Building materials are an essential element in building construction. Improving the properties of building materials is becoming increasingly important. Many different disciplines must be involved in this process to improve building materials. This book, prepared in this context and titled " ACADEMIC STUDIES IN THE FIELD OF BUILDING MATERIALS ", includes different studies and ideas in this field. This book, which is very useful for the scientific world, has emerged as a result of the meticulous preparation of different materials and subjects.

Arzu ÇAĞLAR (Ed.)

ACADEMIC STUDIES IN THE FIELD OF BUILDING MATERIALS

Assoc. Prof. Dr. Arzu ÇAĞLAR was born in Erzincan in 1985. She completed his undergraduate education in 2009 and her master's degree in 2012. She completed his doctoral education in 2018. She currently continues to work at Kırşehir Ahi Evran University, Faculty of Engineering and Architecture. ÇAĞLAR has written many articles and books.

9 786209 278150

Arzu ÇAĞLAR (Ed.)

LAP LAMBERT Academic Publishing

Arzu ÇAĞLAR (Ed.)

ACADEMIC STUDIES IN THE FIELD OF BUILDING MATERIALS

Arzu ÇAĞLAR (Ed.)

ACADEMIC STUDIES IN THE FIELD OF BUILDING MATERIALS

LAP LAMBERT Academic Publishing

Imprint

Cover image: www.ingimage.com

Publisher:
LAP LAMBERT Academic Publishing
is a trademark of
Dodo Books Indian Ocean Ltd. and OmniScriptum S.R.L publishing group

120 High Road, East Finchley, London, N2 9ED, United Kingdom
Str. Armeneasca 28/1, office 1, Chisinau MD-2012, Republic of Moldova, Europe
Managing Directors: Ieva Konstantinova, Victoria Ursu
info@omniscriptum.com

Printed at: see last page
ISBN: 978-620-9-27815-0

ACADEMIC STUDIES IN THE FIELD OF BUILDING MATERIALS

Editor
Assoc. Prof. Dr. ARZU ÇAĞLAR

CHAPTER AUTHORS

1. Chapter

ACADEMIC STUDIES IN THE FIELD OF BUILDING MATERIALS

Abudalrhman ALDAKSHE[1*], Ahmet Celal APAY[2]

[1*] Duzce University, Graduate Education Institute, Duzce

[2]Sakarya University, Faculty of Engineering and Architecture, Sakarya

Corresponding author: daqshabdalrhman94@gmail.com

2. Chapter

ANALYSIS OF THE URBAN TRANSFORMATION PROJECT IMPLEMENTED IN KIRŞEHİR/KAMAN WITH GEOGRAPHICAL INFORMATION SYSTEM (GIS)

Beyza GÖNEN[1*], Arzu ÇAĞLAR[2], Hakan ÇAĞLAR[3], Volkan GÖNEN[4]

[1,4]GÖNEN HARİTA AŞ., Kırşehir

[2*]Kırşehir Ahi Evran Üniversitesi, Mühendislik Mimarlık Fakültesi, Mimarlık Bölümü, Kırşehir

[3]Kırşehir Ahi Evran Üniversitesi, Mühendislik Mimarlık Fakültesi, İnşaat Mühendisliği Bölümü, Kırşehir

Corresponding author: beyzaydinsakir@|gmail.com

3. Chapter

INVESTIGATION OF ENGINEERING PROPERTIES OF PUMICE-BASED RICE HUSK ASH SUBSTITUTED LIGHTWEIGHT CONCRETE

Seyit Can YILMAZ[1*], Hakan ÇAĞLAR[2]

[1*]Civil Engineer (M.SC)

[2]Kırşehir Ahi Evran University, Faculty of Engineering and Architecture, Kırşehir, Türkiye

Corresponding Author: seyitcanyilmaz@hotmail.com

4. Chapter

USE OF NATURAL STONE IN TRADITIONAL HOUSES (KAYSERİ/TALAS/HAN NEIGHBORHOOD EXAMPLES)

Güler ÇİMEN[1*], Arzu ÇAĞLAR[2]

[1*]Kırşehir Ahi Evran University, Advanced Technologies Department, Kırşehir, Turkey

[2]Kırşehir Ahi Evran University, Faculty of Engineering and Architecture, Kırşehir, Turkey

Corresponding Author: gulerrcimen@gmail.com

5. Chapter

EFFECT OF RICE HUSK ON SUSTAINABLE BRICK (IN THE CONTEXT OF POROSITY AND HEAT CONDUCTION COEFFICIENT)

Volkan Gönen[1], Beyza Gönen[2]*

[1,2]GÖNEN HARİTA AŞ., Kırşehir, Türkiye

Corresponding Author: volkangnn.40@gmail.com

CONTENTS

Use of Natural Stone in Traditional Houses (Kayseri/Talas/Han Neighborhood Examples)

Güler ÇİMEN[1*], Arzu ÇAĞLAR[2]

[1*]Kırşehir Ahi Evran University, Advanced Technologies Department, Kırşehir, Turkey

[2]Kırşehir Ahi Evran University, Faculty of Engineering and Architecture, Kırşehir, Turkey

Corresponding Author: gulerrcimen@gmail.com

Abstract

In this study, Şafak Çivici House, Başak Güntan House and Sabiha Arısoy House located in the Han neighborhood of Talas district of Kayseri province were examined. The plan scheme, façade organization and the materials and techniques used in the buildings were examined in detail. As a result of the study, it was seen that stone was used extensively as a building material. It was concluded that Talas provides ideas about human life in the context of traditional housing. These structures should be protected and a connection should be established with the future without breaking away from their traces of the past.

