



# Düzce University Journal of Science & Technology

Research Article

## Characteristics of Düzce Traditional Housing Architecture; The Case of Düzce Konuralp

 Elif BESLİ<sup>a</sup>,  Özlem SALLI BİDECI<sup>b,\*</sup>

<sup>a</sup> Department of Civil Engineering, Institute of Science, Düzce University, Ankara, TURKİYE

<sup>b</sup> Department of Architecture, Faculty of Art Design and Architecture, Düzce University, Düzce, TURKİYE

\* Corresponding author's e-mail address: ozlembideci@duzce.edu.tr

DOI: 10.29130/dubited.1503177

### ABSTRACT

The traditional Turkish house is a type of house that can be described as a cultural heritage, having developed since the moment the Turks appeared on the stage of history and has survived to the present day. Traditional houses are civil architectural works that are built according to the physical conditions and cultural characteristics of the environment they belong to, have become historical, and have become a national symbol. The main idea behind the creation of houses is directly related to the traditional construction rules and building materials of the period to which they belong. In the Western Black Sea Region, where the study was carried out, studies were made on the architecture of traditional houses in the Konuralp District of Düzce province. Konuralp District, a settlement where many historical layers from ancient times to the present day can be seen together, was built on the ancient Roman city of Prusias ad Hypium. In the study, six registered traditional houses, which have survived to the present day with many civil architectural works while preserving their historical texture, were evaluated in terms of building-street relationship, plan typology, facade features, materials, and construction techniques in order to determine their similarity with the architectural features of traditional Turkish houses. It was determined that the traditional houses examined were similar to the concept of Turkish house.

**Keywords:** Traditional architecture, Prusias ad Hypium, Konuralp neighborhood

## Geleneksel Konut Mimarisi Özellikleri; Düzce Konuralp Örneği

### ÖZ

Geleneksel Türk evi, Türklerin tarih sahnesine çıktığı andan itibaren gelişerek günümüze kadar ulaşan, kültür mirası olarak nitelendirilebilecek bir ev tipidir. Geleneksel evler, ait olduğu çevrenin fiziki şartlarına ve kültürel özelliklerine göre inşa edilen, tarihselleşmiş ve ulusal bir simgeye dönüşmüş sivil mimari eserlerdir. Evlerin meydana gelişindeki ana fikir, ait olduğu dönemin geleneksel yapım kuralları ve yapı malzemeleri ile doğrudan ilişkilidir. Çalışmanın yürütüldüğü Batı Karadeniz Bölgesinde, Düzce iline bağlı Konuralp Mahallesiindeki geleneksel evlerin mimarisi üzerine incelemeler yapılmıştır. Antik dönemden günümüze kadar birçok tarihsel katmanın bir arada görülebildiği yerleşim yeri olan Konuralp Mahallesi, antik Roma kenti olan Prusias ad Hypium antik kenti üzerine kurulmuştur. Çalışmada tarihi dokusunu koruyarak birçok sivil mimari eserler ile günümüze kadar ulaşan tescilli 6 geleneksel evin, geleneksel Türk evi mimari özellikleri ile benzerliğinin tespiti amacıyla bina-sokak ilişkisi, plan tipolojisi, cephe özellikleri, malzeme ve yapım teknikleri bakımından değerlendirilmiştir. İncelenen geleneksel evlerin Türk evi kavramıyla benzerlik gösterdiği belirlenmiştir.

**Anahtar Kelimeler:** Geleneksel mimari, Prusias ad Hypium, Konuralp mahallesi

# **I. INTRODUCTION**

The Turkish house has evolved through the synthesis of architectural features carried from various geographical regions where Turks have lived over centuries, integrated with their lifestyle and culture to form unique characteristics. As a result, the Turkish house reflects a specific culture and way of life through its distinctive materials, design elements, and decorations. Particularly in regions under Ottoman rule from the 17th century onwards, it facilitated the development of common spatial configurations and became widespread with characteristic facades [1]. The transition of Turks to settled life is among the most significant factors in the formation of the Turkish house type. This transition led to evolving needs and initiated changes in both lifestyle culture and architectural understanding. Differentiating itself from the tents symbolizing nomadic life, Turkish houses vary in design criteria such as spatial layout, massing, and construction techniques influenced primarily by climate conditions, terrain, available building materials, and craftsmanship. These factors have contributed to the diversity in the formation of houses. Turkey boasts a rich geography and history, making it crucial to study traditional architectural artifacts to preserve their uniqueness and pass them on as cultural heritage to future generations.

Historical buildings, which are a significant reflection of our cultural heritage, form a link between past civilizations and the present. Through these structures, it is possible to understand and interpret civilizations. Therefore, the periodic restoration and preservation of these buildings are of great importance for their permanence and transmission to future generations [2, 3].

Located in the Western Black Sea region and historically accommodating people of diverse origins, the Konuralp neighborhood in Düzce province is the heir to ancient civilizations dating back to around 1300 BC, including periods of Bithynia, Roman, Byzantine, and Ottoman civilizations. It encompasses significant tangible cultural assets such as an ancient theater, archaeological sites, Roman Bridge, Konuralp western fortress walls, aqueducts, necropolises, architectural remains, an Ottoman-era cemetery, historical mosques, and examples of civilian architecture like traditional houses.

This study evaluates and compares the preserved historical fabric of the Konuralp neighborhood, situated 8 km north of Düzce, established in the ancient city of Prusias ad Hypium. The focus is on six registered traditional houses, examining their similarity to traditional Turkish house architectural features through analysis of building-street relationships, plan typologies, facade characteristics, materials, and construction techniques.

