Alam Cipta Int. J. Sustain. Trop. Des. Res. Pract. 19 (1): 15-47 (2026)

ALAM CIPTA

Sustainable Tropical Design Research and Practice

Journal Homepage: http://alamcipta.upm.edu.my/

Investigation of Amasya Traditional Houses with Basic Design Principles in the Context of Sustainability

Meltem Erbaş Özil[1]

[1]*Architecture of Department, Dicle University, Diyarbakır, Turkey*

ABSTRACT

The Industrial Revolution of the 18th century disrupted the balance between humans and nature, leading to environmental challenges. Rapid urbanization, technological development, and fossil fuel use increased the need for harmony with the natural environment. In the 20th century, sustainable architecture emerged to address issues such as energy consumption and environmental pollution. However, this principle had already been practiced for centuries in traditional architecture, where local materials, climate-responsive design, and spatial organization ensured energy efficiency and user comfort. This study examines the relationship between sustainable and traditional architecture through basic design principles, including symmetry, rhythm, balance, and contrast. Five traditional houses in the Sofular Neighborhood of Amasya were selected as case studies. Their spatial layout, building envelope, and architectural form were evaluated using predetermined sustainability criteria. The findings show that traditional houses incorporate passive climate control and ecological design solutions, demonstrating that vernacular architecture offers valuable guidance for contemporary sustainable design practices.

Keywords: Amasya Sofular Neighborhood Houses, basic design principles, ecological architecture, sustainability, traditional architecture.

ARTICLE INFO

Article history:

Received: 25 August 2024

Accepted: 03 March 2026

Published: April 2026

DOI: https://doi.org/10.47836/AC.19.1.PAPER02

Email address:

meltemerbas@gmail.com (Meltem Erbaş Özil)

* Corresponding author

INTRODUCTION

The conflict between the environment and economic developments initiates at the local level and gradually evolves into a global process. Production and consumption trends persist; disregarding sustainability concerns (Owens, 2003). However, it is emphasized that the current generation should meet its needs while also considering the needs of future generations (WCED, 1987). While the utilization of existing natural resources is recognized as a fundamental right to meet these needs, it is essential not to deprive future

generations of these rights during the utilization of these resources. As expressed by Wahl and Baxter (2008), sustainability is a critical issue for both society and designers. This concept is interconnected from social, cultural, economic, ecological, and psychological perspectives. A sustainable environment involves a continuous process of learning and adaptation. In this process, it is not only sufficient to change habits, lifestyles, and resources, but it is also necessary for designs to evolve at the local, regional, or global level (Wahl & Baxter, 2008).

The concept of vernacular architecture emerged in the 19th century, initially documented by cultural scholars as a record of rural life. Particularly in Europe, the Victorian styles of Art and Craft and Pre-Raphaelite movements converged with architectural illustration under the influence of romanticism. Over time, these illustrations captured the interest of traditional architectural schools, leading to academic and professional scrutiny of the subject. The lack of sufficient attention to this concept may be attributed to its initial failure to extend beyond anthropological inquiry. Nevertheless, the outcomes of these efforts materialized under the curation of Bernard Rudofsky in 1964 at The Museum of Modern Art (MoMA), under the title "Architecture Without Architects" (Corbusier, 1941; Rudofsky, 1974; Groth, 1999). Following these developments, a book bearing the same title was published, incorporating local materials. In the 20th century, structures deviating from traditional norms gained popularity, and research on sustainable forms began to be applied in tandem with an understanding of the success of traditional architecture in passive environmental control in the contemporary era (Oliver, 1976; Richards, 2012; Khan Academy, n.d.).

In this context, structures constructed based on topography, climate, and environmental conditions, as well as cultural and economic features, serve as examples of sustainable architecture by aiming not only to provide suitable comfort conditions but also to achieve maximum energy conservation. However, the alignment of design with natural environment and climate data has been recognized long ago, revealing traditional architectural examples that take into account the dimensions of functionality, aesthetics, ecology, and cultural environment. Therefore, the formation of traditional architecture plays a significant role in sustainable architecture, emphasizing the importance of researching and evaluating ecological practices in traditional dwellings (Özel & Sağsöz, 2021).

Traditional architecture represents the lifestyles, cultures, traditions, and customs of a society, reflecting the best harmony with the environment and climate. The effective utilization of traditional construction systems and designs, which respond to user needs and embody an environmentally friendly identity, has led to traditional architecture data becoming one of the most significant inputs for ecological design (ICOMOS, 1999).

Traditional architectural examples are shaped by various conditions such as climate, topography, sun exposure, and wind direction, influencing traditional construction techniques and the use of local materials. These examples demonstrate an adaptive capacity and exhibit features that can be developed over time based on conditions and needs (Vellinga et al., 2007)

Traditional architecture reflects lifestyles, cultures, and environmental harmony. Local materials and climate-responsive construction techniques allow buildings to adapt over time. For this reason, traditional dwellings provide essential data for sustainable architectural practices. In this study, sustainability criteria (Williams & Dair, 2007 & Sev, 2009) and traditional architectural principles (Oliver, 1997; Kısa Ovalı & Delibaş, 2016; Karahan & Davardoust, 2020) were compared through literature. The findings were then summarised according to the main sections of the study (Figure 1).

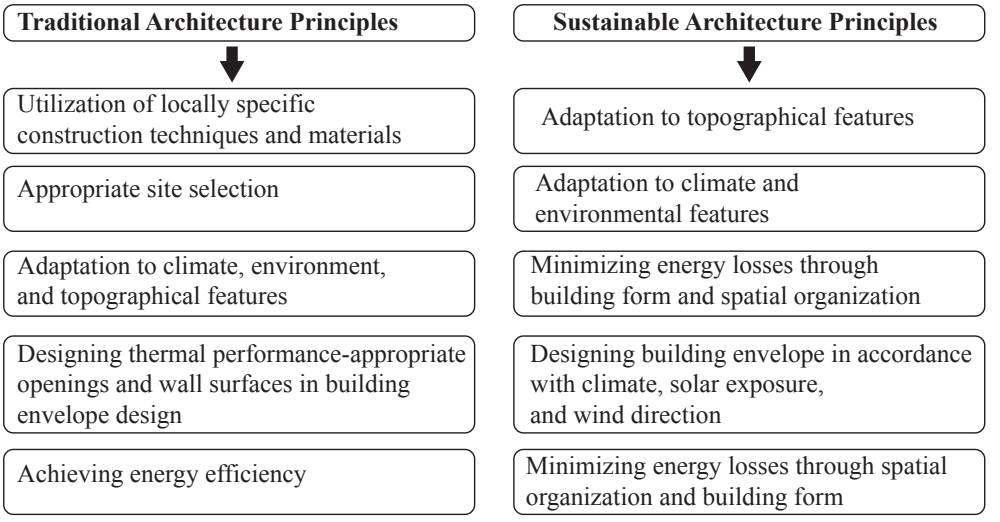


Figure 1. Comparative analysis of sustainable architecture and traditional architecture principles within the scope of the study (Karahan & Davardoust, 2020)

In light of the above explanations, the aim of the study is to elucidate the relationship between traditional architecture and sustainability in terms of incorporating aesthetic and ecological considerations within the context of fundamental design principles. In this regard, under the headings of building envelope design, spatial organization, and building form, five traditional houses from the Amasya Sofular Neighborhood have been examined as the sample group. Other principles that constitute sustainable and traditional architecture have not been explored within the scope of the study.

The selection of this region as the study area is based on multiple interrelated criteria that highlight its urban, historical, and cultural significance. The area presents a valuable urban landscape characterized by well-preserved traditional Ottoman and Republic-era buildings, reflecting a strong architectural heritage. Despite being located within the 1st-degree earthquake zone according to the 1996 "Turkey Earthquake Zones Map" prepared by the former Ministry of Public Works and Settlement, it has remained one of the least affected areas in the city of Amasya, even in the face of past natural disasters such as earthquakes, landslides, floods, and fires. Furthermore, the region has been officially designated as a registered urban conservation area by the decision of the Ministry of Culture's High Council of Monuments and Historic Sites, owing to its rich cultural assets and its ability to preserve distinctive traditional characteristics. The presence of important vista points contributing to the city's visual identity further enhances its value. In addition, Yavuz Selim Square has served as a significant gathering space since ancient times and continues to hold importance due to its proximity to the city center. The historical relevance of the area is also reinforced by the construction of the Palace and Saraydüzü Barracks within its boundaries. However, despite these valuable attributes, many high-quality traditional buildings in the region are currently experiencing structural deterioration, which underscores the urgent need for their documentation and preservation. In this context, the study aims to produce a scientific document that will not only contribute to the conservation of the area but also serve as a reference for future research.

