usage of gypsum in the region are its local availability and the fact that it requires less wood to heat the raw material in kilns than lime does. However, this does not imply that local gypsum is a poor substance. Its adaptability, weather resistance, and performance in construction and structures are comparable to that of other conventional mortars like lime. Contrary to what one may initially assume, the load-bearing structure is not built on stone walls. In order to prevent rising humidity and to withstand pressures from people, animals, and carriages, the basement is constructed with strong stone masonry textiles joined together with mud mortar. However, the skeleton of the building is built of gypsum pillars that are put into the masonry wall at a depth of around 40 cm, preventing the soil's moisture from rising 1 m above the stone masonry and not from the earth. In order to cover the width of the facade with one pillar at each end and the depth of the house with three pillars spaced evenly apart, with the central pillar aligning with the axis of the ridge piece, these pillars are typically built at a maximum distance of 4 to 6 m. Large wood beams made of timber joists and in-place gypsum-molding jack vaulting support the flooring of the house in between the pillars. This building concept, which consists of tiny vaults connected by joists, was designed to take full advantage of the material's unique properties. The houses have a single or double hipped roof made of wood rafters, reed, and curved tiles. Typically, the slopes are positioned parallel to the street. On top of this sloped surface is a layer of mud and straw, onto which tiles are bonded using the same substance. Partition walls composed of vertically stacked stone slabs that are covered in gypsum mortar and supported by vertical posts at the corners and bay jambs serve as markers for the interior plan. These walls were originally plastered with gypsum mortar and, more recently, whitewashed (Vegas et al., 2010).

With architectural, socio-cultural, and climatic aspects, Siirt Houses have a different identity within the traditional residential architecture in Anatolia as influenced by different civilizations, lifestyles, religions, local original materials, local products, related productions, geographical and climatic conditions to form the identity of the city (Özgen and Karadoğan, 2009).

Effect of family structures and the living culture shaped the plan and

space organizations; religions influenced the mass formation and privacy; homemade productions effected residential space requirements; terrestrial climatic conditions determined the preference of building materials, indoor-outdoor space relations and facade layout, and as a result, emerged unique design and the unique structural identity of Siirt Cas Houses (Özavcı, 2023).

Siirt Cas Houses represent a part of the traditional Anatolian residential architecture, form an important part of the historical urban fabric of Siirt, have both architectural and cultural value with their original characteristics. Most of these houses have the characteristics of cultural heritage which are trying to stand and survive today as they are abandoned in a neglected condition. Preserving and bringing Siirt Houses to the future will only be possible if they are re-functionalized with conservation principles and transferred into living buildings (Özavcı, 2023). The works to be carried out in this direction will also contribute to the existence of the houses, in accordance with their structural identities. For these reasons, the analysis of the structural identities of Siirt Cas Houses has been selected as the core subject of this study.

The traditional Siirt Houses, which face the risk of extinction with increasing severity every year, may be protected and passed to the next generations through efficient conservation and survival efforts. In order to bring vitality to the houses, their functionalization in accordance with their structural identities is required and ensure the use of their new functions with minimum problems. For this reason, it is important to determine and reveal the structural identities of these houses before the restoration works for a reuse. For this reason, the aim of our study is to analyze the architectural, socio-cultural, and climatic identities of Siirt Cas Houses and to reveal their structural identities.

Siirt Cas Houses have an important place in the historical urban fabric of Siirt, need to be protected, revitalized and passed to the next generations. For this reason, it is important to conduct studies on these houses. Although there are studies on the historical urban texture of Siirt and Siirt Houses to date, the lack of a detailed study on the architectural, socio-cultural, and climatic identities of the houses makes our research important (Aluclu ve ark. 2006). The short history and historical texture of the city of Siirt, the common architectural characteristics of Siirt Cas Houses, the analysis and determination of the architectural, socio-cultural and climatic identities that make up the structural identities of Siirt houses, and the structural identities of the houses that have revealed by our evaluation in line with these determinations constitute the limits of our study.

