AN INQUIRY INTO THE VALUES AND PROBLEMS FOR CONSERVATION OF TRADITIONAL MUD BRICK HOUSES IN AĞLASUN, BURDUR

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

CANSU CAN

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
CONSERVATION OF CULTURAL HERITAGE IN ARCHITECTURE

DECEMBER 2019

Approval of the thesis:

AN INQUIRY INTO THE VALUES AND PROBLEMS FOR CONSERVATION OF TRADITIONAL MUD BRICK HOUSES IN AĞLASUN, BURDUR

submitted by **CANSU CAN** in partial fulfillment of the requirements for the degree of **Master of Science in Conservation of Cultural Heritage in Architecture Department, Middle East Technical University** by,

Prof. Dr. Halil Kalıpçılar

Dean, Graduate School of **Natural and Applied Sciences**

Prof. Dr. F. Cânâ Bilsel

Head of Department, **Architecture**

Prof. Dr. Neriman Şahin Güçhan

Supervisor, **Architecture, METU**

Examining Committee Members:

Assoc. Prof. Dr. A. Güliz Bilgin Altınöz

Architecture, METU

Prof. Dr. Neriman Şahin Güçhan

Architecture, METU

Dr. Azize Elif Yabacı

Architecture, TED University

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Surname: Cansu Can

Signature:

ABSTRACT

AN INQUIRY INTO THE VALUES AND PROBLEMS FOR CONSERVATION OF TRADITIONAL MUD BRICK HOUSES IN AĞLASUN, BURDUR

Can, Cansu
Master of Science, Conservation of Cultural Heritage in Architecture
Supervisor: Prof. Dr. Neriman Şahin Güçhan

December 2019, 287 pages

The buildings, constituting rural architecture, reflect the environment, in which they are located, as well as the socio-cultural, economical and traditional features of rural life because of being built with local construction materials. Therefore, the conservation of rural architecture contributes to the continuity of rural heritage, which is an essential part of cultural heritage. Traditional houses constitute a significant part of the civil architecture in rural. However, most of them are in danger of extinction as a result of being abandoned or being exposed to uncontrolled transformation because they are not equipped adequately for current living standards. Thus, it is important to ensure the continuity of the historical, authentic and aesthetic values of traditional houses with an appropriate conservation approach which is decided specifically for each building by considering their existing architectural, structural and functional characteristics. The study conducted within the scope of this thesis is on the defining current values and problems of traditional rural houses for a conservation project to be addressed for this purpose.

It is known that the use of mud brick as a building material in housing construction has been observed since the Neolithic Age. Unfortunately, it lost its favor in time with the effect of globalization. However, together with development of eco-friendly architecture, the value of mud brick as a construction material has started to be considered deeply with scientific studies around the world.

Within this context, researches on structural, environmental and sanitary conditions of mud brick constructions has been brought into discussion for the last few decades in also Turkey. With both historical and traditional mud brick masonry architecture richness, Ağlasun district of Burdur is one of the important rural areas in Turkey. In this regard, the aim of this thesis is identifying the current values and problems of traditional houses in Ağlasun in accordance with their architectural and structural characteristics and proposing conservation interventions.

Keywords: Conservation, Traditional Architecture, Mud Brick, Ağlasun

ÖZ

AĞLASUN, BURDUR'DA BULUNAN GELENEKSEL KERPİÇ KONUTLARIN KORUNMASINA YÖNELİK DEĞERLERİN VE PROBLEMLERİN ARAŞTIRILMASI

Can, Cansu
Yüksek Lisans, Kültürel Mirası Koruma, Mimarlık
Tez Yöneticisi: Prof. Dr. Neriman Şahin Güçhan

Aralık 2019, 287 sayfa

Kırsal mimariyi oluşturan yapılar, yerel yapı malzemeleri ile inşa edildikleri için, kırsaldaki yaşamın sosyokültürel, ekonomik ve geleneksel özelliklerinin yanı sıra bulundukları çevreyi de yansıtmaktadırlar. Dolayısıyla, kırsal mimarinin korunması, kültürel mirasın önemli bir parçası olan kırsal mirasın devamlılığına katkı sağlamaktadır. Geleneksel evler, kırsal alanlardaki sivil mimarinin büyük bir kısmını oluşturmaktadır. Günümüzde bu yapıların birçoğu güncel yaşam koşullarına uygun donanıma sahip olmadığı için terk edilerek veya kontrolsüz dönüşüme uğrayarak yok olma tehlikesi altındadır. Bu nedenle, geleneksel konutların mevcut mimari, yapısal ve işlevsel özellikleri göz önünde bulundurularak her bina için özel olarak belirlenen uygun bir koruma yaklaşımıyla tarihi, özgün ve estetik değerlerinin sürekliliğinin sağlanması önemlidir.

Kerpiçin konut inşasında yapı malzemesi olarak kullanımının Neolitik Çağ'dan itibaren gözlemlendiği bilinmektedir. Malesef küreselleşmenin etkisiyle kerpiç zamanla önemini yitirmiştir. Fakat çevre dostu mimarlık anlayışının gelişmesi ve kerpiç üzerine yapılan dünya çapındaki bilimsel çalışmalar ile kerpiçin bir yapı malzemesi olarak değeri dikkate alınmaya başlanmıştır. Bu bağlamda, kerpiç binaların yapısal, çevresel ve sıhhi durumları üzerine araştırmalar son birkaç yıldır Türkiye'de de tartışmaya sunulmaktadır.

Hem tarihi hem de geleneksel yığma kerpiç yapılarının zenginliği ile Burdur'un Ağlasun ilçesi, Türkiye'de bulunan önemli kırsal alanlardan birisidir. Bu bağlamda, kırsalda bulunan geleneksel konutların mevcut değer ve problemlerini mimari ve yapısal özelliklere göre tanımlamak ve koruma müdahaleleri önermek amacıyla, bu tez kapsamında Ağlasun örnek olarak seçilmiş ve incelenmiştir.

Anahtar Kelimeler: Koruma, Geleneksel Mimari, Kerpiç, Ağlasun

To my family…

ACKNOWLEDGEMENTS

I express my sincere gratitude to my supervisor Prof. Dr. Neriman Şahin Güçhan for her patience, guidance and invaluable criticism throughhout this study. Her never-ending encouragement was the primary source of inspiration for me and without her expertise, this study could have never been completed.

I am grateful to thesis examining committee members Assoc. Prof. Dr. Güliz Bilgin Altınöz, Assit. Prof. Dr. Azize Elif Yabacı for their significant costructive criticism and suggestions.

I also would like to express my appreciation to Dr. Ebru Torun, Deputy Director of Sagalassos Excavations, for her encouragement during study. Besides, I would like to thank all members of Archaeology Team of the Sagalassos Archaeological Research Project for their support during the site survey study.

I also would like to thank officers of Ağlasun Municipality, Özkan Taşdelen who is Sakarca Neighborhood representative, Ekrem Akıncı, Mustafa Onaç and all the local people in Ağlasun for their hospitable and supportive approach during the site survey.

I am also grateful to my friend Aslı Hetemoğlu, Aslı Özahi, Tolga İlhan and Elif Düzel for all the academic discussions and their supportive friendship during the process.

Finally, I owe my depest thankfullness to my parents, Nihal Can, Mustafa Can and my brother, Galip Onur Can. As any other accomplishments in my life, this thesis would have never been realized without feeling their invaluable support, endless patience, care and love.

TABLE OF CONTENTS

ABSTRACT v

ÖZ vii

ACKNOWLEDGEMENTS x

TABLE OF CONTENTS xi

LIST OF TABLES xiv

LIST OF FIGURES xv

LIST OF ABBREVIATIONS xxviii

LIST OF SYMBOLS xxix

CHAPTERS

1. INTRODUCTION 1

  1.1. Problem Definition: Conservation of Traditional Mud Brick Houses 4

  1.2. Selection of the Case: Ağlasun 6

  1.3. Aim and Scope 8

  1.4. Methodology and Structure 9

2. UNDERSTANDING THE PLACE: AĞLASUN AND MUD BRICK MASONRY CONSTRUCTION TECHNIQUE 17

  2.1. Characteristics of Ağlasun 17

    2.1.1. Current Settlement Pattern 22

    2.1.2. Studied Traditional Mud Brick Houses in Ağlasun 30

  2.2. A Review on Construction Techniques of Mud Brick Masonry Houses and Characteristics of Mud Brick 35

    2.2.1. Components and Production of Mud Brick 40

    2.2.2. Mud Brick Masonry Construction System 43

2.2.3. Advantages and Disadvantages of Mud Brick as a Construction Material 48

3. ARCHITECTURAL AND CONSTRUCTIONAL CHARACTERISTICS OF TRADITIONAL AĞLASUN HOUSES THROUGH STUDIED EXAMPLES 51

3.1. Description of Traditional Ağlasun Houses 51

3.1.1. Spaces Composing the Traditional Ağlasun Houses 57

3.1.1.1. Main Building 57

3.1.1.2. A Separate Housing Unit 73

3.1.1.3. Auxiliary Buildings 74

3.1.2. Arcitectural Elements 81

3.1.3. Characteristics of the Facades 91

3.2. Materials and Techniques Used in Construction of Traditional Mud Brick Masonry Houses in Ağlasun 94

3.2.1. Construction Materials 94

3.2.2. Construction Techniques 103

3.2.2.1. Foundations 103

3.2.2.2. Walls 104

3.2.2.3. Floorings 110

3.2.2.4. Ceilings 117

3.2.2.5. Roofs 118

3.2.2.6. Architectural Elements 121

3.2.3. Architectural and Structural Characteristics of the House 15 as a Detailed Studied House 132

3.3. Changes and Interventions Done by Users in Ağlasun Houses 157

3.3.1. Changes in Structure 159

3.3.2. Changes and Interventions Made for Functional Purposes 161
3.3.3. Changes in Material 162
3.3.4. Changes in Space 167
4. ASSESMENTS ON ARCHITECTURAL FEATURES AND INTERVENTIONS DONE BY USERS ON THE TRADITIONAL AĞLASUN HOUSES 179
4.1. Results of the Typological Studies: What is Ağlasun House? 179
4.1.1. The Lot of Ağlasun House..179
4.1.2. The Plan Typology..184
4.1.3. The Facade Typology 192
4.1.4. Evaluation of the Ağlasun Houses with Reference to the Typological Studies..197
4.2. Assesment of the Changes and Interventions..203
4.3. Assesments on Traditional Mud Brick Masonry Houses in Ağlasun in terms of Values, Potentials and Problems 205
4.3.1. Assesment in terms of Values and Potentials..205
4.3.2. Assesment in terms of Problems...210
5. PRINCIPLES FOR CONSERVATION OF TRADITIONAL MUD BRICK AĞLASUN HOUSES AND CONCLUSION OF THE THESIS 219
5.1. Principles for Conservation of Traditional Mud Brick Ağlasun Houses 219
5.2. General Decisions and Definitions of Required Interventions among 19 Studied Traditional Mud Brick Ağlasun Houses..222
5.3. Conclusion..228
5.4. Further Studies 230
REFERENCES..231
APPENDICES 235

LIST OF TABLES

TABLES

Table 1: The Methodology and Structure of the Thesis 13

Table 2: Analysis on the toilet types according to their locations. 174

Table 3: Analysis on the bathroom types according to their locations. 175

Table 4: Analysis on the kitchen types according to their locations. 176

Table 5: Analysis on wet space areas according to their relations. 177

Table 6 : The Lot Typology of Traditional Ağlasun Houses................................. 182

Table 7 : Criteria Used for the Lot Typology of Traditional Ağlasun Houses and Their Distribution Among the Studied Cases... 183

Table 8: Plan Typology of Traditional Ağlasun Houses.. 189

Table 9: Criterias Used for the Plan Typology of Traditional Ağlasun Houses and Distribution of them among the Studied Cases 191

Table 10: Facade Typology of Traditional Ağlasun Houses 195

Table 11: Criterias Used for the Facade Typology of Traditional Ağlasun Houses and Distribution of them among the Studied Cases. 196

Table 12: The House Typology of the Traditional Ağlasun Houıses 201

Table 13 : Criterias Used for the House Typology of Traditional Ağlasun Houses and Distribution of them among the Studied Cases. 202

Table 14: Comperative Study in terms of Removals, Alterations and Additions... 204

Table 15: Comparative Study in terms of Values and Potentials 209

Table 16: Comparative Study in terms of Building Scale Problems 217

LIST OF FIGURES

FIGURES

Figure 1: Walking routes during the first site survey in Ağlasun district to select houses to involve this study. 11

Figure 2: A collage with the sketches of different street views, showing traditional mud brick masonry houses in Ağlasun.. 11

Figure 3: Plan examples from the documentation of 19 traditional mud brick masonry houses during the site survey in Ağlasun. 11

Figure 4: Facade examples from the documentation of nineteen mud brick masonry houses during the site survey in Ağlasun. 12

Figure 5: Location of Burdur in Turkey Map ('Map of Turkish Cities and Communes'was used as template yaken from http://cografyaharita.comg -last visit July 2019).. 18

Figure 6: The map on the left illustrates that Location of Ağlasun and its connection with Burdur, Isparta and Antalya. The map reproduced by the author after the 'Physical Map of Turkey' (www.yol.kgm.gov.tr -last visit July 2019). The right one shows the neighbourhoods in Ağlasun. (The map used as a templete is taken from www.yandex.com.tr -tlast visit July 19) 18

Figure 7: A vista from Sagalassos through the Ağlasun (Photo: Göze Üner, 2018); the templete of the visual on the right is taken from the Google Earth, the direction of the view is the similar with the photo. 19

Figure 8: Historical Timeline of Sagalassos and Ağlasun. The table reproduced by utilizing the unpublished book 'Understanding a Historic Rural Landscape: Ağlasun/Sagalassos' (Şahin Güçhan, N. et al, 2016).. 20

Figure 9: Photos on the both left and right sides show that two storey traditional mud brick masonry houses whose ground floors are used as grocery shops of neighbourhoods that they exist. 23

Figure 10: The panoramic view of the landscape within the Ağlasun Stream, green areas, houses and the Akdağ. 23
Figure 11: The photo on the left shows, the water channels existing between the streets with pavements and the houses; the photo on the right shows the historic Plane Tree as the most conspicuous landmark in Ağlasun. The source of the photo on the right is http://www.sagalassosvakfi.org/rehber-brosurler/ 24
Figure 12: The photo on the left shows the street view including the landscape in Ağlasun and the village room which is adjacent to the house with the painted façade; the photo on the right shows the spolia on the wall of the Village Room. 24
Figure 13: Locations of Landmarks on the aerial view of Ağlasun. 25
Figure 14: The confliction between the new housing and the traditional one in Ağlasun. 26
Figure 15: The settlement pattern consisting of new and traditional buildings in Ağlasun. The map is generated by utilizing two maps 'Traditional and new buildings in Ağlasun' and 'Construction techniques used in traditional housing in Ağlasun' (Şahin Güçhan, N. et al, 2016). 27
Figure 16: Street views show traditional mud brick masonry houses, located separately, in Ağlasun and the stone masonry constructed up to the sub-basement level... 28
Figure 17: The street view showing traditional mud brick masonry houses, located adjacently, in Ağlasun and the house with the stone masonry, constructed up to the first floor level. 28
Figure 18: The traditional house, completely built with stone masonry construction technique.. 29
Figure 19: The early period house on the left and the late period house on the right. 29
Figure 20: The structural transfromation of the traditional mud brick masonry houses in Ağlasun.. 30

Figure 21: Studied Traditional 19 Mud Brick Masonry Houses in Ağlasun. The map used as a template is the 'Open-Built Up relation in Ağlasun - Five neighborhoods of Ağlasun' (Kurtulus, Asrav, Güçhan, & Altınöz, 2017, p. 611) 32
Figure 22: Selected Traditional Mud Brick Masonry Houses in Ağlasun................33
Figure 23: Selected Traditional Mud Brick Masonry Houses in Ağlasun................34
Figure 24: Photos from H-15. On the left, northeast facade facing to the street; on the right, southwest facade facing to the garden. 35
Figure 25: Neolithic Site of Çatalhöyük (https://whc.unesco.org/en/documents/131748, last accessed on 21 August 2019) ..37
Figure 26: Old Walled City of Shibam in Yemen. *(https://whc.unesco.org/en/documents/109048, last accessed on 21 August 2019)* ..38
Figure 27: Old Towns of Djenne in Mali. *(https://whc.unesco.org/en/documents/107952, last accessed on 21 August 2019)* ..38
Figure 28: West view of the reconstructed fortification wall. (Seeher, 2007, p. 17)39
Figure 29: The regions with site survey conducted on traditional mud brick construction in Turkey, in 1948 (Kafescioğlu, 2017, p. 163). 40
Figure 30: Mud brick production with traditional molds and equipment. (Cookson, 2010, as cited in Kafescioğlu, 2017, p. 106)...42
Figure 31: Types of mud bricks called as 'ana' and 'kuzu'; a timber mold. The visual is dapted from (Kafescioğlu, 2017, p. 165)...45
Figure 32: Types of mud brick walls. The visual is produced by utilizing illustrations from (Kafescioğlu, 2017, pp. 176-177)...45
Figure 33: On the left, dimentions of lintels and junction point detail of them; on the right, locations of lintels in a mud brick masonry walls of a house in Elbistan. The visual is produced by utilizing an illustration and a photo from (Çelebi, 2012, p. 92) 46
Figure 34: On the left the garden in H18; on the right is the courtyard at H14. 52
Figure 35: The lots with an indirect relation between a main building, located in a courtyard, and a street. 54

Figure 36: The lots where there is a direct relation between the main building, located in a courtyard, and the street. 55
Figure 37: The lots where there is a direct relation between the main building, located in a garden, and the street. 56
Figure 38: The first photo, taken from the H16, shows the open 'sofa'with rooms located on one side of it; the second photo, taken from the H8, shows the closed 'sofa' located in between the rooms. 60
Figure 39: The photo on the left, taken in the H9, shows the corridor; the photo on the right, taken in the H11, shows the enlarged corridor. 61
Figure 40: A panoramic view from one of the rooms in the H5. 62
Figure 41: The 'tahtalık' section with 'ambar', 'ambar üstü' and wooden pillars (Kurtulus et al., 2017). 63
Figure 42 : The granary located on the wooden pillars with stone bases in the ground floor of a main building. 64
Figure 43: The photos, taken in the H16, shows the granary, the space located above the granary and their location in the house. 64
Figure 44: 'Girellik' parts of three different houses. First photo, taken by Arsav, is from the 'Molla Hüseyin House' (Kurtulus et al., 2017) shows the original 'girellik'; the photo in the middle, taken in the H4, shows a 'girellik' part used as a kitchen; the photo, taken in the H6, shows a 'girellik' used as a bathroom. 65
Figure 45: The first and the second photos, taken in the H18, show the 'gezeneks'; the last photo, taken in the H11, shows the balcony, reached via a staircase. 66
Figure 46: The photo, taken in the H6, shows the additional toilet constructed on the 'saçak'; the photo, taken in the H16, shows the additional toilet constructed adjacent to the 'sofa'. 67
Figure 47: Photos, taken in the H19, show the entrance and the interior space of the mezzanine.. 68
Figure 48: Photos, taken in the H7, shows the spaces on the mezzanine. The photo on the left and the one in the middle shows the room which was used as a guestroom and

production space. The photo on the right shows the entrance door of the room used as a storage. 68
Figure 49: The photo on the left, taken in the H15 shows the circulation space located under the closed 'sofa'. The photo in the middle, taken in H13, shows the circulation space located under the open 'sofa'. The photo on the right, taken in the H7, shows the flooring of the 'taşlık' space...69
Figure 50: The first photo, taken from the H4, shows the small opening to the barn from the street; the second photo, taken from the H3, shows interior space of the barn. 70
Figure 51: The photo on the left from the H15 shows the storage area called 'samanlık'; the photo on the right from the H14 shows the storage area called 'odunluk'. 71
Figure 52: The photo from the H8, shows a space located on the ground floor as a workshop. 72
Figure 53: The photos from the ground floor spaces of the H19. The photo on the left shows the furnace and the photo on the right shows the 'gülhane'. 73
Figure 54: Traditional houses with separate housing units that were constructed later in the same lot. 74
Figure 55: The first photo shows the surface of the original 'saçak'; the second one shows the relation between the 'saçak' and the main mass of the house; the third one shows the layers of the 'saçak' structure; the fourth one shows the 'yuvga' stone. All photos are from the H4...76
Figure 56: Two photos from the H5 show the 'saçak' that is constructed with reinforced concrete and the circulation area built with hollow bricks beneath the 'saçak' structure. The photo on the left shows the window and door of it and the one on the right shows the circulation space located under the 'saçak' structure. 77
Figure 57: The photos from the H4 show the authentic entrance door of the original 'saçak' and views from inside of it. 77
Figure 58: Windows of the barns which are constructed additionally adjacent to 'saçak' structures...78

Figure 59: The photo and the ground floor plan of the H2; the relationship between the additional barn, 'saçak' and the main house. 79
Figure 60: In the photo and the ground floor plan of the H18; the relationship between the additional storage, 'saçak' and the main house. 80
Figure 61: The photo, taken from the H11, shows the additional auxiliary building used as a storage. 80
Figure 62: The photo on the left from the H15, shows the greenhouse; the photo, taken in the middle from the H6, and the photo on the right from the H11, show the pens. 81
Figure 63: The photos from the H11, H15 and H19; wooden staircases which reach the 'gezenek', the 'balcony' and the 'sofa' on the first floors. 82
Figure 64: On the left, the entrance door to the ground floor of the main building in the H15; on the right, the entrance door to the courtyard of the H7. 83
Figure 65: On the left, the entrance door to the first floor of the main building in H15; on the right, the entrance door to the first floor of the main building in the H4. 83
Figure 66: On the left the door of a room on the mezzanine floor in the main building in the H7; on the right, an interior door to a room from the 'sofa' in the H15. 84
Figure 67: The most frequently used original window types. The image on the left is produced by utilizing the study 'Understanding a Historic Rural Landscape in Relation with an Archaeological Site: Ağlasun/ Sagalassos'; the photo in the middle is from the H8; the photo on the right side is from the H15. 85
Figure 68: On the left, the window between the room and the closed 'sofa' in the H1; the image, produced by utilizing the study 'Understanding a Historic Rural Landscape in Relation with an Archaeological Site: Ağlasun/ Sagalassos', shows the windows between the room and the open 'sofa'; the photo from the H4, shows the opening called 'samanlık'. 85
Figure 69: Fireplaces with a 'yaşmak' having a different from and ornamentation from the H15 and H13. 87
Figure 70: Tereks on the walls of the H15. The photo on the left is from the space used as a kitchen while the photo on the right is from one of the rooms. 87

Figure 71: On the left, the 'yüklük' in the H7 which serves to just one room; on the right, the 'yüklük' in H15 which serves to the rooms located both side of it. 89
Figure 72: 'Yüklük' with 'şerbetlik' and 'niche' in the H7 and H5. 89
Figure 73: 'Gusülhanes' located on one sides of the 'yüklüks' in the H15 and H4. 90
Figure 74: Niches in one of the rooms located on the first floor of the H3; the niches on the wall facing to the circulation area on the ground floor of the H16. 90
Figure 75: The photo on the left from the H13, shows the two storey main building with the open 'sofa' and the staircase on its courtyard facade; the photo on the right from the H19, shows the main building with mezzanine and the closed 'sofa' constructed as a projection. 91
Figure 76: The photo on the left from the H11, shows the toilet located on the facade facing to the garden and the photo on the right from the H15 shows the balcony on the facade facing to the street. 92
Figure 77: The photos from H4, H15 and H9 show partial plaster on their facades.92
Figure 78: Various arrangements of the doors and windows on the facades and the different way of entrances to the main buildings. 93
Figure 79: From the left to the right: rubble stone masonry (H3); cut stones at the corners of the stone masonry part of the wall (H15); 'helik' stone as infill material over a door opening (H7); 'helik' stone usage as infill material under a window opening (H9). 95
Figure 80: From the left to the right: the stone masonry with 'Köğke' stone; use of spolia as a step of the staircase (H19); use of spolia as a part of stone masonry wall (H13). 96
Figure 81: The use of clay brick in the masonry wall of a traditional Ağlasun House. 97
Figure 82: From left to the right, the timber posts carrying the 'sofa'; timber posts carrying the roof structure; timber elements of the flooring system named 'döver', 'mertek' and 'pargı' from bottom to top (H19). 100

Figure 83: First photo shows a part from the mud brick masonry wall; the last three photo and the sketch show the point of junctions of two lintels, called as 'hatıl'. Photos are from H15. 100
Figure 84: The first photo from H11, shows the 'bağdadi' covering system over the timber frame structure; second one from H4, shows the mud brick plaster on the 'bağdadi' covering; the last one from H2 shows the cement plaster application on the mud brick masonry wall. 103
Figure 85: Sections of stone masonry and mud brick masonry walls which continue in the same thickness under the ground level. The visual is taken from (Şahin, 1995, p. 180) 104
Figure 86: Variations of construction technique (Kurtulus et al., 2017) 105
Figure 87: System Section of a Typical Ağlasun House; Detal 1: Wall Section (Rubble Stone); Detail 2: Wall Section (Mud Brick); Detail 3: The Slab Section of 'Saçak' (Kurtulus, Asrav, Güçhan, & Altınöz, 2017) 108
Figure 88: Mud brick masonry wall types of traditional houses in Ağlasun. First photo is from H15 and second one is from H5. 109
Figure 89: Examples of timber-framed walls with 'bağdadi' covering system. 110
Figure 90: First one is the timber floor board application; second is the threshold between floor finishing with screed and the original flooring cover with timber floor boards; the third is the floor finishing with just rammed earth; the fourth is the ground floor of 'taşlık' space; the last one is the ground floor of the barn with the rammed earth finishing. (H7) 113
Figure 91: Partial plan and sections of Floor Types of H15 115
Figure 92: The first photo, showing the relation between 'döver', 'mertek' and 'pargı', is from the ground floor of the H14; The second photo, showing the relation between 'döver', 'mertek' and floor boards, is from the ground floor of the H15; the third one shows the 'sofa' without ceiling covering; the last two photos shows the same type of ceiling with different colours belonging to the rooms of H5 and H4 respectively. 117
Figure 93: The roof spaces of H13 on the left and H7 on the right. 119

Figure 94: Southwest facade of the H15. An example for the chimney and the eave, extending over the 'gezenek' on which the toilet is located. 119
Figure 95: Partial Ceiling Plan & Section from the Roof Structure of the House-15. 120
Figure 96: Door Types of Traditional Mud Brick Masonry Houses in Ağlasun 123
Figure 97: Detail Drawings of Grounf Floor Entrance Door (House-15)..............124
Figure 98: Detail Drawings of First Floor Entrance Door (House-15).................125
Figure 99: Detail Drawings of an Interior Door (House -15) 126
Figure 100: Window types of Traditional Mud Brick Masonry Houses in Ağlasun. 129
***Figure 101:** Window types of Traditional Mud Brick Masonry Houses in Ağlasun. Image is produced by utilizing photos from 'Understanding a Historic Rural Landscape in Relation with an Archaeological Site: Ağlasun/ Sagalassos'* 130
Figure 102: Windows with iron bars. Photos are taken from H13. 130
Figure 103: Detail Drawings of a Timber Frame Window (House-15).................131
Figure 104: First photo shows northeast facade and the second one shows the northwest façade of the H15; the third photo shows the 'sofa'; the fourth one is from one of the rooms (Room 1-01) of H15. 132
Figure 105: Site Plan of the House - 15 136
Figure 106: Roof Plan of the House-15 137
Figure 107: Ground Floor Plan of the House – 15...138
Figure 108: First Floor Plan of the House - 15 139
Figure 109: Ground Floor Ceiling Plan of the House - 15 140
Figure 110: First Floor Ceiling Plan of the House - 15 141
Figure 111: Northeast Elevation of the House-15...142
Figure 112: Northwest Elevation of the House-15...143
Figure 113: Southwest Elevation of the House-15 144
Figure 114: Southeast Elevation of the House-15 145
Figure 115: Partial Section AA' from the House-15 showing the Structural System 146

Figure 116: Partial Sections BB’ and CC’ from the House-15 147
Figure 117: Floor Plan of the toilet and Its Relation with the Kitche 149
Figure 118: Ceiling Plan of the toilet and Its Relation with the Kitchen 151
Figure 119: Elevations of the toilet of the House-15.. 152
Figure 120: Section AA’ and BB’ of the toilet of the House-15 153
Figure 121: Section CC’ and Section DD’ of the toilet of the House-15.............. 155
Figure 122: The relation between various intervention types. 158
Figure 123: The photo from the H12 on the left shows the reinforced concrete 'saçak’ structure and the stairs which were constructed after the removal of the earthen ‘saçak’ structure and the wooden staircases; The photo from the H4, shows the timber-framed wall constructed after demolition of the mud brick masonry wall on the first floor of the house. 160
Figure 124: Both photos show the functional changes. The one on the left from H13, is a room that is used as storage. The one on the right from H7, is the usage of the ‘ocak’ as a niche. 162
Figure 125: The photo from H19 on the left shows the use of the traditional fireplace as a niche for the washing machine; the photo from the H8 on the right shows the use of the traditional fireplace as a niche for the oven and the use of the transformation of a window opening to the place for a washbasin. 164
Figure 126: The photo on the left and the one in the middle are from H6 and the photo on the right is from the H2. They show the spaces, which were originally used as ‘girellik’, transformed to bathroom. 164
Figure 127: The photo from the H2 on the left shows the removal of the window frames and closing the openings with hollow bricks; the photo from the H7 shows the closed traditional fireplace. 165
Figure 128: Both two photos shows the additional screed layer on the floorings. The one on the left is from H15; the one on the right is from H19. 165
Figure 129: The photo on the left from H15 shows the replacement of the wooden frame window with the PVC. The one on the left one from H14 shows the structural and material change of the wooden staircase with the steel one. 166

Figure 130: The photo on the left from H5 shows the decommissioning of two window openings and a door opening by using both hollow bricks and mud bricks as infill materials. The one on the right from H8, shows partial cement plaster on the facade. 166
Figure 131: Both photos shows the mass additions adjacent to the main structures. The one on the left from H5 is a pen built with hollow bricks. The one on the right from H2 shows the additional rooms which is built with mud brick masonry construction system. 168
Figure 132: First photo shows the toilet located at the end of the ‘enlarged corridor’(H11); the second one shows the toilet located adjacent to the open ‘sofa’(H16); the last one shows the toilet located at the end of the ‘gezenek’(H15). 168
Figure 133: The photo from H2 on the left shows the toilet as a mass addition on the ‘saçak’. The photo from H11 on the right shows the auxiliary building as a mass addition separately located on the same lot with the main housing. 169
Figure 134: These two photo show the closed ‘sofas’, which are used as the kitchen, and the bathroom located just next to the kitchen by dividing the space with additional walls. 170
Figure 135: The photo from H6 on the left shows the 'sofa' which was closed later. The one on the right from H13 shows the toilet in front of the kitchen, which are both constructed with additional walls on the open ‘sofa’. 171
Figure 136: Lot Types observed in the Traditional Ağlasun Houses. 180
Figure 137: First Floor Plan Types 184
Figure 138: The First Floor Plan Type 1 (F.F_1) of the Traditional Ağlasun Houses. 185
Figure 139: Individual cases among the 19 studied traditional houses in terms of their plan organizations. 186
Figure 140: The image shows the First Floor Plan Type 2 and the First Floor Plan Type 3...186
Figure 141: Facade Types of Traditional Ağlasun Houses....................................192

Figure 142: The Examples for the Facade Type 1 193
Figure 143: The image shows the examples for the Facade Type 2 194
Figure 144 : Distribution of the Type 1 and the Type 2. The map, used as a template is the ‘‘Open-Built Up relation in Ağlasun - Five neighborhoods of Ağlasun.’’ (Kurtulus et al., 2017) 200
Figure 145 : Stone, mud brick and timber, the local construction materials of the Traditional Houses in Ağlasun. The photo on the left is from the H15 and the photo on the right is from the H9 206
Figure 146: Spolia as a part of a staircase and the stone masonry wall. The photo on the left is from the H19 and the photo on the right is from the H13. 206
Figure 147: A ‘Yüklük’, a ‘şerbetlik’ and an ‘ocak’ with a ‘yaşmak’. The photos are from the H13 208
Figure 148: The photo on the left shows the sagging on the ceiling. The others show the structural cracks on the masonry walls. From left to right, the photos are from H14, H15, H3 and H7 211
Figure 149: The material loss on the mud brick masonry and timber-framed walls. From left to right, the photos are taken from H3, H4 and H15. 211
Figure 150: The discoloration problem on the timber elements. The photo on the left is taken from H5 and the photo on the right is taken from the H15. 212
Figure 151: The first photo from the H19, shows the mud brick masonry wall exposed to water leakage from the pipe; the second photo from the H9 shows the condition of the drainage piping system and its physical relation with the mud brick masonry wall and reinforced concrete slab; the third one shows the relation between the water pipe and the traditional flooring system. 213
Figure 152: The photos show the electric cables in poor condition without any isolation. From left to right, the photos are from H5, H7 and H15. 214
Figure 153: The image shows the relation of conservation principles and required interventions. 220
Figure 154: Building Sheet - House 1 239
Figure 155: Changes - House 1 241

Figure 156: Building Sheet - House 2....243
Figure 157 : Changes - House 2....245
Figure 158: Building Sheet - House 3....247
Figure 159: Buildin Sheet - House 4....249
Figure 160: Building Sheet - House 5....251
Figure 161: Changes - House 5....253
Figure 162: Building Sheet - House 6....255
Figure 163: Building Sheet - House 7....257
Figure 164: Changes - House 7....259
Figure 165: Building Sheet - House 8....261
Figure 166: Building Sheet - House 9....263
Figure 167: Building Sheet - House 10....265
Figure 168: Changes - House 10....267
Figure 169: Building Sheet - House 11....269
Figure 170: Building Sheet - House 12....271
Figure 171: Building Sheet - House 13....273
Figure 172: Changes - House 13....275
Figure 173: Building Sheet - House 14....277
Figure 174: Building Sheet - House 15....279
Figure 175: Building Sheet - House 16....281
Figure 176: Building Sheet - House 17....283
Figure 177: Building Sheet - House 18....285
Figure 178 : Building Sheet - House 19....287
Figure 179: Changes - House 19....289

CHAPTER 1

INTRODUCTION

Assessment and development of the relation between 'conservation' and 'traditional architecture in rural areas' may provide an important contribution to the cultural heritage. For this reason, in the beginning of the introduction part, a literature review on what these terms mean and how they relate to each other is given.

First, it should be noted that according to the dictionary[1], the word conservation means preservation and repair of archaeological, historical, and cultural sites and artefacts. The term is discussed in the context of traditional architectural heritage in this thesis. Traditional architecture is a significant part of rural environment[2] which is, to a large extent, directly generated by the community that lives in it. So, traditional architecture in rural areas, reflects the settlements' cultural and social identity. As it is stated by Kurtuluş (2018, pp. 1-2) the rural architecture is the traditional cause of having design which is based on both regional traditions related with daily life of the dwellers and rural production related with agriculture and husbandry. Furthermore, rural architecture is vernacular because buildings are constructed by using materials from surrounding environment by considering regional landscape and climate.

In this respect, it is possible to mention that there are some international charters as milestones from 1977 to 2017. In addition, there is a document named '*Rural Development Strategy of the EU the title of 'Basic Services and Village Renewal in*

---

[1] https://www.lexico.com/en/definition/conservation.

[2] Among the international platforms, the first formal emphasis on 'rural environment' taking part in the Venice Charter 1964 (ICOMOS, 1964) with the term 'rural setting' is an important milestone (Eres, 2013, p. 458).

Rural Areas'[3]. Moreover, in Turkey, there are also some projects on conservation of rural areas and rural traditional architecture, carried out by universities or the Ministry of Environment and Urbanization. However, apart from these efforts, it is also clear that the lack of definition of rural areas, rural architecture and their need of conservation is deficiency of the legal-administrative framework in Turkey[4] (Kurtuluş, 2018, pp. 12-90).

In order to ensure continuity of traditional architecture, necessary attention should be provided for closing the gap between the subsequent needs arising from contemporary life and structural and architectural characteristics of traditional buildings. Within the aim of the conservation of traditional architecture, intervention types can be specified considering the case. These types are preservation, consolidation, repair, restoration, rehabilitation, reproduction and reconstruction (Şahin, 1995, pp. 16-17).

If each of these are summarized in the architectural context and the building scale; first, preservation is about taking the environmental external conditions of the building such as air pollution under control. Second, consolidation is related with maintenance of the building just by taking precautions for deteriorations on its existing parts. Third, repair is contribution to continuity of the building by making minimal interventions. Fourth, restoration is re-establishing the building's original spatial and structural features with a proper function. Fifth, rehabilitation is, in brief, upgrading conditions to current needs by taking into consideration of building's original features. Sixth, reproduction is the production of the whole building or just some necessary parts of it. Finally, reconstruction is an integration practice of the structure's original parts to a whole in a systematic way in another suitable place (Şahin, 1995, pp. 16-17).

Some sources related to architectural conservation principles have been utilized while determining the principles of interventions for the conservation of the selected cases

---

[3] For more infromation, see 'Basic Services and Village Renewal in Rural Areas' (Regulation (EU) 1305, 2013: Article 20)

[4] For more information about the conservation of rural architecure in Turkey in the context of historical process and legal dimension, see Eres, 2013.

in the context of this thesis. The main two are the ‘Venice Charter’ (ICOMOS, 1964) and the ‘Charter on the Built Vernacular Heritage’ (ICOMOS, 1999).

Furthermore, Weeks and Grimmer (1995, p. 76) indicated some rehabilitation standards, which are recommended within this thesis for the houses that might be decided to be conserved by also keeping their original functions. These are:

• Using the property as it was before the rehabilitation process or applying a new use which is possible to adapt with just minimal interventions

• Providing the continuity of historical features of the property and paying attention to this approach during the new unavoidable interferences

• Avoiding historical deception by taking properties as an indication of its time, place and usage

• Preserving the alterations having historical importance

• Retaining distinguishing features by means of craftsmanship

• Avoiding the replacement of missing or deteriorated parts and preferring repair of them as much as possible

• Taking possible harm because of chemical and physical treatments into consideration

• Conserving archeological artefacts in their place

• Using new materials and construction techniques which can be distinguished from the original parts while also being in harmony with them in terms of size, scale and proportion

• Ensuring that historic and architectural features of the property should not be damaged in the future in case of the removal of new interventions, applied within the compass of the rehabilitation process.

At this point, in addition to these guidelines most of which are also essential for other conservation approaches besides of the rehabilitation, Feilden and Jokilehto (1998, p. 91) states that if the usage of traditional material is impossible for the necessary additions during rehabilitation practice, using compatible materials with the existing traditional structure is very essential because new materials should not damage the original structure. Moreover, if rigid contemporary structures are included in the existing traditional structure later, it is possible to observe opposite effects between them due to the weight of addition and different attitudes towards seismic actions. So, this makes the whole structure instable.

1.1. Problem Definition: Conservation of Traditional Mud Brick Houses

The traditional houses, in time, become inadequate for the changing daily behaviors and emerging needs of dwellers through the requirements of contemporary life. Thus, most of them are in danger of extinction as a result of being abandoned or being exposed to uncontrolled transformation. Because of some reasons, it is possible to observe this situation mostly in rural areas.

First, although 'urbanization' should have been perceived as the development of rural areas till reaching the urban life standards, as Eres (2013, p. 457) mentions because of rapidly rising 'internal migration' from rural to urban areas and development of agricultural techniques as a result of the industrialization, it has caused not only an imposed burden on the urban centers in terms of the socio-cultural and economical manners but also the abandonment of the rural with its unique culture of life. Apart from abandoned traditional buildings, this migration also caused houses to be used under full capacity due to the decrease in the number of dwellers living in one house.

Second, as an effect of the globalization, dwellers, who did not migrate and continue to live in rural areas, have living experience in urban and want to carry these experiences to the rural life. The dwellers who start to prefer using separate spaces as living room, bedroom and kitchen and bathroom etc rather than doing all daily activities such as cooking, eating, sleeping etc. in one room could be an example to this situation.

Third, the recent availability of facilities such as water and electrical installations in most of house in rural areas caused emergence of different daily needs of dwellers. To illustrate, they prefer using electric furnace rather than traditional fireplaces and using bathrooms instead of traditional cupboards to take a bath.

As mentioned above, traditional buildings become inadequate for contemporary daily needs in time and so, they are inevitably transformed by dwellers. Some interventions, implemented by dwellers, may cause damage due to being applied unconsciously or incompetently. So, it is important that the adaptation of these houses within an appropriate conservation approach should be realized by professionals with a multidisciplinary and multi-stakeholder study.

Mud brick is one of the local building materials used in the construction of traditional buildings. Although the mud brick is used as an infill material in timber frame structures, it is the major structural material in mud brick masonry buildings. In case of existing malpractices or inadequate applications, it is more vulnerable vernacular material than stone and wood against some natural events such as precipitation and an earthquake.[5]

However, mud brick masonry buildings constitute essential part of the traditional architecture, because they have architectural values and advantages of mud brick as a construction material. Regarding this, conservation of traditional mud brick masonry houses is important for many reasons. First, mud brick is a beneficial building material in terms of building biology with its breathability feature. Secondly, mud brick is an ecological building material thanks to being vernacular and renewable. Thirdly, mud

[5]The properties of mud brick as a construction material are presented in the Chapter 2.

brick masonry is the construction system, which has been used since the prehistoric period and architectural characteristics of the mud brick masonry houses reflect the traditional life in rural areas, so, they are part of the tangible representatives of the rural heritage.

Thus, the problem, defined within the scope of this thesis, is the need for achieving the continuity of traditional mud brick masonry houses which constitute a significant part of traditional civil architecture in rural areas with an appropriate conservation approach. So, initially, the problems, values and potentials of these houses must be defined and the last two must be emphasized. In this, regard Ağlasun district of Burdur has been selected as the case within this thesis.

1.2. Selection of the Case: Ağlasun

Mud brick masonry construction system is one of the frequently used traditional construction techniques in the rural areas of Turkey. Ağlasun is one of these settlements with its mud brick masonry traditional houses many of which have survived, keeping their high quality architectural and structural characteristics except partial transformations. Although there are some seasonal periods with heavy precipitation during the year, there are no plaster on the facades of most of the traditional houses in Ağlasun. However, these houses have existed for decades in Ağlasun. Because of this situation, it is thought that the red soil, used in mud brick construction in this settlement, have special material characteristics related with its components.

However, in addition to the decrease in the number of people living in traditional houses due to the change of the custom that more than one family living together in one house, disappearance and decline in some occupations such as agriculture and stockbreeding, weaving, rose water production etc. have caused changes on the daily life routines of dwellers in these houses. In addition to these abandoned behaviours and practices, new habits in houses that occurred as a result of the modern life style cause the emergence of new daily needs such as good quality wet rooms, better heat and water insulation. These factors make the traditional houses in Ağlasun be subjected to the physical transformation by dwellers in time because these houses become insufficient for inhabitants who want to live in contemporary living conditions in their houses.

Moreover, according to the interviews with dwellers living in these traditional houses, it should be noted that they are pleased with their homes because of the fact that the interior spaces in mud brick structures are warm in winter and cool in summer periods and they do not have health problems like arthralgia while living in these structures. Therefore, they indicate that they would not choose to move to reinforced concrete buildings if conditions of their traditional mud brick masonry houses are improved to meet their daily needs. So, for the houses which are decided to continue their original function, the gap between the current situation of the traditional mud brick masonry houses in Ağlasun and the contemporary living standards needs to be overcome by considering conservation of the historical, architectural and cultural values of these houses.

Besides all these, Ağlasun is a region that attracts visitors due to the presence of Sagalassos Ancient City and agricultural tourism activities in the district. Therefore, due to the location of Ağlasun, if the conservation of traditional houses is realized, the project could have the chance to be beneficial for the cultural tourism and in turn get benefit from it, when it is considered in the context of possible rural environmental rehabilitation in the future. This is a feature that may contribute to the sustainability of the studies on traditional houses and therefore the life in Ağlasun.

So, all of the above-mentioned inputs were the significant reasons for the selection of the Ağlasun as a case. In this regard, 19 traditional mud brick masonry houses in Ağlasun were studied within the scope of this thesis.

1.3. Aim and Scope

Especially for traditional buildings constructed with local construction materials, continuity of use is a vital circumstance for sustaining their existence due to the need of regular maintenance. At this point, it is clear that they need to be adapted to the modern life standards in order to keep them being in use with their original function or they need to be given new functions. For both circumstances considering their architectural and structural characteristics and utilizing both local construction materials and eco-friendly industrial products, which are compatible with the traditional ones, together for necessary interventions by not damaging identity of buildings are important.

The aim of this thesis is to determine values and problems of traditional mud brick masonry houses in Ağlasun and accordingly proposing principles for their conservation determined as a consequence of the studies on their structural condition, architectural characteristics and contemporary requirements of the users.

In order to achieve this purpose, first of all, the literature research was made on subjects of conservation of rural architecture; environmental, historical, social and architectural features of Ağlasun settlement; characteristics of mud brick as a construction material and traditional mud brick masonry construction technique.

Moreover, within the scope of this thesis, apart from the literature research, a site survey was conducted on architectural characteristics and construction techniques of 19 traditional mud brick masonry houses in Ağlasun. Then, following this documentation, an assessment was made to explain the reasons and types of changes and interventions. Based on these assessments, principles for conservation of these houses were defined.

1.4. Methodology and Structure

The methodology include the literature review on researches about rural traditional architecture, conservation, mud brick masonry construction system and Ağlasun district in Burdur, made within the scope of this thesis.

It should be noted that, the number of sources on the subject is limited. From these sources following were utilized to understand Aglasun;

• The published works of Vacide Betül Kurtulus, Emine Çiğdem Asrav, Neriman Şahin Güçhan and Güliz Bilgin Altınöz, *Characteristics of Earthen Architecture in Ağlasun* (2017); İhsan Bulut, Cihan Değişgeç, Hurşit Güney and Osman Uzun, *Kültürel Peyzaj Açısından Geleneksel Ağlasun Evleri* (2017); Serdar Karabatı, Evinç Doğan, Melise Pınar and Lale M. Çelik, *Socio-Economic Effects of Agri-Tourism on Local Communities in Turkey: The Case of Ağlasun* (2009); Salih Ceylan, *Ağlasun ilçesinin Turizm Kaynakları* (2015).

• An unpublished study produced within the scope of The Studio/Living Lab (Cons 508: Workshop in Conservation 1 in Spring Semester, 2015-2016), was collaboratively carried between Middle East Technical University (METU) (Turkey) and Katholieke Universiteit (KU) (Belgium): 'Understanding a Historic Rural Landscape in Relation with an Archaeological Site: Ağlasun/ Sagalassos' directed by tutors, A. Güliz Bilgin Altınöz, Neriman Şahin Güçhan, Anlı Ataöv and prepared by the PhD Students, Aynur Uluç, Emine Çiğdem Arsav, Ezgi Balkanay, İsmail Demirdağ, Özge Yersen, V. Betül Kurtuluş.

• Introductory booklets about Ağlasun, prepared and published with the contributions of Ministry of Culture and Tourism, KU Leuven, Mehmet Akif Ersoy University and Municipality of Ağlasun.

They are available at: http://www.sagalassosvakfi.org/rehber-brosurler/

Moreover, visual materials such as maps, the Cadastral Map (1990) from the municipality and maps from the Google Maps and the Google Earth, and photos of the Ağlasun were obtained before the site survey.

During the two weeks long first site survey in the July 2016, observations was made in all six neighborhoods, namely Sakarca, Hamam, Kıraç, Çınar, Bala and Kum, of the Ağlasun district in Burdur province by walking, taking pictures of traditional houses and taking notes about their current conditions (**Figure 1**,**2**). Results of this survey were used while defining general characteristics of Ağlasun settlement and the selection of the houses as case studies.

First of all, in order to do interior survey, some houses were selected according to their structural stability, maintenance of their original characteristics, being in a permanent or periodical use or being abandoned. Then, 19 houses, which still have observable architectural characteristics and have no hazardous structural damage inside despite of some interventions, were chosen to realize more comprehensive study. For this purpose, throughout the interior studies in these houses, survey sheets including information on lots, floor plans, facades and sections with measurements of width, length, height of spaces and architectural elements taken via laser meter and tape measure were used **(Figure 3)**. This data was processed on the architectural sketches of the houses. Moreover, interviews on the history, structural features and current conditions of the houses were made with dwellers and Mustafa Onaç, a local builder, during these interior studies. These information gathered in site survey was used later for preparation of building sheets in digital format for each studied houses.

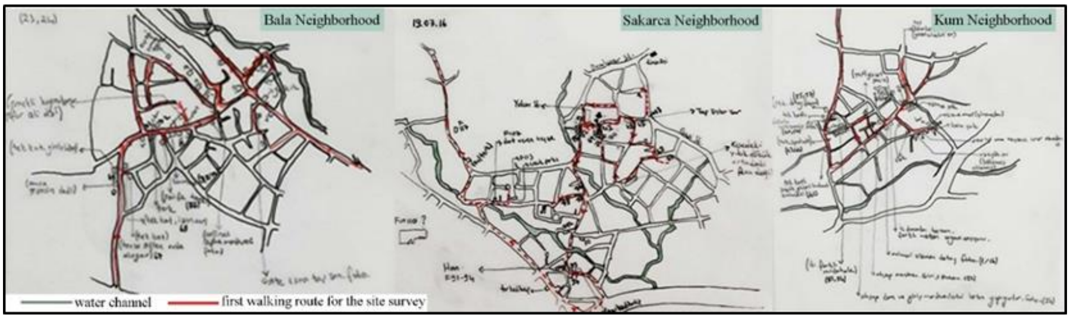


Figure 1: *Walking routes during the first site survey in Ağlasun district to select houses to involve this study.*

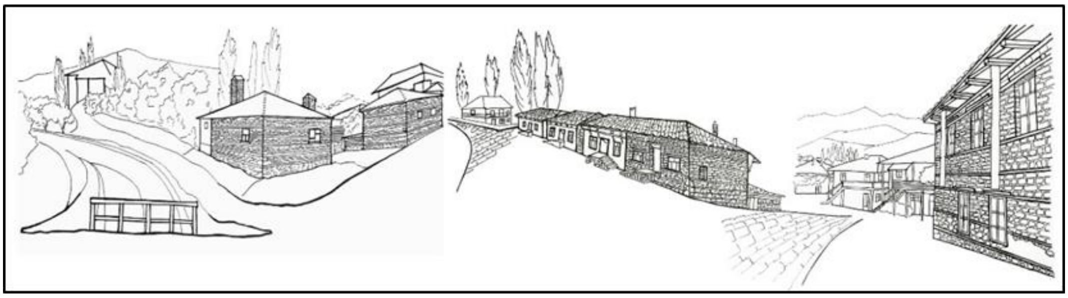


Figure 2: *A collage with the sketches of different street views, showing traditional mud brick masonry houses in Ağlasun*

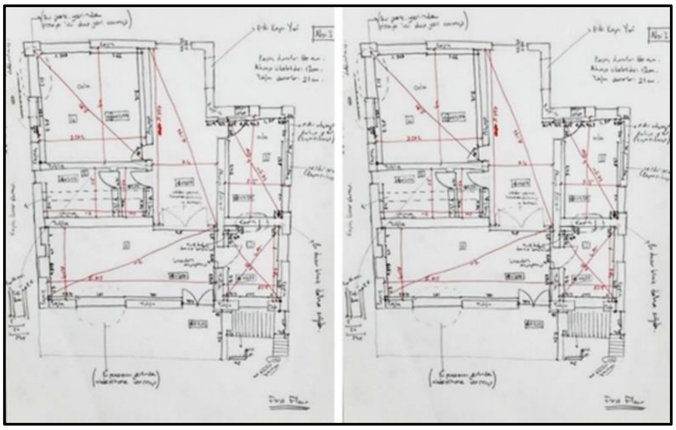


Figure 3: *Plan examples from the documentation of 19 traditional mud brick masonry houses during the site survey in Ağlasun.*

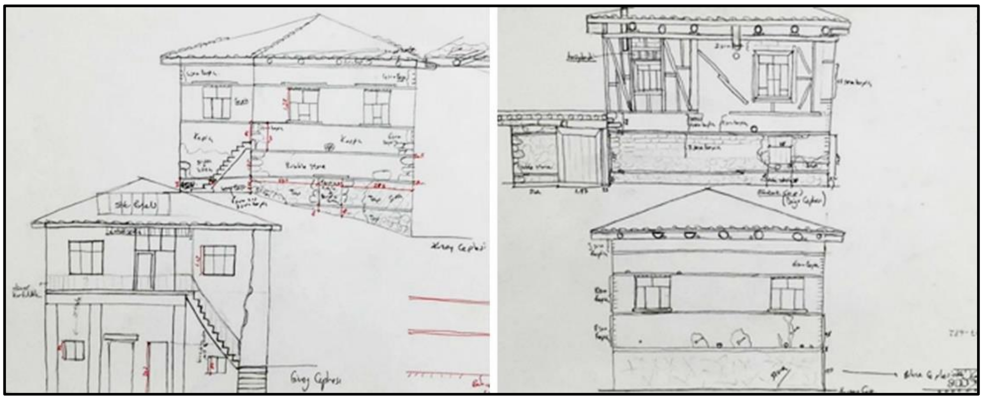


Figure 4: *Facade examples from the documentation of nineteen mud brick masonry houses during the site survey in Ağlasun.*

Then, after the site survey study, hand drawings from the site survey were transferred to the digital drawings with their accurate measurements via AutoCAD 2016. These digital drawings (a site plan in 1/1000 scale, floor plans in 1/250 scale, one section drawing and four facade drawings in 1/200 scale) were presented in building sheets with codes of the houses, such as H1, H2 and H3 etc., which were prepared separately for each house. Exterior and interior photos of houses, addresses and number of dwellers with the information of accommodation periods, the information of current space use, construction materials, construction systems and existing structural changes in terms of additions and alterations were also included in these building sheets.

Afterwards, analyses and evaluations were completed by supporting them with related tables, created using Adobe Photoshop CS6 software. Then, the H15 was selected to be studied in detail. Then, two more field trips, one in September 2016 and the other in April 2019, were carried out to take detailed measurements of the mud brick masonry house (H15) in Ağlasun to express mud brick masonry construction system by drawing system details.

In accordance with all these data collection and production, principles were described and then, intervention suggestions for the conservation of the studied houses were proposed.

INTRODUCTION	UNDERSTANDING THE PLACE : AĞLASUN AND THE MUD BRICK MASONRY CONSTRUCTION TECHNIQUE	ARCHITECTURAL AND CONSTRUCTIONAL CHARACTERISTICS OF TRADITIONAL MUD BRICK AĞLASUN HOUSES THROUGH 19 STUDIED EXAMPLES	ASSESMENT ON ARCHITECTURAL FEATURES AND INTERVENTIONS DONE BY USERS ON THE TRADITIONAL AĞLASUN HOUSES	PRINCIPLES FOR CONSERVATION OF TRADITIONAL MUD BRICK AĞLASUN HOUSES AND CONCLUSION OF THE THESIS
.Conservation of traditional architecture in rural areas. PROBLEM DEFINITION : Conservation of Traditional Mud Brick Houses SELECTION OF THE CASE: Ağlasun, Burdur AIM AND SCOPE METHODOLOGY STRUCTURE	CHARACTERISTICS OF AĞLASUN	DESCRIPTION OF TRADITIONAL AĞLASUN HOUSES	RESULTS OF THE TYPOLOGICAL STUDIES: WHAT IS AĞLASUN HOUSE?	PRINCIPLES for Conservation of Traditional Mud Brick Ağlasun Houses
	TRADITIONAL CONSTRUCTION TECHNIQUES OF MUD BRICK BUILDINGS AND CHARACTERISTICS OF MUD BRICK AS A CONSTRUCTION MATERIAL	CONSTRUCTION MATERIALS AND TECHNIQUES USED IN TRADITIONAL MUD BRICK MASONRY HOUSES IN AĞLASUN	ASSESMENT of Interventions on Traditional Mud Brick Ağlasun Houses	GENERAL DECISIONS and DEFINITION of Required Interventions among 19 Studied Traditional Mud Brick Ağlasun Houses
		DOCUMENTATION OF CURRENT INTERVENTIONS APPLIED BY DWELLERS IN AĞLASUN	ASSESMENT on Traditional Mud Brick Ağlasun Houses in terms of Values,Potentials and Problems	CONCLUSION and Further Discussions
DATA COLLECTION		DATA PROCESS and ANALYSIS	ASSESMENT	CONCLUSION
Pre-site Survey : - Literature Review on the conservation of the rural architecture **Pre-site Survey :** - Collecting documentaion such as maps, photos and previous analysis about the site etc.	**Pre-site Survey :** - Literature Review on Ağlasun and mud brick masonry construction technique.	**Site Survey :** - Production of measured drawings of buildings and related graphics **After Site Survey :** - Analysis within all collected and produced data about both the site and buildings.	Assesments on the analysis	- Proposing Principles - Proposing Interventions - Conclusion

Table 1: The Methodology and Structure of the Thesis

There are five chapters forming the thesis (**Table 1**). In the introduction chapter, in the beginning of the literature research, the importance of traditional rural architecture, the aspects which make it a part of cultural heritage and its conservation are focused on.

This part is followed by the problem definition by emphasizing importance of mud brick as a construction material for the traditional houses, especially in rural settlements. Later on, the reasons for the selection of the Ağlasun district to study within the scope of this thesis are pressented by pointing out the traditional mud brick masonry houses and causes of physical change of traditional architecture in Ağlasun. Following these, aim and scope, methodology and structure of the thesis are explained respectively.

In the second chapter, information on the environmental features and current state of Ağlasun is presented in order to understand the place. Then, a brief information on studied traditional mud brick houses in the district is given. Moreover in the second part of this chapter, features of mud brick as a construction material are studied within the literature research on its historical background, ingredients and traditional production methods, characteristics of mud brick masonry construction system, advantages and disadvantages of the mud brick.

In the third chapter, first, the description of Traditional Ağlasun Houses is made with reference to the analysis of the characteristics of 19 studied houses in terms of their lots, open and built areas, spaces and architectural elements. Furthermore, the information on the construction systems and materials of these traditional mud brick masonry houses are given. Structural and material features are documented with architectural drawings of one selected house, whose detail measurements are done with the site survey study. Then, at the end of this chapter, existing interventions, applied by the dwellers to their houses are described.

In the fourth chapter, typological studies, respectively resulted in the lot typology, the plan typology, the facade typology, and the evaluation of the Traditional Ağlasun

Houses with referring to these typologies are carried out. Then, assessments on the interventions with the categorization of them according to being a removal, an alteration or an addition are made considering causes for their application, their structural effects on the houses and their application frequencies. At the end of this chapter, 19 studied houses are evaluated in terms of their values, potentials and problems.

In the fifth chapter, first the conservation principles are defined according to the analysis on the current condition of the studied traditional mud brick masonry houses. Then, common intervention suggestions for the conservation of these houses are proposed.

CHAPTER 2

UNDERSTANDING THE PLACE: AĞLASUN AND MUD BRICK MASONRY CONSTRUCTION TECHNIQUE

First of all, the characteristics of Ağlasun are described in this chapter in terms of the history, environment and current settlement pattern of the district. Following, a brief information about the Traditional Ağlasun Houses is given. Then, in the second part of the chapter, after mentioning the history of mud brick as a construction material, the components and the traditional production techniques of mud brick, its use in mud brick masonry construction technique and its advantages and disadvantages as a building material are presented with the information gathered from literature review and interviews, made with academicians and local builders in Ağlasun.

2.1. Characteristics of Ağlasun

Being one of the eleven districts of Burdur, Ağlasun is located in the 'Göller Yöresi' to the west of the Mediterranean Region. The settlement is located on the western slopes of the mount '*Akdağ',* which is about 1050 meters above the sea level (**Figure 5**).

The central district of the Burdur city is located in the west of the Ağlasun district, while the Isparta city is in the north east, the Bucak and the Peçenek Beli districts are in the south and the Antalya city is in the southwest. Aglasun is 35 km from Burdur city center, 40 km from Isparta city centre and 105 km from Antalya city centre (**Figure 6**). Mountains in the region are Akdağ in the north of the district, Dereboğazı in the east, Yaylacık Mountain and Çatak Beli in the west. The rivers of the district are Tuzlu Çay, Gürleyik, Bey Spring, Gökpınarı, Susaklı and Kirazlı Çayı. (Bulut, Değişgeç, Güney, & Uzun, 2017, pp. 1706-1707).

Figure 5: *Location of Burdur in Turkey Map ('Map of Turkish Cities and Communes'was used as template yaken from http://cografyaharita.comg -last visit July 2019)*

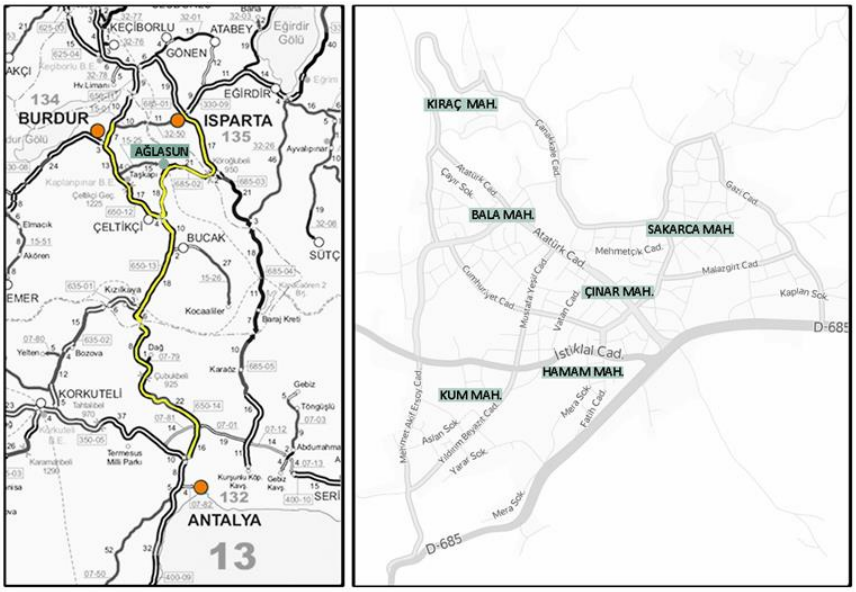


Figure 6: *The map on the left illustrates that Location of Ağlasun and its connection with Burdur, Isparta and Antalya. The map reproduced by the author after the 'Physical Map of Turkey' (www.yol.kgm.gov.tr -last visit July 2019). The right one shows the neighbourhoods in Ağlasun. (The map used as a templete is taken from www.yandex.com.tr -tlast visit July 19)*

Ceylan (2015) as cited in Bulut, Değişgeç, Güney and Uzun (2017, pp. 1706-1707), states that, because of being surrounded by high mountains, the district has a unique climate as the transitions between continental and Mediterranean climates are generally experienced together. In general, summers are hot and dry while winters are mild and rainy. Most of the precipitation falls in spring and winter periods and it is usually in rain form in summer time and spring and snow in winter time. Moreover, the district of Ağlasun has a rich flora. Red pine, larch species, Taurus cedar, cypress and poplar grow in the district. The economy of the district is based on agriculture, stockbreeding and mostly fruit production. Cherry, walnut, apple, wheat and corn are grown in the district. Furthermore, Ağlasun is famous for its rose gardens, trout breeding facilities while two factories, which produce tile and drinking water provide alternative job opportunities for the local people.