METHODOLOGY

This study adopts a qualitative case study approach, which is appropriate for investigating the architectural and spatial characteristics of traditional structures in their natural context. The aim is to understand how sustainability principles are embedded in vernacular design through the lens of basic design principles (symmetry, rhythm, balance, and contrast).

Sample Selection

The study area was determined through purposive sampling, selecting five traditional houses in Amasya's Sofular Neighborhood that are well-preserved, representative of traditional Turkish house typology, and situated in a conservation area. These houses were chosen due to their historical significance, architectural diversity, and compatibility with sustainable design discussions.

Data Collection

The study methodology is based on three main components: field observations, photographic documentation, and archival research. Within the scope of field observations, systematic on-site investigations were conducted to examine the spatial configurations, orientations, materials, and contextual relationships of each building. These observations

were carefully recorded through field notes and checklists prepared in accordance with sustainability and design criteria. In the photographic documentation phase, all selected houses were thoroughly documented using high-resolution photography, enabling detailed analysis of façade elements, spatial relationships, natural lighting strategies, and climatic adaptations. In addition, archival research was carried out by reviewing historical maps, building records, and previous studies to gain a comprehensive understanding of urban and architectural transformations in the study area.

EXPERT VALIDATION

To strengthen the credibility and reliability of the study, the preliminary findings and analysis categories were submitted to three academic experts specializing in vernacular architecture, sustainability, and architectural design theory. These experts were selected from the faculties of architecture at different universities in Turkey. Within the scope of the validation process, the experts reviewed the preliminary coding scheme and thematic categories, evaluated whether the interpretations were consistent with the architectural features and the adopted sustainability framework, and provided detailed feedback on contextual accuracy, analytical consistency, and the appropriate use of terminology. The feedback obtained from the experts was systematically integrated into the final coding structure and was also utilized to refine and improve the comparative assessment tables, such as Table 4 and Table 5.

DATA ANALYSIS

The collected data were analyzed using a content analysis method guided by a deductive coding approach, in which each building was evaluated based on pre-established sustainability criteria and fundamental design principles. In addition, thematic coding was employed to identify patterns and variations related to spatial organization, façade design, and environmental responses. Within this framework, each sample was comprehensively examined in terms of its spatial layout and form, including its relationship with topography, internal circulation, and climatic orientation, as well as building envelope characteristics such as window distribution, material usage, and solar control strategies. Furthermore, key design principles, including symmetry, repetition, contrast, and balance across different scales, were considered in the analysis. The findings obtained from these evaluations were systematically compiled into comparative matrices in order to reveal both commonalities and deviations among the examined examples.

Sustainability in Traditional Architecture

In the last three decades, global concerns about environmental problems have increased significantly. Issues such as climate change, resource scarcity, energy consumption, air and water pollution, waste generation, rapid population growth and the effects

of globalization have come to the fore. These challenges highlight the critical need to integrate sustainability into our daily lives, behaviors, resource consumption and the way we design and construct buildings. In this context, sustainable architecture aims to harmonize natural, cultural, social and economic elements to promote a balanced relationship between people and their environment (Salman, 2004).

The concept of "sustainability" originates from the idea of providing foundational support. In order for a society to persist over time, it must be reinforced by the engagement of both present and future generations. Historically, many traditional societies ensured continuity by integrating natural and constructed environments with social, cultural, and spiritual values. In these contexts, sustainability was not a theoretical framework but a lived and observable reality embedded in everyday practices. When addressing the concept of sustainability, it is important to move beyond surface-level definitions and delve into its deeper significance. Sustainability should not be reduced to the mere combination of environmental, social, and economic dimensions or the pursuit of a better quality of life (Senosiain, 2003). At its core, sustainability involves making choices and taking actions today that do not hinder future generations from fulfilling their own needs. In this context, the examination and reinterpretation of vernacular architecture play a crucial role in strengthening the connection between policy makers and society (Hinrichs, 1987). It is essential that human activities align with ecological systems, rather than working against them. Sustainable design embodies a sense of responsibility and encompasses a profound respect for natural resources, human well-being, and the cyclical nature of life (McLennan, 2006).

Sustainability, in its essence, is inherently architectural. Achieving it requires a direct and thoughtful engagement with design strategies that responsibly utilize environmental resources. Beyond physical design, it is equally critical to examine the broader political, economic, and social dynamics that shape cultural and spiritual contexts—contexts where the pursuit of sustainability reflects a deeper transformation in societal values (Koester, 1995). In this regard, sustainable design emerges not only as a technical approach but also as a philosophical framework aiming to enhance the overall quality and livability of the built environment (McLennan, 2006).

Vernacular architecture has historically emerged as a response to limited resources, both natural and economic. Despite the absence of modern technologies, communities were able to create built environments characterized by strong identity and distinctive features, often through innovative yet modest means (Thomas, 2002). This type of architecture was inherently sustainable, shaped by necessity and rooted in the intelligent use of available materials to address environmental challenges and human needs (Salman et al., 2016)

Sustainable design principles are deeply embedded in vernacular architecture, as these structures evolved over generations through a process of adaptation, experimentation, and refinement. They relied on local materials, traditional construction techniques, and a sensitive understanding of the natural and cultural surroundings. In the context of the Turkish world, vernacular architecture stands as a compelling model of sustainability. It reflects cultural practices and values, offering insights that remain highly relevant for contemporary architectural design. These values pertain not only to construction methods that respond effectively to the climate, but also to social norms, lifestyles, and traditions, revealing a built environment closely aligned with sustainability (see Figure 3).

Figure 2. Konya Sille ,Safranbulu and Amasya houses, which offer sustainable solutions in the climatic and cultural context with their environmentally compatible designs and elements such as solid walls, small openings, light coatings, courtyards and windbreaks in traditional Turkish architecture (Erbaş Özil, 2023; Silleli, 2024; UNESCO World Heritage Centre, 2024)

Furthermore, sustainability is integral to the articulation of architectural identity within a regional context. As Hidayatun, Prijotomo, and Rachmawati emphasize, identity is anchored in permanence, supported by the natural landscape, available materials, and cultural habits. These enduring elements, all of which correspond with sustainable criteria, collectively contribute to the recognition and expression of regional architectural identity (Hidayatun et al., 2015).

In the past, communities did not need to consciously construct or emphasize identity within their built environments, as sustainability was inherently embedded in their way of life. Architectural identity emerged organically through a deep alignment with both the natural surroundings and evolving social structures. Buildings were designed and constructed using locally sourced materials and in harmony with environmental conditions. As a result, architecture naturally reflected the unique characteristics of its place, the culture of its people, and the values of its society.

Traditional architecture is shaped by environmental factors such as climate, topography, solar orientation, and prevailing wind directions. These structures are typically built using local materials and conventional construction techniques. Moreover, they often exhibit adaptive qualities that allow them to evolve over time in response to changing needs and conditions (Vellinga et al., 2007). The reinterpretation and integration of these traditional

architectural values within the framework of contemporary technologies form a critical foundation for sustainability. Therefore, analyzing traditional architectural examples is highly significant in addressing modern environmental challenges.

In this context, sustainability criteria (Willams & Dair, 2007; Sev, 2009) and traditional architectural principles (Karahan & Davardoust, 2020; Kısaovalı & Delibaş, 2016; Oliver, 1997) have been comparatively analyzed through a literature-based approach and summarized according to the main components of the study (Table 1). Based on the derived analysis criteria, it can be concluded that both sustainable and traditional architectural practices share a common goal: to construct buildings in suitable locations that minimize energy demand through harmony with topography, climate, and both natural and built environments.

Table 1
Comparison of sustainable architecture and traditional architecture principles within the scope of the study

Principles of Sustainable Architecture	**Principles of Traditional Architecture**
Compliance with topographical characteristics	Use of locally specific building techniques and materials
Compliance with climate and environmental characteristics	Choosing the appropriate location
Minimizing energy losses through building form and space organization	Adaptation to climate, environment and topography
Creating openings and wall surfaces suitable for thermal performance in building envelope design	Design of building envelope in accordance with climate, insolation and wind direction
Ensuring energy efficiency	Minimizing energy losses through space organization and building form

Based on the aforementioned discussions, this study aims to explore the connection between traditional architecture and sustainability through the lens of fundamental design principles, with particular attention to both aesthetic and ecological aspects. Within this framework, five traditional houses located in Amasya's Sofular Neighborhood were selected as the sample group and analyzed under the categories of building envelope, spatial organization, and architectural form. It is important to note that other principles associated with sustainable and vernacular architecture fall outside the scope of this research.