## 2. Theoretical framework

### 2.1. History and historical texture of Siirt

It has been determined that the history of the city of Siirt, which is a provincial center located in the southeast of Turkey, dates back to the Chalcolithic Age, Bronze and Iron Ages, starting from the Neolithic Age (8000–7000 BCE) as a result of conducted past archaeological excavations and other scientific research carried out in the vicinity of the city. As a result of the surveys and archaeological excavations carried out in 1963 under the control of Halet Çamlıbel and RJ Braidwood, within the scope of the “Southeast Anatolian Prehistoric Research Project”, findings from the Neolithic Age up to the Modern Age were determined. Akabe Road, which is estimated to date back to 3500 years ago, is located close to the city center, and remains from the Assyrians (Siirt Province Yearbook, 1998).

As a result of the archaeological excavations carried out in Türbe Höyük, Başur Höyük and Çatıtepe Höyük in and around the city center between 2002 and 2009, under the direction of Assistant Professor Haluk Sağlamtimur from the Department of Archeology of Ege University (Turkey), the first settlement unit found here was dated back to approximately 12 thousand to 13 thousand years ago.

In 3000 BCE, Semitic tribes, Babylonian, and Assyrian Empires ruled

in Siirt. The dominance of the Hurrian and Mitanni kingdoms in the city lasted for 200 years, and then Siirt and its surroundings, were captured by the Urartians, and then were invaded by the Persians in the VII century BC. The domination of the Persians, which ruled for about 300 years, take possession on the city of Siirt along with all Anatolia as a result of the expeditions of Alexander the Great. After the death of Alexander, the Great, Selepkas, Persians, Romans in the 1st century BCE; Parthians and Sassanids in the 2nd century CE dominated the region. In later periods, the city of Siirt and the nearby region passed under the rule of the Byzantines (Gökçebağ, Feran Tepe, Kurt Tepe, and various temples and churches in other nearby villages belong to this period). In the middle of the VII century AD, the Islam Caliph Omar added Diyarbakir and Al Jazeera region, especially Siirt and Hasankeyf, inside their borders (Siirt il Yılığ, 1998).

Although the attacks of the Byzantine armies in the X and XII centuries extended to Siirt, the Seljuks, who defeated the Byzantines in the Battle of Manzikert and opened their Anatolian gates, also took the Siirt surroundings under their sovereignty (Özgen and Karadoğan, 2009). The city of Siirt, which was in the hands of the Mervanis during the Battle of Manzikert, was invaded by the Mongols during the Artuqid period and later passed under the control of the Ilkhanids, the Celayirs, the Karakoyuns, the Akkoyuns, and the Safavids in 1500, and the Ayyubids in the XIV and XV centuries. After the Çaldıran war, which was lead under the command of Yavuz Sultan Selim in 1514, Diyarbakir and Hasankeyf, along with Siirt, were connected to the Ottoman Empire (Siirt Turizm Envanteri, 1991). Siirt district, which was affiliated to the Bitlis Province between 1892 and 1919, was turned into an independent sanjak with the Decision of the General Assembly No. 48 on September 26, 1919, and gained the status of a province with the establishment of the Turkish Republic in 1923. Today, the city of Siirt is rapidly developing towards the west with a population of approximately 175 thousand people, with a university educating 20 thousand students, as well as being home to many civilizations with its twelve thousand years of history, continues to exist as a cultural city (Fig. 1).

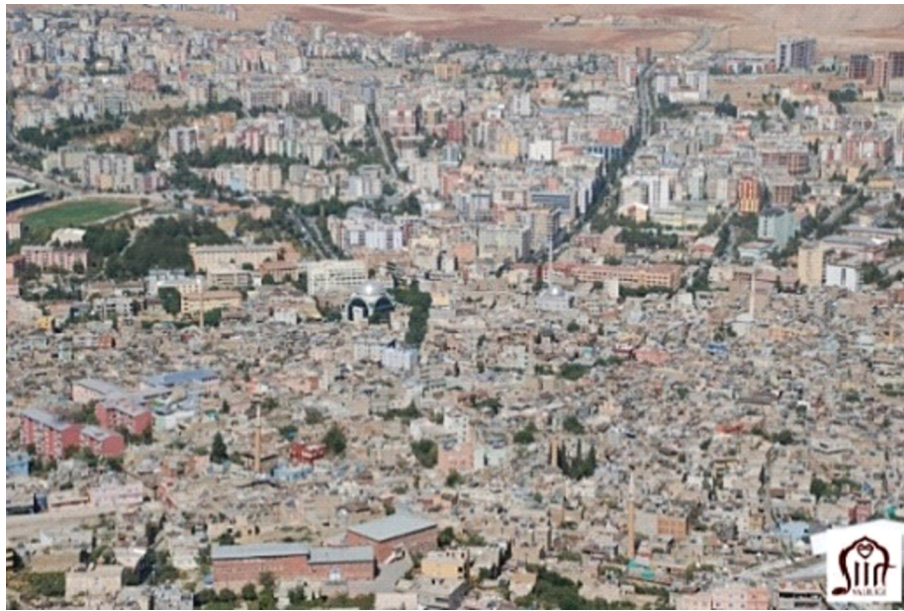
We can present the formation of today's historical urban texture of Siirt, the city cultures and civilizations dating back to the Neolithic Age in the following chronological order:

The period of Great Seljuk Atabeyliks is the period in which the first concrete evidence of the formation of today's historical urban texture of Siirt was observed. In the Seljuk period, which started with the conquest of Siirt from the Mervanis by Sultan Melikşah in 1083 and the domination of the Seljuks, the Ulu Mosque, the oldest structure of today's historical urban fabric, was built in Siirt (Fig. S1). Although date of built is not clear, the Mujahid Ishak Mosque was repaired by the Iraqi Seljuk Sultan Mahmud in 1129 and by the Seljuk Atabeyi Mujahid Ishak, who ruled Siirt in 1260 (Seçkin, 2005). The city started to develop around the Ulu Mosque from the XII century, and this region became a center where cultural, social, political, and economic activities were intensely experienced.

The Artukids, who ruled Siirt between 1102 and 1409, built the Cumhuriyet Mosque (1157) which is in the Ulus District and Asakir Mosque (1265) which is located in the Western District of the historical texture today. Siirt was captured by İmadüddin Zengi after the Artukids (İbnü'l-Esîr, XI, 94), was invaded by the Mongols and the city was largely destroyed. Later, the Ilkhanids and their successors the Celâyir people were dominated the city, before captured by the Akkoyunlus towards 1462 following the Timur invasion. The city came under the rule of the Safavids at the beginning of the 16th century (Tuncel, 2007). During the Principalities period, mosques, masjids, tombs were built in the city, but due to invasions and wars, most of these works were destroyed and could not stay present.

After the victory of Yavuz Sultan Selim against the Safavids in Çaldıran (1514), Siirt tied to the Ottoman lands. Mosques, small mosques, tombs, inns, Turkish baths, fountains and houses in the style of Traditional Turkish House were built in the city, which was a small city with four neighborhoods (Ras/Reis, Bağa, Beyder, Halfaniye) at that time.





**Fig. 1.** An overview of the Siirt city.

Some of these structures have survived and contributed to the formation of the historical texture. The Münkekir and Babuddarb mosques, Ayn salip fountain and sabats built in the late Ottoman period constitute a large part of today's historical urban fabric. In addition, most of the Cas Houses which are examples of traditional residential architecture of nowadays was built in the late Ottoman Period (T.C. [Siirt Governorate, 2021](#)).

At the end of the 19th century and the beginning of the 20th century, the Armenian revolts that took place in the close vicinity of Siirt also negatively affected the city of Siirt, and in these years, the city suffered much due to its proximity to the Russian and British fronts. During the armistice of Anatolia, city was occupied by the British army for a short time ([Tuncel, 2007](#)). Due to these events, the Ottoman Period was a destruction period for Siirt, where no progress occurred in the urban fabric. Thus, no traces of the early Ottoman period following the Principalities period can be observed in the historical urban fabric.

Siirt became a provincial center in the Republican Period started in 1923. However, the city could not develop due to the negative effects of the First World War and Independence War and the effects of changing ruler countries. In this period, the streets in districts such as İnönü, Ulus, Sakarya and Dumlupınar, which were in the center of the city, were quite narrow and irregular and were deprived of a zoning plan. Towards the 1950s, Tinaztepe, Batu, Ülkü and Karakol districts developed gradually. However, the narrow streets which were wide enough just for passage of walkers were left to the initiative of the landowners, except for the planning of the local administrations. Neighborhoods built during this period were not containing any transportation axis showing the characteristics of a street. In these neighborhoods, where there is no infrastructure and planning, no measures have been taken regarding human wealth ([Özgen and Karadoğan, 2009](#)).