## **II. TRADITIONAL TURKISH HOUSES**

### **A. DEFINITION OF THE TURKISH HOUSE**

The word "ev" (house) originates from the old Turkish word "eb," meaning a dwelling place built for people to reside in [4]. It is also used to describe a dwelling constructed in a size and manner suitable for housing a single family [5]. According to Celal Esad Arseven, a house in architecture refers to a substantial or wooden structure larger and more carefully constructed than a hut or shack [6]. According to Soykan, a house is feminine, it nurtures, supports, and protects. It provides comfort and facilitates an easy way of life [7]. The traditional Turkish house, on the other hand, directly reflects Turkish culture and traditions [8]. According to D. Kuban, the Turkish house is recognized and defined as a type of residence that has served the needs of Turkish people for centuries, displaying shape and plan features aligned with the living culture and customs of the traditional Turkish family [9]. Integrating harmoniously with its environment and inhabitants, the traditional Turkish house presents itself with a specific internal and external spatial organization. It serves as a mirror reflecting the physical-functional needs of its residents, their cultural-social structure, family dynamics, lifestyle, and the geographical

and topographical characteristics of its surroundings. These features have evolved over centuries in certain settlements without losing their integrity, maintaining their essence until present times [10].

## **B. FACTORS INFLUENCING THE FORMATION OF THE TURKISH HOUSE**

The factors influencing the formation of the Turkish house can be categorized into three main headings: geographical factors, historical factors, and social factors.

### **B. 1. Geographical Factors**

The influence of geographical factors on the formation of houses is divided into two main categories: climatic effects and topographic effects. Regions where Turkish houses are found generally lie within the temperate zone, but exhibit significant variations in terms of climate, heat, and precipitation between the north and south, coastal and inland areas, and due to local topography [11]. For instance, traditional houses in Erzurum, under the strong continental climatic influence, feature small windows placed high above ground and thick walls to minimize heat loss, with reduced-size "sofalar" (rooms adjacent to the main living area) [12].

The choice of plan types also reflects climatic and socio-economic influences. In Northern Anatolia, closed sofas are prevalent, contrasting with the preference for open sofas along the Aegean and Mediterranean coasts. Meanwhile, courtyard-based plan types are commonly found in Diyarbakır and Mardin [13]. These variations stemming from both topographic and climatic characteristics have significantly influenced the overall structure and materials of Turkish houses.

Different climatic conditions in geographic regions have led to variations in the materials used for construction, the positioning of structures on the terrain, and construction techniques. For example, regions with abundant rainfall in Northern Anatolia utilize wood from forested areas, whereas in dry regions like Central Anatolia, stone and adobe predominated [8,14]. One of the most notable features in the design of these houses is their distinct separation from the external environment, influenced by the rugged terrain of Anatolia. Houses in organic, naturally integrated neighborhoods often sit on sloped terrain to maximize natural light intake [14]. While the spatial and functional characteristics of houses remain consistent across different geographical regions, their external forms vary significantly [15].

The typology of Turkish houses is evaluated across seven main regions: The Black Sea coast, Istanbul and the Marmara region, the Aegean region, the Mediterranean region, the Central Anatolian region, the Eastern Anatolian region, and the Southeastern Anatolian region [16]. Turks traditionally sourced construction materials from local environments, and the varied geography and climate of Anatolia have profoundly influenced the formation and relationships of Turkish houses with their surroundings.

### **B. 2. Social Factors**

Social factors that influence the formation of the Turkish house can be categorized into two main headings: community and family structure. The formation, transformation, and development of architectural environments are profoundly influenced by family structure and lifestyle culture [17]. Parameters such as family size, lifestyle, religious beliefs, patterns of dwelling use, social relationships, economic status, production-consumption relationships, and customs and traditions within the family play a significant role in shaping the architecture of residences, influencing spatial organization and the relationship between structure and environment directly [18].

The planning of the Turkish house has been influenced by family lifestyle and cultural values. Each room in the house is designed to cater to all the users' needs [19]. Respect shown towards human beings, nature, and the immediate environment is considered one of the fundamental principles in the construction of traditional Turkish houses [20]. Following the acceptance of Islam, a more distinct division of labor between men and women emerged among Turks. The concept of privacy inherent in

religious belief influenced the inward-oriented design of Turkish houses significantly. As a result of the patriarchal family structure, the most important room became the men's quarters, often referred to as "Başoda" or "selamlık," where guests were entertained and servant relationships were structured accordingly. Over time, the "sofa" took over this functional role. Rooms used by women in Turkish homes were typically less ostentatious compared to those used by men. The relationship between the exterior environment and the house, the relationships between rooms, and the shaping of the house according to the daily life of the housewife are also evident [21]. In ancient Turkish houses, to protect family privacy, bath areas known as "kehriz" were created. These were constructed by raising and removing the floorboards within the cupboards located on either side of the hearth [22].

### **B. 3. Historical Factors**

The Turks lived a nomadic life in Central Asia due to climatic and geographical conditions, where portable dwellings symbolized by tents influenced the formation of Turkish houses. The concept of the Turkish house attained its true identity with the transition to settled life in Anatolia. There are significant similarities in terms of usage areas, functionality, and relationships between sections between the rooms that differentiated the Turkish house and the interior arrangement of tents. It can be observed that the Turkish house sofa, where tents gathered around a square, formed the source of rooms [23]. Some Turks settled into a sedentary lifestyle in Anatolia, while others remained nomadic, constantly moving to find pasture for their animals and living in tents known as "yurt" or "ak-öy." The tower houses, known as "kule ev" in Central Asia and characterized by high walls with an open perimeter, reflected in the Turkish house as the main floor being above the upper floor [21]. However, Kuban (1993) noted that the tower house was associated with defense considerations, mostly seen in noble buildings, and was foreign to the concept of the Turkish house [24]. The types of houses encountered and emulated by the Turks in Anatolia after their arrival can also be considered as origins of the Turkish house. In prehistoric times, the entrance of the crescent-shaped plan in mudbrick architecture prevalent in Central Anatolia resembled an open exterior sofa with its roof and three sides closed. The "iwan" seen today in Bukhara and Khiva is identical to this crescent. The antechamber in front of the megarons that appeared in Troy, Beycesultan, and Kültepe resembled an open exterior sofa. In later periods, the colonnades of Greek and Roman temples and courtyard buildings also had similar effects on the formation of houses. The continuity observed in elements like flat earth roofs and hearths, ovens, and other building components persists in the same regions today, indicative of a mudbrick architectural tradition. The post-and-beam method of wooden construction was also applied in Anatolia during prehistoric times and continued in Central Asia using the same technique within this geographical range. In the Byzantine period, the upper floor was the primary living space, demonstrating its equal importance in the Byzantine and Ottoman periods. It is unclear whether there was a widespread tradition of timber-framed construction in Anatolia during the Byzantine period, but this technique was frequently used in forested areas [25].