Previous Studies on the Traditional Houses of Amasya's Sofular Neighborhood.

To date, no in-depth research has been specifically carried out on the traditional houses of Amasya's Sofular Neighborhood. While there are a few studies that touch upon the general urban fabric of the area, these tend to lack detailed architectural evaluations or structure-specific analyses. In contrast, Hatuniye Neighborhood which exhibits comparable characteristics to Sofular in terms of spatial layout, building form, and envelope design that has been the subject of several comprehensive investigations. These studies offer valuable

insights into architectural elements such as material selection, construction techniques, and sustainability practices. The table below presents a chronological overview of the key studies conducted on the houses of Hatuniye Neighborhood (Table 2).

Table 2
A chronological review of prior research on Amasya's traditional residential architecture

Author(s)	Title of the Study	Subject	Type	Year
Meşhur, M.Ç.	New approaches in urban conservation process, the case study-city of Amasya, Yalıboyu houses	The evolution of historical environment conservation thought in Amasya and Yaliboyu Houses', where historical environmental values mainly concentrate on, physical and social structure were evaluated. In the light of all analyses and evaluations, proposals for conserving the historical environment in Amasya and the case study areaYahboyu Houses_ were presented.	Master Thesis	1999
Sarı, T.	The examination of housing production transition phases happened along with urban planning developments in Turkey and the Amasya city case	This study, in particular covers urbanisation by parting phase by phase beginning from the second half of 19th century to 1980?ies. Spatial development phases and contributing arguments are analyzed and differentiating housing practices are also studied. The city of Amasya is selected to demonstrate the effects of differentiation in housing production over time by the cause of the urban growth turkey has experienced.	Master Thesis	2010
Güzelci, O. Z.	A Shape Grammer Study on Amasya Yalıboyu Houses	Sharing common features with traditional Turkish residential architecture, the general characteristics, spatial layouts, and façade designs of the Amasya Yalıboyu Houses have been examined in detail. Based on these analyses, new rule definitions and rule sets have been formulated to reflect both the general patterns and specific conditions observed in these houses.	Master Thesis	2012

Author(s)	Title of the Study	Subject	Type	Year
Alaca, A. M.	The Analysis, Evaluation and the Preservation-Rehabilitation Proposal of Traditional Settlement Pattern of Amasya Sofular District and Its Vicinity	In this thesis which taken up with an integrated preservation approach, the traditional pattern on the Sofular district and the vicinity which has got densely traditional pattern was investigated in detail and evaluated.	Master Thesis	2012
Altanlar, A., Kavak, İ. and Güremen L	Effects of Tourism Oriented Interventions on Community Dwellers in Historical Districts: The Case of Amasya Sofular District	This study aims both at discovering the historical district dwellers‟ perceptions of such tourism oriented interventions and the factors affecting their perceptions. Therefore a questionnaire was held at Sofular District in Amasya which owns all characteristics of Ottoman civil architecture. Principal components analysis (PCA) was used to understand the perceptions of dwellers on tourism oriented interventions and One-Way Anova analysis was used to understand how these perceptions differ according to various characteristics of participators.	Article	2018
Erbaş Özil, M.	The relationship between the space depth and window opening in Amasya traditional houses	The main aim of the study is to evaluate the relationship between spatial depth and window opening in the traditional houses of Amasya according to TSE and CIE standards in terms of natural lighting.	PhD Thesis	2018
Temiz H.K.	Traditional Turkish Settlements Sustainability Implications: Amasya Case	In the study; land use, occupancy, space, slope, climate, orientation, transportation, open and semi-open spaces, green areas, production and trade units, natural environment, social environment, demographic structure, local culture, housing and traditional architectural features are discussed	Book Section	2020
Karacalı, A. O.	A Review of Architectural Features of Amasya Yalıboyu Houses and A Suggestion	Aim of this study is to make the mentioned background design reasons of the Yalıboyu Hoses (scope) clear and suggesting a residence for modern river-cities.	Article	2021

Author(s)	Title of the Study	Subject	Type	Year
Okumuş, G. and Şahin Güçhan, N.	Harmony and Incompatibility in the Historical Fabric: A Morphological Assessment of Amasya Yalıboyu Houses, Turkey	The study aims to understand the process of change and transformation in the texture and facade characteristics of the Yalıboyu Houses from a morphological perspective, and to measure the compatibility or incompatibility of the "new" with the unique qualities of the urban form. This measurement system aims to examine the mass (scale, mass rhythm) and facade characteristics (solid-void ratio, facade layout, and elements) of the buildings on the Yalıboyu Facade.	Conference Paper	2021
Erbaş Özil, M. and Aykal F. D.	A Tourism-Oriented Urban Renewal: The Example of Amasya Hatuniye District	The aim of the study is to protect the settlement's natural values, ancient ruins, ruins, archaeological sites and historical/ traditional urban fabric, to evaluate the decisions taken by the competent units of the central government in "conservation", and to develop opinions and suggestions for the holistic, sustainable protection and development of these values.	Conference Paper	2021
Erbaş Özil, M.	Researching Traditional Dwelling Architecture in the Context of Sustainability: The Case of Amasya Hatuniye Neighborhood	The aim of this study is to examine the residential buildings in the Hatuniye neighborhood, located in the historic site area of Amasya city center, in terms of ecological sustainability, with a view to revealing energy-efficient design solutions for traditional buildings in Anatolia and presenting them as examples for today's and tomorrow's designers to follow.	Conference Paper	2021
Altanlar A.	The Impact of Place Attachment of Historical Neighborhood Residents on the Tourism Support	This article studies the relationship between the place attachment of historical neighborhood residents, the effects of tourism, and the support for tourism	Article	2021

Author(s)	Title of the Study	Subject	Type	Year
Altanlar A.	The Effect of Place Attachment on Tourism Strategies: Amasya Example	This study aims to examine the relationship between residents' place attachment, tourism impacts, pro-tourism behavioral intentions and behavioral attitudes towards sustainable tourism policies. For this purpose, field research was conducted in 2017 in ten neighborhoods, including Sofular Neighborhood, which is located in Amasya province and has a traditional neighborhood texture.	Article	2021
Erbaş Özil, M.	An Evaluation of Doors and Windows as Facade Elements in Traditional Amasya Houses	The aim of the study is to determine the extent to which doors and windows, which are structural components of the facade of a house, have remained original, and to identify the types of use they have undergone. In addition, the study aims to determine what factors have influenced the facade design of traditional houses.	Book Section	2022
Asan S.T.	Functional change in Amasya houses in the historical process and the evaluation of this change within the scope of sustainability	In this change of traditional Amasya houses, their spaces and the organization between spaces differ, and this difference causes the formation of new plan schemes. In this study, the formation phases of traditional Amasya houses and the changes in the organization of space in the historical process are examined within the scope of sustainability; A general definition of Amasya has been made, the city development has been examined, and the houses examined in this development have been classified according to their construction date.	Master Thesis	2022

Analysis Of The Working Area In Sofular Neighborhood

The location of the selected Sofular Neighborhood, which is the study area, within the city and its relationship with the surrounding neighborhoods are presented in Figures 3 and 4 below.

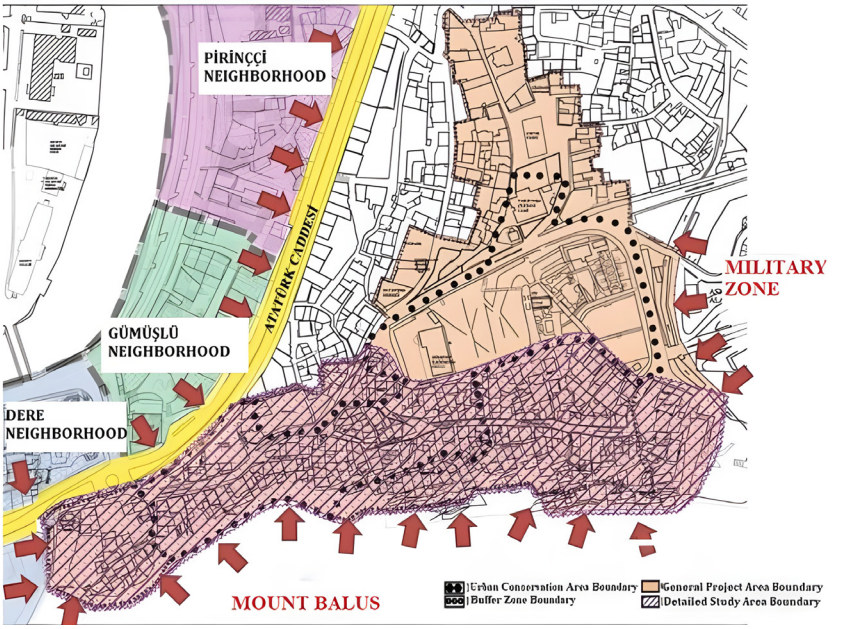


Figure 3. The overall study area and the detailed study area selected as the region (Alaca, 2012).