Located in the Bahçelievler district, which has survived from the Republican Period, there is the Siirt Governorate old Government Office building (1945), which is an examples of Republican period architecture. In the Republican Period, especially in the years between 1950 and 1970, there was a radical change in the historical texture, and more planned constructions emerged compared to the old neighborhoods. In addition, the planning of the streets and boulevards that constitute the main transportation axes of the city has been carried out. In the Ottoman period, the structures that were built without a balcony due to religious influences were replaced by structures with balconies towards the 1940s. In this context, Cas Houses, which were built in the first half of the XX

century, were designed with balconies different from the traditional houses of the 19th century.

The historical urban fabric of Siirt continues to exist as a cultural heritage that transfers the architecture of the past to the present with the buildings built in different historical periods of the city. It is important to conduct restoration and reuse works with sensitive conservation awareness carried out by both the central and local administrations on these cultural properties which suffer from lack of adequate protection ([Fig. 2](#)).

## 2.2. Siirt Cas Houses

Siirt Cas Houses, which have an important place in Anatolian traditional residential architecture with their original characteristics, continue their existence in Siirt historical urban fabric, almost all of which are registered but require protection. The houses built in the XIX and XX Centuries were shaped by the influence of Ottoman Turkish-Islamic architecture. The architectural characteristics of the ten houses that we examined on-site with our fieldwork carried out within the scope of our research are as follows:

A culture of living based on agriculture and production; the privacy-oriented religion of Islam; and terrestrial climatic conditions with hot/dry summers and cold/rainy winters have been influential in the formation of the plan and space organization of Siirt Cas Houses. The courtyard and inward plans developed with these influences has emerged in three different forms as inner sofa, diwan and stony. Among these, the plan type with inner sofa was the most common plan ([Fig. 3](#)).

The building material of the Traditional Siirt Houses, which generally have two floors, is rubble stone and the walls of the masonry construction system are built with a thickness of 60 to 120 cm ([Ege, 2019: 98](#)). The walls were plastered with the local plaster material Cas. Baking the gypsum-limestone (Jips) supplied from the surrounding of the city and turning it into powder was the method to produce Cas material ([Aluclu et al., 2006](#)).

To facilitate the transfer of the load of the walls of the houses to the ground, the outer wall surface was narrowed inward by about 25–50 cm on two floors and raised in an upward slope from the ground. So, the walls on the ground floors of the houses are built thicker compared to the upper floors. This technique made a truncated pyramidal/conical form that narrows from the ground to the roof as a common form in all houses ([Fig. 4](#)) ([Alkan, 2018](#)).





Fig. 2. Historical and urban texture of Siirt today.

The covering system in Siirt Houses is flat roof. The flat roof formed by the earth fill is designed as an internal dome or barrel vault in some of the houses. This internal-external shape difference in the cover system is a specific feature in the region (Alkan, 2018) (Fig. 5).

The facades of the houses are usually plain. The main doors on the facades with rectangular wooden windows in the ratio of  $\frac{1}{2}$ , are generally arched and decorated around the perimeter like the crown door. The floors are also surrounded by stone moldings (Fig. 4). The floors are covered with Cas material on both floors, and the mezzanine ceilings are formed with cylindrical wooden beams and wood coated in the opposite direction (Fig. 6).

### 3. Identity in Siirt Cas Houses

Identity, which literally means “document showing who you are”, is a state of understanding, remembering and consciousness (Emen, 2013); which is also explained as the state of being distinguishable between an object and other objects. In addition, identity is a means of expressing not only individuals, but also the environment, society, and structures (Lynch, 1960). Identities whose continuity is ensured by social norms and values based on the cultures of different societies are structural identities.

To determine the structural identities of Siirt Cas Houses, which belong to the traditional residential architecture in the historical city center of Siirt, which is the subject of our research, we may categorize our analysis based on architectural, socio-cultural, and climatic identities of the houses:

#### 3.1. Architectural identity

With the determination of structural identity, architectural identity, plan-space organization, material, construction technique, covering system, mass form, facade layout and original details emerge (Hacıhasanoğlu, 1996). The traditional life cultures of the societies, the surrounding climatic conditions in the geography, the local material richness, and the effects of architectural cultures of the location are the main factors for the formation of architectural characteristics.

