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THE NEOLITHIC ARCHITECTURAL STRUCTURES AND CULTURAL LANDSCAPE OF SUMAKI HÖYÜK

PhD Thesis

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ABSTRACT
THE NEOLITHIC ARCHITECTURAL STRUCTURES AND CULTURAL LANDSCAPE OF SUMAKI HÖYÜK

Space is a means of self-expression and evolves under the influence of social structure and environment. The environment-human-space relationship can be examined by using different models. Among them, the physical aspect and the socio-cultural aspect are dominant. This mutual relationship has always been a focal point for archaeology and geographical sciences. Supporting archaeological finds with absolute dating methods and interdisciplinary studies may lead to establishing paleo-environmental models for various periods and may also help to define external physical factors affecting social structures.

Constructions, one of the tangible cultural items, are also one of the most evident visible remains of past societies. The investigation of the space in the architectural context is the most important tool used to understand the daily practices of past communities, their social structure and also their organization. The architectural traditions created by the communities are based on the matured two-way relationship of the relationship that man constructs with space in a short and long run. The structure is also a solution to social consequences and/or a socio-economic crisis.

New excavations and researches carried out in Neolithic settlements of the Upper Mesopotamia have provided various informations. This increase in knowledge has been led to a very different pattern emerging as well as complementing the missing aspects of current information. Thus, in prehistoric archaeology of the Near East, but especially for Upper Mesopotamia, it become necessary to make some changes in long-accepted concepts. This study is about participating in the discussions about the cultural mobility process in Upper Mesopotamia and its surroundings between 8000 - 7000 BC with the architectural data of Sumaki Höyük Neolithic settlement.

Keywords: Sumaki Höyük, Architecture, Neolithic, Paleo-environment, Ethnoarchaeology

RESUME

LES STRUCTURES ARCHITECTURALES NEOLITHIQUES ET LE PAYSAGE CULTUREL DE SUMAKI HÖYÜK

L'espace est une construction personnelle qui peut évoluer sous l'influence de la structure sociale et de l'environnement physique. Différents modèles rendent compte des relations entre l''environnement, lmes personnes et l'espace. Parmi ces différents modèles, les aspects physiques et socio-culturel sont prééminents. Cette relation mutuelle a été au centre de l'attention continue des sciences de l'archéologie et de la géographie. Les découvertes archéologiques sont étayées par des méthodes de datation absolue et des études interdisciplinaires, et des modèles paléo-environnement peuvent être construits.

En termes archéologiques, les déterminations de l'espace de vie sont généralement basées sur des données architecturales. Les constructions, sont l'un des témoins les plus tangibles et les plus clairs que nous ont laissés les communautés passées. Dans le contexte architectural, les études spatiales sont les outils les plus importants utilisés pour comprendre les pratiques quotidiennes, les structures sociales et l'organısatıon des communautés passées Les traditions architecturales sont basées sur une relation bidirectionnelle à court et à long terme entre l'homme et l'espace. Le lieu est aussi le résultat des expériences sociales et/ou des solutions de crise socio-économique.

Les nouvelles fouilles et recherches menées dans les sites néolithiques en Haute Mésopotamie nous ont donné des informations variées. Ces nouvelles données complètent l'information existante, mais conduisent également à une vision renouvelée du Néolithique dans cette région. Ainsi, dans l'archéologie préhitorique le Proche-Orient, mais surtout de Haute Mésopotamie, il est nécessaire d'apporter des changements à des concepts acceptés de longue date. L'objectif de cette thèse est de s'appuyer sur les données architecturales de l'habitation néolithique de Sumaki Höyük pour débattre sur le processus de mouvement culturel en Haute Mésopotamie et son environnement proche entre les années 8000-7000 BP.

Kevwords: Architecture, Néolithique, Paléogéographie, Archéométrie, Ethnoarchéologie

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TABLE OF CONTENTS

ABSTRACT ..... **i**

RESUMÉ ..... **ii**

PREFACE ..... **iii**

TABLE OF CONTENTS ..... **v**

ABBREVIATIONS ..... **x**

FIGURE LIST ..... **xii**

DIAGRAM LIST ..... **xxxiv**

TABLE LIST ..... **xliii**

INTRODUCTION **1**

CHAPTER I
PURPOSE, METHOD AND PROBLEMS

1.1. Location and limits of the research area **4**

1.2. Purpose and subject of the research area **6**

1.3. Methodology of research **8**

1.3.1. Brief syntheses of previous researches **10**

1.3.2. Archaeological and Geoarchaeological field study **13**

1.3.3. Ethnoarchaeological field study **15**

1.3.4. Laboratory analyses **16**

1.3.4.1. Scanning Electron Microscopy / Energy Dispersive X-Ray Spectroscopy analyses (SEM/EDX) **17**

1.3.4.2. X-Ray Diffraction analysis (XRD) **17**

1.3.4.3. X-Ray Fluorescence analysis (XRF) **18**

1.3.4.4. Dating analysis **18**

1.3.4.5. Phytolith and pollen analysis **19**

1.3.4.6. Stable isotop analysis **19**

CHAPTER II
UPPER MESOPOTAMIA NEOLITHIC ARCHITECTURE AND SOME THEORETICAL APPROACHES

2.1. Neolithic concept and cultural diversity..... 36

2.2. Upper Mesopotamian Neolithic in the context of cultural alteration and deterioration…… 39

2.3. Living Areas with concept of space, environment and mobility..... 41

2.4. Upper Mesopotamian Neolithic Period..... 42

2.5. Architecture of Final PPNB to Early PN settlements from Upper Mesopotamia and its vicinity..... 43

2.5.1. Upper Tigris Basin..... 43

2.5.1.1. Çayönü Tepesi 44

2.5.1.2. Salat Camii Yanı..... 49

2.5.2. Upper Euphrates Basin..... 51

2.5.2.1. Mezraa Teleilat..... 51

2.5.2.2. Akarçay Tepe..... 54

2.5.2.3. Gritille……..... 57

2.5.3. Zagros highland area and Urmia region..... 59

2.5.3.1. Jarmo..... 59

2.5.3.2. Hajji Firuz..... 63

2.5.4. Jazira and Mosul region..... 66

2.5.4.1. Ginning..... 66

2.5.4.2. Tell Hassuna..... 69

2.5.5. Khabur and Balikh Basins..... 71

2.5.5.1. Tell Seker al-Aheimar..... 71

2.5.5.2. Tell Kashkashok II..... 74

2.5.5.3. Sabi Abyad II..... 77

2.5.6. Douara Basin..... 79

2.5.6.1. Tell El-Kowm..... 79

2.5.6.2. Tell El-Kowm 2 – Caracol..... 81

2.5.6.3. Qdeir..... 84

2.5.7. Rouj Basin (Tell el-Kerkh 2)..... 85

2.6. Discussion and Interpretation..... 87

CHAPTER III
PALEO-ENVIRONMENTAL CONDITIONS AND STRATIGRAPHY OF SUMAKİ HÖYÜK NEOLITHIC SETTLEMENT

3.1. General information on Sumaki Höyük..... 95

3.2. Paleo-environmental condition of Sumaki Höyük..... 98

3.2.1. Hydrography and river system around Sumaki Höyük..... 98

3.2.2. Landslides around Sumaki Höyük..... 100

3.2.3. Soil structures and the cultural deposits of Sumaki Höyük..... 104

3.2.4. Climate..... 106

3.2.4.1. General view of the global climate cycle..... 107

3.2.4.2. Climatical conditions of the Near East during the Holocene Period and the 8.2 ka event..... 110

3.2.4.3. Climatic conditions of Sumaki Höyük and its environs in the Neolithic Period..... 116

3.2.5. Plants identified in the Neolithic deposits of Sumaki Höyük..... 118

3.3. Stratigraphy of the settlement..... 123

3.2.1. Phases N7 …..……..... 126

3.2.1. Phases N6 …..……..... 127

3.2.1. Phases N5 …..……..... 131

3.2.1. Phases N4 …..……..... 135

3.2.1. Phases N3 …..……..... 138

3.2.1. Phases N2 …..……..... 141

3.2.1. Phases N1…..……..... 145

3.4. Brief summary and Discussion..... 147

CHAPTER IV
ARCHITECTURE AND MICROARCHAEOLOGICAL INVESTIGATIONS OF SUMAKİ HÖYÜK NEOLITHIC SETTLEMENT

4.1. Construction material and methods 184

4.2. Cluster Analysis of the construction material from Sumaki Höyük..... 193

4.3. Architectural elements and construction techniques 197

4.3.1. Earth walls / Stone rows..... 197
4.3.2 Hearths..... 205
4.3.3 Fire Pits..... 207
4.4. Description and microarchaeological observations of Sumaki Höyük Neolithic architecture..... 209
4.4.1. Phase N7 Architecture..... 209
4.4.1.1. Architectural remains..... 210
4.4.1.2. Hearths..... 210
4.4.1.3. Fire Pits..... 212
4.4.2 Phase N6 Architecture..... 217
4.4.2.1. Structures..... 217
4.4.2.2. Hearths..... 245
4.4.3 Phase N5 Architecture..... 247
4.4.3.1. Structures..... 250
4.4.3.2. Hearths..... 286
4.4.3.3. Fire Pits..... 292
4.4.4. Phase N4 Architecture..... 295
4.4.4.1. Structures..... 295
4.4.4.2. Hearths..... 321
4.4.4.3. Fire Pits..... 324
4.4.5 Phase N3 Architecture..... 328
4.4.5.1. Structures..... 329
4.4.5.2. Hearths..... 331
4.4.5.3. Fire Pits..... 333
4.4.6 Phase N2 Architecture..... 334
4.4.6.1. Structures..... 335
4.4.6.2. Hearths..... 355
4.4.7 Phase N1 Architecture..... 358
4.4.7.1. Architectural Elements..... 361
4.4.7.2. Hearths..... 370
4.5. Discussion..... 373

CHAPTER V
SEMI-NOMADIC PASTORALISTS IN THE LOWER GARZAN BASIN: ARCHITECTURE AND SETTLEMENT PATTERN

5.1. A semi-nomadic pastoralists group: Alikan Tribe..... 499
5.2. Arhitecture of semi-nomadic groups in the Lower Garzan Basin..... 505
5.2.1. Wattle Structures (Type 1)..... 506
5.2.2. Stone-Walled Wattle Structures (Type 2)..... 507
5.2.3. Stone-Walled Tentsites (Type 3)..... 508
5.2.4. Wattle-Walled Tentsites (Type 4)..... 509
5.2.5. Brushwood-Walled Tentsites (Type 5)..... 510
5.2.6. Mixed-Walled Tentsites (Type 6)..... 511
5.2.7. Tents (Type 7)..... 511
5.3. Settlement models of the winter quarters in the Lower Garzan Basin..... 512
5.4. Winter quarters in the Lower Garzan Basin..... 514
5.4.1. Şeyhosel Kom..... 515
5.4.2. Çemisitrin Kom..... 517
5.4.3. Sulan Kom..... 520
5.4.4. Sulane Girgiz Kom..... 524
5.4.5. Bazivan Kom..... 527
5.4.6. Memika Kom..... 530
5.4.7. Mezrik Kom..... 534
5.4.8. Işıkveren Kom I..... 536
5.4.9. Işıkveren Kom II..... 538
5.4.10 Boğaz Kom..... 540
5.5. Discussion..... 543

CONCLUSION ……..... 593
BIBLIOGRAPHY ..…… 609
CURRICULUM VITAE (CV) ….……..……..……..... 628

ABBREVIATIONS

p. : Page

Vol. : Volume

Trans. : Translator(s)