Keywords: Traditional house, stone, Kayseri, Talas

Geleneksel Konutlarda Doğal Taş Kullanımı (Kayseri/Talas/Han Mahallesi Örnekleri)

Özet

Bu çalışmada, Kayseri ili Talas ilçesi, Han mahallesinde bulunan Şafak Çivici Evi, Başak Güntan Evi ve Sabiha Arısoy Evi incelenmiştir. Yapıların, plan şeması, cephe organizasyonu ve kullanılan malzeme ve teknikler detaylı bir şekilde irdelenmiştir. Çalışma sonucunda, yapı malzemesi olarak taşın yoğun bir şekilde kullanıldığı

görülmüştür. Talas'ın geleneksel konutlar bağlamında insan yaşamı ile ilgili fikirler verdiği sonucuna varılmıştır. Bu yapıların koruma yoluna gidilmesi, geçmişteki izlerinden koparılmadan gelecekle bağ kurulması sağlanmalıdır.

Anahtar Kelimeler: Geleneksel konut, taş, Kayseri, Talas

1. Introduction

Natural stones are a historical tool that carries traces of human life and transmits these traces to other generations (Türkeri, 2022). Natural stone, a traditional building material, has pioneered sustainable designs. When sustainable designs are examined, we come across many criteria, from material selection and function, integrity with nature, the relationship between the street and the building, and the formation of the spaces that emerge from the unity with the sun. These criteria are seen throughout traditional residential architecture. Shaping the material according to environmental conditions and keeping the energy consumed for heating and cooling at the most appropriate level are phenomena found in traditional settlements. In addition, buildings with their own unique character, built according to the geographical situation of the region, have been meeting the needs of the region for many years without wasting resources. We see that today's buildings consume very high energy to perform heating and cooling processes. Therefore, by examining human life and housing culture in the past, different ideas will be put forward on sustainable building design (Gezer, 2013).

When the construction technique used in traditional settlements is examined in terms of local material selection, land placement and spatial organization, it can guide the solution of today's energy problem in terms of design and construction technique. The fact that the traditional housing fabric does not harm nature and creates integrity shows that it is sustainable and ecological (Çelik, 2013).

Natural stones gain their own unique appearance and increase their durability over time. It can also be cleaned easily. It has become one of the most preferred

building materials because of its resistance to earthquakes and fire. The sustainability of natural stone is also crucial for its use (Korkmaz, 2001). Traditional houses are constructed in similar forms. While each house may appear similar, it possesses its own unique identity and distinct language. This is due to the human factor that makes each structure unique (Atamer, 2011).

Kayseri province, with its historical and cultural heritage, holds a significant position, bringing together diverse civilizations under one roof, creating its own unique architectural characteristics through its layering and the influence of local materials, construction techniques, and topography. Talas district, on the other hand, is home to the natural stone material used in traditional residential architecture (Çimen et al., 2021).

In this study, the plan features, structural elements, facades, materials and technical examinations of three traditional houses in the Han neighborhood in the Urban Protected Area were carried out.

2. Han Neighborhood Sample Buildings

The examined buildings in the Han neighborhood; Şafak Çivici House, Başak Güntan House and Sabiha Arısoy House are shown on the map (Figure 1).