As a result of the traditional Siirt residential architecture, the

geographical location of the city in Anatolia, and the architectural effects of many different cultures experienced in history, its architectural identity has emerged as a cultural synthesis. Although the effects of Turkish-Islamic culture were dominant in the shaping of the structures that make up the traditional residential architecture in Siirt, the effects of different periods helped to shape architectural identity of the city. The architectural identity of traditional houses, which started with the transition to settlement life in Siirt, has developed with cultural transfers, effects of climate, local materials, and economic concerns (Demir, 2016).

In Siirt Cas Houses, plan types with inner sofa, diwan and stony form constitute the spatial organization, and the plan type with inner sofa is common characteristic. Generally, these two-floored houses are surrounded by high stone walls, include a courtyard, have an introverted planning with daily living spaces on the lower floors and spaces for night functions on the upper floors. In the houses built with the masonry construction technique, the building material was stone, and the plaster material was Cas. The cover system was a flat roof filled with soil. In some houses, the flat roof is shaped as a dome or vault in the indoor. Generally, cubic form houses have a plain facade with rectangular wooden windows. The arched doors are decorated with embroideries like the crown door, and the spaces between the floors are surrounded by stone moldings.

#### 3.2. Socio-cultural identity

Socio-cultural identity in buildings was formed by the reflection and concretization of a cultural environment and lifestyle and through participation and sharing individuals and social groups. The settlements and designed spaces reflect the social lifestyle, economic-political structure, artistic-cultural, physical and material values of that period and society (Günay and Selman, 1994). In line with these values, which are unique to each society, architecture is shaped and building forms emerge from daily needs, actions, family structure, religious belief and even graves. Housing is not only a phenomenon that meets the need for shelter, but also a socio-cultural asset. There are three basic factors in the formation of socio-cultural identity: social, cultural, and religious.