Figure 7: *A vista from Sagalassos through the Ağlasun (Photo: Göze Üner, 2018); the templete of the visual on the right is taken from the Google Earth, the direction of the view is the similar with the photo.*

Information on the history of Sagalassos Archaeological Site and Ağlasun settlement is obtained from the web site of Sagalassos Foundation[6].

The ancient city of Sagalassos lies 7 km northwest of the center of the Ağlasun district. It lies between 1490-1600 meters on the south-facing slopes of the south-western Taurus Mountains (**Figure 7**).

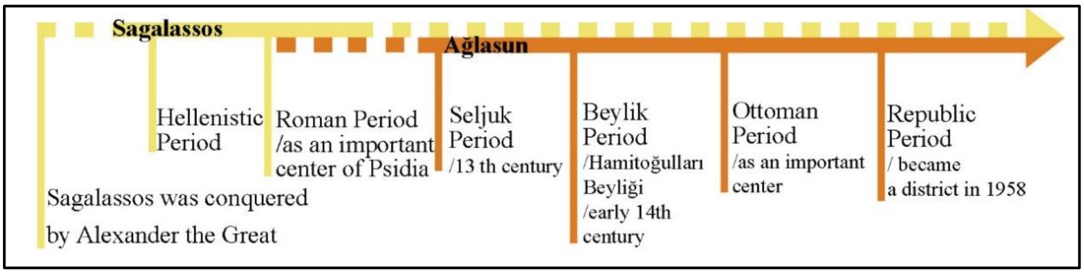


Figure 8: *Historical Timeline of Sagalassos and Ağlasun. The table reproduced by utilizing the unpublished book 'Understanding a Historic Rural Landscape: Ağlasun/Sagalassos'*[7] *(Şahin Güçhan, N. et al, 2016).*

Human traces date back to 10,000 BC in Sagalassos. After settled by Luwians and Pisidians, Sagalassos was conquered by Alexander the Great in 333 BC and then, came under the Roman sovereignty in 25 BC. The place had developed during the Hellenistic period, but it was the most prominent city of Pisidia during the Roman period. As a result of earthquakes and plague, the life in the city continued until the 13th century AD (**Figure 8**).

Then, the settled life started in Ağlasun, which took its name from Sagalassos. After the Seljuk Turks arrived and settled in Ağlasun, construction of a caravanserai and a

[6] For more information, see http://www.sagalassosvakfi.org/tarihce/
[7] More information about the unpublished study is given under the title 'Methodology of the Thesis' in the Chapter 1.

bathhouse connected to it and establishment of the region's market in this settlement point out that Ağlasun was an active settlement during the 16th century.

Kurtuluş, Asrav, Güçhan and Altınöz (2017, pp. 611-618) state that among the 5 neighbourhoods of Ağlasun, Bala is the oldest settlement area considering the literature reviews, interviews with locals and its location which is closer to the Sagalassos than the other neighbourhoods. Moreover, none of them come into existence late because all neighbourhoods are observed in the aerial photo from the year 1955.

Ağlasun became a district in 1958 and excavations in Sagalassos have been carried out every summer since 1990 by a scientific team of researchers from the University of Leuven, Belgium, Turkey and other countries. Also some local people work together with the team during the excavations.

In addition, within the scope of this thesis, it was observed during the site survey conducted in Ağlasun that today, besides the ongoing excavations and tourism, the spolia[8], used in the construction of traditional houses in Ağlasun, also point out the relation between Sagalassos and Ağlasun.

Today, Sagalassos is also the most influential value, constituting tourism potential in Ağlasun. In addition, there are mountain hiking, rock climbing and bicycle tour routes which contribute to the nature tourism and open air sports tourism. Moreover, within the scope of the 'Tarım*, Turism, Takas'* (TATUTA) Project, agricultural tourism activities are carried out in the settlement (Karabatı, Doğan, Pınar, & Çelik, 2009, pp. 129-142).

---

[8] https://www.brown.edu/Departments/Joukowsky_Institute/courses/artinantiquity/7270.html

2.1.1. Current Settlement Pattern

Ağlasun consist 5 neighbourhoods which are named Sakarca, Hamam, Bağla, Kum and Kıraç in the 1990 Cadastral Map, however, the Çınar neighbourhood, which consist some parts of Sakarca and Hamam neighbourhoods, was defined officially in 2007.

Except the Atatürk Avenue and the İstiklal Avenue, which are the main arteries in the district, organic street pattern which consists of buildings that are located both in adjacent and separate order on the right and left sides of the streets and intersection points between the neighbourhoods form the settlement. Traditional coffee houses, mosques and small grocery stores, which serve to six neighbourhoods separately, are located close to these areas (**Figure 9**). Moreover, Ağlasun Stream and water channels extending between the streets with pavements and the residences are the most prominent features of Ağlasun streets (**Figure 10**).

The historic Plane Tree in the Cumhuriyet Square at the center of the district, which is said to be 1000 years old, has become a symbol of Ağlasun (**Figure 11**). Apart from this, the fact that public buildings, such as municipality and hospitals, are located in this region makes daily life in Çınar Neighborhood separate from the others in terms of human and vehicle density during the day. There are also other landmarks in Ağlasun such as the Historical Seljuk Bath, the Old Mosque in Sakarca Neighborhood, a bazaar place, the city park called 'Altın Park' and the village room (**Figure 12**, **16**).

Figure 9: *Photos on the both left and right sides show that two storey traditional mud brick masonry houses whose ground floors are used as grocery shops of neighbourhoods that they exist.*

Figure 10: *The panoramic view of the landscape within the Ağlasun Stream, green areas, houses and the Akdağ.*

Figure 11: *The photo on the left shows, the water channels existing between the streets with pavements and the houses; the photo on the right shows the historic Plane Tree as the most conspicuous landmark in Ağlasun. The source of the photo on the right is* http://www.sagalassosvakfi.org/rehber-brosurler/

Figure 12: *The photo on the left shows the street view including the landscape in Ağlasun and the village room which is adjacent to the house with the painted façade; the photo on the right shows the spolia on the wall of the Village Room.*

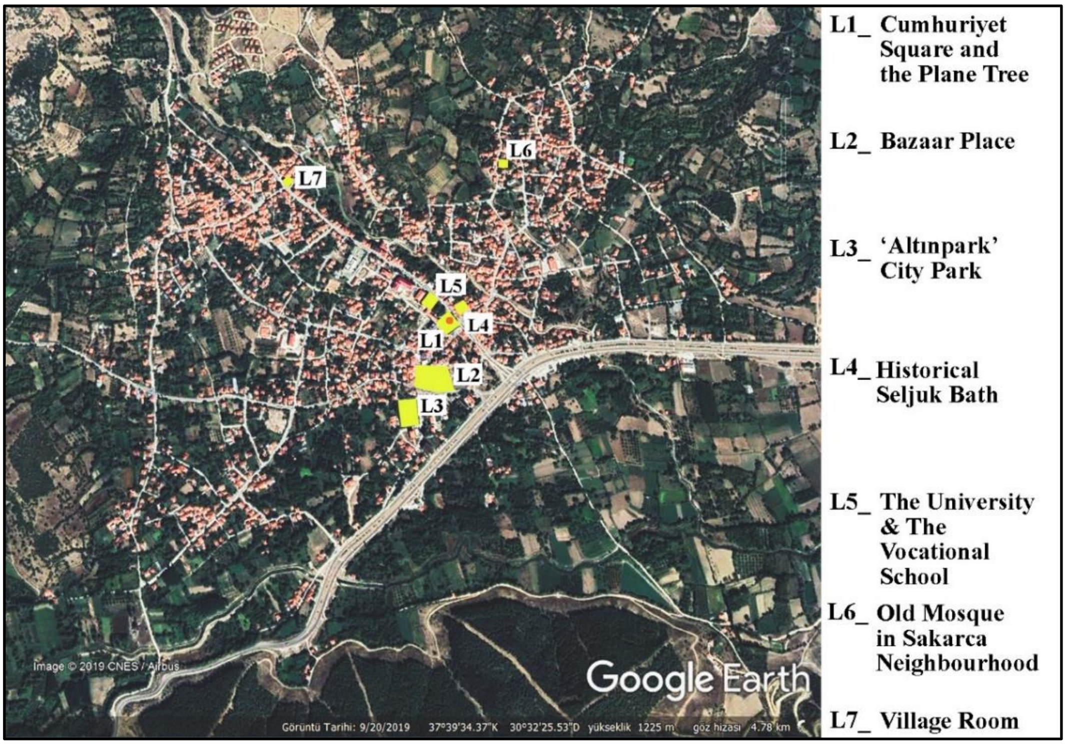


Figure 13: *Locations of Landmarks on the aerial view of Ağlasun.*

It is indicated in the Ağlasun Municipality's web page that the population has increased until 1990 but it has decreased since 2011 due to internal migration to cities. Population of Ağlasun was 8.537 in 2018. Apart from decrease in population, the human profile also highly vary in the settlement periodically. In addition to the existence of a university and Sagalassos Archaeological Site, activities such as outdoor sports tourism and agricultural tourism are effective in this. Thus, new demands for accommodation emerged and this accelerated construction of new buildings in the district.

Today, especially in the Çınar Neighborhood, where reinforced concrete structures become widespread has started to dominate the characteristic built environment of the district, which is formed by traditional architectural fabric (**Figure 14**).

Figure 14: *The confliction between the new housing and the traditional one in Ağlasun.*

Traditional Ağlasun houses, most of which have two-storey main mass, define a built environment conforming the human scale as opposed to new constructions. Among the houses that continue to be in use, some of them are in good structural condition while some of them have serious structural problems. Apart from these, it is observed that most of the abandoned traditional houses are partially or completely demolished.

Traditional Ağlasun Houses are comprised of stone masonry, mud brick masonry and timber frame construction techniques (**Figure 15**). In all these houses timber-framed walls are built mostly as interior walls. However, at the first glance, it is possible to categorize them in three group according to usage of mud brick masonry and stone masonry construction techniques.

First one consists mud brick masonry houses, in which the stone masonry is used for constructing the walls of foundation continuing just till the sub-basement level (**Figure 16**). Second one is the houses whose ground floor is constructed with stone masonry while the first floor of them constructed with mud brick masonry system (**Figure 17**). The last group includes stone masonry houses, mostly in which '*Köğke*' is used in the form of a cut stone over the rubble stone masonry used for the sub-basement (**Figure 18**). The first two are discussed in the scope of this thesis.

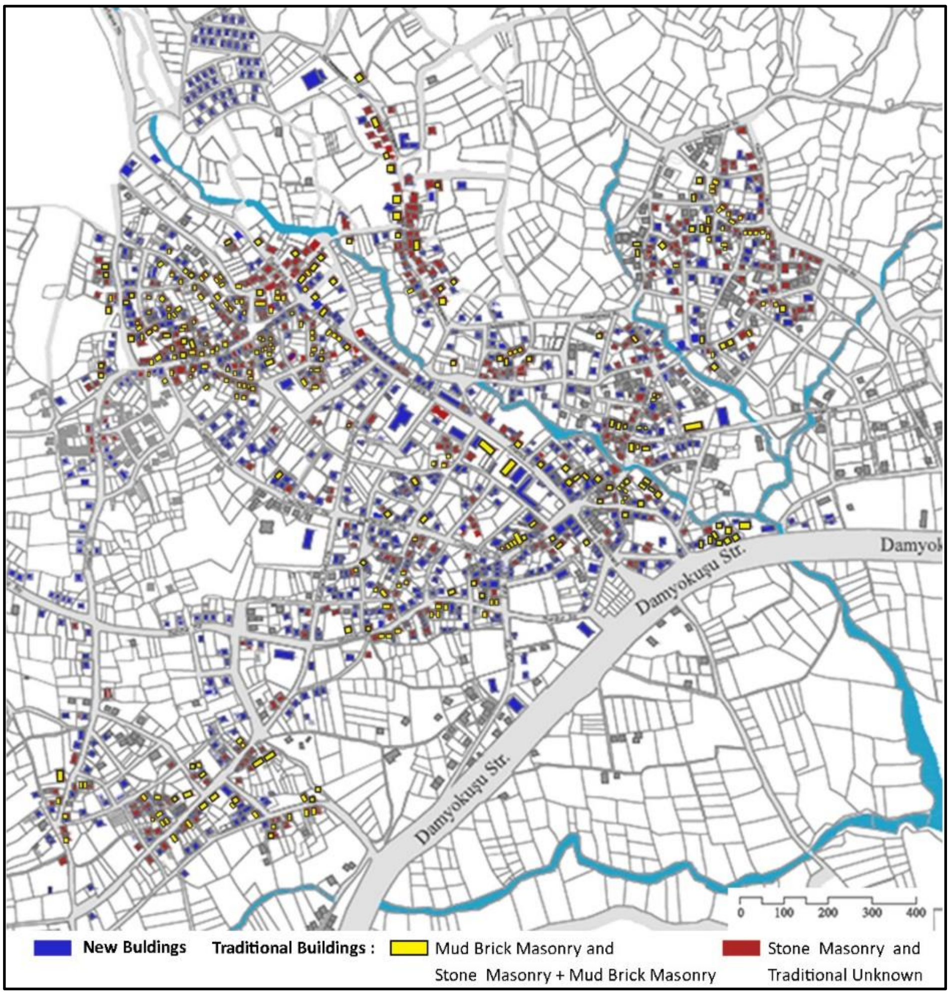


Figure 15: *The settlement pattern consisting of new and traditional buildings in Ağlasun. The map is generated by utilizing two maps 'Traditional and new buildings in Ağlasun' and 'Construction techniques used in traditional housing in Ağlasun' (Şahin Güçhan, N. et al, 2016).* [9]

[9] More information about the unpublished study, '*Understanding a Historic Rural Landscape in Relation with an Archaeological Site: Ağlasun/ Sagalassos*' is given under the title 'Methodology of the Thesis' in Chapter 1.

Figure 16: *Street views show traditional mud brick masonry houses, located separately, in Ağlasun and the stone masonry constructed up to the sub-basement level.*

Figure 17: *The street view showing traditional mud brick masonry houses, located adjacently, in Ağlasun and the house with the stone masonry, constructed up to the first floor level.*

Figure 18: *The traditional house, completely built with stone masonry construction technique.*

Traditional Ağlasun houses are also divided into two as the early and late period buildings (**Figure 19**). Spatial relations and mass characteristics of the buildings as reflections of these two periods are explained in the following chapter within the scope of 19 houses studied.

Figure 19: *The early period house on the left and the late period house on the right.*

However, local people have started to prefer new buildings for accommodation because the traditional houses have become insufficient in time for the contemporary needs of dwellers. Decrease of number of local builders who know traditional construction techniques, easy accessibility of industrial building materials are the causes that locals, who do not have the possibility of moving to newly built houses, prefer using these materials for the interventions to repair or increase the capacity of their traditional houses and this attitude mostly causes a dangerous transformation of traditional structures (**Figure 20**). These changes on traditional mud brick houses are discussed in more detail in the following sections.

Figure 20: *The structural transfromation of the traditional mud brick masonry houses in Ağlasun.*

2.1.2. Studied Traditional Mud Brick Houses in Ağlasun

The site survey was carried out in six neighborhoods, named as Sakarca, Hamam, Kıraç, Çınar, Bala and Kum, in the Ağlasun district of Burdur. In the first step of this field research, traditional mud brick masonry houses are examined with an exterior survey on their structural conditions, authenticity[10], being in a continuous or a periodical use or abandoned.

[10] For more information, see 'The Nara Document on Authenticty' (ICOMOS, 1994)

19 houses, located within the boundaries of four neighborhoods, were selected for interior survey (**Figure 21-26**). These are 7 house in Bala Neighborhood, 7 house in Sakarca Neighborhood, 2 house in Çınar Neighborhood and 3 house in Kum Neighborhood. This selection was made mainly considering their structural and architectural qualities such as maintaining structural durability, keeping original spatial organisation in a significant degree, and authenticity of architectural elements. Structural stabilization proposal requires a separate and more detailed study, performed by experts. Therefore, during the preliminary study on interior spaces, the houses, which had problems such as demolition of timber-framed walls and constructing most of the interior walls with hollow bricks, hazardous structural cracks on the mud brick masonry walls and the loss of material, were discarded from the scope of this study.

Although the time constraint of the site survey affected the number of studied houses, sufficient number of qualified traditional mud brick masonry houses were studied in the district in order to reveal the variations and repetitions both in the structural system and architectural contexts and to specify the types of values and problems observed in different houses.

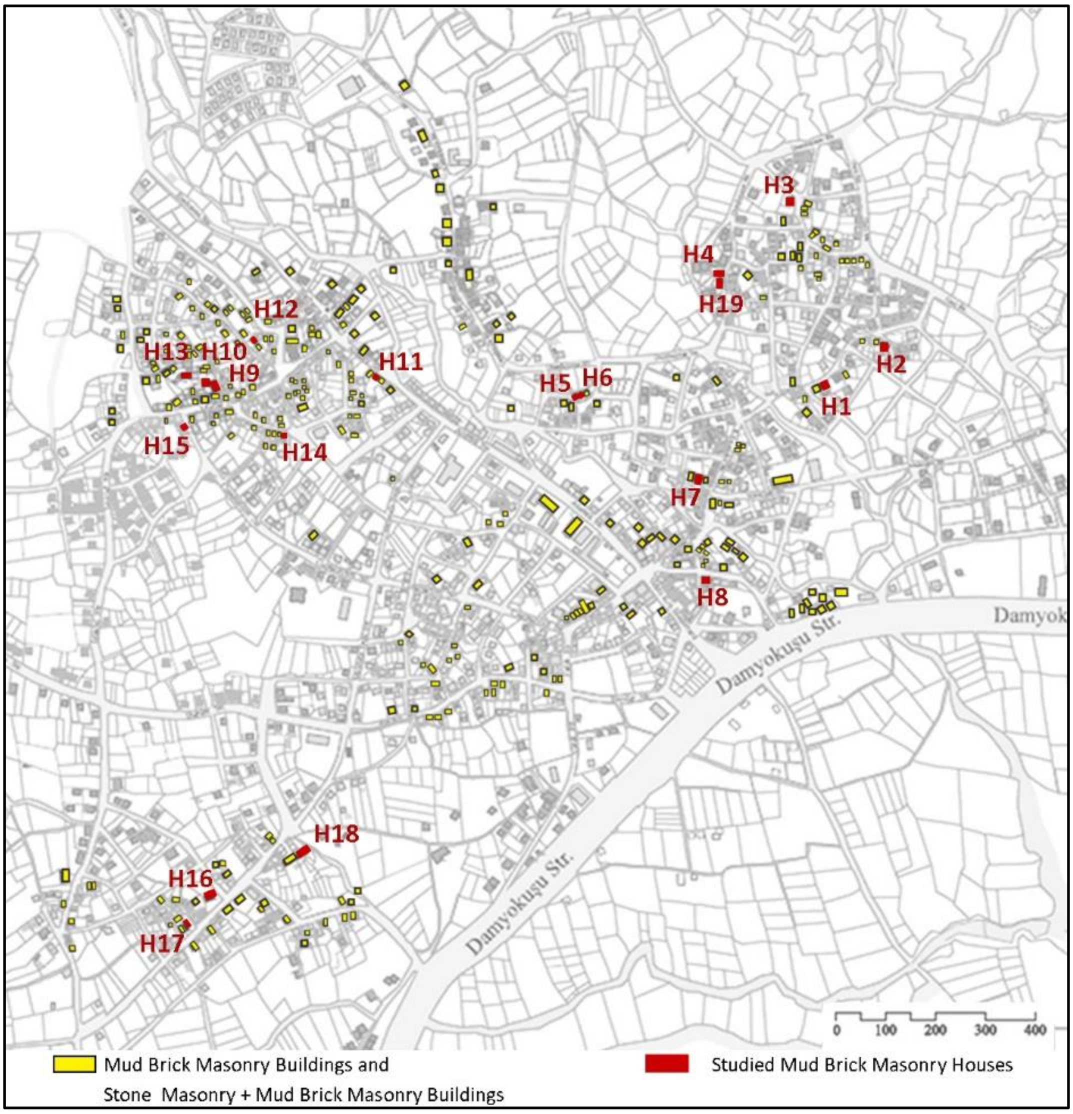


Figure 21: *Studied Traditional 19 Mud Brick Masonry Houses in Ağlasun. The map used as a template is the 'Open-Built Up relation in Ağlasun - Five neighborhoods of Ağlasun' (Kurtulus, Asrav, Güçhan, & Altınöz, 2017, p. 611)*

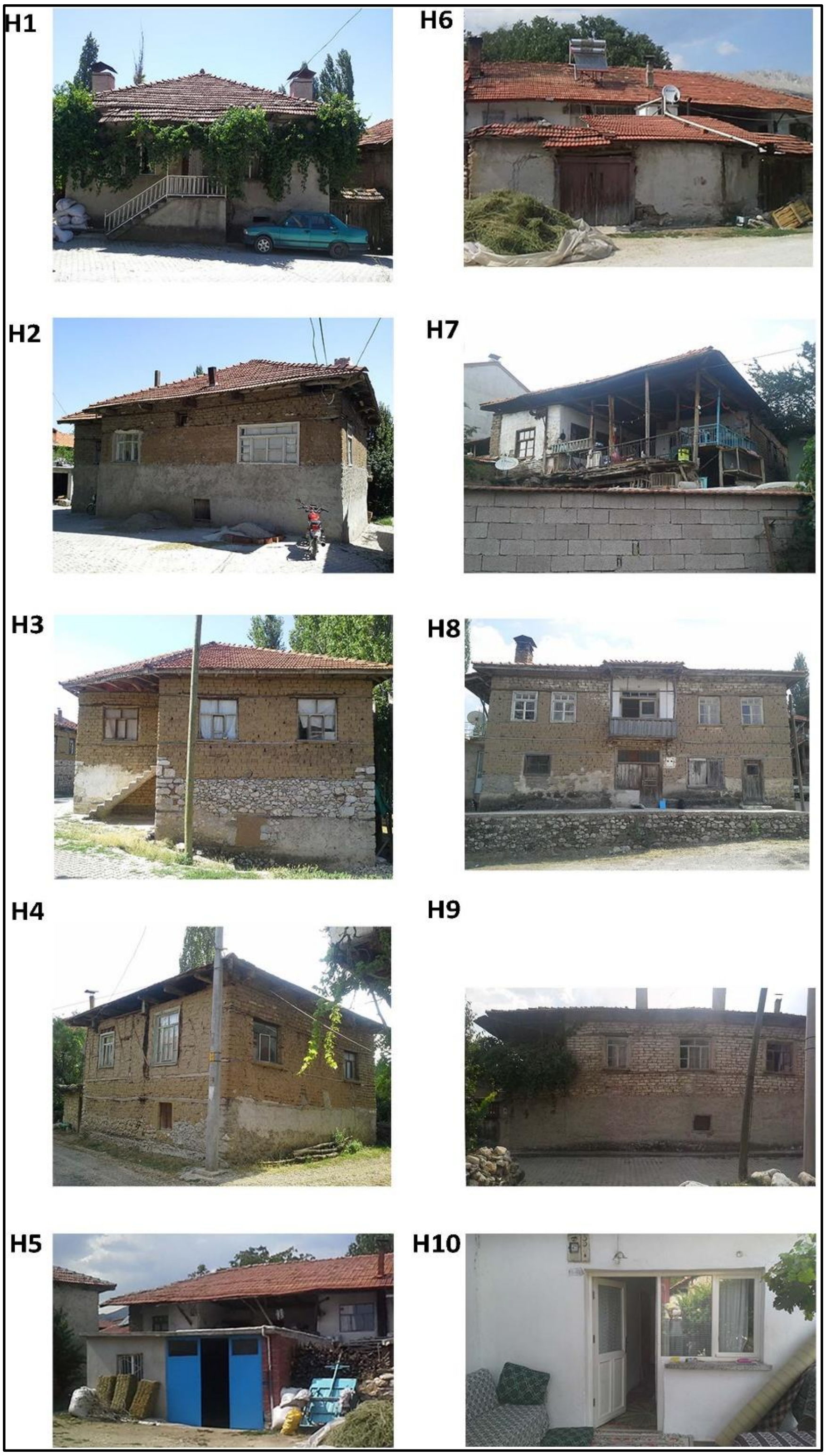


Figure 22: *Selected Traditional Mud Brick Masonry Houses in Ağlasun*

Figure 23: *Selected Traditional Mud Brick Masonry Houses in Ağlasun*

During the interior surveys among the 19 houses, the House-15, which is located in Bala Neighborhood, was studied by taking detailed measurements in order to obtain and present more information about its construction system as an example among the studied houses (**Figure 24**).

There were some factors for the selection of this house. Compared to other 18 houses studied, architectural and structural interventions by dwellers were minimal and there was no spatial intervention in the House-15. Moreover, it had an undamaged structure except the material loss at the corner of the house. In addition to these, for this selection, the consent and the willingness of dwellers to participate to the study by sharing their knowledge about the house was also essential.

Figure 24: *Photos from H-15. On the left, northeast facade facing to the street; on the right, southwest facade facing to the garden.*

2.2. A Review on Construction Techniques of Mud Brick Masonry Houses and Characteristics of Mud Brick

Information obtained from literature research on components of mud brick, traditional mud brick production process and mud brick masonry structures are included in this section after a brief history of mud brick as a construction material. To get information about these topics, two main written sources, titled 'Anadolu Kerpiç Mimarlığı' by

Prof. M. Rifat Çelebi, and 'Çağdaş Yapı Malzemesi Toprak ve Alker' by Ruhi Kafesçioğlu, were utilized. Moreover, an interview with Prof. Dr. Bilge Isik in June 2016 and some interviews with Mustafa Onaç, the building foremen in Ağlasun, during site survey studies were carried out.

Earth has been used as a building material since ancient times. Sources in the literature give information about the existence of mud brick structures in different regions of the world at different periods. According to Minke (2006, pp. 11-13), when earth is referred as a building material, the base scientific term is the loam, which is the mixture of clay, silt, sand and larger aggregates such as gravel or stones. The terms 'mud brick' or 'adobe' are used for handmade unbaked bricks. Mud brick houses, constructed between 8000 to 6000 BC, were discovered in Russian Turkestan (Pumpelly, 1908, as cited in Minke 2006).

The presence of the mud brick structure in Turkey is older than this time interval. The use of mud brick in the 10th century BC was found in Mesopotamia while the use of mud brick was started in Çayönü settlement in Diyarbakır in 8500 BC (Çavuş et al., 2015, pp. 184-192).

In addition, Naumann (1975, p. 92) states that large mud brick walls were discovered in Çatalhöyük, Hacılar, Beycesultan, Nordsuntepe, Acemhöyük and Kültepe during excavations (**Figure 25**). Heights of these walls, built with or without beams, sometimes exceeds 3m. The thickness of these walls, which have no particular type of masonry, varies. Initially, stone was not used for building their foundations, but by the beginning of the late Neolithic period, when stone was easily found, application of stone foundation became a definite rule.

Figure 25: *Neolithic Site of Çatalhöyük*
(https://whc.unesco.org/en/documents/131748, last accessed on 21 August 2019)

Moreover, during history, mud brick has been used as the building material for construction of not only one or two storey houses but also high-rise buildings and monumental structures such as those in Shibam, Yemen (from 15th century) and Draa Valley (***Figure 26***), Morocco (from 17th century); monumental structures such as the temple of Ramses II in Gourna, Egypt (from 2th BC) and the Large Mosque in Djenne, Mali (from 13th century) (***Figure 27***) ; citadels such as Citadel of Bam in İran from 6th to 4th centuries) and city walls such as Hattuşa City Wall in Çorum, Turkey (**Figure 28**). Apart from the use of mud brick in their constructions, another common feature of all these examples is that they are all included in the Unesco World Heritage List.[11]

[11] https://whc.unesco.org/en/list/

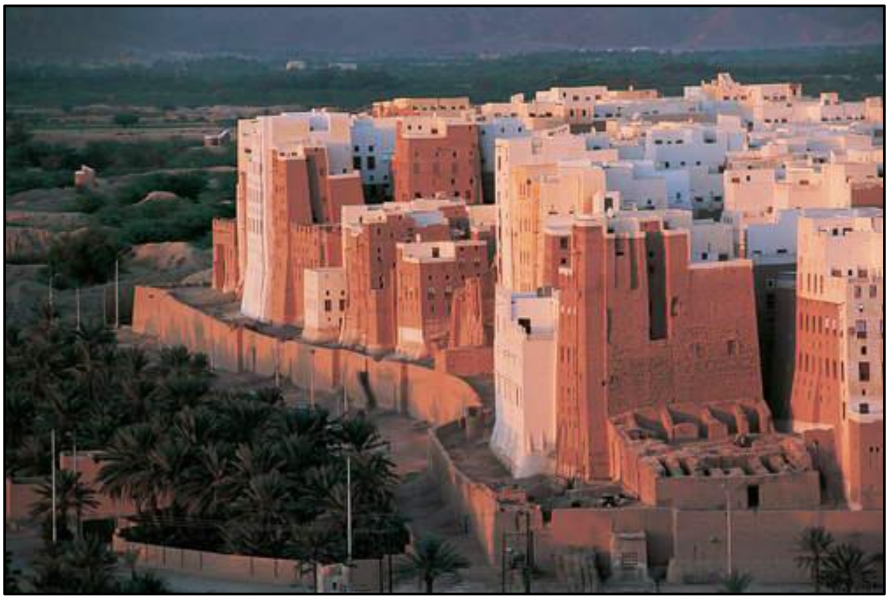


Figure 26: Old Walled City of Shibam in Yemen.

(https://whc.unesco.org/en/documents/109048, last accessed on 21 August 2019)

Figure 27: Old Towns of Djenne in Mali.

(https://whc.unesco.org/en/documents/107952, last accessed on 21 August 2019)

Figure 28: *West view of the reconstructed fortification wall. (Seeher, 2007, p. 17)*

A large scale field study is done at Istanbul Technical University in 1948 to collect information about the production of mud brick and construction techniques of mud brick buildings in Turkey (**Figure 29**). The construction technique, which consists mud brick as an infill material between the timber frame structures, is seen especially on the mountainous regions and forestlands on the northern, western and southern coasts. Moreover, it is observed that there has not been much change on the mud brick masonry construction technique, especially in the Central Anatolia and the Eastern Anatolia since the ancient times; it has continued to be constructed and used since Middle Ages (Kafescioğlu, 2017, pp. 15-19) .

In addition to this, it should be indicated that considering the location of Ağlasun in the inner part of the Mediterranean Region, where it is possible to observe mud brick masonry buildings in use, it is not limited to these two regions of Anatolia today.

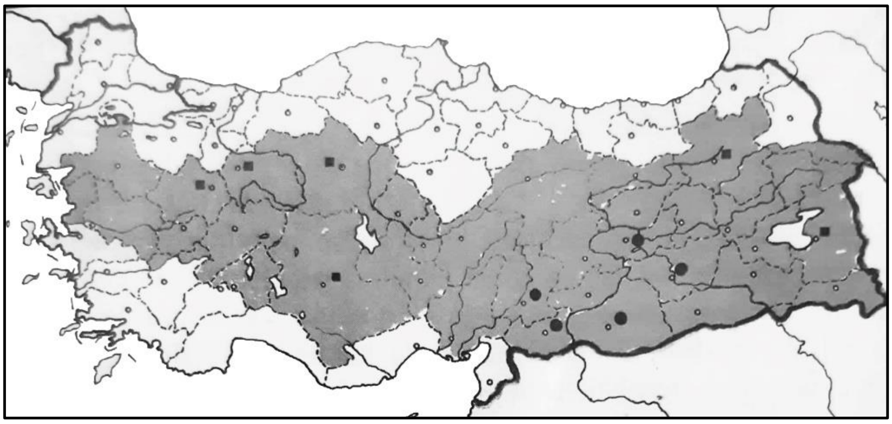


Figure 29: *The regions with site survey conducted on traditional mud brick construction in Turkey, in 1948 (Kafescioğlu, 2017, p. 163).*

2.2.1. Components and Production of Mud Brick

In light of the common information obtained from written sources and the interviews with Işık and Onaç, it is possible to define traditional mud bricks as handmade sun-dried blocks that are made of soil, containing aggregate, sand, silt and clay, with addition of water and fibrous materials such as straw and grass. Clay increases the stabilization of mud brick mixture, addition of water provides plastic consistency to the mixture and fibrous materials ensure uniform shrinkage during drying and provide reinforcement. Moreover, Minke (2006, p. 41) states that addition of ox blood, manure and urine is applied depending on cultures in order to benefit from their binding and stabilizing features.

The soil to be used in the production of adobe should not contain organic substance. Therefore, it is important that the site selected for gathering soil is away from waste collection areas. In addition to this, it should be indicated that all soil types are not suitable for being used in construction. There are three types of soil called 'building soils'. First one is the soil, having cohesion and plasticity thanks to its sufficient silt and clay content. Second one is the soil including sand, marl and pozzolana without clay and cohesion quality. Third soil type is specific to its location with special properties useful for construction. These soil types can be defined as ‘building materials’ when they are prepared according to the place, where they will be used, such as wall, mortar and plaster (Kafesçioğlu, 2017, pp. 33-35).

Although, in the construction stage of the existing traditional mud brick structures in Turkey, the ratio of components that should be included in soil for its stabilization characteristics and the proportions of the materials, used in the mud brick mixture, have never been tested in the laboratory, the appropriate ratio was achieved with the amounts determined by basic physical tests in fields. The local people, who were capable of making conscious choices with their established culture of traditional construction, have succeeded in producing building materials with high physical and mechanical qualities. This has been documented by subsequent laboratory experiments in many regions (Kafescioğlu, 2017, p. 164).

In the beginning, the surface level of the reserved area must be cleaned and flattened. Sand or hay should be laid on the floor to prevent adobe blocks from sticking. The selected soil is purified from big size aggregates. Then, after the preparation of the mud brick is completed by adding hay and water to that soil, the mixture is left to rest for one or two nights.

Kafescioğlu (2017, p. 165) states that this resting period of the mixture provides a homogeneous distribution of the moisture in it and causes the interaction, which probably provides an improvement, between minerals and substances in the mixture. The rectangular wooden moulds are prepared 1-2 cm wider than the dimensions of desired mud bricks because shrinkage occurs during the drying process (**Figure 30**). Water is added to the mixture to achieve the appropriate consistency before pouring it in the prepared moulds, so in this way the mixture is given a certain amount of fluidity. Then, after the mixture is poured into the wooden moulds, it is compressed with a trowel. Drying process takes place under the shadow so that no cracks occur. It is important to ensure that all four surfaces of the blocks are dried evenly. For this purpose, they are turned vertically after one or two days. Finally, the blocks are collected and stacked.

Figure 30: *Mud brick production with traditional molds and equipment. (Cookson, 2010, as cited in Kafescioğlu, 2017, p. 106)*

Soil used for production of mud bricks is also the basic material for preparing mortar and plaster. Before using the soil in order to produce mortar, big size stones in it are removed. No additives such as hay are mixed into the mortar. For plastering, the same slurry is applied in two layers as coarse layer and fine layer. A sum of hay is mixed into the rough plaster. As the last layer, lime wash is applied over the mud based plaster to form a protective surface on the wall.

2.2.2. Mud Brick Masonry Construction System

Construction types of walls, on which earth is used as a building material are: mud brick masonry construction system, timber frame structure system with mud brick infill and rammed earth construction system (Kafescioğlu, 2017, p. 128). The first two are the traditional construction techniques in Turkey. The studies carried out within the scope of this thesis are on mud brick masonry construction system. Information that are initially obtained from the literature research on mud brick masonry construction system also were taken into consideration while studying on traditional mud brick masonry houses during the site survey in Ağlasun. These inputs are comparatively indicated in this part of the study before more detailed structural analysis on the construction system of selected Ağlasun houses within the following chapter.

Foundations

The foundations of mud brick masonry walls are placed directly on the rocky layer, if it exists in the field or stone foundations are built in deeper levels where hard ground is reached. During the course of history in Anatolia, mud brick masonry wall construction on the rock and rare existence of mud brick foundations were observed (Naumann, 1975, pp. 58-61).

Stone foundations of mud brick structures in Anatolia are mostly built with mud based mortar. Wall thicknesses of these stone foundations are wider than the thickness of mud brick masonry wall constructed over them. The distance between the top level of the stone foundation and the ground level of buildings generally ranges from sixty centimetres to one meter. The stone walls, rising from the foundation, are terminated at the sub-basement level by by placing lintel on them and then, the construction of the mud brick walls are started. However, it was also observed that mud brick masonry walls were built directly on the stone masonry walls in some cases (Çelebi, 2012, p. 83).

Mud Brick Masonry Walls

Since there is no industrial market in our country yet, mud brick masonry walls are made with blocks, which are specially produced for structures in every construction site. There are two types of mud brick called '*ana*' and '*kuzu*' according to their sizes (**Figure 31**). Small differences in size can be observed from region to region. The types of mud brick masonry walls show variety according to their thickness such as half brick wall, single brick wall, one and a half bricks wall and two bricks wall (**Figure 32**) (Kafescioğlu, 2017, p. 176).

In addition to these, Çelebi (2012, pp. 87-89) states that the name of the wall type, which is built with two half mud bricks, is 'kuzu duvar' and he indicates that it is not a load bearing wall type. Mud brick masonry wall type constructed with one and a half mud bricks is called *'frenk örgü duvar'*, and the wall type made up of two bricks are called '*ana duvar*'. In addition to these, he mentions that there is also a type of wall, built with two '*ana*' bricks and one '*kuzu*' brick together and it is called as *'paşa duvarı'*.

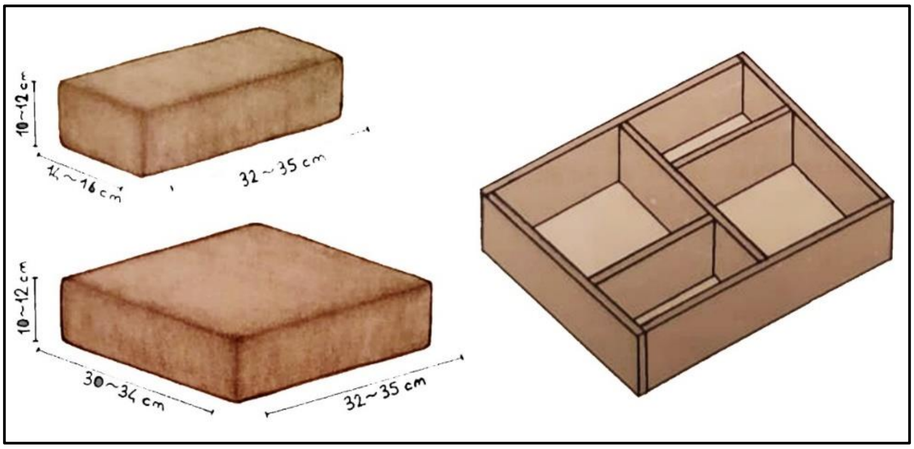


Figure 31: *Types of mud bricks called as 'ana' and 'kuzu'; a timber mold. The visual is dapted from (Kafescioğlu, 2017, p. 165)*

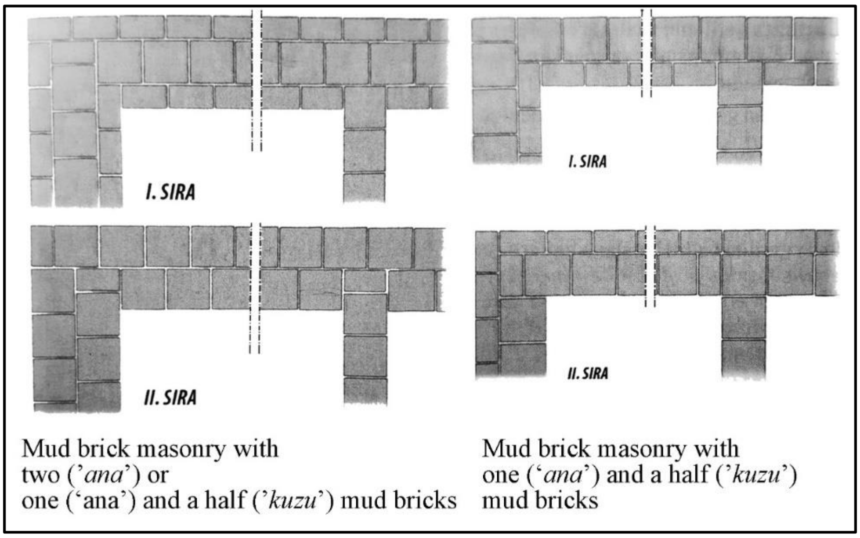


Figure 32: *Types of mud brick walls. The visual is produced by utilizing illustrations from (Kafescioğlu, 2017, pp. 176-177)*

Mud brick masonry walls are supported by lintels (**Figure 33**). These are horizontal timber structural elements having rectangular cross-sections with dimensions such as 5x10 cm 8x8 cm etc. They are connected to each other at about every two meters and at the corners of the structure. The functions of the lintels are stopping vertical cracks that may occur on the wall; ensuring that the loads on the wall are spread evenly; preventing horizontal distortion due to joint thicknesses and block dimensions during wall construction period; bringing the wall parallel to the horizontal line at certain heights; and providing a suitable surface for nailing the structural elements to be attached to the wall (Çelebi, 2012, p. 90).

It is important that lintels are located at the lower and upper levels of the window openings and upper levels of door openings, the levels where the floor beams are placed on walls, and as the base at the level where the roof sits on the walls.

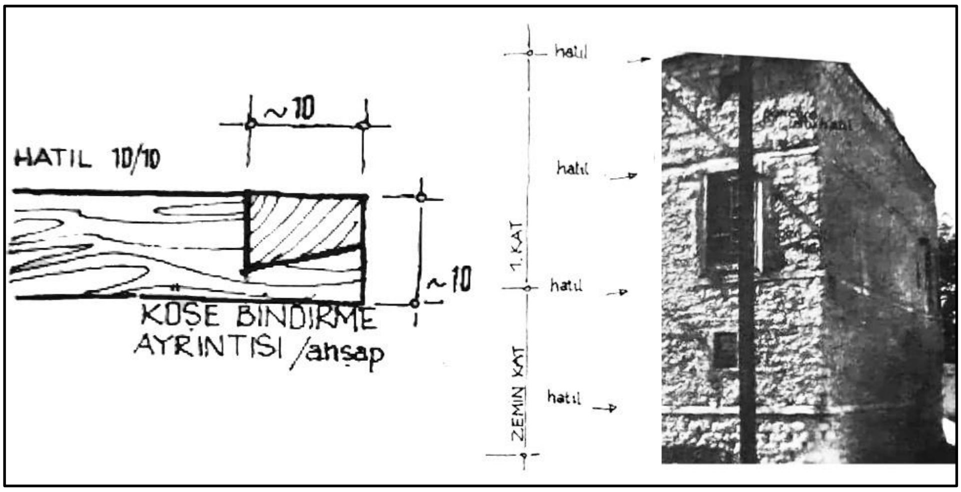


Figure 33: *On the left, dimentions of lintels and junction point detail of them; on the right, locations of lintels in a mud brick masonry walls of a house in Elbistan. The visual is produced by utilizing an illustration and a photo from (Çelebi, 2012, p. 92)*

Floorings

The flooring is itself the ground in single-storey mud brick structures. The floor covering is well compacted hay plaster with 7-10 cm thickness. The primary elements of floor slabs and roof ceilings are wooden beams, which are placed on the last lintels on the walls. These beams are sawn timbers with rectangular cross-section. There are also untreated ones with round cross-sections measuring around 15-25 cm in diameter. The beams are placed at intervals of 30-60 cm and the rigid opening that they span is 4 meters. Soil is laid on the branches placed in the opposite direction on the beams. Wooden floor covering boards are laid on wooden lathes with cross-sections such as 4x4 cm and 5x5 cm that are placed at 50-60 cm intervals. Moreover, stone or lean concrete is used as the finishing material on the slabs of wet rooms (Çelebi, 2012, p. 108).

Roofs

As it is stated by Çelebi (2012, p. 110), the roofs of mud brick buildings in Anatolia are generally earthen roofs while newly formed roofs of these houses are made of roof tiles on sloping wooden frames. It is possible to show the roofs of the traditional houses in Ağlasun as an example to this situation.

2.2.3. Advantages and Disadvantages of Mud Brick as a Construction Material

As mentioned at the beginning of this chapter, the use of mud brick as a building material has a long history. There are many reasons such as geological and climatic characteristics of regions, economic factors and traditions making people prefer using mud brick to construct buildings. One factor in the demand for mud brick as a building material is the limited accessibility of natural sources for stone and timber building materials in settlements and around their vicinity. Apart from this, the advantageous material based features of mud brick also have been confirmed by scientific methods by experts.

The earthen structures, produced according to the rules, are better than all other structures constructed under similar conditions. They have physical and mechanical qualities that can meet all expectations so, they are reliable in every respect. They provide significant energy saving both during construction process and use of the structure. Earthen structures achieve the best level of building-user health relationships by providing bioclimatic comfort conditions (Kafescioğlu, 2017, pp. 157-158).

Similarly, Elias Ozkan, Summers, Sürmeli and Yannas (2006) state that mud brick has better thermal property than contemporary building materials according to the analysis on temperature and humidity measurements which are implemented with buildings constructed with mud brick, hollow brick, concrete blocks, straw and autoclaved aerated concrete. They also emphasize that besides being more affordable, mud brick is an environmentally friendly construction material thanks to its energy efficient behaviour and bio-degradability.

Moreover, according to the interview made with Prof. Dr. Bilge Isik, there are also other advantages of mud brick as a construction material. These are availability of the material in large quantities; being suitable for the construction of most parts of the buildings; being resistant to fire; making a building able to breathe by providing a healthy building envelope with moisture balance between inside and outside.

However, Işık also mentioned that there are also some disadvantages of mud brick which make people stop using mud brick for construction of their buildings. These are having critically low level of earthquake-resistance; reduction of the number of builders skilled in construction with mud brick; need of time and wide open space in the field; higher workmanship requirements for both construction and maintenance periods because of not being a standardized material. In addition to these, having low water-resistance is one of the most detrimental disadvantage of the mud brick.

In addition, without adequate precautions for the protection of mud brick from water, if an existing space is transformed to a wet room in mud brick houses or a wet room is constructed adjacent to these houses, low water resistance feature of the material become a threat for mud brick structures in terms of their continuity. It is confirmed that there are non-integrated or integrated but poor quality wet rooms in traditional mud brick masonry houses in Ağlasun.

As a result, if the disadvantages of the mud brick are eliminated, it is possible to keep benefitting from its advantages. For this purpose, scientific studies are in progress throughout the world in terms of both improving the compositional properties of mud brick and strengthening the structural characteristics of the buildings in which it is used. Among these studies, beside the ones executed with the aim of constructing new high quality mud brick structures, there are those, carried out for the conservation and repair of existing mud brick structures.

CHAPTER 3

ARCHITECTURAL AND CONSTRUCTIONAL CHARACTERISTICS OF TRADITIONAL AĞLASUN HOUSES THROUGH STUDIED EXAMPLES

The first phase of the site survey, including exterior analyses on the traditional mud brick masonry houses, was carried out in six neighborhoods, which are called Sakarca, Hamam, Kıraç, Çınar, Bala and Kum in the Ağlasun district of Burdur. Then, within the scope of this thesis, nineteen houses, located in Sakarca, Bala, Çınar and Kum neighborhoods, were studied in terms of their structural and architectural characteristics. After the site survey, documentation of these houses were compiled within the building sheets including architectural drawings and photographs of these houses. According to the information obtained from these studies, description of the Traditional Ağlasun Houses, spaces and architectural elements, building lot, plan and facade characteristics and the construction techniques of these houses respectively take part in this chapter.

3.1. Description of Traditional Ağlasun Houses

Building lots are the units defining Ağlasun houses, which include open and built-up areas. Open areas are defined as a garden or a courtyard. Built-up areas consist of a main building, which includes production and living spaces, and auxiliary buildings such as a '*saçak*', a barn, a storage, a pen and a greenhouse. In addition to these, in some cases, it was observed that dwellers have built another housing unit later within their parcels, in which their existing traditional houses are located.

In 4 of 19 building lots, built-up areas cover more than 50% of the lot; this value decreases to approximately %50 in 6 lots and becomes less than %50 in 7 lots. While most of the lots with at least %50 built-up areas have courtyards, many of those with less than %50 built up areas have gardens.

Open areas in the lots are defined as gardens or courtyards (**Figure 34**). As mentioned above, gardens exist in larger parcels. They are located at the back side of the houses one facade of which defines the adjacent street. Gardens have neither walls, nor doors opening to the street. On the other hand, the courtyards are open areas surrounded by walls, which were built along the parcel boundaries with at least two meter height. These masonry walls were built with rubble stone, cut stone or mud brick. On these walls, there are double-winged, wide and tall wooden courtyard doors which are suitable for animal transfer.

There are fruit trees such as plums, apples, peaches, walnuts and cherries in gardens and courtyards as well. Different from the courtyards, some of the gardens include an area for growing fruit and vegetable, which are specially cultivated for income generation.

Figure 34: *On the left the garden in H18; on the right is the courtyard at H14.*

In general, the building lots with gardens are larger than those with courtyards, and the size of the main structure does not change proportionally with the size of the lot. Therefore, the ratio of built-up area to the entire building lot is lower in the examples with gardens. The main building is the largest mass among the other structures in the parcel. In addition, the size of barns and storages is almost equal to the size of '*saçaks*'. These are followed by greenhouses regarding their coverage while the smallest masses in the parcel are poultry houses.

In addition to these, although the spatial distribution of the masses in parcels, where the houses are located, as well as the relations between built-up areas and the alleys or streets that define at least one side of the parcel vary and all these are observed in different examples. The main distinguishing feature is the two different schemas between the main structure and the street.

The first one (L_1) represents the lots with a main building which is in an indirect relation with the street as seen in **Figure 35**. In such cases, the main buildings are always located in the courtyards and they don't have a facade facing to the street. There is no '*saçak*' structure in the cases where the main structure occupies a larger space than the others (L_1a). In the cases where there is a '*saçak*' structure, the main building is accessed from the area defined by the '*saçak*' after entering the courtyard (L_1b).

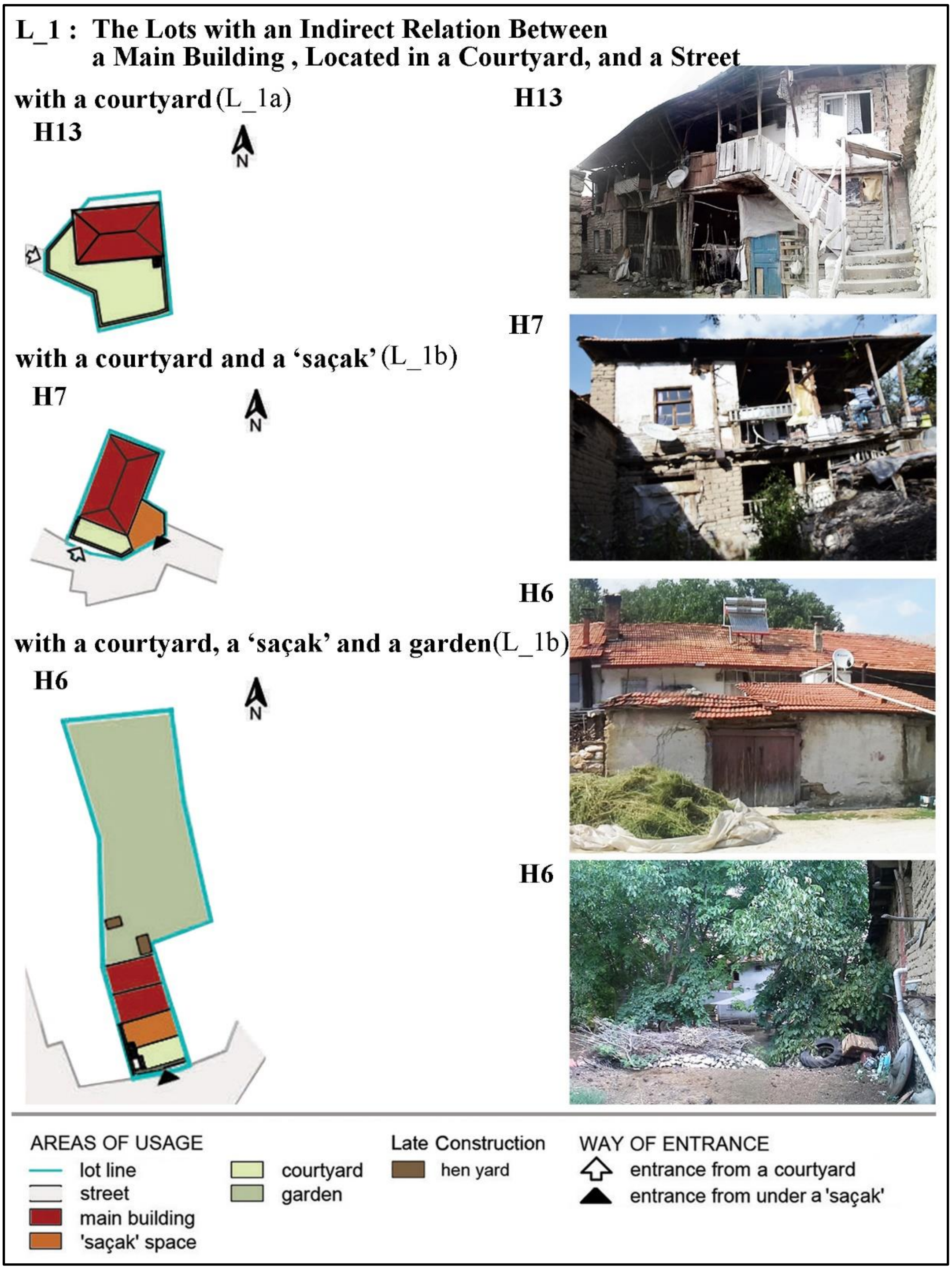


Figure 35: *The lots with an indirect relation between a main building, located in a courtyard, and a street.*

The second schema (L_2) represents the building lots with a main building which has a direct relation with the street (**Figure 36, 48)**. In these cases, the main building is located adjacent to the street and defines the street with at least one of its facades. Among these cases, as well as those where the main buildings are located in the courtyard (L_2a), the ones with garden in the lot constitute the majority (L_2b). There is a '*saçak*' in the courtyard of one of the buildings located adjacent to the street. Alongside eight out of ten buildings with street facades and gardens, there are '*saçaks*'. In four of these eight examples, the street is defined just by the facade of the main building. In three cases, there are structures used as a barn or a storage that were built after the eaves. On the other hand, '*saçaks*' are located next to the street facade of the main building within the other four of the eight cases having both a garden and a '*saçak*'.

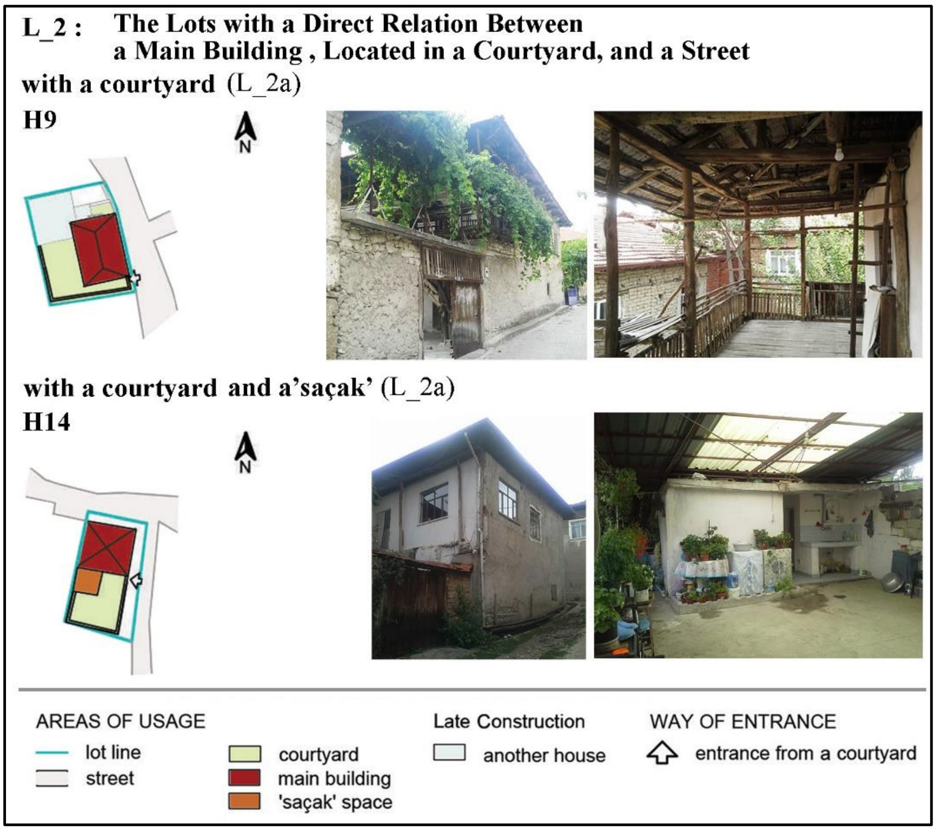


Figure 36: *The lots where there is a direct relation between the main building, located in a courtyard, and the street.*

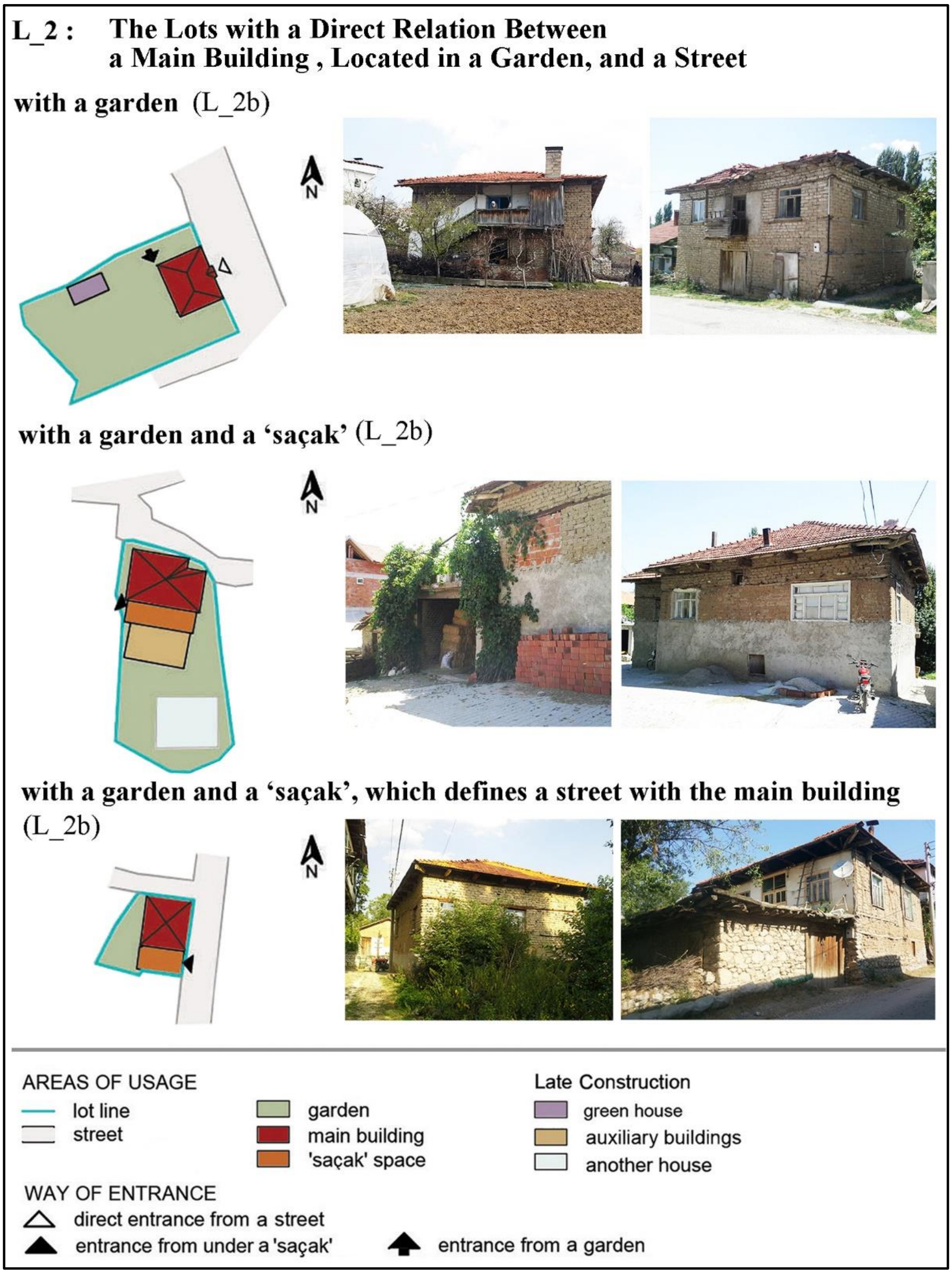


Figure 37: *The lots where there is a direct relation between the main building, located in a garden, and the street.*

Four entrance types were identified for the traditional houses in Ağlasun. These are, entrance from courtyard (E1), direct entrance from street (E2), entrance from the space defined by '*saçak*' (E3), and entrance from garden (E4). In some houses having a street facade, there is a direct entrance from the street to the ground floor of the main building, while in some of the main buildings, the entrance is on the facade facing the garden. The stairs leading to the upper floors are located on the street facade of the some houses while in all other cases, the staircases are located in the space defined by the '*saçak*'.

3.1.1. Spaces Composing the Traditional Ağlasun Houses

The spaces located in a main building and the spaces in the auxiliary structures are respectively defined with their architectural elements.

3.1.1.1. Main Building

The mass of the main structures, consisting spaces for living and the production, can be in rectangular prism or cubic form. They are mostly two-storey buildings, consisting a ground floor and a first floor, but some of them also have a mezzanine. Mezzanines and first floors are always reached by the same staircase, built outside the main buildings as adjacent to one of its facades. Except the semi-open spaces such as balconies, '*gezeneks*' and an additional TOİLET on the first floor, there are generally no projections on the facades of main buildings. Although it is not very common, there are projected '*sofa*s' in some traditional houses such as H19. The structures, having earthen flat roofs when they were first built, today have a hipped or gable roofs, which are constructed with wooden construction elements and French roof tiles.

The foundation walls and ground floor walls up to 1-1,5 m were built with stone masonry. All the exterior walls and some interior walls were built with mud brick masonry, which is the main construction technique in the area. Timber frame construction system with the '*bağdadi*' covering technique was used for the construction of some walls that define the first floor spaces. The construction techniques of the main buildings are discussed later in this chapter.

The original functions of spaces show variety according to their respective floors in the main buildings. On the ground floors, there are spaces used as storage, barn or workshop while spaces used as workshop, storage or guesthouse are located on mezzanines. Moreover, , there are '*sofas*', enlarged corridors, rooms, '*girelliks*', 'gezeneks' and a balconies on the first floors. Since the first floors of the main buildings are reserved for daily activities, the spaces located on the first floors are described first.

Spaces Located on the First Floor

The first floors, which are averagely 2.60 m high, comprise areas with multi-compartment plan organization. On the first floors of the houses, the stairs first reach to the semi-open spaces such as, '*gezeneks*', balconies or '*sofas*'. After then, the rooms and '*girellik*s' are spaces which are entered directly from the '*sofa*' or the corridor or an enlarged corridor. In current situation, some of these spaces or some part of them are used for separate functions such as bedroom, living room, kitchen, bathroom and toilet. Besides that, there are spaces built later on the first floors of the houses mostly in order to fulfil the need for wet rooms in the houses.