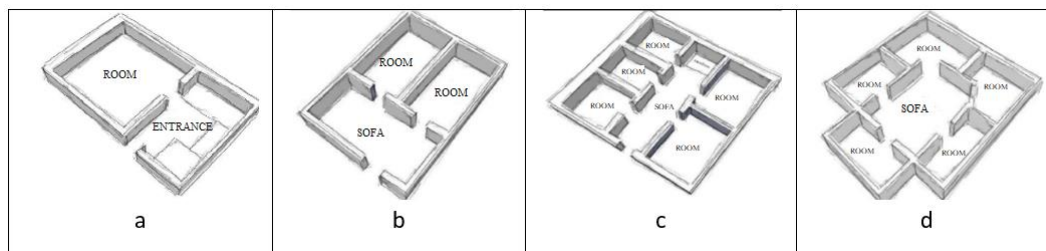
## **C. ARCHITECTURAL FEATURES OF THE TURKISH HOUSE**

The Turkish house has been examined under the headings of plan features, facade features, materials, and construction techniques.

### **C. 1. Plan Features**

Several factors have played a role in shaping the plan type of the Turkish house. Cultural and geographical factors are the most influential factors directly affecting the formation of these plans. The main elements that constitute the plan type are rooms, sofas, passages, and stairs. Studies indicate significant similarities between the Turkish nomadic dwelling, the tent, and the rooms of the Turkish house [15, 24, 26]. Following the single-roomed dwellings such as tents, the increase in the number of rooms diversified the plan types and led to the emergence of the sofa unit as a common area between rooms. The sofa is one of the most characteristic plan elements of Turkish houses, serving as a circulation space for sitting and gathering activities. Sofas are known by various names in different regions such as sergâh, sergi, sayvan, çardak, and divanhane in Turkish expression. While rooms separated by sofa extensions represent a less variable living unit, the sofa itself is a variable unit.

Therefore, the sofa determines the house plan [27]. S.H. Eldem scientifically classified the arrangement of sofas and rooms that define the plan type of the Turkish house. The sofa is a communal space where inter-room relationships are maintained, and all functions are gathered and dispersed. The eyvan at the end of the sofa contains sedirs (low seating platforms) and seki (raised platforms). Iwan is a place covered with carpets and furnished with cushions, used for daily activities where women can sit, perform household chores, socialize with friends, and chat [28]. Additionally, it is noted that eyvan's form originated in early Islamic architecture, known as “beyt” in Arabic and “talar” in Persian [24]. According to S.H. Eldem's classification, sofa types include type without sofa, outer sofa type, inner sofa type, and central sofa type (Figure 1).



**Figure 1.** Plan types *a) Without sofa b) Outer sofa c) Inner sofa d) Central sofa*

Without sofa plan; the first and most primitive plan type developed after the tent. This plan type is commonly found in hot southern regions. In houses with multiple floors, connections between lower floors are facilitated by courtyards, pavements, and sidewalks, while balconies are the most important spatial element for connecting upper floors [27, 29].

Outer sofa plan is the second stage of the Turkish house plan type. It consists of a simple row of rooms with a sofa in front. The sofa unit, which facilitates relationships between rooms, emerged with this plan type. Symmetry is not emphasized in these plan types, and the plans are flexible. Depending on the location of the sofa within the plan, it is referred to by various names such as open-front sofa (ön açık sofa), corner-open sofa (köşe açık sofa), lively sofa (hayatlı sofa), and exhibition sofa (sergahlı sofa). "I", "L", and "U" shaped variations of the dış sofalı plan schemes are more commonly preferred in rural areas [29]. Eyvans and mansions add richness to this plan type. Eyvans are created by leaving gaps between rooms to expand the sofa [23, 30].

Inner sofa plan is the most preferred plan type. The sofa is located between rooms arranged opposite each other, typically in a square or rectangular shape. Inner sofa plan type plan tipi is also known as "stuffed eggplant". The sofa is oriented towards the view, street, or light. Special spaces such as corners or sitting areas are arranged at one or both ends of the sofa to enrich the plan [23].

The central sofa plan is the most developed phase of Turkish house plan types. The sofa is located at the center of the house, surrounded by rooms on all four sides. Eyvans between rooms are used to illuminate the sofa. Besides eyvans, service spaces such as stairs, pantry, and kitchen may also be found between rooms. Initially square-shaped, the sofa has evolved to become elliptical, polygonal, or oval. Due to its sheltered nature, this plan type is preferred in regions with cold climates [27].