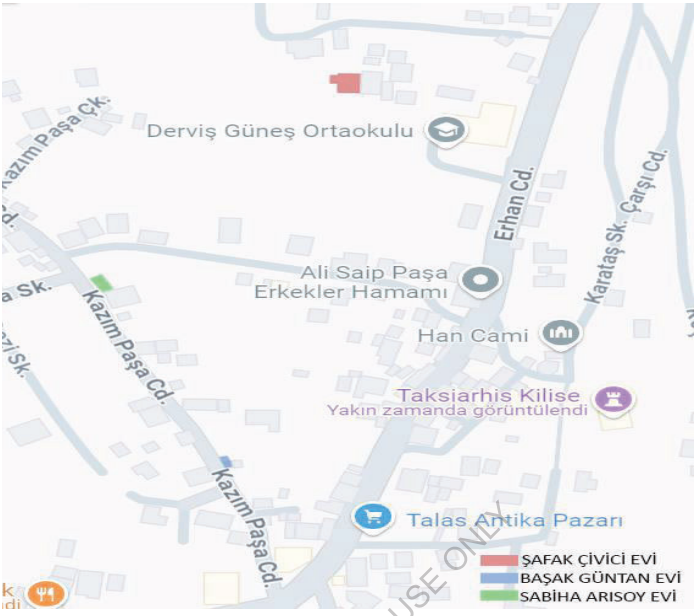


Figure 1. Map of Han District

2.1. Şafak Çivici House

2.1.1.Plan Scheme

The garden is accessed through the door on the street side of the ground floor plan. As you approach the structure, you feel like the middle part is receding. The hall is accessed from the entrance door in the middle of the building. There are two rooms on the right side of the hall and one on the left. The room in the south section served as a kitchen. A door opens to the backyard from the hall section in the middle. Two rooms are accessed from the backyard. The ground floor plan has very few windows. The middle section is located in a small room behind the stairs. The facade marked in red is shown below (Figure 2).

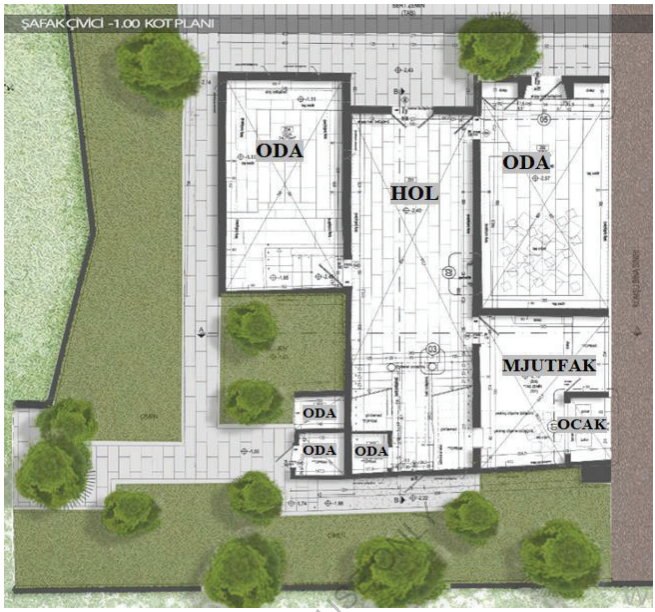
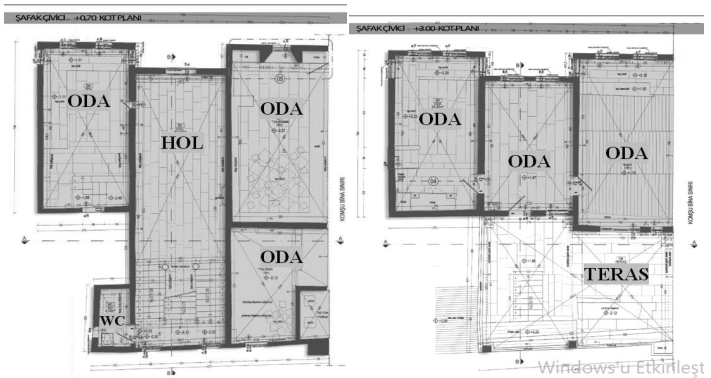


Figure 2. Şafak Çivici -1.00 Level Plan (Ground Floor)

The landing section of the double-flight staircase in the hallway leads to the WC on the mezzanine floor. The mezzanine floor plan has two windows on the landing section, five in the north-left room, one in the hallway, one in the north-right room, and one in the south room (Figure 3a).

A single-leaf staircase from the mezzanine floor leads to the terrace section of the upper floor. From the terrace section, the middle room is accessed. The middle room has one room on each of its right and left arms. The left room has four windows, the middle room has three, and the right room has five. The ground floor plan continues on this floor. The structure is reinforced with two columns on the terrace section (Figure 3b).



a) b)

Figure 3. a) Şafak Çivici +0.70 Elevation Floor Plan (Mid-Floor), b) Şafak Çivici +3.00 Elevation Floor Plan (Upper Floor)

2.1.2. Elevation Organization

The entrance on the north facade is located in the middle section. The entrance section was constructed by pulling back relative to the right and left arms. The arched section above the entrance door was created by interlocking stones like a puzzle. Just above it is a rectangular window called a skylight. The beam above the window continues along the middle section, and the stone moulding on the beam continues along the entire facade. The door on the left side is also arched and the arched stone detail on it is different from the entrance. The skylight above the door is in the form of an arched rectangle. There are two wooden shuttered windows on the first floor of the middle section, and above them are two small arch-shaped lights. There is a beam in the middle of the windows. Stone moulding is also present on this floor and continues along the façade. On the first floor of the left section, there are two rectangular windows with wooden shutters and a central joist. Above these windows are wooden lintels. Above these windows are the same lights as those in the central section. A metal pipe was attached to the stone gargoyle in the corner, allowing water to drain to the ground. Andesite stone was chosen for the walls. They were built using a mortared cut-faced masonry system (Figure 4).

There are two windows on the ground floor of the right-hand façade, which is further north. The windows are smaller than those on the first floor. Above the windows, a beam extends along the façade.