First, the '*sofa*' which is the most frequently used area in main buildings and the enlarged corridor, which is a substitute for '*sofa*' in some houses are explained. After these spaces one of the functions of which is supplying access to the other spaces in main buildings, rooms that serve various functions at the present time, namely '*girellik*s' , 'balconies' and 'gezeneks' are described respectively.

‘*Sofa*’

The ‘*sofa*’, also called 'tahtalık' by the locals in Ağlasun, is the first space to be encountered on the first floor of the house (**Figure 38**). Its function can be defined as both a living space and a circulation area. It is generally rectangular in shape and its wooden flooring is carried by mud brick masonry walls and wooden posts with stone bases located on the ground floor.

The '*sofa*' is the main determinant on the diversity of the plan of the first floor. Both open and closed ‘*sofa*’ are observed in the traditional houses in Ağlasun. In some examples, open '*sofa*' is located on the one side of the sequential rooms, while in other houses, it is located at the entrance of the corridor that provides access to the rooms. The corridors with an average width of 1.5 m (**Figure 39**), located together with the open ‘*sofa*’ on the first floors of some main buildings, serve just as a circulation space. These spaces, which are entered from an originally open '*sofa*', provide access to the sequential rooms located on their both sides and to '*girellik*s' located between the two of these rooms.

Moreover, apart from the situation that an open ‘*sofa*’ was closed later, it is also observed that there are houses with closed '*sofa*'s, which were located between the rooms on their left and right side, when they were first built.

Figure 38: *The first photo, taken from the H16, shows the open 'sofa'with rooms located on one side of it; the second photo, taken from the H8, shows the closed 'sofa' located in between the rooms.*

Enlarged Corridor

The term 'enlarged corridor' (**Figure 39**) has been defined within this thesis for the area which is in the transition phase from an open '*sofa*' to a closed '*sofa*'. Because these spaces are neither as narrow as a corridor nor they are as wide as a '*sofa*' they are used for different purposes like a '*sofa*' in addition to being used as a circulation area.

Figure 39: *The photo on the left, taken in the H9, shows the corridor; the photo on the right, taken in the H11, shows the enlarged corridor.*

Room

> ‘‘*As a matter of fact, that, Turkish room is in itself the equivalent of a house. It is used to sit, eat and sleep in; for each of these various activities, the room is provided with cupboards, closets, built-in wardrobes and side-boards. Originally the meaning of the word room, oda or hane was the same as that of dwelling or house, and a room with only one door served the same purpose as a house. Consequently, there were very few rooms in the old houses. On the same principle, there were no doors between adjoining rooms. These were able to enjoy a privacy of their own, as a separate units in the plan. This characteristic of Turkish rooms, which prevents them from the type of rooms of Western Europe.*’’ (Eldem, 1954, pp. 217-218).

These features, which make the rooms of traditional Turkish houses special, can be seen in the rooms of the traditional Ağlasun houses (**Figure 40**). The form of the rooms with an average area of 12 square meters and a height of 2.60 meters is rectangular prism. Rooms are accessed from a '*sofa*/tahtalık' or a corridor or an enlarged corridor. There is a single-wing wooden door between a room and the circulation area. Each room has exterior windows while some of them also have interior windows. There are no doors or windows between two adjacent rooms.

Additionally, it should be noted that there is also a hierarchy amongst the rooms illustrated on the ornamentations on their wooden architectural elements. This shows both the social-economic status of the property owner and the existence of the hierarchy among spaces with respect to their users. '*Ocaks*', '*yüklüks*' and niches are the main architectural elements defining the special characteristics of these rooms.

Rooms with no rammed earth layer on their flooring are called as summer room by the dwellers. Nowadays, the rooms are heated with stoves in winter. Moreover, due to the abandonment of the tradition of the use of each room by a single family, today every room has a single function such as a living room, a bedroom and a kitchen etc.

***Figure 40**: A panoramic view from one of the rooms in the H5.*

‘*Ambar Üstü*’ / the Room Located over a Granary

The granary, ‘ambar’, is a container made of wood with some narrow compartments inside it (**Figure 41**). They are located directly on stone bases or on wooden pillars placed over stone bases on the ground floors of main buildings (**Figure 42**). Products such as corn, wheat and barley are stored in them. Nowadays, the granaries are not used as they are no longer needed.

The room, called '*Ambar Üstü*' by locals, is located on the short side of the open '*sofa*' which is rectangular in plan. Its flooring is raised about 20-30 cm due to the granary beneath it (**Figure 43**). In some houses in Ağlasun, this area is distinguished from the ‘*sofa*' only with its raised floor. However, among the houses studied within the scope of this thesis, it is observed that these are separate spaces, surrounded by walls. They also contain traditional architectural elements such as '*ocak*s' and niches and serve as a kitchen or a living space.

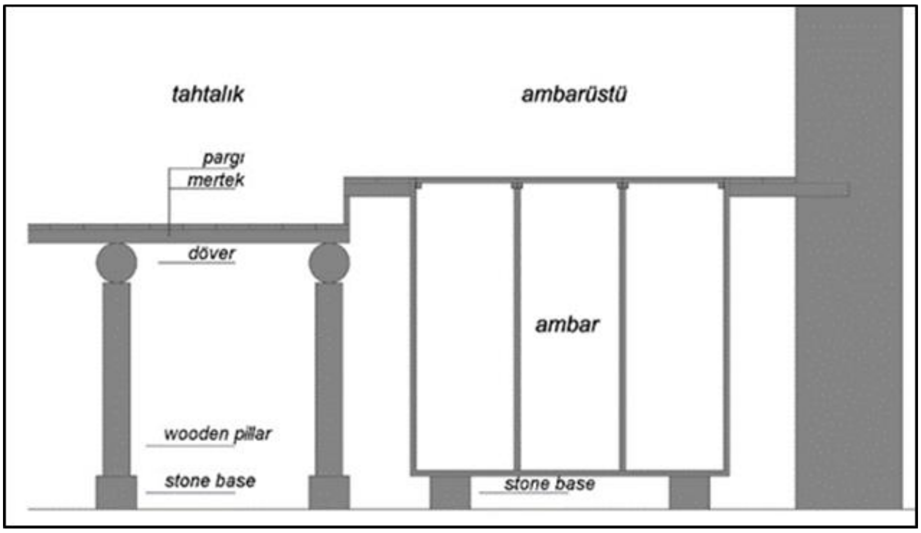


Figure 41: *The ‘tahtalık’ section with ‘ambar’, ‘ambar üstü’ and wooden pillars (Kurtulus et al., 2017).*

Figure 42 *: The granary located on the wooden pillars with stone bases in the ground floor of a main building.*

Figure 43: *The photos, taken in the H16, shows the granary, the space located above the granary and their location in the house.*

'*Girellik*' / Cellar

'*Girellik*' (**Figure 44**) is located on the first floor, on one side of the '*sofa*' and also between two rooms. Locals stated that the word '*girellik*' is generated in time by corruption of the word 'kiler' which means cellar, however today, none of them in studied houses are used as cellar. Today, most of them serve as a wet space.

Balcony

Balcony is a semi-open space on the first floor of the house and it is directly connected to the interior '*sofa*'. In one of the studied houses, the balcony also provides the connection between the staircase and the '*sofa*' like a 'gezenek' while in some houses, the balconies are located directly opposite to the main entrance to the first floor (**Figure 45**). Both of these semi-open spaces are carried by wooden beams with 15-20 cm diameter protruding from the mud brick masonry wall.

'*Gezenek*'/ a Transition Area

'*Gezeneks*' are located adjacent to the houses and create a semi-open and narrow circulation area, connecting the staircase and the main entrance of the living area on the first floor (**Figure 45**). In some cases, there are also washbasins and toilets located on '*gezeneks*'.

Figure 44: *'Girellik' parts of three different houses. First photo, taken by Arsav, is from the 'Molla Hüseyin House' (Kurtulus et al., 2017) shows the original 'girellik'; the photo in the middle, taken in the H4, shows a 'girellik' part used as a kitchen; the photo, taken in the H6, shows a 'girellik' used as a bathroom.*

Figure 45: *The first and the second photos, taken in the H18, show the 'gezeneks'; the last photo, taken in the H11, shows the balcony, reached via a staircase.*

Wet Spaces

According to interviews made with locals, original toilets had been located in gardens or courtyards away from the traditional mud brick houses until the when wet rooms were built in the houses (**Figure 46**). Furthermore, except for a space called '*güsulhane*', originally there had not been any space used as a bathroom in the houses. All toilets and bathrooms were created later as separate areas by dividing original rooms or adding extra masses to the houses. Moreover, one of the rooms or '*sofa*s' in the houses are used as a kitchen with the addition of water installation. These interventions on the traditional mud brick masonry houses in Ağlasun and the current wet room conditions are discussed in the following chapter.

Figure 46: *The photo, taken in the H6, shows the additional* toilet *constructed on the 'saçak'; the photo, taken in the H16, shows the additional* toilet *constructed adjacent to the 'sofa'.*

Spaces Located on the Mezzanine

Mezzanine floors are located between the ground floors and the first floors in the main building of the traditional houses in Ağlasun. One staircases, starting from the ground level, provide direct access to the mezzanine floors before reaching the first floors of the houses (**Figure 47**). According to Kurtuluş et al. (2017), spaces located between the ground floor and the first floor are called '*yer evi*' and mostly exist in '*Ağa Evi*' which is a house of a rich and prominent person in the village.

The two out of 19 studied houses (H7 and H19) involve mezzanines with approximately 2 m ceiling height. In both cases, the plan organizations of the mezzanines are similar with the plan organizations of the upper floors. Rooms in the mezzanine of the H7 had been reserved for the household employees and then they were also used for some gastronomic productions in an adequate amount for dwellers of the house (**Figure 48**). However, two separate spaces in the mezzanine of H19 are used as service areas for the furnace. But today, spaces on the mezzanines in both houses are used as storages.

Figure 47: *Photos, taken in the H19, show the entrance and the interior space of the mezzanine..*

Figure 48: *Photos, taken in the H7, shows the spaces on the mezzanine. The photo on the left and the one in the middle shows the room which was used as a guestroom and production space. The photo on the right shows the entrance door of the room used as a storage.*

Spaces Located on the Ground Floor

Circulation spaces, barns, storages and workplaces are spaces located on the ground floors with 2.80 m average ceiling height.

Circulation Spaces

These spaces provide connection between the outside, barns and storage areas on the ground floors but in addition to that, in some cases, they are also used as spaces for keeping some goods and animals inside for a while (**Figure 49**).

The top layer of the ground floor is a made up with rammed earth in general. Moreover, use of stone pavement on the floors was observed in three houses, that is, H2, H8 and H19. So, these spaces are also called 'taşlık' because of their stone paved floors. It is also possible to observe ground floors consist just barns and storages which are located one after another.

Figure 49: *The photo on the left, taken in the H15 shows the circulation space located under the closed 'sofa'. The photo in the middle, taken in H13, shows the circulation space located under the open 'sofa'. The photo on the right, taken in the H7, shows the flooring of the 'taşlık' space.*

Barns

A barn is one of the two main spaces, where cattle and goats are kept on the ground floors. Forms of the barns, which are composed of single and large spaces, are rectangular prisms. They are accessed through single-winged and mostly poor quality wooden doors from circulation spaces.

There are two defining elements for the barns: The first is the small openings on one of the exterior walls in order to put the hay in the barn directly from the street. The second one is the feeder (**Figure 50**).

In most of the houses, the first level of the flooring over the barns is composed of rammed earth because this earth layer within the flooring system provides both thermal insulation and prevents the odour of the barn reaching the living spaces on the first floor to some extent.

Figure 50: *The first photo, taken from the H4, shows the small opening to the barn from the street; the second photo, taken from the H3, shows interior space of the barn.*

Storages

A storage is another main space on the ground floor. Like barns, the form of single and large storages is rectangular prism and they are accessed from the circulation space through single-winged and usually poor quality wooden doors. Originally there had been windows in the same size with the ones located on the upper floors, on their exterior walls. However, almost all of these windows were closed later.

Hay, wood, dry foods and unused household items are often stored in these areas. Thus, these spaces are also called '*odunluk*' or '*samanlık*' by the local people (**Figure 51**).

Figure 51: *The photo on the left from the H15 shows the storage area called 'samanlık'; the photo on the right from the H14 shows the storage area called 'odunluk'.*

Workshop

In addition to those mentioned above, there is also a space on the ground floor of the H8 with a fireplace, wide windows and a wooden shelf which were observed mostly in the rooms on the first floors of the houses (**Figure 52**). This space was used as a workplace.

In addition, it was observed that some of the spaces on the ground floor, which are usually used as storages at present, also include a fireplace, niches, '*terek*' and wide windows. This shows that they were originally workshops located on the ground floor. Workshops on the ground floors were observed in H8, H9. In addition to that, , there is a furnace on the ground floor of H19, which was used by all villagers, and '*gülhane*' which was a space used for the rose water production for many years (**Figure 53**). Today these spaces are not in use.

Figure 52: *The photo from the H8, shows a space located on the ground floor as a workshop.*

Figure 53: *The photos from the ground floor spaces of the H19. The photo on the left shows the furnace and the photo on the right shows the 'gülhane'.*

3.1.1.2. A Separate Housing Unit

As it was mentioned before, it was seen that some dwellers built another housing unit into their parcels afterwards. This is because there is a kinship relation between dwellers, who live in the separate houses located in the same lot. In current situation, if the housing unit, built later in the parcel of an already existing traditional house, is also constructed with traditional materials and construction techniques. It also has its own auxiliary buildings and separate entrance form the street to the lot. One of these examples, which was constructed later adjacent to the H9 located in the courtyard, is H10. In addition to this, there are two examples, which are not traditional buildings and located in the gardens of H2 and H8 but completely separate from the them (**Figure 54**).

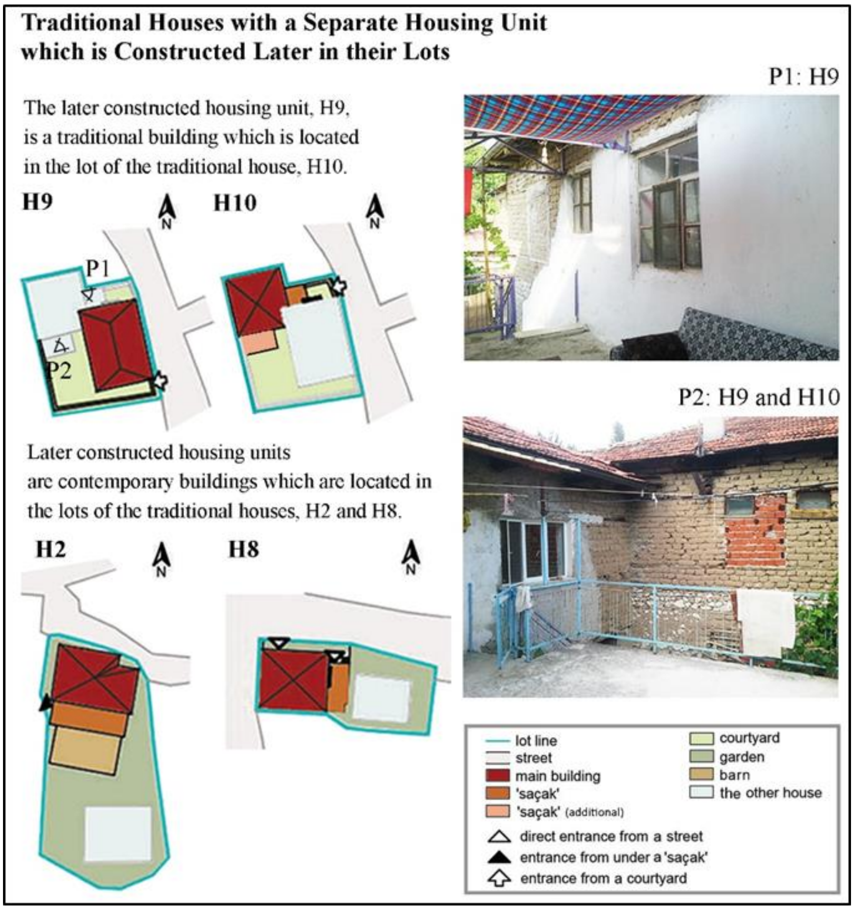


Figure 54: *Traditional houses with separate housing units that were constructed later in the same lot.*

3.1.1.3. Auxiliary Buildings

Characteristics of the spaces defined by auxiliary structures such as '*saçaks*', barns, storages, pens and greenhouses and the architectural elements in these spaces are described as following.

These are structures that vary according to the dwellers' production based lifestyle. While some of them were built at the same time with the main buildings, some of them were built subsequently according to needs of dwellers.

‘*Saçaks*’

Although in the architectural terminology, athe word ‘*saçak*’ means ‘eave’, its use is different for the traditional Ağlasun houses. In Ağlasun, the term ‘*saçak*’ is used for a separate mass which is constructed adjacent to traditional houses (**Figure 55**).

The flat top layer of the ‘*saçak*’ structure is similar to the structure of original flat roofs of the traditional houses, which are called ‘*kara dam /düz dam*’. This part consists of ‘*dövers*’ (wooden beams), ‘*mertek*’ (girder), ‘*pargı*’ (branches), ‘*hasır*’ (mat) and moisturized soil that is compressed with a ‘*yuvga*’ stone. This top layer of the ‘*saçak*’ is carried by exterior stone masonry walls and timber posts located in the space surrounded by these walls. ‘*Saçak*’ structures started to collapse over time because of neglect and poor maintenance, and then the dwellers demolished them totally and built reinforced concrete ones in their stead. Among the 19 houses studied, the original '*saçak*' structures are seen only in the houses, H4 and H7.

On the ground level, the space defined by a ‘*saçak*’ structure serves as a circulation space and a temporary storage. The staircase, giving access to the upper floors, is also constructed in this space, adjacent to the main building (**Figure 56**). Most of these stairs are made of steel or reinforced concrete , and are not authentic, even if they are located in the spaces defined by original ‘*saçaks*’.

Moreover, in some cases such as H2 and H7, there are single spaces inside ‘*saçak*’ structures, where separate compartments were formed by timber posts. These compartments are used for storing wood and farming products However, in the H4, there is a section separated by a timber-framed wall and used as a barn. Similarly, in H1, there is a section separated by a hollow brick wall and used as a storage.

In addition to these, the top level of the ‘*saçak*’ structure is same with the level of first floor or mezzanine of the houses. Dwellers use the area on the ‘*saçak*’ for some house works such as drying fruit.

On the walls of the authentic ‘*saçak*’ structures, defining a closed space, there is an entrance door which is also similar to the doors providing connection between the street and the ground floor of the main buildings. However, most of them are not authentic wooden doors but made of steel (**Figure 57**). Suchlike, window openings on the original ‘*saçak*’ structures are similar in size to the ones on the walls of the storages located under the main building.

Figure 55: *The first photo shows the surface of the original ‘saçak’; the second one shows the relation between the ‘saçak’ and the main mass of the house; the third one shows the layers of the ‘saçak’ structure; the fourth one shows the ‘yuvga’ stone. All photos are from the H4.*

Figure 56: *Two photos from the H5 show the 'saçak' that is constructed with reinforced concrete and the circulation area built with hollow bricks beneath the 'saçak' structure. The photo on the left shows the window and door of it and the one on the right shows the circulation space located under the 'saçak' structure.*

Figure 57: *The photos from the H4 show the authentic entrance door of the original 'saçak' and views from inside of it.*

Barns

These are single-storey additional buildings composed of one space and constructed adjacent to the '*saçak*' but distant from the main buildings in order to keep animal odour away from the living areas in the main buildings. They are constructed with mud brick masonry or reinforced concrete and hollow bricks. The access is provided from the circulation area defined by the '*saçak*'. These structures were observed in two houses, H1 and H2.

The doors of the additional spaces having the function of barn and storage are similar to those that can be seen on the ground floors of the main buildings. These are also single-winged wooden doors. However, the openings on the walls of barns called '*samanlık*', which were constructed later, are wider than the those on the walls of the barns located on the ground floor of the main building (**Figure 58**).

Figure 58: *Windows of the barns which are constructed additionally adjacent to 'saçak' structures.*

Storages

Like the additional barns storages are also single-storey buildings composed of a single space and constructed adjacent to '*saçaks*'. It is observed in the H18 that a single-storey structure, which is similar to the barns mentioned above in terms of its location and construction system, is used as a storage. It is also observed in H11 that an additional storage is constructed separate from the '*saçak*' and main building (**Figure 61**).

Pens

They are poor quality small structures defining a single space used for keeping sheep (**Figure 62**). They are mostly constructed with materials such as wood, nylon, wire and hollow bricks. They might be located adjacent to the main structure or separately within the parcel. They were observed in the gardens of three houses, H3, H5 and H6.

Greenhouse

It is an additional semi-cylindrical structure, constructed with iron bars and nylon covering in order to grow various vegetables. It is observed in the garden of the H15.

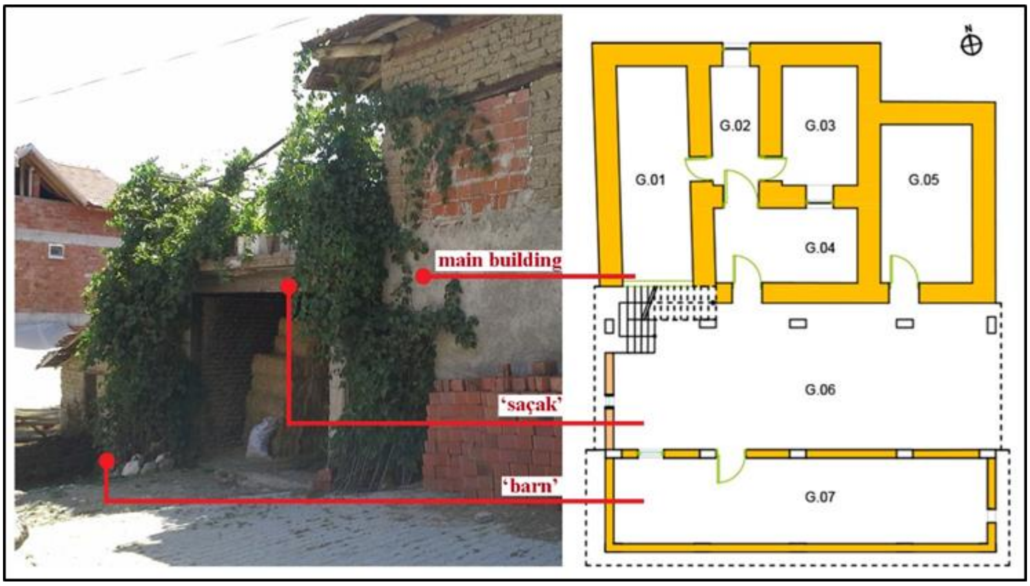


Figure 59: *The photo and the ground floor plan of the H2; the relationship between the additional barn, 'saçak' and the main house.*

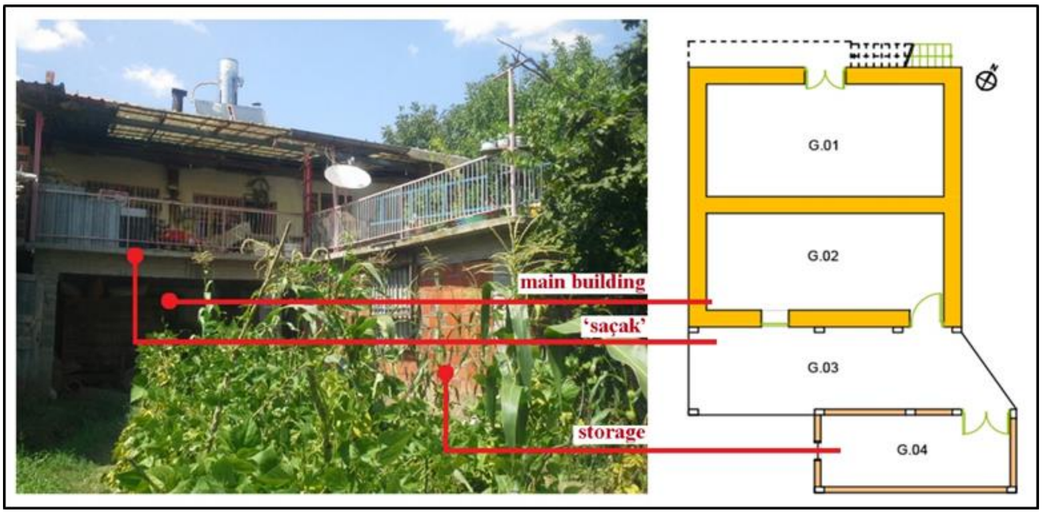


Figure 60: *In the photo and the ground floor plan of the H18; the relationship between the additional storage, 'saçak' and the main house.*

Figure 61: *The photo, taken from the H11, shows the additional auxiliary building used as a storage.*

Figure 62: *The photo on the left from the H15, shows the greenhouse; the photo, taken in the middle from the H6, and the photo on the right from the H11, show the pens.*

3.1.2. Arcitectural Elements

Under this heading, the locations and functions of the architectural elements belonging to the main building are explained. These elements are respectively, stairs, doors, windows, "*samanlık*" openings, "*ocak*", "*terek*", "*yüklük*", "*şerbetlik*", "*gusülhane*" and niches.

Staircase

Access between the ground floor and the upper floors are provided by the staircases which are usually located adjacent to one of the exterior facades of the houses (**Figure 63**). In majority of authentic wooden staircases first few steps are built with cut stones. They are always located outside of the houses and if there is a mezzanine in the house, it is reached via the same staircase.

Figure 63: *The photos from the H11, H15 and H19; wooden staircases which reach the 'gezenek', the 'balcony' and the 'sofa' on the first floors.*

Doors

In traditional Ağlasun houses, the doors vary according to their locations, intended uses and sizes. Accordingly, there are six types of wooden doors: courtyard doors, entrance doors to the '*saçaks*', ground floor entrance doors, doors on the mezzanines, first floor entrance doors and first floor interior doors (**Figure 64, Figure 66**). Although there are differences in terms of the materials and workmanship, the repetition of certain types can be seen in different houses, especially in their interior spaces. Detailed information about the types and structures of wooden doors encountered in traditional houses is given within the scope of the construction techniques of the Traditional Ağlasun Houses.

Figure 64: *On the left, the entrance door to the ground floor of the main building in the H15; on the right, the entrance door to the courtyard of the H7.*

Figure 65: *On the left, the entrance door to the first floor of the main building in H15; on the right, the entrance door to the first floor of the main building in the H4.*

Figure 66: *On the left the door of a room on the mezzanine floor in the main building in the H7; on the right, an interior door to a room from the 'sofa' in the H15.*

Windows

Like the doors, windows of the traditional houses in Ağlasun differ according to their positions, intended uses and sizes. Although there are various window types, it was observed that certain types were repeated in different houses (**Figure 67**). It is possible to specify these varieties as windows on the walls of the storages located on the ground floor of the main building, windows on the walls of the mezzanines, windows on the exterior walls of the spaces on the first floors and the interior windows that provide visual connection between the rooms and a '*sofas*' (**Figure 68**).

Unlike doors, interventions to windows implemented by dwellers are frequent. Examples of such interventions include change of material, closing the windows on the entrance floors, extending the window openings on the first floors, and opening new windows on the mud brick walls for ventilation. Detailed information about the types and structures of wooden windows encountered in traditional houses in Ağlasun is given within the scope of the construction techniques of the Traditional Ağlasun Houses.

Figure 67: *The most frequently used original window types. The image on the left is produced by utilizing the study 'Understanding a Historic Rural Landscape in Relation with an Archaeological Site: Ağlasun/ Sagalassos'*[12]*; the photo in the middle is from the H8; the photo on the right side is from the H15.*

Figure 68: *On the left, the window between the room and the closed 'sofa' in the H1; the image, produced by utilizing the study 'Understanding a Historic Rural Landscape in Relation with an Archaeological Site: Ağlasun/ Sagalassos', shows the windows between the room and the open 'sofa'; the photo from the H4, shows the opening called 'samanlık'.*

[12] For more information about the source, please refer to the 'Methodology and Structure' on page 9.

‘*Samanlık*’/ an Opening on the Wall

In each barn, there is a 50-60 cm wide and 65-75 cm high small opening on one of the exterior walls that is used to put hay inside directly from the street. These openings are called ‘*samanlık*’ (**Figure 68**). Most of them have a wooden pen. Except for these windows and the entrance doors, usually there are not any other opening on the walls of the barns located on the ground floor of the main buildings.

‘*Ocaks*’/ Fireplaces

‘*Ocak*’ is located in almost every room on the first floor of the houses (**Figure 69**). They were originally used for cooking and heating purposes but now they are not used anymore except for the ones in the houses H8 and H15. They were usually constructed in the interior surface of mud brick masonry walls without causing any projection on the exterior. The openings of fireplaces measure approximately 90-110 cm in width, 120-150 cm in height and 45-60 cm in depth. Interior spaces of the fireplaces also plastered up to a certain level (generally up to 1.5 height from the ground) with mud or lime-based plaster before white wash application as the final finishing coat. Some of these traditional fireplaces have an ornamented wooden board called '*yaşmak*' whose function is preventing spread of ashes and dust to the room.

***Figure 69**: Fireplaces with a 'yaşmak' having a different from and ornamentation from the H15 and H13.*

'*Tereks*' / a Shelves

25-30 cm wide wooden shelves, called '*terek*' by locals, surround the walls of rooms (**Figure 70**). Although their function is to hold variety of kitchen utensils, including plates and dishes, they also exist in the rooms which are not used as kitchen. Similar to the fireplaces, which were observed in many rooms in the houses, the '*tereks*' also reveal that each room with its original spatial potential was also used as a kitchen in the past.

***Figure 70:** Tereks on the walls of the H15. The photo on the left is from the space used as a kitchen while the photo on the right is from one of the rooms.*

'*Yüklük*' / a Traditional Built-in Cupboard

There are built-in wardrobe called '*yüklük*', which are used to store mattresses, pillows, quilts as well as clothes, in traditional rooms (**Figure 71**). In some cases, the area between two walls, constructed with timber frame structure with 'bağdadi' covering system, is also evaluated as '*yüklük*'. In one example, there exists a wardrobe opening with a door to put in or out items and it can be used by the rooms, located both sides of it. However, in another example, there is a timber-frame wall on one side of the '*yüklük*' and there is no opening on this wall to use it while at the side of the room that the '*yüklük*' serves for, unlike the other example, there are wooden pens extending from one side wall to the other. Therefore, also it is possible to see wooden ornaments on them. These decorations are especially found in the wooden niches which are located as part of the '*yüklük*' door or located both sides of an '*ocak*'.

'*Şerbetlik*'/ Small Shelves

Moreover there are small shelves called '*şerbetlik*' within some wooden niches as a part of the '*yüklük*' (**Figure 72**).

'*Gusülhane*'/ Ablution Cubicle

The 1- 1.5 square meter part of the '*yüklük*' is called '*gusülhane*' and is used for performing ablution (**Figure 73**).

Niches

Niches are functional openings in the mud brick masonry walls and they are seen mostly in rooms located on the first floors and rarely in the workshops and circulation spaces on the ground floor. They are small spaces with 45-100 cm width and 60-120 cm height. They are used as storage for various properties and some of them, located on the first floors, have wooden pens. Moreover it was also observed that there are niches created with wooden elements on both sides of '*ocak*s' (**Figure 74**).

Figure 71: *On the left, the 'yüklük' in the H7 which serves to just one room; on the right, the 'yüklük' in H15 which serves to the rooms located both side of it.*

Figure 72: *'Yüklük' with 'şerbetlik' and 'niche' in the H7 and H5.*

Figure 73: *'Gusülhanes' located on one sides of the 'yüklüks' in the H15 and H4.*

Figure 74: *Niches in one of the rooms located on the first floor of the H3; the niches on the wall facing to the circulation area on the ground floor of the H16.*

3.1.3. Characteristics of the Facades

It is possible to observe some common features on the facades of the traditional Ağlasun Houses. First of all, except for two houses, which have mezzanines, all studied traditional mud brick masonry houses are two storey structures (**Figure 75**). Second, there are no projections except for the 'sofa' of the H19, a toilet, a balcony and a '*gezenek*'' (**Figure 76**). Finally, in the current condition, the roofs of the houses are not the original earthen flat roofs, but hipped or gable roofs.

Figure 75: *The photo on the left from the H13, shows the two storey main building with the open 'sofa' and the staircase on its courtyard facade; the photo on the right from the H19, shows the main building with mezzanine and the closed 'sofa' constructed as a projection.*

Figure 76: *The photo on the left from the H11, shows the toilet located on the facade facing to the garden and the photo on the right from the H15 shows the balcony on the facade facing to the street.*

The visibility of traditional construction techniques and materials on the facades of the buildings is one of the common features for many traditional houses in Ağlasun. The analysis on this construction techniques, which are stone masonry, mud brick masonry and timber frame construction with '*bağdadi*' covering, are included in the second part of this chapter. Although most of the houses were not plastered when they were built, the mud brick masonry walls have remained for many years. But over time, partial material losses and surface degradation have occurred on the exterior walls. Therefore, when dwellers have the opportunity, they apply plaster on the facades of their houses (**Figure 77**).

Figure 77: *The photos from H4, H15 and H9 show partial plaster on their facades.*

The types of entrances with many doors and stairs have effect on the facades. Furthermore, there are '*saçaks*' or courtyard walls located next to the street facades of some houses. Accordingly, the four main entrance types described are the entrance from courtyard, direct entrance from street, entrance to the space defined by a '*saçak*' and entrance from garden (**Figure 78**).

The original wooden doors and windows vary in size depending on their location, but some of them are commonly seen in different houses. The courtyard doors are wide and double-winged wooden doors. It is possible to see a double-winged door, a single-winged door or more than one single-winged doors on the facades of the ground floors. Moreover, the entrance doors on the first floors are double-winged wooden doors with glass panels on their upper parts.

Windows are other architectural elements affecting the facade character. On facades of the ground floors there are mostly no windows except for the small openings called '*samanlık*'. Existing ones are closed in most cases. The locations of the windows on facades of the first floors, especially facing the street, are symmetrical and this is an effect of the floor plan organization of the houses constructed during the recent period. More information on doors and windows is given in the second part of this chapter.

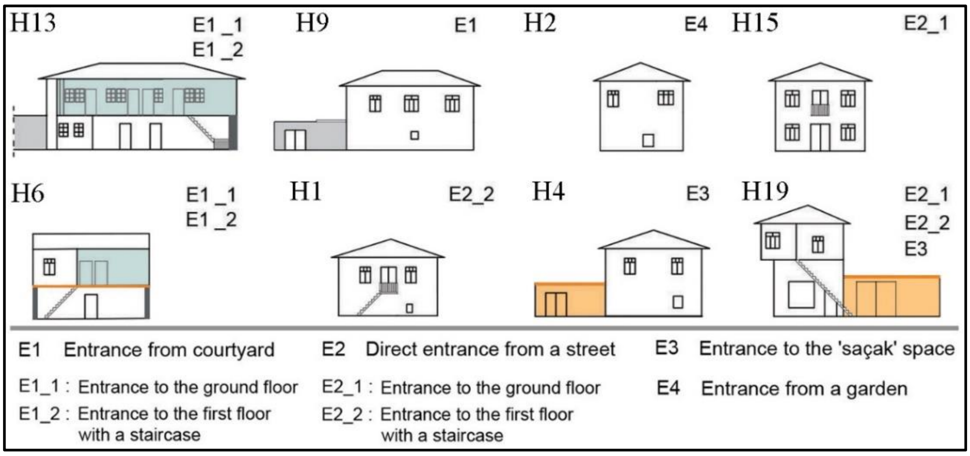


Figure 78: *Various arrangements of the doors and windows on the facades and the different way of entrances to the main buildings.*

3.2. Materials and Techniques Used in Construction of Traditional Mud Brick Masonry Houses in Ağlasun

Within the aim of gathering information about the construction techniques of Traditional Mud Brick Masonry Ağlasun Houses, researches were done during the site survey by taking necessary measurements, doing sketches and taking photos. Moreover, most of the information about construction techniques, material use and local names of some materials and structures were obtained in virtue of informative conversations during the survey with Mustafa Onaç who is one of the masters on construction techniques of traditional structures in Ağlasun. Furthermore, interviews, previously made with different masters in Ağlasun within the scope of another study, are also included in this section.

3.2.1. Construction Materials

Stone, mud brick, timber, mud based mortar and plaster are main local construction materials, used in the most of Traditional Houses in Ağlasun. Although the amount of the usage of these materials in the construction is different in each house, mud brick is the most commonly used material compared to others. In addition to these, in some cases fired clay bricks are also used in the stone masonry walls.

On the other hand, as a consequence of later interventions, some contemporary construction materials are also seen in the traditional houses in Ağlasun. These are concrete, hollow bricks, briquette, aerated concrete blocks, ceramic tiles, screed, steel sheets, cement plaster, lime plaster, wrought iron, PVC and French roof tiles.

In this section, the areas of usage of the traditional building materials are explained.

Stone

Various types of stones were used for different purposes in the Traditional Ağlasun Houses,. First, rubble stones and rough cut stones are mostly used for the foundation walls and ground floor walls at least up to the sub-basement level (**Figure 79**). Second, different kinds of stones are also used as bases under the timber posts and as the first few steps of the wooden staircases. Similarly, in some houses the use of spolia, historical architectural fragments taken out of their original context and reused in a different context, is observed as a part of stone masonry wall or a base stone under the timber posts or a part of a staircase (**Figure 80**).

'*Köğke*' is a kind of soft stone which is used as cut stone blocks on the upper levels of the walls but it was not seen among the nineteen houses studied.

'*Helik*' stones, which are small in size, are used as an infill material over the door openings and over and under the window openings.

Figure 79: *From the left to the right: rubble stone masonry (H3); cut stones at the corners of the stone masonry part of the wall (H15); 'helik' stone as infill material over a door opening (H7); 'helik' stone usage as infill material under a window opening (H9).*

Figure 80: *From the left to the right: the stone masonry with 'Köğke' stone; use of spolia as a step of the staircase (H19); use of spolia as a part of stone masonry wall (H13).*

Mud Brick

Mud brick is the most commonly used construction material of the Traditional Ağlasun Houses. It is used for the construction of the masonry walls of the ground floors, the mezzanines and the first floors of these houses.

Red clay soil obtained from the deposits in Bala, Kum and Hamam neighbourhoods were used in of mud brick block production in Ağlasun. Although the region receives rainfall substantially especially during the winter, most of the traditional mud brick houses have been able to endure approximately for sixty years till today without external plaster. So, it is possible to deduce that this points to the high durability degree of the mud brick blocks and good quality of the soil. However, it was observed that there are also erosions and deformations on the surfaces of the mud bricks because of being directly affected by the climatic factors.

According to the information obtained from Mustafa Onaç, a local builder in Ağlasun, there are certain stages of the production process. This is also confirmed by the information acquired from written sources, which are mentioned within the previous chapter in this study. Moulding process gives a block shape to the mud brick mixture via wooden moulds. Local people call this process '*kerpiç kesmek*' which means 'cutting mud brick'.

Clay Brick

The use of clay bricks can be seen within the stone masonry walls of the ground floors of some traditional houses in Ağlasun. In some examples, it is possible to observe an intensive use of this material on masonry walls while in some houses, it is only used in order to create patterns or signs on some parts of the walls. However, it was also seen in the studied houses that this material is occasionally used for filling some small spaces between the stone masonry walls.

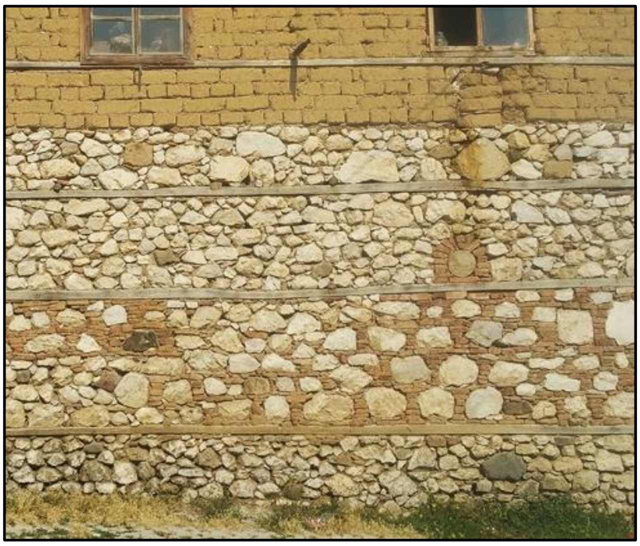


Figure 81: *The use of clay brick in the masonry wall of a traditional Ağlasun House.*

Timber

The usage area of timber is quite wide. Apart from its use in timber-framed walls, there are vertical and horizontal timber structural elements such as timber posts, wooden beams named ‘*döver*’, girders called ‘*mertek*’, and lintels called ‘*hatıl*’. In addition to these, timber is the main construction element of the free-standing roofs and original architectural elements such as staircases, windows, doors, ‘*yüklük*s’, ‘*ambar*s’, ‘*yaşmaks* and some niches. Floor and ceiling coverings of mezzanines and first floors are also made up with timber.

Timber posts **(Figure 82)** are load bearing elements located on the ground floor to carry the weight of the first floor and the load on it; and also, they are used in the ‘*sofa / tahtalık*’ section of the first floor to carry the weight of the roof. A single large stone is placed under the timber post as a base between it and the surface it stands on. In general, the cross-section of timber posts are round measure about 10-20 cm in diameter. They are usually debarked as a precaution for a probable insect infestation like all other structural timber elements.

The wooden beams are called ‘*döver*’ by local people. Their cross-sections measure around at least 25 cm in diameter. It is possible to see them under the ceilings of the ground floors or on the exterior facades of the houses. They carry the cantilevering parts of the first floors, such as ‘*gezeneks*’, balconies, original earthen ‘*saçaks*' and loads transferred from the girders (*mertek*) that is one of the structural elements of timber construction floorings. Loads on the wooden beams are transferred to the mud brick masonry walls which they are placed on. Cross-sections of girders measure 10-15 cm in diameter and they are placed at 25-35 cm intervals. As Salih Usta mentioned, wooden beams and girders that are used in the structure are produced from poplar (populus afghanica) tree which grows throughout Ağlasun. In the past, cedar and juniper trees were also used.

Lintels are other important horizontal structural elements which hold mud bricks on the masonry wall together and absorb lateral seismic inertial forces, mostly caused by earthquakes. The use of lintels in the masonry walls of the traditional houses in Ağlasun is applied systematically except for a few omissions in some cases. It was observed within nineteen houses studied that, lintels were placed in both mud brick and stone masonry walls at 80-150 cm intervals in the vertical direction from ground level to the roof. Their cross-sections measure between 4x5 cm- 8x10 cm in diameter. There are also examples that one lintel extends alongside the facade while in some cases, the two lintels are used tip to tip in order to supply continuity through the wall. This depends on the quantity of available material. There are two kinds of joining details at the corners of the orthogonal walls where the beams on the same level are located. The first one is to place one after the other, and the second is to connect the two by thinning their cross-sections. Sometimes there is also an additional piece of timber on them (**Figure 83**). The wooden tie beams, which are circular in section and in the same length with the width of the masonry wall and used to connect the inner and outer lintels at the same level of a wall, are called 'piştivan'.[13]

[13] While the term 'puştivan', which appear in the Ottoman architecture texts, referred to a short wooden beam connecting the beams to its basic grids, the term 'piştuvan' means a piece of wood that connects two beams to each other (Davulcu, 2015, p. 73).

Figure 82: *From left to the right, the timber posts carrying the 'sofa'; timber posts carrying the roof structure; timber elements of the flooring system named 'döver', 'mertek' and 'pargı' from bottom to top (H19).*

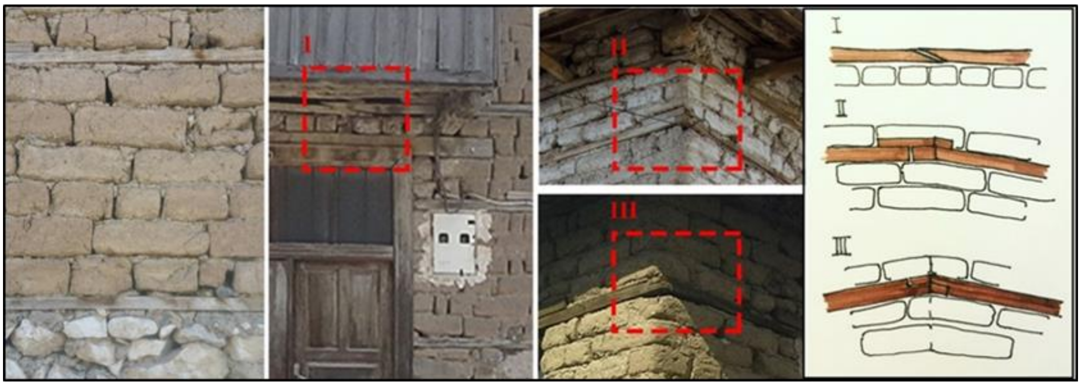


Figure 83: *First photo shows a part from the mud brick masonry wall; the last three photo and the sketch show the point of junctions of two lintels, called as 'hatıl'. Photos are from H15.*

Mortar and Plaster

As Mustafa Onaç mentioned the same mud-based mortar, the diluted mix of earth and hay, were used in both stone and mud brick masonry walls. However, especially after 1950s, lime plaster, the diluted mix of sand and lime, was started to be used rather than mud-based plaster. Because of lacking plaster, as well as abrasion on the surfaces of the adobe bricks on the exterior facades of the houses, loss of mortar also exists between their bricks.

At this point of the study, it is beneficial to mention about the interview which is conducted in 2016 by Prof. Dr. Neriman Şahin Güçhan with two participants namely Ebru Torun, the assistant director of Sagalassos Archeological Research Project, and Bekir Karaç, the local builder of traditional houses in Ağlasun because it is thought that the information, which the intervention contains about the mortar and plaster production, can be useful also in the context of the interventions that were planned for the rehabilitation of traditional houses. A relevant part of this interview, which was made in Turkish, was transcribed from the audio format and translated to English in order to include it in this study.

Bekir Karaç says,

''*If we build stone or brick walls, we mix 1 m3 of sand and 2 bags (50 kg) of hydraulic lime on the same day. We use 6-7 bags of fresh lime (24-35 kg). If we do plastering, we use 1 or 2 more bags and let the mixture stay for one day. But if we build walls, we do not let the mixture. We constantly mix and use it. At the same time, we add a bag of black cement to make the mixture harden more quickly. We use both slaked lime and powdered lime in production of plaster, whitewashing and mortar. Slaked lime has better qualities because its hardness is higher. To prevent it from burning under the sun, we water both slaked lime and powdered lime four times a day; once towards noon, once at noon, once in the afternoon and once in the evening. Sand should be clean, not grounded.*''

Ebru Torun says,

''*We don't use sand in the field, which is the Sagalassos archeological excavation site, because the sand here is clayey. If we use it, our mortar sometimes holds out, sometimes not. When the sand is clayey, its colour is nice pink but it doesn't make sense as hydraulic lime. So, we use broken pebbles.*

But Bekir Usta uses construction sand from a factory in Burdur or a quarry in Isparta. There is no river sand here, but there is in Isparta. We add gravel fracture, pumice or lime and tile powder to Roman mortar. They use tile dust in water-related places. If you add pumice, you make Roman cement which is very durable. In certain proportions, we put white gravel fracture, pumice (pozzolanic mortar) and extinguished and waited lime, which do not contain any cement. Pumice exists here because this region is volcanic. We mix it but not water it. We try not to wet the mortar. If you dilute the mortar too much, lime reveals up and cracks. When it is doughy, we cover it with linen so that it does not dry out easily. We also wet the stones to prevent the material from draining. First, we apply, then we break the surface with the back of the trowel because the more threaded, porous thing you leave on the surface, the better the mortar holds. Both the texture and durability of the mortar are better because the formed pits are large enough to eliminate the expansion caused by freezing.''

The facades of the houses are mostly not plastered, although the structure of the walls is the mud brick masonry. However, within time, dwellers have started to partially apply mostly cement plaster on the exterior surfaces of the exterior stone and mud brick masonry walls (**Figure 84**). Apart from these, original interior plaster, applied on both timber-framed walls and inner surfaces of mud brick masonry walls, is composed of respectively 2, 5 cm thick mud-based rendering coat and 0, 5 cm thick finishing coat. Finally, lime wash is applied as the last layer over these plasters. However, according to local people, finishing coat is applied with the mix of lime and cement before the lime wash especially during the construction of late period houses, constructed after 1950s. In some of the late period houses in Ağlasun, lime plaster was applied directly instead of mud based fine plaster.

Figure 84: *The first photo from H11, shows the 'bağdadi' covering system over the timber frame structure; second one from H4, shows the mud brick plaster on the 'bağdadi' covering; the last one from H2 shows the cement plaster application on the mud brick masonry wall.*

3.2.2. Construction Techniques

In this section, construction techniques of foundations; walls including stone masonry, mud brick masonry and timber-framed walls, floorings, ceilings, roofs and architectural elements such as doors and windows are described respectively.

3.2.2.1. Foundations

It was not possible to observe the foundation construction system of the traditional mud brick masonry houses in Ağlasun during the site survey. However, the information about foundations of these houses were obtained from the interview with the local builder Mustafa Onaç confirmed by the information in the literature. Onaç states that he built stone masonry foundation walls, consisting rubble stones and rough-cut stones, in the same thickness with the mud brick masonry walls, rising over these stone walls. This method is also seen in drawings on masonry walls of traditional Ankara houses (**Figure 85**). According to Onaç, foundation walls continue down from the ground level until it reaches the hard soil. In traditional structures in Ağlasun, the difference between the level of hard soil and the ground level varies between 80 cm and 1.5 meters.

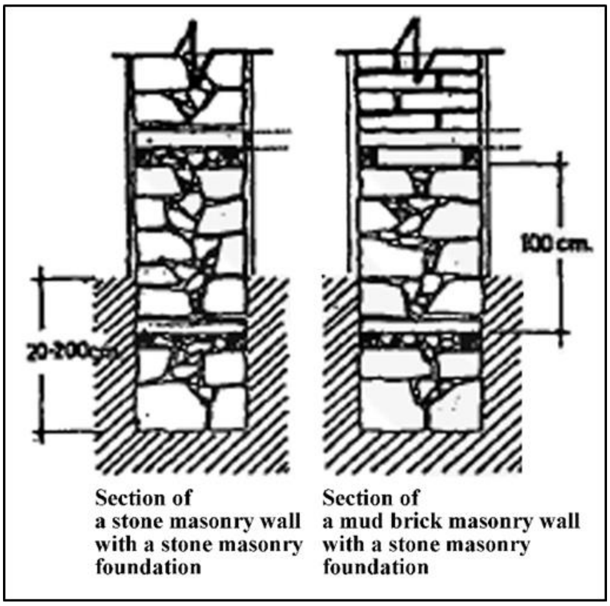


Figure 85: *Sections of stone masonry and mud brick masonry walls which continue in the same thickness under the ground level. The visual is taken from (Şahin, 1995, p. 180)*

3.2.2.2. Walls

Main local construction materials of the traditional Ağlasun houses are stone, mud brick and timber. The usage of these materials changes from house to house. Following observations were made on the 19 houses studied: mud brick over rubble stone up to a certain level (1), mud brick over rubble stone through all the ground floor wall (2B), and mud brick and '*bağdadi*' over rubble stone (4A) (**Figure 86**).

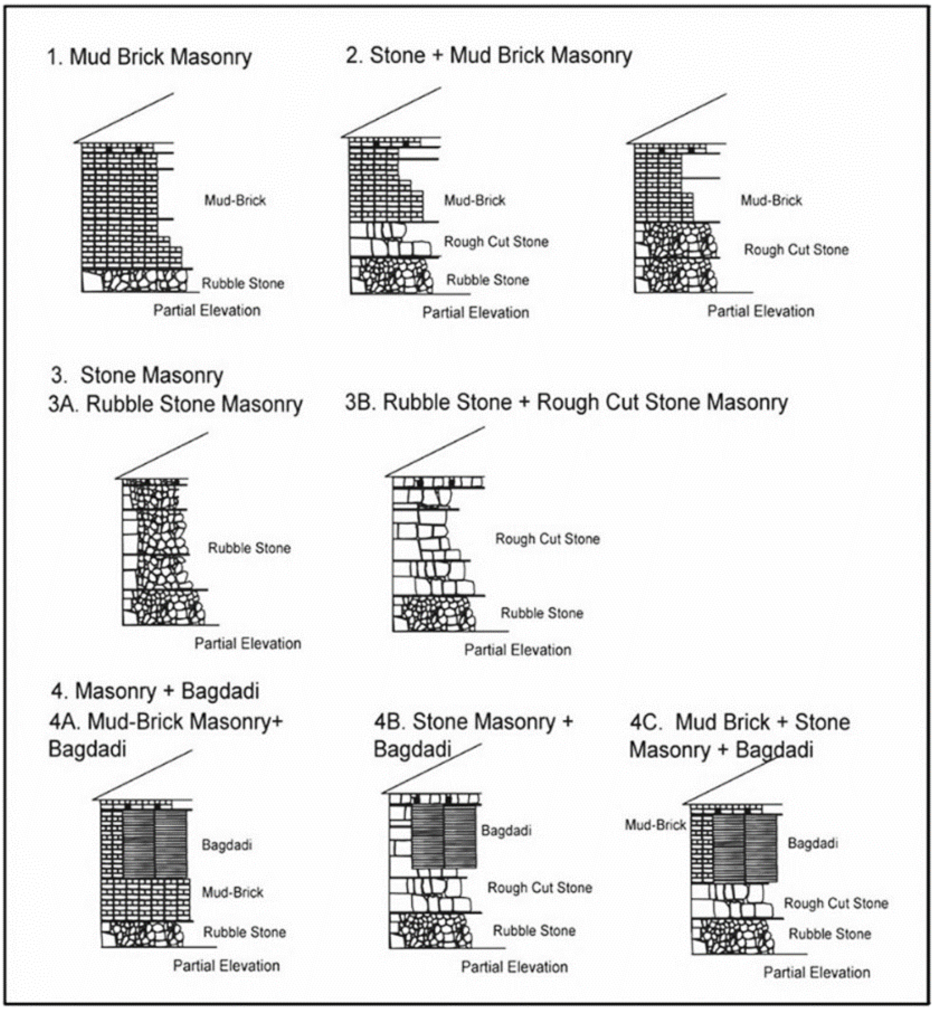


Figure 86: *Variations of construction technique (Kurtulus et al., 2017)*

Stone Masonry Walls

In all traditional houses studied, stone masonry construction system is used maximum up to 2 meters high from the ground level except for the H3 whose ground floor walls constructed entirely with the stone masonry system. Rubble stones are used in the construction of the core of the stone masonry wall while cut stones are generally used on the edges of the walls. '*Helik*' stones are small stones that are used between big stones on the walls.

Mud based mortar is used as a binder material between the stones. In most of cases, after the height of 1.5 meters from the ground level, first lintel (*hatıl*) is placed before the continuation of the wall again with stone masonry or mud brick masonry construction systems.

Mud Brick Masonry Walls

Kurtuluş *et al.* (2017, p. 615) states that according to the interview with construction foremen Emin Üre and Salih, the production of mud brick consists of two phases. Firstly, clayed earth is mixed with water and wheat hay successively. After that the mixture is left for two days to let it reach an appropriate density. Letting it dry after moulding operation is the second stage of the process. Foreman Salih said that in order to use mud brick production, the most appropriate clayed earth is red earth which is possible to find from Bala, Kum and Hamam neighborhoods in Ağlasun district. Foremen mentioned that the thickness of the mud brick masonry walls was 80 cm in the past, but this was reduced to 50 cm later. When putting up a mud-brick wall it is necessary to place a girder in every 1, 5- 2 meters to strengthen it against lateral forces such as earthquake. Placing of lintels in every 1.5-2 meters throughout the vertical direction of the mud brick masonry walls is very essential to make it more strength against lateral forces that generally occurs because of earthquakes.

Mud brick masonry construction technique is applied to construct load-bearing walls of the ground floor, mezzanine and the first floor. The mud brick masonry walls are built on the stone masonry walls, which start to rise from the foundation level, by placing lintels (*hatıl)*, between them (**Figure 87**).

These masonry walls consist of two different sizes of mud bricks called ‘ana’ and ‘*kuzu*’.[14] Joints with 1.5-3 cm width between these mud bricks, are filled with mud-based mortar that is more fluid phase of the same adobe mixture. In addition to these, the dimensions of some ‘*kuzu*’ bricks, used in the mud brick masonry walls of these 19 houses studied, are 10-12x15-20x30-40 cm.

In Ağlasun, the heights of mud bricks, called ‘ana’, varies between 10-13 cm; their width varies between 30-40 cm and the length varies between 28-38 cm. However, the 'half brick wall' type and the 'paşa wall' type, which are mentioned above, are not observed in mud brick houses in Ağlasun. ‘One brick wall’ type is used in the interior walls of the first floors of some houses. Because the internal walls are plastered, bricks could not be observed and this assessment is made by measuring thicknesses of these walls. Wall types that are mentioned above as ‘frenk örgü duvar’ (one and a half mud bricks) and ‘ana duvar’ (two bricks) are used for the exterior walls of the houses in Ağlasun.

As it is mentioned in the Chapter 2, types of mud brick masonry walls are named according to regulations of single blocks which also determine the thickness of the walls. Two types of them, ‘frenk örgü duvar’ (one and a half mud bricks) and ‘ana duvar’ (two bricks), were observed during the site survey thanks to non-plastered exterior walls of houses (**Figure 88**). The thickness of the mud brick walls of the 19 houses, examined during the field study, shows variety in both types of walls and size of the mud bricks. Mud brick masonry wall of one of these houses has 50 cm thickness. Moreover, 6 out of 19 houses have mud brick walls with 60-65 cm thickness; 3 out of 19 houses have mud brick walls with 70-75 cm thickness and the rest 7 houses have mud brick masonry walls with 80-85 cm thickness.

Moreover, it should also be noted that, the thickness of the interior mud brick masonry walls is less than that of the exterior ones. According to the measurement information taken from studied examples, if the house consists exterior mud brick masonry walls

[14] More information is given in the Chapter-2.

with 70-80cm in thickness, mud brick masonry walls, which constructed as interior walls in the same house, are 50-60 cm thick. Although there are exceptions, the houses considered belonging to the late period and also are also mentioned as Type 1 at the beginning of this section, have thicker mud brick masonry walls than those belonging to Type 2. Over time, the desire for large areas in the interiors and the use of contemporary heating devices instead of traditional fireplaces explain the decrease in wall thicknesses in time.

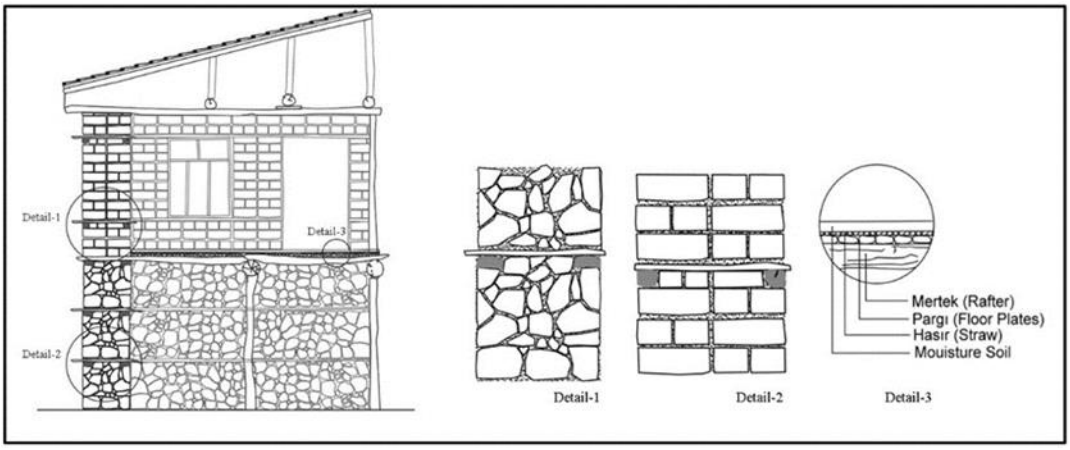


Figure 87: *System Section of a Typical Ağlasun House; Detal 1: Wall Section (Rubble Stone); Detail 2: Wall Section (Mud Brick); Detail 3: The Slab Section of 'Saçak' (Kurtulus, Asrav, Güçhan, & Altınöz, 2017)*

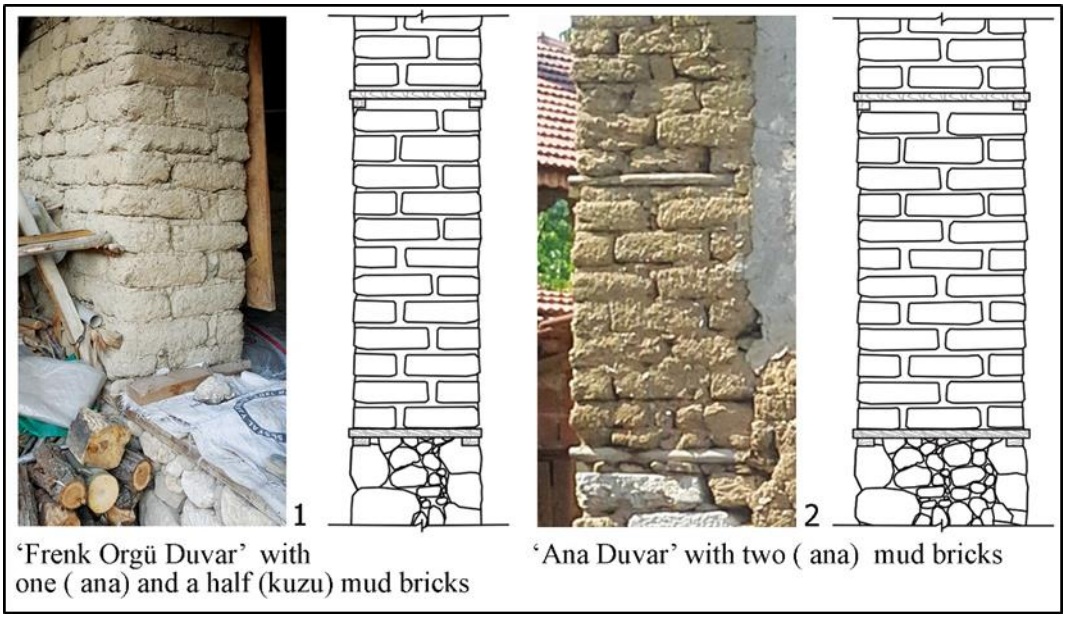


Figure 88: *Mud brick masonry wall types of traditional houses in Ağlasun. First photo is from H15 and second one is from H5.*

Timber-Framed Walls

Inner structure of timber-framed walls of 19 houses could not be examined because they were all in good condition. But the information about their construction systems and measurements of their structural elements were gathered from both conversations done with foreman Mustafa Onaç and the observations on these kinds of walls in some unused and devastated houses in the district (**Figure 89**).

These walls are usually constructed as interior walls between two rooms while in buildings with at least three facades constructed with masonry walls, there are also examples of a timber-framed wall used as an exterior wall of a single facade. The thickness of these walls are usually 13 cm. They involve 5-6 cm x10 cm timber studs. Their bases are nailed to the sole plate; their upper parts are nailed to the top plate and the ones, located adjacent to the mud brick masonry walls, are also nailed to the lintel in the masonry wall. These studs are located consecutively with 30-50 cm interspaces.