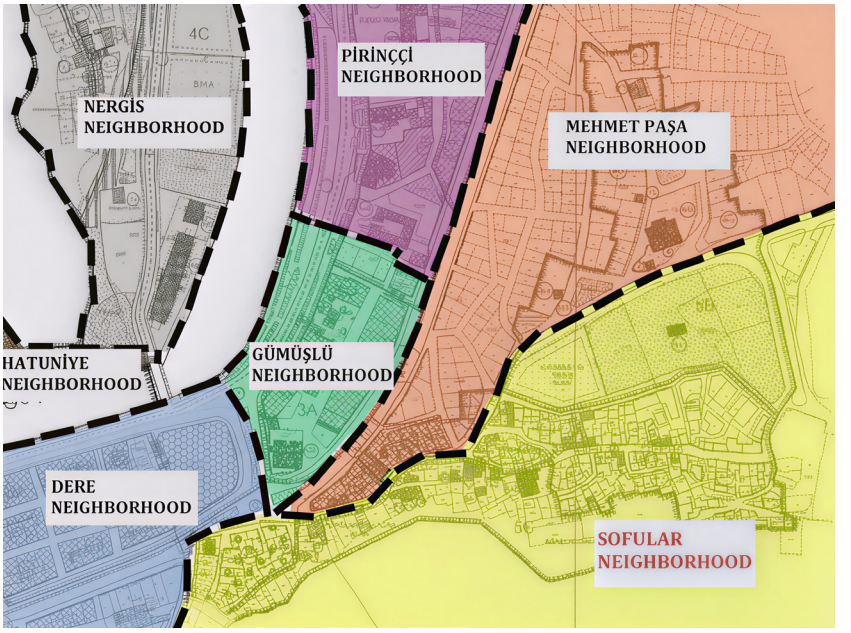
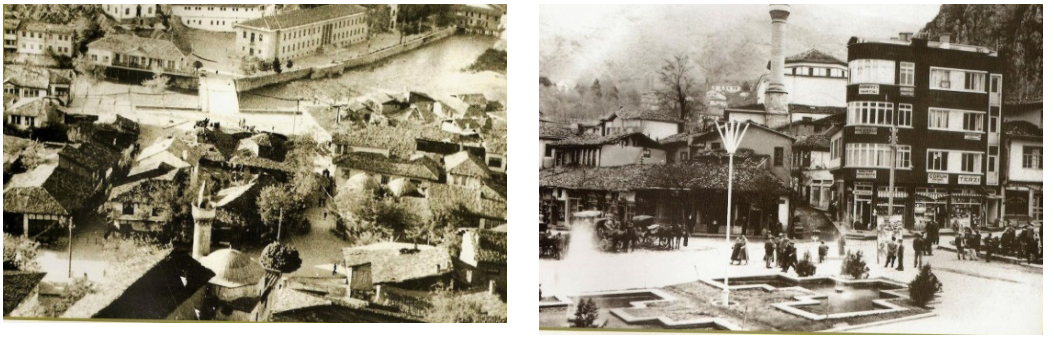


Figure 4. The position of Sofular Neighborhood in relation to the surrounding neighborhoods (Alaca, 2012).

The Yavuz Selim Square, located in the northwest of the study area, is chosen as the urban open space due to its location directly across from the administrative center of the city since the Tanzimat era. With its identity as a city square, it serves as the most important meeting point in the city (Figure 5) (Seçkin, 2006).



(a) (b)

Figure 5. (a) Before the opening of Selağzı/Yavuz Selim Square. (b) The vicinity of Yavuz Selim Square in the year 1928 (Yaşar, 1986).

The study area, located directly behind this significant gathering place, the square, occupies a central position. Through the commercial structures situated at the entrance of the neighborhood, it interacts with this square. The relationship of the area with the square is illustrated in Figure 6, and its relationship according to the viewpoints is shown in Figures 7 and 8.

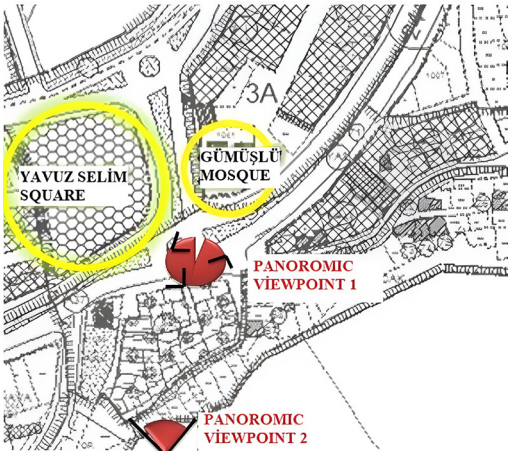


Figure 6. The relationship of the study area with the square (Developed from the K.A.I.P. Map).

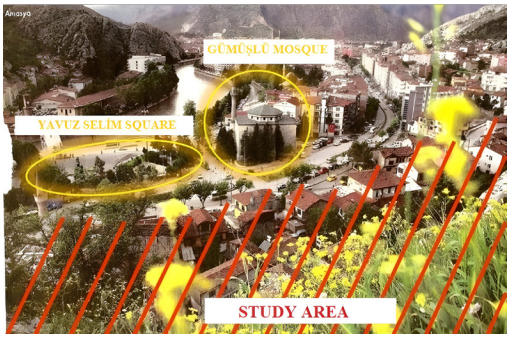


Figure 7. The relationship of the study area with the square and Gümüşlü Mosque (Viewpoint 1) (Hürriyet newspaper archive-2011)

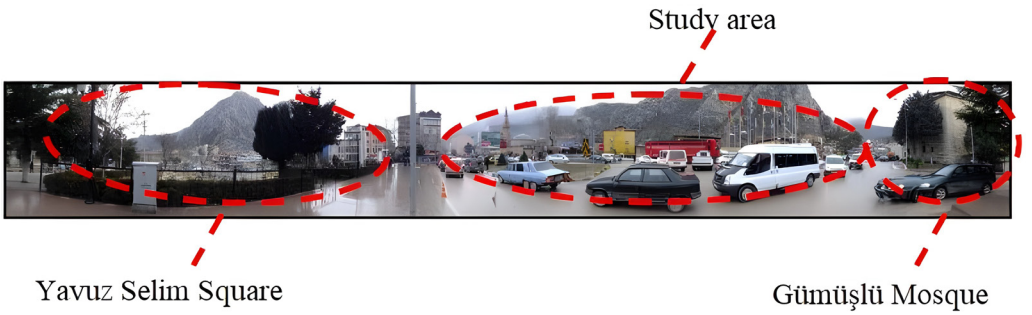


Figure 8. The relationship of the study area with Yavuz Selim Square and Gümüşlü Mosque (Viewpoint 2 - Panoramic).

Roads shaped by the slope of the area differ from a linear system, narrowing at some points and expanding at others. The road widths vary between 1 m and 7 m. Another characteristic feature of the street pattern in the study area is the presence of dead-end streets (Figure 9) and stair streets (Figure 10). There are a total of 7 dead-end streets in the area, each named after the street it connects to.

(a) (b)

Figure 9. (a) Müftü Kamil Sokak dead-end street. (b) Yıldız Sokak (Erbaş Özil Photo Archive, 2023).

Figure 10: Stairs Street: Onur Street (Erbaş Özil Photo Archive, 2023)

The topography formed by the roads, Saraydüzü Avenue and Müftü Kamil Street, rises within the study area, starting from the intersection of Saraydüzü Avenue and Müftü Kamil Street and ascending towards the interior of the area. It reaches its highest point at the intersection of Müftü Kamil Street and Onur Street (Figure 11).