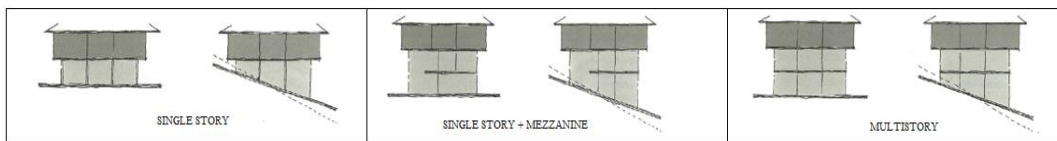
## C. 2. Facade Features

Traditional houses, reflecting the characteristics of their era, are crucial tangible assets that demonstrate the economic, sociological, and cultural aspects of their society. The facades of traditional houses are elements that contribute to the uniqueness of urban texture and reflect the culture they belong to in the urban environment. Turkish houses exhibit very simple lines in terms of general design principles, while parameters such as projections, bay windows, doors, windows, decorations, and eaves shape the facade, enhancing the aesthetic value of the street perspective [6, 31]. Due to the sense of privacy, which has

led to an inward-facing lifestyle, cantilever that were initially made in main rooms later began to be applied to other rooms on the street side [20].

### C. 3. Floor Features

Turkish houses are generally single-story or two-story, although the number of floors has increased over time. The fundamental characteristics of Turkish houses were initially observed on a single floor. To maximize light, sun, air, and views, the actual living floor, elevated 1.5-2 m above the ground on wooden posts, has been the subject of studies determining the typologies of traditional Turkish houses. In multi-story houses, the ground floor serves as a transitional floor arranged according to needs. Therefore, the ground floor, facilitating the establishment of relationships between the actual living floor and the natural environment, has been constructed with a casual approach (Figure 2) [15, 30].



*Figure 2. Upper floors and the relationship of the structure with nature in Turkish houses [15].*

The ground floor consists of garden walls and wooden columns supporting the house; it is not used for sitting. Over time, the purpose of the ground floor has changed; it has been closed with walls and used as storage, barn, hayloft, and stable. Later, an intermediate floor was added between the ground floor and the main floor, not covering the entire building area. The ceiling height is less than that of other floors. Rooms on the intermediate floor are typically used as winter rooms, hence they are more sheltered, with fewer and smaller windows. Although the importance of intermediate floors has increased over time, the upper floor has always determined the interior layout and facade appearance [19, 30].

### C. 4. Materials and Construction Techniques

Wood, stone, and adobe are the primary construction materials of traditional Turkish houses, with adobe commonly used as infill material. The availability of construction materials, influenced by the region's climate and topography, is the most important factor determining material selection. For example, wood is used in forested areas with heavy rainfall, while stone and adobe are preferred in arid regions. Thus, the materials used in construction systems and elements are sourced locally [11].

Adobe, made by mixing straw, clay, and water, has been used as a building material since ancient times. Due to its low cost and porous structure, adobe is a healthy and easily obtainable material. In traditional Turkish houses, adobe is widely used in load-bearing walls, occasionally in foundations, and as infill material in walls, as well as in floors, plaster, and mortar [32, 33, 34]. In traditional timber-framed constructions, accessibility is the most critical factor in selecting infill materials. Adobe, stone, brick, and wood are commonly encountered types of infill in traditional Turkish houses. In timber-framed constructions, the infill and wooden structure act together against earthquake forces. Since earthquake forces increase with the mass of the structure, the lightweight skeleton system of timber-framed constructions is advantageous. Especially when lightweight infill materials are used, timber-framed systems withstand earthquakes with minimal damage.

Various construction systems have been used in traditional Turkish houses, including timber frame or timber infill systems. While lower floors use timber with stone lintels, upper floors use timber framing filled with adobe or brick. The choice of material for elements such as windows, doors, roofs, floors, and stairs depends on whether the structure's load-bearing system is a natural stone and adobe or timber-based [7, 35, 36]:

-Timber Infill System: In this system, logs are placed horizontally on top of each other, either in their natural state or processing, and joined at the corners using the lap joint technique. Walls also serve as load-bearing elements.

-Timber Frame System: This system involves placing timber on stone wall foundations to a certain height to insulate from moisture. Depending on the technique used to create the wall surface, this system is divided into subgroups:

-Filling between timber frames with adobe, brick, stone, or wood.

-Uneven filling between timber frames with brick, stone, or adobe, finished with mud plaster or wooden cladding.

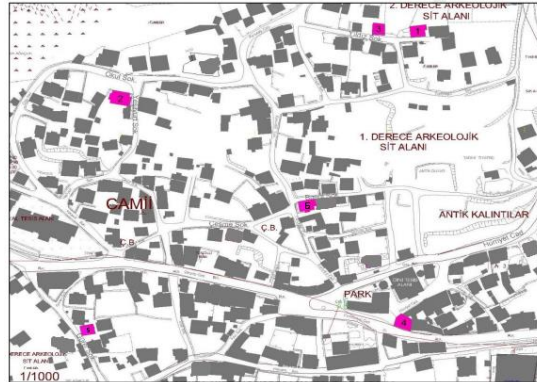
-Constructing the timber frame system using a distinct modular (panel) construction, filled with wood or stone.

-Leaving the space between timber frames empty, cladding the exterior with wood, and plastering the interior with mud using the mud plaster technique.

-Mixed System: This involves using different construction systems together.

### **III. TRADITIONAL KONURALP HOUSES**

The study area includes houses located in the Konuralp neighborhood: House No. 1 within the archaeological site limits on Topçu Street, House No. 2 on Yeşilyurt Street, House No. 3 on Yıldız Street, House No. 4 on Cumhuriyet Avenue, House No. 5 on Başol Street, and House No. 6 on Hamam Street. These houses will be referred to by their respective numbers in the explanations provided. Figure 3 shows the settlement plan of the Konuralp neighborhood with houses numbered 1 through 6.