Ed. : Editor

Eds. : Editors

et al. : el alii

Fig. : Figure

BC : Before Christ

BP : Before Present

AD : Anno Domini

PN : Pottery Neolithic

EPN : Early Pottery Neolithic

PPN : Pre Pottery Neolithic

PPNA : Pre Pottery Neolithic A

PPNB : Pre Pottery Neolithic B

PPNC : Pre Pottery Neolithic C

FPPNB : Final Pre Pottery Neolithic B

LPPNB : Late Pre Pottery Neolithic B

Post-PPNB : Post-Pre Pottery Neolithic B

Strc. : Structure

RCC : Rapid Climate Change

DEM : Digital Elevation Model

GT : Garzan Terrace

E : East

W : West

N : North

S : South

NW : Northwest

NE : Northeast

SW : Southwest

SE : Southeast

O : Oxygen

C : Carbon

N : Nitrogen

Na : Sodium

Mg : Magnesium

Al : Aluminum

Si : Silicone

P : Phosphorus

S : Sulfur

Cl : Chlorine

K : Potassium

Ca : Calsium

Ti : Titanium

V : Vanadium

Mn : Manganese

Fe : Iron

Ni : Nickel

Cu : Copper

Zn : Zinc

Se : Selenium

Sr : Strontium

Zr : Zirconium

Pd : Palladium

Cd : Cadmium

FIGURE LIST

Figure 1.1: Some blow-ups from field research and lab work 14
Figure 1.2: Turkey provinces map and location of Batman province 20
Figure 1.3: Location of the Upper Tigris Basin and Sumaki Höyük 20
Figure 1.4: Some place in the Lower Garzan Basin 21
Figure 1.5: Locations of all analysis sample from Phase N1 at the Area A 27
Figure 1.6: Locations of all analysis sample from Phase N1 at the Area B 27
Figure 1.7: Locations of all analysis sample from Phase N2 at the Area A 28
Figure 1.8: Locations of all analysis sample from Phase N2 at the Area B 28
Figure 1.9: Locations of all analysis sample from Phase N3 at the Area A 29
Figure 1.10: Locations of all analysis sample from Phase N3 at the Area B 29
Figure 1.11: Locations of all analysis sample from Phase N4 at the Area A 30
Figure 1.12: Locations of all analysis sample from Phase N4 at the Area B 30
Figure 1.13: Locations of all analysis sample from Phase N5 at the Area A 31
Figure 1.14: Locations of all analysis sample from Phase N5 at the Area B 31
Figure 1.15: Locations of all analysis sample from Phase N6 at the Area A 32
Figure 1.16: Locations of all analysis sample from Phase N6 at the Area B 32
Figure 1.17: Locations of all analysis sample from Phase N7 at the Area B 33
Figure 1.18: Locations of Isotope analysis sample from trench 14G at the Area B 34
Figure 1.19: Locations of Isotope analysis sample from trench 15G at the Area B 34
Figure 1.20: Locations of Isotope analysis sample from trench 15F at the Area B 34
Figure 1.21: Locations of Isotope analysis sample from trench 20M at the Area A 35
Figure 1.22: Locations of Isotope analysis sample from trench 21M at the Area A 35
Figure 2.1: 3D DEM and cross-section of the environment of Çayönü Tepesi 44
Figure 2.2: Reconstruction model a Cell Building from Çayönü Tepesi 46
Figure 2.3: Settlement pattern and architecture from Subphase c3 46
Figure 2.4: Settlement pattern and architecture from Subphases c3b and lr1 47
Figure 2.5: Settlement pattern and architecture from Subphases lr3 and lr2 48
Figure 2.6: Settlement pattern and architecture from Subphases lr4-lr6 48
Figure 2.7: 3D DEM and cross-section of the environment of Salat Cami Yanı 49
Figure 2.8: Settlement pattern and architecture from Phase 2 (Miyake, 2010a: 444 Çizim 2, 446 Resim 1) 50
Figure 2.9: 3D DEM and cross-section of the environment of Mezraa Teleilat 52

Figure 2.10: 3D DEM and cross-section of the environment of Akarçay Tepe 54
Figure 2.11: Settlement pattern and architecture of Akarçay Tepe (Duru, 2013:339 Şekil 20) 55
Figure 2.12: 3D DEM and cross-section of the environment of Gritille 57
Figure 2.13: 3D DEM and cross-section of the environment of Jarmo 60
Figure 2.14: Settlement pattern and architecture from J-II, 3 (Braidwood, 1983a: 181 Fig.84) 61
Figure 2.15: Settlement pattern and architecture from J-I, 6a-d, and J-I, 8 (Braidwood, 1983a: 174 Fig.41, 173 Fig.39) 61
Figure 2.16: 3D DEM and cross-section of the environment of Hajji Firuz 63
Figure 2.17: Settlement pattern and architecture from Phase J and Phase K (Voigt, 1983: 31 Fig.22-24) 64
Figure 2.18: Settlement pattern and architecture from Phase D (Voigt, 1983: 26 Fig.16).. 64
Figure 2.19: 3D DEM and cross-section of the environment of Ginning 67
Figure 2.20: Rectangular building in Ginning (Baird & Campbell, 1990: 67 Fig.2) 68
Figure 2.21: 3D DEM and cross-section of the environment of Tell Hassuna 69
Figure 2.22: Settlement pattern and architecture from Hassuna Phase Ib-Ic (Lloyd, et al., 1945: 403 Fig.28) 70
Figure 2.23: 3D DEM and cross-section of the environment of Tell Seker al-Aheimar..... 72
Figure 2.24: Settlement pattern and architecture of Tell Seker al-Aheimar (Nishiaki, 2016: 70 Fig.2; Nishiaki and Le Mière, 2005: 58 Fig.3; Portilllo, et al., 2014: 108 Fig.2) 73
Figure 2.25: 3D DEM and cross-section of the environment of Tell Kashkashok II..... 75
Figure 2.26: Settlement pattern and architecture of Tell Kashkashok II (Matsutani, 1991: Plate 57)..... 76
Figure 2.27: 3D DEM and cross-section of the environment of Sabi Abyad II 77
Figure 2.28: Settlement pattern and architecture from Phase 3 (Verhoeven, 2000: 9 Fig.3) 78
Figure 2.29: 3D DEM and cross-section of the environment of Tell El-Kowm 79
Figure 2.30: 3D DEM and cross-section of the environment of Tell El-Kowm 2 – Caracol 81
Figure 2.31: Type 1 and Type 2 structure plans from Tell El-Kowm 2 – Caracol (Stordeur et al., 2000b: 39 Fig.2)..... 82

Figure 2.32: Settlement pattern and architecture from Subphase IX and X (Stordeur, 2000a:89 Fig1) 83
Figure 2.33: 3D DEM and cross-section of the environment of Tell el-Kerkh 2 85
Figure 2.34: Architecture structures from Layer3 and Layer 7 (Miyake & Tsuneki, 1996: 112 fig.4-5) 86
Figure 2.35: Location of the basins and/or regions mentioned in the thesis 92
Figure 2.36: Locations of contemporary archaeological sites 92
Figure 2.37: Distribution of architectural structure plans of some contemporary settlements at Sumaki Höyük 93
Figure 2.38: Distribution of architectural structure materials of some contemporary settlements at Sumaki Höyük 93
Figure 3.1: 3D DEM and cross-section of the environment of the Sumaki Höyük 95
Figure 3.2: DEM and excavation area at Sumaki Höyük 96
Figure 3.3: Changes in topography by phases at Sumaki Höyük 97
Figure 3.4: Location of the Garzan Basin in the Upper Tigris Basin 98
Figure 3.5: Hydrography of the Lower Garzan Basin 99
Figure 3.6: Landslides and landfall modeling in the vicinity of Sumaki Höyük 101
Figure 3.7: Cross-section of trench 22L at Sumaki Höyük 104
Figure 3.8: Oak communities in the Lower Garzan Basin 119
Figure 3.9: Neolithic stratigraphy modeling of Area B at Sumaki Höyük 125
Figure 3.10: Settlement pattern and architecture from Phase N7 at Area B 126
Figure 3.11: Settlement pattern and architecture from Phase N6 at Area B 128
Figure 3.12: Settlement pattern and architecture from Phase N6 at Area A 129
Figure 3.13: Settlement pattern and architecture from Phase N5 at Area A 131
Figure 3.14: Settlement pattern and architecture from Phase N5 at Area B 132
Figure 3.15: Settlement pattern and architecture from Phase N4 at Area A 135
Figure 3.16: Settlement pattern and architecture from Phase N4 at Area B 136
Figure 3.17: Settlement pattern and architecture from Phase N3 at Area A 138
Figure 3.18: Settlement pattern and architecture from Phase N3 at Area B 139
Figure 3.19: Settlement pattern and architecture from Phase N2 at Area A 142
Figure 3.20: Settlement pattern and architecture from Phase N2 at Area B 142
Figure 3.21: Settlement pattern and architecture from Phase N1 at Area A 145
Figure 3.22: Settlement pattern and architecture from Phase N1 at Area B 146

Figure 3.23: A headwater is located on the northeast slope of Sumaki Höyük 150
Figure 3.24: View of the İkiköprü Channel from southeast 150
Figure 3.25: View of the Ulular Channel from north 150
Figure 3.26: View of the Kıradağı Basalt and Sumaki Höyük from Asmadere village 151
Figure 3.27: Kıradağı basalt and other geological formation 151
Figure 3.28: Cross-section of the Kıradağı basalt 151
Figure 3.29: Colluvial and hydrographic deposition traces in front of Rıdvan village 152
Figure 3.30: General view hydrographic deposition traces between Asmadere and Yeşiloba villages 152
Figure 3.31: Detail view hydrographic deposition traces between Asmadere and Yeşiloba villages 152
Figure 3.32: Propagation of reeds and herbaceous plants near Sulan Kom 153
Figure 3.33: Propagation of reeds and herbaceous plants near Sulan village 153
Figure 3.34: A natural reed belt along the Garzan Stream 153
Figure 3.35: Mass movements and landslides area on the eastern outskirts of Kıradağı .. 154
Figure 3.36: Mass movements and landslides area on the eastern outskirts of Kıradağı .. 154
Figure 3.37. Falling and/or drifting of blocks detached from the Mare Tepesi conglomerates 154
Figure 3.38: Drifting of blocks detached from the Kıradağı Basalt, near Tepecik village 155
Figure 3.39: Mass movements and current landslide traces, on the northeastern slope of Sumaki Höyük 155
Figure 3.40: Current landslide traces, on the northeastern slope of Sumaki Höyük 155
Figure 3.41: Torrent / flood sediment in trench 22L form Area A (Torrent 1) 156
Figure 3.42: Obsidian core and blade in flood/torrent sediment (trench 22L) 156
Figure 3.43: Obsidian core in flood/torrent sediment (trench 22L) 156
Figure 3.44: Torrent / flood sediment in trench 15F form Area B (Torrent 1) 157
Figure 3.45: Torrent / flood sediment in trench 20C form Area C (Torrent 1) 157
Figure 3.46: Torrent / flood sediment in trench 15F form Area B (Torrent 2) 157
Figure 3.47: Thin earth line between Phase 4 and Phase 3 from Sumaki Höyük 158
Figure 3.48: Thin earth line between Phase 4 and Phase 3 from Sumaki Höyük 158
Figure 3.49: Natural steep slope in trench 20G 158
Figure 3.50: Sumaki Höyük excavated areas 159
Figure 3.51: Sumaki Höyük Excavated areas, from North 159

Figure 3.52: Location of Sumaki Höyük 160
Figure 3.53: General view of Sumaki Höyük excavation area from north..... 160
Figure 3.54: General view of Area A from the South 161
Figure 3.55: General view of Area B from the west 161
Figure 3.56: Profile drawings of Sumaki Höyük Area A 162
Figure 3.57: Profile drawings of Sumaki Höyük Area B 163
Figure 3.58: Settlement pattern and architectural plan Phase N7 in Area B 164
Figure 3.59: Settlement pattern and architectural plan Phase N6 in Area A 165
Figure 3.60: Settlement pattern and architectural plan Phase N6 in Area B 166
Figure 3.61: Settlement pattern and architectural plan Phase N5 in Area A 167
Figure 3.62: Settlement pattern and architectural plan Phase N5 in Area B 168
Figure 3.63: Settlement pattern and architectural plan Phase N4 in Area A 169
Figure 3.64: Settlement pattern and architectural plan Phase N4 in Area B 170
Figure 3.65: Settlement pattern and architectural plan Phase N3 in Area A 171
Figure 3.66: Settlement pattern and architectural plan Phase N3 in Area B 172
Figure 3.67 Settlement pattern and architectural plan Phase N2 in Area A 173
Figure 3.68: Settlement pattern and architectural plan Phase N2 in Area B 174
Figure 3.69: Settlement pattern and architectural plan Phase N1 in Area A 175
Figure 3.70: Settlement pattern and architectural plan Phase N1 in Area B 176
Figure 3.71: Settlement pattern and architectural plan between phases N5-N1 from trench 18G-20G in Area C..... 177
Figure 3.72: Settlement pattern and architectural plan between phases N3 to N1 from trench 17M in Area..... 178
Figure 4.1: Classification of earth implementation (Aurenche et al., 2011:16 fig.2)..... 187
Figure 4.2: Traces of piled earth walls in the south trench section of 15G 198
Figure 4.3: Caliche layer in the sounding of trench 20/O 199
Figure 4.4: Stone row from Phase N1 200
Figure 4.5: Construction stages and cross section of a hearth (N1O1) 205
Figure 4.6: Hearth N7O1 and its cross-section..... 211
Figure 4.7: Hearth N7O2 and its cross-section..... 212
Figure 4.8: Fire Pit N7A1 and its cross-section..... 212
Figure 4.9: Fire Pit N7A2 and its cross-section..... 213
Figure 4.10: Fire Pit N7A3 and its cross-section..... 214