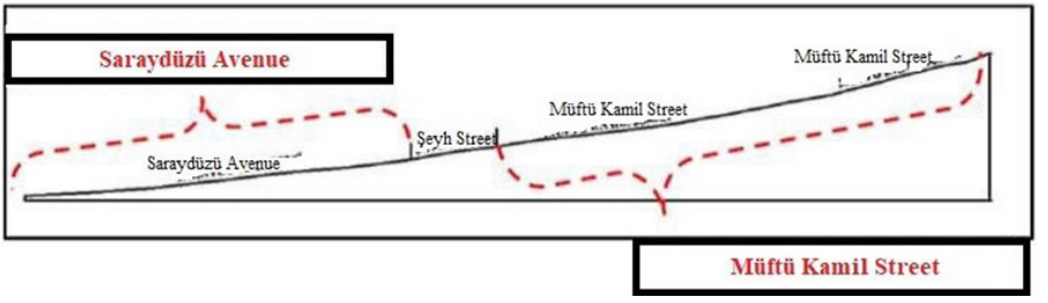


Figure 11 . The topography traversed by Saraydüzü Avenue and Müftü Kamil Street.

In Sofular Neighborhood, there are 39 contour lines with an approximate interval of 2 meters, and the highest slope percentage is found on Müftü Kamil Street. Onur Street has an approximate slope of 15% from its beginning to the end. Considering Onur Street as the highest line, the slope increases from west to east. Sofular Neighborhood is situated at a higher elevation compared to other neighborhoods. While natural slope dominates all streets in the area, Onur Street in the study area and Fecir and Bamya Streets in Mehmet Pasa Neighborhood use staircases for ascent.

The fundamental factors influencing the spatial design features of Anatolian houses include climate and topography, local building materials, and the traditional house culture. The organization of house spaces has diversified through the reflection of factors such as production relationships, climate, and topography, solidifying with the manifestation of people's beliefs. Even if climate conditions, vegetation, and building materials are the same, differences in people's beliefs and the understanding of integrity naturally reflect

in architecture. The slope, the attractiveness of the landscape created by vegetation, and the effects of climate are determining factors in the orientation of houses (Sözen, 2006). The positioning of structures in Sofular Neighborhood according to the slope is as follows (Figure 12).

Figure 12. The positioning of structures in Sofular Neighborhood according to the topography

When examining the development of traditional houses in Sofular Neighborhood in Amasya, traces of the house culture developed by the Turks after their arrival in Anatolia can be observed. These houses are generally positioned in parallel with the slope of the hill, arranged side by side, and in adjacent order, harmonizing with the topography (Figure 13).

Figure 13. Housing-topography harmony in Sofular Neighborhood each house has a courtyard, which is located both behind the house and in front of it (Türkoğlu, 2006).

Basic Design Principles

Design principles are essential guidelines for organizing elements such as line, color, and texture when creating a design. These principles serve to relate design elements to each other. While design elements are visual components, design principles are fundamental assumptions applied for visual interpretation.

To create diversity in design, different basic design principles are often used together in one or more places. The designer determines the proportion and combinations of these principles used in a design. In short, the accuracy of how these principles are applied depends on the artist's discretion (Güngör, 2005). Sustainable design aims to minimize the environmental, social, and economic impacts of products, services, and systems throughout their entire life cycle. In this process, traditional design principles such as symmetry, repetition, contrast, dominance, balance, and unity play a critical role in achieving sustainability goals (Table 3).

Table 3
Basic design principles

Basic Design Principles	
Symmetry	Symmetry refers to the reflection of an object or design in two equal or balanced parts. As a fundamental design principle, symmetry aims to create a sense of order and balance. The fact that one side of an object is similar or identical to the other side can create a perception of regularity, equilibrium, and aesthetics in the human mind (Akkurt & Aykal, 2021)
Repetition	Repetition is the use of elements such as line, form, scale, and color multiple times within a design. The repetition of these elements creates a rhythmic effect in the design. Repetition is often a design principle encountered in spatial organizations and facade arrangements. In spatial designs, features like beams and columns are repeated to create necessary openings. In both functional and aesthetic solutions for spaces, windows and doors create repeated voids on walls (Ustaömeroğlu, 1998).
Contrast	Contrast is created by incorporating elements that possess characteristics that are the complete opposite of the features found in other elements within the design. Contrast is discussed when design elements lack common or similar characteristics. In design, contrast is often used to eliminate monotony and add excitement to the design by creating a focal point of interest. Continuous use of contrast in an organization can lead to confusion. In architectural design, contrast can exist within the structure itself or in its relationship with the surrounding environment.
Dominance	Dominance is the perception of one or more elements in an organization as superior to all other elements. In a design, larger objects may dominate smaller ones, warm colors may dominate cool colors, and hard-textured surfaces may dominate smooth-textured surfaces. A designer emphasizes various elements during the design process to create changes, highlighting certain features while pushing others into the background. This creates both primary focal points and secondary areas for the eye to navigate, allowing for the establishment of dominance (Ocvirk et al., 2015)
Balance	Balance is the visual effect of all parts in a design harmoniously interacting with each other. It is an integral part of other design elements and principles. Balance implies that the elements composing the design are equivalent in terms of basic design principles, and it can be achieved through various elements. Proper use of these elements prevents one side from dominating the design. Elements within a design, such as their size, direction, and spacing, are compared to create an overall sense of balance in the composition. This composition should provide a general feeling of balance, and no element should overpower the design's center of gravity in any direction, maintaining equilibrium (Güngör, 2005).
Unity	The principle of Unity is the establishment of balanced visual integrity when all the elements and principles discussed so far come together. Unity is achieved by establishing the correct relationship between all the elements and principles used in the design. To achieve unity, it is not necessary for the elements used in the design to be the same and to be repeated continuously. Balance can be achieved with contrasting elements, creating unity. The presence of balance is essential for achieving the principle of unity. Additionally, the principle of unity is related to the principles of appropriateness, dominance, and contrast. Repetition, appropriateness, and hierarchy principles are used to achieve repetition and appropriateness for the emergence of unity (Güngör, 2005).

These principles guide the design process toward a more sustainable future by fostering harmony between aesthetic quality, functionality, and ecological responsibility.

The Relationship Between Design Principles and Sustainability

Design principles contribute not only to aesthetic quality but also play a crucial role in supporting environmental and functional sustainability. For instance, the principle of balance represents both visual and structural stability. This stability enables optimization in material use, reducing resource waste during the design and construction processes (Chapman, 2018). In particular, symmetrical balance allows for the efficient use of modular components with minimal material input (Getty Museum, 2025).

Rhythm is achieved through the repetition of certain elements within a design. Such repetition improves spatial legibility and also facilitates maintenance and repair processes. Accordingly, modular rhythmic systems can promote long-term savings in energy and materials (Yaşar & Erkartal, 2024).

Symmetry, by encouraging standardization and modularity in production, helps to minimize material waste and streamline construction processes. This feature becomes especially critical in prefabricated systems, where sustainability is often pursued through efficient assembly and resource use (McDonough, 1992).

The principle of contrast, while highlighting distinctive elements, can also help eliminate superfluous or non-functional components. When integrated with minimalist design approaches, contrast supports the creation of simple, functional, and sustainable spaces by avoiding unnecessary decorative elements (Chapman, 2018).

Unity, as a design principle, refers to the coherent integration of all parts within a composition. When applied effectively, it ensures that each design element serves a sustainable purpose, thereby enhancing the overall longevity and ecological performance of the structure (Getty Museum, 2025).

Similarly, the principles of scale and proportion, when aligned with human needs and environmental conditions, can contribute significantly to reducing energy consumption. Human-scaled designs, for instance, often require less heating and cooling, thereby supporting passive energy strategies (Yaşar & Erkartal, 2024).

All these principles are closely aligned with McDonough's (1992) Hannover Principles, which emphasize sustainability through approaches such as "designing without waste," "integrating with natural energy flows," and "conceiving systems holistically.

FINDINGS

The traditional houses in Amasya Sofular Mahallesi that have survived to the present day are generally structures from the Ottoman period, contributing an architectural character to the city. The fundamental factor in the design of these houses is the respect for humanity, nature, and the surrounding environment. Open and semi-open spaces created based on natural materials and climatic features, as well as the garden's role as a space for daily life, are indicative of the care and respect for both humans and the environment (Avcı, 2015). In this context, these traditional architectural examples are not only shaped by technical, functional, and aesthetic dimensions but also take into account ecological and cultural environmental aspects.

In line with the study objectives, the adaptations provided in the design of the buildings were evaluated in terms of the physical sustainability criteria discussed below, taking into account the climatic conditions of the traditional houses of Amasya Sofular Neighborhood, which show the characteristics of Traditional Turkish Houses.