The first floor of the façade has the same appearance as the other floors. The remaining right section of the north façade, a later addition, has a door on the ground floor. The right section is similar to the left section. Although the ground floor views are identical, the shutters on the right section of the first floor are absent. The small skylights above the windows are also missing on this façade (Figures 5a, 5b).

Figure 4. Şafak Çivici Northern Front (Cultural Heritage Protection Report, 2013)

a) b)

Figure 5. a) Şafak Çivici Northern Front, b) Şafak Çivici Later Addition Northern Front

2.1.3. Material and Techniques

On the street side of the building, the andesite cut stones have been painted pink. The garden is accessed through a double-winged iron gate.

The combination of wood and stone is evident throughout the structure. At the entrance, wood was chosen for the doors, windows, and beam applications. The arched shape of the door allows for the appearance of a puzzle-like design. The interlocking archwork adds freedom to the structure. The window above the door has a wood frame and iron bars. Among the building materials, stone was used in the walls and moldings that highlight the floors (Figures 6, 7a, 7b).

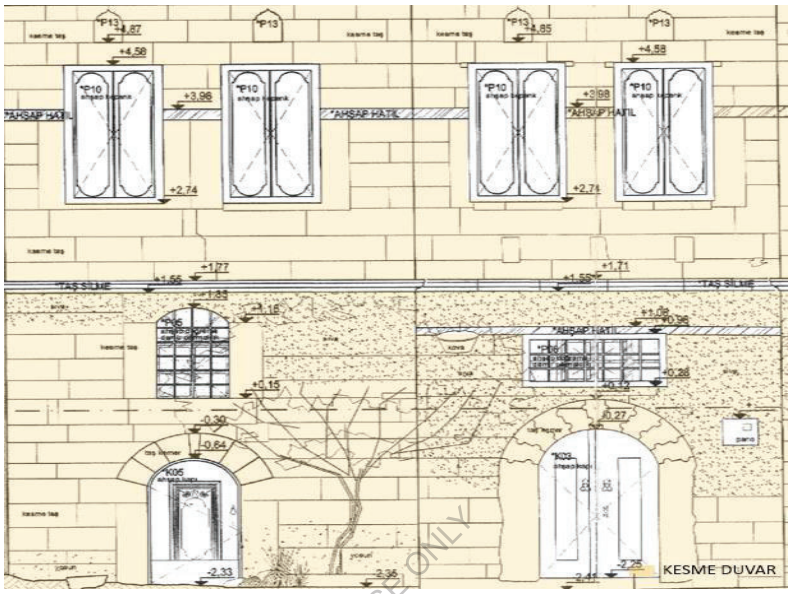


Figure 6. Part of the Şafak Çivici Entrance Facade (Cultural Heritage Protection Report, 2013)

a) **b)**

Figure 7. a), View of the Entrance Section of the Şafak Çivici Garden, b), View of the Entrance Section of the Şafak Çivici Garden

Wooden windows with wooden shutters and iron bars were chosen in the narrow spaces of the sections further along the north facade. While the wooden beams are

sometimes located above the windows, they also intersect with them (Figure 8a). The wooden beam system was reinforced by using iron tensioners in the areas along the facade and at the joints (Figure 8b).

a) b)

Figure 8. a), Şafak Çivici Narrow Facade View, b), Şafak Çivici Beam System View

2.2. Başak Güntan House

2.2.1. Plan Scheme

Three steps on the ground floor floor lead to the entrance. Upon entering, you'll first find a large hallway. The kitchen is located on the south side, while rooms are located on the north and west sides. There is also a second entrance to the building, accessed via stairs from the east. The walls on the north and east facades of the building are thicker than those on the other facades (Figure 9).

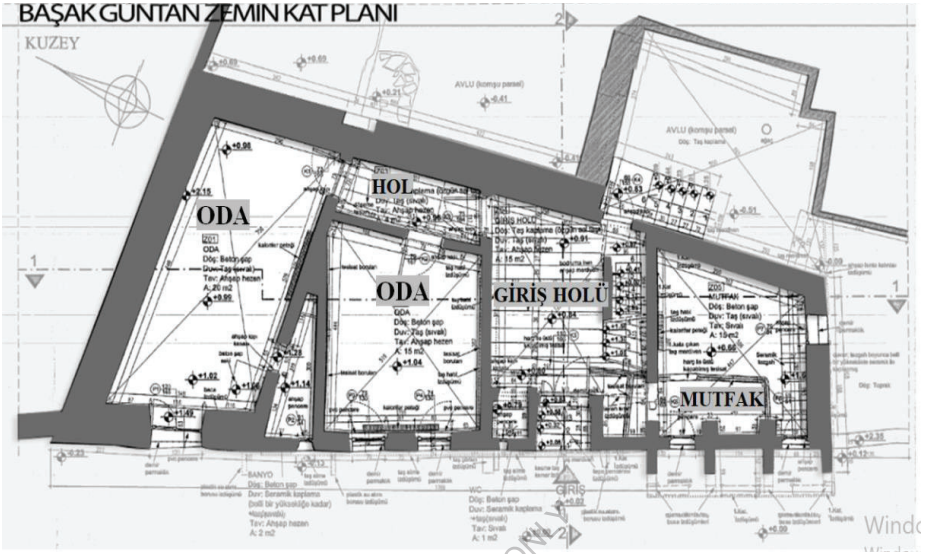


Figure 9. Başak Güntan House Ground Floor Plan

The first floor plan features a room that projects from the terrace. There are four windows, each with iron bars in front of them. The room's overhang onto the street provides space on the first floor that was not available on the ground floor due to the street's width (Figure 10).