Figure 4.11: Fire Pit N7A4 and its cross-section..... 214
Figure 4.12: Location and plan of Structure N6B1 217
Figure 4.13: Location and plan of Structure N6B2 220
Figure 4.14: Location and plan of Structure N6B3 223
Figure 4.15: Location and plan of Structure N6B4 225
Figure 4.16: Location and plan of Structure N6B5 227
Figure 4.17: Location and plan of Structure N6B6 228
Figure 4.18: Location and plan of Structure N6B7 230
Figure 4.19: Location and plan of Structure N6B8 231
Figure 4.20: Location and plan of Structure N6B9 232
Figure 4.21: Location and plan of Structure N6B10 235
Figure 4.22: Location and plan of Structure N6B11 238
Figure 4.23: Location and plan of Structure N6B12 239
Figure 4.24: Location and plan of Structure N6B13 241
Figure 4.25: Location and plan of Structure N6B14 243
Figure 4.26: Location and plan of Structure N6B15 244
Figure 4.27: Location and plan of Structure N5B1 251
Figure 4.28: Location and plan of Structure N5B2 254
Figure 4.29: Location and plan of Structure N5B3 255
Figure 4.30: Location and plan of Structure N5B4 259
Figure 4.31: Location and plan of Structure N5B5 262
Figure 4.32: Location and plan of Structure N5B6 263
Figure 4.33: Location and plan of Structure N5B7 266
Figure 4.34: Location and plan of Structure N5B8 268
Figure 4.35: Location and plan of Structure N5B9 270
Figure 4.36: Location and plan of Structure N5B10 272
Figure 4.37: Location and plan of Structure N5B11 274
Figure 4.38: Location and plan of Structure N5B12 277
Figure 4.39: Location and plan of Structure N5B13 281
Figure 4.40: Location and plan of Structure N5B14 283
Figure 4.41: Location and plan of Structure N5B15 285
Figure 4.42: Hearth N5O7 and its cross-section..... 290
Figure 4.43: Hearth N5O9 and its cross-section..... 291

Figure 4.44: Fire Pit N5A1 and its cross-section..... 292
Figure 4.45: Fire Pit N5A2 and its cross-section..... 293
Figure 4.46: Fire Pit N5A3 and its cross-section..... 293
Figure 4.47: Fire Pit N5A4 and its cross-section..... 294
Figure 4.48: Location and plan of Structure N4B1 296
Figure 4.49: Location and plan of Structure N4B2 300
Figure 4.50: Location and plan of Structure N4B3 302
Figure 4.51: Location and plan of Structure N4B4 305
Figure 4.52: Location and plan of Structure N4B5 307
Figure 4.53: Location and plan of Structure N4B6 308
Figure 4.54: Location and plan of Structure N4B7 309
Figure 4.55: Location and plan of Structure N4B8 310
Figure 4.56: Location and plan of Structure N4B9 314
Figure 4.57: Location and plan of Structure N4B10 316
Figure 4.58: Location and plan of Structure N4B11 318
Figure 4.59: Location and plan of Structure N4B13 319
Figure 4.60: Fire Pit N4A1 and its cross-section..... 325
Figure 4.61: Fire Pit N4A2 and its cross-section..... 326
Figure 4.62: Fire Pit N4A3 and its cross-section..... 326
Figure 4.63: Fire Pit N4A4 and its cross-section..... 327
Figure 4.64: Location and plan of Structure N3B1 329
Figure 4.65: Location and plan of Structure N3B2 331
Figure 4.66: Location and plan of Structure N2B1 336
Figure 4.67: Location and plan of Structure N2B2 337
Figure 4.68: Location and plan of Structure N2B3 338
Figure 4.69: Location and plan of Structure N2B4 340
Figure 4.70: Location and plan of Structure N2B5 342
Figure 4.71: Location and plan of Structure N2B6 343
Figure 4.72: Location and plan of Structure N2B7 345
Figure 4.73: Location and plan of Structure N2B8 346
Figure 4.74: Location and plan of Structure N2B9 349
Figure 4.75: Location and plan of Structure N2B10 350
Figure 4.76: Location and plan of Structure N2B11 351

Figure 4.77: Location and plan of Structure N2B12 354
Figure 4.78: Hearth N2O2 and its cross-section..... 356
Figure 4.79: Stone rows from Phase N1 359
Figure 4.80: Stone rows from Phase N1 360
Figure 4.81: Number 6 Stone Row / Wall 361
Figure 4.82: Number 7 Stone Row / Wall 362
Figure 4.83: Number 12 Stone Row 363
Figure 4.84: Number 38 Stone Row 363
Figure 4.85: Number 39-40 Stone Rows 364
Figure 4.86: Number 75 Stone Row 365
Figure 4.87: Number 28 Stone Row 366
Figure 4.88: Number 32 Stone Row 366
Figure 4.89: Number 33 Stone Row 367
Figure 4.90: Number 34 Stone Row 368
Figure 4.91: Number 4 Stone Pavement..... 369
Figure 4.92: Number 5 Stone Pavement..... 369
Figure 4.93: Structure N6B1 from south 381
Figure 4.94: Lime traces on the cell base of Structure N6B1 381
Figure 4.95: Cross-section view of massive piled earth (Structure N6B1) 381
Figure 4.96: Structure N6B2 from south 382
Figure 4.97: Lime traces and piled earth / duripan (?) wall of Structure N6B2 382
Figure 4.98: Structure N6B1 from north 382
Figure 4.99: Structure N6B3 from southeast..... 383
Figure 4.100: Structure N6B3 from northeast 383
Figure 4.101: Bird's-eye view of Structure N6B3 and its piled earth walls 383
Figure 4.102: Structure N6B4 384
Figure 4.103: Lime traces on the cell base of Structure N6B4..... 384
Figure 4.104: Cross-section of massive piled earth (Structure N6B4)..... 384
Figure 4.105: Trace of Structure N6B5 385
Figure 4.106: Structure N6B5 from east 385
Figure 4.107: Bird's-eye view of Structure N6B5 385
Figure 4.108: Structure N6B6 from east 386
Figure 4.109: Massive piled earth walls and cells of Structure N6B6 386

Figure 4.110: Some stone tools and bones on the corridor base of Structure N6B6 386
Figure 4.111: Trace of Structure N6B7 387
Figure 4.112: Massive piled earth walls Structure N6B7 387
Figure 4.113: Structure N6B8 from south 387
Figure 4.114: Trace of Structure N6B9 388
Figure 4.115: Trace of massive piled earth walls from Structure N6B9 388
Figure 4.116: Structure N6B9 from west 388
Figure 4.117: Lime traces on the cells and corridor base of Structure N6B9 389
Figure 4.118: Cross-section view of massive piled earth (Structure N6B9) 389
Figure 4.119: Lime traces on the cell base and earth wall edge of Structure N6B9 389
Figure 4.120: Structure N6B10 from southwest 390
Figure 4.121: Structure N6B10 from west 390
Figure 4.122: Lime traces on the cells and corridor base and also earth walls edge of Structure N6B10 390
Figure 4.123: Massive piled earth walls layers from Structure N6B10 391
Figure 4.124: Massive piled earth walls and lime traces on the cell base of Structure N6B10 391
Figure 4.125: Thin lime traces from massive piled earth walls edge of Structure N6B10 391
Figure 4.126: Structure N6B11 from south 392
Figure 4.127: Structure N6B12 392
Figure 4.128: Thin lime traces from piled earth walls edge of Structure N6B12 392
Figure 4.129: Structure N6B13 393
Figure 4.130: Massive piled earth walls layers from Structure N6B13 393
Figure 4.131: Structure N6B14 from southwest 393
Figure 4.132: Structure N5B1 from north 394
Figure 4.133: Structure N5B1 from south 394
Figure 4.134: Lime traces of wickerwork and duripan wall from Structure N5B1 394
Figure 4.135: Structure N5B2 from southeast 395
Figure 4.136: Structure N5B2 from south and its piled earth walls 395
Figure 4.137: Cross-section of piled earth walls from Structure N5B2 395
Figure 4.138: Bird's-eye view of Structure N3B3 396
Figure 4.139: Limy wall trace and plastered floor residues in room number 2 from Structure N5B3 396

Figure 4.140: Detail view of plastered floor residues in room number 2 and lime fragments from Structure N5B3 396
Figure 4.141: Structure N5B4 from east 397
Figure 4.142: Massive piled earth walls layers from Structure N5B4 397
Figure 4.143: Detail view of massive piled earth walls layers from Structure N5B4 397
Figure 4.144: Structure N5B5 from north 398
Figure 4.145: Piled earth wall trace and lime fragment of Structure N5B5 398
Figure 4.146: Piled earth wall trace of Structure N5B5 from west 398
Figure 4.147: Massive piled earth wall trace of Structure N5B6 from north 399
Figure 4.148: Cells and corridor of Structure N5B6 399
Figure 4.149: Structure N5B6 and Structure N5B7 399
Figure 4.150: Bird's-eye view of Structure N5B8 400
Figure 4.151: Piled earth / duripan wall of Structure N5B8 400
Figure 4.152: Duripan wall of Structure N5B8 400
Figure 4.153: Structure N5B9 from southwest 401
Figure 4.154: Structure N5B9 from west 401
Figure 4.155: Cells of Structure N5B10 from west 401
Figure 4.156: Bird's-eye view of Structure N5B11 402
Figure 4.157: Duripan wall from Structure N5B11 402
Figure 4.158: Example of duripan wall from Structure N5B11 402
Figure 4.159: Structure N5B12 from north 403
Figure 4.160: Plastered floor residues in room number 3 from Structure N5B12 403
Figure 4.161: Cross-section of the wall from Structure N5B12 403
Figure 4.162: Some mud bricks example from Structure N5B12 404
Figure 4.163: Detail view of mud bricks and mortar from Structure N5B12 404
Figure 4.164: Traces of plants in mud brick mud and also mortar 404
Figure 4.165: Structure N5B13 from south 405
Figure 4.166: Structure N5B14 from southwest 405
Figure 4.167: Structure N5B15 from south 405
Figure 4.168: Massive piled earth walls traces of Structure N4B1 from west 406
Figure 4.169: Thin lime traces from massive piled earth walls edge of Structure N4B1 . 406
Figure 4.170: Rooms and door openings of Structure N4B1 from north 406
Figure 4.171: Structure N4B2 from south 407

Figure 4.172: Thin lime traces from piled earth walls edge of Structure N4B2 407
Figure 4.173: Structure N4B3 from east and thin lime traces from its piled earth walls edge 407
Figure 4.174: Massive piled earth walls traces of Structure N4B4 from north..... 408
Figure 4.175: Detail view of massive piled earth walls layers from Structure N4B4 408
Figure 4.176: Structure N4B7 from southeast and cross-section of earth wall..... 408
Figure 4.177: Structure N4B8 from south 409
Figure 4.178: Detail view of wattle frame of massive piled wall from Structure N4B8... 409
Figure 4.179: Thin lime traces from massive piled earth walls edge of Structure N4B8 . 409
Figure 4.180: Bird's-eye view of Structure N4B9 and lime fragment in its piled earth walls 410
Figure 4.181: Massive piled earth walls layers from Structure N4B9 410
Figure 4.182: Detail view of massive piled earth walls layers from Structure N4B9 410
Figure 4.183: Structure N4B4 411
Figure 4.184: Structure N4B11 411
Figure 4.185: Structure N4B13 411
Figure 4.186: Structure N3B1 from north 412
Figure 4.187: Example a post-hole from Structure N3B1..... 412
Figure 4.188: Structure N3B1 from north 412
Figure 4.189: Structure N2B1 from northeast..... 413
Figure 4.190: Structure N2B2 from west 413
Figure 4.191: Structure N2B3 from west 413
Figure 4.192: Location of the Structures N2B2-N2B3- N2B4..... 414
Figure 4.193: Structure N2B4 from west 414
Figure 4.194: Structure N2B4 from north 414
Figure 4.195: Location of the Structures N2B5 and N2B6 415
Figure 4.196: Structures N2B5 and N2B6 from southwest..... 415
Figure 4.197: Bird's-eye view of Structures N2B5 and N2B6 415
Figure 4.198: Piled earth wall traces of Structure N2B7..... 416
Figure 4.199: Bird's-eye view of Structures N2B7 416
Figure 4.200: Location of the Structure N2B7 416
Figure 4.201: Structure N2B8 from south..... 417
Figure 4.202: Structure N2B8 from west 417