Depending on the builder, it is possible to observe diagonal braces and noggings that are placed between these studs though not always. On both sides of the studs, timber laths with the 1, 5 cm thickness, 3-6 cm width and 30-80 cm length are nailed at 2-3 cm interval between them. First, 2, 5 cm thick mud-based rendering coat then, 0, 5 cm thick finishing coat and finally lime wash are applied on these laths. This lath and plaster technique is called as '*bağdadi*'. However, in time, cement plaster has started to be preferred in wet spaces as its water resistance is higher than that of lime plaster.

Figure 89: *Examples of timber-framed walls with 'bağdadi' covering system.*

3.2.2.3. Floorings

Floor types of traditional Ağlasun houses vary according to the functions of spaces (**Figure 90**). So, in this part of the study, first, the types are classified under two groups which are ground floors' flooring types and upper floors' flooring types. Then, the materials, selected according to location and function of the spaces, are determinant factor for the generation of different floor system types according to the layers of them.

First floor type of the ground floors is composed of the floor finishing with mud. After levelling and smoothing the natural ground, a mixture consisting soil, in small quantity of hay and water is applied to the ground floor surface and pressed in order to provide the desired slope. The second type has the floor finishing with stone that causes the area to be named as '*taşlık*'. In this type, after the applications on the natural ground with the mud-based mortar, stones are inserted in it as a finishing layer.

On the other hand, there are three kinds of floor systems, belonging to the upper floors and they were observed during the interior study in the 19 houses. All these floor types exist in the H15, in which measured detail drawings were made (**Figure 91**).

Type l: From bottom to top, the elements used for the construction of the floor system, are as following. First, there are girders (*mertek)* with mostly10-15x15 cm in rectangular section. However, some of them are just round timber planks, which are not cut but are simply debarked. In order to transfer the weight on them to the mud brick masonry walls, end points of these girders must be placed on the wooden beams or to the lintels called as '*hatıl*'. Second one is branches without surface treatment (generally 3-8 cm in diameter). These branches are called '*pargı*' by local people (**Figure 92**). Third, rammed earth with a depth of 5- 10 cm is spread over on these branches. It is compacted with a trowel and provides thermal insulation between two layers. Moreover, there are timber laths, 5x5 cm in section, buried in the rammed earth and they are lined up with 30-40 cm distance between them. Finally, at the top of these layers, there are 2 cm thick, 8-10 cm wide and 100-120 cm long wooden floor covering boards which are laid on the timber laths in a perpendicular direction and nailed to them. In addition to these, in the spaces that are used only as kitchens, there are no wooden covering boards and timber laths under them and these floors ends with rammed soil surface. According to the dwellers, this is a kind of precaution against the possibility of fire due to the fireplace which is in use.

Type 2: This floor system consists just girders and wooden floor boards which are directly nailed on them. It is applied on the floors of spaces where heat insulation is not much needed such as '*sofa*' and the room that is described as a 'summer room' by the dweller of the H15.

Type 3: It must be indicated that this type is not the original floor system because it includes intervention by the dwellers. Like the previous one, respectively there are a girder, wooden flooring boards and rammed earth. Furthermore, there is screed or levelled concrete application directly on the rammed earth. In the example H15, 3 cm thick screed have been applied on the rammed earth finishing of the kitchen floor and the aim is again preventing the fire. Similarly, it has been also observed during the site survey that the levelled concrete with the thickness up to 8-10 cm is generally applied on floorings of the wet spaces to prepare for the placement of an alla turca toilet. Moreover, in some of these examples, there is also use of iron reinforcement in the additional concrete layer.

Figure 90: *First one is the timber floor board application; second is the threshold between floor finishing with screed and the original flooring cover with timber floor boards; the third is the floor finishing with just rammed earth; the fourth is the ground floor of 'taşlık' space; the last one is the ground floor of the barn with the rammed earth finishing. (H7)*

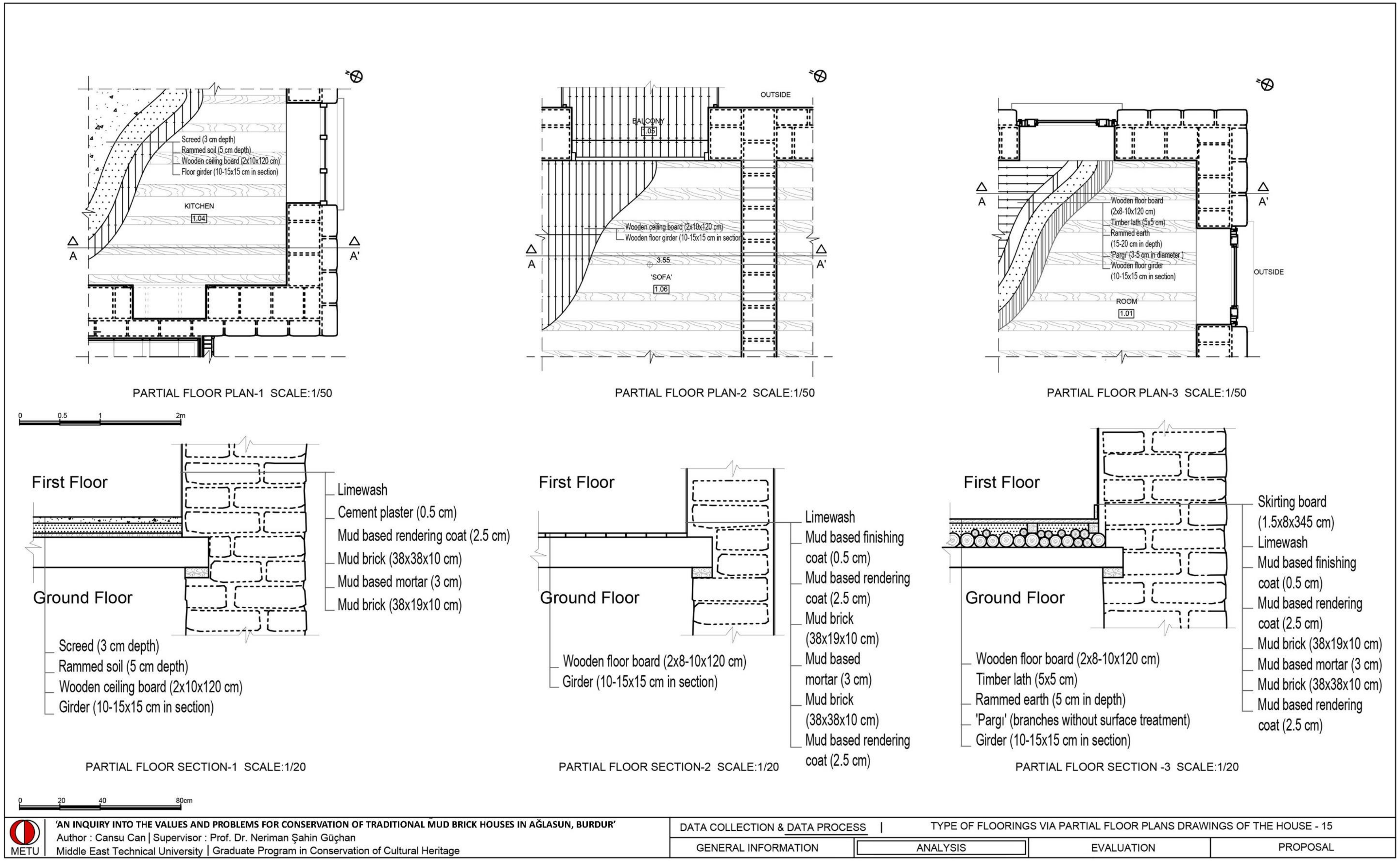


Figure 91: *Partial plan and sections of Floor Types (H15).*

3.2.2.4. Ceilings

There are no covering on the ceilings of the ground floors. It is possible to see the wooden beam, girders, sometimes '*pargı*' and flooring boards of the first floors (**Figure 92**). Ceiling boards are used on the mezzanines and the first floors of the houses and except for the changed ones, just one type is observed in all nineteen houses. Although there are decorative figures on the ceiling coverings of the houses belonging to the wealthy dwellers according to the dwellers, none of these were encountered in the houses involved in this study.

Besides this, on the first floor of some houses (H5, H7, H13), the roof space is visible because there is no ceiling over the '*sofa*'. In these examples, it was observed that the girders are used to hang some properties and also foods to dry.

Figure 92: *The first photo, showing the relation between 'döver', 'mertek' and 'pargı', is from the ground floor of the H14; The second photo, showing the relation between 'döver', 'mertek' and floor boards, is from the ground floor of the H15; the third one shows the 'sofa' without ceiling covering; the last two photos shows the same type of ceiling with different colours belonging to the rooms of H5 and H4 respectively.*

3.2.2.5. Roofs

It is also indicated by dwellers that structure of the original roofs, which is called '*kara dam*' by locals, were the same with the original '*saçak*' structure until 1950s. Then, the original earthen flat roofs were converted to gable or hipped roofs, which can be seen today (**Figure 93**).

In addition to these, it should be indicated that no roof space could be entered in the houses during the site survey. Even so, drawings of the ceiling and roof of the H15 (**Figure 95**) was made on the basis of the information, which are collected by observation of the roof space through the opening, existing on the ceiling.

Structural element of these roof are rafters, wooden beams, timber posts and battens under the french roof tiles. The rafters sit on the mud brick wall and the space between them is filled with one or two rows of mud bricks. This part is called '*eneflik*'.

Chimneys of some houses still exist and are in use. Their size depends on the width of the mud brick masonry walls with the traditional fireplaces. Shafts of the chimneys emerging from the roof structure are constructed mostly with briquette and their form is rectangular in cross-section.

Uncovered timber eaves with the width, approximately ranging from 50 cm to 60 cm, are essential parts of the roofs to protect the mud brick masonry walls from rain. Their width reaches to 100-120 cm if there is a balcony or '*gezenek*' located under them (**Figure 94**).

Figure 93: *The roof spaces of H13 on the left and H7 on the right.*

Figure 94: *Southwest facade of the H15. An example for the chimney and the eave, extending over the 'gezenek' on which the toilet is located.*

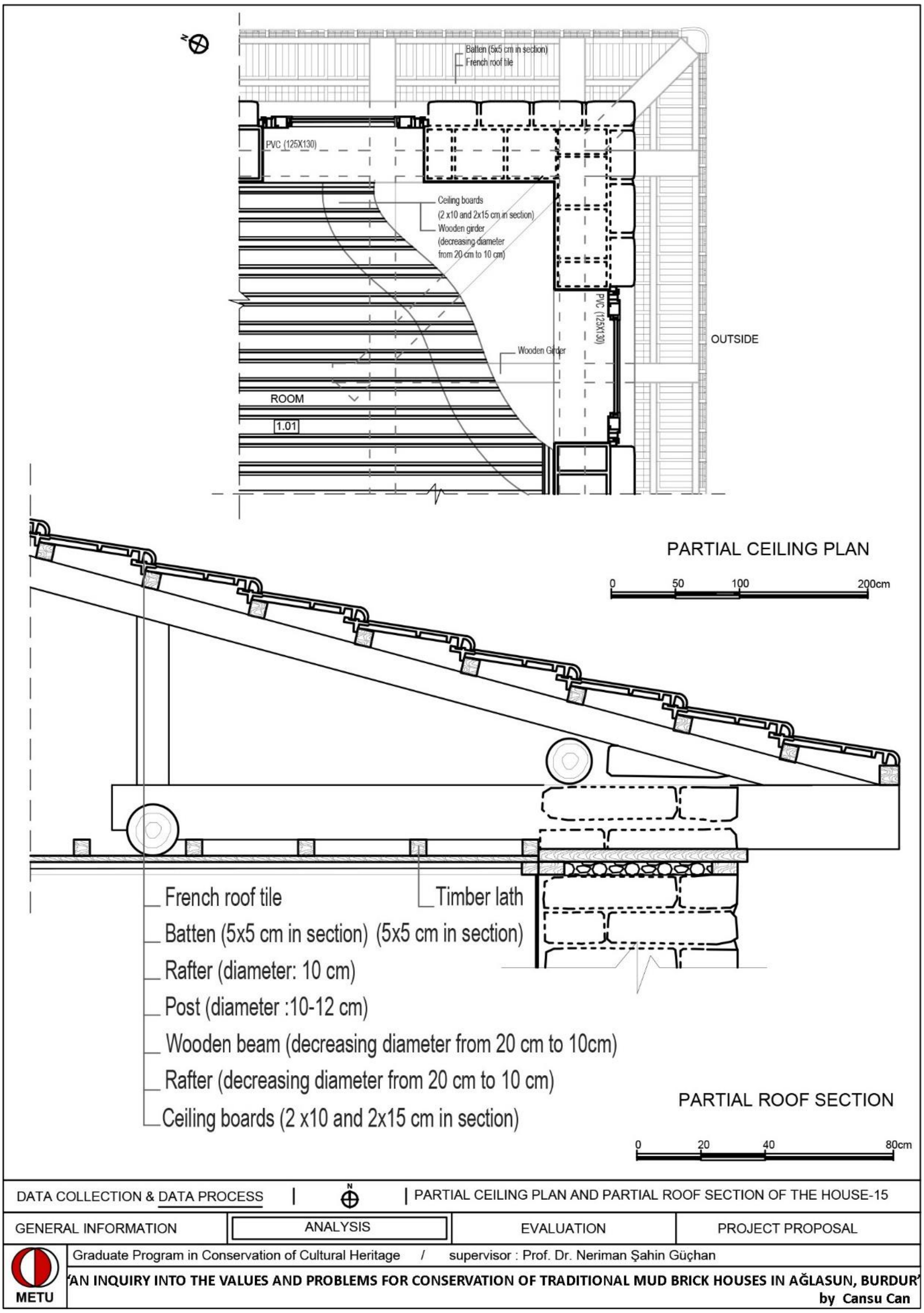


Figure 95: *Partial Ceiling Plan & Section from the Roof Structure of the House-15.*

3.2.2.6. Architectural Elements

Doors

It is possible to observe exterior and interior doors in both the mud brick masonry walls and the timber-framed walls, so all these timber-framed doors are grouped mainly according to their location such as courtyard entrance doors, ground floor entrance doors, doors on the mezzanines and doors on the first floors (**Figure 96**). Apart from that, their sizes are also taken into consideration.

First of all, 180-230 cm wide and 210-250 cm high wooden courtyard doors have double wings so that both cattle and some construction equipment can easily enter and exit. These wings consist of generally 2 cm thick timber planks placed in a vertical direction. They are hold together by 3 or 4 wooden piece with 5x5 cm size that are nailed behind them in a horizontal direction and these are fixed to the wooden elements acting as a door frame fixed to the bonding beams located on the masonry walls on both sides. Some courtyard doors have openings within wooden fencings at their top. Moreover, if the space located under the '*saçak*' is surrounded with walls and this space is also used as a storage or to access to the barn, the entrance door of these spaces are wide like the courtyard doors. Otherwise, they have separate entrance with the single-winged ordinary doors.

Secondly, most of the doors within the mud brick masonry walls supply direct connection between the street and the area located under '*sofa*'. While there are also single-winged ground floor entrance doors such as D14 (100 x 210 cm) and D15 (80 x 190 cm), the example for the most common used ground floor entrance door is the D13 (210 x 238 cm), belonging to H15, of which detailed drawings were also made (**Figure 97)**.

Moreover, the top level of the door is just below the lintels in coarse woods, used as lintels for spanning the door opening. '*Helik*' stones or some mud brick pieces are also used to fill the gaps between these wooden elements (**Figure 98**).

Furthermore, on the ground floor of some houses, there are spaces with an opening between them without doors. However, there are the single-winged doors, formed by wooden pieces in a patchy way in some of these areas.

Third, heights of doors, existing on mezzanines, are less than others. Mostly they connect the rooms to semi-open area except for the one, which belongs to H19 and supply the direct connection between the mezzanine and the staircase, adjacent to the facade of the building.

Finally, the fourth one is the doors on the first floors. It is possible to categorize them as the main entrance doors to the living spaces and the interior doors. First floor entrance doors are with two wings in general and there are lacquered sections over them such as D1 (160 x 180 cm), D2 (170 x 180 cm), D3 (160 x 210 cm) and D4 (185 x 210 cm). However, although not very frequent, it is also possible to see the single-winged main entrance door such as D5 (90 x 200 cm) in the H19. Among doors observed during the interior study on 19 houses, the type D6 (90 x 180 cm) is the most commonly used one, which connects rooms to '*sofa*'.

Measured drawings of the door, belonging to H15, were made and different relationships between this type of doors and different flooring applications was shown (**Figure 99)**. Moreover, like D7 (90 x 170 cm), interior doors with a lacquered section also exists in some houses. Doors of '*girellik*' parts of these houses such as D11 (62 x 180 cm) and D12 (80 x 180 cm) are narrower than the other interior doors. It should be noted that, D7, D11 and D12 are not the original ones and also the D15 is an example which was narrowed down later.

Figure 96: *Door Types of Traditional Mud Brick Masonry Houses in Ağlasun*

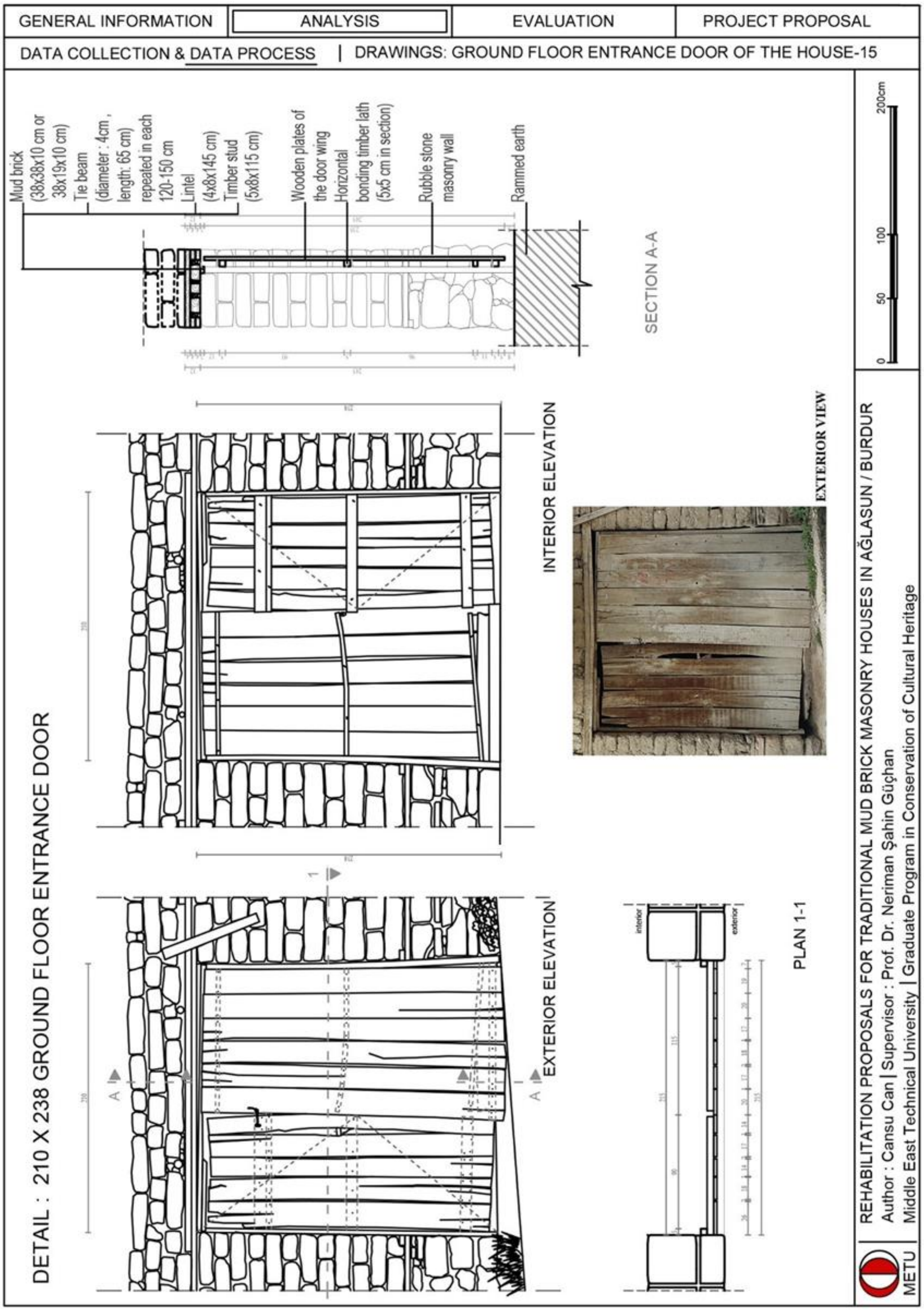


Figure 97: *Detail Drawings of Grounf Floor Entrance Door (House-15)*

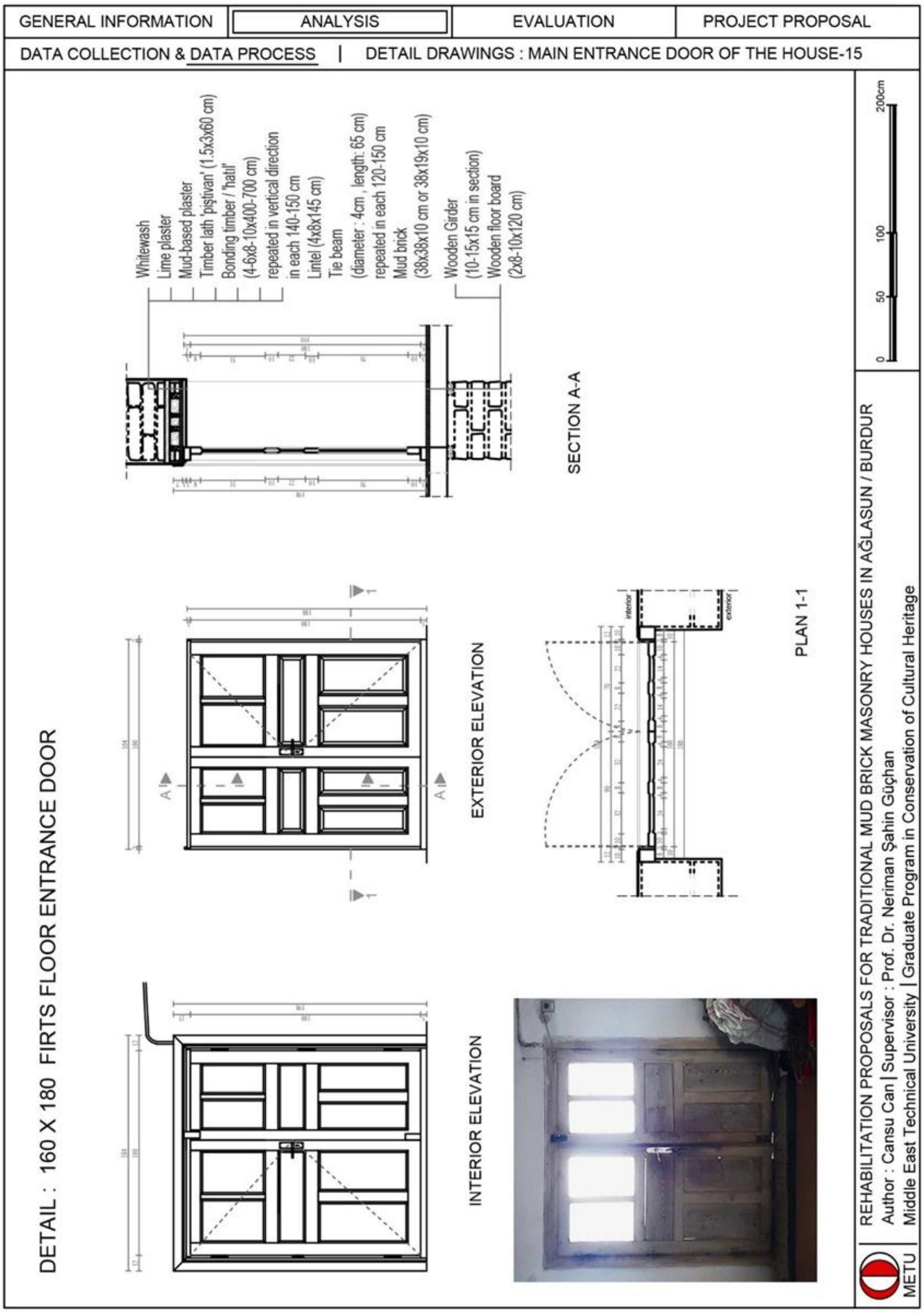


Figure 98: *Detail Drawings of First Floor Entrance Door (House-15)*

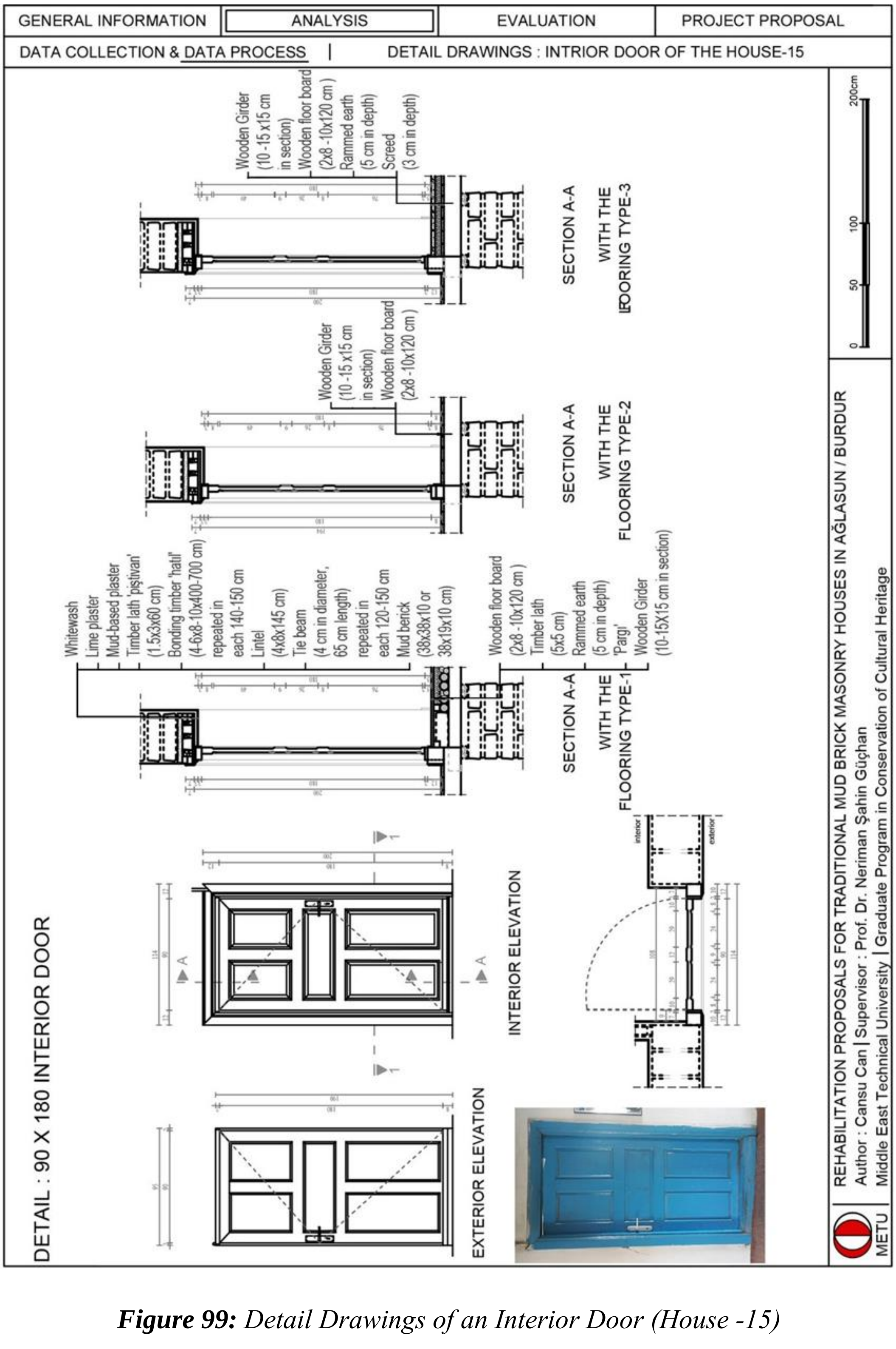


***Figure 99:** Detail Drawings of an Interior Door (House -15)*

Windows

Windows are categorized according to their locations and construction system of the wall on which they are located (**Figure 100**). First of all, there are no windows on the ground floor walls except for 60-80 cm wide and 80-100 cm high small openings called '*samanlık*'. They provide the direct physical connection between a street and a barn. There are timber frame and a wing composed of timber plates. Top of the timber frame is located just below the first lintel, located in the mud brick masonry wall.

Moreover, windows on the first floor are also divided into two groups: First group includes windows on the '*iskiyet*' walls, the timber-framed walls with *bağdadi* covering, while the second one consists windows on the mud brick masonry walls. The windows in the first group are those which supply visual connection between rooms and the '*sofa*'. These windows still exist in many houses as interior windows even if the *sofa* is a closed space.

On the other hand, second group windows are those providing visual connection between the outside and the inside of the houses. They are mostly on the mud brick masonry walls. W1 (100-125 x 130-140 cm) and W2 (90-100 x 120-140 cm) are the most common types while there are also alternatives such as W3 (196 x 126 cm), W4 (150 x 124 cm) and W5 (130 x 130 cm). Among these, W3 and W4, which are not original, are examples for extended windows by dwellers.

In addition, W1 and W2 type windows are also used in timber-framed walls if the "*iskiyet*" wall is constructed as the exterior wall. Furthermore, there are also different examples for the original timber frame window types and sizes than observed ones in the 19 houses studied (**Figure 101**).

According to all these investigations, it was seen that apart from expanding an existing window, width of the original windows in the early period houses are narrower than the ones in the late period houses. Also, use of iron bars in the windows is commonly observed among the early period houses (**Figure 102**).

Moreover, the relation between the window opening and the mud brick masonry wall is expressed within the measured drawings of the W1 (125x130 cm) type window of the house H15 (**Figure 103**). Window openings exist between two lintels called '*hatıl*'. From bottom to top; there are tie beams with 4 cm in diameter and 65 cm in length to which outer and inner lintels are connected, laying on mud brick masonry wall at the same level. There is a distance between these two tie beams which is equal to planned window opening. So, the gaps between these tie beams are filled with stones that are called '*heliktaşı*' by the local people. After levelling application with these stones there is a concrete window sill (5-8x70x150 cm) interior part of which is mostly covered with 0.5 thick cement plaster.

Then, the lime wash is applied to the surface as finishing. While the lower section of the 5 cm wide and 6 cm thick wooden window frame, to which some parts embedded in the window sill, upper section of its fixed to the 3 cm wide, 1 cm thick and 60 cm long timber laths by nailing. The mix of lime and cement is applied as the finishing coat in the late period houses. These upper timber lathes are nailed under the lintels above the window openings. There are also plaster and lime wash on the surface of these timber laths, corresponding to the inside of windows. The type of the plaster can change according to the function of the space and the application date.

Moreover, at the top level of the window openings, there are also two timber lintels between the inner and outer bonding beams besides the lintels over them. These lintels, located between bonding beams, are different from the other two in terms of not being perfectly cut and also having double sized section compared to others. Finally, these lintels are also connected to each other with two tie beams.

Figure 100: *Window types of Traditional Mud Brick Masonry Houses in Ağlasun.*

Figure 101: *Window types of Traditional Mud Brick Masonry Houses in Ağlasun. Image is produced by utilizing photos from 'Understanding a Historic Rural Landscape in Relation with an Archaeological Site: Ağlasun/ Sagalassos'* [15]

Figure 102: *Windows with iron bars. Photos are taken from H13.*

[15] For more information on the source, please refer to the 'Methodology and Structure' on page 9.

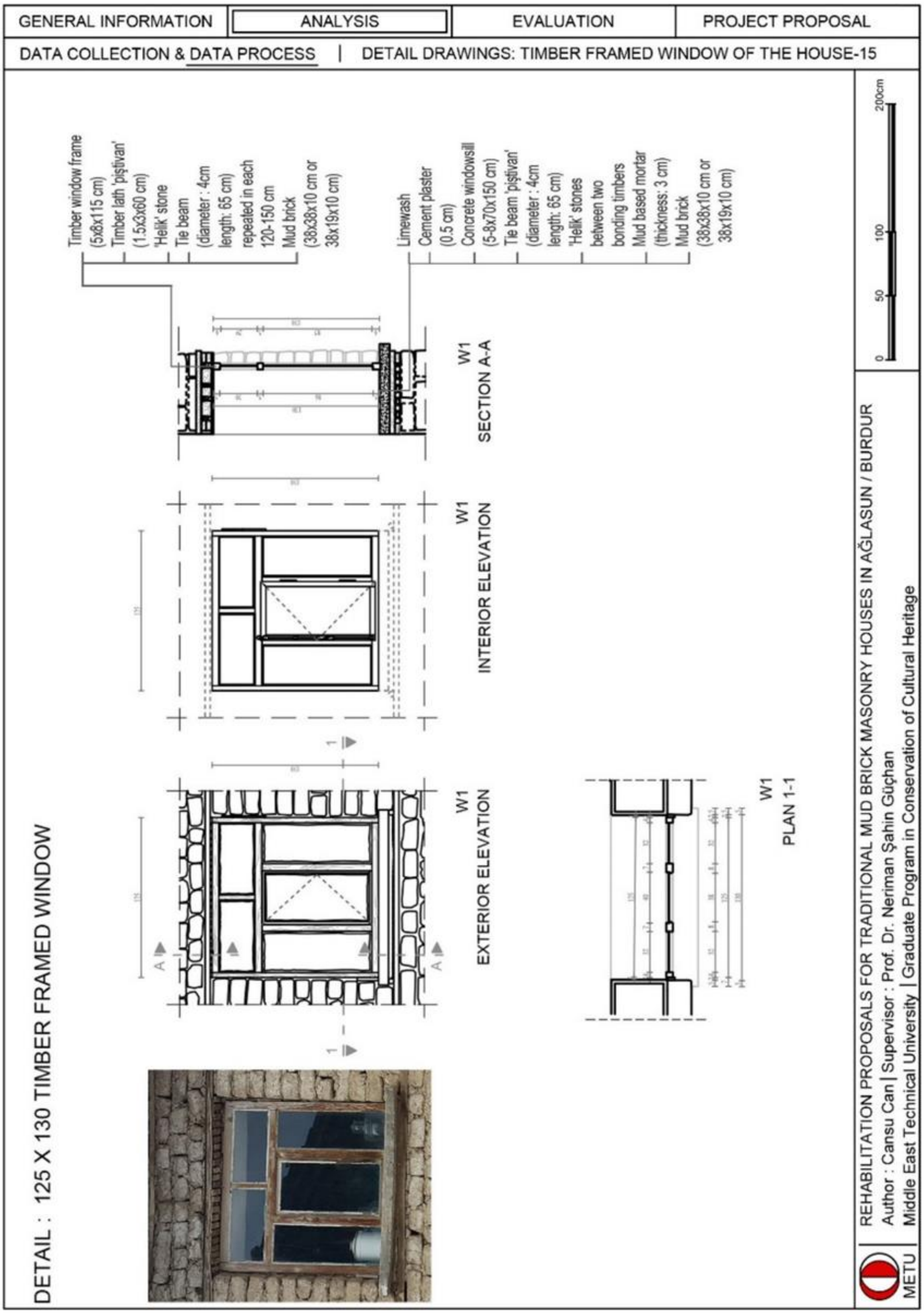


Figure 103: *Detail Drawings of a Timber Frame Window (House-15)*

3.2.3. Architectural and Structural Characteristics of the House 15 as a Detailed Studied House

The technical drawings of the House 15 is made to make contribution to the presentation of most common structural features of the traditional mud brick masonry houses in Ağlasun. Its architectural and structural problems, values and potentials are examined and evaluated together with other 19 houses in the following chapter of this study.

Figure 104: *First photo shows northeast facade and the second one shows the northwest façade of the H15; the third photo shows the 'sofa'; the fourth one is from one of the rooms (Room 1-01) of H15.*

Şerife Demirtaş, an 85 years old lady, lives alone in this house throughout the year. During the study, interviews on the house are conducted with her and her 63 years old son, Mehmet Demirtaş, who has lived in Ağlasun since he was born. According to them, the house was built in 1965.

The House-15, belonging the House Type-2, is located in the lot next to the Cumhuriyet Avenue in Bala Neighborhood. Except for the traditional mud brick masonry house located adjacent to the Cumhuriyet Avenue, the lot, which is partially surrounded with a stone masonry garden wall, also contains plum, apple, peach, palm, walnut and cherry trees, roses and a greenhouse which is made of iron bars and nylon covering. The garden wall does not continue alongside the border of the land defined by the avenue, so, there are no physical restriction to reach the garden, located at the back side of the house, and the ground floor of the house from the avenue. Also, the narrow water channel between the street and the house does not pose an obstacle between the entrance door of the ground floor and the avenue.

The house has a cubical form. There are no projections except the balcony on the north-east facade. The first space entered is the circulation area G-03 with the 2.60 m width, 7.85 m length and the 2.80 m height at the ground floor (**Figure 107**). There are two rectangular spaces, which are approximately 25 square meter, on the right and left side of the circulation area located under the '*sofa*' on the first floor. The G-01 space is currently used for storing hay, while the function of the space G-02 is a barn.

The access to the first floor (**Figure 108**), called the living area of the house, is provided by the wooden staircase, starting with 3 stone steps and constructed adjacent to the southwest facade of the house. The staircase ends with a semi-open area, 1-07, called '*gezenek*' by local people. The entrance door of the first floor also opens to this area and the toilet, 1-08, is located at the end of it. Between the entrance door and the toilet, there is also a sink mounted on the mud brick masonry wall.

Direct access to the ‘*sofa*’, 1-06, is provided by the entrance door of the first floor which is defined as a living area of the house. The ‘*sofa*’ is a space with approximately 20 square meter area and 2.35 m ceiling height. There is only one double seat coach in the '*sofa*'. There is a 2.7 square meter balcony just opposite to the main entrance of the house.

There are two adjacent spaces, each of which is approximately 11 square meter, on the left and right of the *sofa*. There are traditional built-in wardrobes called '*yüklük*' between the two spaces. Direct access to these spaces are provided by original wooden doors (**Figure 99**). The room 1-01 that is used by the dweller both as a living room and a bedroom is located in the southeast of the house. There are two windows which were replaced with new ones made with PVC in the room. Heating is provided by a stove. The space 1-04, which is located next to this room in the south of the house is now used as a kitchen. The kitchen has a traditional built-in wardrobe named '*yüklük*', a traditional fireplace '*ocak*', a wooden shelf called ‘*terek*‘ and an original wooden timber frame window (**Figure 103**). The toilet, located on the '*gezenek*', is just behind the mud brick masonry wall of which the '*ocak*' is a part. Also the wet room installation is transferred to the outside through this wall (**Figure 117**). The space 1-02, located in the north of the house, there are two original timber-framed windows and a ‘*yüklük*’. Located next to this room, there is another room 1-03, which has one original timber frame window, one traditional fireplace and a ‘gusulhane', which is a separate space in the '*yüklük*' to perform ablution. It is stated that this place had been used as a kitchen previously. These last mentioned two spaces, 1-02 and 1-03, are not actively used in the current condition.

Being consistent with the date it was built, the mud brick masonry walls are 60 cm wide (**Figure 115**). The foundation walls of the house, which usually settled on the firm soil reaching 80-100 cm below the ground level, are constructed with rubble stone. These walls continue up to the 1.20 m height from the ground level. And then, the rest of the four exterior walls with 60 cm width and two interior walls with 45 cm width are constructed with mud brick masonry formed by using 38x38x10 'ana' and

19x38x10 'kuzu' mud bricks using 3 cm width mud-based mortar between them. Exterior facades of the house are not plastered except for the late partial implementations with lime and cement plasters. However, mud based rendering coat, finishing coat with the mix of cement and lime and lime wash are applied respectively on wall surfaces of the interior spaces.

Timber-framed walls with *bağdadi* covering, called 'iskiyet' by local people, are constructed as walls of traditional built-in wardrobe called as '*yüklük*', located between two rooms placed consecutively, and as walls of the toilet.

As mentioned before there are two kinds of flooring types on the ground floors. Ground floor of this house is the type one the finishing material of which is compressed mud consisting soil and hay. All three different floor types are observed in this house. The rooms 1-01 and 1-03 are in the Floor Type 1, the room 1-02 while the '*sofa*' 1-05 is in the Floor Type 2 and the kitchen, which is not original 1-04 in the Floor Type 3. Rammed soil and the screed are additional layers to the original floor, which is also Type 2, of the kitchen in this house (**Figure 91**).

There is no covering on the ceiling of the ground floor. All structural elements such as wooden beams, girders and '*pargı*' are seen. The same type of wooden ceiling covering, which is not ornamented with decorative figures, is seen in each space located on the first floor. Moreover, like all the traditional houses in Ağlasun, the original earthen flat roof of this house was changed with the wooden hipped roof covered by French roof tiles (**Figure 95).**

The 'gusulhane' has not been used by dweller and there is no special space to take shower in the house. Moreover, the toilet is located outside of the house and because of many material loss, it is in a very poor structural condition. In addition to these, the piping system for both water supply and drainage is implemented to the house through the mud brick masonry wall, which is located between the kitchen and toilet, without any water insulation precaution and this have started to damage the wall.

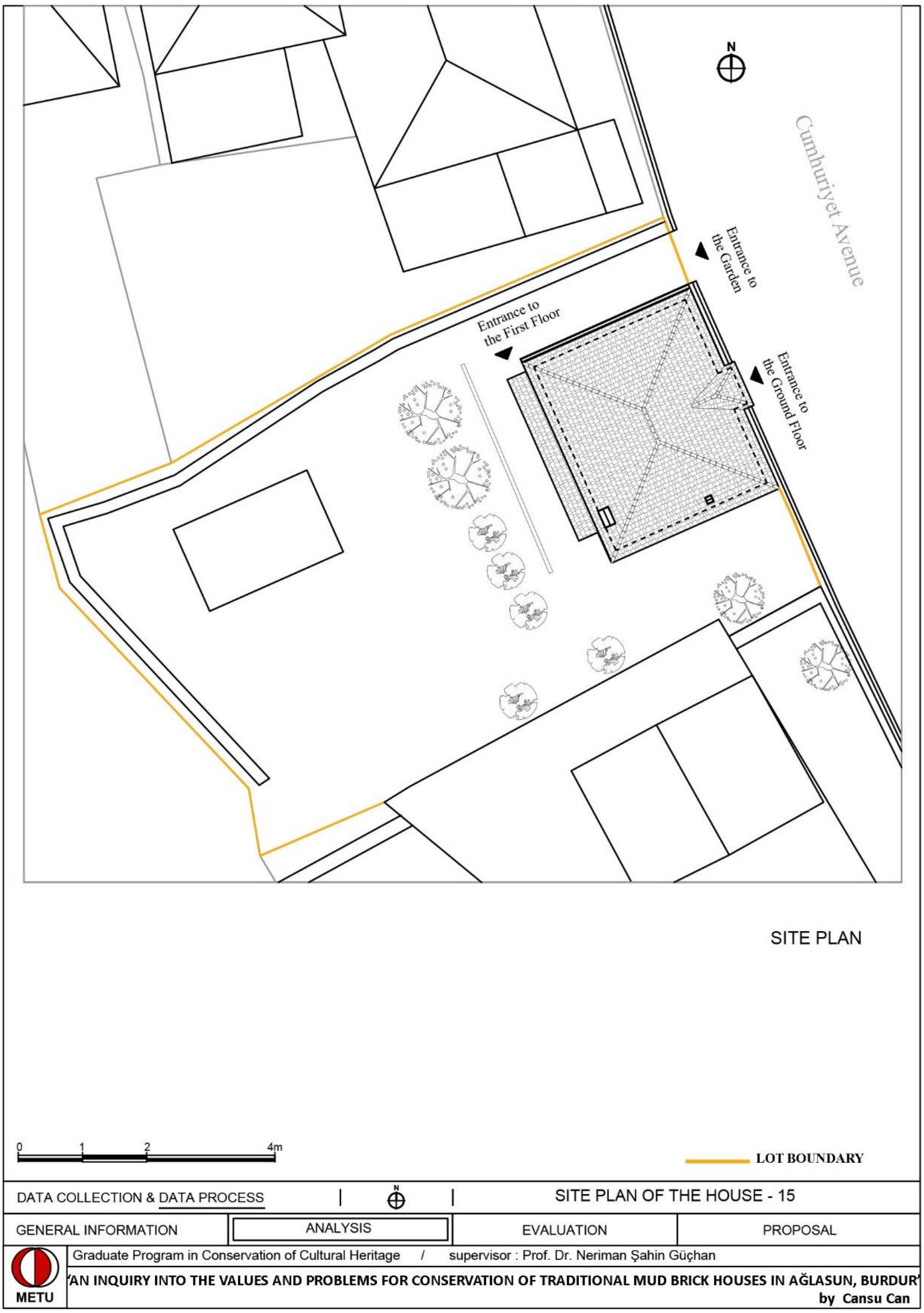


***Figure 105**: Site Plan of the House - 15*

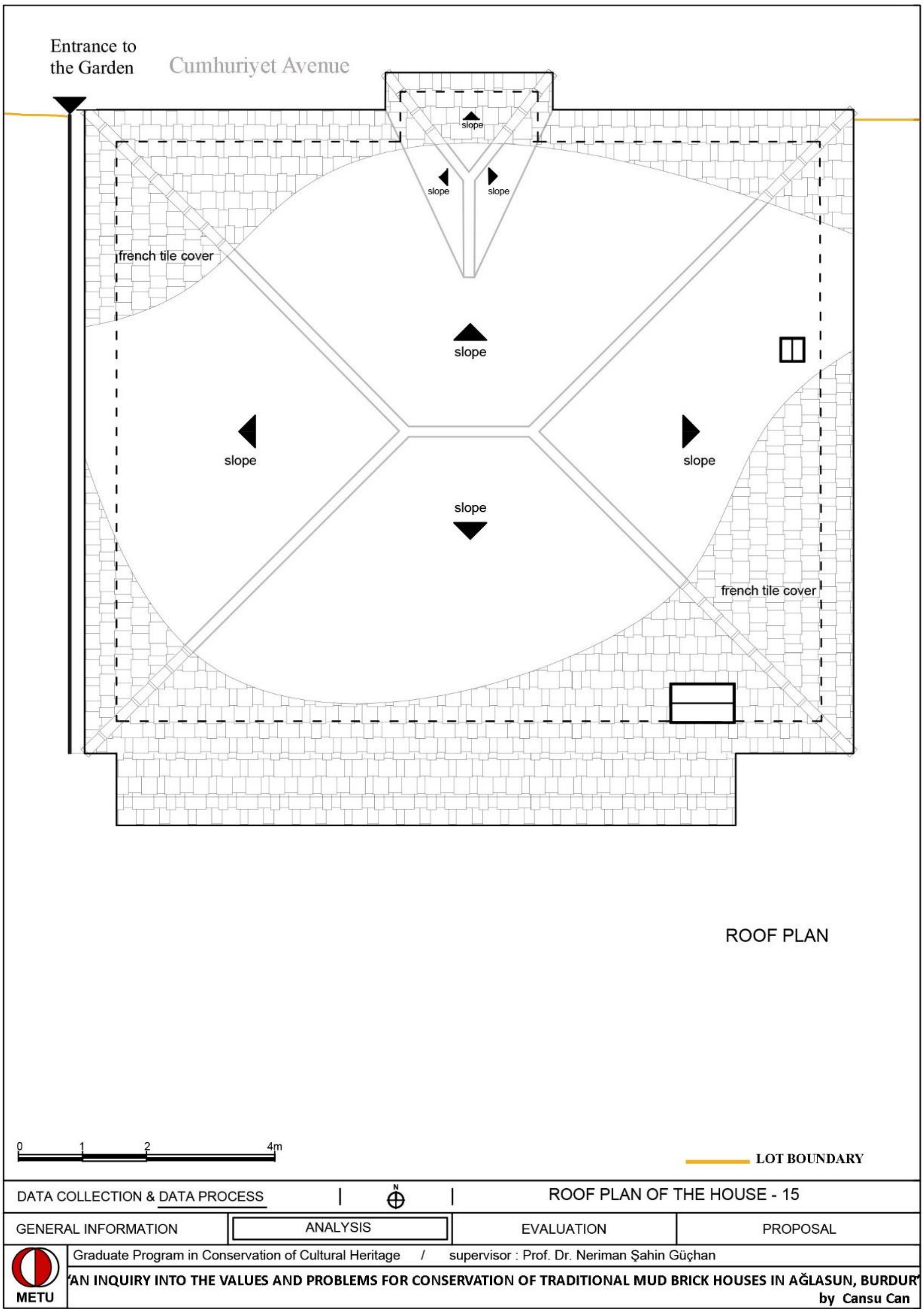


Figure 106: *Roof Plan of the House-15*

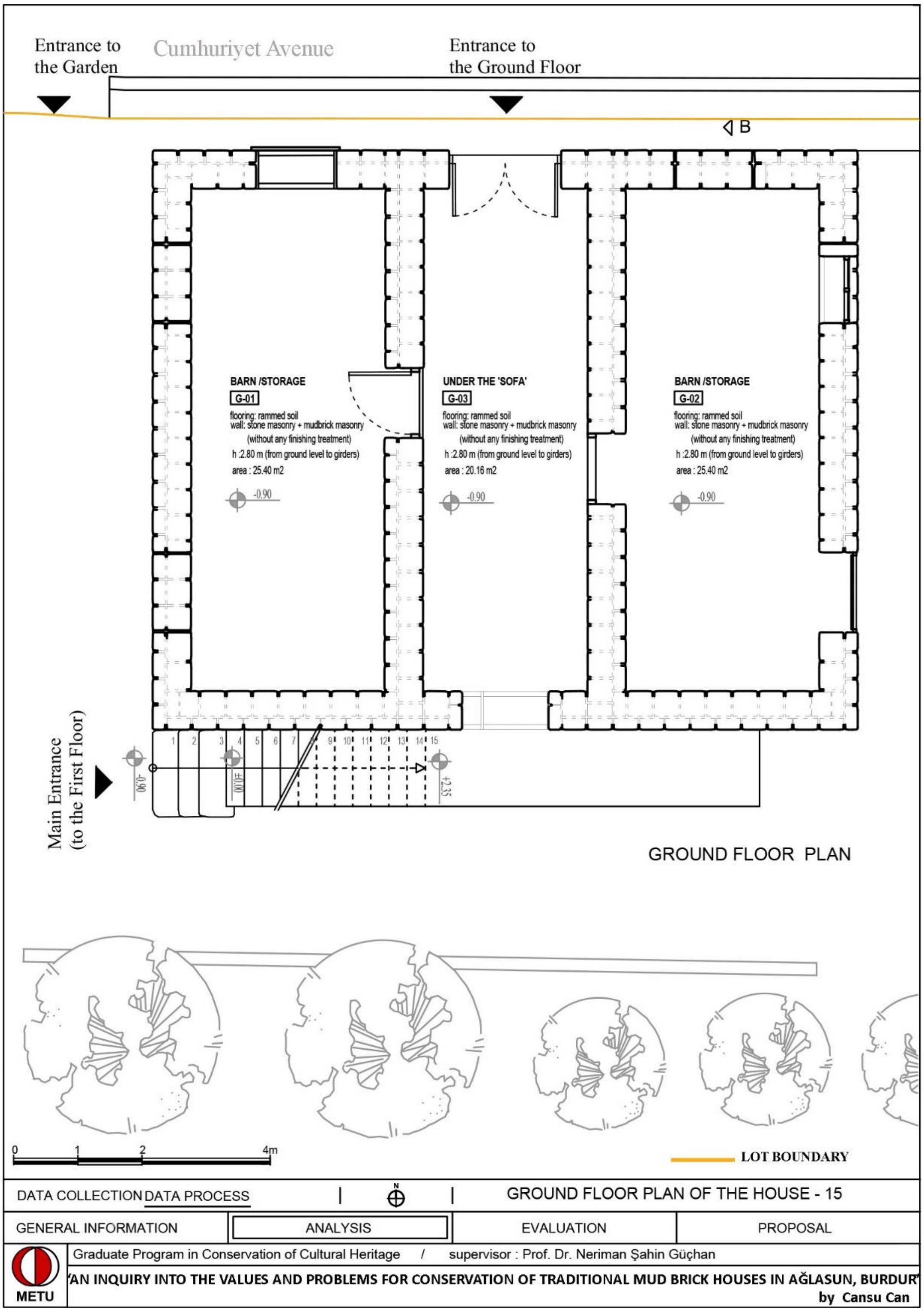


Figure 107: *Ground Floor Plan of the House – 15*

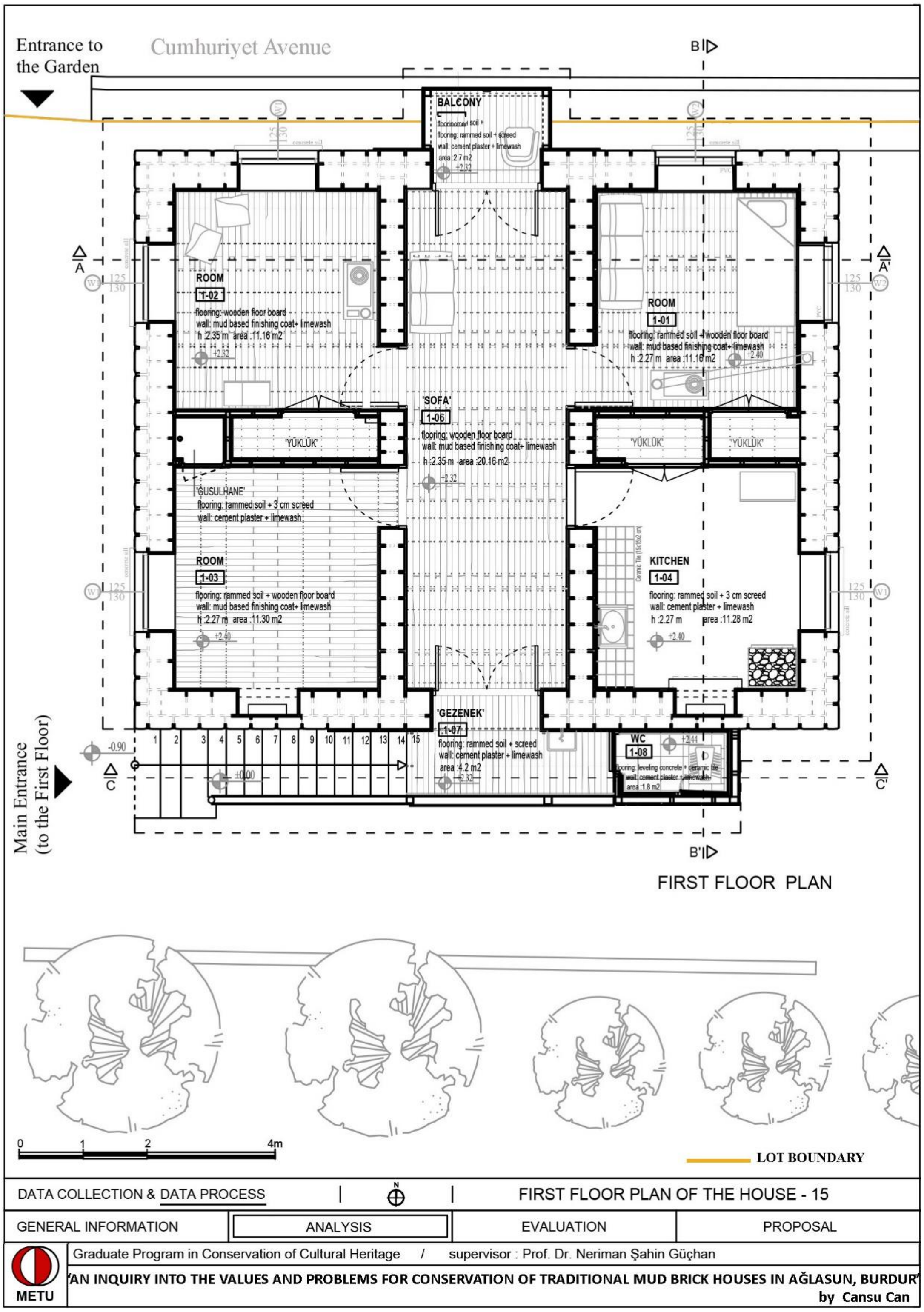


***Figure 108:** First Floor Plan of the House - 15*

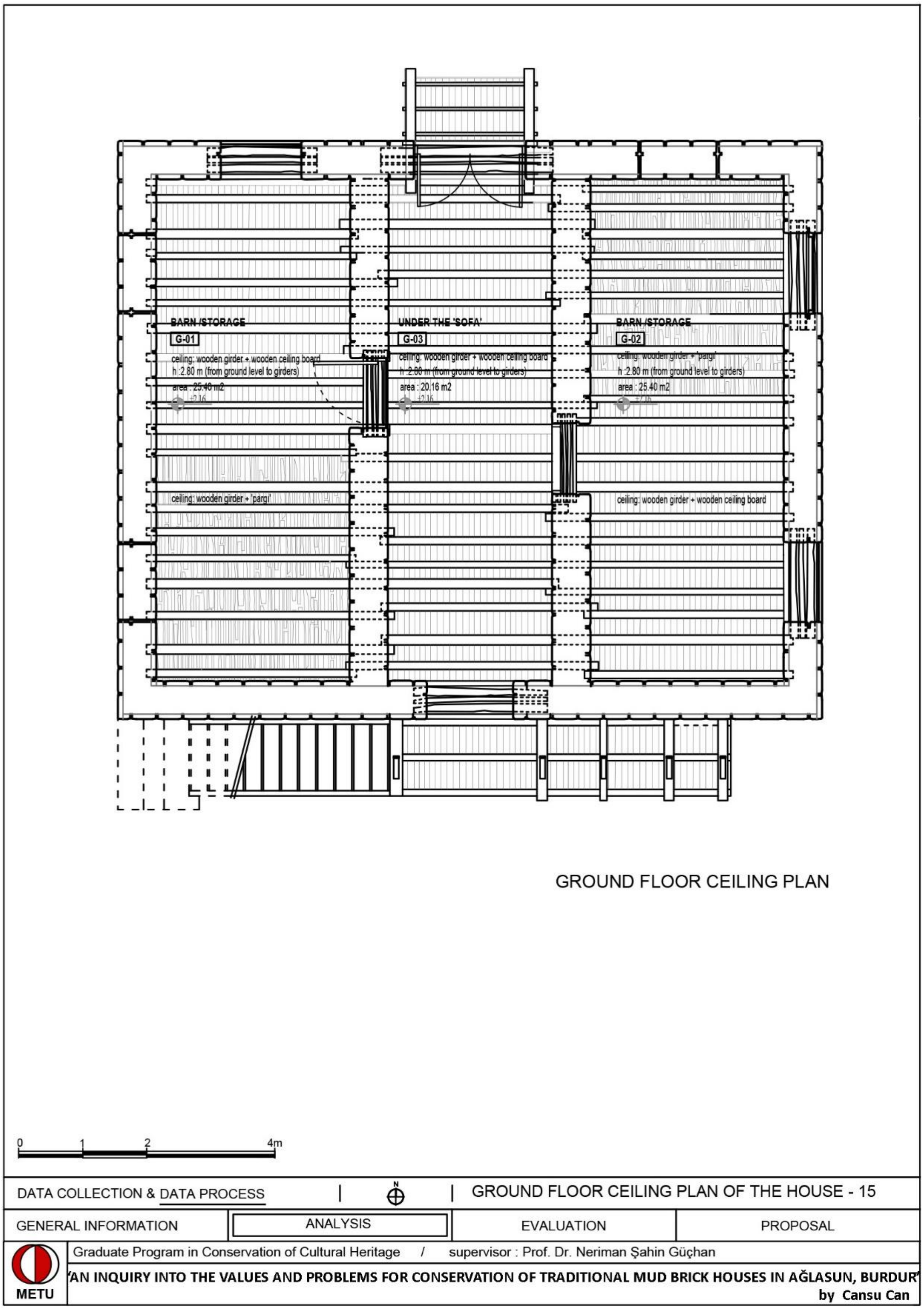
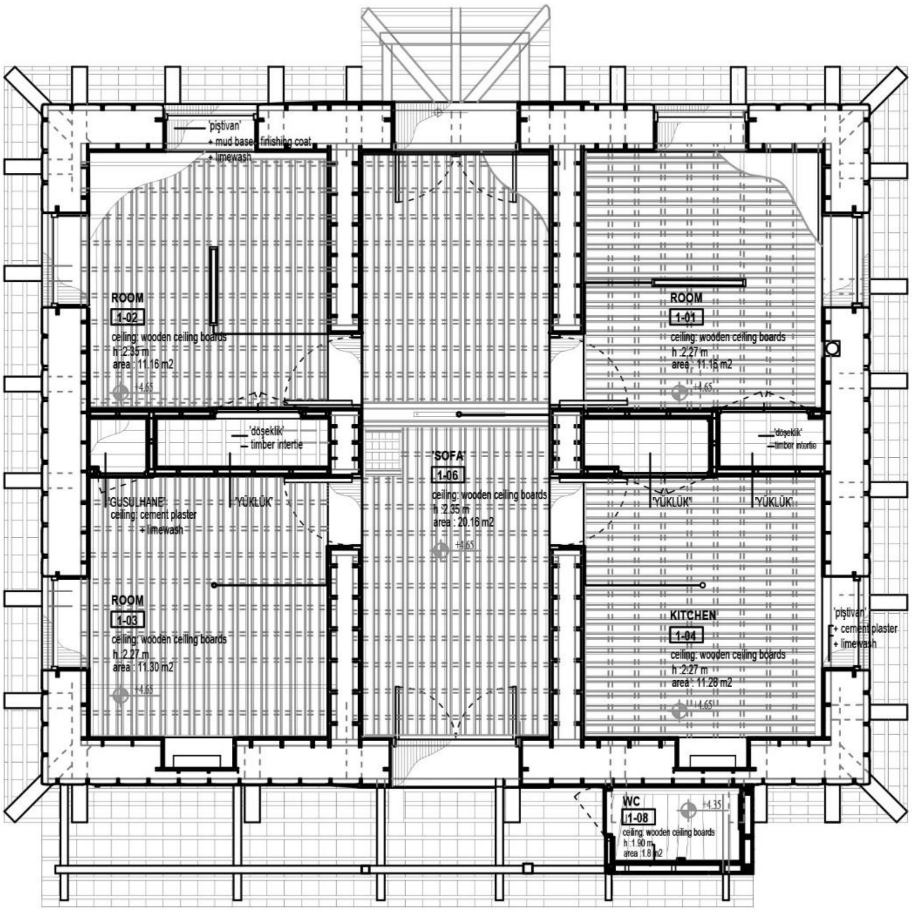


Figure 109: *Ground Floor Ceiling Plan of the House - 15*



FIRST FLOOR CEILING PLAN

0 1 2 4m

DATA COLLECTION & DATA PROCESS	N	FIRST FLOOR CEILING PLAN OF THE HOUSE - 15	
GENERAL INFORMATION	ANALYSIS	EVALUATION	PROPOSAL

METU

Graduate Program in Conservation of Cultural Heritage / supervisor : Prof. Dr. Neriman Şahin Güçhan