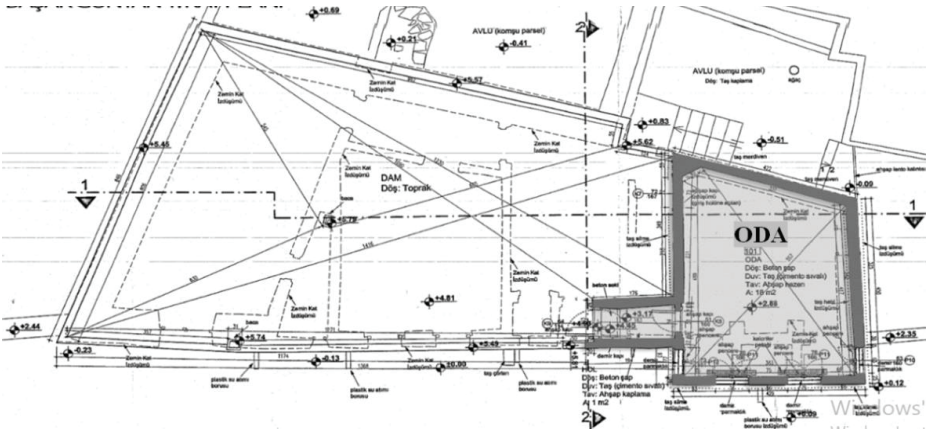


Figure 10. Başak Güntan House 1st Floor Plan

2.2.2. Elevation Organization

The building was built parallel to the road. On the west side, facing the street, is an iron gate, accessed by three steps. Above the iron gate is a semicircular wooden window with iron bars, known as a skylight. The two wooden windows near the ground floor were built for air circulation in the basement and are smaller than the ground floor windows. On the right side of the building, the windows below the first-floor overhang are square, illuminating and ventilating the kitchen. On the left side of the building are five windows. Two small windows are called "breathing holes." The other three windows are rectangular and made of PVC (Figure 11).

On the facade extending from the first floor, there are two rectangular wooden windows with iron bars. There is also another window overlooking the door of the projecting facade. All the large rectangular windows on the ground floor of the west facade have wooden shutters. Stone moldings are visible in the central section of the building. Upon reaching the entrance, due to the arch detail, the direction of the stone moldings changes at the top and then continues in the same direction until the projecting section. The wooden beams in the projecting section are connected to four buttresses. At the intersections of the wooden beams, iron tension members are used to increase their strength. The building contains three stone gargoyles (Figures 12a, 12b).

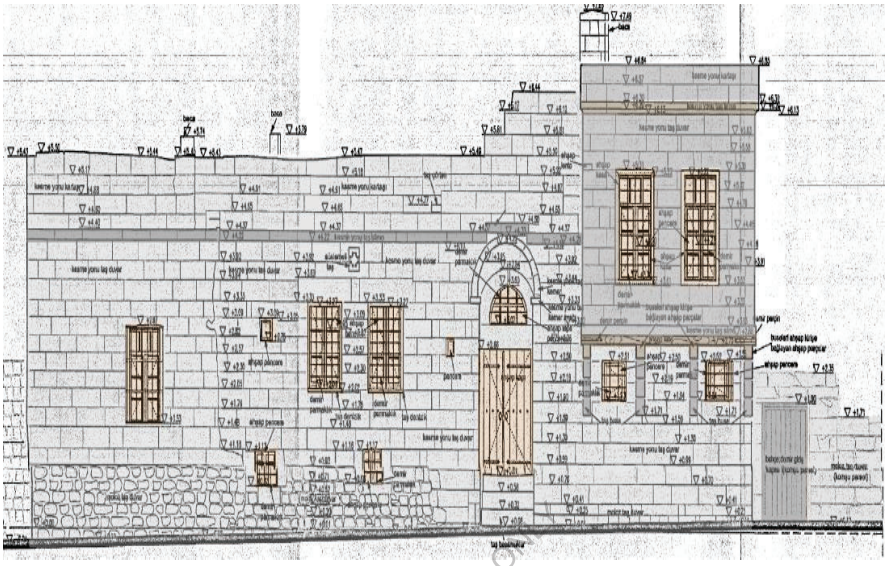


Figure 11. Başak Güntan House West Facade (Cultural Heritage Protection Report, 2013)

a) **b)**

Figure 12. a) Başak Güntan House West Facade View, b) Başak Güntan House West Facade View

2.2.3. Material and Techniques

The primary building material used in the structure is stone. Basalt, a moisture- and rain-resistant material, was chosen for the staircase. Rubble stone was used on the

left side of the west facade and for approximately 50 centimeters of the ground floor. Throughout the structure, on the right side of the west facade and on the south facade, cut andesite, a variety of colors, was used. In some sections of the structure, moisture, heat, and other natural factors have caused the stone's structure to deteriorate and discolor (Figure 13). Cement-based grout was applied to the rectangular window area, particularly on the left side of the west facade. Stone was used for the buttresses and gargoyles. Other building materials used in the structure are wood and iron. Wood is used in most of the windows and all of the shutters.