Figure 4.203: Structure N2B8 and 1st stage torrent/flood fillings accumulated on its edge 417
Figure 4.204: Structure N2B9 and its cells from west 418
Figure 4.205: Structure N2B10 from north 418
Figure 4.206: Structure N2B13 from north and upper phases stone row on its filling 418
Figure 4.207: Hearth N7O1 419
Figure 4.208: Detail view of Hearth N7O1 419
Figure 4.209: Hearth N7O2 419
Figure 4.210: Hearth N6O1 420
Figure 4.211: Bird's-eye view of Hearth N6O2 420
Figure 4.212: Hearth N6O2 from southwest and two ground stone artefacts near it 420
Figure 4.213: Overview of Phase N6 and N5 hearths together. 421
Figure 4.214: Hearth N6O3 from southwest 421
Figure 4.215: Stone Pavement / Hearth N6O5 from east 421
Figure 4.216: Hearth N5O1from west 422
Figure 4.217: Overview of Phase N5 hearths together at the Area A 422
Figure 4.218: Hearth N5O2 from west 422
Figure 4.219: Hearth N5O3 base under the plastered floor from east 423
Figure 4.220: Hearth N5O3 from southwest 423
Figure 4.221: Hearth N5O3 from west 423
Figure 4.222: Hearth N5O5 from south 424
Figure 4.223: Hearth N5O5 from east 424
Figure 4.224: Bird's-eye view of Hearth N5O6 and lime fragments around it 424
Figure 4.225: Hearth N5O7 and lime fragments around it and also on its plastered floor 425
Figure 4.226: Cross-sectional view of stone pavement and plastered floors from Hearth N5O7 425
Figure 4.227: Stone pavement from Hearth N5O7 425
Figure 4.228: Hearth N5O8 from east 426
Figure 4.229: Overview of Hearth N5O9 and Hearth N5O10 together at the Area B 426
Figure 4.230: Hearth N5O9 from east 426
Figure 4.231: Location of Hearth N4O4 from south 427
Figure 4.232: Bird's-eye view of Hearth N4O3 and lime fragments around it 427
Figure 4.233: Hearth N4O4 427

Figure 4.234:Hearth N4O5 from east (1st stage) 428
Figure 4.235: Hearth N4O5 from west (1st stage) 428
Figure 4.236: Cross-sectional view of stone pavement and plastered floors from Hearth N4O5 428
Figure 4.237: Overview of Phase N4 hearths together at the Area B 429
Figure 4.238: Hearth N4O6 and Hearth N4O7 together at the Area B 429
Figure 4.239: Hearth N4O6 from south..... 429
Figure 4.240: Hearth N3O1 from southwest and densely lime fragments around it..... 430
Figure 4.241: Hearth N3O1 from north..... 430
Figure 4.242: Cross-sectional view of stone pavement and plastered floors from Hearth N3O1 430
Figure 4.243: Hearth N3O2 431
Figure 4.244: Cross-sectional view of stone pavement and plastered floors from Hearth N3O2 431
Figure 4.245: Stone pavement from Hearth N3O2..... 431
Figure 4.246: Hearth N3O3 432
Figure 4.247: Hearth N3O4 432
Figure 4.248: General view of the superimposed position of Hearth N3O3 and Hearth N3O4 432
Figure 4.249: Hearth N2O1 433
Figure 4.250: Bird's-eye view of Hearth N2O1..... 433
Figure 4.251: Plastered floor and stone pavement together from Hearth N2O1 433
Figure 4.252: Hearth N2O2 from south (1st floor stage) 434
Figure 4.253: Hearth N2O2 from south (3th floor stage)..... 434
Figure 4.254: Stone pavement from Hearth N2O2..... 434
Figure 4.255: Hearth N2O3 from west 435
Figure 4.256: Cross-sectional view of stone pavement and plastered floors from Hearth N2O3 435
Figure 4.257: Hearth N2O4 from west 435
Figure 4.258: Overview of Hearth N2O5 and Stone Pavement / Hearth N2O6 together at the Area C..... 436
Figure 4.259: General view of the superimposed position of Hearth N2O5 and Stone Pavement / Hearth N2O6..... 436

Figure 4.260: Detail view of plastered floor from Hearth N2O5 436
Figure 4.261: Hearth N1O1 from north 437
Figure 4.262: Cross-sectional view of stone pavement and plastered floors from Hearth N1O1 437
Figure 4.263: Detail view of cross-sectional view of Hearth N1O1 437
Figure 4.264: Stone Pavement / Hearth N1O1 438
Figure 4.265: Hearth N1O3 from north 438
Figure 4.266: Cross-sectional view of stone pavement and plastered floors from Hearth N1O4 438
Figure 4.267: Hearth N1O5 from north 439
Figure 4.268: Detail view of plastered floors from Hearth N1O5 439
Figure 4.269: Stone pavement from Hearth N1O5 439
Figure 4.270: Stone Pavement / Hearth N1O6 440
Figure 4.271: Bird's-eye view of Hearth N1O7 440
Figure 4.272: Cross-sectional view of stone pavement and plastered floors from Hearth N1O7 440
Figure 4.273: Fire Pit N7A1 and its burnt filling 441
Figure 4.274: Fire Pit N7A2 and limy plant remains around the fire pit 441
Figure 4.275: Cross-section of its burnt filling of Fire Pit N7A2 441
Figure 4.276: Fire Pit N7A3 (unexcavated) 442
Figure 4.277: Fire Pit N7A3 (excavated) 442
Figure 4.278: Traces of Fire Pit N7A5 (unexcavated) 442
Figure 4.279: Fire Pits N5A2 and N5A3 from west 443
Figure 4.280: Bird's-eye view of Fire Pits N5A2 and N5A3 443
Figure 4.281: Fire Pits N5A2 and N5A3 from east 443
Figure 4.282: Traces of Fire Pit N4A1 444
Figure 4.283: Cross-section of Fire Pit N4A1 444
Figure 4.284: Fire Pit N4A3 from east 444
Figure 4.285: Fire Pit N4A6 445
Figure 4.286: Cross-section of Fire Pit N4A6 from northwest 445
Figure 4.287: Bird's-eye view of Fire Pit N4A6 445
Figure 4.288: Fire Pit N3A1 446
Figure 4.289: Fire Pit N2A2 446

Figure 4.290: Fire Pit N3A3 446
Figure 4.291: SEM images of lime samples taken from Structure N6B1 453
Figure 4.292: SEM images of lime samples taken from Structure N6B2 453
Figure 4.293: SEM images of soil samples taken from Structure N6B2 454
Figure 4.294: SEM images of lime samples taken from Structure N6B9 454
Figure 4.295: SEM images of lime samples taken from Structure N6B10 455
Figure 4.296: SEM images of lime samples taken from Structure N5B1 455
Figure 4.297: SEM images of lime samples taken from Structure N5B3 456
Figure 4.298: SEM images of soil samples taken from Structure N5B3 456
Figure 4.299: SEM images of lime samples taken from Structure N5B4 457
Figure 4.300: SEM images of lime samples taken from Structure N5B6 457
Figure 4.301: SEM images of lime samples taken from Structure N5B7 458
Figure 4.302: SEM images of lime samples taken from Structure N5B8 458
Figure 4.303: SEM images of lime samples taken from Structure N5B9 459
Figure 4.304: SEM images of lime samples taken from Structure N5B10 459
Figure 4.305: SEM images of lime samples taken from Structure N5B11 460
Figure 4.306: SEM images of lime samples taken from Structure N5B12 460
Figure 4.307: SEM images of lime samples taken from Structure N5B14 461
Figure 4.308: SEM images of lime samples taken from Structure N4B1 461
Figure 4.309: SEM images of soil samples taken from Structure N4B1 462
Figure 4.310: SEM images of lime samples taken from Structure N4B2 462
Figure 4.311: SEM images of lime samples taken from Structure N4B3 463
Figure 4.312: SEM images of lime samples taken from Structure N4B8 463
Figure 4.313: SEM images of soil samples taken from Structure N4B8 464
Figure 4.314: SEM images of lime samples taken from Structure N4B9 464
Figure 4.315: SEM images of soil samples taken from Structure N4B10 465
Figure 4.316: SEM images of lime samples taken from Structure N4B13 465
Figure 4.317: SEM images of soil samples taken from Phase N3 filling..... 466
Figure 4.318: SEM images of lime samples taken from Structure N2B2 466
Figure 4.319: SEM images of lime samples taken from Structure N2B3 467
Figure 4.320: SEM images of lime samples taken from Structure N2B4 467
Figure 4.321: SEM images of lime samples taken from Structure N2B6 468
Figure 4.322: SEM images of lime samples taken from Structure N2B8 468

Figure 4.323: SEM images of lime samples taken from Structure N2B11 469
Figure 4.324SEM images of soil samples taken from Structure N2B12..... 469
Figure 4.325: Bulliform shape, Elongate, and Trichome phytoliths determined of lime samples taken from architectural remains 488
Figure 4.326: Elongate, Trichome and Panicoid phytoliths determined of lime samples taken from architectural remains..... 488
Figure 4.327: Trichome, Panicoid and Festucoid phytoliths determined of lime samples taken from architectural remains 489
Figure 4.328: Trichome and Panicoid phytoliths determined of lime samples taken from architectural remains..... 489
Figure 4.329: Trilobate and Panicoid phytoliths determined of lime samples taken from architectural remains..... 490
Figure 4.330: Trichome, Panicoid and bulky Elongate phytoliths determined of lime samples taken from architectural remains 490
Figure 4.331: Apocynaceae, Cesalpiniaceae, Liliaceae and Verbenaceae pollens determined of lime samples taken from architectural remains..... 491
Figure 4.332: Apsparagaceae, Malvaceae and Poaceae pollens determined of lime samples taken from architectural remains 491
Figure 4.333: Geometric layout of Structure N6B1 492
Figure 4.334: Geometric layout of Structure N6B6 492
Figure 4.335: Geometric layout of Structure N6B5 492
Figure 4.336: Geometric layout of Structure N4B10 493
Figure 4.337: Geometric layout of Structure N5B3 493
Figure 4.338: Geometric layout of Structure N5B12 493
Figure 4.339: Geometric layout of Structure N4B1 494
Figure 4.340: Geometric layout of Structure N5B4 494
Figure 4.341: Geometric layout of Structure N5B5 494
Figure 4.342: Geometric layout of Structure N4B9 495
Figure 4.343: Geometric layout of Structure N6B7 495
Figure 4.344: Geometric layout of Structure N6B15 495
Figure 4.345: Geometric layout of Structure N2B10 496
Figure 4.346: Geometric layout of Structure N2B11 496
Figure 4.347: Geometric layout of Structure N2B12 496

Figure 5.1: Migration routes of semi-nomadic tribes in Northern Mesopotamia and Southeast Anatolia (Adapted from Beşikçi, 1969: Map 2) 498
Figure 5.2: Migration routes of Alikan Tribes (Adapted from Beşikçi, 1969: Map 3) 500
Figure 5.3: Mobility of semi-nomadic groups between winter quarters to summer pasture 501
Figure 5.4: A semi-nomadic group passing down the Garzan Basin 502
Figure 5.5: Reasons for accommodation and migration of semi-nomadic groups 504
Figure 5.6: Architectural elements of a Wattle Structures 506
Figure 5.7: Architectural elements of a Stone-Walled Wattle Structure 507
Figure 5.8: Architectural elements of a Stone-Walled Tentsites 508
Figure 5.9: Architectural elements of a Wattle-Walled Tentsites 510
Figure 5.10: Architectural elements of a Tent 512
Figure 5.11: Location of the winter quarters in the Lower Garzan Basin 513
Figure 5.12: Settlement pattern and architecture of the Şeyhosel Kom 515
Figure 5.13: Settlement pattern and architecture of the Çemisitrin Kom 517
Figure 5.14: Settlement pattern and architecture of the Sulan Kom 521
Figure 5.15: Settlement pattern and architecture of the Sulane Girgiz Kom 525
Figure 5.16: Settlement pattern and architecture of the Bazivan Kom 527
Figure 5.17: Settlement pattern and architecture of the Memika Kom 531
Figure 5.18: Pencil drawing of the Memika Saz Evi (by Nilüfer İdikut) 532
Figure 5.19: Settlement pattern and architecture of the Mezrik Kom 534
Figure 5.20: Settlement pattern and architecture of the Işıkveren Kom I 536
Figure 5.21: Settlement pattern and architecture of the Işıkveren Kom II 538
Figure 5.22: Settlement pattern and architecture of the Boğaz Kom 540
Figure 5.23:Semi-nomadic group on the way back to winter quarters, near Hasankeyf 546
Figure 5.24: Semi-nomadic group on the way to the summer pasture, near Kentalan Mountain 546
Figure 5.25: Semi-nomadic group on the way to the summer pasture, near Rıdvan village 546
Figure 5.26: Temporary campsite was located in the south of Hasankeyf 547
Figure 5.27: Temporary camp site was located in front of Rıdvan village 547
Figure 5.28: A temporary campsite was located near Kumgeçit village 547
Figure 5.29: Temporary campsite in the Lower Garzan Basin, near Beşpınar town 548