'AN INQUIRY INTO THE VALUES AND PROBLEMS FOR CONSERVATION OF TRADITIONAL MUD BRICK HOUSES IN AĞLASUN, BURDUR'

by Cansu Can

Figure 110*: First Floor Ceiling Plan of the House - 15*

***Figure 111**: Northeast Elevation of the House-15*

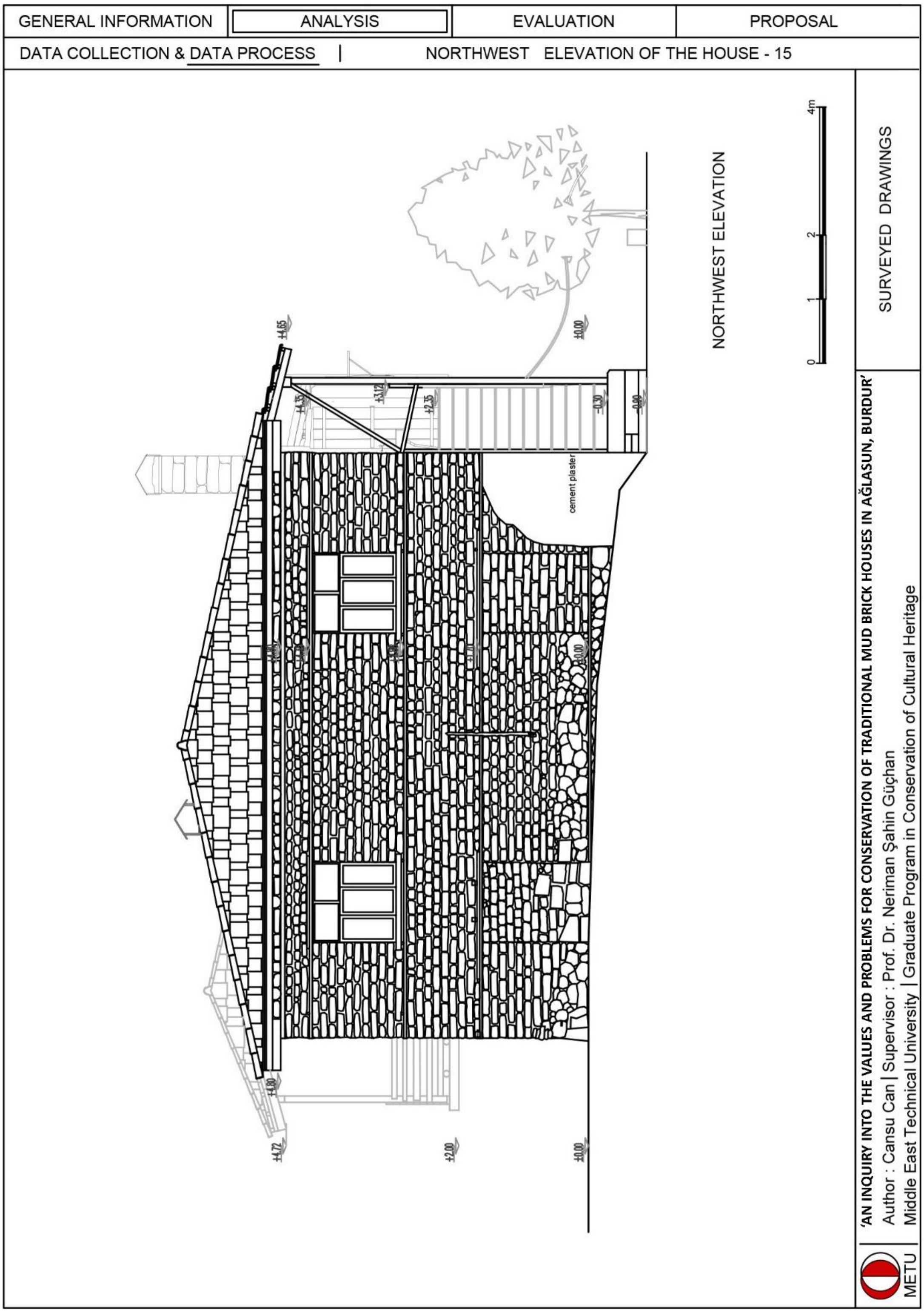


***Figure 112**: Northwest Elevation of the House-15*

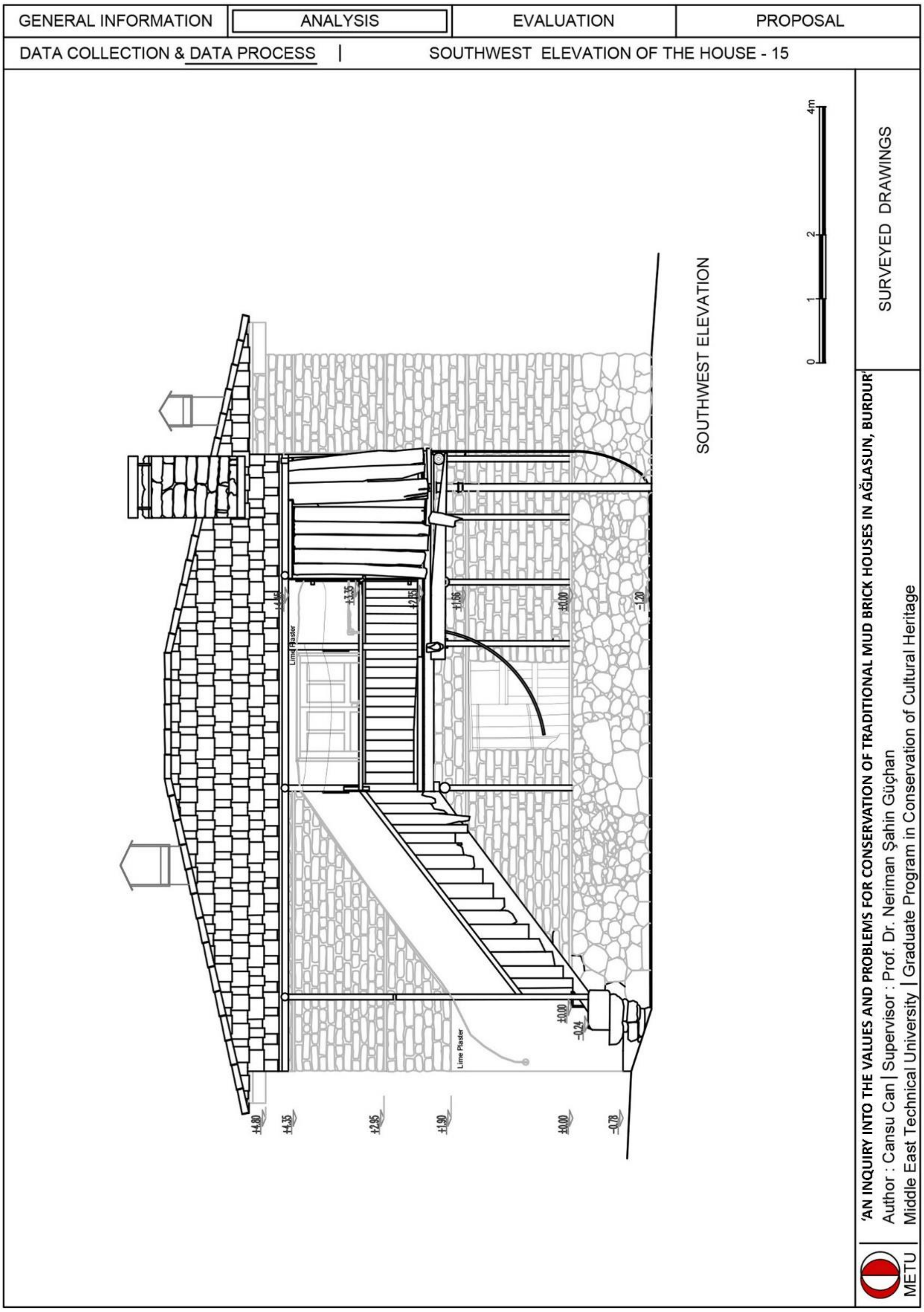


Figure 113: *Southwest Elevation of the House-15*

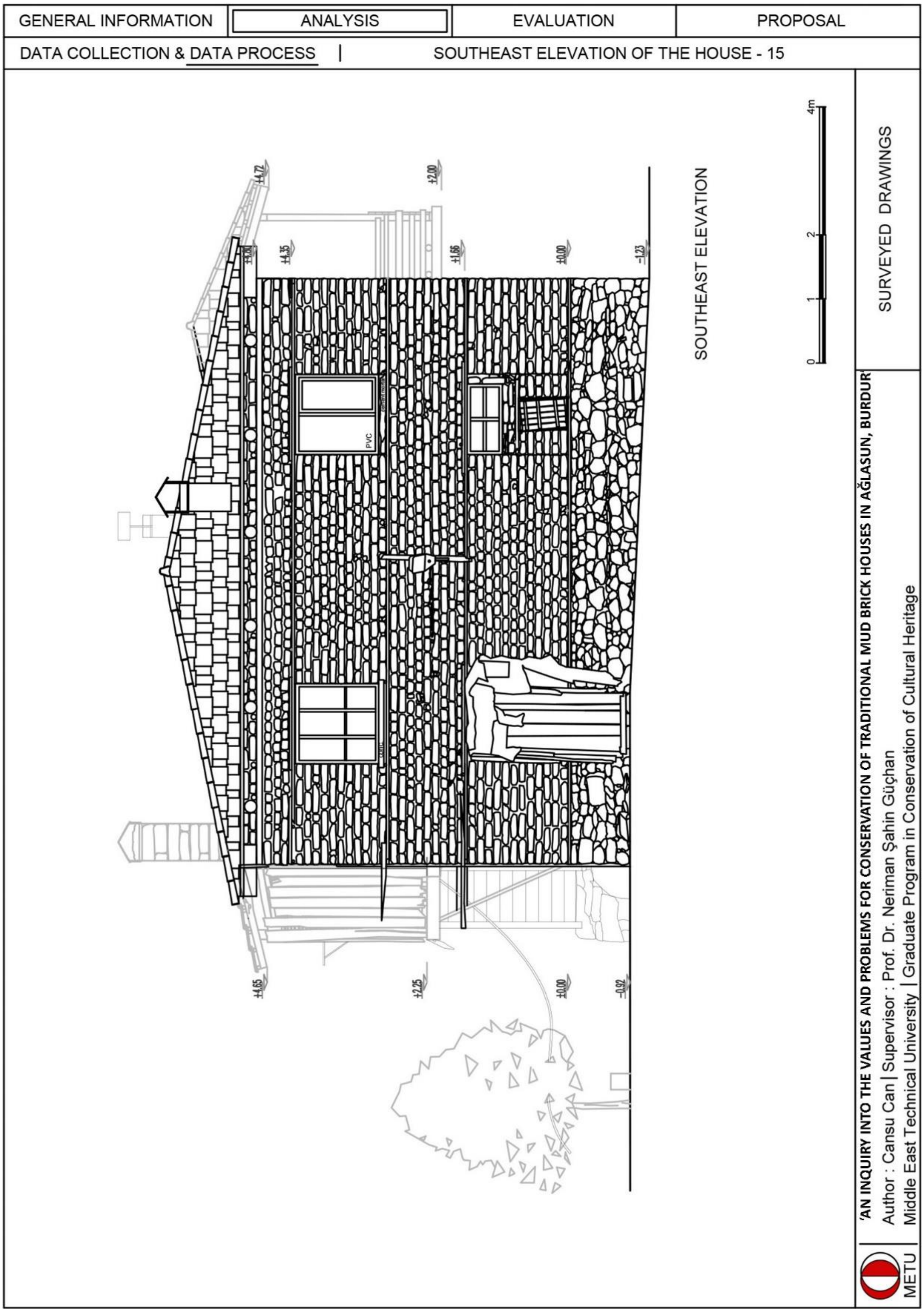


Figure 114: *Southeast Elevation of the House-15*

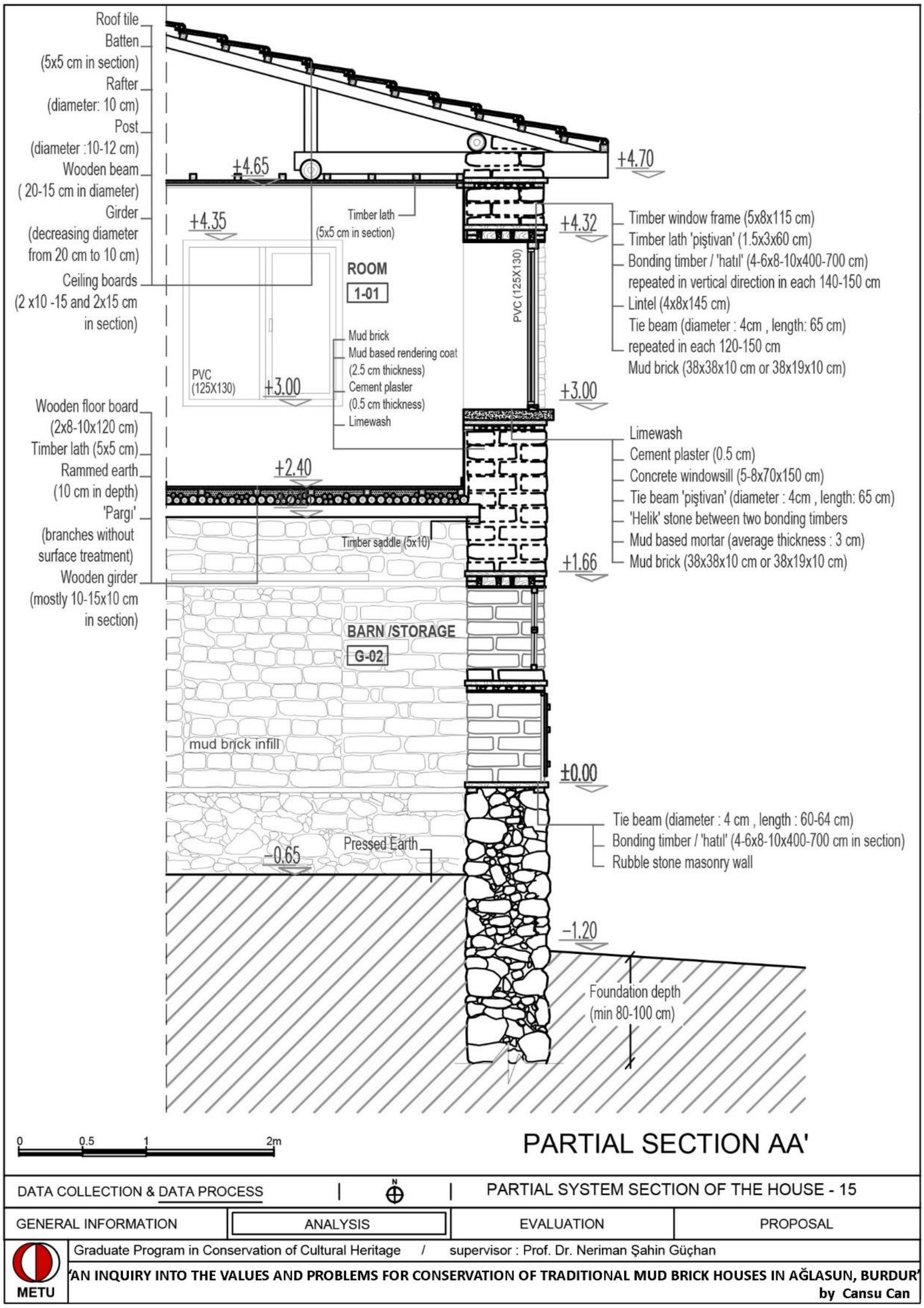


Figure 115: *Partial Section AA' from the House-15 showing the Structural System*

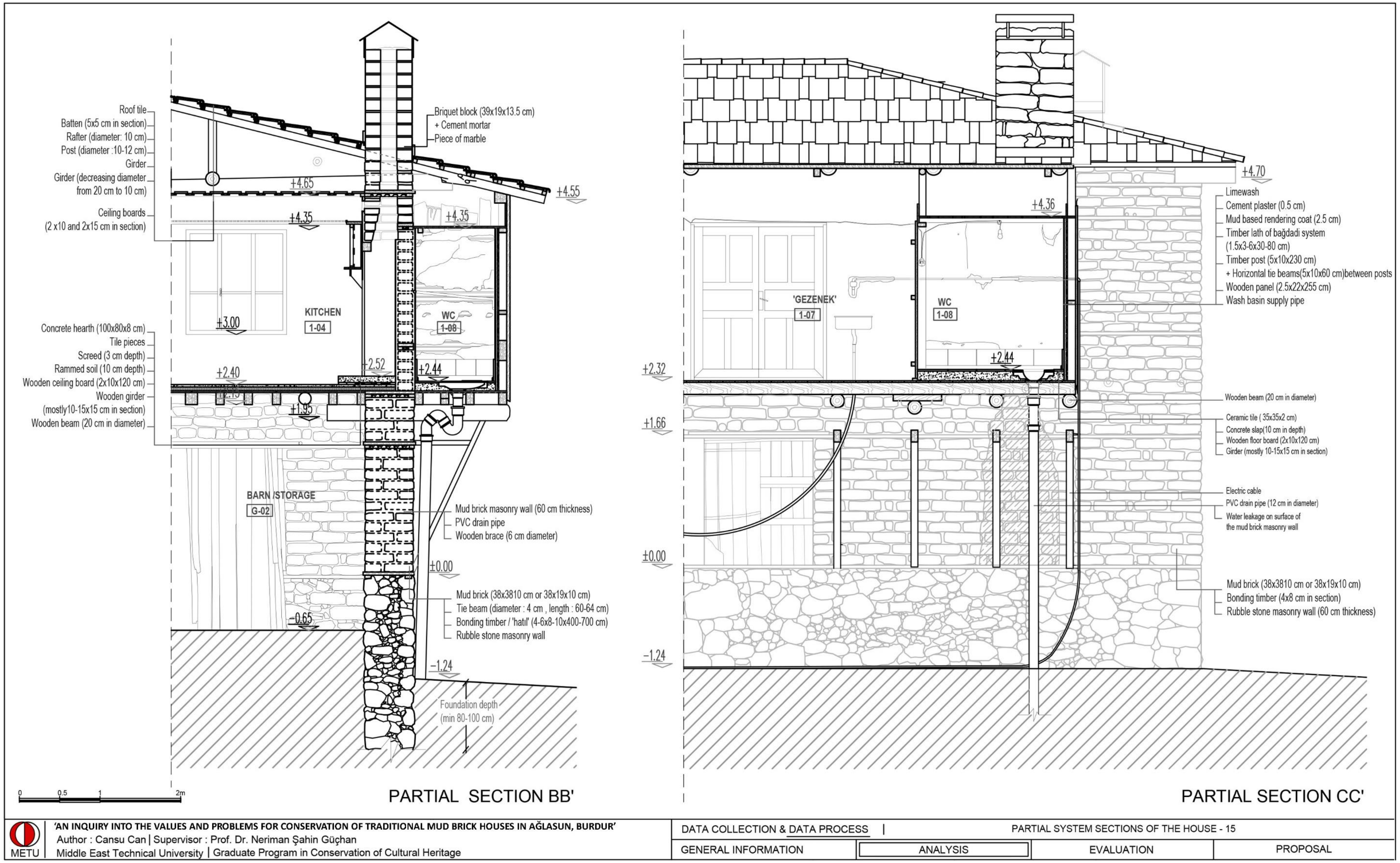


Figure 116: *Partial Sections BB' and CC' from the House-15*

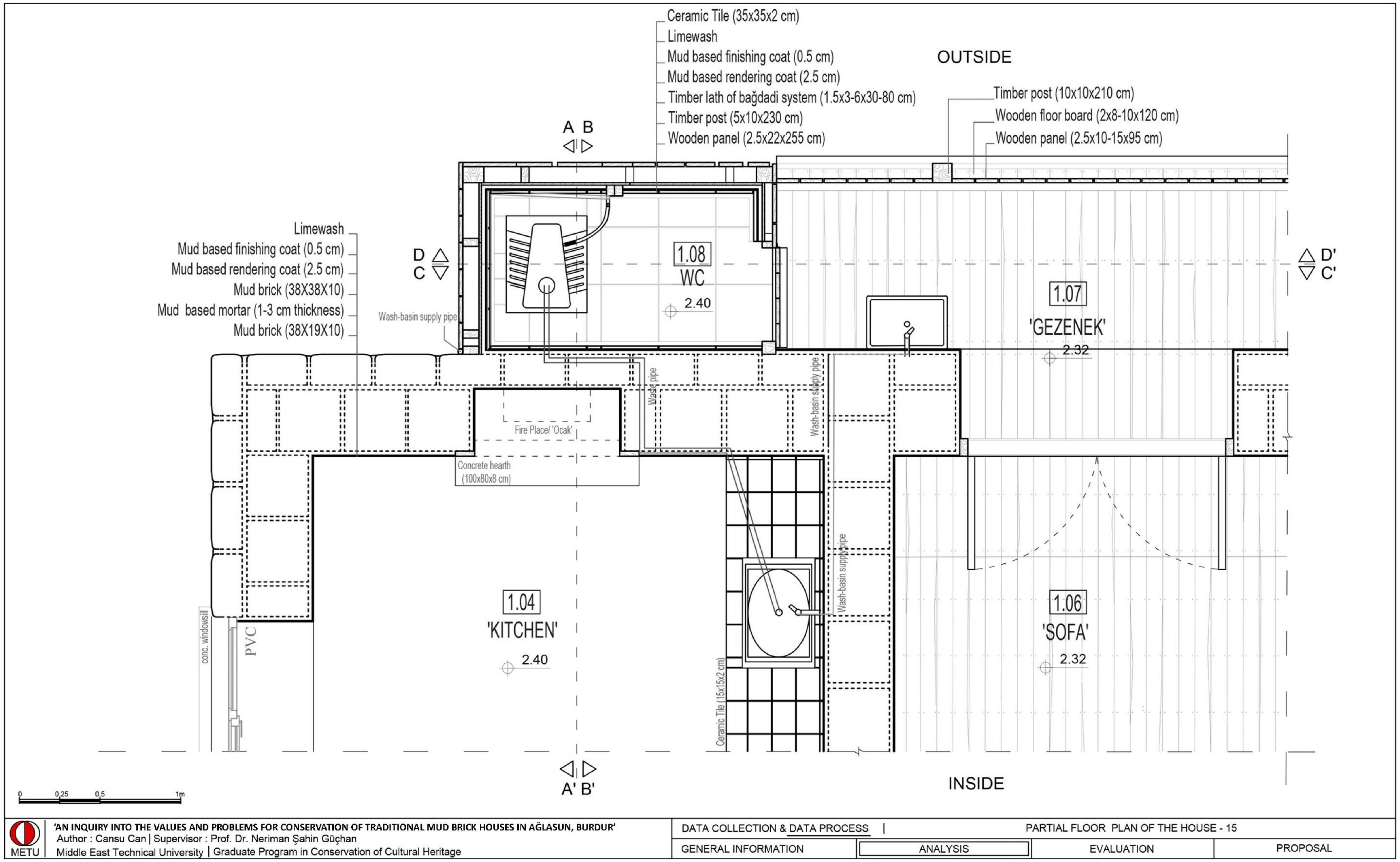


Figure 117: *Floor Plan of the WC and Its Relation with the Kitchen.*

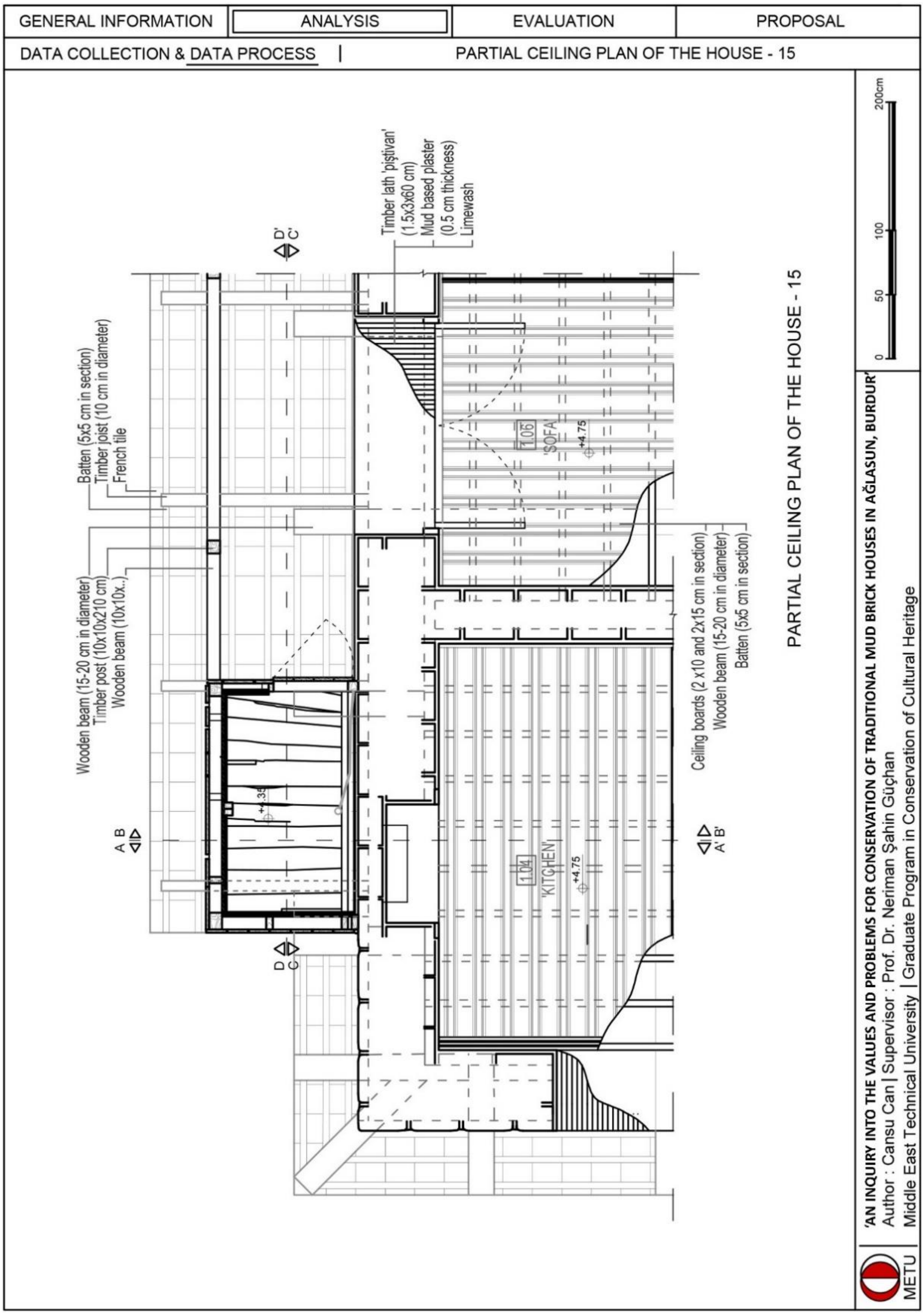


Figure 118: Ceiling Plan of the toilet and Its Relation with the Kitchen

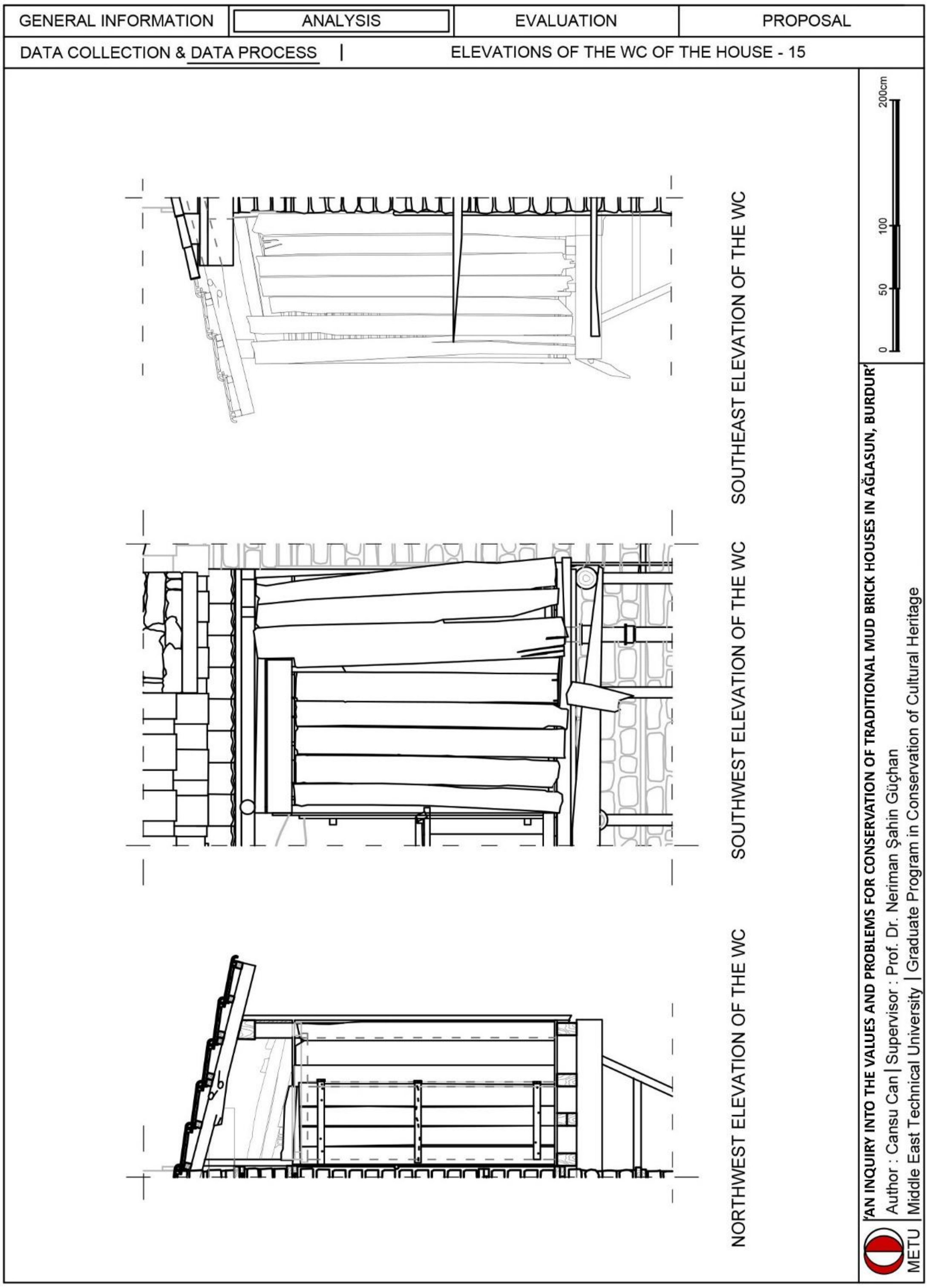


Figure 119: *Elevations of the toilet of the House-15*

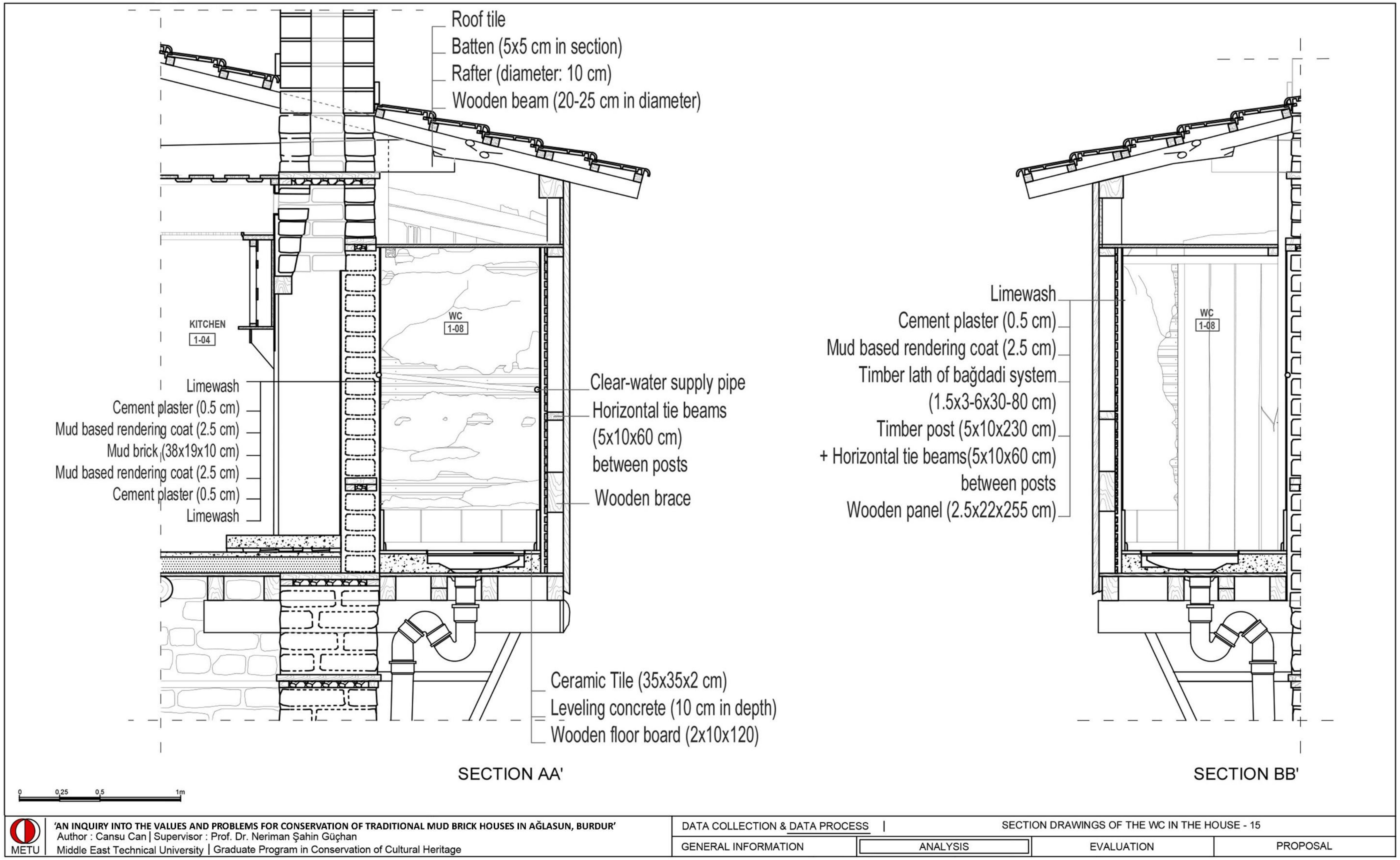


Figure 120: *Section AA' and BB' of the WC of the House-15*

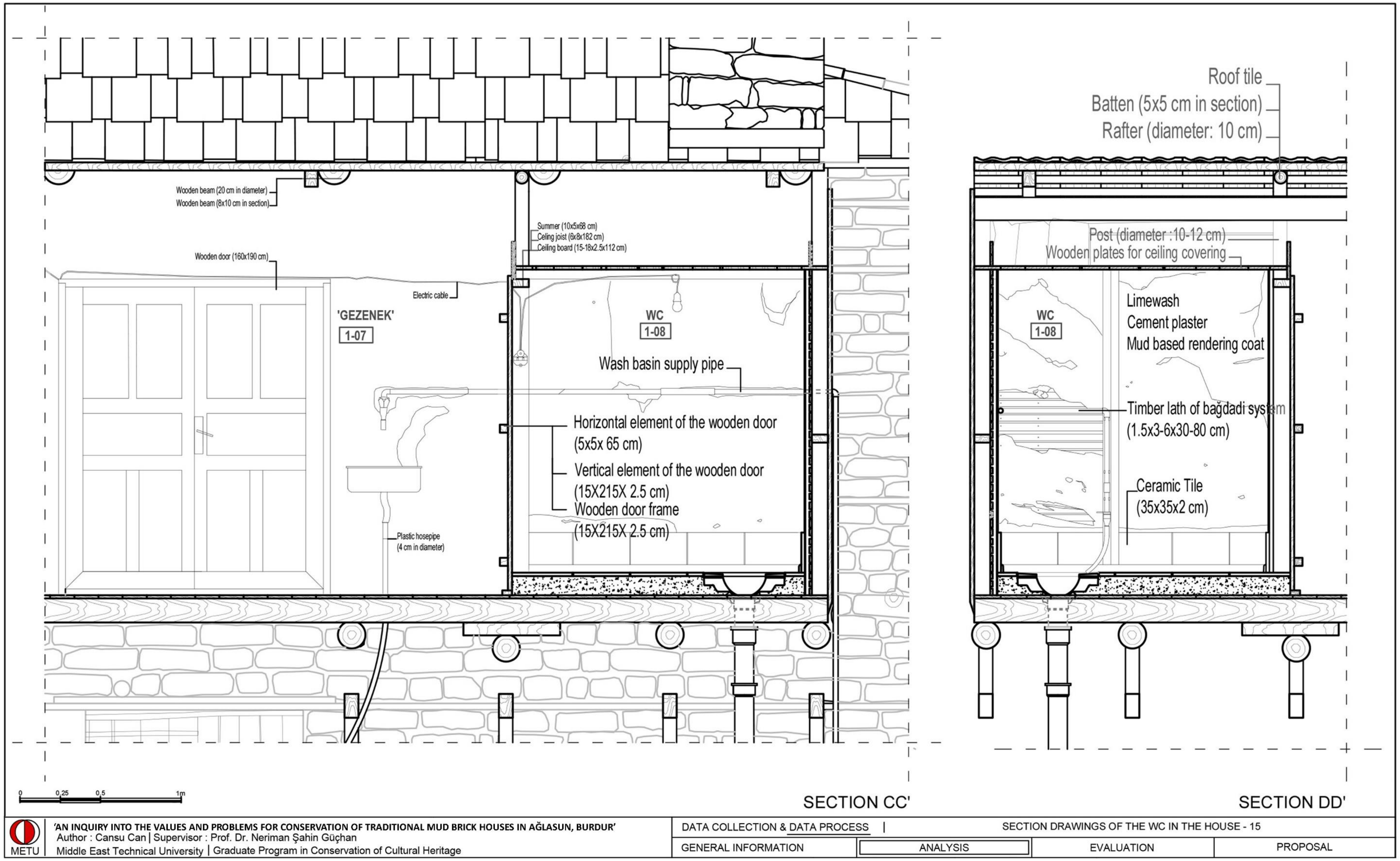


Figure 121: *Section CC' and Section DD' of the WC of the House-15.*

3.3. Changes and Interventions Done by Users in Ağlasun Houses

In this section, first of all, the interventions applied by dwellers to the houses are described, then, analyses and evaluations are made on the effects of these interventions and their frequency. In the second part, the problems, mostly caused by inappropriate interventions, the values that still exist and the potentials, needed to be improved are stated within the scope of 19 houses studied.

The changes on economic, social and cultural lives with time has brought with changes in daily residential activities and needs of dwellers. This causes dwellers to intervene on the houses because it is an inevitable situation for living spaces to keep up with human behaviours and habits. Thoughts on the reasons of the changes, observed in the traditional mud brick masonry houses in Ağlasun, are gathered during the interviews, conducted with Ekrem Akıncı, the previous headman of Sakarca Neighborhood, Özkan Taştekin, the headman of Sakarca District, the construction foreman Mustafa Onaç and the dwellers of 19 houses during the site survey.

To begin with, intervention types are analysed under this heading. Then, the current conditions of wet spaces in accordance with the related spatial and material interventions are also mentioned in this part under the light of the analysis which are done after the deduction, related with wet rooms, by the evaluations in terms of the problems of the traditional mud brick masonry houses in Ağlasun.

Different intervention types, applied on traditional mud brick masonry houses in Ağlasun, are also related with each other (**Figure 122**). The main reasons for the interventions are two necessities, namely functional needs of dwellers in order to live in contemporary life standards and the need for structural improvement of houses as a result of deformations on them.

The first reason causing functional interventions that can be practiced without any physical change on something or practiced with material intervention or spatial intervention. There are also material interventions fulfilled with the aim of improving or changing the existing features of the things, independently of any functional intervention. However, the reasons for all spatial interventions are functional.

Second reason leading to structural interventions which are resulted with positive or negative outcomes. If material based and spatial interventions are harmful or their applications are incorrect, they adversely affect the structure of the houses.

Thus, descriptions on the intervention types are made under four different headings, which are related with the functions, materials, spaces and structures. Analysis of the interventions also based on the reasons and method of implementations; whether it reflects its application period with considerable architectural and structural quality or not or the application frequency among the studied houses, being reversible or not.

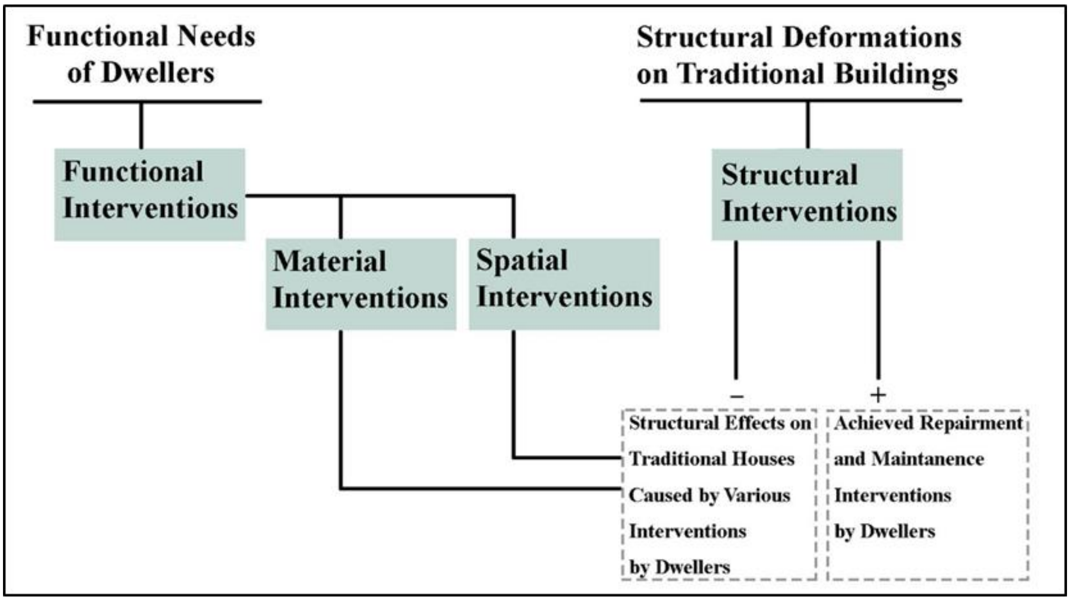


Figure 122: *The relation between various intervention types.*

3.3.1. Changes in Structure

Structural interventions on traditional mud brick masonry houses in Ağlasun constitute the most common intervention type among all and it can be observed in five different parts of the houses such as roofs, '*saçak*' structures, staircases, timber posts and mud brick masonry walls.

First, according to the interviews with dwellers and the builder Mustafa Onaç the original earthen flat roofs of these traditional houses were changed in the 1950s because those which were not regularly maintained had begun to collapse and pose a danger. So, during the site survey study, no house with earthen flat roof was encountered.

For the same reasons, earthen '*saçak*' structures were replaced with the reinforced concrete ones (**Figure 123**). Among the studied houses, only H4 and H7 have original earthen '*saçak*' structures. Stairs that provide access to living spaces of the houses end with the areas above the '*saçak*' structures if they exists. Thus, original wooden stairs were also replaced with the reinforced concrete ones like the '*saçak*' structures. 11 out of the 19 houses (H1, H2, H3, H5, H6, H8, H10, H12, H14, H17 and H18) can be given as examples for this intervention.

Moreover, putting additional timber posts is another structural intervention which was applied by dwellers because of sagging bending moments on floors and ceilings or deteriorations on timber construction elements of them.

Apart from this type of structural intervention with the aim of strengthening the house, there are some applications like constructing new walls using hollow bricks or building timber frame structure within mud brick infill after demolishing the walls, which were originally constructed with mud brick masonry system, just in order to have larger areas inside the houses. In these interventions, while the use of hollow bricks is common, timber frame construction with mud brick infill was observed just in the H4.

Structural interventions observed in the 19 studied traditional mud brick masonry houses in Ağlasun usually cause additional structural problems for the houses because of the incompatibility of the contemporary construction materials with the traditional ones. They must be examined in detail by experts including structural engineers on the site.

Figure 123: *The photo from the H12 on the left shows the reinforced concrete 'saçak' structure and the stairs which were constructed after the removal of the earthen 'saçak' structure and the wooden staircases; The photo from the H4, shows the timber-framed wall constructed after demolition of the mud brick masonry wall on the first floor of the house.*

3.3.2. Changes and Interventions Made for Functional Purposes

Under this title, there are three types of functional change, resulting with the loss of function without any material intervention. First, according to the information obtained from interviews with dwellers, it can be said that over time, livestock breeding, weaving and agriculture have no longer been the preferred occupations by most of local people in Ağlasun for economic reasons. Temporary or permanent departure of local people, especially young generation, from Ağlasun for the purpose of education or employment, causes the decrease on the number of people occupied with animal husbandry and agriculture. Therefore, the barn and storage areas in the traditional houses remain empty or they are started to be used for other functions such as an atelier or a tool house.

In additiın to that, both the migration out of the district and the decline of the tradition that more than one family live together in one house are effective in the emergence of unused spaces also in the first floors of the houses.

Furthermore, the use of niches and fireplaces for different purposes is also very common. The devices such as electric oven, stove, that were started to be used in daily life, has brought about the loss of the traditional fireplace usage. If an '*ocak*' in a room have not been closed although it is not used for its original function, dwellers utilize the volume, existing inside the mud brick masonry wall, as a niche to put some home devices such as an oven or the television (**Figure 124**).

Figure 124: *Both photos show the functional changes. The one on the left from H13, is a room that is used as storage. The one on the right from H7, is the usage of the 'ocak' as a niche.*

3.3.3. Changes in Material

In adaptation of the spaces to the contemporary life style, this type of interventions are divided in two which are the ones that applied because of functional changes of spaces or architectural elements and the others applied just because with the aim of improving characteristic features of elements or improving the benefits, provided by them.

The example for the first material based intervention type as a result of functional changes placing a washing machine or a dishwasher is in the volume of the unused traditional fireplace while some window openings are used as places for washbasin in some houses (**Figure 125**).

In addition to this, using a '*girellik*' as a bathroom or a kitchen is another example for the functional changes of the spaces (**Figure 126**). This kind of changes in the usage of the architectural elements and spaces necessitate the addition of water installation systems. At this point a problem occurs because neither compatible industrial insulation materials nor natural waterproof materials for plastering are used.

Moreover, dwellers usually prefer decommissioning an unused architectural element with material addition. To illustrate, according to dwellers, out of use, need for more privacy inside or attempts to increase heat insulation between inside and outside of buildings are some causes for closing door and window openings (**Figure 127**). In order to close some doors and windows, dwellers use adobe bricks or hollow bricks or some wooden plaques. Another intervention, which is related with loss of function and decommissioning with material addition, is that the traditional fireplaces are no longer in use, some of them are closed by covering via plastered and painted rows of hollow brick. That industrial building materials became easy to obtain makes dwellers, seeking a solution to their contemporary needs, prefer not to use traditional and local building materials and construction techniques.

The last example for the functional change related material based interventions is also one of the most frequently observed intervention. The screed application over the rammed earth layers of the floorings of the areas started to be used as wet rooms such as toilets, bathrooms and kitchens (**Figure 128**). According to Mustafa Onaç, the local builder, the thickness of the screed can change between 3 cm to 10 cm, which is applied also with reinforcement steels inside them.

Apart from these, it is possible to give replacement of wooden window frames with those made of PVC to provide heat insulation or enlargement of windows to get more daylight and exterior view and adding of iron or steel bars to windows for safety purposes as examples for this type of interventions (**Figure 129**).

Furthermore, with the aim of protecting mud bricks from outdoor conditions and keep them stable, dwellers apply partial plaster on exterior facades of their houses whenever they get a financial and workmanship opportunity. They prefer to use lime plaster or cement plaster rather than mud-based plaster (**Figure 130**).

Figure 125: *The photo from H19 on the left shows the use of the traditional fireplace as a niche for the washing machine; the photo from the H8 on the right shows the use of the traditional fireplace as a niche for the oven and the use of the transformation of a window opening to the place for a washbasin.*

Figure 126: *The photo on the left and the one in the middle are from H6 and the photo on the right is from the H2. They show the spaces, which were originally used as 'girellik', transformed to bathroom.*

Figure 127: *The photo from the H2 on the left shows the removal of the window frames and closing the openings with hollow bricks; the photo from the H7 shows the closed traditional fireplace.*

Figure 128: *Both two photos shows the additional screed layer on the floorings. The one on the left is from H15; the one on the right is from H19.*

Figure 129: *The photo on the left from H15 shows the replacement of the wooden frame window with the PVC. The one on the left one from H14 shows the structural and material change of the wooden staircase with the steel one.*

Figure 130: *The photo on the left from H5 shows the decommissioning of two window openings and a door opening by using both hollow bricks and mud bricks as infill materials. The one on the right from H8, shows partial cement plaster on the facade.*

3.3.4. Changes in Space

Spatial interventions are analysed under two main sub-headings which are spatial intervention via mass addition and spatial intervention by transforming the existing spaces according to the needs.

Building an additional mass in the same lot with the house at a different location from it, building a later mass adjacent to the house with / without an interior connection are three different variations of spatial interventions made with mass addition.

The first two applications are observed in additional mass construction mostly for the auxiliary buildings and the pens. The 3 of 19 houses (H1, H2, and H11) have additional auxiliary buildings while 4 of them (H3, H5, H6, H11) have pens on their lots separate from the main building (**Figure 131**). However, green house as an additional structure just exists on the lot of the H15.

Moreover, the interior expansion with mass addition to have new rooms for the house is observed only in the H2 (**Figure 131**). The other purpose of mass addition is to have an interior toilet which is integrated to the living areas of the houses (**Figure 132**).

In addition to these, in 5 out of 19 houses (H1, H2, H6, H8 and H14), there are new wet room additions on the '*saçak*' structures with the contemporary industrial materials such as concrete, screed, hollow bricks, cement mortars and plasters (**Figure 133**). If the structures, located on '*saçaks*' without any physical relation with the house such as the toilets, are required to be removed because of being not qualified and compatible constructions, it is possible to reverse them without causing damages to the traditional houses.

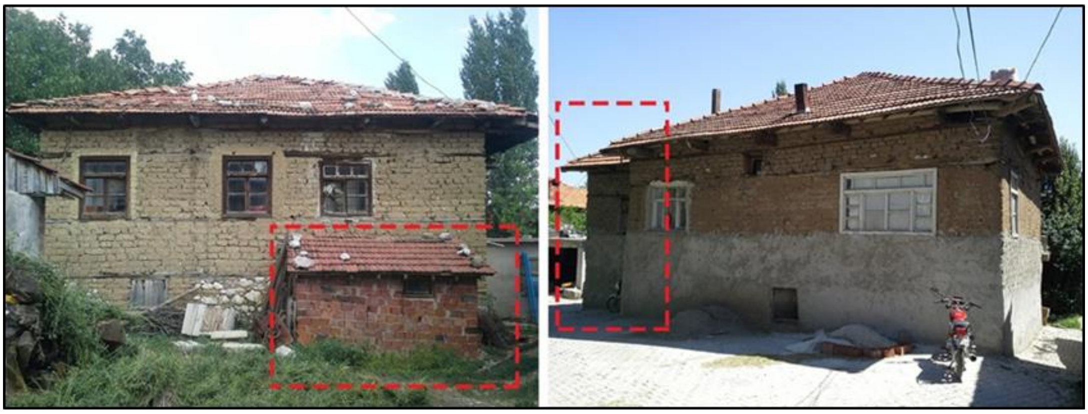


Figure 131: *Both photos shows the mass additions adjacent to the main structures. The one on the left from H5 is a pen built with hollow bricks. The one on the right from H2 shows the additional rooms which is built with mud brick masonry construction system.*

Figure 132: *First photo shows the toilet located at the end of the 'enlarged corridor'(H11); the second one shows the toilet located adjacent to the open 'sofa'(H16); the last one shows the toilet located at the end of the 'gezenek'(H15).*

Figure 133: *The photo from H2 on the left shows the toilet as a mass addition on the 'saçak'. The photo from H11 on the right shows the auxiliary building as a mass addition separately located on the same lot with the main housing.*

Apart from all these, dividing spaces or closing semi-open areas of the traditional mud brick masonry houses are the other methods of spatial interventions.

First, additions of new interior walls, which divide existing spaces, were done frequently in order to overcome the lack of original wet rooms such as toilet and bathroom and kitchen integrated with the living area (**Figure 134**). This is the most problematic type of the intervention made by the dwellers because water insulation is very essential for the mud brick masonry structures. Interventions such as poor water installation applications and usage of contemporary construction materials, which are incompatible with the local construction materials damage mainly the structural features of the traditional mud brick masonry houses in Ağlasun. This is observed in the 13 out of 19 houses namely H2, H3, H5, H9, H10, H11, H12, H13, H14, H16, H17, H18 and H19.

Secondly, another spatial intervention is closing an open '*sofa*' by constructing additional walls. It is possible to observe this intervention in H3, H6 and H14 (**Figure 135**). Moreover, in the houses H2, H12, and H18, the '*sofas*' were closed later too but different from the other three houses, a new room is also created with dividing the space belonging to '*sofa*'. The dwellers demanding to have a separate space from the '*sofa*' for using as a kitchen and wanting to keep the living space warmer during the winter seasons in a cheaper and easier way are the main reasons for this intervention type. Also, it is possible to note that most of additional walls are poor quality in terms of structural and material features but they are reversible if it is decided. However, this intervention is important as an action because of reflecting the contemporary needs of the dwellers.

Figure 134: *These two photo show the closed 'sofas', which are used as the kitchen, and the bathroom located just next to the kitchen by dividing the space with additional walls.*

Figure 135: *The photo from H6 on the left shows the 'sofa' which was closed later. The one on the right from H13 shows the toilet in front of the kitchen, which are both constructed with additional walls on the open 'sofa'.*

Analysis on the Curent Conditon of the Wet Spaces through Related Spatial Interventions

Among the interventions on the traditional mud brick masonry houses in Ağlasun mentioned above, the most frequently applied and problematical ones are structural, functional and material based additions which are applied in order to procure wet rooms, supplying contemporary living conditions to the dwellers. Because of the use of low quality materials, use of contemporary materials that are incompatible with the traditional ones and installations without considering water insulation between pipes and mud brick masonry walls or timber flooring systems have negative effects on the structure of the traditional mud brick masonry buildings over time.

Within the scope of this study, it was observed in the 19 houses that the materials and systems used for the interventions to create wet spaces mostly do not change, but there are various spatial solutions, implemented by dwellers. They are defined according to the locations of the toilet, bathroom and kitchen spaces.

It is seen on the **Table 2** that constructing additional walls on the 'saçak' structure, constructing an additional mass adjacent to the facade of the building and creating a separate space by dividing an existing space are different methods applied by dwellers to build a toilet. For the first one, there are five houses having toilets, which were constructed with hollow bricks on the reinforced concrete 'saçak' structure and there is just one example with a patchy structure, built by nailing wooden boards and timber laths together on the earthen 'saçak' structure. Secondly, the toilet, built adjacent to the facade of the house at the level of the first floor plan, has a direct entrance from the hall or the extended corridor. These structures were built with the timber frame structure with bağdadi covering system which is called '*iskiyet'* by the local people. Third, it is possible to observe the method of dividing an existing space by constructing additional walls on the ground floor, 'sofa' and one of the traditional rooms. Among these, the most common applications are building a toilet that is located separate from the house on the 'saçak', and allocating a space for the toilet by dividing an existing room. Similar to toilets, the bathrooms are located on 'saçaks', 'sofas' or in the area formed by dividing an existing room by an additional wall

Most of them are built next to the toilet (**Table 3**). In addition, it was observed that in three houses, the '*girellik*' space had been converted into a bathroom and there were '*gusülhane*' in two houses. Among these, the '*gusülhane*' in the H4 is currently in use while the one existing in the H15 is discarded.

Refunctioning of one of the original rooms to the kitchen is the most common intervention for adaptation of the houses to the modern requirements (**Table 4**). Apart from this, using 'girellik' as a kitchen and creating a separate space for the kitchen by constructing additional walls on the '*sofa*' are other practices. Also, in some cases, using the '*sofa*' as a kitchen by adding a kitchen furniture at the one side of the '*sofa*' is observed in some houses mostly during the summer periods.

After these analyses on the wet room installations made by dwellers, it was seen that a kitchen, a bathroom and a toilet were located all together in the 8 out of 19 buildings and in only 4 houses, there were walls constructed for the common use by the wet rooms that are located side by side (**Table 5**).

In H15, there is no area for taking a shower other than ‘gusulhane' which is not in use today. Its toilet, located at the end of the ‘*gezenek*’ without any direct interior connection between the living areas of the house, is in a very poor condition due to its damaged structure and water piping system. The mud brick masonry wall between the kitchen and the toilet is used for the transfer of water installation without taking any precaution of water insulation except the usage of the cement added plaster on the wall. Considering all these reasons, among the 19 studied houses, H15 is determined as the house whose wet space condition is the most critical.

Table 2: *Analysis on the toilet types according to their locations.*

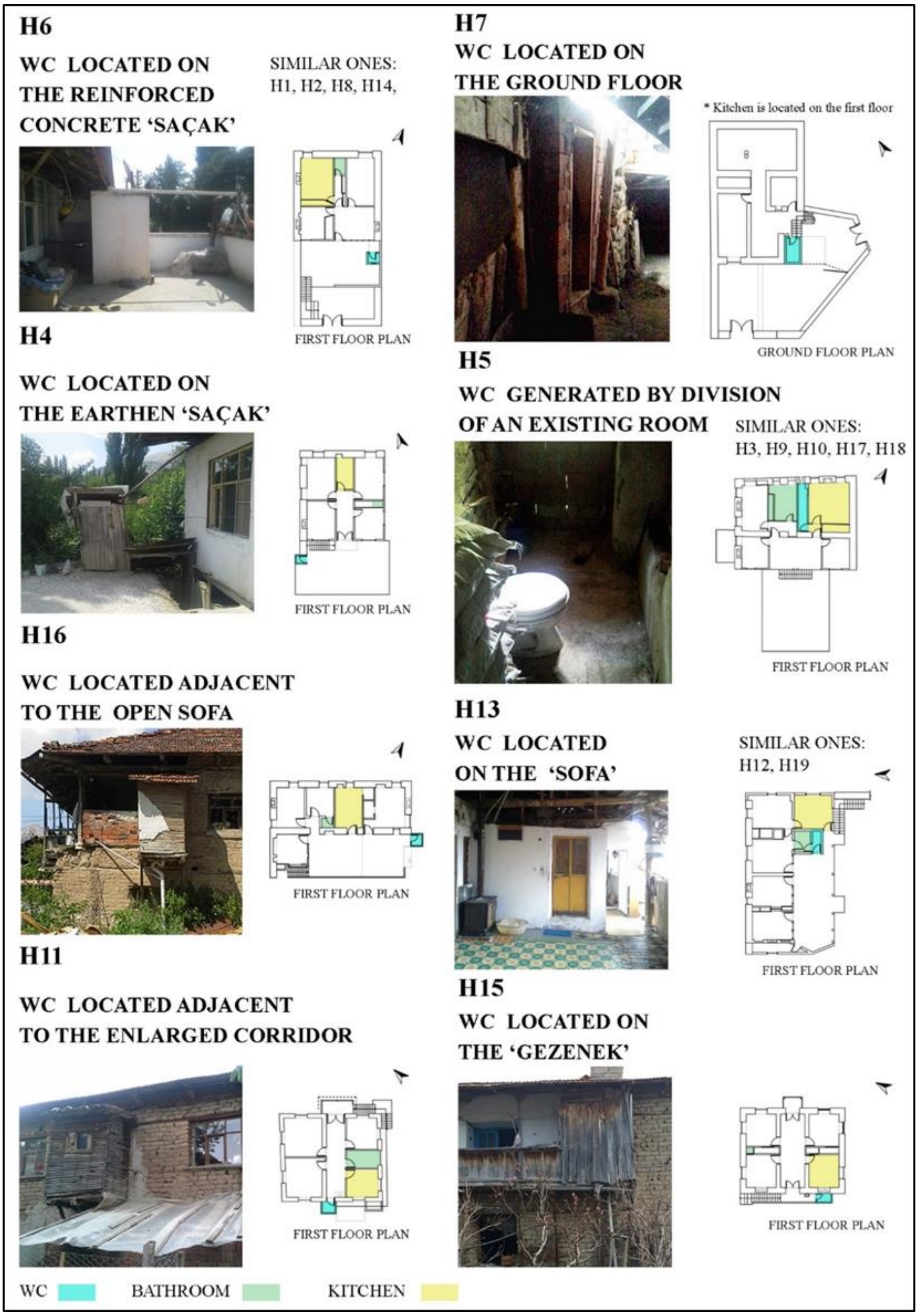


Table 3: *Analysis on the bathroom types according to their locations.*

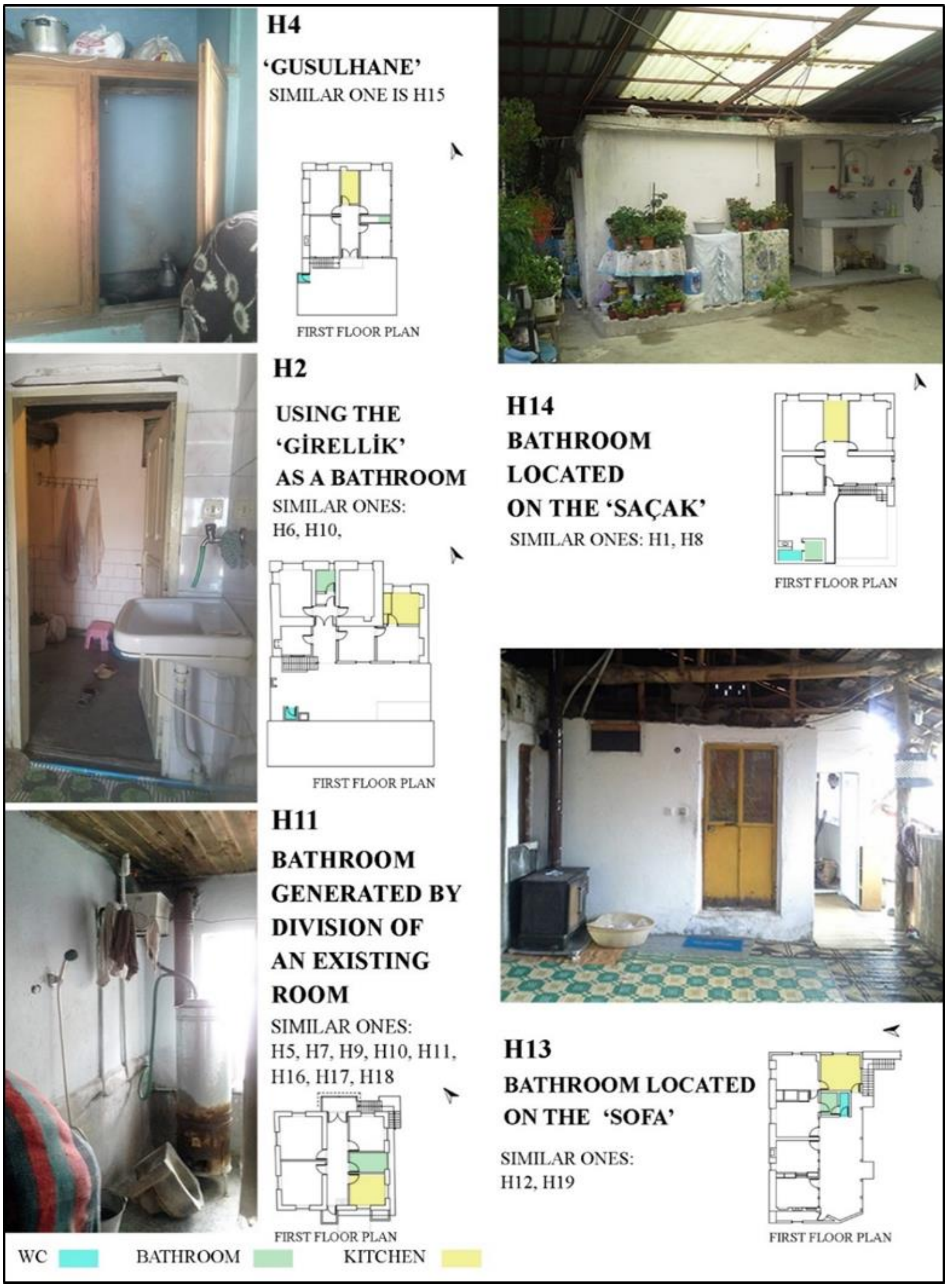


Table 4: *Analysis on the kitchen types according to their locations.*

H16

ADDITIONAL KITCHEN WORKTOP LOCATED ON THE 'SOFA'

SIMILAR ONES: H3, H7, H12

H19

USING ONE OF THE ORIGINAL ROOMS AS A KITCHEN

SIMILAR ONES: H1, H5, H6, H7,H8, H9, H10, H11, H15, H16, H17

H14

USING 'GIRELLIK' AS A KITCHEN

SIMILAR ONE IS H4

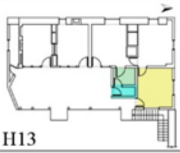
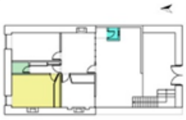
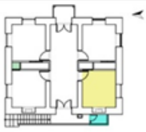
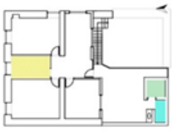
H13

KITCHEN AS A LATER ADDITION ON THE 'SOFA'

SIMILAR ONES: H2, H18

WC BATHROOM KITCHEN

Table 5: *Analysis on wet space areas according to their relations.*

Sapaces Located Together	Sample Plan	Additiona Installation Wall is Existent in Between the Spaces	Additional Installation Wall is Non-existent in Between the Spaces
THE KITCHEN, THE BATHROOM AND THE WC ARE LOCATED TOGETHER	 H13	H3, H9, H13	H5, H8, H10, H17, H18
THE KITCHEN AND THE BATHROOM ARE LOCATED SIDE BY SIDE	 H6	H12	H6, H11, H16
THE KITCHEN AND THE WC ARE LOCATED SIDE BY SIDE	 H15		H15
THE BATHROOM AND THE WC ARE LOCATED SIDE BY SIDE	 H14	H1, H14, H19	
The Kitchen, the Bathroom and the Wc are all located seperately in H2, H4 and H7			
WC BATHROOM KITCHEN			

CHAPTER 4

ASSESMENTS ON ARCHITECTURAL FEATURES AND INTERVENTIONS DONE BY USERS ON THE TRADITIONAL AĞLASUN HOUSES

4.1. Results of the Typological Studies: What is Ağlasun House?

Under the light of the information obtained from 19 houses studied within the scope of this thesis, lot typology, plan typology and facade typology studies have been carried out on the traditional houses in Ağlasun. As a result of the evaluation of these typologies, the typology of the Traditional Houses in Ağlasun is determined. The data considered while generating the typologies, their relations with each other and the distribution of their existence in 19 houses are indicated within the context of lot, plan and facade of the houses respectively.