Iron was preferred for the bars on doors and windows. Wood was also preferred for the beams connecting the buttresses and the lintels above the windows.

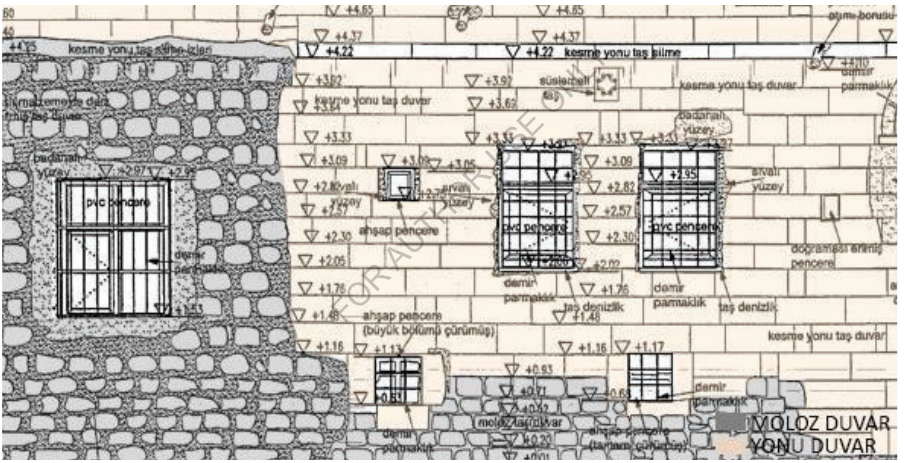


Figure 13. Başak Güntan House West Facade (Cultural Heritage Protection Report, 2013)

2.3. Sabiha Arısoy Houses

2.3.1. Plan Scheme

The garden is accessed from the roadside of the building, and the entrance hall is accessed from the garden. Three rooms of varying sizes open onto the entrance hall. Windows are also installed to provide lighting and ventilation for the entrance hall. The rooms facing the street have two windows, while the back room has one. The walls of

the rooms facing the street were constructed to accommodate the harsh climate conditions (Figure 14).

The stairs leading from the ground floor to the first floor are located on the exterior of the building. As we ascend the stairs, we encounter a large hall. Two rooms face the hall. The larger room has five windows, while the other has three (Figure 15).