Form and Space Organization Features:

Building form is defined through geometric features of the structure, such as the ratio of building length to depth, building height, roof type, etc., as depicted in the plans. These features vary depending on the climate types (Akın, 2001).

Amasya Sofular Mahallesi traditional houses have a spatial organization reflecting the "Turkish House" plan scheme. This plan scheme has been oriented to take advantage of the wind and protect against sunlight, considering climatic features. Although the external courtyard plan type is commonly observed, the internal courtyard plan type began to appear from the 19th century. In external courtyard plan types, effective ventilation between rooms and the courtyard increases heat loss in the summer months. On the other hand, the preference for internal courtyard plan types is influenced by having a larger number of rooms.

Furthermore, the courtyards, where much of daily life takes place, are typically positioned behind or beside the buildings, considering the predominant direction of the wind. This arrangement allows spaces such as storage and cellar, which generate heat, to be located in the courtyard, contributing to the cooling of both indoor and outdoor spaces (Aktuna, 2007).

The diversity in the arrangement of courtyards and sofas, along with preference differences, has led to the influence of various design principles when evaluating the selected houses for the study. Based on the examined examples, their general arrangement around a central point has created partial symmetry, thereby establishing harmony and rhythm.

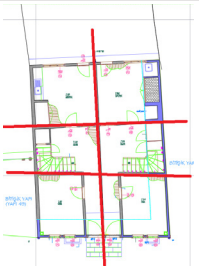
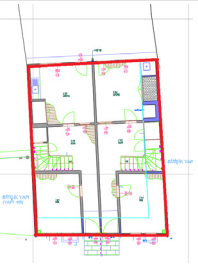
The houses in Sofular Neighborhood are generally two stories high, with floor heights ranging between 3 – 3.5 – 4 meters. Although the houses are positioned on narrow streets, dead-end alleys, and stair streets, expansion from the plan level to the upper floors through projections can be observed. Projections, extending over the street to dissipate heat from the building, increase wall surface area to achieve heat loss, capture wind from different directions, and make efficient use of natural light (Erbaş, 2018) (Figure 14).

Figure 14. Oriel windows in the traditional houses of Sofular Neighborhood (İhlas Haber Ajansı, 2018).

In this context, the opening of mutual windows in projections in some of the sample structures has resulted in the harmonious repetition of certain lines. This has led to the presence of rhythm and balance criteria in many of the examined structures. However, the presence of different-width spaces between elements for heat dissipation and the placement of the building according to the parcel have created contrast (Table 4).

Table 4
Assessment of the spatial organization and form characteristics of the selected traditional houses in Sofular Neighborhood in the context of defined basic design principles.

Sample	**Symmetry**	**Rhythm (Repeat)**	**Balance**	**Contrast**
	It is the correct harmony between the elements of a work and the connection between the different elements of the design according to an element chosen as a criterion.	It is the regular and harmonious repetition of specific lines, shapes, forms, or colors.	It is the unity of design elements in harmony and relationships.	It refers to the absence of any common or shared qualities among the design elements.

Sample	Symmetry	Rhythm (Repeat)	Balance	Contrast
	 Symmetry is not dominant.	 There is no rhythm element in the building form and geometric arrangement due to the lack of similar elements in the sustainable design elements.	The building is located in a row of attached order. The building's position does not create full harmony in the design.	The presence of openings created to benefit from natural lighting and the positioning of the building in relation to the parcel have led to fragmentation and the lack of close qualities between its elements.
	 Partial symmetry exists in façade and plan.	 There is a principle of rhythm due to the repetition of architectural elements of the same size and direction of the building designed after the decisions for which purposes the spaces created within the scope of space organization will be used, how much heat and light will be needed.	The integrity formed by the use of the principles of measure, texture, range, volume, space, form, proportion, light and shadow and repetition creates the concept of balance in the structure.	Unified design elements prevent contrast..

Sample	Symmetry	Rhythm (Repeat)	Balance	Contrast
	 The building contains partial symmetry.	 Grouping of rooms with similar thermal needs creates rhythmic layout.	Unified design elements prevent contrast.	There is no contrast due to the unity of the design elements in harmony and relationships.
	 Partial symmetry observed in space organization.	 Similar thermal spaces are arranged together, creating partial rhythm.	The coherence formed by the use of design elements and repetition principles has created the concept of balance in the building.	Unified design elements prevent contrast.
	 Clear symmetry exists between spaces.	 The spaces are arranged depending on the climatic characteristics and the openings are in a certain order and harmony. In this context, rhythm criterion is present in the building.	The spaces are positioned based on the required amount of heat, light, and ventilation according to their functions. This situation has led to the spaces being harmonious and interconnected.	There is no contrast due to the unity of the design elements in harmony and relationships.

Building Envelope Features:

The building envelope is a design element that separates a building from its external environment and shapes it according to environmental factors such as heat, light, and sound. While controlling outdoor air temperature and sunlight to meet comfort conditions, it also provides acoustical comfort by managing the noise between the exterior and interior spaces.

The traditional houses of Amasya Sofular Neighborhood reflect the functionality of the plan by incorporating Traditional Turkish House features in the facade design. Façade elements such as garden walls, bay windows, eaves, windows and street doors are used. These openings are placed according to not only the facade appearance but also the functionality and needs of the spaces.

In the settlement of Amasya Sofular Neighborhood, where a hot and dry climate prevails in summers and a cold climate in winters, the spatial organization complements each other with the appropriate orientation of the buildings. Typically, the first-floor windows of the houses are arranged in large numbers and sizes to provide natural ventilation and lighting to the spaces. Ground-floor windows are smaller in size and fewer in number to preserve privacy (Figure 15).

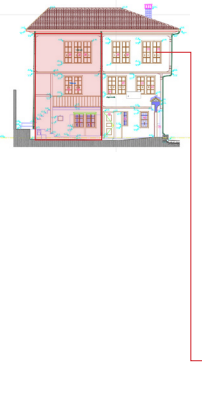
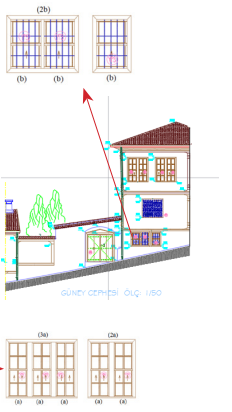
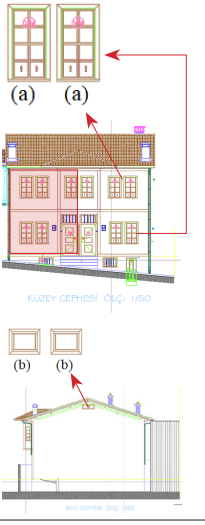
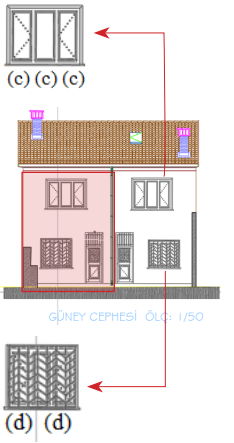
Figure 15. The opening features of traditional houses in Amasya Sofular Neighborhood

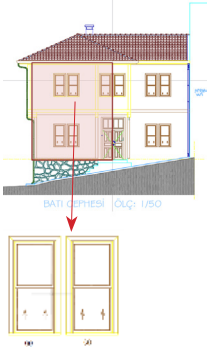
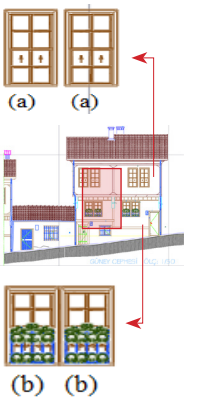
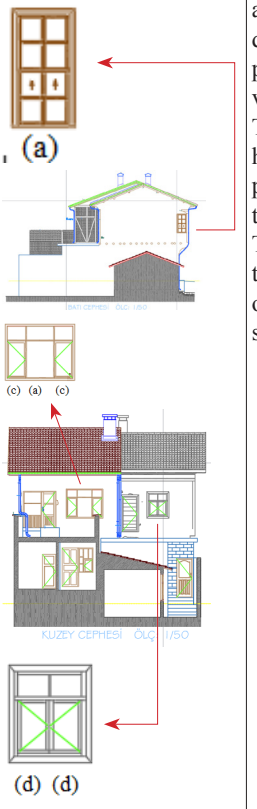
While dormer windows are not very common, they can be found on the north facades of some houses in Amasya Sofular Neighborhood. These windows provide natural lighting and ventilation while assisting in the upward flow of air (Küçükerman, 1996).