Figure 5.30: Establishment of a temporary campsite in the Lower Garzan Basin, near the town of Bespinar 548
Figure 5.31: Establishment of a temporary campsite in the Lower Garzan Basin, near the town of Bespinar 548
Figure 5.32: External view of Memika Saz Evi and its tensioning system, near Gedikli village 549
Figure 5.33: External view of Memika Saz Evi , near Gedikli village 549
Figure 5.34: Wickerwork detail of the Wattle Structure, near Gedikli village 549
Figure 5.35: Wattle Structure: its plan with dimensions 550
Figure 5.36: Architectural components and its dimensions of a Wattle Structure (long axle) 551
Figure 5.37: Architectural components and its dimensions of a Wattle Structure (short axle) 551
Figure 5.38: External view of the Wattle Structures and its architectural construction process, near Kumgeçit 552
Figure 5.39: External view of the Wattle Structures and its architectural construction process, near Kumgeçit 552
Figure 5.40: Architectural construction process of a Wattle Structure, near Kumgeçit village 552
Figure 5.41: Architectural construction process of a Wattle Structure, near Kumgeçit village 553
Figure 5.42: Some wooden poles in a Wattle Structure, near Kumgeçit village 553
Figure 5.43: Some wooden poles was used for Wattle Structures, near Kumgeçit village 553
Figure 5.44: Architectural components of the superstructure of a Wattle Structure 554
Figure 5.45: Reeds cover of the superstructure of a Wattle Structure 554
Figure 5.46: Exterior view of a Wattle Structure (long axle) 555
Figure 5.47: Exterior view of a Wattle Structure (short axle) 555
Figure 5.48: Stone-Walled Wattle Structure in Memika Kom, from Gedikli village 556
Figure 5.49: Stone-Walled Wattle Structure in Bazivan Kom, south of Kumgeçit village 556
Figure 5.50: Stone-Walled Wattle Structure in Işıkveren Kom II, south of Işıkveren village 556
Figure 5.51: Stone-Walled Wattle Structure: plan with dimensions 557

Figure 5.52: Architectural components and its dimensions of a Stone-Walled Wattle Structure (long axle) 558
Figure 5.53: Architectural components and its dimensions of a Stone-Walled Wattle Structure (short axle) 558
Figure 5.54: Architectural components of the superstructure of a Stone-Walled Wattle Structure..... 559
Figure 5.55: Reeds cover of the superstructure of a Stone-Walled Wattle Structure..... 559
Figure 5.56: Exterior view of a Stone-Walled Wattle Structure (long axle)..... 560
Figure 5.57: Exterior view of a Stone-Walled Wattle Structure (short axle)..... 560
Figure 5.58: External view of a Stone-Walled Tentsites (in usage)..... 561
Figure 5.59: Overview of some Stone-Walled Tentsites (after usage)..... 561
Figure 5.60: External view of a destroyed Stone-Walled Tentsites and its architectural components..... 561
Figure 5.61: Stone-Walled Tentsite: plan and dimensions..... 562
Figure 5.62: Architectural components and its dimensions of a Stone-Walled Tentsite (long axle) 562
Figure 5.63. Architectural components and its dimensions of a Stone-Walled Tentsite (short axle) 562
Figure 5.64: External view of some Wattle-Walled Tentsites (sheep pen) 563
Figure 5.65: Interior view of a Wattle-Walled Tentsite (sheep pen)..... 563
Figure 5.66: External view of a evacuated Wattle-Walled Tentsite (dwelling ?) 563
Figure 5.67: Wattle-Walled Tentsite: plan and dimensions 564
Figure 5.68: Architectural components and appearance of a Wattle-Walled Tentsite (long axle) 564
Figure 5.69: Architectural components and appearance of aWattle-Walled Tentsite (short axle) 564
Figure 5.70: External view of a Brushwood-Walled Tentsite in Sulane Girgiz Kom (after usage)..... 565
Figure 5.71: Abandoned Brushwood-Walled Tentsite in Bazivan Kom, south of Kumgeçit village 565
Figure 5.72: Abandoned Mixed-Walled Tentsite in Bazivan Kom, south of Kumgeçit village 565
Figure 5.73: Tent in Sulan Kom 566

Figure 5.74: Establish process a Tent in Bazivan Kom 566
Figure 5.75: Interior view of a Tent in Bazivan Kom 566
Figure 5.76: View from the front: a tent with architectural components 567
Figure 5.77: Side view of a tent with its architectural components 567
Figure 5.78: Independent model of a winter quarters (M1), Çemistrin Kom 568
Figure 5.79: Nearby-village model of a winter quarters (M2), Mezrik Kom 568
Figure 5.80: Intra-village model of a winter quarters (M3), Memika Kom 568
Figure 5.81: General view of Seyhosel Kom in 2002 569
Figure 5.82: Location of Seyhosel Kom 569
Figure 5.83: Some Stone-Walled Tentsites and Modern Tent in Seyhosel Kom 569
Figure 5.84: General view of Çemi Sitrin Kom in 2002 570
Figure 5.85: Location of Çemi Sitrin Kom 570
Figure 5.86: Interior view of a Wattle-Walled Tentsites in Çemi Sitrin Kom 570
Figure 5.87: Exterior view of a Wattle-Walled Tentsites in Çemi Sitrin Kom 571
Figure 5.88: Hearth (tandır) in the open spaces from Çemi Sitrin Kom 571
Figure 5.89: Example of destroyed stone surrounding remains in Çemi Sitrin Kom (after usage) 571
Figure 5.90: Location of Area 1 between abandoned village architecture from Sulan Kom 572
Figure 5.91: Stone surroundings between abandoned village architecture from Sulan Kom 572
Figure 5.92: Stone surrounding and wattle remains in the in the Area 1 (Sulan Kom) 572
Figure 5.93: Location of Area 2 from Sulan Kom 573
Figure 5.94: Settlement patterns of the Area 2 from Sulan Kom 573
Figure 5.95: Some architectural perishable structures of the Area 2 from Sulan Kom 573
Figure 5.96: Location of Sulane Girgiz Kom 574
Figure 5.97: View of a destroyed stone surrounding remains in Sulane Girgiz Kom 574
Figure 5.98: Brushwood-Walled Tentsite in Sulane Girgiz Kom (after usage) 574
Figure 5.99: Location of Area 1 and its architectural structure remains in Bazivan Kom (1st stage) 575
Figure 5.100: Field usage of Area 1 and its changing settlement pattern in Bazivan Kom (2nd stage) 575
Figure 5.101: Overview of Area 1 after abandonment in Bazivan Kom (3rd stage) 575

Figure 5.102: Front view of some Wattle Structures in the Area 2 from Bazivan Kom ... 576
Figure 5.103: Rear view of some Wattle Structures in the Area 2 from Bazivan Kom 576
Figure 5.104: View of some Wattle Structures in the Area 2 from Bazivan Kom (after abandonment) 576
Figure 5.105: General view of some Wattle Structures in the Area 1 from Bazivan Kom577
Figure 5.106: View of some Wattle Structures in the Area 1 from Bazivan Kom 577
Figure 5.107: Brushwood-Walled Tentsite in Bazivan Kom (after usage) 577
Figure 5.108: Location of Area 2 and its architectural structure during inhabiting 578
Figure 5.109: Overview during evacuation of Area 2 in Bazivan Kom 578
Figure 5.110: External view of a Stone-Walled Wattle Structure in Area 2 from Bazivan Kom 578
Figure 5.111: Interior view of Stone-Walled Wattle Structure and arrangement of living space in Area 2 579
Figure 5.112: Interior view of Stone-Walled Wattle Structure and arrangement of living space in Area 2 579
Figure 5.113: Interior view of Stone-Walled Wattle Structure and arrangement of living space in Area 2 579
Figure 5.114: Some Architectural Structures in Memika Kom from southwest 580
Figure 5.115: Some Architectural Structures in Memika Kom from northwest 580
Figure 5.116: Some Wattle-Walled Tent in Memika Kom (in usage) 580
Figure 5.117: Some Wattle-Walled Tent in Memika Kom (after usage) 581
Figure 5.118: Fuction of a Wattle-Walled Tent in Memika Kom 581
Figure 5.119: View of a destroyed Wattle-Walled Tent in Memika Kom 581
Figure 5.120: Memika Saz Evi in 2008 (in usage) 582
Figure 5.121: After destroyed Memika Saz Evi in 2012 582
Figure 5.122: Last remaining trace of Memika Saz Evi in 2013 582
Figure 5.123: Wattle Structures in Memika Kom 583
Figure 5.124: Architectural change of Wattle Structures to Stone-Walled Wattle Structures in Memika Kom 583
Figure 5.125: Destroyed a Stone-Walled Wattle Structures in Memika Kom 583
Figure 5.126: Location of Mezrik Kom 584
Figure 5.127: Wattle Structure in Mezrik Kom 584
Figure 5.128: Example of Earth Wall (Piled Earth) in Mezrik Kom 584

Figure 5.129: Location of Işıkveren Kom I 585
Figure 5.130: External view of a Stone Walled Wattle Structure in Işıkveren Kom I 585
Figure 5.131: External view of a Stone Walled Wattle Structure in Işıkveren Kom I 585
Figure 5.132: Location of Işıkveren Kom II 586
Figure 5.133: Some architectural structures in Işıkveren Kom II 586
Figure 5.134: Hearth (tandır) in the open spaces from Işıkveren Kom II 586
Figure 5.135: Location of Boğaz Kom from east 587
Figure 5.136: Location of Boğaz Kom from southeast 587
Figure 5.137: Some architectural structures in Boğaz Kom 587
Figure 5.138: Parallel dimensions of architectural structures from Şeyhosel Kom 588
Figure 5.139: Parallel dimensions of architectural structures from Çemisitrin Kom 588
Figure 5.140: Parallel dimensions of architectural structures from Sulan Kom 589
Figure 5.141: Parallel dimensions of architectural structures from Sulane Girgiz Kom .. 589
Figure 5.142: Parallel dimensions of architectural structures from Bazivan Kom 590
Figure 5.143: Parallel dimensions of architectural structures from Memika Kom 590
Figure 5.144: Parallel dimensions of architectural structures from Mezrik Kom 591
Figure 5.145: Parallel dimensions of architectural structures from Işıkveren Kom I 591
Figure 5.146: Parallel dimensions of architectural structures from Işıkveren Kom II 592
Figure 5.147: Parallel dimensions of architectural structures from Boğaz Kom 592

DIAGRAM LIST

Diagram 1.1: Methodological chart of this thesis study 9
Diagram 3.1: Average of EDX results from Sumaki Neolithic phases 105
Diagram 3.2: Northern Hemisphere paleoclimate and pedosedimentary records, in particular showing the 9.2 and 8.2 ka events (from Berger et al., 2016: 1849 fig.1) 108
Diagram 3.3: *Comparison of anomalies experienced during 9.2 ka event (from* (Fleitmann, 2008: 4 fig. 3) 109
Diagram 3.4: Dead Sea Lake level lchanges (Adapted from Migowski, et al., 2006:427 Fig 4; Litt, et al., 2012: 101 Fig.5d; Stein et al., 2001:279 Fig.7) 112
Diagram 3.5: Temporal variation of the $\delta^{13}C$ isotope values of the Soreq Cave (Adapted from Weninger at al., 2009: 16 fig.5 and Bar-Matthews et al., 2003: 3190 adapted from Fig.8D)..... 112
Diagram 3.6: Dead Sea and Lake Van levels changes (Adapted from Migowski et al., 2006:427/Fig 4; Litt et al., 2012: 101 Fig.5d; Stein et al., 2001:279/Fig.7)..... 113
Diagram 3.7: Lake Van level changes (Adapted from Özdemir, vd., 2013: 967 Şekil 3) 114
Diagram 3.8: Pollen and oxygen isotope (Adapted from: Dead Sea - Litt et al., 2012:99 / Fig.3; Zeribar Lake - Stevens et al., 2001:750 / Fg.3; Lake Van Wick et al., 2003:670 / Fig.4 and Soreq Cave - Majewski et al., 2004:245; Langgut et al., 2014:8) 115
Diagram 3.9: Comparison of adaptive and selected pollen with climate comments (Adapted from: Zeribar Lake- Stevens et al., 2001:750 / Fig.3 and 752-753; Dead Sea - Litt et al., 2012:99 / Fig.3 and 99 -102; Lake Van Wick et al., 2003:670 / Fig.4 and 671 / Tab.1) .. 115
Diagram 3.10: Distribution of $\delta^{18}O$ and $\delta^{13}C$ stable isotope at Sumaki Höyük 116
Diagram 3.11: Distribution of $\delta^{18}O$ and $\delta^{13}C$ stable isotope 117
Diagram 3.12: Distribution of ratios of phytoliths from Sumaki Neolithic Phases 121
Diagram 3.13: Distribution of pollen data according to Neolithic phases at Sumaki Höyük 122
Diagram 3.14: Distribution of phytoliths by Neolithic phases at Sumaki..... 122
Diagram 3.15: C_{14} dating of Sumaki Höyük 124
Diagram 3.16: Distribution of architectural structures and elements by Neolithic phases 125
Diagram 3.17: Phytolith analysis of lime samples from Phase N7 127
Diagram 3.18: Comparison of XRF analysis results taken from Phase N6 structures..... 131
Diagram 3.19: Comparison of XRF analysis results taken from Phase N5 structures 133