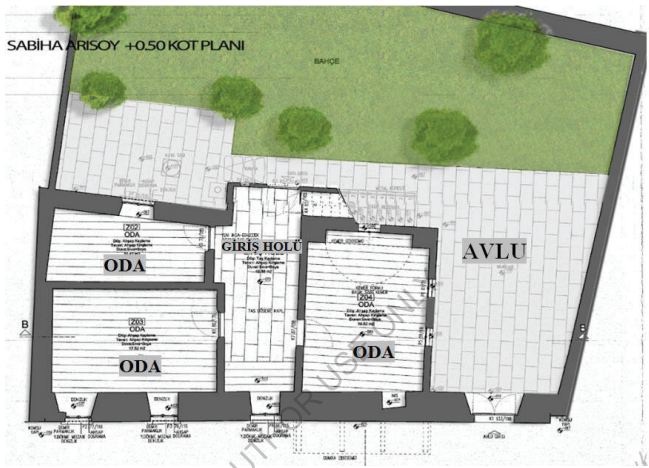


Figure 14. Sabiha Arısoy +0.50 (Ground) Elevation Plan

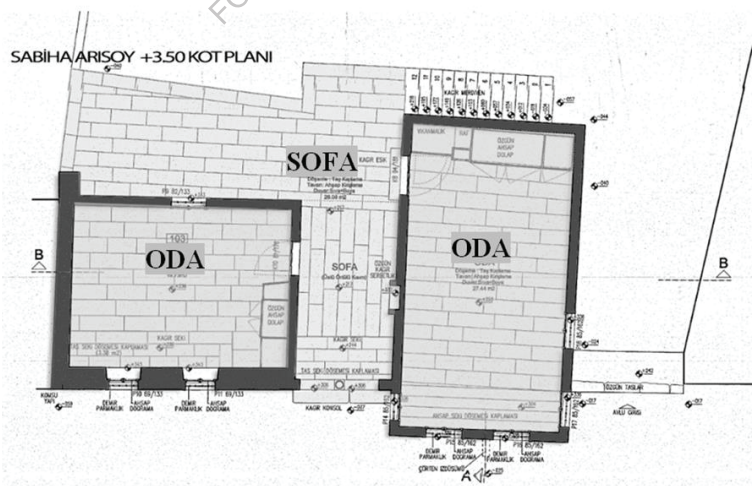


Figure 15. Sabiha Arısoy +3.50 (First) Elevation Plan

2.3.2. Elevation Organization

The ground floor of the west facade of the building features three rectangular windows of similar dimensions. The first-floor windows are larger than those on the ground floor and are made of wood. The two windows in the hall are arched. The rooms have four rectangular windows. The windows in the hall are not aligned on the facade but are closer to the road level. The projection 20 cm in front of the hall window is supported by small stone buttresses. The section of the room on the west facade that projects onto the street is noteworthy. The projection is connected to the ground floor walls by wooden buttresses. The projection section has four rectangular windows (Figure 16).

The wooden beams above the room windows on the first floor of the building, and the stone moldings on top of them, continue in the same plane on the facades. Above the stone moldings are three gargoyles. The andesite cut stone in the building's projection is a different color than the other facades. A wooden door opens from the road to the south facade of the building. There are four windows on the south facade. All except the windows in the hall are barred (Figures 17a, 17b).

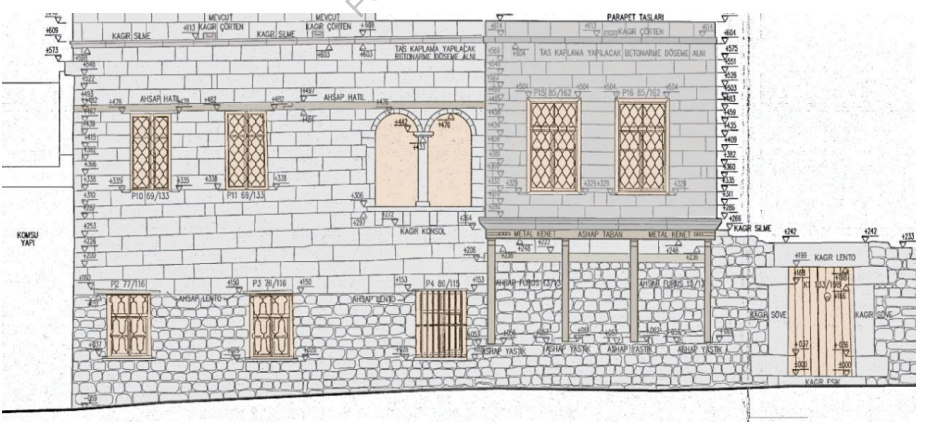


Figure 16. Sabiha Arısoy Western Front (Cultural Heritage Protection Report, 2007)

a) b)

Figure 17. a), Sabiha Arısoy West and South View, b), Sabiha Arısoy West View

2.3.3. Material and Techniques

The ground floor walls of the building are constructed with a rubble masonry system. A 70-centimeter-long, unjointed wall is visible below the window, while a jointed wall is seen slightly below the first floor level. Cut-faced stone was used on the first floor walls. Rubble stone was used on the left side of the building's west facade and up to approximately 50 centimeters from the ground level (Figure 18).

Andesite stone of various colors was used throughout the building, including the right side of the west facade and the south facade. In some sections of the building, the stone's structure has deteriorated and discolored due to humidity, heat, and other natural factors. Stone was used in gargoyles and moldings.

Other materials used in the building are wood and iron. Wood was used for most of the windows, the door opening to the garden, and the buttresses in the overhanging section. The wooden base of the overhanging section was reinforced with metal clamps (pieces of iron). Wood was also used for the beams connecting the buttresses and the lintels above the windows. Iron was also used for the bars in front of the windows (Figures 19a, 19b).

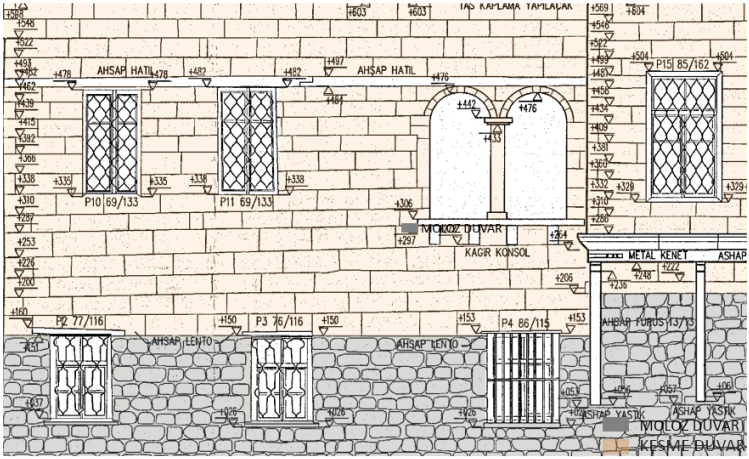


Figure 18. Part of the Sabiha Arısoy Western Front (Cultural Heritage Protection Report, 2007)

a) b)

Figure 19. a), Sabiha Arısoy West View, b), Sabiha Arısoy West View

3. Results

In this study, three examples were identified from the Han neighborhood, an urban protected area within the Talas district of Kayseri province. The exterior character of the buildings was examined. The study also examined the facades that connect to the street.