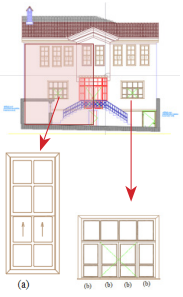
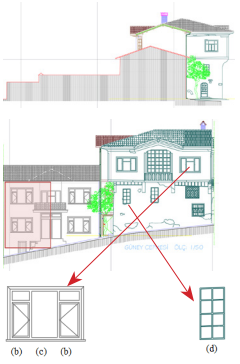
Traditional houses in Amasya Sofular Neighborhood exhibit differences in the ground floor and upper floor facades. Ground floors integrate with garden walls, forming a continuous wall along the street, while upper floors expand through projections based on climate, natural light, and functional needs. Openings in these projections, oriented in different directions, facilitate cross-ventilation and illumination of the spaces.

In line with the above explanations, the examined examples have different solid-to-void ratios, leading to a contrast in fundamental design principles. However, when each floor is considered independently, it is observed that balance is achieved in some structures through the use of principles such as scale, texture, spacing, volume, form, proportion, light, and shadow (Table 5).

Table 5
Evaluation of the building envelope features of selected traditional houses in Sofular Neighborhood in the context of established basic design principles.

SAMPLE	Symmetry	Rhythm (Repeat)	Balance	Contrast
	It is the correct harmony between the elements of a work and the connection between the different elements of the design according to an element chosen as a criterion.	It is the regular and harmonious repetition of specific lines, shapes, forms, or colors.	It is the unity of design elements in harmony and relationships.	It refers to the absence of any common or shared qualities among the design elements.
			When evaluated in terms of the values emerging in the building envelope while adhering to the climate, a symmetrical balance predominates. It has been formed through the use of elements such as spacing, texture, volume, form, orientation, light, and ventilation, employing the principle of repetition.	The dominance of symmetrical balance on the facade is devoid of the principle of contrast.
			In the openings of the building envelope, there is a specific harmony in terms of proportions and their placements on the shell. In this context, it positively contributes to the thermal losses and gains of the building, and consequently, the comfort conditions within the interior space.	Symmetry dominates the façade, so contrast is absent.

SAMPLE	Symmetry	Rhythm (Repeat)	Balance	Contrast
			Window and door openings are proportionally arranged on the façade. In this context, it positively contributes to the thermal losses and gains of the building, and consequently, the comfort conditions within the interior space.	The prevalence of symmetrical balance on the facade results in a lack of contrast.
		 The openings do not repeat themselves in a specific order and harmonically	Window arrangement does not provide uniform ventilation. There is a lack of harmony in their placement on the shell surface. This has hindered the dominance of balance in the structure.	The principle of contrast is present on the facade due to the lack of harmony and unity among the design elements in terms of volume, form, and orientation.

SAMPLE	Symmetry	Rhythm (Repeat)	Balance	Contrast
	 Sun-control elements are arranged rhythmically.		Evaluated in terms of the openings emerging in the building envelope while adhering to the climate, symmetrical balance predominates	For security and privacy purposes, similar to Turkish Houses, the upper-floor windows in the building are more numerous and larger than the lower-floor windows. However, there is no principle of contrast due to the presence of similar forms, measurements, dimensions, and textures in the windows.

The collected data were analyzed using a content analysis method guided by a deductive coding approach, in which each building was evaluated based on pre-established sustainability criteria and fundamental design principles. In addition, thematic coding was employed to identify patterns and variations related to spatial organization, façade design, and environmental responses. Within this framework, each sample was comprehensively examined in terms of its spatial layout and form, including its relationship with topography, internal circulation, and climatic orientation, as well as building envelope characteristics such as window distribution, material usage, and solar control strategies. Furthermore, key design principles, including symmetry, repetition, contrast, and balance across different scales, were considered in the analysis. The findings obtained from these evaluations were systematically compiled into comparative matrices in order to reveal both commonalities and deviations among the examined examples.

Achieving visual or physical balance creates a sense of stability in users or the public. This suggests that well-balanced designs can be realized with fewer materials, promoting material efficiency. Symmetrical balance enables minimal material use through structural repetition, while asymmetrical balance encourages creativity and can contribute to waste reduction in sustainable design. The use of repetitive elements (e.g., structural modules) promotes environmental consistency and simplifies maintenance processes. This rhythm extends the building's lifespan and helps reduce the consumption of resources throughout its life cycle. Symmetrical designs are well-suited to modularity and mass

production, facilitating sustainable construction methods such as prefabricated systems. Such approaches enhance standardization and minimize production waste. Contrast highlights functional components while minimizing non-essential decorative elements. This principle aligns with minimalist design strategies, which support sustainability by avoiding material excess and emphasizing purpose-driven forms. Unity ensures that all parts of the design are meaningfully connected and work together as a cohesive whole. This contributes to the long-term reusability and recyclability of modular systems, thereby supporting circular design approaches. Designs that align with human scale can reduce energy demands, particularly in heating and cooling, by minimizing unnecessary volume. Moreover, modular scaling allows for efficient material use and reduces construction waste.

CONCLUSION

The acceleration of industrialization and technological advancements has diminished interest in traditional architecture, which emerged from centuries-old experiences and cultural accumulations. However, environmental issues that have arisen over time have highlighted the necessity of developing solutions to these problems, leading to the emergence of a sustainable architectural approach. Sustainable architecture aims to achieve sustainability by considering existing land and climate data and employing design principles that utilize renewable energy sources, thereby minimizing the consumption of energy in buildings. Therefore, the evolution of traditional architecture has become a significant component of sustainable architecture. The examination and evaluation of ecological practices in traditional residences are crucial for addressing contemporary environmental issues.

Based on this idea, it has been chosen as the subject of the study to evaluate, within the context of fundamental design principles, the relationship between traditional and sustainable architecture in Sofular Mahallesi, the historical core of Amasya, by taking five examples of traditional houses in this neighborhood. In this context, the aim of the study is to articulate the relationship between traditional architecture and sustainability in terms of fundamental design principles, considering aesthetic and ecological data. In the examination, six traditional houses in Amasya Sofular Mahallesi are comparatively analyzed under the titles of building envelope design, spatial organization, and building form. As a result of these evaluations, the following findings have been reached (Table 6):

Table 6
Findings of the study

Form and Space Organization	Envelope Characteristics
Considering the climate characteristics, the selected examples have been oriented to harness the wind and provide protection from sunlight. It has been determined that open or closed projections are preferred for shading. To achieve the desired climatic comfort indoors, rectangular, fragmented, and courtyard plans have been employed to increase the wall area, thereby enhancing heat losses on exterior surfaces. Sofas have been oriented towards the south and southeast to take advantage of the prevailing meltem wind. Although the predominant plan type in Amasya Traditional Houses is the external sofa plan, the examples provided also include the central and internal sofa plan types. This situation has led to the influence of different design principles on the spatial organization of the examples. However, in all examined examples, spaces with similar thermal needs have been resolved together, ensuring the intake of wind from different directions and maximizing the use of natural light.	The window and door gaps opened in the building envelope affect the heat gains and losses of the building. For this reason, the location, size and shape of the gaps are important for ensuring climatic comfort. The analyzed examples have traditional architectural features. The upper floor windows of the houses are arranged in large sizes and in large numbers, providing natural ventilation and illumination and increasing visibility. In addition, the openings are arranged in different directions in order to provide ventilation throughout the space. This affected the occupancy-void ratios of the building envelope and the openings of the examples created symmetry, rhythm, balance or contrast. In Amasya Sofular Neighborhood Traditional Houses, wooden shutters were used to protect the windows on the south and west facades where the sun is active. In this way, balance was created in the building envelope. There is no complete symmetry throughout the facades. However, symmetry is created independently on the ground floor or first floor rather than the whole building. In most of the examples evaluated, it was determined that measures were taken to provide natural ventilation and sun protection required by climatic conditions, and that the design criteria determined in this direction were similar.

Due to the facilitating and guiding nature of the fundamental design principles in making arrangements, efforts have been made to better articulate the relationship between sustainable and traditional architecture. Throughout the evaluated examples, the criteria for spatial organization and the criteria for the building envelope have shown variations. Symmetry and rhythm are often predominant in the facades and spatial organizations of the residences, leading to a sense of balance.