Diagram 3.20: Comparison of XRF analysis results taken from Phase N4 structures 137
Diagram 3.21: EDX analysis results of soil samples taken from Phase N3 at Area A 139
Diagram 3.22: EDX analysis results of soil samples taken from Phase N3 at Area B 140
Diagram 3.23: XRF analysis results of soil samples taken from Phase N3 at Area A 140
Diagram 3.24: XRF analysis results of soil samples taken from Phase N3 at Area B 141
Diagram 3.25: Comparison of XRF analysis results taken from Phase N2 structures 144
Diagram 3.26 AMS radiocarbon date from Middle Age level (M) at Sumaki Höyük 179
Diagram 3.27: AMS radiocarbon date from Phase N3 at Sumaki Höyük 179
Diagram 3.28: AMS radiocarbon date from Phase N4 at Sumaki Höyük 179
Diagram 3.29: AMS radiocarbon date from Phase N4 at Sumaki Höyük 180
Diagram 3.30: AMS radiocarbon date from N4 at Sumaki Höyük 180
Diagram 3.31: AMS radiocarbon date from Phase N5 at Sumaki Höyük 180
Diagram 3.32: AMS radiocarbon date from Phase N5 at Sumaki Höyük 181
Diagram 3.33: AMS radiocarbon date from Phase N5 at Sumaki Höyük 181
Diagram 3.34: AMS radiocarbon date from Phase N5 at Sumaki Höyük 181
Diagram 3.35: AMS radiocarbon date from Phase N6 at Sumaki Höyük 182
Diagram 3.36: AMS radiocarbon date from Phase N6 at Sumaki Höyük 182
Diagram 3.37: AMS radiocarbon date from Phase N6 at Sumaki Höyük 182
Diagram 3.38: AMS radiocarbon date from Phase N6 at Sumaki Höyük 183
Diagram 3.39: AMS radiocarbon date from Phase N7 at Sumaki Höyük 183
Diagram 4.1: Clustering of lime samples from all data according to XRF analysis 194
Diagram 4.2: Clustering of lime samples from Al ann Si data according to XRF analysis 195
Diagram 4.3: Clustering of earth samples from all data according to XRF analysis 195
Diagram 4.4: Comparison and clustering of basalt samples according to XRF analysis .. 196
Diagram 4.5: Comparison of basalt samples according to XRD analysis 197
Diagram 4.6: EDX analysis of lime samples taken from Structure N6B1 218
Diagram 4.7: XRF analysis of the lime samples taken from Structure N6B1 219
Diagram 4.8: EDX analysis of lime samples taken from Structure N6B2 221
Diagram 4.9: EDX analysis results of soil samples taken from Structure N6B2 221
Diagram 4.10: XRF analysis of the soil samples taken from Structure N6B2 222
Diagram 4.11: Distribution of phytoliths in the lime samples taken from Structure N6B2 222

Diagram 4.12: Distribution of phytoliths in the lime samples taken from Structure N6B4 226
Diagram 4.13: Distribution of phytoliths in the lime samples taken from Structure N6B5 228
Diagram 4.14: EDX analysis of lime samples taken from Structure N6B9 233
Diagram 4.15: Distribution of phytoliths in the lime samples taken from Structure N6B9 234
Diagram 4.16: EDX analysis of lime samples taken from Structure N6B10 236
Diagram 4.17: EDX analysis results of tubes found in lime samples from Structure N6B10 236
Diagram 4.18: EDX analysis of plant remains found in the lime samples taken from Structure N6B10 237
Diagram 4.19: Distribution of phytoliths in the lime samples taken from Structure N6B10 237
Diagram 4.20: EDX analysis of soil samples taken from Structure N6B13 242
Diagram 4.21: Distribution of phytoliths in the lime samples taken from Structure N6B13 242
Diagram 4.22: Distribution of phytoliths in the lime samples taken from Structure N6B15 245
Diagram 4.23: Distribution of phytoliths in the lime samples taken from Structure N5B1 251
Diagram 4.24: EDX analysis of lime samples taken from Structure N5B1 252
Diagram 4.25: EDX analysis results of insect chitin found in lime samples taken from Structure N5B1 252
Diagram 4.26: XRF analysis of the lime samples taken from Structure N5B1 253
Diagram 4.27: EDX analysis of lime samples taken from Structure N5B3 256
Diagram 4.28: EDX analysis results of SiO2 gels found in lime samples taken from Structure N5B3 257
Diagram 4.29: EDX analysis results of lime fragment around the SiO2 gels found in lime samples taken from Structure N5B3 257
Diagram 4.30: XRF analysis of the lime samples taken from Structure N5B3 258
Diagram 4.31: Distribution of phytoliths in the lime samples taken from Structure N5B3 258

Diagram 4.32: EDX analysis of lime samples taken from Structure N5B4 260
Diagram 4.33: XRF analysis of the lime samples taken from Structure N5B4..... 261
Diagram 4.34: EDX analysis of lime samples taken from Structure N5B6 264
Diagram 4.35: XRF analysis of the lime samples taken from Structure N5B6..... 265
Diagram 4.36: EDX analysis of lime samples taken from Structure N5B7 266
Diagram 4.37: XRF analysis of the lime samples taken from Structure N5B7..... 267
Diagram 4.38: EDX analysis of lime samples taken from Structure N5B8 268
Diagram 4.39: XRF analysis of the lime samples taken from Structure N5B8..... 269
Diagram 4.40: EDX analysis of lime samples taken from Structure N5B9 271
Diagram 4.41: EDX analysis of lime samples taken from Structure N5B10 273
Diagram 4.42: EDX analysis of plant remains found in the lime samples taken from Structure N5B10..... 273
Diagram 4.43: EDX analysis of lime samples taken from Structure N5B11 275
Diagram 4.44: EDX analysis of plant remains found in the lime samples taken from Structure N5B11..... 276
Diagram 4.45: XRF analysis of the lime samples taken from Structure N5B11..... 276
Diagram 4.46: Distribution of phytoliths in the lime samples taken from Structure N5B12 279
Diagram 4.47: EDX analysis of lime samples taken from Structure N5B12 279
Diagram 4.48: EDX analysis of plant remains found in the lime samples taken from Structure N5B12..... 280
Diagram 4.49: EDX analysis results of lime fragments around the plant residues found in lime samples taken from Structure N5B12..... 280
Diagram 4.50: Distribution of phytoliths in the lime samples taken from Structure N5B13 282
Diagram 4.51: EDX analysis of lime samples taken from Structure N5B14 283
Diagram 4.52: EDX analysis results of insect chitin found in lime samples taken from Structure N5B14..... 284
Diagram 4.53: EDX analysis of lime samples taken from Structure N4B1 297
Diagram 4.54: EDX analysis results of tubes found in lime samples from Structure N4B1 297
Diagram 4.55: EDX analysis results of acicular crystals found in lime samples from Structure N4B1 298

Diagram 4.56: EDX analysis results of soil samples taken from Structure N4B1 298
Diagram 4.57: XRF analysis of the lime samples taken from Structure N4B1 299
Diagram 4.58: EDX analysis of lime samples taken from Structure N4B2 301
Diagram 4.59: EDX analysis results of acicular crystals found in lime samples from Structure N4B2 301
Diagram 4.60: EDX analysis of the lime samples taken from Structure N4B3 303
Diagram 4.61: EDX analysis of tubes identified in the lime samples from Structure N4B3 303
Diagram 4.62: XRF analysis of the lime samples taken from Structure N4B3 304
Diagram 4.63: Distribution of phytoliths in the lime samples taken from Structure N4B4 306
Diagram 4.64: EDX analysis of lime samples taken from Structure N4B8 311
Diagram 4.65: XRF analysis of the lime samples taken from Structure N4B8 311
Diagram 4.66: EDX analysis results of soil samples taken from Structure N4B8 312
Diagram 4.67: XRF analysis results of soil samples taken from Structure N4B8 312
Diagram 4.68: Distribution of phytoliths in the lime samples taken from Structure N4B8 313
Diagram 4.69: EDX analysis of lime samples taken from Structure N4B9 315
Diagram 4.70: EDX analysis results of soil samples taken from Structure N4B10 317
Diagram 4.71: XRF analysis of the soil samples taken from Structure N4B10 317
Diagram 4.72: EDX analysis of lime samples taken from Structure N4B13 320
Diagram 4.73: EDX analysis of lime samples taken from Structure N2B2 338
Diagram 4.74: EDX analysis of lime samples taken from Structure N2B3 339
Diagram 4.75: XRF analysis of the lime samples taken from Structure N2B3 339
Diagram 4.76: EDX analysis of lime samples taken from Structure N2B4 341
Diagram 4.77: XRF analysis of the lime samples taken from Structure N2B4 341
Diagram 4.78: Distribution of phytoliths in the lime samples taken from Structure N2B5 342
Diagram 4.79: Distribution of phytoliths in the lime samples taken from Structure N2B6 344
Diagram 4.80: EDX analysis of lime samples taken from Structure N2B6 344
Diagram 4.81: XRF analysis of the lime samples taken from Structure N2B6 345
Diagram 4.82: EDX analysis of lime samples taken from Structure N2B8 347

Diagram 4.83: EDX analysis results of tubes found in lime samples from Structure N2B8 347
Diagram 4.84: XRF analysis of the lime samples taken from Structure N2B8 348
Diagram 4.85: EDX analysis of lime samples taken from Structure N2B10 350
Diagram 4.86: EDX analysis of lime samples taken from Structure N2B11 352
Diagram 4.87: XRF analysis of the lime samples taken from Structure N2B11 352
Diagram 4.88: Distribution of phytoliths in the lime samples taken from Structure N2B11 353
Diagram 4.89: EDX analysis results of calcareous soil samples taken from Structure N2B12 354
Diagram 4.90: XRF analysis of the soil samples taken from Structure N2B12 355
Diagram 4.91: XRD analysis pattern and detected minerals of basalt samples taken from Sumaki Höyük 470
Diagram 4.92: XRD analysis pattern and detected minerals of basalt samples taken from Sumaki Höyük 470
Diagram 4.93: XRD analysis pattern and detected minerals of basalt samples taken from Sumaki Höyük 471
Diagram 4.94: XRD analysis pattern and detected minerals of basalt samples taken from Sumaki Höyük 471
Diagram 4.95: XRD analysis pattern and detected minerals of basalt samples taken from Kıradağı 472
Diagram 4.96: XRD analysis pattern and detected minerals of basalt samples taken from Kıradağı 472
Diagram 4.97: XRD analysis pattern and detected minerals of basalt samples taken from Kıradağı 473
Diagram 4.98: XRD analysis pattern and detected minerals of basalt samples taken from Kıradağı 473
Diagram 4.99: XRD analysis pattern and detected minerals of basalt samples taken from Karacadağ 474
Diagram 4.100: XRD analysis pattern and detected minerals of basalt samples taken from Karacadağ 474
Diagram 4.101: XRD analysis pattern and detected minerals of lime samples taken from Structure N6B1 475

Diagram 4.102: XRD analysis pattern and detected minerals of lime samples taken from Structure N6B2 475
Diagram 4.103: XRD analysis pattern and detected minerals of lime samples taken from Structure N6B10 476
Diagram 4.104: XRD analysis pattern and detected minerals of lime samples taken from Structure N5B1 476
Diagram 4.105: XRD analysis pattern and detected minerals of lime samples taken from Structure N5B4 477
Diagram 4.106: XRD analysis pattern and detected minerals of lime samples taken from Structure N5B6 477
Diagram 4.107: XRD analysis pattern and detected minerals of lime samples taken from Structure N5B7 478
Diagram 4.108: XRD analysis pattern and detected minerals of lime samples taken from Structure N5B8 478
Diagram 4.109: XRD analysis pattern and detected minerals of lime samples taken from Structure N5B9 479
Diagram 4.110: XRD analysis pattern and detected minerals of lime samples taken from Structure N5B11 479
Diagram 4.111: XRD analysis pattern and detected minerals of lime samples taken from Structure N5B12 480
Diagram 4.112: XRD analysis pattern and detected minerals of lime samples taken from Structure N5B14 480
Diagram 4.113: XRD analysis pattern and detected minerals of lime samples taken from Structure N4B1 481
Diagram 4.114: XRD analysis pattern and detected minerals of soil samples taken from Structure N4B1 481
Diagram 4.115: XRD analysis pattern and detected minerals of soil samples taken from Structure N4B2 482
Diagram 4.116: XRD analysis pattern and detected minerals of lime samples taken from Structure N4B3 482
Diagram 4.117: XRD analysis pattern and detected minerals of lime samples taken from Structure N4B8 483