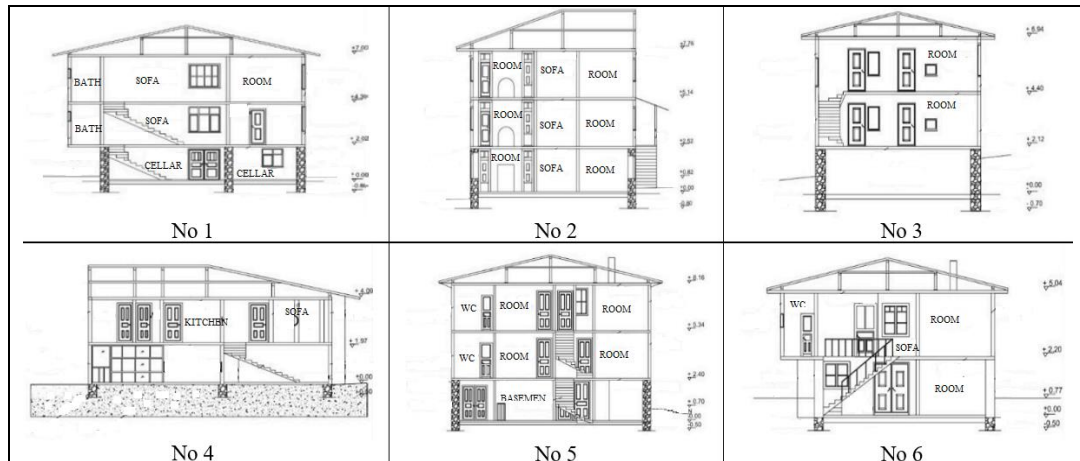


*Figure 3. Settlement Plan of Konuralp Neighborhood*

#### **A. ARCHITECTURAL PLAN FEATURES**

The fact that Konuralp houses are two or three stories tall can be associated with the evolution from single-story or two-story ancient Turkish houses, known as winter floors, which later became more common and eventually transformed into standard floors, thereby increasing the number of floors. The floor heights of the examined houses in normal floors range approximately from 240 cm to 290 cm. The arrangement of spaces on upper floors as living areas in Konuralp houses is similar to multi-story ancient Turkish houses where each floor caters to different needs, while ground floors serve functions such as storage, stable, and hayloft when there is no basement. House No. 5 has a basement, while Houses No. 3, 4, and 6 consist of ground and first floors, and Houses No. 1 and 2 consist of ground, first, and second floors. House No. 6 does not exhibit the ground floor usage characteristics typical of traditional Konuralp houses. Both the ground and first floors are suitable for performing vital functions. Section of

Houses No. 2, 3, 4, 7, and 6 are provided in Figure 4. The section plan drawings of the houses mentioned are depicted in Figure 4.



**Figure 4.** Section Plans of Houses No. 1, 2, 3, 4, 5, and 6

In the examined houses, the predominant plan type is the inner sofa type. The inner sofa plan type, commonly found in traditional Turkish houses, reflects an inward-oriented lifestyle. According to the typology of traditional Turkish house plans, House No. 3 has an outer sofa plan type, while Houses No. 1, 2, 4, and 6 exhibit inner sofa plan types. Among the examined Konuralp houses without sofa plan types, House No. 3 has a Type of I outer sofa, and House No. 5 has a corner-open sofa. On the other hand, it was observed that Houses No. 1, 3, and 6, which have a sofa with a double-armed staircase, have staircases consisting of wooden steps and railings, whereas Houses No. 4 and 5, which have an external entrance, have staircases with single-armed and reinforced concrete structures. Figure 5 shows the ground floor plans of Houses No. 1, 2, 3, 4, 5, and 6, Figure 6 displays the first-floor plans of Houses No. 1, 2, 3, 4, 5, and 6, and Figure 7 presents the second-floor plans of Houses No. 1 and 2.