In conclusion, it is considered that Sofular Mahallesi Houses should be approached taking into account their functional, economic, cultural, aesthetic, and ecological aspects. Aesthetic evaluations within the framework of fundamental design principles have been made based on the characteristics of form, spatial organization, and building envelope design (Table 3). These evaluations are based on the criteria specified in Table 4 and Table 5, which include fundamental design principles such as symmetry, rhythm, balance, and contrast. In line with the mentioned headings, it has been determined that the common goal of traditional and sustainable architecture is to construct buildings in suitable

locations that minimize energy consumption, in line with the harmony of topography, natural and built environment, and climate. In light of the analysis criteria and design inputs obtained, it has been identified that traditional Kaleiçi structures are created with consideration for functional, natural, and cultural environmental dimensions, as well as aesthetic dimensions, in accordance with fundamental design principles.

As a result, when basic design principles are integrated into sustainability solutions, they ensure resource efficiency by reducing waste in production processes through symmetry and modularity. They also enable long-lasting designs by achieving material compatibility through integrity, proportion, and scale. Furthermore, they contribute to reducing energy and maintenance costs by enhancing system optimization through human-scale design and rhythmic modular systems.

ACKNOWLEDGEMENT

N/A.

REFERENCES

Akın, C. T. (2001). Climate balanced housing design control model in settlement and building scale, according to natural environment factors (Doctoral dissertation, Yıldız Technical University, İstanbul, Turkey).

Akkurt, E., & Aykal, F. D. (2021). The effects of Gestalt theory on façade perception: Diyarbakır Mahabad Boulevard evaluation. *Online Journal of Art and Design, 9*(1), 22–43.

Aktuna, M. (2007). Geleneksel mimaride binaların sürdürülebilir tasarım kriterleri bağlamında değerlendirilmesi (Master's thesis, Yıldız Technical University, İstanbul, Turkey).

Alaca, A. M. (2012). The analysis evaluation and the preservation-rehabilitation proposal of traditional settlement pattern and Amasya Sofular District and its vicinity (Master's thesis, Gazi University, Institute of Science and Technology, Ankara, Turkey).

Avcı, Ü. (2015). Pebble mosaic art in residential architecture: Antalya Kaleici as an example. *Journal of Art-Sanat, 4*(2015), 116–121.

Chapman, C. (2018). The principles of design and their importance. Toptal. https://www.toptal.com/designers/ui/principles-of-design

Erbaş Özil, M. (2023). *Photo archive* [Unpublished photo collection].

Erbaş, M. (2018). The relationship between the space depth and window opening in Amasya traditional houses (Doctoral dissertation, Dicle University, Diyarbakır, Turkey).

Getty Museum. (2025). Principles of design. *ASLCORE Encyclopedia*. RIT / NTID.

Groth, P. (1999). Making new connections in vernacular architecture. Journal of the So*ciety of Architectural Historians, 58*(3), 444–451.

Güngör, H. İ. (2005). *Basic design for visual arts and architecture*. Esen Offset Printing: İstanbul, Turkey.

Hidayatun, M. I., Prijotomo, J., & Rachmawati, M. (2015). Sustainability is an important part of the identity in the dimension of regionalism architecture. *Applied Mechanics and Materials, 747*, 145–148. https://doi.org/10.4028/www.scientific.net/amm.747.145

Hinrichs, C. L. (1987). *The architecture of the courtyard house as generated by passive solar energy and other factors* (MPhil thesis, The University of Manchester, Manchester, UK).

ICOMOS. (1999). *ICOMOS charter on the built vernacular heritage*.

İhlas Haber Ajansı. (2018, December 24). *Amasya'da yeni turizm rotası yenilenen Osmanlı konakları*. İhlas Haber Ajansı. https://www.iha.com.tr/amasya-haberleri/-2188315

Interaction Design Foundation. (2025). *The building blocks of visual design*. https://www.interaction-design.org/literature/article/the-building-blocks-of-visual-design?srsltid=AfmBOorLDFOn_M1Q8TXNWzFNQ4Bo-W775WL6vB1gqjU-3C2W1CfYesCQ

Karahan, F., & Davardoust, S. (2020). Evaluation of vernacular architecture of Uzundere District (architectural typology and physical form of building) in relation to ecological sustainable development. *Journal of Asian Architecture and Building Engineering, 19*(1), 1–12.

Khan Academy. (n.d.). *Victorian art and architecture*. https://www.khanacademy.org/humanities/becomingmodern/victorian-art-architecture

Kısa Ovalı, P., & Delibaş, N. (2016). Analysis of Kayaköy within the scope of the sustainability of the vernacular architecture. *MEGARON, 11*, 515–529.

Koester, R. J. (1995). Sustainability is an architecture. *Architronic*.

Küçükerman, Ö. (1996). *Turkish house: In search of spatial identity*. Türkiye İş Bankası Cultural Publications.

Le Corbusier. (1941). *The four routes* (D. Todd, Trans.). Dennis Dobson Ltd.

McDonough, W. (1992). *The Hannover principles: Design for sustainability*. Hannover, Germany: Author.

McLennan, J. F. (2006). *The philosophy of sustainable design*. EcoTone.

Ocvirk, O. G., Stinson, E. R., Wigg, R. P., & Cayton, L. D. (2015). *Fundamentals of art theory and practice*. Karakalem Publishing.

Oliver, P. (1976). *Shelter and society* (2nd ed.). Barrie & Jenkins Ltd.

Oliver, P. (1997). *Encyclopedia of vernacular architecture of the world*. Cambridge University Press.

Owens, S. (2003). Is there a meaningful definition of sustainability? *Plant Genetic Resources, 1*(1), 5–9.

Özel, E., & Sağsöz, A. (2021). Investigation of the traditional houses with basic design principles in the context of sustainable design: Kaleiçi/Antalya example. *The Journal of International Social Research, 14*(78)

Richards, S. (2012). "Vernacular" accommodations: Worldplay in contemporary-traditional architecture theory. *Cambridge Journals, 16*(1).

Rudofsky, B. (1974). *Architecture without architects: A short introduction to non-pedigreed architecture*. Academy Editions.

Salman, M., Easterbrook, S., Sabie, S., & Abate, J. (2016). Sustainable and smart: Rethinking what a smart home is. In *Proceedings of ICT for Sustainability* (pp. xx–xx). ICT4S. https://doi.org/10.2991/ict4s-16.2016.22

Salman, M. (2004). Sustainable house: Futuristic approach for sustainable architecture. In *Proceedings of Housing Symposium II* (pp. 422–435). Al-Riyadh Development Authority.

Seçkin, Y. Ç., & Türkoğlu Dülger, H. (2006). The analysis of usage of the open spaces in the historical city center of Amasya. *İTU Journal, Architecture, Planning, Design, 5*(1), 15–28.

Senosiain, J. (2003). *Bio-architecture*. The Architectural Press.

Sev, A. (2009). *Sustainable architecture*. Construction-Industry Center.

Silleli. (2024). *Sille mimarisi*. Silleli. https://www.silleli.com/sayfa/sille-mimarisi/30

Thomas, D. (2002). *Architecture and the urban environment: A vision for the new age*. Architectural Press.

Türkoğlu, E. (2006). *The analysis and evaluation of Amasya, Hatuniye Mahallesi and the preservation/rehabilitation proposals for the traditional settlement* (Master's thesis, Gazi University, Graduate School of Natural and Applied Sciences, Ankara, Turkey).

UNESCO World Heritage Centre. (2024). *Image from World Heritage Site* (UNESCO site ID 614). UNESCO World Heritage Centre. https://whc.unesco.org/include/tool_image_bootstrap.cfm?id=131118&gallery=site&id_site=614

Ustaömeroğlu, A. A. (1998). *A research on heavily aesthetic method development for architectural analysis by using basic design elements and principles* (Master's thesis, Karadeniz Technical University, Graduate School of Natural and Applied Sciences, Trabzon, Turkey).

Vellinga, M., Oliver, P., & Bridge, A. (2007). *Atlas of vernacular architecture of the world*. Routledge.

Wahl, D. C., & Baxter, S. (2008). The designer's role in facilitating sustainable solutions. *Design Issues, 24*(2), 72–83.

World Commission on Environment and Development. (1987). *Our common future*. http://www.un-documents.net/our-common-future.pdf

Williams, K., & Dair, C. (2007). What is stopping sustainable building in England? Barriers experienced by stakeholders in delivering sustainable developments. *Sustainable Development, 15*, 135–147.

Yaşar, A. H. H. (1986). *History of Amasya* (No. 1). Amasya Municipality Culture Publications.

Yaşar, D., & Erkartal, P. Ö. (2024). A study of design character in green office interiors. *New Design Ideas, 8*(3), 656–673. https://doi.org/10.62476/ndi83656