4.1.1. The Lot of Ağlasun House

The determination of the lot and the characteristics related with the open and built areas on it are mentioned at the beginning of the previous chapter while defining the Traditional Ağlasun House.

In therms of morphological examination, 6 of the 19 lots studied are in rectangular form, while 13 of them do not have a regular geometric shape. Because of there isno specific relation between gathered information about morphology, size and open-built area ratios, these inputs were not considered while defining the lot typology. So, as the second step for the lot study, functions existing in lots, locations of the houses and their relations with the surroundings were evaluated for each and the lot typology is defined according to these.

In order to identify the lot typology, the type of the relationship between the house and the street defining the lot is considered as the main parameter. Thus, there are two types of lots which are determined by the two kinds of relations. The Lot Type 1 with seven examples represents the indirect relation between the house and a street defining the lot boundary while the Lot Type2 with other twelve examples indicates the direct relation between the house and the street (**Figure 136**). All seven houses in the Lot Type 1 have a courtyard. Moreover, there are also two lots with both a courtyard and a garden while there are 10 lots without a courtyard but with a garden in the Lot Type 2.

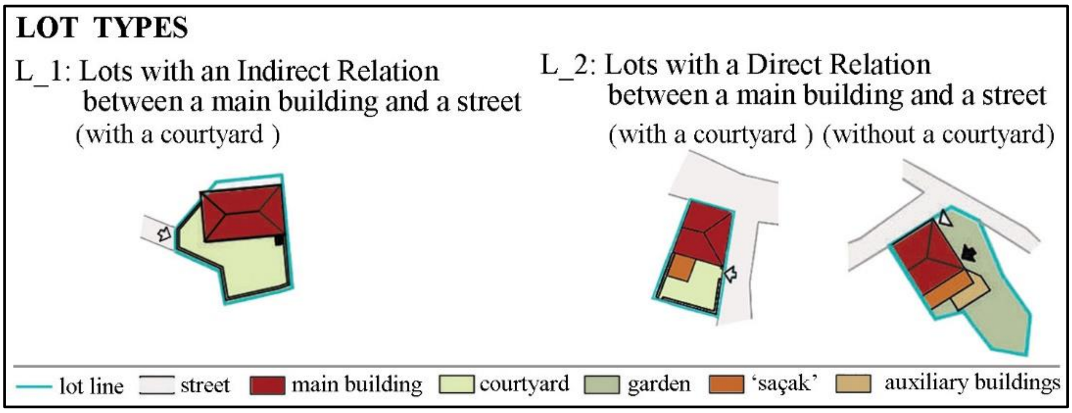


Figure 136: *Lot Types observed in the Traditional Ağlasun Houses.*

The distribution of these types among the 19 houses studied is presented in the **Table 6**. The distribution of the features of the lots such as ther relationship with built area, way of entrances and the relationship between a main building and a street are presented together in the **Table 7**.

In addition to these, courtyards increase the privacy of the houses. 6 out of these 10 buildings, which are not located in the courtyards but in gardens, have facades that directly define a street and their '*saçaks*' are located on the garden side while just 3 of them define a street with their both facades and '*saçaks*'. Thus, it is understood that for the buildings without courtyard, the privacy of a '*saçak*' is preferred rather than the privacy of the rooms. Because a '*saçak*' also supply a common area, which is different from a '*sofa*'.

Table 6 : *The Lot Typology of Traditional Ağlasun Houses*

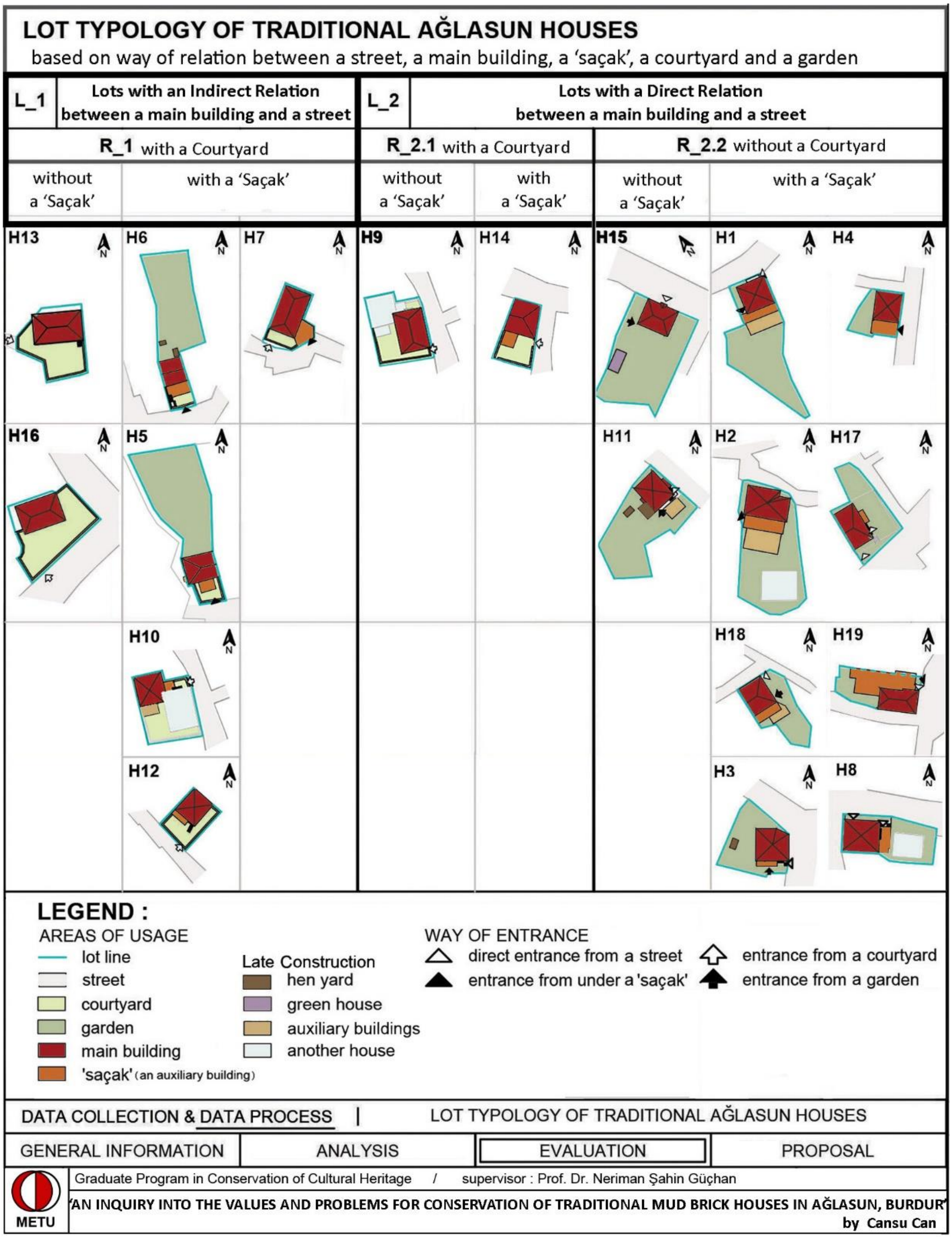


Table 7 : *Criteria Used for the Lot Typology of Traditional Ağlasun Houses and Their Distribution Among the Studied Cases.*

CRITERIAS EXAMINED FOR
THE LOT TYPOLOGY OF TRADITIONAL AĞLASUN HOUSES
based on way of relation between a street, a main building, a 'saçak', a courtyard and a garden

HOUSES			H 1	H 2	H 3	H 4	H 5	H 6	H 7	H 8	H 9	H 10	H 11	H 12	H 13	H 14	H 15	H 16	H 17	H 18	H 19	TOTAL
Built Area of a Lot	more than %50								●		●	●									●	4
	equal to %50			●	●					●				●	●	●						6
	less than %50		●				●	●					●				●	●	●			7
Relation between a street, a main building and an open area in a lot	R_1 Lots with a main building, not adjacent to a street (with a courtyard)						●	●	●			●		●	●			●				7
	R_2 Lots with a main building, adjacent to a street	R_2.1 with a courtyard									●					●						2
		R_2.2 without a courtyard	●	●	●	●				●			●				●		●	●	●	10
way of **Entrance**	E1 ⇧ Entrance from a courtyard						●	●	●		●	●		●	●	●		●				9
	E2 △ Direct entrance from a street		●		●					●			●				●		●	●	●	8
	E3 ▲ Entrance from a 'saçak'					●													●		●	3
	E4 ⬆ Entrance from a garden		●	●	●												●			●		5
LOT TYPOLOGY	L_1 Lots with an Indirect Relation between a Main Building and a Street						●	●	●			●		●	●			●				7
	L_2 Lots with a Direct Relation between a Main Building and a Street		●	●	●	●				●	●		●			●	●		●	●	●	12

DATA COLLECTION & DATA PROCESS | CRITERIAS EXAMINED FOR THE LOT TYPOLOGY

GENERAL INFORMATION | ANALYSIS | EVALUATION | PROPOSAL

METU | Graduate Program in Conservation of Cultural Heritage / supervisor : Prof. Dr. Neriman Şahin Güçhan

'AN INQUIRY INTO THE VALUES AND PROBLEMS FOR CONSERVATION OF TRADITIONAL MUD BRICK HOUSES IN AĞLASUN, BURDUR'
by Cansu Can

4.1.2. The Plan Typology

The Plan Typology of the traditional mud brick masonry houses in Ağlasun were determined according to the first floor plan organization which includes the living spaces of the houses. These study was made according to the original spatial features of the traditional houses.

On the first floors, there are three main plan types which are defined according to their common spaces. First, within the F.F._1, there is an open '*sofa*' and rooms; second, within the F.F._2, there is a common space which is located between the rooms is defined as the 'enlarged corridor' and third one, F.F._3, is the plan organization with a closed '*sofa*' located between the rooms (**Figure 137**).

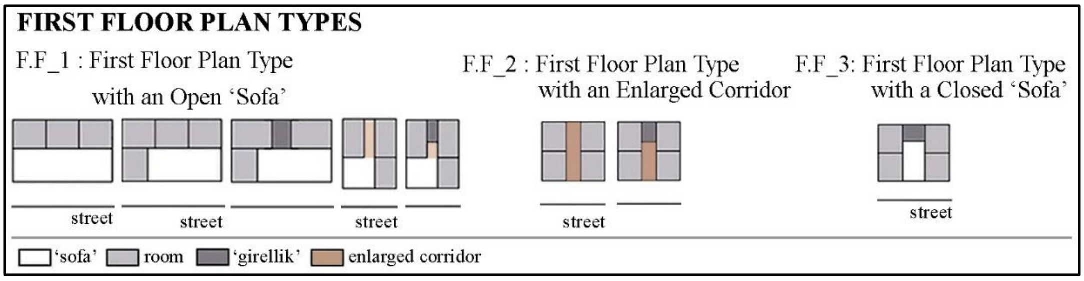


Figure 137: *First Floor Plan Types*

There are 12 houses belonging to the Plan Type-1 (F.F._1) and rooms around it. These are, the plan organization with rooms arranged in an order on one side of an open '*sofa*' (F.F_1.1), the plan organization with rooms arranged in an L shape around an open '*sofa*' (F.F_1.2), the plan organization with rooms arranged via both an open '*sofa*' and a hallway (F.F_1.3). In addition to these, there are also 'girelliks' in some houses belonging to the last two.

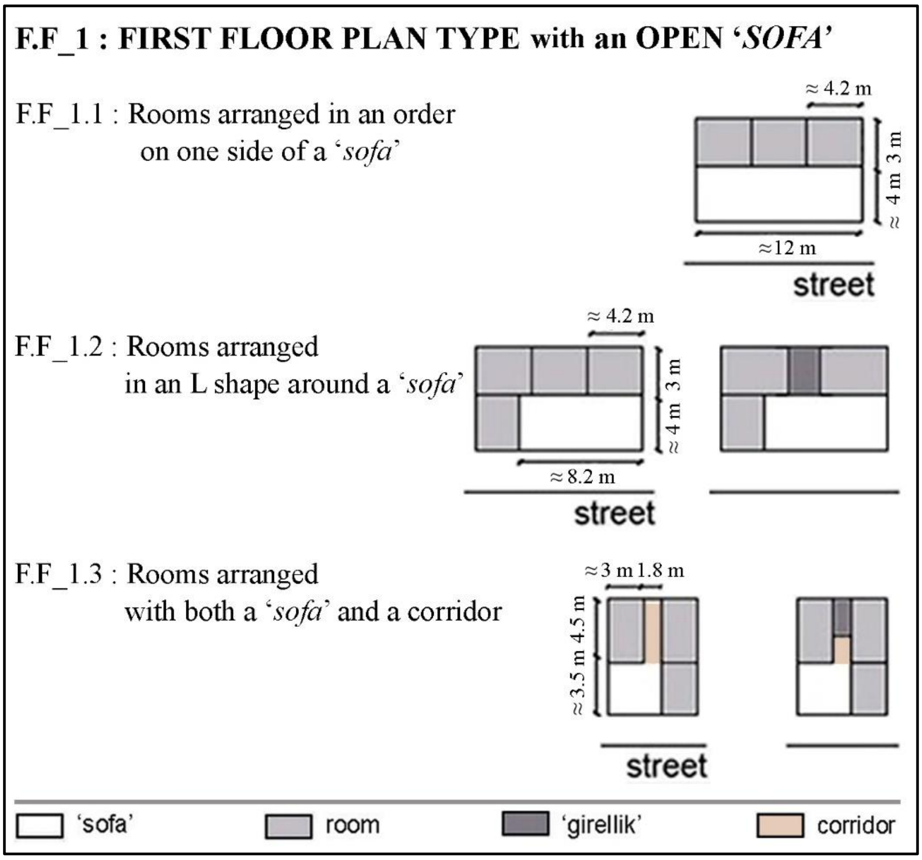


Figure 138: *The First Floor Plan Type 1 (F.F_1) of the Traditional Ağlasun Houses.*

However, according to this plan typology (F.F_1), there are two exceptional houses which have their special kind of '*sofa*' among the studied houses (**Figure 139**). First one is H19, which is special due to its '*sofa*' which was originally closed and constructed as a projection on the first floor, although its plan typology is one of the F.F._1.1. Second one is H9, which has an open '*sofa*' located outside of the first floor, although it is an example of the F.F._1.3.

On the other hand, Plan Type-2 (F.F._2) with 5 houses, consists of rooms that are located on the both sides of an enlarged corridor on one side of which a 'girellik' is located. Finally, the last plan type is the Plan Type 3 (F.F_3) with a closed '*sofa*' and rooms located on both sides of it (**Figure 140**).

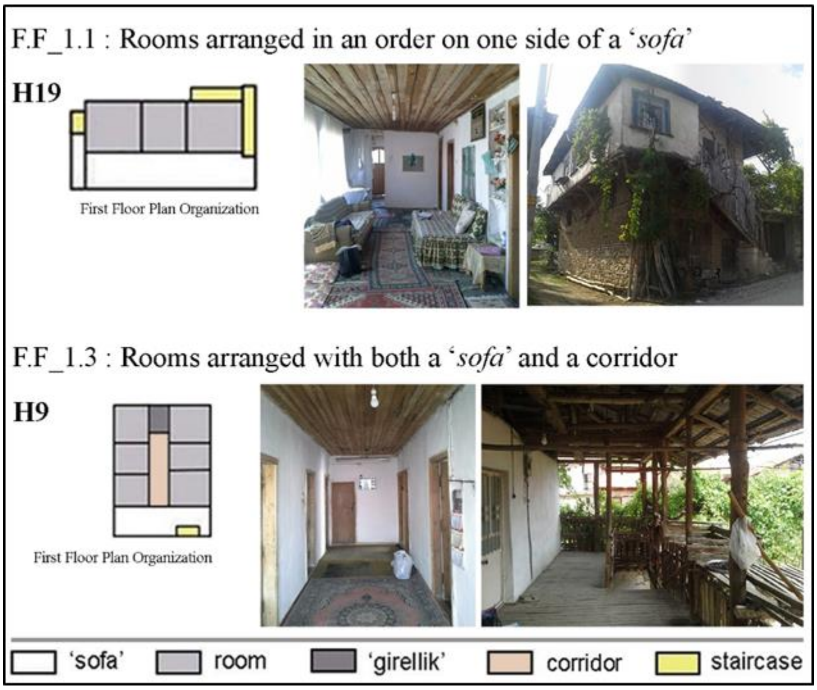


Figure 139: *Individual cases among the 19 studied traditional houses in terms of their plan organizations.*

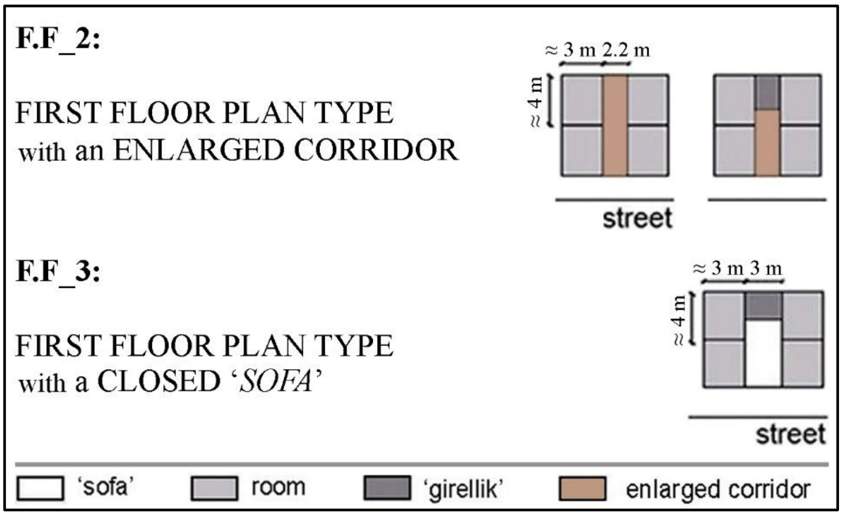


Figure 140: *The image shows the First Floor Plan Type 2 and the First Floor Plan Type 3.*

Regarding the floor plan typology, organized according to the original plans of the houses, it can be deduced that the space organizations have changed from F.F_1 to F.F_3 in time and F.F_1.1 is the oldest spatial organization among all.

Moreover, due to the change of daily routines in the house and newly emerging daily needs of people, some changes on both the plan organizations and features of some spaces were made after the construction of these houses. There are two kinds of interventions which change the plan scheme. First one is that the open '*sofa*'s in the buildings belonging to F.F_1.3 of Type 1, except H7, were subsequently closed. '*Sofas'* of H3, H14 and H6 were closed and given their current form, while the plan organization of H2, H12 and H18 were converted to FF_2 by closing their '*sofas*' in order to create another separate room.

While the transition from F.F_1.3 to F.F_2 in the first floor plan organizations occurred in the houses constructed later, in the meantime, the transformation of existing houses in the same direction over time with interventions by dwellers became a part of this transition. These interventions are analysed in Chapter 4 within the scope of this thesis work.

In addition to these, there are three variations of the ground floor plan organization in these defined spaces. As indicated in the **Table 8**, these are the plan organization with two consecutive spaces (GF_1), the plan organization with an L shape or U shape space arrangement around a circulation area (GF_2) and the plan organization with spaces located on both sides of a circulation area (GF_3). The first one is the most prevalent with eight examples while the second one is seen in five houses and the last one is seen in six houses. The distribution of both the plan typology and the ground floor plan organization among the 19 traditional houses studied is shown in the **Table 9**.

Table 8: *Plan Typology of Traditional Ağlasun Houses*

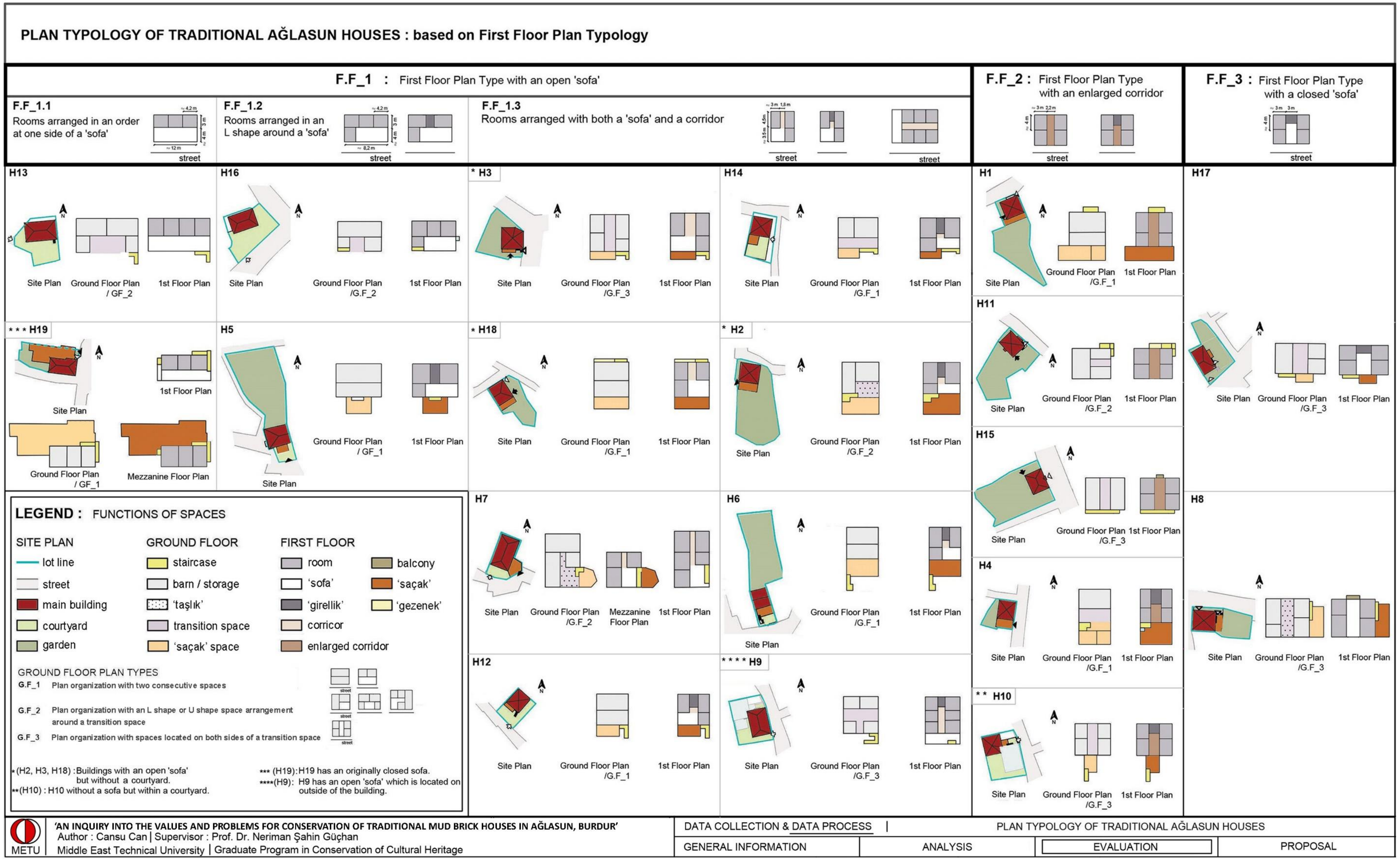


Table 9: *Criterias Used for the Plan Typology of Traditional Ağlasun Houses and Distribution of them among the Studied Cases*

CRITERIAS EXAMINED FOR
THE PLAN TYPOLOGY OF TRADITIONAL AĞLASUN HOUSES
based on First Floor Plan Typlogy

HOUSES			H 1	H 2	H 3	H 4	H 5	H 6	H 7	H 8	H 9	H 10	H 11	H 12	H 13	H 14	H 15	H 16	H 17	H 18	H 19	TOTAL
FIRST FLOOR PLAN TYPOLOGY	F.F_1 First Floor Plan Type with an open 'sofa'	F.F_1.1 Rooms arranged in an order at one side of a 'sofa'													●						●	2
		F.F_1.2 Rooms arranged in an L shape around a 'sofa'					●											●				2
		F.F_1.3 Rooms arranged both with a 'sofa' and a hallway		●	●			●	●		●			●		●				●		8
	F.F_2 First Floor Plan Type with an enlarged corridor		●			●						●	●				●					5
	F.F_3 First Floor Plan Type with a closed 'sofa'									●									●			2
GROUND FLOOR PLAN ORGANIZATIONS	G.F_1 Plan organisation with two consecutive spaces		●			●	●	●						●		●				●	●	8
	G.F_2 Plan organisation with an L shape or U shape space arrangement around a 'taşlık'			●					●				●		●			●				5
	G.F_3 Plan organisation with spaces located two sides of the 'taşlık'				●					●	●	●					●		●			6

DATA COLLECTION & DATA PROCESS | CRITERIAS EXAMINED FOR THE PLAN TYPOLOGY

GENERAL INFORMATION | ANALYSIS | EVALUATION | PROPOSAL

METU
Graduate Program in Conservation of Cultural Heritage / supervisor : Prof. Dr. Neriman Şahin Güçhan
'AN INQUIRY INTO THE VALUES AND PROBLEMS FOR CONSERVATION OF TRADITIONAL MUD BRICK HOUSES IN AĞLASUN, BURDUR'
by Cansu Can

4.1.3. The Facade Typology

Before determination of the facade typology of the houses, a representative exterior facade of each house are selected. If any, the facades, defining the street, were selected. For the houses, located in a courtyard without any relation with a street, the first encountered facade of the house behind the courtyard walls are taken into consideration. Accordingly, the Facade Typology of traditional Ağlasun houses consist two main types which are described as courtyard facades (Fa_1) and street facades (Fa_2) (**Figure 141**).

Except for one house constructed later adjacent to an existing traditional house in a courtyard, the houses belonging to the Facade Type-1 have an open '*sofa*' in their courtyards. Staircases of most of these houses are also adjacent to their facades. Moreover, as a common feature, there is at least one single-winged door on the courtyard facades providing access to the spaces located on the ground floors of the main buildings from the streets (**Figure 142**).

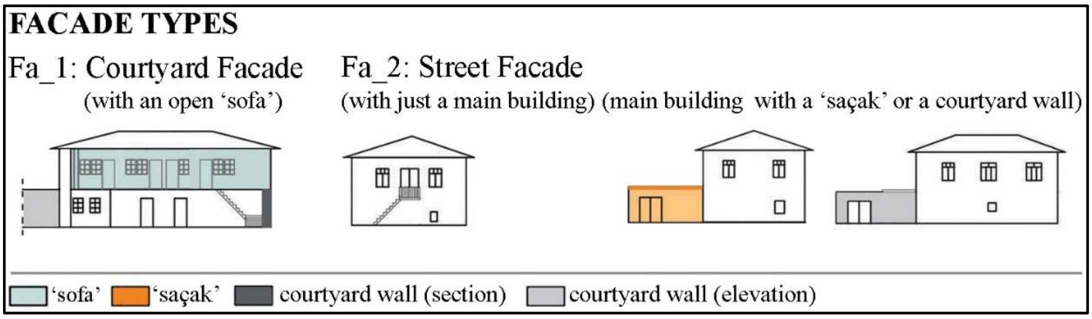


***Figure 141:** Facade Types of Traditional Ağlasun Houses*

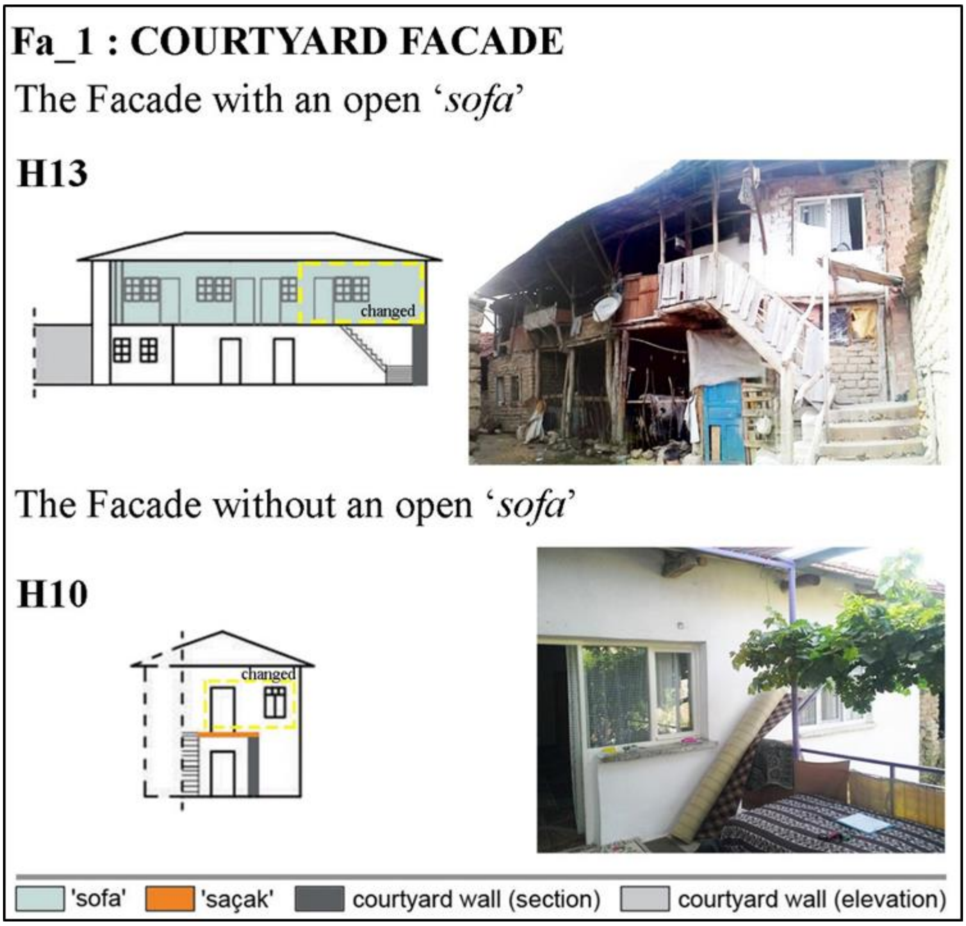


Figure 142: *The Examples for the Facade Type 1.*

In some houses belonging to the Facade Type 2, at least one facade of the main structure defines the street (**Figure 143**). Among these houses, there are ones that have direct access to the living area from the street with the stairs on their facades. Even if they are rare, there are single-winged doors that provide direct access from the street to the ground floor of the main building.

The distribution of the Facade Typology (**Table 10**), the types of entrances observed on the selected facades and the features of the selected facade wall in terms of its materials and construction techniques are shown together in the **Table 11**.

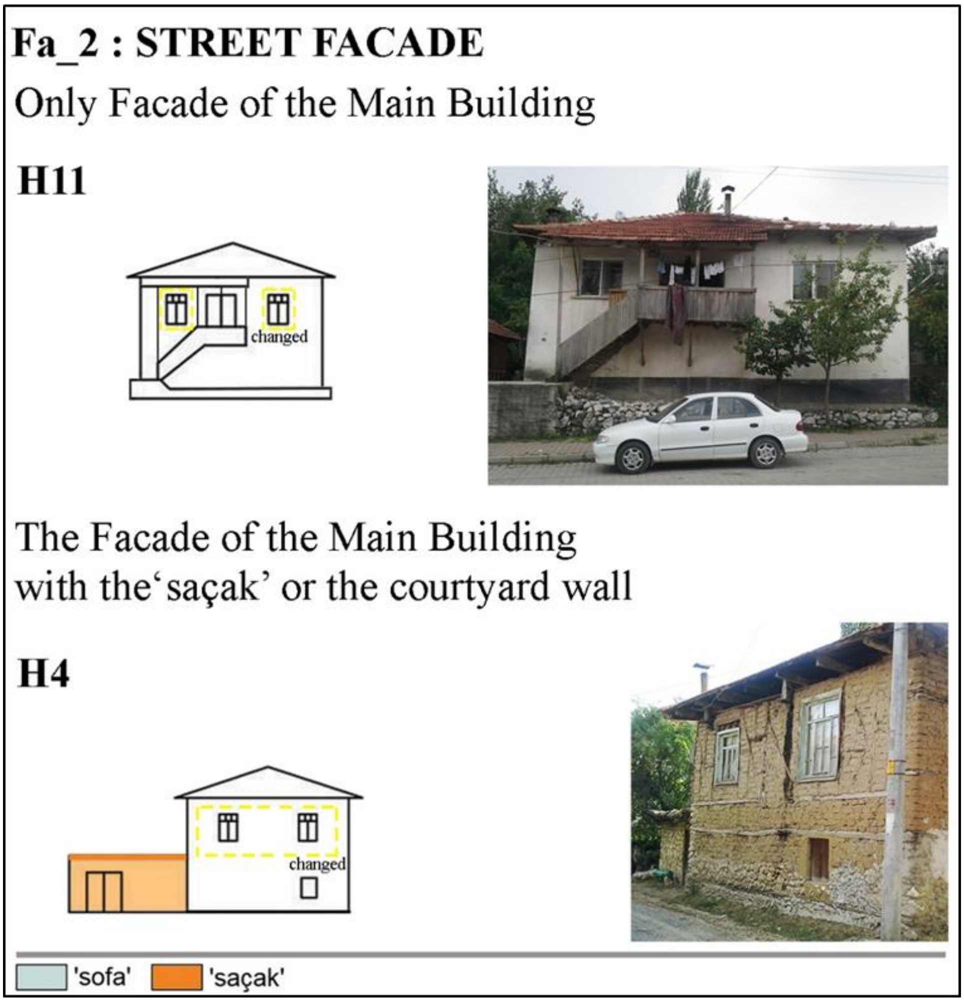


Figure 143: *The image shows the examples for the Facade Type 2.*

Table 10: *Facade Typology of Traditional Ağlasun Houses*

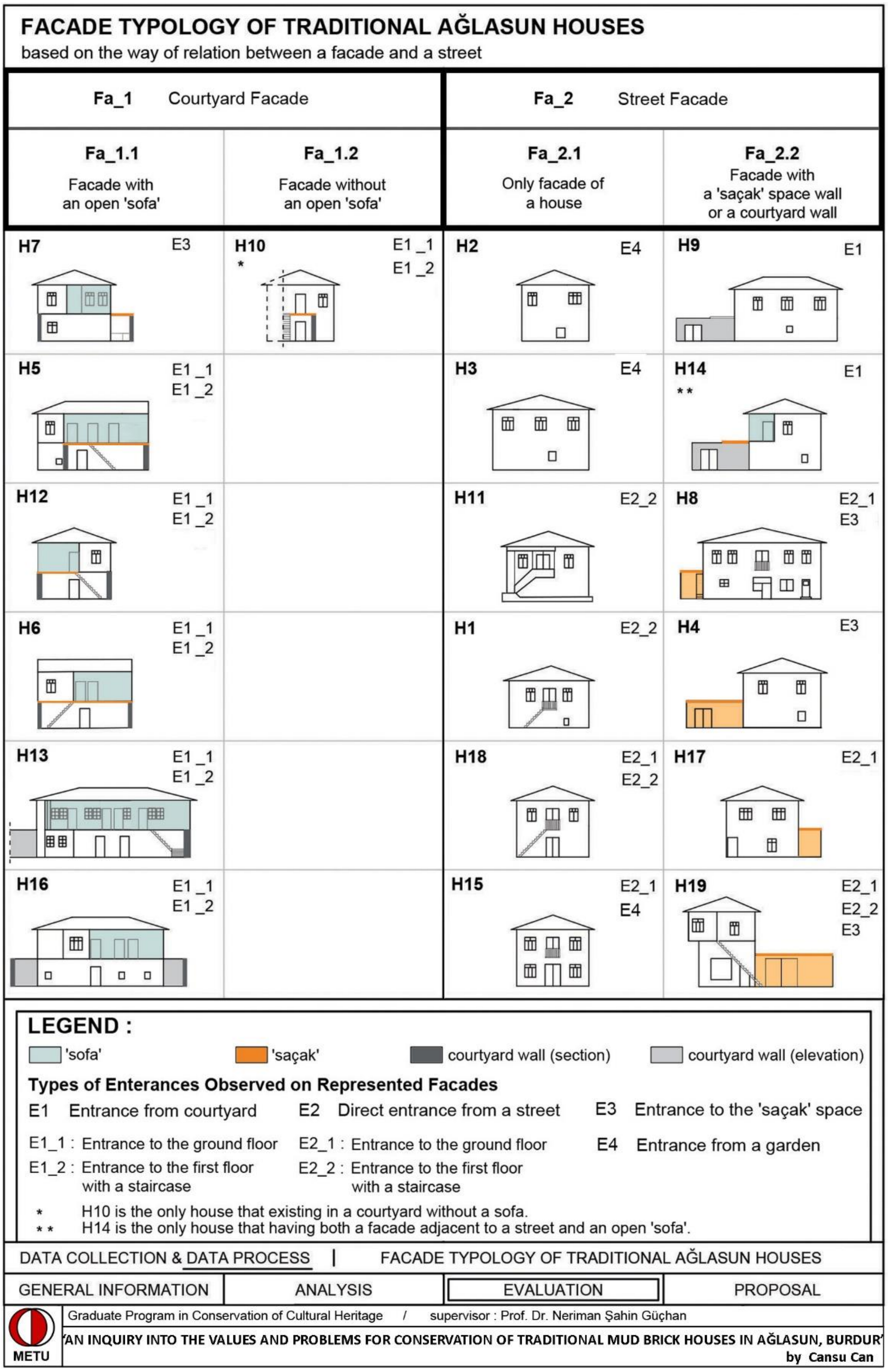


Table 11: *Criterias Used for the Facade Typology of Traditional Ağlasun Houses and Distribution of them among the Studied Cases.*

CRITERIAS USED FOR
THE FACADE TYPOLOGY OF TRADITIONAL AĞLASUN HOUSES
based on the way of relation between the facade and the street

HOUSES			H 1	H 2	H 3	H 4	H 5	H 6	H 7	H 8	H 9	H 10	H 11	H 12	H 13	H 14	H 15	H 16	H 17	H 18	H 19	TOTAL
FACADE TYPOLOGY	Fa_1 Courtyard Facade	**Fa_1.1** Facade with an open 'sofa'					●	●	●					●	●			●				6
		Fa_1.2 Facade without an open 'sofa'										●										1
	Fa_2 Street Facade	**Fa_2.1** Only facade of a house	●	●	●					●			●				●			●		7
		Fa_2.2 Facade with a 'saçak' space wall or a courtyard wall				●					●					●			●		●	5
Types of Entrances Observed on Selected Facades	E1 Entrance from a courtyard	E1_1 : Entrance to the ground floor					●	●						●	●			●				5
		E1_2 : Entrance to the first floor with a staircase						●						●	●			●				4
	E2 Direct entrance from a street	E2_1 : Entrance to the ground floor								●							●		●	●	●	5
		E2_2 : Entrance to the first floor with a staircase	●										●						●	●	●	5
	E3 Entrance to the 'saçak space'					●													●		●	3
	E4 Entrance from a garden			●	●																	2
Selected Facade Wall	Visible Construction Techniques	Mud brick Masonry		●	●	●	●		●	●	●	●		●	●		●	●			●	13
		Stone Masonry ; more than 1m from the ground level			●										●						●	3
		Bağdadi System with timber					●		●					●	●			●			●	6
	Finishing Materials	not plastered				●																1
		partially plastered		●	●		●		●	●	●	●		●	●		●	●			●	12
		totally plastered	●					●					●			●			●	●		6

DATA COLLECTION & DATA PROCESS | CRITERIAS EXAMINED FOR THE PLAN TYPOLOGY

GENERAL INFORMATION | ANALYSIS | EVALUATION | PROPOSAL

METU | Graduate Program in Conservation of Cultural Heritage / supervisor : Prof. Dr. Neriman Şahin Güçhan

'AN INQUIRY INTO THE VALUES AND PROBLEMS FOR CONSERVATION OF TRADITIONAL MUD BRICK HOUSES IN AĞLASUN, BURDUR'
by Cansu Can

4.1.4. Evaluation of the Ağlasun Houses with Reference to the Typological Studies

According to literature, namely the unpublished study, titled ‘Understanding a Historic Rural Landscape in Relation with an Archaeological Site: Ağlasun/ Sagalassos’ directed by the tutors, A. Güliz Bilgin Altınöz, Neriman Şahin Güçhan, Anlı Ataöv and prepared by the PhD Students Aynur Uluç, Emine Çiğdem Arsav, Ezgi Balkanay, İsmail Demirdağ, Özge Yersen, V. Betül Kurtuluş, and the article ‘Characteristics of Earthen Architecture in Ağlasun’ (Kurtulus et al., 2017), the Bala is the oldest neighbourhood in Ağlasun and the categories of Ağlasun Houses, consisting of early and late period structures; are ‘Ağa evi’ (Mansion), ‘Ordinary Traditional Houses’ and ‘Köy Odaları’ (Community Houses). Under the light of this information from the literature, the typology studies on the Traditional Ağlasun Houses, including both ordinary houses and the houses described as ‘Ağa Evi’, were realized.

Determination of The House Typology of traditional mud brick masonry houses in Ağlasun is based on the integrated assessment of the Lot Typology, the Plan Typology and the Facade Typology. According to this, there are two types in the House Typology of traditional mud brick masonry houses in Ağlasun (**Table 12**). Distribution of them are demonstrated in the **Table 13**. Information on construction dates of the houses were obtained from dwellers during the field study. Regarding this, as mentioned before, the traditional houses in Ağlasun are divided into two. The houses belonging the Type 1, which were constructed during the early period before the 1950s and the houses, belonging to the Type 2, which were built during the late period, after the 1950s.

Traditional Ağlasun Houses, belonging Type-1, which are older than the others, are mostly observed in Bala Neighbourhood. All of them are in the form of a rectangular prism and most of them are located in a courtyard. They are two storey buildings and some of them also have a mezzanine. Moreover, an open '*sofa*' on their first floors is another common and distinguishing characteristics of them.

Although small and modest dwellings are the majority, the dwellings called as 'Ağa Evi' are included in Type-1. Kurtuluş et al. (2017) state that some traditional houses in Ağlasun are called 'Ağa Evi' because they belong to the prominent and rich people. This type of houses are not different from the other houses in terms of their plan organizations but they are bigger and have more ornamented architectural elements than the ordinary houses. Moreover, there are a separate cellar, named 'ambar' and mezzanines, serving as a guest room or a temporary storage area in these houses.

Among the 19 traditional houses studied within the scope of this thesis, three early period houses, H7, H13 and H16, have some similar features with this definition of the **'***Ağa Evi***'.** They are all big in size and they have more ornamented elements such as '*yaşmak*' and '*şerbetlik*' compared to the others. Except for the houses that are defined as 'Ağa Evi', there is no difference between houses belonging Type-1 and Type-2 in terms of the functions of the spaces, the architectural elements and ornamentations.

The transition between these two types is not sharp, so differences are observed among the first type of the houses. Among the studied houses, the oldest ones belonging to Type 1, are located in the courtyards. The living area has an open rectangular '*sofa'* with rooms located on one side of it. In some cases, there is also a separate room called 'ambar üstü' as a part of the '*sofa*'.

In the plan organization of some houses, which were built later than the houses belonging the Type 1, a corridor between rooms was started to be used in addition to the '*sofa*'. These include the houses both located inside the courtyards and the ones that do not have a courtyard and define the street with their facades. The '*saçak*' and open '*sofa*' are located on the garden side of the main building provide the privacy in these houses. The entrances to these buildings are mostly from the rear facade or lateral facades, not directly from the street.

On the other hand, the Traditional Ağlasun Houses, belonging Type-2, were built during the late period, after 1950. They are also defined as traditional in the above mentioned study, 'Understanding a Historic Rural Landscape in Relation with an Archaeological Site: Ağlasun/ Sagalassos'. But these houses, which have cubic form, differentiated from others as the New Traditional because of being developed after 1950s and built with local materials and techniques by the local building masters.

All of these houses are located in a garden, not in a courtyard and at least one of their facades defines the street. They are cubic, two storey modest buildings. A decrease in the use of the open '*sofa*' has been occured since the 1950s in these buildings. From that times, while the open '*sofa*' of some houses, belonging Type 1, were turned into the closed '*sofa*', the construction of the open '*sofa*' ended with the construction of enlarged corridors, which are slightly wider than an ordinary corridor but also narrower than a '*sofa*', in the houses belonging Type 2. Although these spaces are not used for various daily activities as frequent as a '*sofa*', they are also not just circulation areas. In two studied houses, H8 and H17, it was seen that these spaces, located between rooms, are built as wide as a closed '*sofa*'.

Different from some Type 1 houses, which have a street facade, the '*saçak*' of some houses, belonging Type 2, are also located next to the street facades of the main buildings and the space defined by the 'saçak' supply an access from the street to the ground floor of the main building. Except for the cases where these spaces contain itself a staircase, reaching the living area on the first floor, a staircase is located adjacent to one of the facades, usually the street facade, with a balcony or a '*gezenek*'.

In this respect, when the Type 1 houses belonging to the early period and the Type 2 houses built during the late period are compared, it is observed that the space arrangements are generated as more closed to the outside while between the houses and the street, the stronger relation in terms of direct access to the interiors is provided.

Distribution of the 19 traditional mud brick masonry houses studied in Ağlasun according to the house types are indicated in the **Figure 144**. Five out of seven houses studied in Sakarca neighbourhood belong to Type 1 and two houses belong to Type 2. Four out of seven houses studied in Bala neighbourhood belong to Type 1 and three houses belong to Type 2. One of the two houses studied in the Çınar neighbourhood belongs to Type 1 and the other one belongs to Type 2. Two out of three houses studied in Kum neighbourhood belong to Type 1 and one house belongs to Type 2. However, it must be indicated that in order to determine the exact ratios of the existence and distribution of the two types of houses throughout the Ağlasun, a similar study should be carried out involving all traditional houses in the district.

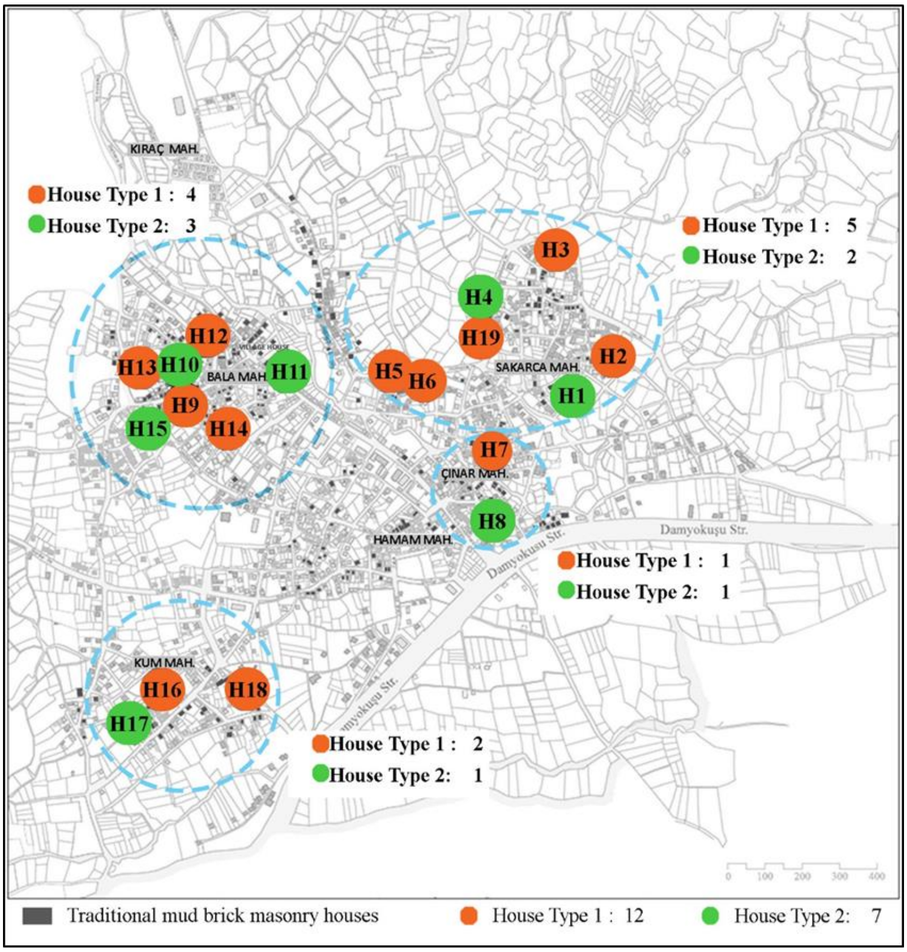


Figure 144 : *Distribution of the Type 1 and the Type 2. The map, used as a template is the ''Open-Built Up relation in Ağlasun - Five neighborhoods of Ağlasun.'' (Kurtulus et al., 2017)*

***Table 12:** The House Typology of the Traditional Ağlasun Houses*

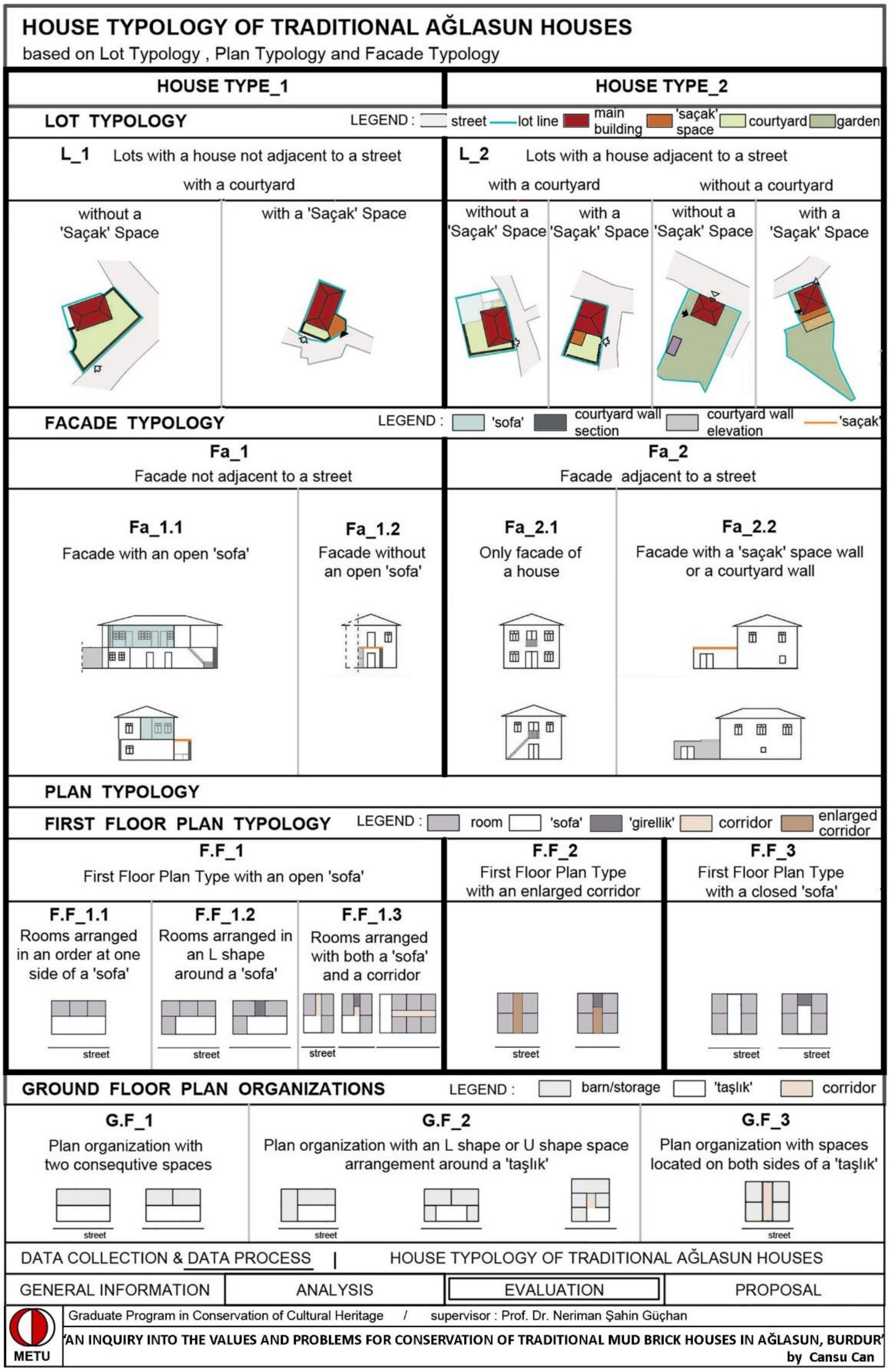


Table 13 : *Criterias Used for the House Typology of Traditional Ağlasun Houses and Distribution of them among the Studied Cases.*

CRITERIAS USED FOR THE HOUSE TYPOLOGY OF TRADITIONAL AĞLASUN HOUSES

based on Lot Typology , Plan Typology and Facade Typology

HOUSES			H 1	H 2	H 3	H 4	H 5	H 6	H 7	H 8	H 9	H 10	H 11	H 12	H 13	H 14	H 15	H 16	H 17	H 18	H 19	TOTAL
LOT TYPOLOGY	L_1 Lots with a house not adjacent to a street	L_1 with a courtyard					●	●	●			●		●	●			●				7
	L_2 Lots with a house adjacent to a street	L_2.1 with a courtyard									●					●						2
		L_2.2 without a courtyard	●	●	●	●				●			●				●		●	●	●	10
FACADE TYPOLOGY	Fa_1 Facade not adjacent to a street	Fa_1.1 Facade with an open 'sofa'					●	●	●					●	●			●				6
		Fa_1.2 Facade without an open 'sofa'										●										1
	Fa_2 Facade adjacent to a street	Fa_2.1 Only Facade of the house	●	●	●								●				●			●		6
		Fa_2.2 Facade with a 'saçak' space wall or a courtyard wall				●				●	●					●			●		●	6
FIRST FLOOR PLAN TYPOLOGY	FF_1 First Floor Plan Type with an open 'sofa'	FF_1.1 Rooms arranged in an order at one side of a 'sofa'													●						●	2
		FF_1.2 Rooms arranged in an L shape around a 'sofa'					●											●				2
		FF_1.3 Rooms arranged both with a 'sofa' and a hallway		●	●			●	●		●			●		●				●		8
	FF_2 First Floor Plan Type with an enlarged corridor		●			●						●	●				●					5
	FF_3 First Floor Plan Type with a closed 'sofa'									●									●			2
GROUND FLOOR PLAN ORGANIZATION (This section has no role in determining the plan typology. It is included just for comparison.)	GF_1 Plan organization with two consequtive spaces		●			●	●	●						●		●				●	●	8
	GF_2 Plan organization with an L shape or U shape space arrangement around a 'taşlık'			●					●				●		●			●				5
	GF_3 Plan organization with spaces located on both sides of a 'taşlık'				●					●	●	●					●		●			6
HOUSE TYPOLOGY	TYPE 1			●	●		●	●	●		●			●	●	●		●		●	●	12
	TYPE 2		●			●				●		●	●				●		●			7

LEGEND : ● House belogs to Lot Type2 and Facade Type2 but Plan Type1
● House belongs to Lot Type1 and Facade Type1 but Plan Type2
● House which is relatively differentiated with its special kind of a 'sofa'

DATA COLLECTION & DATA PROCESS | CRITERIAS EXAMINED FOR THE PLAN TYPOLOGY

GENERAL INFORMATION | ANALYSIS | EVALUATION | PROPOSAL

METU | Graduate Program in Conservation of Cultural Heritage / supervisor : Prof. Dr. Neriman Şahin Güçhan

'AN INQUIRY INTO THE VALUES AND PROBLEMS FOR CONSERVATION OF TRADITIONAL MUD BRICK HOUSES IN AĞLASUN, BURDUR'
by Cansu Can

4.2. Assesment of the Changes and Interventions

All the interventions are evaluated under three headings according to their effects on the original houses.These are **removals**, **alterations** and **additions** on buildings (**Table 14**).

Removals includes just interventions on architectural elements. **Alterations** are defined under three sub-headings namely alterations in use, alterations in material and size of architectural elements, alterations in structures and materials. Moreover, there are two types of additions which are **additions** of new spaces and additions of architectural elements.

Decommissioning doors, windows and traditional fireplaces by closing them, changing the earthen flat roofs with the hipped roofs, changing materials and structures of both the stairs and the 'saçaks', using the fireplaces as the niches, using barns as storage areas, replacing wooden doors with those made of steel or PVC, changing timber-framed windows with those made with PVC, addition of partial plaster on the exterior facades, constructing new walls, addition of the screed layer on the floors and the water installations to create wet rooms are the most frequent interventions implemented. On the other hand, the use of a niche as a sink, addition of new space to have a room, and addition of walls for transforming an open '*sofa*' to closed '*sofa*' are the least common interventions implemented among the 19 studied houses.

Table 14: *Comperative Study in terms of Removals, Alterations and Additions*

TABLE OF COMPARATIVE STUDY BETWEEN 19 HOUSES AND THE VILLAGE ROOM in terms of REMOVALS, ALTERATIONS and ADDITIONS

REMOVALS	ALTERATIONS			ADDITIONS	
Removal of Architectural Elements	C1_Alterations in Use	C2_Alterations in material and size of architectural elements	C3_Alterations in Structure & Material & (Place)	A1_Addition of New Spaces	A2_Addition of Architectural Elements
R1- Removal of a door R2- Removal of a window R3- Removal of a 'Ocak'	C1.1- Use of a 'Ocak' as a Niche C1.2_Use of a Barn as a Depot C1.3- Use of a Niche as a Sink	C2.1- Changing a door frame material from wooden to steel or PVC C2.2_Changing a window frame material from wooden to PVC	C3.1- Changing material of stairs from wooden to reinforeced concrete OR steel C3.2- Changing an earthen 'Saçak' to one made up of reinforeced concrete C3.3- Changing an earthen flat roof to free standing wooden roof C3.4- Changing mudbrick masonry or 'bağdadi' walls to walls made up of a wooden frame structure within mud brick infill or to hollow brick masonry or to gas concrete masonry	A1.1- Addition of a new space to have a barn A1.2- Addition of a new space to have a room	A2.1- Addition of walls to create a space mostly for a bathroom and rarely for a new room. A2.2- Addition of walls for transforming an open 'sofa' to closed 'sofa' A2.3- Addition of doors A2.4- Addition of windows A2.5- Addition of partial plaster on exterior facade walls A2.6- Addition of timber posts

HOUSE	R1	R2	R3	C1.1	C1.2	C1.3	C2.1	C2.2	C3.1	C3.2	C3.3	C3.4	A1.1	A1.2	A2.1	A2.2	A2.3	A2.4	A2.5	A2.6
H1				●				●	●	●	●								●	
H2		●	●						●	●	●		●	●	●		●	●	●	
H3	●	●	●	●	●				●	●	●	●			●	●				●
H4			●									●							●	●
H5	●	●	●						●	●	●				●		●		●	
H6			●						●	●	●					●	●	●	●	
H7			●	●					●		●	●			●				●	●
H8	●	●		●	●	●			●	●	●				●		●		●	
H9		●		●	●		●	●			●	●			●		●	●	●	●
H10					●			●	●	●	●	●	●		●		●		●	●
H11		●						●			●	●	●		●		●	●	●	
H12				●	●		●	●	●	●	●	●			●	●	●	●	●	●
H13											●	●			●		●	●		●
H14		●			●		●	●	●	●	●	●			●	●	●	●	●	●
H15	●	●		●	●			●			●								●	
H16			●								●				●		●			
H17				●	●				●	●	●	●			●		●			
H18				●	●				●	●	●	●	●		●		●			
H19			●		●						●	●			●		●	●	●	

METU | 'AN INQUIRY INTO THE VALUES AND PROBLEMS FOR CONSERVATION OF TRADITIONAL MUD BRICK HOUSES IN AĞLASUN, BURDUR' | DATA COLLECTION & DATA PROCESS | COMPARATIVE STUDY BETWEEN 19 HOUSES in terms of REMOVALS, CHANGES and ADDITIONS

Author : Cansu Can | Supervisor : Prof. Dr. Neriman Şahin Güçhan

Middle East Technical University | Graduate Program in Conservation of Cultural Heritage

GENERAL INFORMATION | ANALYSIS | EVALUATION | PROPOSAL

4.3. Assesments on Traditional Mud Brick Masonry Houses in Ağlasun in terms of Values, Potentials and Problems

In order to preserve values, improve potentials and overcome problems, they are evaluated before the determination of conservation principles by utilizing both the information collected and produced up to end of this part of the study.