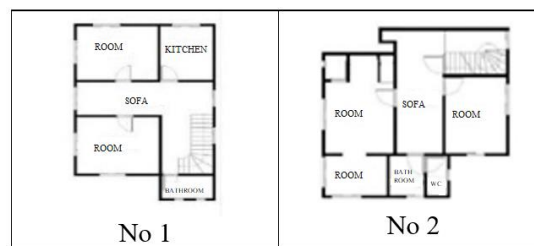


**Figure 5.** Ground Floor Plans of Houses No. 1, 2, 3, 4, 5, and 6



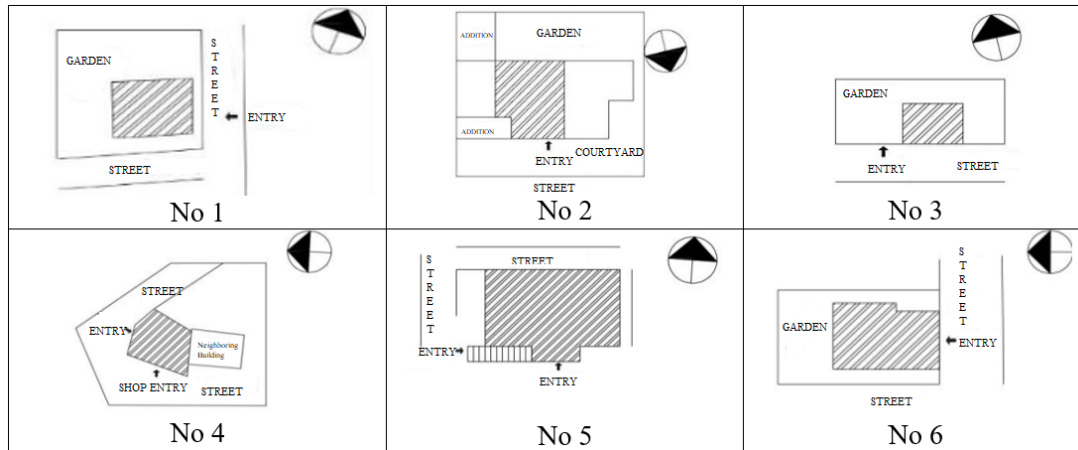


**Figure 6.** First Floor Plans of Houses No. 1, 2, 3, 4, 5, and 6



**Figure 7.** Second Floor Plans of Houses No. 1 and 2

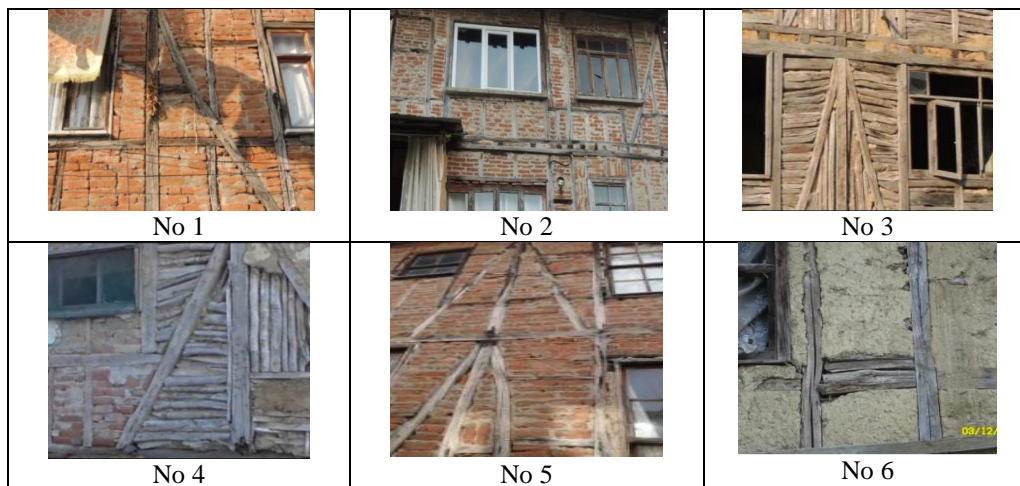
The houses are situated on sloping terrain, resulting in varying numbers of floors on different facades of some houses. It was determined that entry to the houses is either directly from the road facade or through a garden or courtyard. Houses No. 2, 3, 4, and 5 have entries from the north facade, while Houses No. 1 and 6 have entries from the south facade. Considering the positions of the examined houses on their plots, it was observed that House No. 4 faces the street directly, while the other houses have gardens and face the Street. The widths of the roads between the streets range from 3.00 m to 4.00 m, and it was found that the widths exceed 4.00 m at the intersections in Konuralp Square. Garden entrance gates are metal, while house entrance doors are wooden. The gardens associated with the houses are generally located at the rear facades and are surrounded by wire fences. There are also independent extensions used as storage in these gardens. Figure 8 provides the building-street relationships and entry directions for Houses No. 1, 2, 3, 4, 5, and 6. Some streets surrounding the examined houses have a northward slope, and it was observed that some houses' gardens are separated from the street by high walls, similar to the privacy concept seen in traditional Turkish houses. The number of windows on the street-facing facades of the houses is less than on the other facades, which coincides with this concept. It was observed that the number of windows on the south-facing facades of the rooms was higher than on the other facades, in order to benefit more from sunlight and view.



**Figure 8.** Building-Street Relationships and Entry Directions of Houses No. 1, 2, 3, 4, 5, and 6

### A.1. Construction System and Material Characteristics

The most significant factor in shaping the unique identity of Turkish houses is their spread across a diverse Anatolian geography characterized by various climates and topographic features. These climatic and topographic characteristics have influenced the form of traditional Turkish houses, spatial relationships, the choice of construction materials, and building techniques. Accessibility to materials indicates that Konuralp houses exhibit characteristic Turkish house features when considering their construction system and materials. Most of the examined houses feature a timber frame system. Houses No. 1, 2, and 5 employ timber frames with brick infill, while Houses No. 4 employ timber frames with brick infill and a timber frame with a wooden infill construction system and No. 6 use employ timber frames with mud infill. House No. 3 utilizes a timber frame with a wooden infill construction system (Figure 9). The description provides an overview of the construction systems and materials used in the examined houses, highlighting the diversity influenced by local accessibility and traditional Turkish house characteristics.



**Figure 9.** Construction Systems of Houses No. 1, 2, 3, 4, 5, and 6

Rubble stones are mostly used in foundations, while wood is used in floors, posts, and braces placed on stone blocks, and roof constructions. Figure 10 provides visuals related to the ground floor, foundation construction system, and materials used in Houses No. 1, 2, 3, 4, 5, and 6.



*Figure 10. Construction Systems and Materials Used in Houses No. 1, 2, 3, 4, 5, and 6*

## **A.2. Architectural Elements and Decorations**

### ***A.2.1. Ceiling Features***

Ceilings in most houses vary according to the floor they belong to. While applications where wooden ceiling beams are clearly visible are preferred on the basement and ground floors, there are flat wooden ceilings on the upper floors. Ceilings are typically devoid of ornamentation. Decorations in the form of ceiling centers and corner joints were observed only in House No. 6. Figure 11 provides ceiling visuals of Houses No. 1, 2, 3, 4, 5, and 6. This section describes the characteristics of ceilings in the examined houses, detailing their construction techniques and decorative elements, if any, with specific reference to Figure 11.



*Figure 11. Ceiling Images of Houses No. 1, 2, 3, 4, 5, and 6*

### A.2.2. Stairs

Wooden stairs between floors are supported by stringers, unlike traditional Turkish houses where the bottoms of stairs are mostly closed. Figure 12 shows staircase visuals of Houses No. 1, 2, 3, 4, 5, and 6. The stairs of houses 1 2 3 4 and 6 are wooden semi-revolving stairs. It can be seen that the staircase of house no. 5 has a single arm. The stair railings of houses no. 2 and 5 are circular in section and carved.