Diagram 4.118: XRD analysis pattern and detected minerals of soil samples taken from Structure N4B8 483
Diagram 4.119: XRD analysis pattern and detected minerals of lime samples taken from Structure N4B9 484
Diagram 4.120: XRD analysis pattern and detected minerals of lime samples taken from Structure N4B10 484
Diagram 4.121: XRD analysis pattern and detected minerals of lime samples taken from Phase N3 at Area A 485
Diagram 4.122: XRD analysis pattern and detected minerals of lime samples taken from Phase N3 at Area B 485
Diagram 4.123: XRD analysis pattern and detected minerals of lime samples taken from Structure N2B2 486
Diagram 4.124: XRD analysis pattern and detected minerals of lime samples taken from Structure N2B8 486
Diagram 4.125: XRD analysis pattern and detected minerals of lime samples taken from Structure N2B10 487
Diagram 4.126: XRD analysis pattern and detected minerals of lime samples taken from Structure N2B12 487

TABLE LIST

Table 1.1: Locations and detailed information of EDX analysis soil samples from Sumaki Höyük 21
Table 1.2: Locations and detailed information of EDX analysis torrent sediment samples from Sumaki 21
Table 1.3: Locations and detailed information of EDX analysis lime samples from Sumaki Höyük architectural structures 22
Table 1.4: Locations and detailed information of XRF analysis lime samples from Sumaki Höyük 23
Table 1.5: Locations and detailed information of XRF analysis earth samples from Sumaki Höyük 23
Table 1.6: Locations and detailed information of XRD analysis of lime samples from Sumaki Höyük 24
Table 1.7: Locations and detailed information of XRD analysis of earth samples from Sumaki Höyük 24
Table 1.8: Locations and detailed information of XRD analysis of torrent sediment samples from Sumaki Höyük 24
Table 1.9: Locations and detailed information of XRD analysis of caliche samples under the Sumaki Höyük 24
Table 1.10: Locations and detailed information of Isotope analysis of lime samples from Sumaki Höyük 25
Table 1.11: Locations and detailed information of Phytolite analysis of lime samples from Sumaki Höyük 25
Table 1.12: Locations and detailed information of Pollen analysis of lime samples from Sumaki Höyük 26
Table 1.13: Locations and detailed information of C14 (AMS) dates from Sumaki Höyük 26
Table 3.1: XRD analysis of soil samples taken from Sumaki Höyük Neolithic phases 106
Table 3.2: Distribution of plant residues found in Sumaki Höyük Neolithic Phases 120
Table 3.3: C_{14} dates (AMS) from Sumaki Höyük 123
Table 3.4: Sumaki Höyük stratigraphy and variation of settlement strategy 147
Table 4.1: Comparative Terminology of Construction Techniques at Sumaki Höyük 192

Table 4.2: Architectural structures plans and partitions at Sumaki Höyük 202
Table 4.3: Properties of architectural structures fillings at Sumaki Höyük..... 203
Table 4.4: Dimensions of architectural structures at Sumaki Höyük 204
Table 4.5: Statistical data of the hearths at Sumaki Höyük..... 206
Table 4.6: Statistical data of the Fire Pits at Sumaki Höyük 208
Table 4.7: Distribution of architectural plans of the Sumaki Höyük Neolithic Phase 209
Table 4.8: Quantitative results of EDX analysis of lime samples from Sumaki Höyük architectural structures..... 447
Table 4.9: Quantitative results of EDX analysis of soil samples from Sumaki Höyük 448
Table 4.10: Quantitative results of EDX analysis of torrent sediment samples from Sumaki Höyük 448
Table 4.11: Quantitative results of XRF analysis of lime samples from Sumaki Höyük architectural structures..... 449
Table 4.12: Quantitative results of XRF analysis of earth samples from Sumaki Höyük architectural structures..... 449
Table 4.13: Quantitative results of XRD analysis of lime samples from Sumaki Höyük architectural structures..... 450
Table 4.14: Quantitative results of XRD analysis of earth samples from Sumaki Höyük architectural structures..... 450
Table 4.15: Quantitative results of EDX analysis of torrent sediment samples from Sumaki Höyük 450
Table 4.16: Quantitative results of XRD analysis of caliche samples under the Sumaki Höyük 450
Table 4.17: Quantitative results of Isotope analysis of lime samples from Sumaki Höyük 451
Table 4.18: Quantitative results of Phytolite analysis of lime samples from Sumaki Höyük 451
Table 4.19: Quantitative results of Pollen analysis of lime samples from Sumaki Höyük 452
Table 5.1: Winter quarters relationship with villages in Lower Garzan Basin 512
Table 5.2: Numerical density of temporary structures at winter quarters in Lower Garzan Basin 514
Table 5.3: Dimensions of architectural structures at Şeyhosel Kom..... 516

Table 5.4: Dimensions of architectural structures at Çemisitrin Kom 519
Table 5.5: Dimensions of architectural structures at Sulan Kom 523
Table 5.6: Dimensions of architectural structures at Sulane Girgiz Kom 526
Table 5.7: Dimensions of architectural structures at Bazivan Kom 530
Table 5.8: Dimensions of architectural structures at Memika Kom 533
Table 5.9: Dimensions of architectural structures at Mezrik Kom 535
Table 5.10: Dimensions of architectural structures at Işıkveren Kom I 537
Table 5.11: Dimensions of architectural structures at Işıkveren Kom I 539
Table 5.12: Dimensions of architectural structures at Boğan Kom 542

INTRODUCTION

The main aim of this thesis is to assess the Final Pre-Pottery Neolithic B/ Late Pre-Pottery Neolithic B (FPPNB/LPPNB) - Early Pottery Neolithic Period (EPN) architectural features revealed in Sumaki Höyük settlement using archaeological and geographical methods in a temporal and spatial context to reveal the social organization model in Upper Mesopotamia in this period. Within the framework of this main topic, the differences in settlement strategy and area use at Sumaki Höyük and cultural variability in the architecture were investigated. The technological characteristics of the architecture provided information about the temporal and spatial development and/or progress of variation. Additionally, an attempt was made to determine the place of Sumaki Höyük Neolithic architecture and social organization within the geographical and cultural region through comparison of construction techniques, structural plans and settlement patterns with contemporary settlements having similar features in Upper Mesopotamia and close surroundings.

The method used in this thesis is based initially on determining the paleo-environmental conditions and processes of the area in which the settlement is located within a time-space context. Additionally, details of architectural variations and movements in the Neolithic settlement are described. Together with the construction techniques used for the buildings and distribution of architectural elements and findings in open areas, the variable settlement distribution and use of space in the time context were analysed based on both mineralogical and numerical data. In this study, the main topics were independently studied in detail. However, assessing the data determined independently along with the results of other studies led to repetitive testing of the results related to each topic. Thus, an attempt was made to determine in detail the structural types, quality of material used and changes in this material in Sumaki Höyük Neolithic settlement.

The arrangement of a settlement is directly related to its natural surroundings. The natural conditions of the existing outer space and the stability and variability of these conditions are the primary elements of the settlement and interior space. A secondary element is the culture of the community or communities that choose a certain area in this natural environment. In other words, the culture of the community comes into play in the arrangement of outdoor spaces under certain natural conditions; these having different functional structures (indoor) and open spaces (open or semi-open spaces associated with

the interiors). Not only the layout, direction, and dimensions of structures but also the work places and daily production areas in line with activities carried out in open areas are reflections of the lifestyle of the community.

In this context, in 9000 CalBP, which has been denoted as the date of the "*collapse*", "*degradation*" or "*degeneration*" of the Pre-Pottery Neolithic Period, was such a phenomenon actually experienced? Did the mobile communities, whose existence has been determined and discussed in the process called the "8.2 ka event", not exist in the previous Pre-Pottery Neolithic period (PPN)? Does the increase in visibility of the mobile groups, which are of lesser importance than the permanent structures of Near-East Pre-Neolithic settlements, reflect a "*collapse*" or "*degeneration*"? Or is it that the community adapted rationally to conditions caused by physical events, such as climatic change, that are easily explained?

In this thesis study is being discussed; Sumaki Höyük Neolithic Period architectural data, micromorphological analysis results, climate and/or environmental impact and the changes in the life strategy of the communities adapting to the natural environment and some determinations are being made in the context of Sumaki Höyük. In addition to all these, the selection of the current semi-nomadic groups, which are using the Lower Garzan Basin as winter quarters and/or as a temporary campsite, are also benefit from the use of settlement utilization and architectural construction techniques.

CHAPTER I
PURPOSE, METHOD AND PROBLEMS

The developmental period that consists of groups of people adapting to the climatic and environmental conditions and carrying out food production is defined as the Neolithic Period. However, the Neolithic Period is not limited to the transition to food production. (Çambel & Braidwood, 1980: 1) This period can be described as featuring the establishment of full settlements, domestication of animals, technological innovations, trading and even a developmental phase wherein an interregional socio-economic network is formed or matures. (Esin, 2007: XII; Kuijt, 2000: 75; Matthews, 2003: 68; Özdoğan, 2007b: 448-452) The Neolithic era is also a period that emerges as a result of the interaction of multiple variations with common ground in different environmental conditions (Gebel, 2002: 325) This period mainly symbolizes a revolution regarding the history of humanity. (Braidwood & Howe, 1960: 4, 97; Childe, 1929: 23; Childe, 1998: 49; Wright, 1992: 115)

Though some generalisations may be made for the Near East Neolithic Period, excavations and investigations prove that there was also a socio-economic model and architectural tradition different from the norm in separate geographical regions within that period. (Kuijt & Goring-Morris, 2002: 231, 312) Considering the existence of approximately 500 ecological zones in the 25 primary geographic areas of Near East geography with approximately 130 subsections (Gebel, 2002: 315), it is an exaggeration to consider that the mentioned region has only one cultural line. This categorisation has for a long time caused the models of the communities in question to be treated inevitably in a linear or progressive frame. Construal and reconstruction of past models of living concerning time - space have been investigated in the recent researches. The settlements that experienced this transformation between 9000-8000 CalBP in different regions with different ecological factors were discussed in this context. However, the primary purpose of our research is to understand the living strategies in the settlements, the physical remains of such an approach, the network of social relations, and social organization structures within the human-natural environment and human-space context.

Investigation of the settlement pattern and living model of an archaeological settlement presents an opportunity to understand the architectural tradition and lifestyle of communities as well as examine traces of social organization. In this context, the most

important physical evidence to determine the cultural background of a settlement is the accumulation/fill of the layers and spatial organization. Since the location, size, and function of structures or open areas used show variability linked to several environmental factors as much as to human activities, as Neil Roberts have already emphasised that humans always leave foot prints on their environments, in a way that the environment is doubtlessly the part of human culture (Roberts 1998), this thesis study attempts to reveal the settlement organization of Sumaki Höyük Neolithic community in the framework of environmental (organic and inorganic) - human relationships.

It is not easy to comprehend the settlement pattern and architectural processes in a Neolithic settlement or to reveal all aspects based on the remains found. The data from archaeological excavations not only consist of man-made objects. All the excavation data must be evaluated efficiently to understand environmental conditions of the past and the adaptation strategy of inhabitants to the environment. The type of stone used in architecture, the sources of clay and organic material, animal bones and traces of a variety of natural events such as the variation in soil structure of deposits, floods/inundations, earthquakes and landslides all provide evidence related to the environment that people inhabited in the past and changes experienced within this environment. In his open book namely *Studies in Human-Thing Entanglement*, Ian Hodder pointed to the multifaceted relations between human and nature, and he tried to show methods to disentangle the relationship, "…. In studies of cultural systems, the external world was frequently described as the environment, the natural world to which the cultural system adapted. Culture was defined as man's extra-somatic means of adaptation. But from an entanglement perspective there is no environment. …. everything is always already entangled. And there is nothing extra-somatic, outside the body, because the body, mind and meaning are distributed. Culture/nature, subject/object have all been very effectively critiqued. In exploring the conditions of existence of a region, period or cultural system, entanglement studies follow the filaments, the threads that make those entities possible." (Hodder 2016:7).