When the social structure of the Siirt Cas Houses is examined, it was

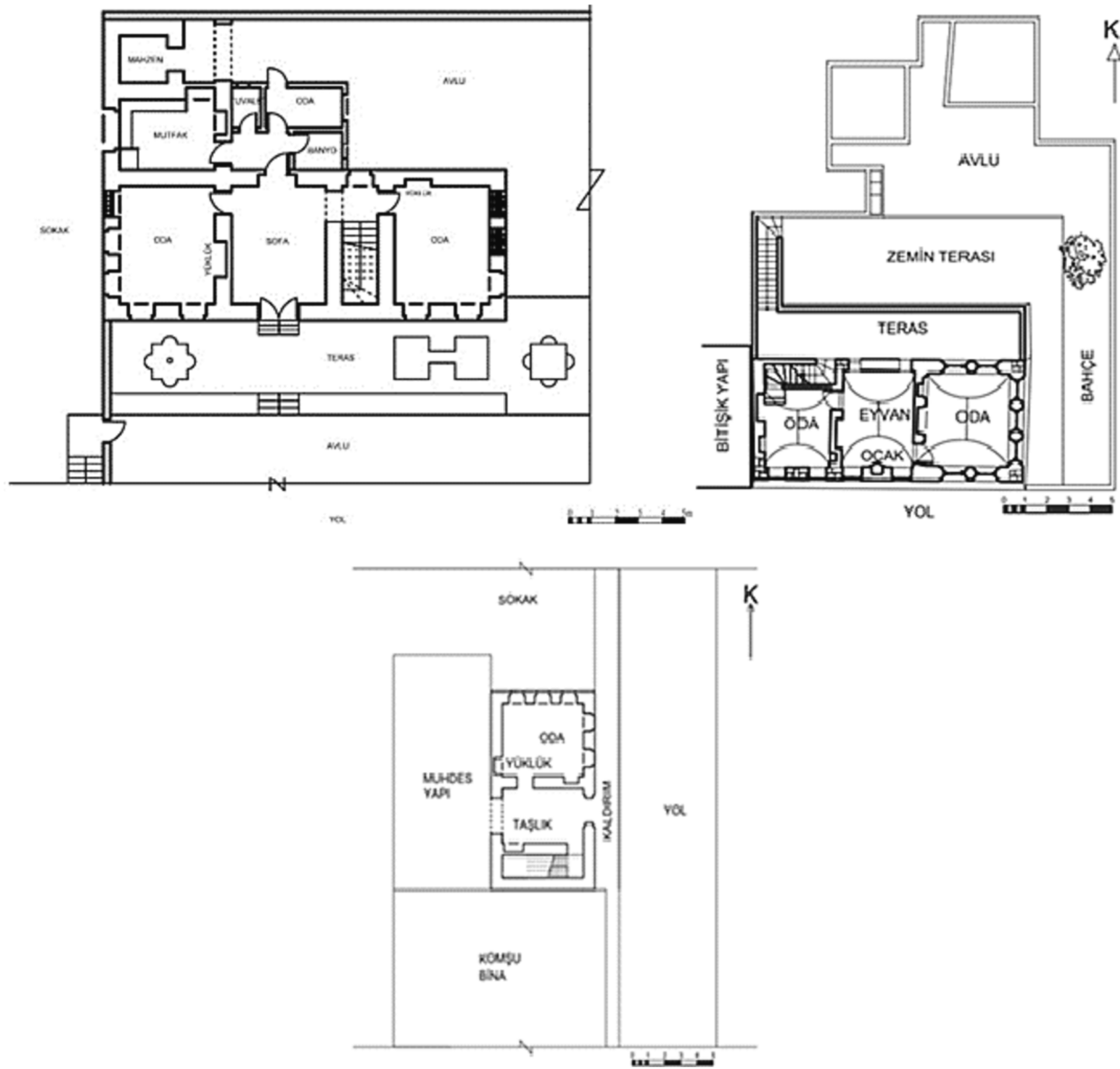


Fig. 3. Plan types of Siirt Houses, Plan type with interior hall (a), Plan type with diwan (b), and Stony plan type (c).



Fig. 4. Conical form in Siirt Houses (Author – 2020).

determined that the married family members continue to live in the same house with parents for a while, which makes continuing changes in the family population, whose main economic activities were agriculture and animal husbandry. The effects of this lifestyle added houses a flexibility in the plan, the possibility of adding and removing mass and volume depending on the change in the family population, the flamboyant main door design that symbolizes the economic situation of the household, the barn, woodshed, stove, and spatial formations where cultural foods are prepared and stored. In addition, physical planning, which strengthens neighborly relations on the street scale, manifests itself, and social relations between the residents of the houses lined up along narrow streets.

Although Siirt Houses are shaped according to the Turkish lifestyle based on the tent life of the Central Asia Turks, they have gained an identity with the influences of the cultures of different civilizations in the twelve-thousand-year history of the city of Siirt. It is known that Assyrians, Jews, and Muslims lived together at the same time in the city, had trouble-free neighborships, got married to each other and were even influenced by each other's unique food culture (Baştürk, 2007: 94). It has been determined that the architectural style of the sabats<sup>2</sup>, arched





Fig. 5. Cover system of Siirt Houses (Author – 2020).

and carved structures, the unique interior dome, and the flat laying technique origins from Syriacs and Jews, and the remaining characteristics are the architectural style, techniques and features sourced from Muslims. In the houses, the elements of the effects of the cultural richness on the architecture are the common space sofa rooted from the single space understanding of the nomadic tent life; plan types with inner sofa, diwan and stony plan shaped by the culture of day life, domed and vaulted cover system, presence of an important room as a headroom for guests, stone bench-cedar design, facade layout and decoration details used in the interior, generally to welcome guests.

The religious influence in Siirt Houses was realized by the Anatolian

Seljuk and Ottoman Period, the dominance of Islamic culture-belief. Even though the city has hosted so many civilizations, the houses were planned by Islamic values in the entire interior-exterior design process, from street scale to building scale, and the separation of male and female environments with the effect of privacy. The effects of the privacy phenomenon of the region on the architecture can be revealed as introverted living and courtyard plan scheme, high courtyard walls, the number of rooms changed due to gender differences and the location of the rooms, the design of the ghuslhane/ablution room, the presence of door knockers and prayer-verse inscriptions on the main doors, the door-window direction, dimensions, and positions. In addition, when viewed at the street scale, the development from the inside to the outside with the street-building-courtyard relationship, the fact that the houses are located opposite each other on narrow streets, and therefore the buildings do not use balconies are also privacy effects showing that the building was planned in harmony with surroundings.

### 3.3. Climatic identity

The impact of climate on human activities is well known. The formation, development and settlement of cultural elements are affected by the climate. Material cultural elements such as clothing, food and residential culture vary according to the climatic characteristics of the region where they originate. The designs of the buildings are also shaped by the effects of the climatic conditions of the geographical regions.