**Figure 12.** Staircase Images of Houses No. 1, 2, 3, 4, 5, and 6

### A.2.3. Door Features

In the examined houses, main entrance doors are typically double-leafed and made of wood. Ornamentation is generally absent from the metal handles and other components of these doors. It was observed that house no. 1 had a two-winged wooden door measuring 200\*190 cm without any decoration. It was found that the outer door of house no. 2 was made of 85\*200 cm and 90\*190 cm in size and was made entirely of wooden boards and nailing techniques. It was determined that house no. 3 could be entered with a wooden single-leaf door measuring 80\*190 cm and the inner surface of the door was connected with three wooden belts. It was determined that the room doors of house no. 4 were wooden single-winged and the entrance door of house no. 5 measured 230\*210 cm and was made with the nailing technique. In addition, house number 5 is located in the door niche that has survived to this day, preserving its originality. In this way, the façade is given a sense of depth and the entrance is made more protected against external influences. The glass-paned, wooden, double-winged door also has two bright windows. There is no decoration on the door and its handles are made of metal. It was determined that house number 6 measures 160\*220 cm and has a wooden double-winged door. Figure 13 provides the main entrance door visuals of Houses No. 1, 2, 3, 4, 5, and 6.



*Figure 13. Main Entrance Doors of Houses No. 1, 2, 3, 4, 5, and 6*

#### **A.2.4. Window Features**

On the south-facing facades of rooms, it has been observed that there are more windows compared to other facades to maximize sunlight and views. Figure 14 provides window visuals of Houses No. 1, 2, 3, 4, 5, and 6. Considering the types of windows, it was determined that upper floors often feature vertically opening single-leafed wooden sash windows, commonly found in traditional Turkish houses (Figure 14. 1., 4., 5., and 6.). In basement floors and ground floors not serving vital functions, single or double-leafed windows are used instead of sash windows (Figure 14.2.). In this context, the careful designs applied to the upper floors in traditional Turkish houses can be seen reflected in Konuralp houses.

In some houses, wooden interior windows are arranged on walls facing the living space to allow light into rooms (Figure 14.3.). The frequent occurrence of interior windows in Konuralp houses is another similarity they share with traditional Turkish houses. Figure 14 provides window visuals of Houses No. 1, 2, 3, 4, 5, and 6.



*Figure 14. Windows of Houses No. 1, 2, 3, 4, 5, and 6*

### ***A.2.5. Hearthstone and Cupboards***

In the rooms arranged on both sides of the sofa, at least one hearthstone, locally referred to as "ocak," and cupboards designed to meet various needs have been found on both sides of the hearth. The hearths are circular in shape and undecorated. Due to changing living conditions, the hearths originally used for heating purposes have now lost their function. Attempts were made to address heating needs by connecting stove pipes to the hole on top of the hearth. The cupboards adjacent to the hearth serve functions such as bathrooms, wardrobes, pantries, and kitchens. However, cupboards designed as bathrooms have lost their function over time. This situation can be associated with bathrooms being solved in different parts of the plan. The wall where the hearth and cupboards are located is positioned in the direction of the room door opening. This connection of the wall with the wall where the room entrance door is located is reminiscent of traditional Turkish houses. Figure 15 shows images of traditional hearths and cupboards found in houses numbered 2, 3, 5, and 6.



**Figure 15.** *Traditional Hearthstones and Cupboards in Houses No. 2, 3, 5, and 6*

## **IV. CONCLUSION**

Preserving the historical texture and immovable cultural assets while maintaining its traditional identity is crucial for the Konuralp neighborhood, which has survived to the present day. Military, religious, and civilian architectural structures in Konuralp, which are at risk of disappearing, should be preserved and sustained. Registered houses in Konuralp, which are increasingly endangered, should undergo restoration efforts that do not disrupt the historical fabric, taking into account the needs of the region.

As a result of the study, according to the information obtained from the houses examined, it was determined that the building-street relationship, plan type, facade features and building material selection, which are affected by geographical, social and historical factors, are similar to the traditional Turkish house concept.

**ACKNOWLEDGEMENTS:** This study was derived from the thesis titled "Examination of Traditional Turkish House Architecture: The Example of Konuralp, Düzce," which was accepted by the Düzce University Institute of Natural and Applied Sciences in 2019.

## **V. REFERENCES**

- [1] H. Karpuz, "Türk evi," *Türk Yurdu Journal*, vol. 31, no. 290, pp. 55-63, 2011.
- [2] Ş. Gürsoy, Y. Turcan, K. Şık., "Comparison of designs according to different codes under earthquake loads of wooden structures," *Sakarya International Symposium of Earthquake Engineering*

“The Learning Outcomes of Marmara Earthquake in the First Decade”, 1-3 October, Kocaeli, Türkiye, 2009, 8-18.