4.3.1. Assesment in terms of Values and Potentials

Apart from environmental and historical values of Ağlasun, the selection of houses to study is based on values in the building scale. These are use of local construction materials, existence of original structural and architectural elements and architectural spaces reflecting the traditional way of life in these houses.

Firstly, the contribution to the environmental sustainability and energy efficiency with the usage of local construction materials is the base value of traditional architecture in Ağlasun, as in many rural areas in Turkey (**Figure 145**). In addition to these, the use of spolia construction materials is also an essential value for these houses because this also points out the relationship between the ancient city 'Sagalassos' and the life in the Ağlasun settlement (**Figure 146**).

Figure 145 : *Stone, mud brick and timber, the local construction materials of the Traditional Houses in Ağlasun. The photo on the left is from the H15 and the photo on the right is from the H9.*

Figure 146: *Spolia as a part of a staircase and the stone masonry wall. The photo on the left is from the H19 and the photo on the right is from the H13.*

Second, values of architectural elements are evaluated according to their authenticity related with originality of materials and construction techniques. So, it should be pointed out that, while defining the condition of authenticity, the quantity of existing conscious interventions by dwellers on architectural and structural elements constitute the ground. The case-specific balance in this attitude for each house is important for any probable conservation project. The loss of authenticity of walls, doors, windows and floors is significant and also most of the stairs and '*saçak*' structures among the 19 traditional houses studied have no authenticity because of total change of their materials and construction techniques.

However, thirdly, despite all the improper interventions, these nineteen traditional mud brick masonry houses keep their original architectural characteristics to a large extent. For instance, existence of fireplaces, niches, '*yüklük*', '*şerbetlik*', '*gusülhane*' and granaries are important values for these houses because they directly indicate the traditional life style including dwellers' daily habits and customs in the past (**Figure 147**). Similarly, each open, semi open and closed space with original functions such as '*sofa*', rooms, 'girellik', balcony, storage, barn, garden and courtyard are evaluated as architectural value of these houses. Among these traditional architectural elements and spaces, the ones that are not in use today have the utility potential which is possible in future, depending on the user profile.

Furthermore, accessibility of environmental sources for obtaining local construction materials such as stone, soil and timber is a potential for possible coherent interventions in the future.

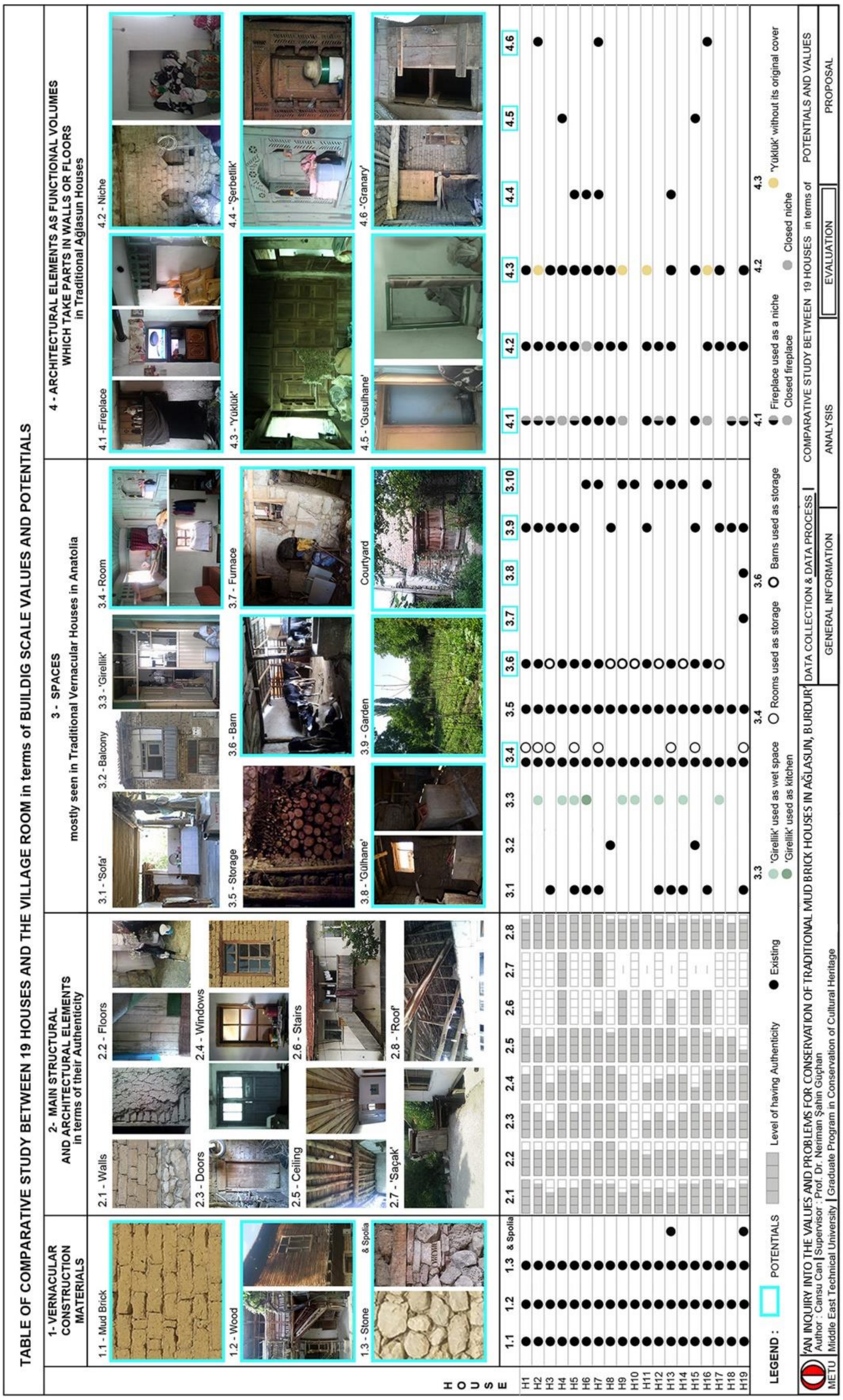
Figure 147: *A 'Yüklük', a 'şerbetlik' and an 'ocak' with a 'yaşmak'. The photos are from the H13.*

In addition to these, Ağlasun is a rural settlement with its high tourism potential. Agri-tourism and outdoor sports tourism are also headings on which various studies have been carried out besides the ongoing scientific studies under the light of archaeological excavations in Sagalassos.[16] In this regard, if traditional houses in Ağlasun are evaluated within the context of rural architectural heritage, it is possible to evaluate both the rehabilitation of traditional houses and the rural tourism as interactive supporting issues. In this case, rooms and barns, which are used as storages because they have lost their original functions, are suitable for periodic re-functioning according to characteristic architectural elements that they have while the houses still continue to be used as dwellings. In addition to these, the presence of the bakery and the '*gülhane*', the space for rose water production, in H19 have also potentials to be revitalized with the contribution of collective and participatory labour.

Assessment of the 19 houses studied in terms of their values and potentials in a comparative study are presented in the **Table 15**.

[16] For more information, see ' Ağlasun İlçesinin Alternatif Turizm Kaynakları' (Ceylan, 2015)

***Table 15:** Comparative Study in terms of Values and Potentials*



4.3.2. Assesment in terms of Problems

Especially in earthquake-prone regions like Burdur, apart from the necessity of proper construction practices, being in use and having regular maintenance are very vital for traditional structures. During the site survey in Ağlasun, it is observed that most of abandoned traditional mud brick masonry houses have collapsed. Nineteen studied traditional mud brick masonry houses, which continue to exist with their original functions, also have some problems.

Problem types are analysed under six main headings. These are structural problems, surface problems, installation problems, insulation problems, problems based on inadequate interventions and utilization problems.

First, structural cracks and material loss existing on masonry walls, and sagging bending moments on ceilings are observed as the structural problems of some houses (**Figure 148**, **Figure 149**).

Second, there are surface problems comprising non-structural cracks, which appear mostly on the plasters on the walls, material degradation and material discoloration on stones, mud bricks, timber elements, mortar and plaster (**Figure 150**).

Figure 148: *The photo on the left shows the sagging on the ceiling. The others show the structural cracks on the masonry walls. From left to right, the photos are from H14, H15, H3 and H7.*

Figure 149: *The material loss on the mud brick masonry and timber-framed walls. From left to right, the photos are taken from H3, H4 and H15.*

Figure 150: *The discoloration problem on the timber elements. The photo on the left is taken from H5 and the photo on the right is taken from the H15.*

Third, the use of low-quality pipes and drainage systems in water installation is the most important installation problem (**Figure 151**). Electrical installation also pose danger due to the uninsulated electric cables. In addition to this, some dwellers indicate the appearance of the electrical installations as a problem but it is possible to evaluate the visibility of electric cables as a part of the characteristic interior space of these houses in case they are well insulated and arranged properly.

Fourth, lack of or insufficient heat insulation in floors, doors, windows, ceilings and roofs and lack of water insulation around water installation are types of insulation problems.

Figure 151: *The first photo from the H19, shows the mud brick masonry wall exposed to water leakage from the pipe; the second photo from the H9 shows the condition of the drainage piping system and its physical relation with the mud brick masonry wall and reinforced concrete slab; the third one shows the relation between the water pipe and the traditional flooring system.*

Figure 152: *The photos show the electric cables in poor condition without any isolation. From left to right, the photos are from H5, H7 and H15.*

Fifth, there are various problems based on inadequate interventions. First of all, dwellers prefer to complete the partially collapsed mud brick masonry walls by using hollow bricks. Moreover, some dwellers, just because they want to extend interior spaces in the first floor of their houses, consciously demolish a part of the mud brick masonry walls and construct new walls made up of hollow bricks or timber framed structure within mud brick infill. These applications weaken the stability of structures by damaging load bearing walls and disrupting the integrity of the construction system. There are no strong structural relation between mud brick masonry walls and the walls constructed with hollow bricks because they just constructed adjacently without any connection detail. So, they are separated from each other when the houses are exposed to earthquake forces. And the only implementation applied on these areas is just covering the cracks by plastering.

One of the most common intervention problem in traditional mud brick houses in Ağlasun is the usage of cement plaster on the mud brick masonry walls. According to Minke (2006, p. 101), cement plaster is not appropriate material to be used together with mud brick because it is a weak material against both thermic and hygric forces. This causes the penetration of the water into the loam and consequently causes the swelling, crack formations and spillage on the plaster. Similarly, Şahin (1995, p. 275) states that Portland cement is not compatible with mud brick because it is less pervious and stronger material than mud brick and also it contains a high salt consentration. Use of cement plaster leads to deterioration in mud brick, in which consisting organic materials, because of permanent dampness under the plaster.

Furthermore, alteration of the timber-framed windows with the ones made of PVC eliminates the beneficial features of the timber-framed windows such as breathing capability and being compatible with the mud brick masonry walls. Similarly, the replacement of the original doors with new ones is observed in some houses.

In addition to these, replacement of wooden stairs and earthen '*saçak*' structures with the ones, constructed with reinforced concrete damages the characteristics of the houses by breaking their integrity in terms of being built with local construction materials and traditional construction systems. Because both the stairs and the '*saçak*' structures are parts of a whole that defines 'Traditional Ağlasun Houses' like the main building, involving living spaces.

The last problem type is the utilization of spaces in many houses. Formerly, in the buildings, where more than one family lived together, each room on the first floor of the houses were spaces that provided various needs of a family such as cooking, showering and sleeping etc. Due to this intensive use, each room was also heated continuously with the traditional fireplaces. Moreover, at that time, the number of local people, who were occupied with animal husbandry, and their animals were more than today so, barns were warmer because the animals used to heat up the environment. Thus, at the present time, the temperature difference between floors is higher than before due to the use of barns on the ground floors as storages.

Furthermore, since the number of people living in each traditional house in Ağlasun is not more than five in general, many rooms on the first floors are not used continuously during the day. These two situations make it difficult to maintain heating in the living areas during the winter period and therefore, dwellers spend most of their time in just one room during a day. This situation shows that for the traditional mud brick masonry houses in Ağlasun, better thermal insulation in doors, windows, roofs, ceilings and floors is required.

In addition to these, it should be indicated that, piping and drainage problems of the water installation, lack of water insulation around these piping systems, material or construction system alterations on existing walls and inadequate structural relation between mud brick masonry walls and new walls built with contemporary materials, are problems which have been caused the structural problems.

Table 16: *Comparative Study in terms of Building Scale Problems*

TABLE OF COMPARATIVE STUDY BETWEEN 19 HOUSES AND THE VILLAGE ROOM in terms of PROBLEMS

	1 - STRUCTURAL PROBLEMS		2 - SURFACE PROBLEMS				3 - INSTALLATION PROBLEMS		4 - INSULATION PROBLEMS		5 - INADEQUATE INTERVENTION PROBLEMS					6 - UTILIZATION PROBLEMS	
	1.1- Structural Cracks	1.2- Sagging Bending	2.1- Non-Structural Cracks	2.2- Material Degradation on stone, mud brick, timber, morter and plaster	2.3- Material Loss on stone, mud brick, timber, morter and plaster	2.4- Material Discoloration on stone, mud brick, timber, morter and plaster	3.1- Piping and Drainage Problems of Water Installation	3.2- Cable Problems of Electrical Installation	4.1- Insufficient Heat Insulation on floors, doors, windows, ceilings and roofs	4.2- Lack of Water Insulation around water installations	5.1- Material or Construction System Alterations on existing walls	5.2 -Alteration of windows to get better heat insulation	5.3 -Alteration of doors to increase security	5.4-Alteration of stairs and 'saçak	5.5- Inadequate relation between reinforced concrete or hollow brick walls and mud brick masonry walls	6.1- Not Being in a Full Capacity Use	6.2- Alteration in Use of Spaces
HOUSE	1.1	1.2	2.1	2.2	2.3	2.4	3.1	3.2	4.1	4.2	5.1	5.2	5.3	5.4	5.5	6.1	6.2
H1			●		●	●	⊖	●	●	●		●		●		●	
H2			●	●		●	⊖	●	●	●	●			●	●	●	●
H3	●		●			●	⊖	●	●	●	●	●	●	●	●	●	●
H4	●	●	●	●	●	●	⊖	●	●	●	●	●					●
H5			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
H6	●	●	●	●		●	●	●	●	●		●	●	●			●
H7	●	●	●	●	●	●	●	●	●	●				◐		●	●
H8			●	●	●	●	●	●	●	●	●	●		●	⊖		●
H9		●	●			●	⊖	●	●	●	●	●	●		●		●
H10	●		●				⊖	●	●	●	●	●	●	●	●		●
H11			●	●		●	⊖	●	●	●	●	●	●				
H12		●	●	●	●	●	⊖	●	●	●		●	●	●			●
H13	●	●	●	●	●	●	●	●	●	●	●	●	●	◐		●	
H14		●	●	●	●	●		●	●	●	●	●	●	●			●
H15		●	●		●	●	●	●	●	●		●	●			●	
H16	●		●		●	●	●	●	●	●							
H17			●	●	●	●	●	●	●	●			●	●	●		●
H18		●	●	●				●	●	⊖			●	●	●		●
H19	●		●	●	●	●	●	●	●	●	●			●		●	●

LEGEND : ◤ This problem also causes a structural problem ⊖ Could not observed ◐ Alteration of just stairs

'AN INQUIRY INTO THE VALUES AND PROBLEMS FOR CONSERVATION OF TRADITIONAL MUD BRICK HOUSES IN AĞLASUN, BURDUR'
Author : Cansu Can | Supervisor : Prof. Dr. Neriman Şahin Güçhan
METU | Middle East Technical University | Graduate Program in Conservation of Cultural Heritage

DATA COLLECTION & DATA PROCESS | COMPARATIVE STUDY BETWEEN 19 HOUSES in terms of PROBLEMS

GENERAL INFORMATION | ANALYSIS | EVALUATION | PROPOSAL

CHAPTER 5

PRINCIPLES FOR CONSERVATION OF TRADITIONAL MUD BRICK AĞLASUN HOUSES AND CONCLUSION OF THE THESIS

After the evaluations which are related with architectural and spatial characteristics of the houses, interventions done by dwellers, definitions and assessment of the values, potentials and problems of the 19 traditional mud brick masonry houses in Ağlasun are given in the previous chapter. In order to conserve these values, solve the problems and evaluate the potentials, general decisions and principles for conservation are presented in this section. Following this, intervention proposals are indicated prior to conclusion of the thesis.

5.1. Principles for Conservation of Traditional Mud Brick Ağlasun Houses

In order to determine principles for conservation of traditional mud brick masonry houses in Ağlasun, maintaining the values and potentials, appropriate approach for interventions made by dwellers and new interventions are considered. Accordingly following principles are driven:

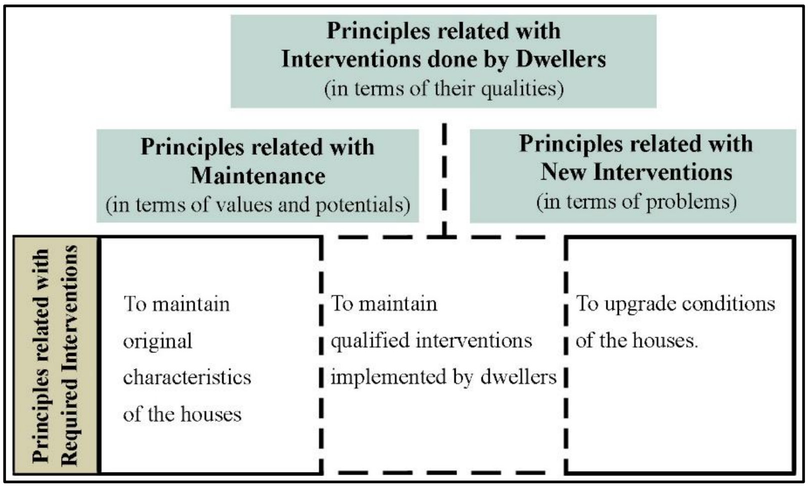


Figure 153: *The image shows the relation of conservation principles and required interventions.*

Principles Related with Maintenance

- Characteristic features of the buildings, consisting original structural and architecural values and potentials, must be preserved.

- The sources of the physical problems must be determined and kept under control.

- Seismic measures must be taken considering earthquake risks.

- Material decay, material loss, structural problems and non-structural cracks must be repaired with both distinguisable and compatible materials.

- Repair of missing or damaged parts of the buildings must be preferred as much as possible rather than their replacement.

- Use of local construction materials must be prefered and sustained in repair.

- Unique and distinguishing features in terms of craftsmanship must be retained.

- Spolia must be documented, and preserved in-situ and analysed by specialists.

Principles Related with the Interventions Done by Dwellers

- Each existing intervention on the building should be analyzed by considering their potential for representing the time physically in the assessments of their quality before applying the required conservation interventions.

- Qualified alterations and additions, reflecting their application periods, must be maintained and preserved.

- If the implemented interventions damage the original structure or architectural characteristics of the traditional houses, they must be reversed or replaced using compatible materials and techniques with the originals.

Principles Related with New Interventions

- Redundant interventions must be avoided by keeping the new interventions at minimum as much as possible.

- If one part of the building needed to be removed inevitably due to the new interventions, which is done in order to bring houses to contemporary living standards, the trace of the missing component must be made observable and must be preserved.

- New interventions must reflect their implementation period with the current technology by also considering the spirit of the place.

- New materials and construction techniques, used for the new interventions, must be distinguished from the original parts of the houses while also must be harmonious in terms of color, size and proportion.

- Materials used for the new interventions must be compatible with the existing authentic materials in terms of performance characteristics such as density, porosity and mechanical resistance in order to preserve the structural and architectural integrity of the traditional buildings.

- New interventions must be reversible in case they are wanted to be removed from the structure in future not to damage the integrity, historical, architectural and structural features of the traditional houses.

- New interventions must be designed flexible in order to maintain their continuity by being able to fulfil the different needs of the future generation.

5.2. General Decisions and Definitions of Required Interventions among 19 Studied Traditional Mud Brick Ağlasun Houses

This section of the thesis includes required interventions among 19 studied traditional mud brick masonry houses in Ağlasun which are related with the determined conservation principles.

Required Interventions Related with Repair and Conservation of the Original Structural and Architectural Elements

The durability of the structures is the primary requirement that must be ensured in terms of both the continuity of the buildings and the safety of inhabitants. This section consist required interventiones for providing structural stability and repair of architectural elements.

During this process, the maintanence, consisting structural improvement and partial repair, should be the primary preferred method for the interventions on the decayed structural and architectural elements, and the replacement of the original elements with the new ones must be practiced later if it is needed.

Before all interventions, finding the possible reasons and causes of the physical problems and keeping them under control are vital precautions for maintaining the existence of the building. Regarding this, rising damp must be prevented by finding and eliminating its sources such as the humidity problems of the houses. It is very vital for mud brick structures due to their low water resistance.

There are no structural problem on the stone masonry walls among the studied traditional houses in Ağlasun apart from the material loss in small quantities and two types of surface problems, namely salt deposition and efflorescence, caused by rising damp. Taking preventive measures for rising damp, leaning deposition of dirt, stain and efflorescence and removing the salts from the surface of the stone masonry walls must be practiced for the maintanence of the stone masonry walls of the studied houses.

Eartquake is the most threatening reason of the structural cracks on the traditional mud brick masonry houses in Ağlasun and the seismic precautions are very essential for these houses in the district which is located on the 1st degree earthquake zone. There are two different contemporary methods to strengthen the existing mud brick masonry walls by supplying seismic isolation. First one is the use of the scrap tire ring[17] as a low-cost post tensioning material for masonry strenghthening while the second one is the use of the nylon rope mesh[18] which is also developed as an economic structural reinforcement system for both new and existing earthen constructions, built in seismic regions. Because of being environmentally friendly and low-cost structural reinforcement methods, they might be tested on the traditional mud brick houses in Ağlasun with the necessary researches, made by experts on the site.

[17] For more information, see the article, Scrap Tire Ring as a Low-cost Post-tensioning Material for Masonry Strengthening (Ahmet Turer, 2008, pp. 1345-1361)
[18] For more information, see the conference paper, Using a Nylon Rope Mesh as Seismic Reinforcement for Earthen Constructions (Blondet, Tarque, & Vargas, 2018, pp. 51-58)

Morever, repairment of structural and non-structural cracks, material decay and material loss on the walls must be fulfilled with distinguisable and compatible materials considering the original construction materials and techniques of the traditional houses. At this point, the compatibility of the material in terms of its performance characteristics such as low density, water permeability, comparable porosity and mechanical resistance is also very essential besides its size, texture and color etc.

There is a method of repairing of the cracks on walls which is carried out by filling them with small blocks of compressed mud and the mixture composed of mud, sand and natural lime.[19] Moreover, there is also a repair method for the large cracks with lime and fired brick.[20] These methods are valuable in terms of material selection for the cracks and material loss on the mud brick masonry walls of the traditional houses so, they might be evaluated also in Ağlasun instead of using cement mortar and hollow bricks to solve this kind of structural problems. Besides that, it is recommended to decide the material to be specifically used on the site as a result of the laboratory analysis of the mechanical and the chemical properties.

Unsuitable interventions on timber elements such as cutting them mostly for create new window or door openings, insect infestations, weather conditions and covering floor boards with screed are most common reasons for the problems on both timber structural and architectural elements among the studied traditional houses in Ağlasun. Wood preservatives can be used in order to overcome these problems. But because of they are chemical products, it should be considered that they also may cause harm on the timber elements. Thus, at first, they must be tried on a small part of the structure.

Apart from solving the problems on the structural timber elements such as timber posts, girders, lintels etc., repair of the original wooden staircases, timber flooring and

---

[19] For more information, see the article, The rehabilitation of traditional architecture in Jericho (Palestine) (Sabelli & Celiento, 2015, pp. 80-97).

[20] For more information, see the research report, Conservation and Rehabilitation Plan for Tighermt (Kasbah) Taourirt, Southern Morocco (Woo, 2016, pp. 134-137).

ceiling boards must be handled to be partially repaired or being replaced with again timber elements. Within these maintenance interventions, repair of original timber framed doors and windows must be carried out to ensure optimum thermal insulation according to their capacity.

Requred Interventions Related with the Existing Implementations Made by Dwellers

According to the principles mentioned above, if the interventions reflect their application periods, they must be maintained and preserved, however, if they damage the original structure or architectural characteristics of traditional houses, they must be reversed or replaced with the ones, consisting materials and techniques that are compatible with the original buildings.

In some of the studied houses, the destroyed parts of a mud brick masonry walls were completed with hollow bricks or gas concrete blocks. In some houses, it can be seen that some of the mud brick masonry walls on the first floor were deliberately demolished and these walls were replaced with the hollow brick walls or the timber framed structure with mud brick infill in order to expand the interior spaces. The required thing for the interventions, which disrupt the structural and material integrity of the buildings and damage their stability, is reversing these applications and completing the gaps by using the same material and the construction system with the original ones. In such a case, a mud brick sample, taken from the house, should be analyzed and similar mud brick blocks should be produced to be used in the new intervention. The newly built part of the wall should be distinguishable from the original walls in a suitable way according to the decided conservation approach.

The walls, constructed with perforated bricks, are often used to divide an existing room located on the first floors of the traditional houses to create separate wet rooms.

These walls should be replaced with a lighter and more functional technical infrastructure walls. It is possible to change the current location of wet rooms with integrated spatial solutions within the scope of conservation proposals that are probably developed in the future.

The PVC windows, which do not let the walls breath, are used instead of the original wooden windows and they negatively affect the interior moisture balance. Moreover, wooden or iron doors, which are used instead of original wooden doors, are not quality elements. These materials should be removed because they are not compatible with timber and mud brick and also they damage the architectural integrity of the traditional houses. Doors and windows, which are compatible with timber, letting the walls breath and developed in terms of thermal insulation, should be placed in the door and window openings without changing their original dimensions.

It is observed in traditional houses in Ağlasun that the screed is applied mostly on the floors of the wet rooms, cement plaster is used on the mud brick masonry and stone masonry walls, reinforced concrete is used for the new construction of '*saçaks*' and staircases. All of these materials have high salt concentration. Therefore, they cause rising damp in mud brick masonry walls in the cases they are in touch. Apart from this, screed creates extra load on the traditional flooring system; reinforced concrete '*saçaks*' and staircases damage the architectural integrity of the traditional houses; cement plaster causes fragmentation on the mud brick masonry walls because of being a stronger material than the mud brick. Thus, these materials, not compatible with the mud brick, should be removed from the traditional mud brick masonry houses in Ağlasun. Lime plaster and gypsum plaster must be used instead of the cement plaster.

All traditional fireplaces and chimneys must be repaired and made available to be used. The closed traditional fireplaces in the rooms on the first floors should be opened again.

If the wooden staircases and earthen '*saçaks*' are reconstructed with traditional materials and construction techniques instead of existing reinforced concrete ones, a collective organization is needed to be established in Ağlasun in order to undertake regular maintenance of these structures.

On the other hand, alterations and additions reflecting their application period, should be maintained. These are hipped and gable roofs, which are needed to be repaired; subsequently closed '*sofa*'s, additional spaces or spaces, divided with a mud brick masonry wall or a timber frame wall with '*bağdadi'* covering to have a new separate space.

Required New Interventions

Within the scope of the conservation approach to be determined for each structure, the main purpose of the new interventions is upgrading the current architectural and structural conditions of the traditional mud brick masonry houses in Ağlasun.

In this context, water pipes must be insulated properly against frost and they must be kept away from the mud brick masonry walls by being located in a technical infrastructure wall which will serve for all wet rooms in the house. In case the leakages occur, they must be easily reached, removed and replaced without giving any damage to the original structure.

Furthermore, the screed, applied on the floors of wet spaces must be removed as it is not a compatible material with the original construction materials of the houses. Then, the water protection of the traditional flooring system in wet rooms might be supplied with a raised floor system rather than screed application.

These additional systems must be adapted to each house according to their structural and architectural characteristics such as construction types of traditional walls and floors, dimensions of the spaces and traditional architectural elements. During these interventions, the compatibility of contemporary materials with the traditional materials, weight of the additional systems that should not create excessive load on the traditional flooring and that these systems are reversible and distinguishable are the factors to be considered.

Wet spaces should be plastered with water proof plastering which are compatible with the original materials. Thus, after the cement plaster is removed from the mud brick wall surfaces, alternative materials for waterproofing should be considered. Their compatibilty with the mud brick used in the traditional houses in Ağlasun should be searched with laboratory studies or pilot tests on small areas on the site should be done before application.

Electrical cables, with eroded insulating material around them must be replaced with the new ones and they should be arranged inside fireproof rectangular cable channels.

Finally, after solving the structural problems of the roofs by repair or replacement of the timber elements and tiles, the condition of the roofs might be upgraded by adding heat insulation.

5.3. Conclusion

The changes in population and job opportunities are more radical in rural settlements than in urban areas. This situation affects the traditional rural architecture, which is an important part of the cultural heritage in Turkey, in a negative way.

Traditional houses become unable to meet the needs of dwellers because of the change of daily life styles and the common contemporary living standards. Consequently, traditional houses are either abandoned and then collapsed because of being neglected, or they are transformed by dwellers towards their needs. However, some unconscious interventions of dwellers cause detrimental effects on the structure and architectural identity of their houses.

One of the reasons for those people, who continue to live in traditional houses despite their negative features, is their inadequate economic conditions to leave their home. However, when it is considered in the context of traditional houses studied in Ağlasun, it is also important that people who have lived in mud brick masonry buildings for many years are aware of the convenience of these buildings with the climate conditions and human health. Accordingly, most local people mention that rather than new contemporary buildings, they would prefer living in mud brick masonry houses if their conditions are improved. Thus, after defining appropriate conservation approach for each traditional mud brick house, carrying out them within a participatory conservation project and involving dwellers during the process is very essential.

In this respect, after related literature reviews, architectural and structural analysis of traditional mud brick masonry houses in Ağlasun within the scope of the selected examples were realized. Accordingly, the values, potentials and problems of these houses were identified. Then, required interventions were indicated within the light of the conservation principles. The information compiled and produced within this thesis can be utilized in case preparation of a future conservation project for mud brick houses in Ağlasun.

5.4. Further Studies

Information, produced within the scope of this thesis may be utilized and developed for a comprehensive rural conservation project, considering both architectural and environmental characteristics of the Ağlasun, with a management plan to ensure the maintenance of the traditional houses.

In case the decisions and proposed interventions presented in this study are adapted in a conservation project, it is important that they should be considered according to the special circumstances of each and every house. It should be indicated that realization of interdisciplinary studies consisting comprehensive structural and material analyses by specialists are very essential. Moreover, local people should be involved in the process and encouragements for dwellers in social, cultural and economic aspects should be provided.

REFERENCES

Almaç, U. (2002). *Alçı Bağlayıcılı Hazır Harç ile Toprak Karışımının Hasarlı Kerpiç Yapılarda Onarım Harcı Olarak Kullanılabilmesi için Deneysel Araştırma* (Master's Thesis). Istanbul: Istanbul Technical University.

Blondet, M., Tarque, N., & Vargas, J. (2018). Using a Nylon Rope Mesh as Seismic Reinforcement for Earthen Constructions. *6. International Conference Kerpic'18* (pp. 51-58). Gaziantep: iBoo Press.

Brown University. (2019, August 22). *Art in Antiquity 2008 (public) Joukowsky Institute for Archaeology and the Ancient World.* Retrieved from: https://www.brown.edu/Departments/Joukowsky_Institute/courses/artinantiquity/7270.html

Bulut, İ., Değişgeç, C., Güney, H. & Uzun, O. (2017). Kültürel Peyzay Açısından Geleneksel Ağlasun Evleri. *Atatürk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 4, 1706-1707.

Ceylan, D. D. (2015). *Ağlasun İlçesinin Alternatif Turizm Kaynakları.* Ankara: Pegem Akademi.

Claudia, C., Marcus, B., and Boussalh, M. (2016). Conservation and Rehabilitation Plan for Tighermt (Kasbah) Taourirt. Los Angeles: Getty Conservation Institute; Ouarzazate, Morocco: CERKAS

Cookson, C. B. (2010). *Living in Mud.* İstanbul: Ege.

Çavuş, M., Dayı, M., Ulusu, H., & Aruntaş, Y. (2015). Sürdürülebilir Bir Yapı Malzemesi Olarak Kerpiç. *2nd International Sustainable Buildings Symposium* (p. 184-192). Ankara: Gazi Üniversitesi.

Çelebi, R. (2012). Kerpiç Yapı Sistemleri. *Anadolu Kerpiç Mimarlığı*. İstanbul: İstanbul Kültür Üniversitesi.

Davulcu, M. (2015). Ormana Yöresi Geleneksel Konut Mimarisi ve Yapıcılık Geleneği. *Kalemişi, 3(5),* 47-96.

Eldem, S. H. (1954). *Türk Evi Plan Tipleri.* İstanbul: Pulhan Matbaası.

Elias-Ozkan, S., T., Summers, F., Surmeli, N., and Yannas, S. (2005)"A Comparative Study of the Thermal Performance of Building Materials" PLEA2006 - *The 23rd Conference on Passive and Low Energy Architecture,* (pp. 6-8). Geneva: Environment and Energy Studies Programme.

Eres, Z. (2013). Türkiye'de Geleneksel Kırsal Mimarinin Korunması: Tarihsel Süreç, Yasal Boyut. In K. Eyüpgiller & Z. Eres (Eds.), *Mimari ve Kentsel Koruma / Prof. Dr. Nur Akın'a Armağan* (pp. 457-469). İstanbul: YEM Yayın.

Feilden, B. & Jokilehto, J. (1998). *Management Guidelines for World Cultural Heritage Sites.* Rome: ICCROM.

ICOMOS (1964). *International Charter for the Conservation and Restoration of Monuments and Sites (The Venice Charter 1964)*. Venice.

ICOMOS (1994). *The Nara Document on Authenticty*. Nara.

ICOMOS (1999). *Charter on the Built Vernacular Heritage*. Mexico City.

Kafesçioğlu, R. (2017). *Çağdaş Yapı Malzemesi Toprak ve Alker.* İstanbul: İTÜ Vakfı Yayınları.

Karabatı, S., Doğan, E., Pınar, M., & Çelik, L. M. (2009). Socio Economic Effects of Agri-Tourism on Local Communities in Turkey: The Case of Ağlasun. *International Journal of Hospitality & Tourism Administration*, 10, 129-142.

Kurtulus, V. B., Asrav, E. Ç., Güçhan, N. Ş., & Altınöz, G. B. (2017). Characteristics of Earthen Architecture in Ağlasun. In C. Mileto, F. Vegas Lopez-Manzanares, L. Garcia-Soriano & V. Cristini (Eds.) *Vernacular and Earthen Architecture* (pp. 611-618). Valencia: CRC Press.

Kurtuluş, V. B. (2018). *Understanding the Integrity of Rural Life and Architecture for Sustainable Conservation Case Study: Çomakdağ Region, Milas* (Master's Thesis). Ankara: Middle East Technical University.

Minke, G. (2006). *Building with Earth: Design and Technology of a Sustainable Architecture*. Basel: Birkhauser.

Naumann, R. (1975). *Eski Anadolu Mimarlığı.* Ankara: Türk Tarih Kurumu Yayınları.

Oxford University. (2019, August 20). *Conservation.* Retrieved from: https://www.lexico.com/en/definition/conservation

Pumpelly, R. (1908). *Explorations in Turkestan.* Washington: Gibson Bros.

Sabelli, R., & Celiento, I. (2015). The Rehabilitation of Traditional Architecture in Jericho (Palestine). *Restauro Archeologico*, 80-97.

Sagalasos Vakfı. (2019, August 21). Retrieved from:
http://www.sagalassosvakfi.org

Seeher, J. (2007). *Hattuşa Kerpiç Kent Suru Bir Rekonstrüksiyon Çalışması.* İstanbul: Ege Yayınları.

Şahin Güçhan, N., Bilgin Altınöz, G., Ataöv, A., Uluç, A., Arsav, E.Ç., Balkanay, E., Demirdağ, İ., Yersen, Ö., Kurtuluş, V.B. (2016). *Understanding a Historic Rural Landscape in Relation with an Archaeological Site: Ağlasun/ Sagalassos. Lecture 508: Workshop in Conservation 1 in Spring Semester*. Ankara: Middle East Technical University.

Şahin, N. (1995). *A Study on Conservation and Rehabilitation Problems of Historic Timber Houses in Ankara* (Doctoral Dissertation). Ankara: Middle East Technical University.

Turer, A., & Gölalmış, M. (2008). Scrap Tire Ring as a Low-Cost Post-Tensioning Material for Masonry Strengthening. *Materials and Structures, 41(8),* 1345-1361.

UNESCO World Heritage Center (2019, August 30). *Old Town of Djenne*. Retrieved from: https://whc.unesco.org/en/documents/107952

UNESCO World Heritage Center (2019, August 30). *Old Walled City of Shibam in Yemen*. Retrieved from: https://whc.unesco.org/en/documents/109048

UNESCO World Heritage Center (2019, August 30). *UNESCO World Heritage List*. Retrieved from: https://whc.unesco.org/en/list/

UNESCO World Heritage Center (2019, August 21). *Neolithic Site of Çatalhöyük.* Retrieved from: https://whc.unesco.org/en/documents/131748

Weeks, D. K., & Grimmer, E. A. (1995). *The Secretary of the Interior's Standards for The Treatment of Historic Properties With Guidelines For Preserving,Rehabilitating, Restoring & Reconstructing Historic Buildings.* Washington, D.C.: National Park Service.

APPENDICES

A. CATALOGUE OF SURVEYED BUILDINGS

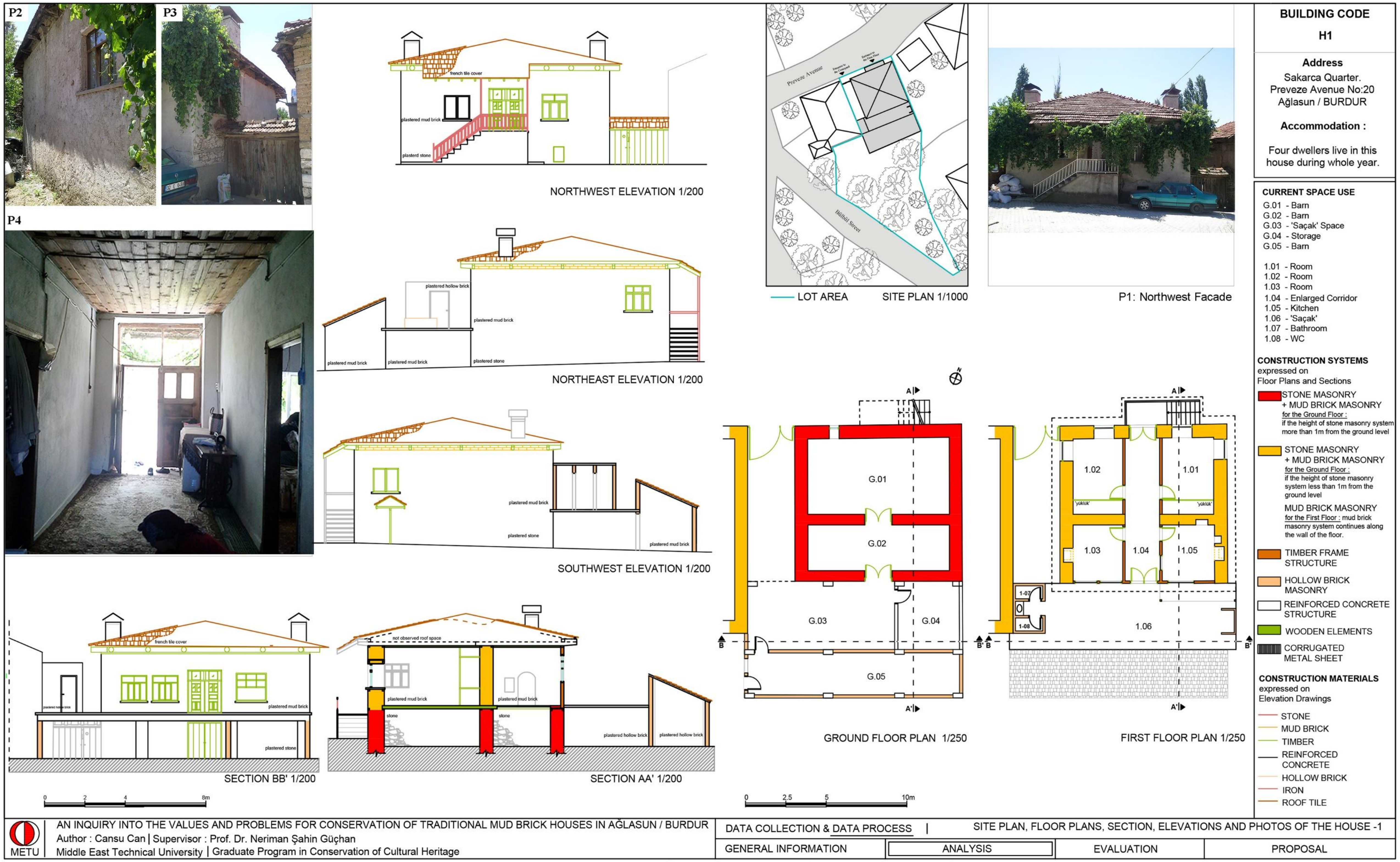


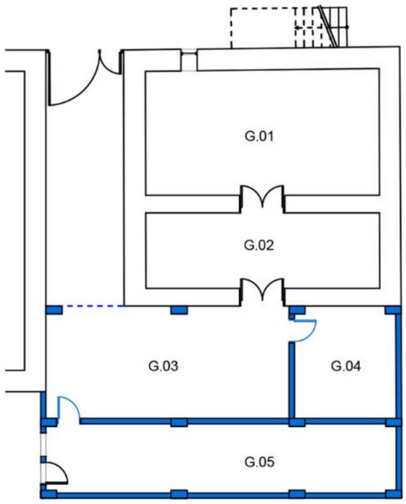
Figure 154: Building Sheet - House 1

METU	Graduate Program in Conservation of Cultural Heritage	Author : Cansu Can	Supervisor : Prof. Dr. Neriman Şahin Güçhan
	AN INQUIRY INTO THE VALUES AND PROBLEMS FOR CONSERVATION OF TRADITIONAL MUD BRICK HOUSES IN AĞLASUN / BURDUR		

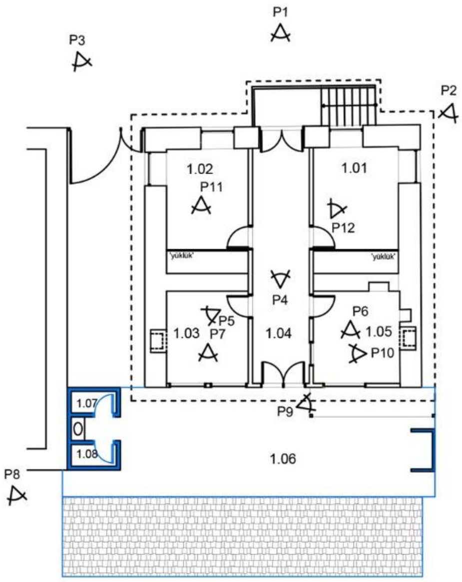
GENERAL INFORMATION	ANALYSIS	EVALUATION	PROPOSAL

DATA COLLECTION & DATA PROCESS | CHANGES AND PHOTOS OF THE HOUSE-1

BUILDING CODE	Address :	Accommodation :	Changes :
H1	Sakarca Quarter. Preveze Avenue No:20 Ağlasun / BURDUR	Five dwellers live in this house during whole year.	Addition Alteration Functional Change Not in use



GROUND FLOOR PLAN



FIRST FLOOR PLAN

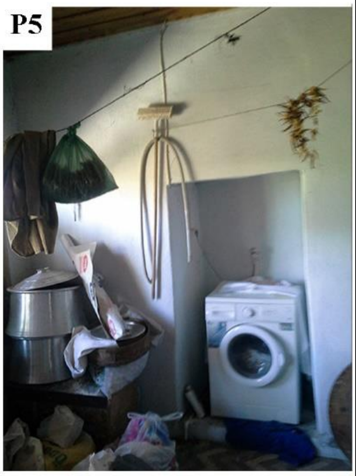


Figure 155: Changes - House 1

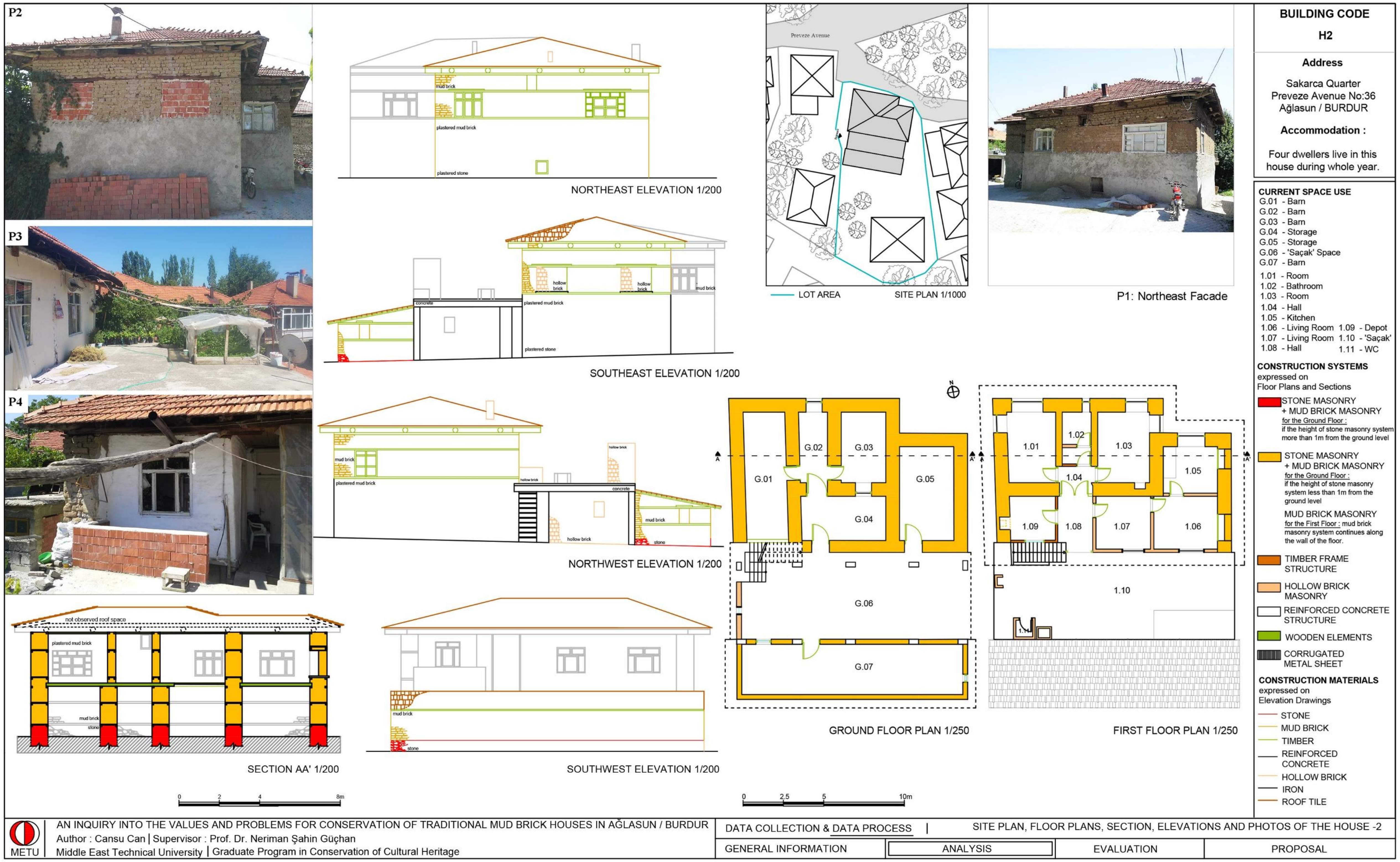


Figure 156: *Building Sheet - House 2*

METU

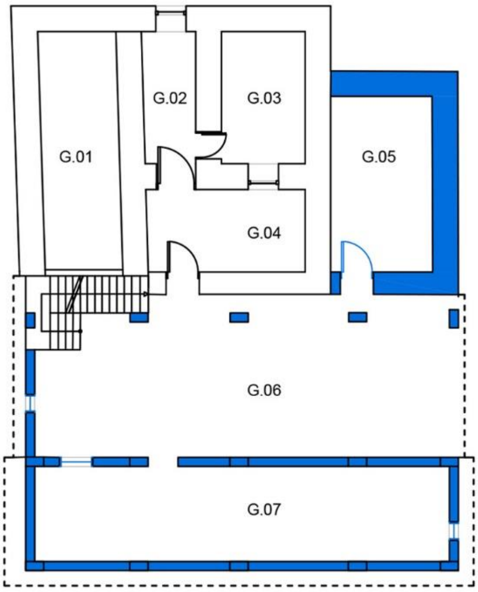
Graduate Program in Conservation of Cultural Heritage | Author : Cansu Can | Supervisor : Prof. Dr. Neriman Şahin Güçhan

AN INQUIRY INTO THE VALUES AND PROBLEMS FOR CONSERVATION OF TRADITIONAL MUD BRICK HOUSES IN AĞLASUN / BURDUR

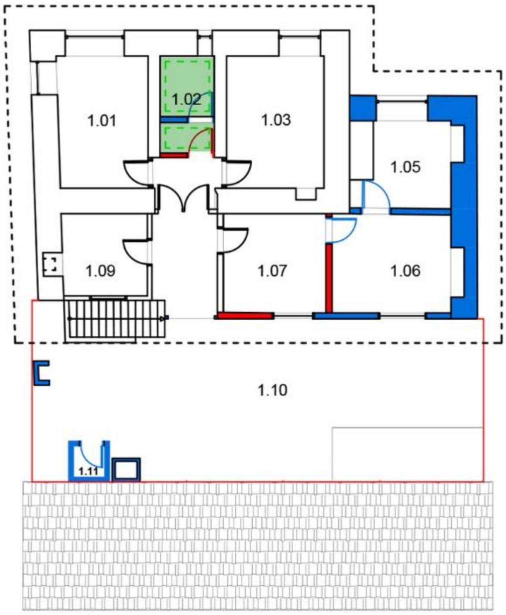
GENERAL INFORMATION	ANALYSIS	EVALUATION	PROPOSAL

DATA COLLECTION & DATA PROCESS | CHANGES AND PHOTOS OF THE HOUSE - 2

BUILDING CODE	Address :	Accommodation :	Changes :
H2	Sakarca Quarter Preveze Avenue No:36 Ağlasun / BURDUR	Four dwellers live in this house during whole year.	Addition Alteration Functional Change Not in use



GROUND FLOOR PLAN



FIRST FLOOR PLAN

Figure 157 : *Changes - House 2*

Figure 158: *Building Sheet - House 3*

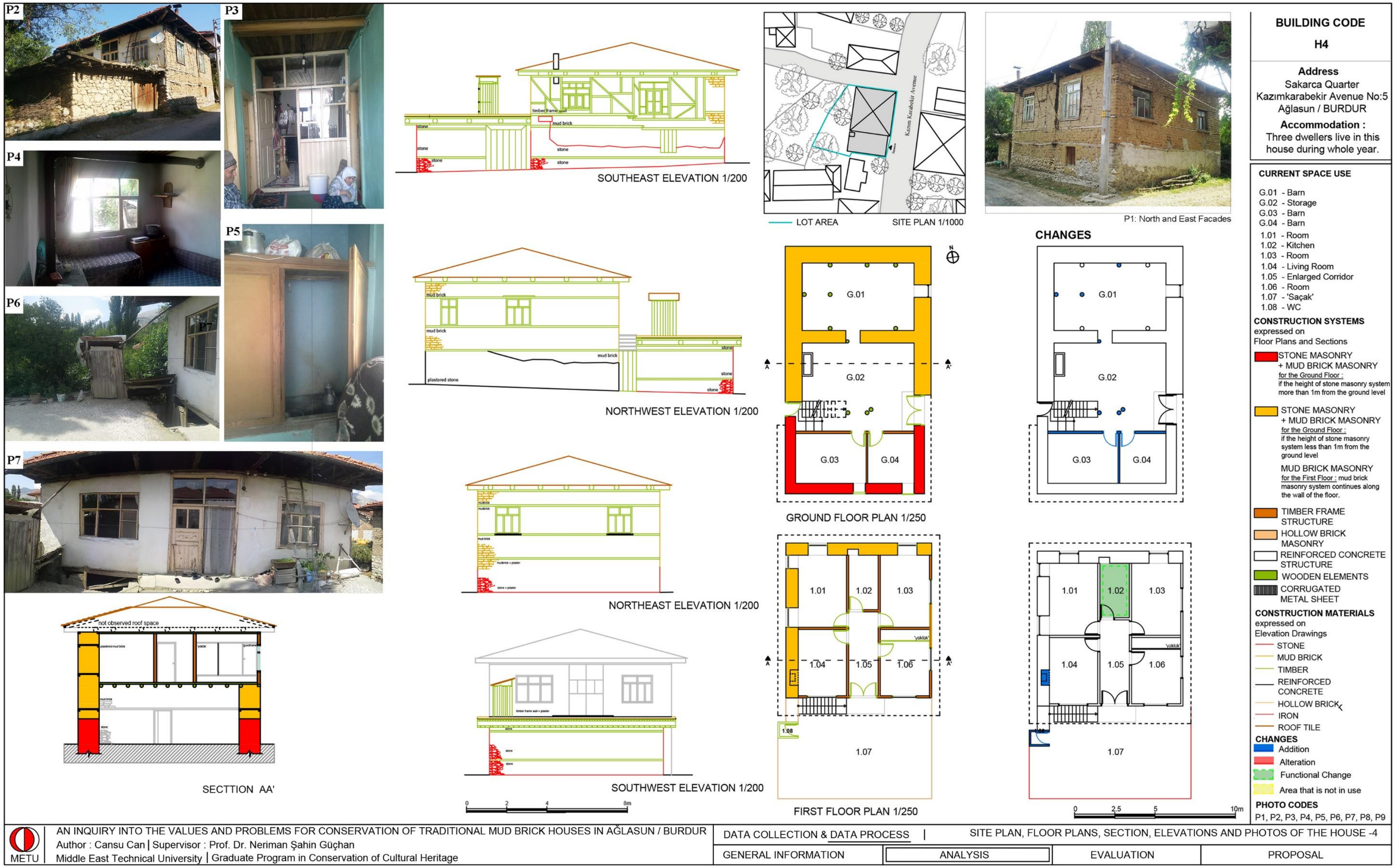


Figure 159: *Building Sheet -House 4*

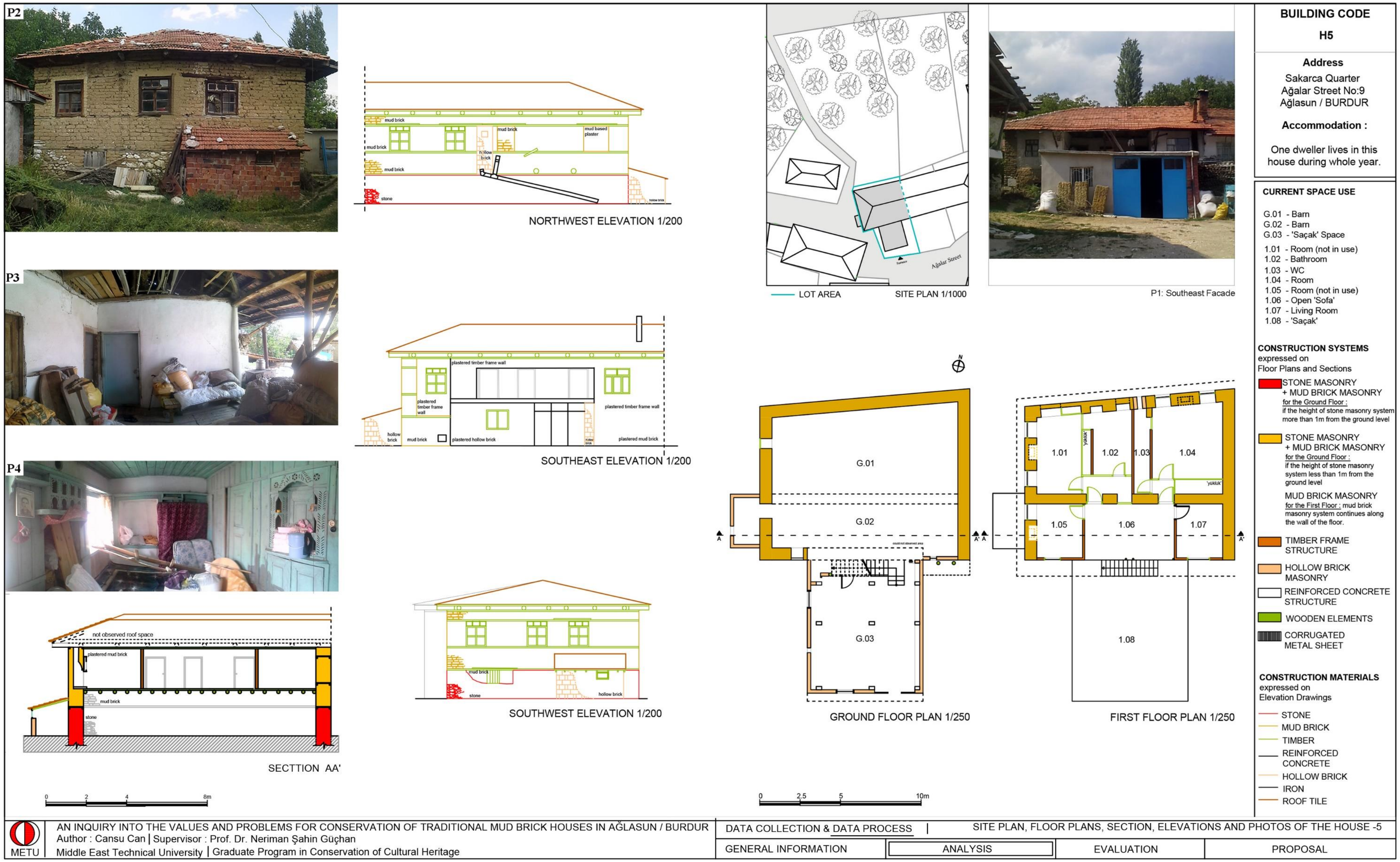


Figure 160: *Building Sheet - House 5*

METU	Graduate Program in Conservation of Cultural Heritage	Author : Cansu Can	Supervisor : Prof. Dr. Neriman Şahin Güçhan
	AN INQUIRY INTO THE VALUES AND PROBLEMS FOR CONSERVATION OF TRADITIONAL MUD BRICK HOUSES IN AĞLASUN / BURDUR		

GENERAL INFORMATION	ANALYSIS	EVALUATION	PROPOSAL
DATA COLLECTION & DATA PROCESS	CHANGES AND PHOTOS OF THE HOUSE- 5		

BUILDING CODE	Address :	Accommodation :	Changes :
H5	Sakarca Quarter Ağalar Street No:9 Ağlasun / BURDUR	One dweller lives in this house during whole year.	Addition Alteration Functional Change Not in use

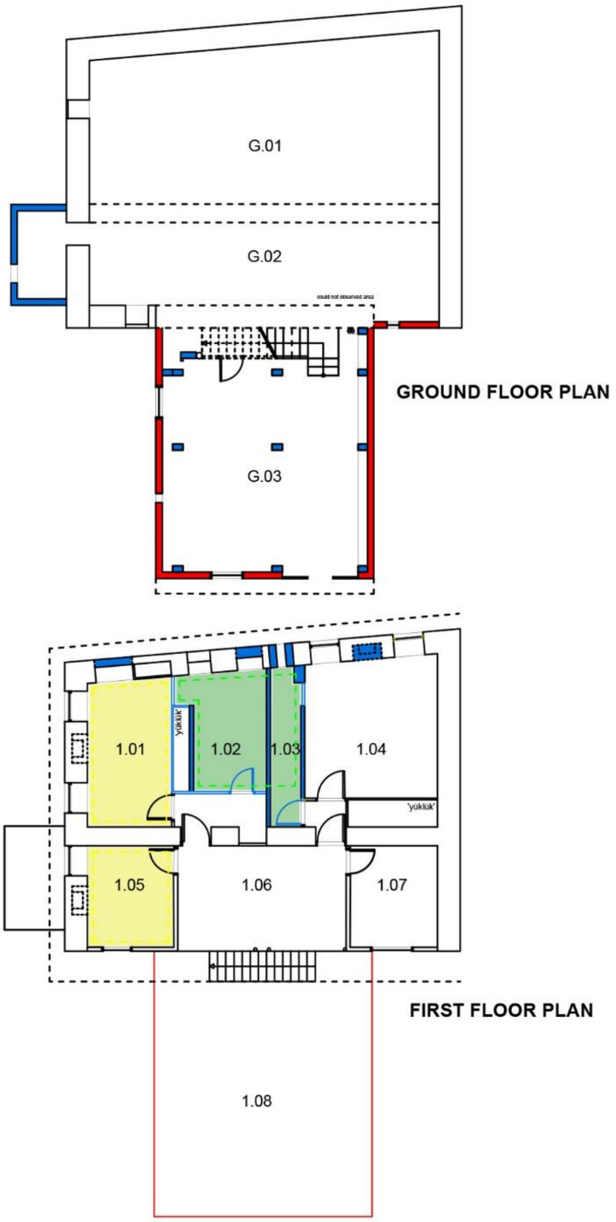
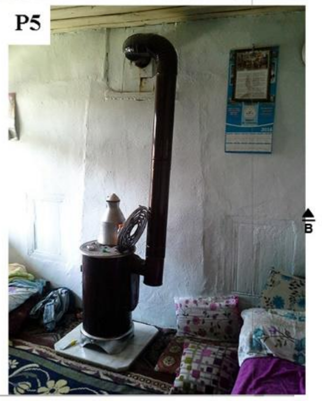
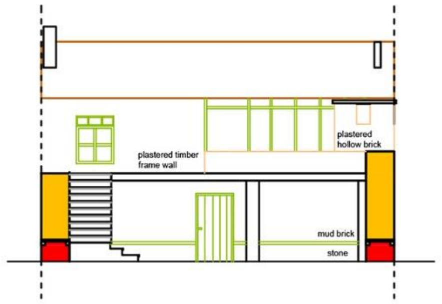
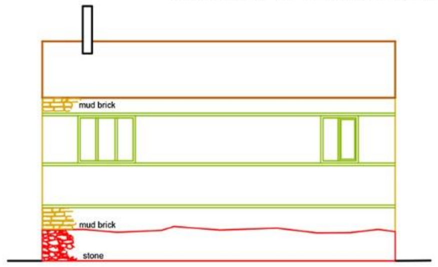


***Figure 161**: Changes - House 5*

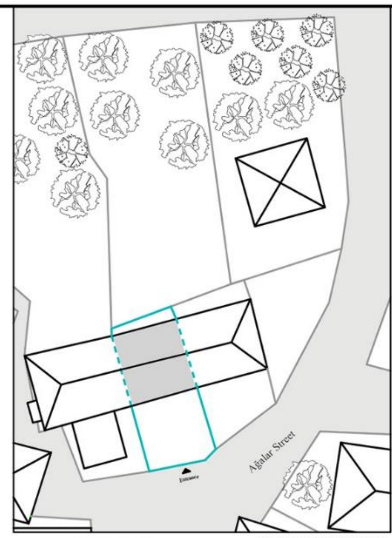




NORTHWEST ELEVATION 1/200

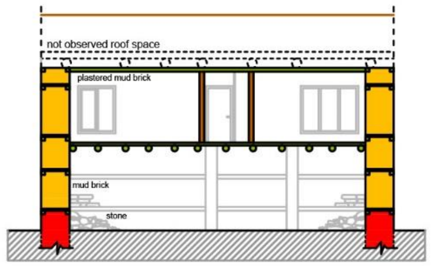


SOUTHEAST ELEVATION 1/200

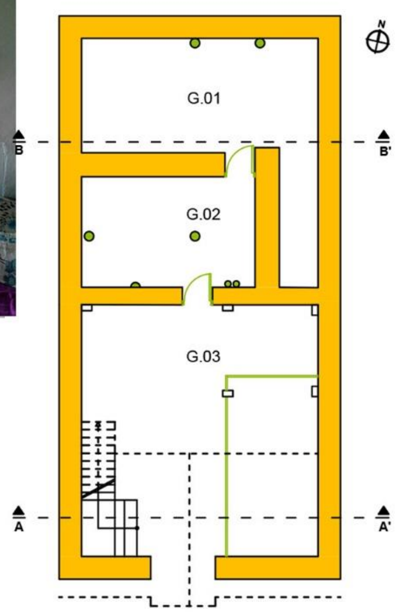


LOT AREA SITE PLAN 1/1000

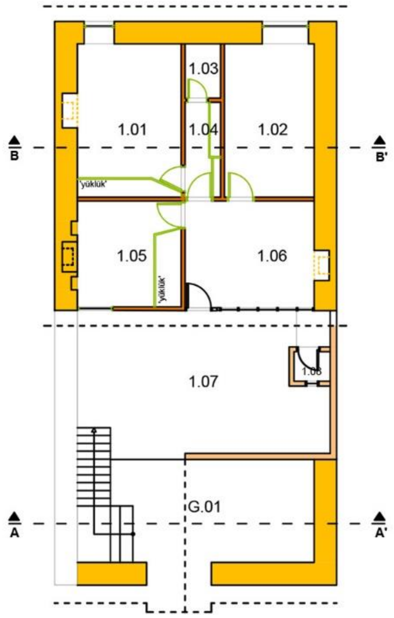
P1: Southeast Facade



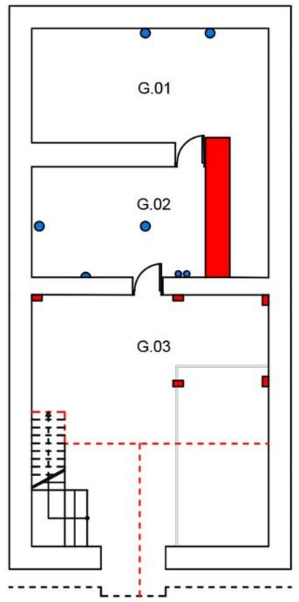
SECTION BB'



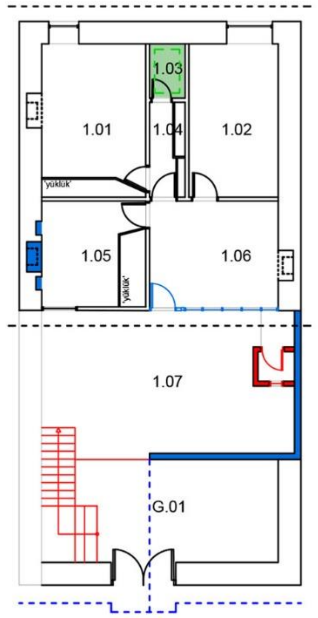
GROUND FLOOR PLAN 1/250



FIRST FLOOR PLAN 1/250



GROUND FLOOR PLAN 1/250



FIRST FLOOR PLAN 1/250

BUILDING CODE

H6

Address

Sakarca Quarter
Ağalar Street No:11
Ağlasun / BURDUR

Accommodation :

Two dwellers live in this house during whole year.