Indoor-outdoor planning of the houses and mass forums have been shaped by the effects of climatic conditions in Siirt which is under the influence of the continental climate with hot and dry summers and cold and rainy winters. The cover systems of Siirt Cas Houses are domed in the interior and the high ceilings are an identity detail compatible with the continental climate.

Rather than semi-open space designs such as courtyards, porticoes



Fig. 6. Floor and ceiling in Siirt Houses (Author – 2020).



and diwans in houses, the storage of important climate compatible agricultural product wheat, production rooms of grape molasses and kome, existence of units such as behu, tabok/cellar and çirtak contributes to the design of the climate (Yüksel, 2019). In addition, in the traditional residential architecture of Siirt, positioning the buildings on narrow streets in the north-south direction, door-window sizes, small skylights, the use of stone and Cas materials on the walls and the thickness of the walls, the presence of a stove and woodshed for cold winter months are the elements that affect the formation of identity of the houses by the climatic conditions.

#### 4. Evaluation and conclusion

In our research and field studies on the architectural characteristics of Traditional Siirt (Cas) Houses, it has been determined that the structural identity of the houses gains a unique quality with their architectural, socio-cultural, and climatic identities. The characteristics of the houses have gained an identity by being shaped by the effects of different cultures, climatic conditions, local material richness, living culture characteristics and religion of the region in the history. In our study, these different effects are classified under three main headings: architectural, socio-cultural, and climatic identities. In our analysis, it has been revealed that both the physical and social and cultural elements that add originality to the houses form the structural identity of the houses by shaping the architecture and space organization of the houses.

The plan-space organization that forms the architectural identity, as a synthesis of the cultures in Siirt's history, has been shaped and characterized by the effects of living cultures. In addition to the local material stone, the widespread use of Cas as a finishing material for both plaster and flooring add the houses an important architectural identity. Mass form, cover system and facade arrangement also constituted architectural characteristics in relation to cultural influences and climatic conditions. In Siirt Cas Houses, which complete their spatial formation with the effects of social life, space requirements have emerged as a reflection of life based on agriculture and animal husbandry. In addition, spatial planning has developed according to the effects of Turkish tent life culture and crowded family structure. In the multicultural history of Siirt, the cultural influences of Assyrians and Jews, as well as Muslims, have formed a socio-cultural identity in the plan schemes, cover systems, facade layouts and decoration details of the houses.

Measures such as inward planning of houses according to the privacy concept of the religion of Islam, organization of space according to gender discrimination in interior spaces, isolation of houses from the street have also been important in the formation of identity. Siirt is in the continental climate zone and this factor was affected the formation of plan schemes and mass forms, the building materials and dimensions used, and the formation of facade layouts. The necessity of local production possibilities depending on the climate has also given the houses a climatic identity by necessitating spatial arrangements.

The unique architectural, socio-cultural, and climatic identities formed by the multicultural history, lifestyles, religions, local materials and climate effects in its history form the structural identity of Siirt Cas Houses and determines its special place in traditional Anatolian residential architecture. It has been revealed that the original structural identity of Siirt Houses, which takes its name from the local material Cas, is not limited to Cas, but is formed by many different effects and constitutes a unique characteristic. We hope that our research will shed light on and be a resource for future studies on traditional residential architecture in Siirt.

There is a great diversity of solutions in Cas houses to meet every day needs of owners. This diversity exists even in common features. With today's building techniques, structures can be produced with traditional architectural approaches in which these solutions are used. Having a few living masters of Cas house construction is an important advantage that

can utilized in a team to produce 3D digital copies of these houses with all old, realized design concepts.

Restoration of these buildings as touristic areas or the construction of replicas with additive gypsum materials to ensure adaptive reuse will increase their durability. The practices of the Ministry of Health to prevent the construction of such buildings are a necessity in terms of preventing possible problems that may arise in the future. It is important that the selection of appropriate additives to be added in the Cas material will provide advantages in increasing compliance with the advanced health criteria of the future and to reduce the risk of building collapses. However, it should be noted that deciding whether to reuse a building requires a complex set of considerations, including location, heritage, architectural assets, and market trends.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jksus.2023.102938>.

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