The three traditional houses examined provide insights into the human life of that period with their plans, façade details, materials used and construction techniques.

An examination of plan diagrams reveals that traditional guest houses generally consist of a basement, ground floor, and first floor. The Başak Güntan House has this plan. The Şafak Çivici House consists of a basement, ground floor, mezzanine, and upper floor. The Sabiha Arısoy House consists of a ground floor and a first floor. The basement floors generally housed spaces called cellars, used for storing food and beverages, while some structures were used as animal feeders or stables. The ground floor houses rooms arranged around a sofa, a kitchen, and wet areas. Additions were made to the building over time to meet changing needs.

To analyze the exterior facades of the examined buildings, connections were first established based on the plans. Plan readings guide the facade analyses. It was observed that the buildings were generally positioned parallel to the road. Ground-floor windows were smaller than those on the upper floors. Double-winged wooden doors, accessed from the road level to the steps, were preferred. Some doors featured skylights. The smaller windows compared to those on the upper floors were determined to be functional and to maintain privacy. Some sections of the first floors facing the road level were observed to have overhangs. These overhangs were sometimes supported by stone buttresses and sometimes by wooden buttresses. The windows on the first floors were mostly rectangular, constructed of wood and with iron bars.

While most buildings have staircases accessed from the interior, the Sabiha Arısoy House has staircases that lean against the facade. Traditional houses often feature spaces called "sofas" and "courtyards." Of the traditional houses we examined, the Sabiha Arısoy House features an outdoor space called "open sofa." Others have a space called "closed sofas."

Although overhangs are mostly located on the right or left side of the building, there are also overhangs that extend along the façade. A buttress system can be seen in one corner of the building in the Başak Güntan House and the Sabiha Arısoy House.

As a result, the natural stone structures used in traditional Talas housing, a sustainable material, have become one of the primary characteristics that define its identity. Some of the structures, which are heritage from the past to the present, have been integrated with the public through small touches and innovations. In this context, traditional Talas housing offers insights into human life and transports us back to the past. Therefore, preservation of these structures is crucial, maintaining their connection to the future without severing their legacy.

4. References

Türkeri, İ. (2022). Use of Natural Stone in Religious Architecture: Sancaklar Mosque and Beylikdüzü Fatma Ana Cemevi, DergiPark Article Research, 2 (1), 1-9.

Gezer, H. (2013). Evaluation of Traditional Safranbolu Houses in Terms of Sustainability, Istanbul Commerce University Journal of Science, 23, 13-31.

Çelik., E. (2013). Green Building Certification Programs and Their Applicability in Turkey, Master's Thesis, Istanbul University Institute of Science, Istanbul, 49-52.

Korkmaz, B. (2001). Access Link: naturadergi.com/anasayfa/traditional-settlements-over-natural-stone-use-in-architecture/

Atamer, M. (2011). Time in Talas, Yeni İnsan Publishing House.

Çimen, G., Çağlar A., & Çağlar H. (2021). The Effect of Natural Stone, a Traditional Building Material in Kayseri Talas, on Residential Architecture Over Time, Ahi Evran University 2nd Architecture Symposium Proceedings, Kırşehir, 653-659.

Kayseri Metropolitan Municipality, Cultural Heritage Protection Report, (2013).

DATE
16.12.2025

OmniScriptum S.R.L.
120 High Road, East Finchley
London, N2 9ED
United Kingdom

Str. Armeneasca 28/1, office 1
Chisinau, MD-2012
Republic of Moldova

info@omniscriptum.com
www.omniscriptum.com

To Whom It May Concern

Dear Sir/Madam,

We are pleased to announce the publication of the book entitled "ACADEMIC STUDIES IN THE FIELD OF BUILDING MATERIALS", edited by Arzu ÇAĞLAR. The book was released by Lambert Academic Publishing in December, 2025 and bears ISBN 978-620-9-27815-0.

Being an imprint of OmniScriptum S.R.L., LAMBERT Academic Publishing provides high-quality publications, with all the advantages of an international company in marketing, production and distribution. Books of LAP are therefore available on the worldwide market via more than 80,000 bookstores and 3,000 online stores.

OmniScriptum is an associate member of the American Booksellers Association, the Booksellers Association of the UK, a member of the Börsenverein des Deutschen Buchhandels, and also a member of German PEN Center.

The company was founded in Germany in 2002.

Please do not hesitate to contact us, should you need any further information.

--

Kind regards,

Aurora Jian
Supervisor

Lambert Academic Publishing is a trademark of:
OmniScriptum S.R.L.

info@omniscriptum.com / www.omniscriptum.com