CURRENT SPACE USE

G.01 - Barn
G.02 - Barn
G.03 - 'Saçak' Space
1.01 - Kitchen
1.02 - Room
1.03 - WC
1.04 - Hall
1.05 - Room
1.06 - Closed 'Sofa'
1.07 - 'Saçak'
1.08 - WC

CONSTRUCTION SYSTEMS expressed on Floor Plans and Sections

- STONE MASONRY + MUD BRICK MASONRY for the Ground Floor : if the height of stone masonry system more than 1m from the ground level
- STONE MASONRY + MUD BRICK MASONRY for the Ground Floor : if the height of stone masonry system less than 1m from the ground level
- MUD BRICK MASONRY for the First Floor : mud brick masonry system continues along the wall of the floor.
- TIMBER FRAME STRUCTURE
- HOLLOW BRICK MASONRY
- REINFORCED CONCRETE STRUCTURE
- WOODEN ELEMENTS
- CORRUGATED METAL SHEET

CONSTRUCTION MATERIALS expressed on Elevation Drawings

- STONE
- MUD BRICK
- TIMBER
- REINFORCED CONCRETE
- HOLLOW BRICK
- IRON
- ROOF TILE

CHANGES

- Addition
- Alteration
- Functional Change
- Area that is not in use

PHOTO CODES

P1, P2, P3, P4, P5, P6

METU | AN INQUIRY INTO THE VALUES AND PROBLEMS FOR CONSERVATION OF TRADITIONAL MUD BRICK HOUSES IN AĞLASUN / BURDUR
Author : Cansu Can | Supervisor : Prof. Dr. Neriman Şahin Güçhan
Middle East Technical University | Graduate Program in Conservation of Cultural Heritage

DATA COLLECTION & DATA PROCESS | SITE PLAN, FLOOR PLANS, SECTION, ELEVATIONS AND PHOTOS OF THE HOUSE -6

GENERAL INFORMATION | ANALYSIS | EVALUATION | PROPOSAL

Figure 162: *Building Sheet - House 6*

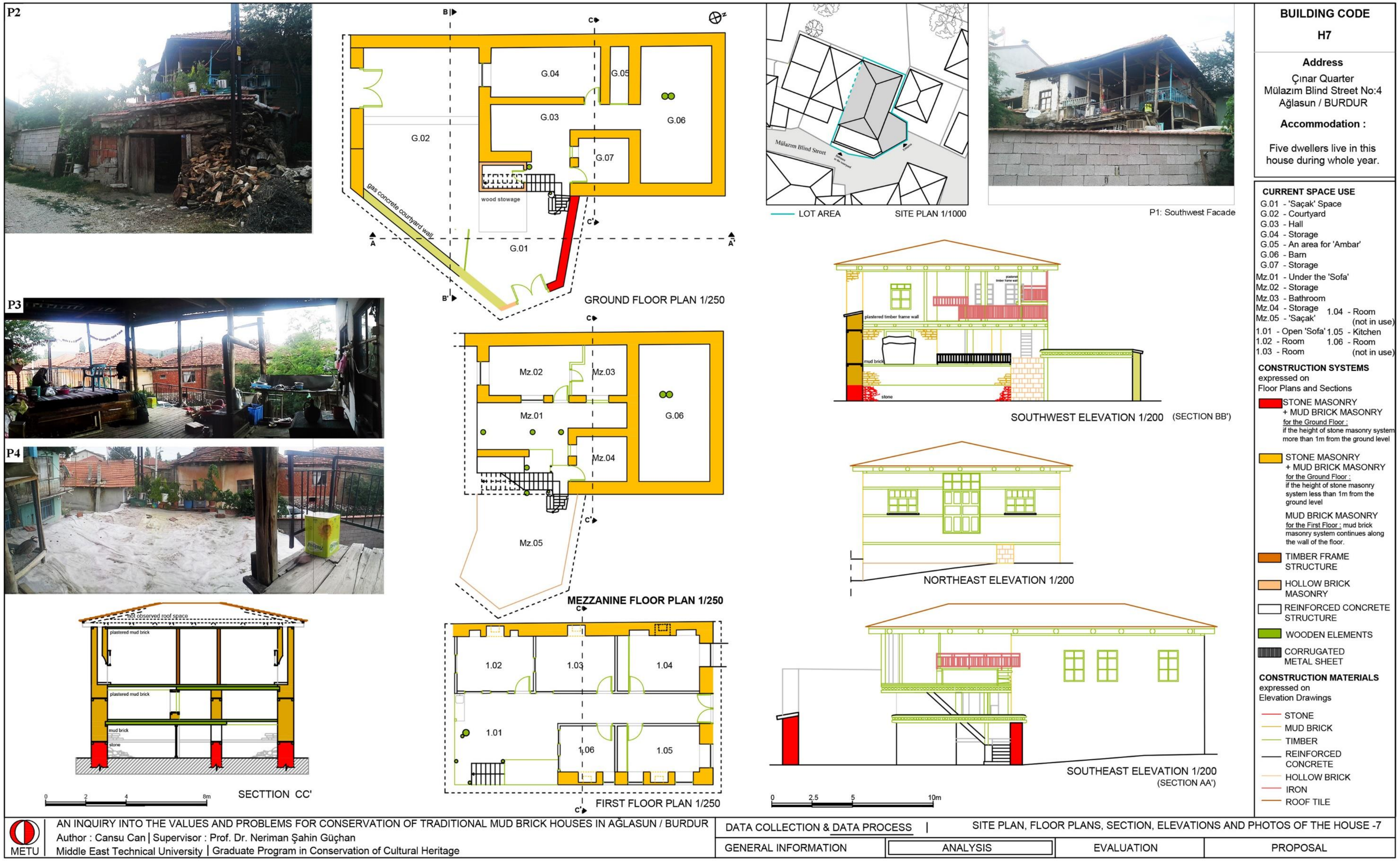
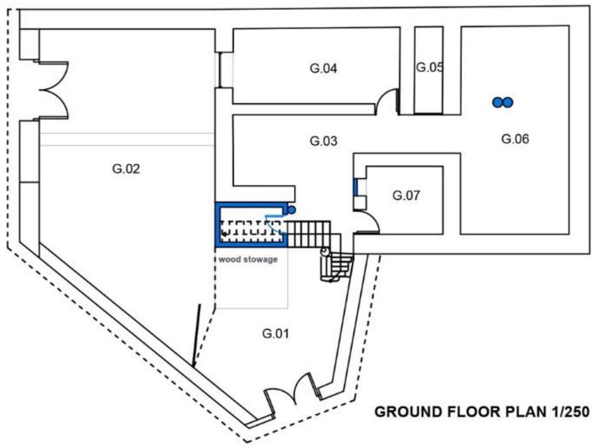


Figure 163: *Building Sheet - House 7*

METU	Graduate Program in Conservation of Cultural Heritage	Author : Cansu Can	Supervisor : Prof. Dr. Neriman Şahin Güçhan
	AN INQUIRY INTO THE VALUES AND PROBLEMS FOR CONSERVATION OF TRADITIONAL MUD BRICK HOUSES IN AĞLASUN / BURDUR		

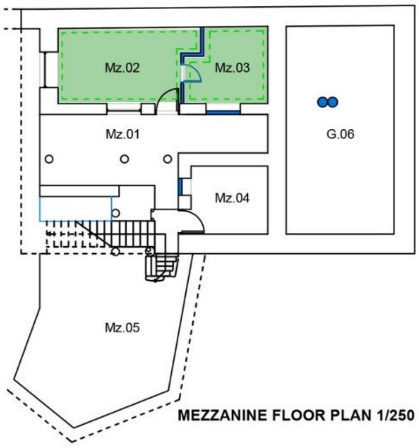
GENERAL INFORMATION	ANALYSIS	EVALUATION	PROPOSAL
DATA COLLECTION & DATA PROCESS		CHANGES AND PHOTOS OF THE HOUSE-7	

BUILDING CODE	Address :	Accommodation :	Changes :
H7	Çinar Quarter Mülazım Blind Street No:4 Ağlasun / BURDUR	Five dwellers live in this house during whole year.	Addition Alteration Functional Change Not in use



GROUND FLOOR PLAN 1/250

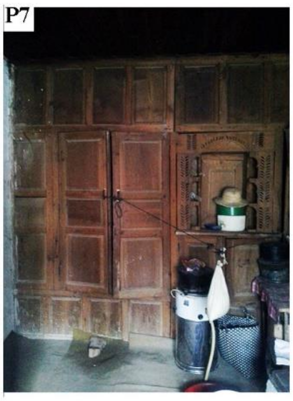
P5



MEZZANINE FLOOR PLAN 1/250

P6

FIRST FLOOR PLAN



P7

Figure 164: *Changes - House 7*

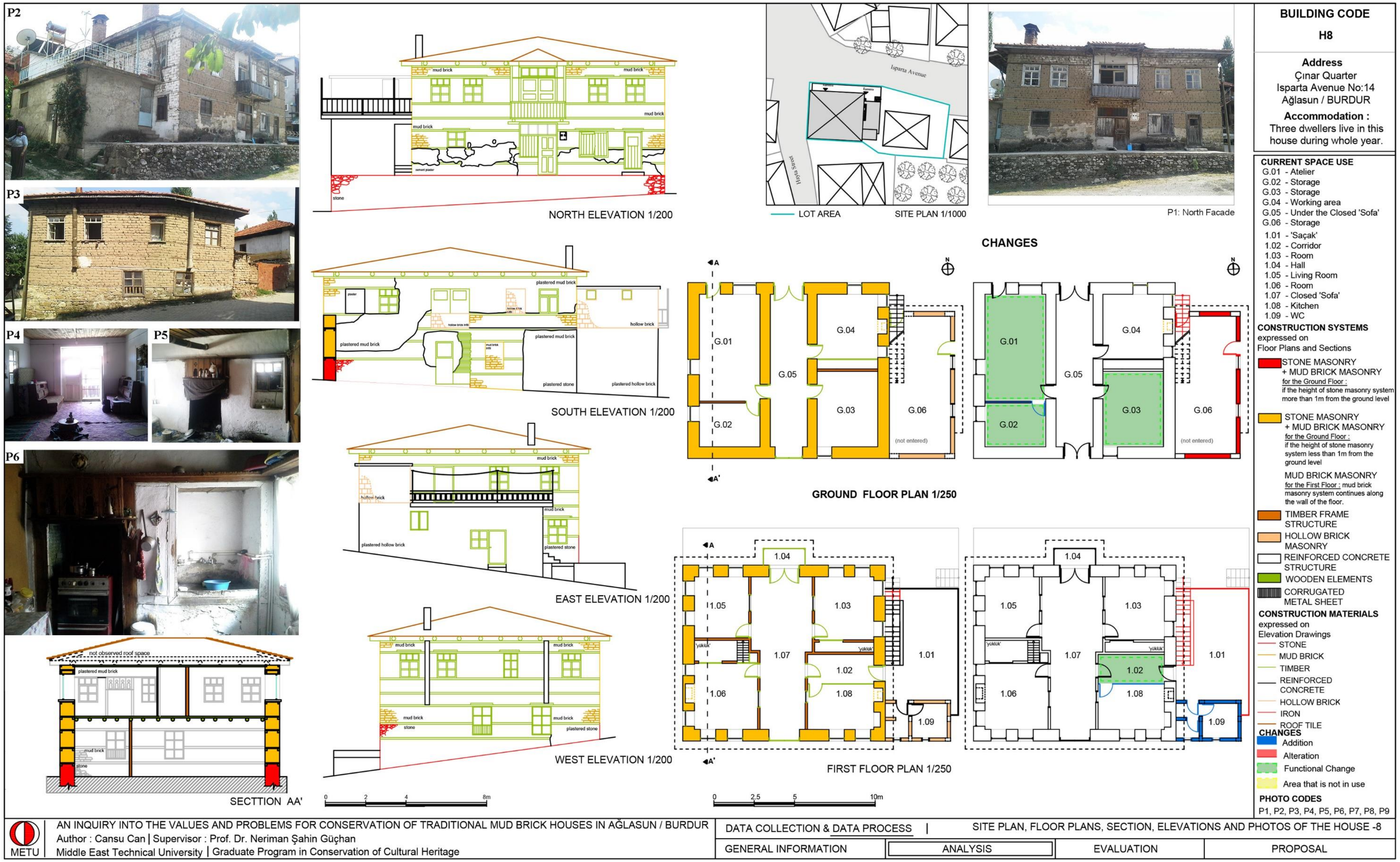


Figure 165: *Building Sheet - House 8*

Figure166: *Building Sheet - House 9*

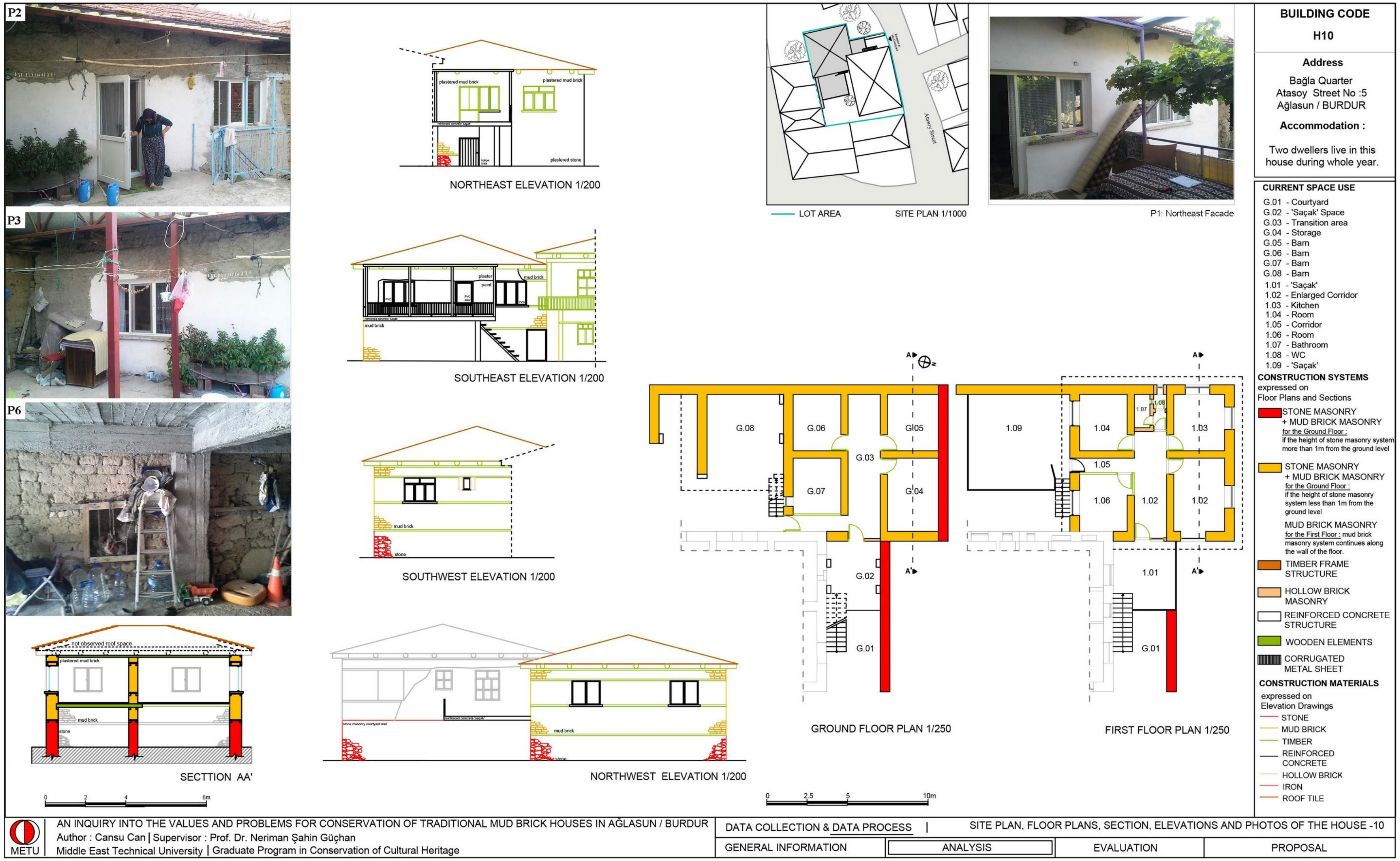


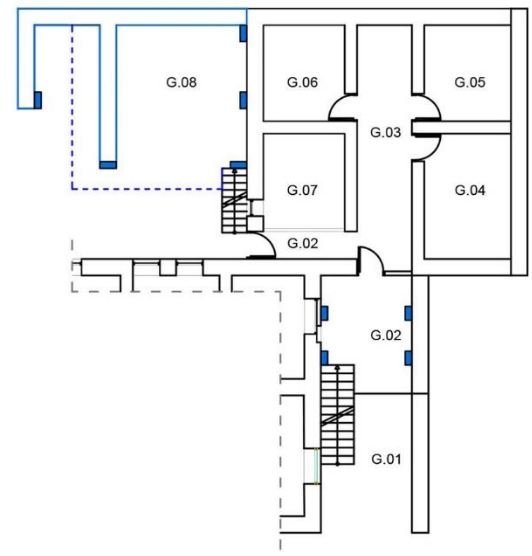
Figure167: *Building Sheet - House 10*

METU	Graduate Program in Conservation of Cultural Heritage	Author : Cansu Can	Supervisor : Prof. Dr. Neriman Şahin Güçhan
	AN INQUIRY INTO THE VALUES AND PROBLEMS FOR CONSERVATION OF TRADITIONAL MUD BRICK HOUSES IN AĞLASUN / BURDUR		

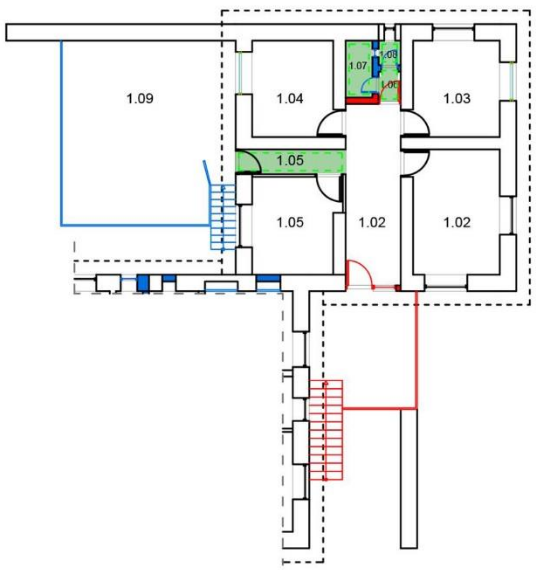
GENERAL INFORMATION	ANALYSIS	EVALUATION	PROPOSAL

DATA COLLECTION & DATA PROCESS	CHANGES AND PHOTOS OF THE HOUSE-10

BUILDING CODE	Address :	Accommodation :	Changes :
H10	Bağla Quarter Atasoy Street No :5 Ağlasun / BURDUR	Two dwellers live in this house during whole year.	Addition Alteration Functional Change Not in use



GROUND FLOOR PLAN



FIRST FLOOR PLAN

P5

P6

P7

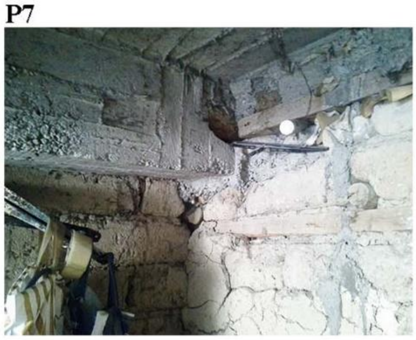


Figure 168: *Changes - House 10*

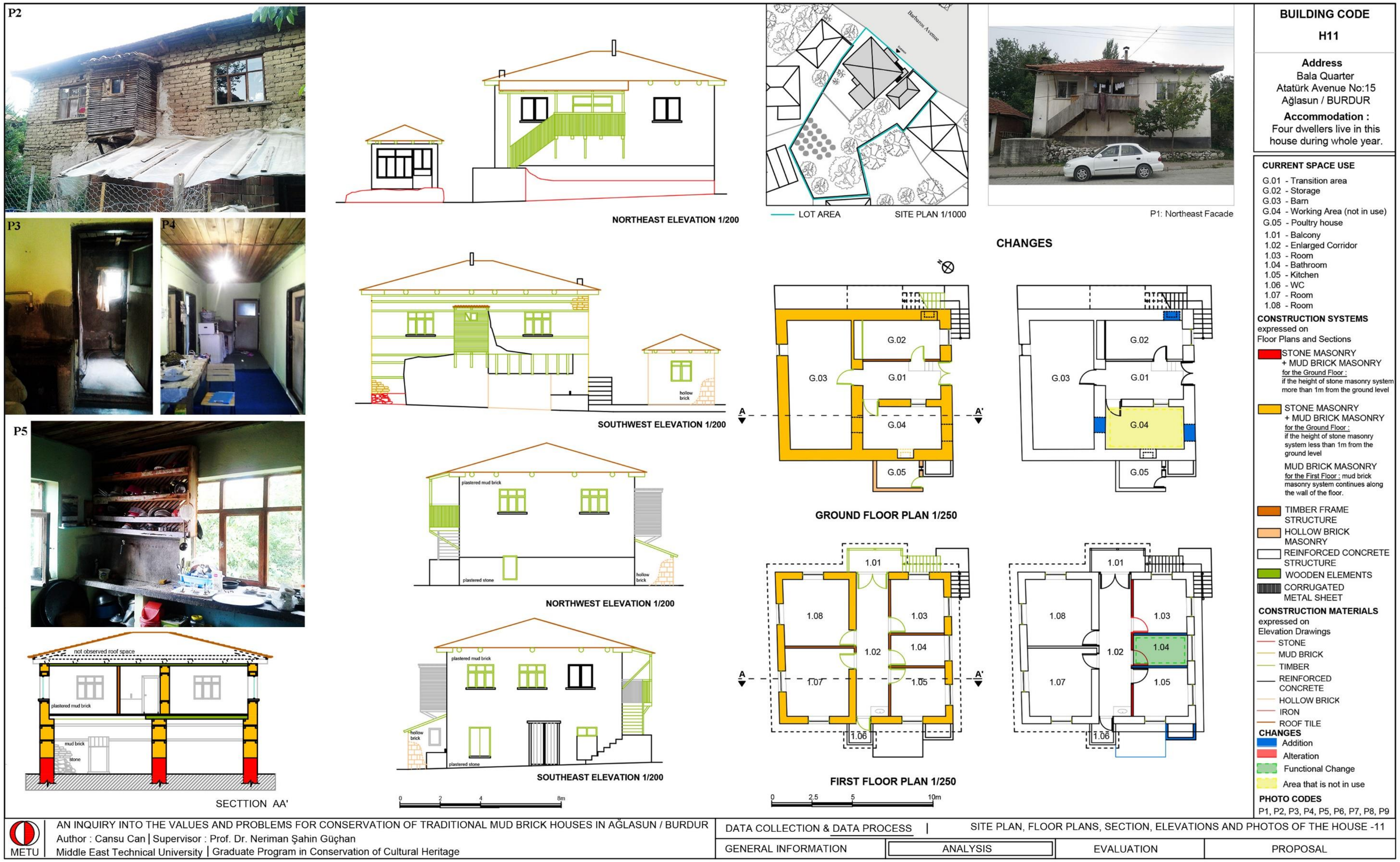


Figure 169: *Building Sheet - House 11*

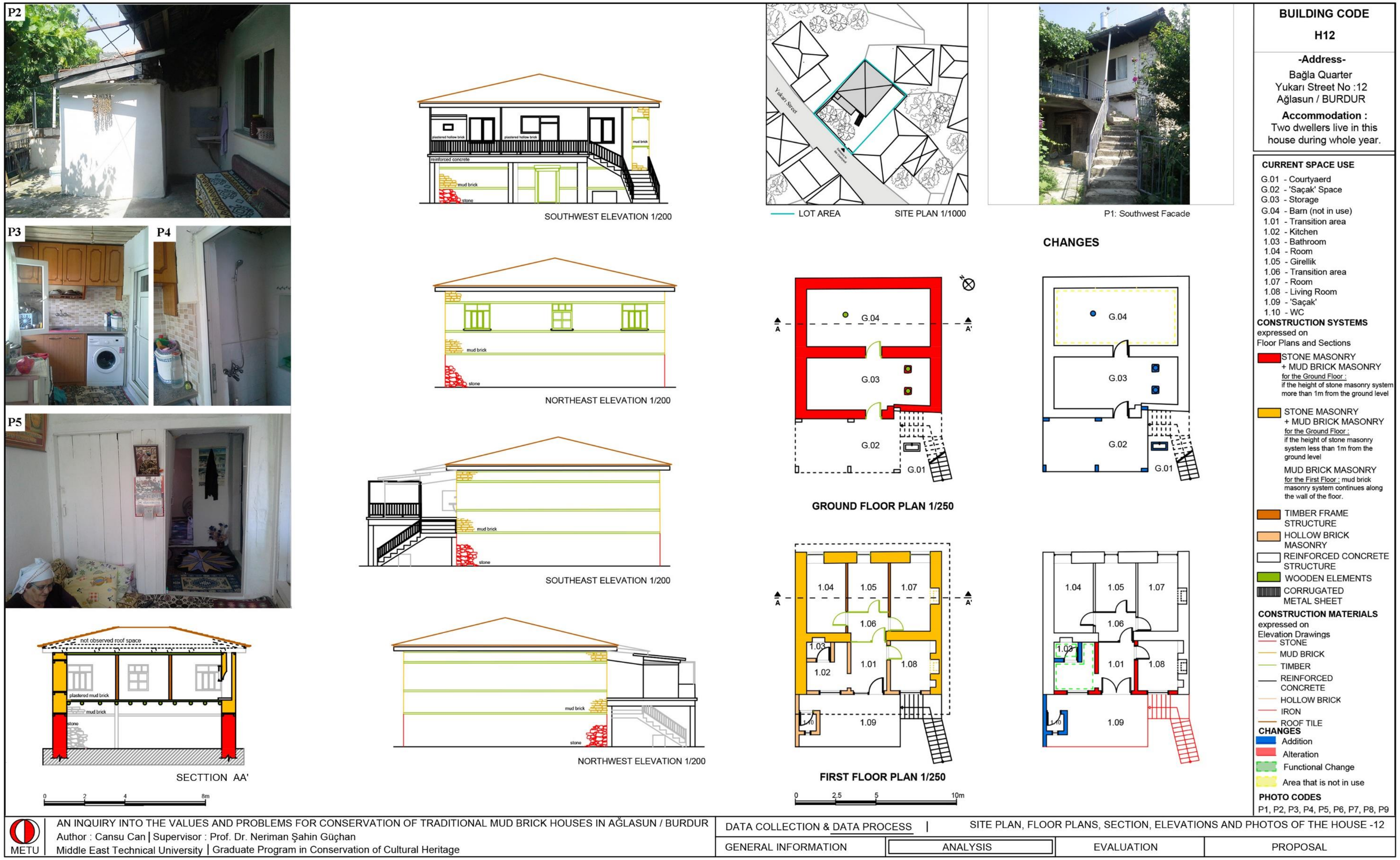


Figure 170: *Building Sheet - House 12*

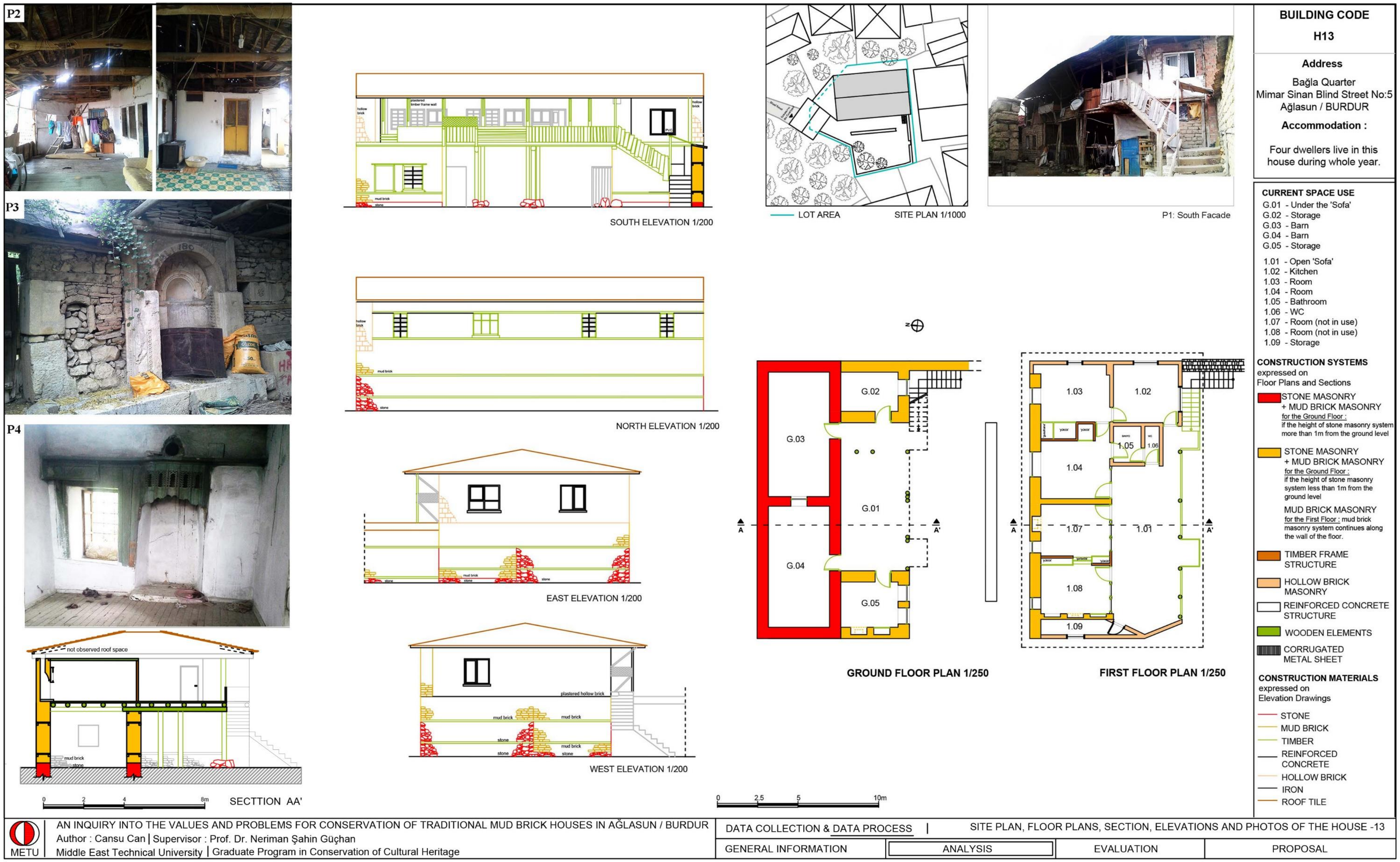


Figure 171: *Building Sheet - House 13*

METU | Graduate Program in Conservation of Cultural Heritage | Author : Cansu Can | Supervisor : Prof. Dr. Neriman Şahin Güçhan

AN INQUIRY INTO THE VALUES AND PROBLEMS FOR CONSERVATION OF TRADITIONAL MUD BRICK HOUSES IN AĞLASUN / BURDUR

GENERAL INFORMATION | ANALYSIS | EVALUATION | PROPOSAL

DATA COLLECTION & DATA PROCESS | CHANGES AND PHOTOS OF THE HOUSE-13

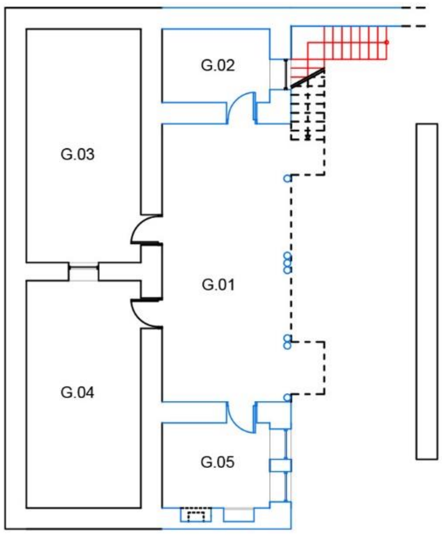
BUILDING CODE

H13

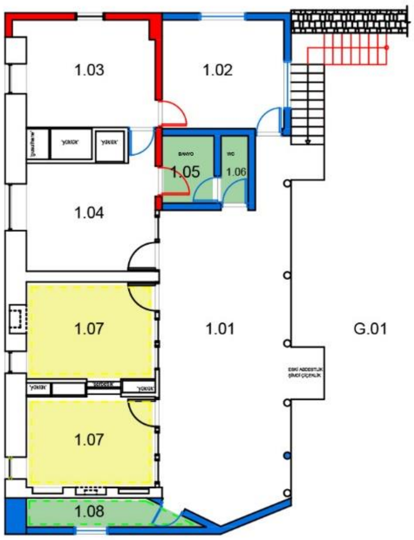
Address :
Bağla Quarter
Mimar Sinan Blind Street No:5
Ağlasun / BURDUR

Accommodation :
Four dwellers live in this house during whole year.

Changes :
Addition
Alteration
Functional Change
Not in use



GROUND FLOOR PLAN 1/250



FIRST FLOOR PLAN 1/250

***Figure 172:** Changes - House 13*

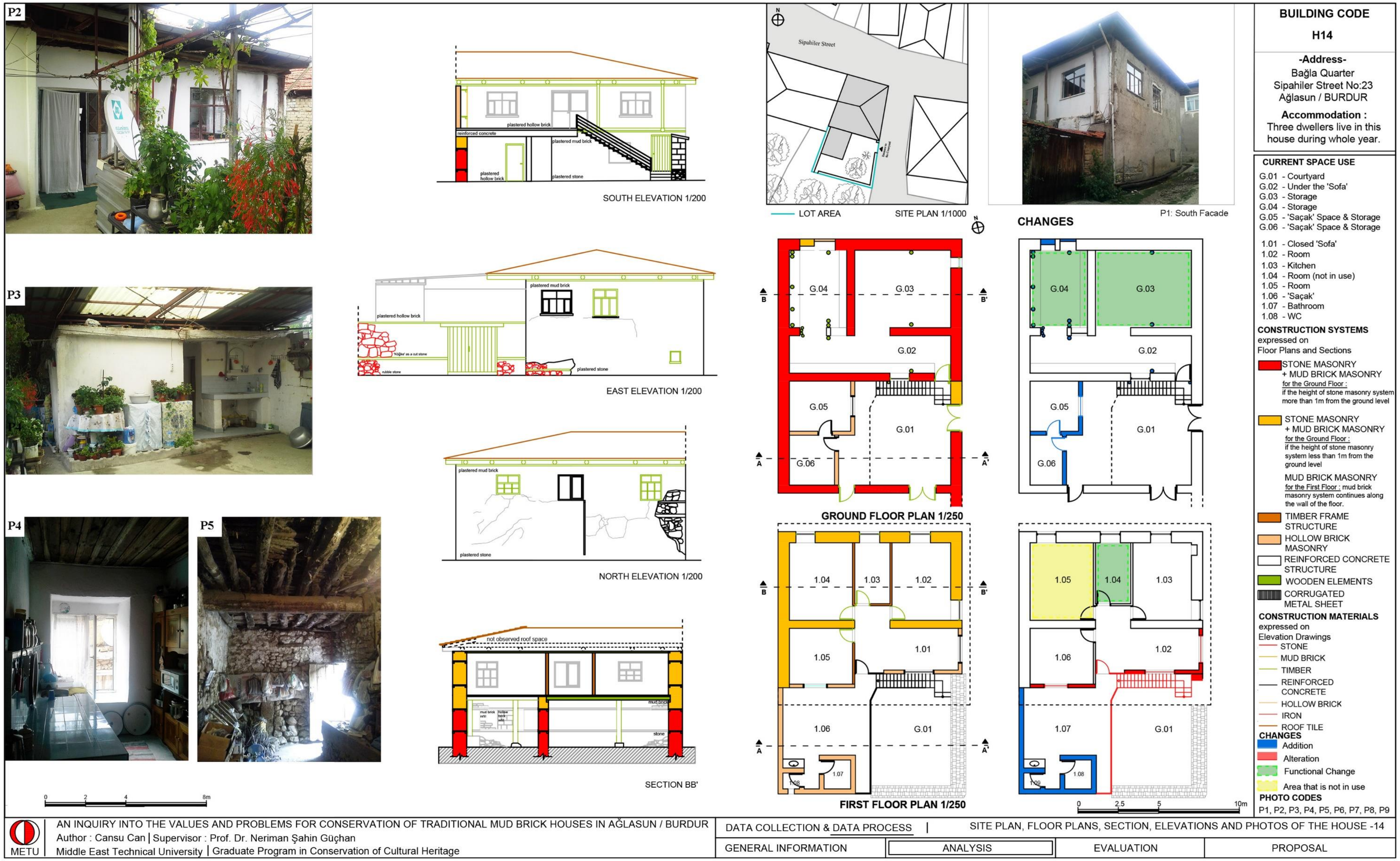


Figure 173: *Building Sheet - House 14*

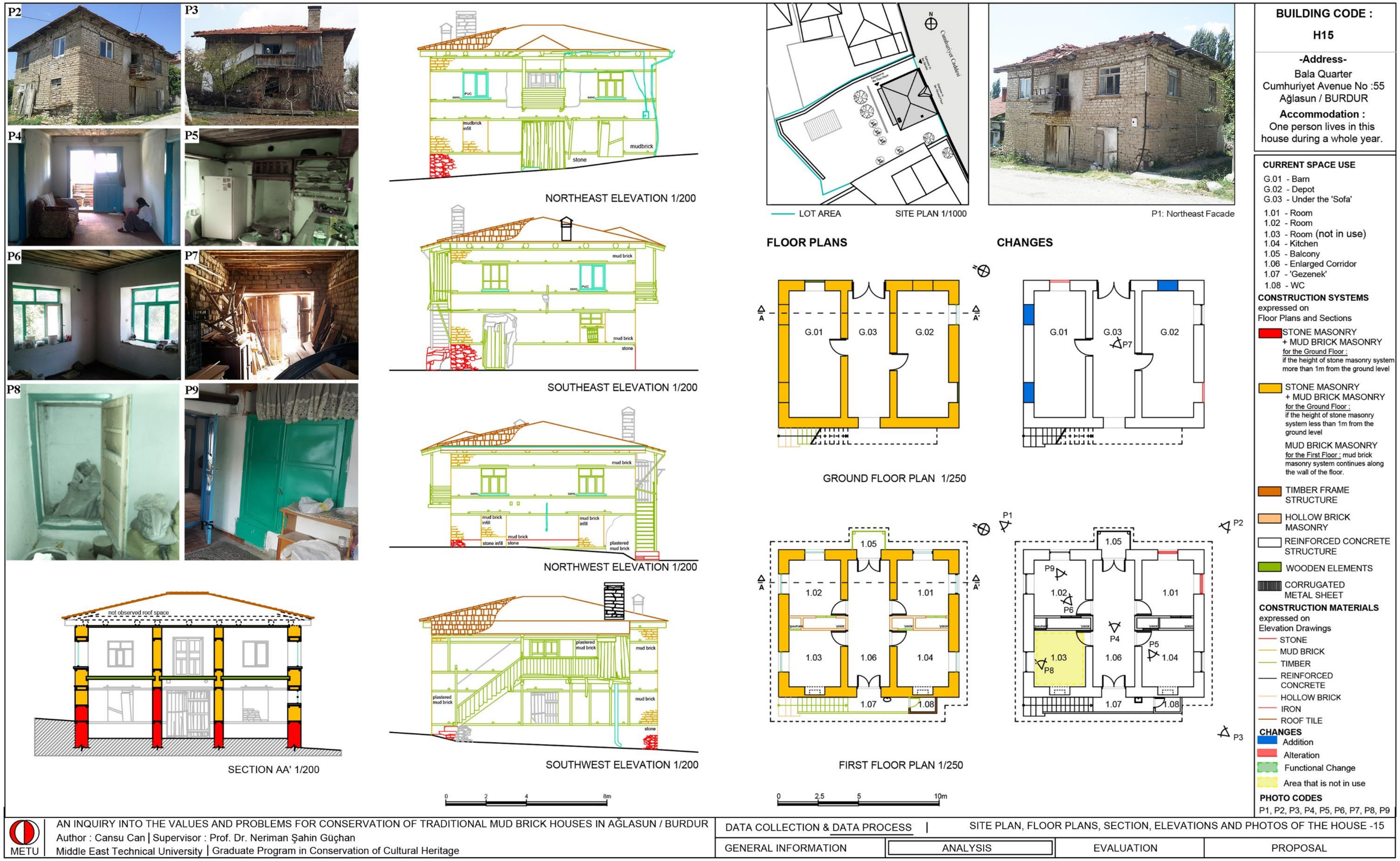


Figure174: *Building Sheet - House 15*

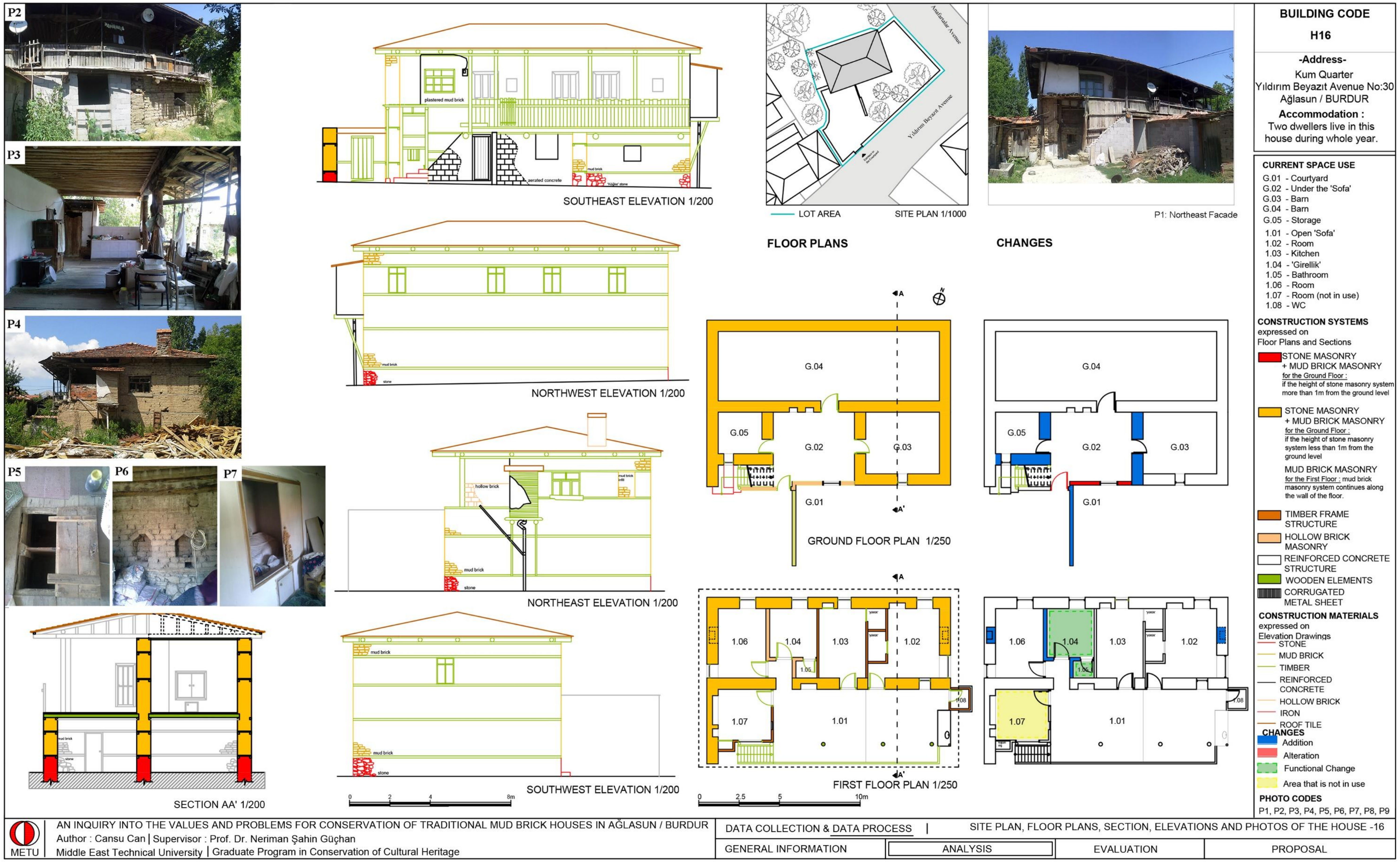


Figure 175: *Building Sheet - House 16*

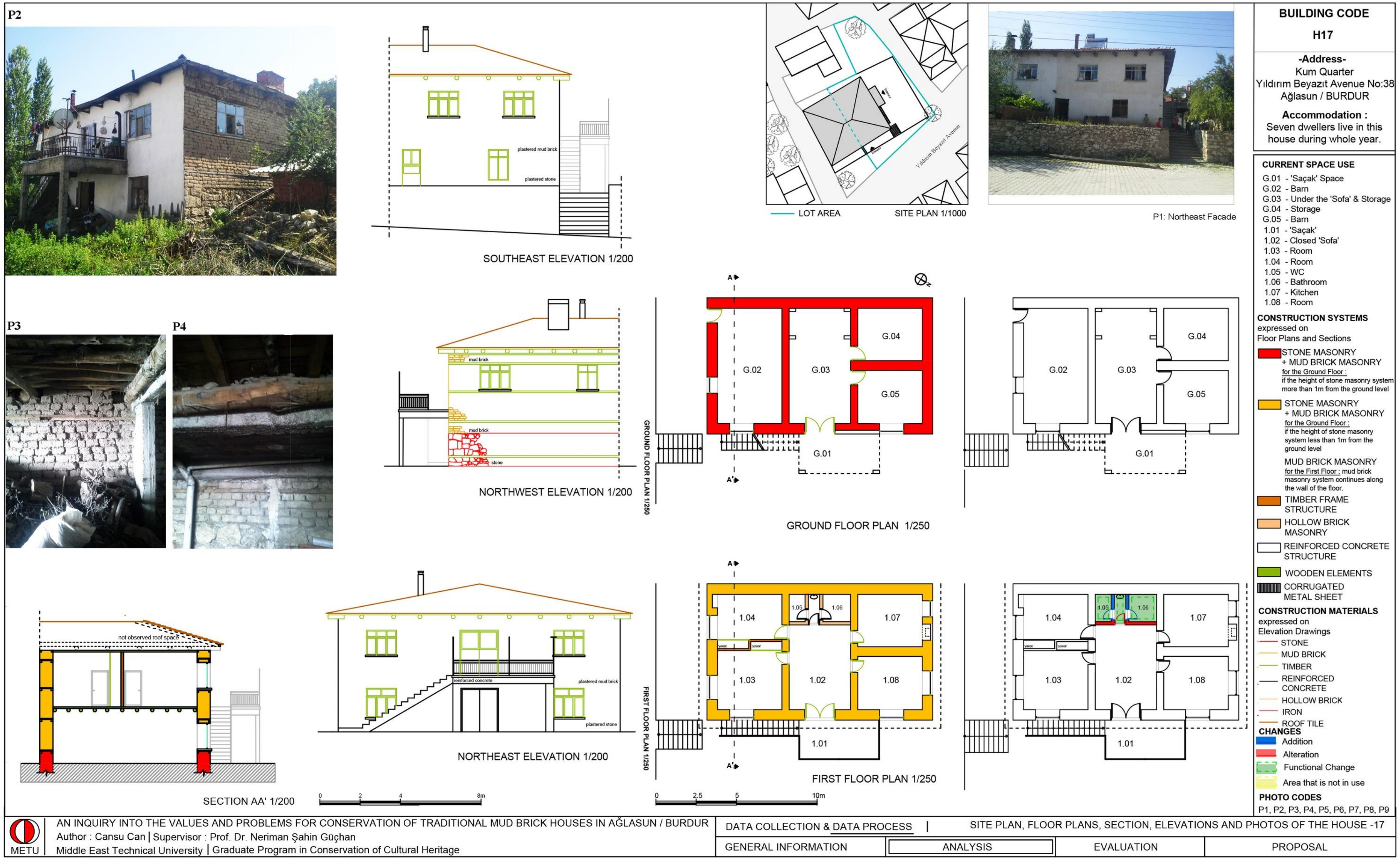


Figure 176: *Building Sheet - House 17*

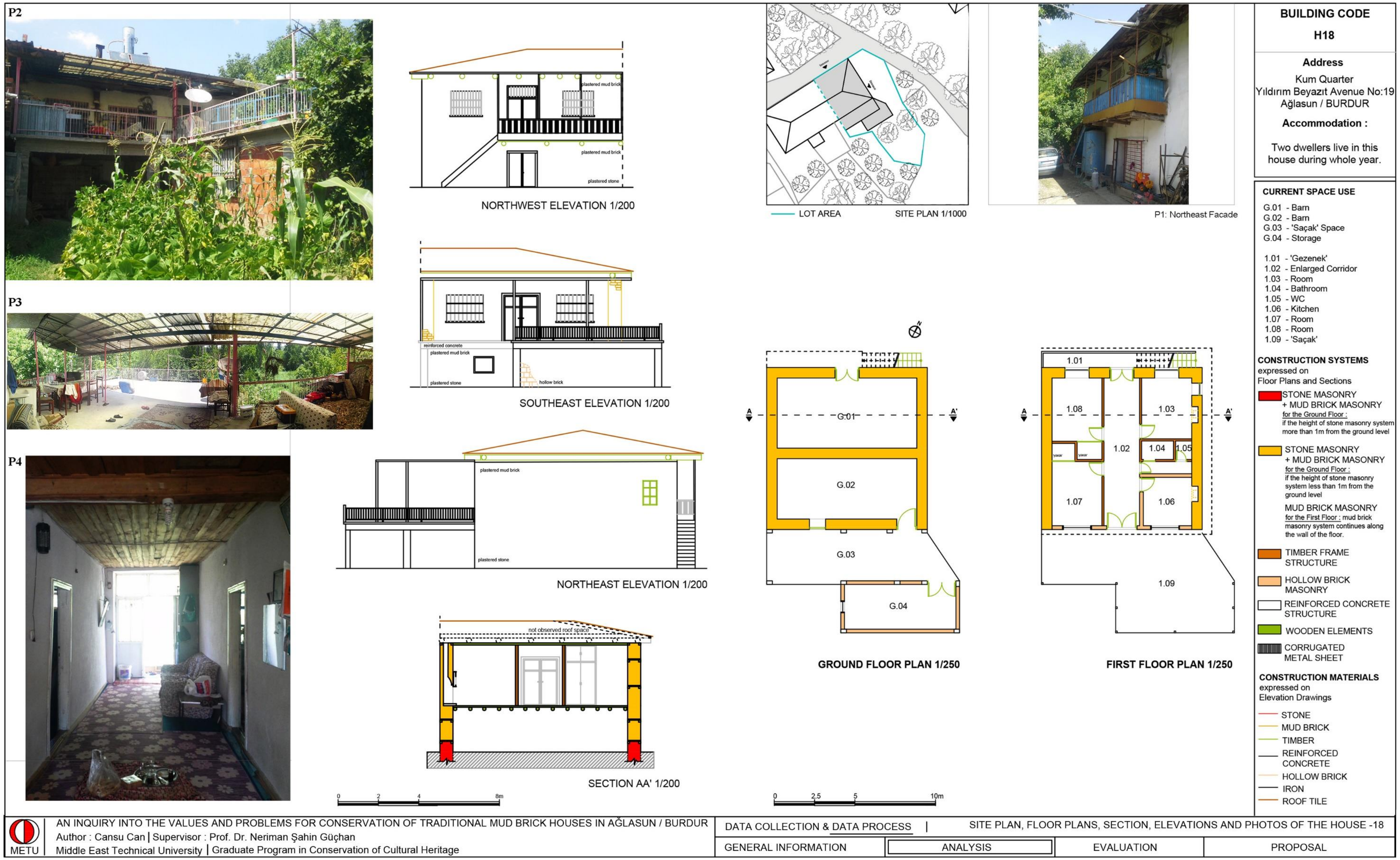


Figure177: *Building Sheet - House 18*

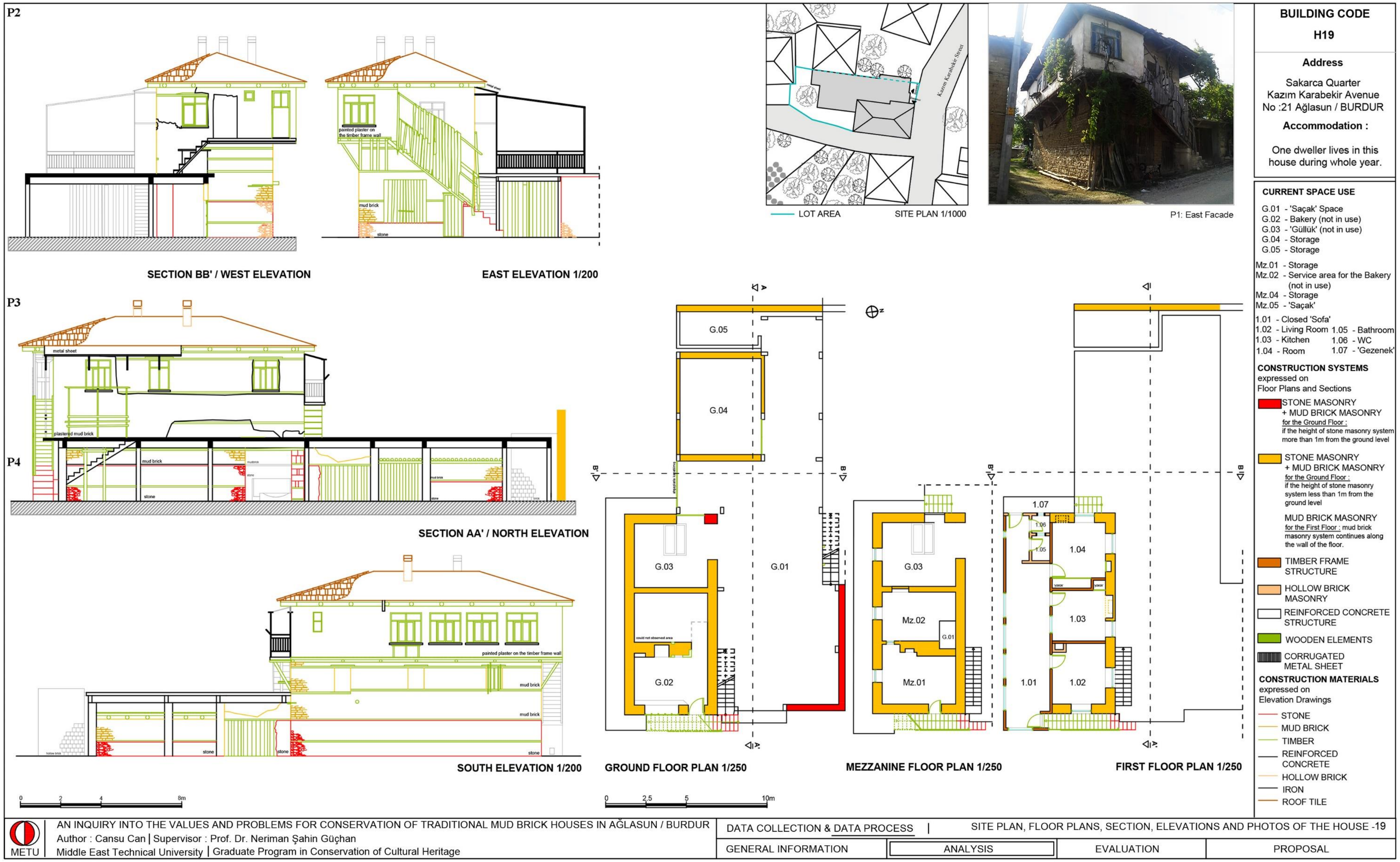


***Figure 178:** Building Sheet - House 19*

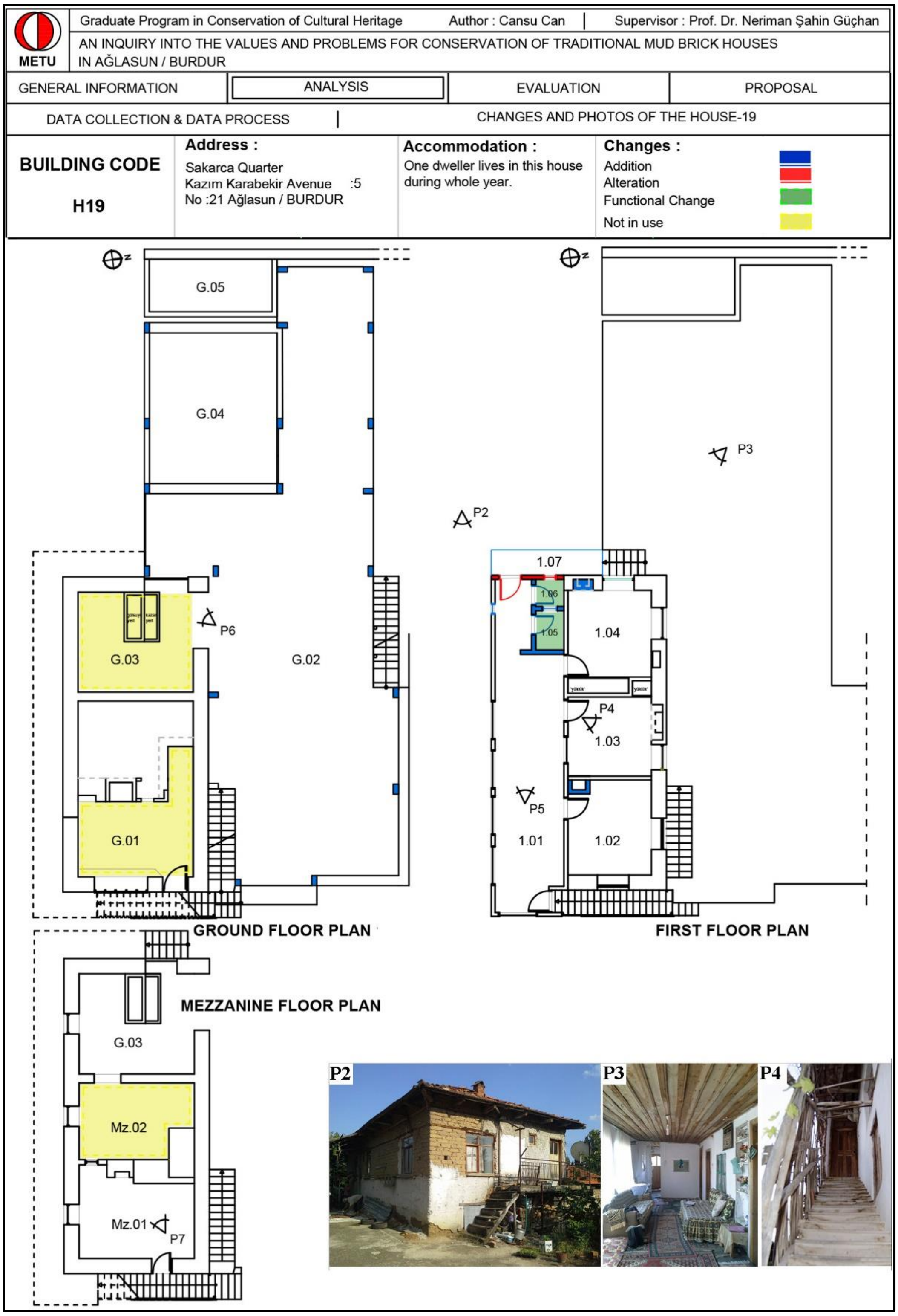


Figure 179: *Changes - House 19*