- [3] M. Saatci, Ş. Gürsoy, Y. Turcan, “Investigation of the effects of different types of traditional timber loadbearing systems used in Turkey on building behaviour,” *ICONARP International Journal of Architecture and Planning*, 10 (1), 2022, pp. 179-202.
- [4] M. Larousse, “Ev” maddesi 4 C., Meydan Publisher, İstanbul, Türkiye, 1990.
- [5] D. Hasol, *Ansiklopedik mimarlık sözlüğü*, Yem Publisher, İstanbul, Türkiye, no.184, 1990.
- [6] C. E. Arseven, *Türk sanatı tarihi*, Maarif Publisher, VII. Fascicule, İstanbul, Türkiye, p. 535.
- [7] Ö. N. Soykan, “Ev üstüne felsefece bir deneme,” *Cogito Journal*, no. 18, pp. 101-112, 1999.
- [8] Y. Gögebakan, “Factors that determine the formation of traditional Turkish house having characteristics value and general features of these houses,” *İnönü University Journal of Culture and Art*, vol. 1, no.1, pp. 41-55, 2015.
- [9] D. Kuban, *Sanat tarihimizin sorunları*, Çağdaş Publisher, İstanbul, 1975.
- [10] M. M. Önal, S. Çellek, “Traditional Turkish houses in Anatolia, their structural properties, case study; Yozgat and Kırşehir,” *International Bozok Symposium*, Yozgat, Türkiye, 2016, pp. 315-331.
- [11] S. Başlılar Altun, “Traditional Turkish houses, used construction materials, construction elements and construction techniques,” M.S. thesis, Architecture, Institute of Natural and Applied Sciences, Karadeniz Technical University, Trabzon, Türkiye, 2008.
- [12] Y. Gök, A. Kayserili, “The investigation of the Erzurum traditional houses from the perspective of cultural geography,” *Eastern Geographical Review*, vol.18, no.30, pp. 175-216, 2014.
- [13] C. Karagülle, “The evaluation of local data in house design process: Mardin example,” Ph.D. dissertation, Architecture, Institute of Natural and Applied Sciences, Istanbul Technical University, İstanbul, Türkiye, 2009.
- [14] M. Baran, M. Yıldırım, “The traditional Turkish house and the use of color,” *Electronic Journal of Social Sciences*, vol. 7, Issue 26, pp. 223-234, 2008.
- [15] Ö. Küçükerman, “*Turkish house in search of spatial identity*,” Türkiye Turing ve Otomobil Institution, 2nd edition, İstanbul, Türkiye, 1985.
- [16] Y. Arat, “Analysis of traditional Turkish house indoor components based on anthropometric data; Konya houses,” Ph.D. dissertation, Architecture, Institute of Natural and Applied Sciences, Selçuk University, Konya, Türkiye, 2011.
- [17] M. Davulcu, “The folk architecture in the rural settlements of Bartın,” *TURUK International Language, Literature and Folklore Researches Journal*, year.4, no.8, pp. 93-144, 2016.
- [18] G. Yeler, “Analysis of ecological and social-cultural factors in dwelling architecture,” M.S. thesis, Architecture, Institute of Science and Technology, Trakya University, Edirne, Türkiye, 2004.
- [19] E. B. Burkut, “Reading Ottoman / Turkish house space installation in modern residential housing architecture (Houses of Wright, Corbusier, Eldem and Cansever),” M.S. thesis, Institute of Architecture, Engineering and Science, Fatih Sultan Mehmet Foundation University, İstanbul, 2014.

- [20] K.H. Yıldırım, M. Lütfi, "Türk yaşam kültürünün geleneksel türk evlerindeki yansımaları," *4th International Turkish culture and art congress/art activity*, Egypt, 2009, pp. 114-120.
- [21] M. E. Coşkun, "Construction materials and techniques in Turkish houses," M.S. thesis, Architecture, Institute of Natural and Applied Sciences, Haliç University, İstanbul, Türkiye, 2013.
- [22] S. Oymael, H. K. Çakır, Ö. Sallı Bideci, "Interpration of traditional architectural applications," *6th International Advanced Technologies Symposium (IATS'11)*, Elazığ, Türkiye, 2011, pp. 75-80.
- [23] S. G. Bozkurt, "Investigation at instance of Safranbolu houses of indoor montage in Ottoman domestic architecture in 19 th century," *Journal of the Faculty of Forestry, Istanbul University*, vol. 62, no. 2, pp. 37-70, 2013.
- [24] D. Kuban, "*Türk "Hayat"lı Evi*," Eren Publisher, İstanbul, Türkiye, 1995.
- [25] H. Yürekli ve F. Yürekli, *The Turkish house: A concise re-evaluation*, Yapı-Endüstri Merkezi Publisher, İstanbul, Türkiye, 2005.
- [26] E. Aksoy, "Orta mekân: Türk sivil mimarisinde temel kuruluş prensibi," *Mimarlık ve Sanat Journal*, vol. 20, pp. 39-92, 1963.
- [27] D. Özakbaş, "Development process of Istanbul domestic architecture between the years of 1923-1940," *The Journal of Academic Social Science Studies International Journal of Social Science*, vol. 40, pp. 283-309, 2015.
- [28] N. Bayazıt, "Safranbolu evlerinin plan tipolojisi ve kullanıcı ihtiyaçları hiyerarşisi," *Tasarım+Kuram Journal*, vol. 10, no. 17, pp. 1-15, 2014.
- [29] H. Ürer, "Façade systems of traditional Turkish house in Eskigediz," *Sanat Tarihi Journal*, vol. 22, no. 2, pp. 189-230, 2013.
- [30] S.H., Eldem, *Türk evi plan tipleri*, ITU Faculty of Architecture Publisher, 2. Print, İstanbul, Türkiye, p. 10, 1968.
- [31] Y. Çetin, "Geleneksel Türk evinde cumba," *Sanat Tarihi Journal*, vol. 15, no. 2, pp. 18-27, 2006.
- [32] B. Kahraman, "Wooden interior architectural flements in the traditional Turkish house," M.S. thesis, Institute of Science and Technology, Mimar Sinan University, İstanbul, 1997.
- [33] R. Naumann, *Eski Anadolu mimarlığı*, Türk Tarih Kurumu Publisher, Ankara, 1991.
- [34] H. Tayla, "*Geleneksel Türk mimarisinde yapı sistem ve elemanları*," Foundation for the Protection of Monuments, Environment and Tourism Values, İstanbul, Türkiye, 2007.
- [35] T. Çobancaoğlu, "Türkiye'de ahşap evin bölgelere göre yapısal olarak incelenmesi ve restorasyonlarında yöntem," Ph.D. dissertation, Architecture, Institute of Science and Technology, Mimar Sinan University, İstanbul, Türkiye, 1998.
- [36] K. Güler, A. C. Bilge, "Timber frame building tradition and conservation problems of Eastern Black Sea Region," *Symposium on Restoration and Conservation of Traditional Timber Structures*, İstanbul, Türkiye, pp. 178-193, 2013.