1.1. Location and limits of the research area

Sumaki Höyük is located 1 km east of Beşiri District in Batman Province in Southeastern part of Anatolia, geographically on the mountain-plain transition zone of Northern Mesopotamia. (Figure 1.2) The settlement is in the northern portion of the Lower

Garzan Valley nearly 2.5 km west of Garzan Stream. The settlement is situated on ground slightly sloping in a southwest-northeast direction on an erosional surface with an elevation of 700 - 710 meters. The settlement sits on a Plio-Quaternary base level, with the Kani Huşur (Cadalı spring) running in a very deep valley immediately north of the site. The Lower Garzan Basin hosting the settlement, which is an important part of the Upper Tigris Basin (Bartl, 2014; Çelik, 2017; Doğan, 2005; Nicoll, 2009), is an arid – semi-arid zone based on current data. (Atalay, 2002: 134-136; Onüçyıldız, et al., 2016: 131; Özgen & Özçağlar, 2017: 88)

Garzan Stream, which runs in the eastern section of the Diyarbakır Basin within the Southeast Anatolia Region, is an important tributary of the Tigris River. (Figure 40; Figure 1.3) The Garzan basin covers an area of 2838 km^2. With several geomorphological erosion and deposition areas, the main source area of the basin begins in the Mutki valley to the north and forms two buried valleys[1] (Figure 3.24-3.25) before joining the Tigris River.

In our study, the Garzan Stream Basin was divided into two, namely, upper and lower basins. The defined boundary is the buried meandering İkiköprü Channel located 2358 m east of Sumaki Höyük. The central area of our study is the Lower Garzan Basin to the south of İkiköprü Channel. According to the World Geodetic System (WGS84/Google Earth), the coordinates of the Lower Garzan Basin are between 37°56′15.22″ N - 41°20′08.05″ E and 37°43′54.75″ N - 41°37′04.01″ E. The basin is nearly 35 km long as the crow flies running NW-SE and covers an area of 426.8 km^2. (Figure 40; Figure 1.4)

Approximately 2,35 km west-south west of the Sumaki Höyük the Kıradağı basalt flow with very flat topography is located. This flow, equivalent to a “mesa” in geomorphologic terms, is found above the Upper Miocene-aged claystone, mudstone, sandstone and conglomerates of the Şelmo Formation. This has critical geomorphological consequences affecting the Sumaki Höyük Neolithic settlement. Firstly, this basalt mass acts as a reservoir for rainwater seeping into the rock and the underground water meeting the clay layer underneath comes to the surface in slope springs. The water emerging underground and from seasonal rains becomes a surface flow on very steep slopes. These slopes formed by clay units are also areas where extreme erosion and landslides are experienced. (Figure 42) Due to the massive basalt mass and slope instability, landslide events occur very

[1] İkiköprü and Ulular channels

frequently around the Sumaki Höyük. Current and paleo-landslide traces may be observed in the form of rupture surfaces, landslide rubble, and toes on the west slope of the Lower Garzan Basin. There are various traces in the excavation data as well as the environs of the site indicating that Sumaki Höyük settlement was directly affected by these landslides and/or soil flow processes.

1.2. Purpose and subject of the research area

Human may change the environment and the impact of the environmental on human populations and/or settlements is indisputable. This interrelation has always been the focus of archaeology and geography. By supporting archaeological remains with absolute dating methods and interdisciplinary studies, the environmental models of different periods can be reconstructed and paleo-environmental conditions may be determined. In particular, environmental-archaeology studies provide a better understanding of the paleo-environmental conditions of the studied area and the communities' habitat and their socio-economic response patterns. The settlement's topography, climatic characteristics, paleo-environmental conditions, proximity to raw material sources, and effects of human choice are some of these factors.

There was a distinctive and mutually interactive relationship between the settlement pattern-architecture-natural environment of *Pre-Pottery Neolithic* communities in the Near East, e.g. Çayönü, Göbeklitepe, etc. Considering that part of this network is symbolic and settlements are organized accordingly, (Watkins, 2006:15), it would not be misleading to argue that “long and serious” climate change, such as the 9.2 and 8.2 ka events has a “multi-dimensional effect”. This subject will be discussed with the C14 dates of Sumaki Höyük.

According to archaeological data, during the LPPNB period, most of the large settlements had either been abandoned or become considerably smaller, and a different lifestyle had appeared. In this context, it is necessary to determine how and to what extent the LPPNB communities in Upper Mesopotamia[2] and its vicinity with a complex geographic

[2] The term Upper Mesopotamia, as a non-political definition, has similar meanings to "Taurus / Toros"(Cauvin, 1989) and "Taurus/Zagros mountainous range". (Goring-Morris & Belfer-Cohen, 2013) Aside from these terms, many researchers have used the names "South-eastern Turkey"(Erim-Özdoğan, 2007; Özdoğan, 1995a; Williams S. M., 1953), "South-eastern Anatolia Region" (Özkaya & Coşkun, 2011), "Northern Syria" (Miyake & Tsuneki, 1996; Wilkinson, et al., 2010) or “North Iraq” (Evins, 1982; Baird & Campbell, 1990) to define the same region, based on somewhat political borders. Some prefer the name "South-west Asia" (Wright, 1992;

structure responded to this climate change and turbulence by redefining their adaptive strategy.

Being positioned on the mountain-plain transition zone of Northern Mesopotamia, the Sumaki Höyük, where changes in the settlement pattern, architectural tradition and geographical effects have been determined in detail, has **13** C_{14} data falling between the years 9084 – 8123 cal BP. These dates showed that the area where the Sumaki settlement is, has been occupied between two serious climate effects 9.2 ka and 8.2 ka.

The lack of data on the cultural structure during and after the LPPNB / FPPNB in the Lower Garzan Basin is evident. Sumaki Höyük is the only Neolithic settlement in all the archaeological surveys and excavations carried out to date in the Lower Garzan Basin. In this context, Sumaki Höyük is a very important site for removing the lack of data for the Neolithic settlement pattern and architectural tradition and also mobility lifestyle in the Upper Mesopotamian Neolithic Period between two serious climate effects 9.2 ka and 8.2 ka.

In Sumaki Höyük *Neolithic* settlement, models of semi-nomadic or sedentary communities and the process of change can be determined in detail. This process is observed in the architecture (structural plans, different utilization of stone, clay and/or organic materials within a phase or between phases); in settlement patterns (position of structures, open spaces, communal elements in the open areas, layout of temporary shelters); in various daily artifacts (pottery, stone, bone artefacts, etc.) and in deterioration and changes caused by environmental conditions affecting different lifestyles (structural deformation, calcification of organic material, change in soil texture, torrents, landslides, etc.).

Briefly, the data analyses of our study were aimed to understand and interpret the life strategies of the Late/Final PPNB - EPN communities in Upper Mesopotamia using all relevant and available methods of environmental-archaeology and ethno-archaeology.

Kohl et al., 1978). The term "Iraqi Kurdistan" (Braidwood & Howe, 1960) is also used by a small number of researchers and authors. Aside from these, the region in question is geographically defined as the "Upper Tigris Valley" (Doğan, 2005; Nicoll, 2009). In short, researchers and authors do not agree on a specific name for the region in question. Accordingly, I prefer to use the definition "Upper Mesopotamia" or "Upper Tigris Basin", as being non-political and covering the geographical definitions.

1.3. Methodology of research

In this study, to determine the environment-human interrelationship and its impacts, the primary purpose is to define the geomorphological process affecting the choice of residential area. The differences in settlement strategy and land utilization, and cultural variability in the architecture of phases at Sumaki Höyük Neolithic settlement are examined concerning time and space by archaeological and geographical methods.

In terms of technique and function, several methods were used, such as use of multiple analysis methods, creating an elevation model of the research area and determining paleo-environmental conditions in addition to observation, comparison and field studies. By micro-morphological analysis, the settlement fillings, soil structure, formation, and accumulation process are also evaluated.

Furthermore, through comparison of the structural techniques, structural plans and settlement pattern with similar Late/Final PPNB - EPN settlements in Upper Mesopotamia and its near geography, I sought to examine the Sumaki Höyük Neolithic architecture and its social organization within the geographic and cultural context.

In terms of understanding and interpreting the architecture and/or human-made material culture of past communities, ethno-archaeological investigations are also beneficial. My main aim of ethno-archaeological studies is to analyse the social organization of contemporary pastoral nomads from present to past by focusing on changes or transformations, particularly in their architectural style. The material culture of those communities located in the Lower Garzan Basin, such as structures or structural elements, is our primary subject rather than their socio-economic organization. In this way, I will be able to understand the construction technologies of different phases of Sumaki Höyük. I also aim to examine the social structure of residential areas as well as the dynamism of temporary settlements within the relationship between space and time. I have also tried to explain the location and frequency of usage of structures related to each other from a critical perspective.

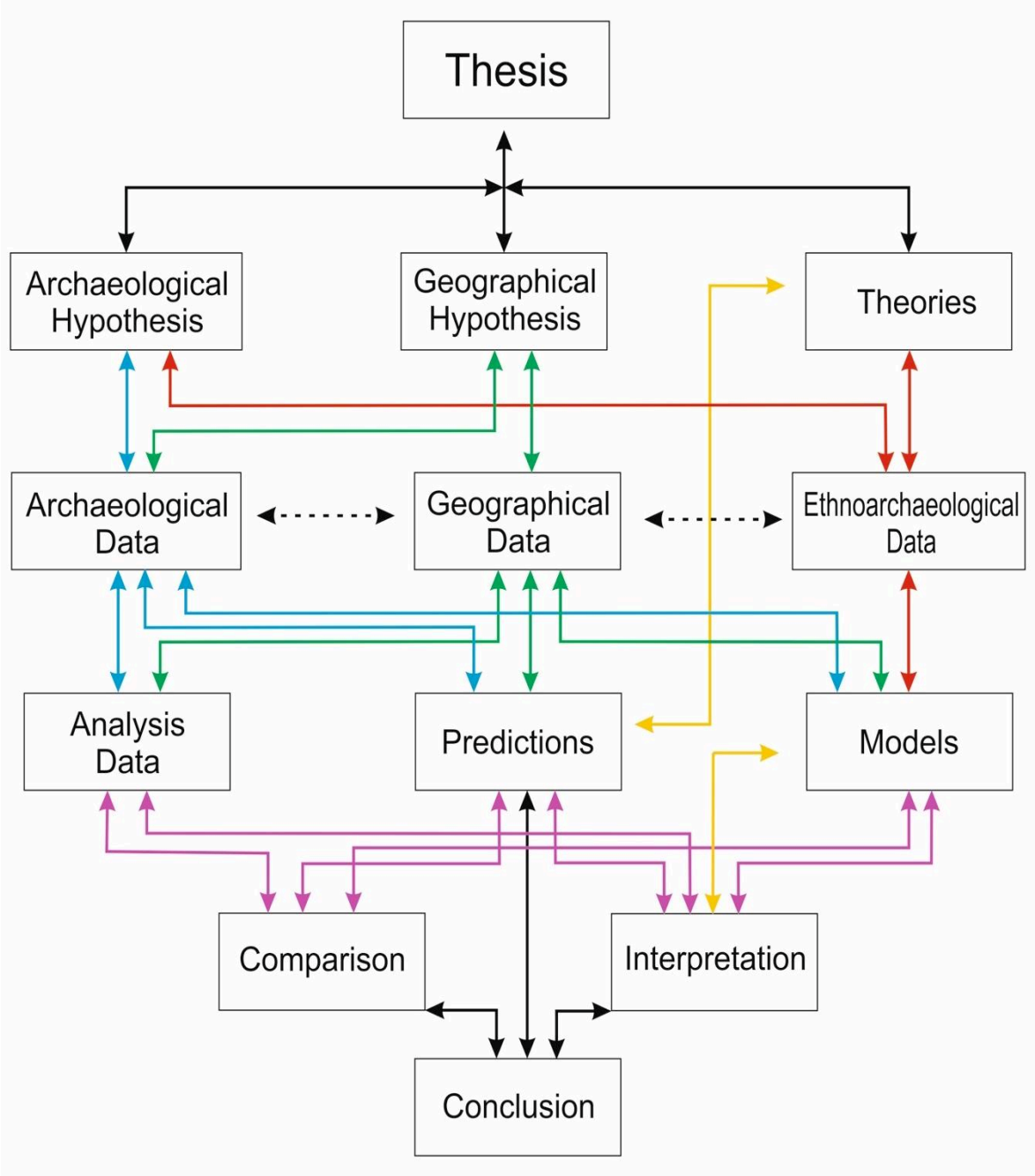


Diagram 1.1: Methodological chart of this thesis study

In this study, the main topics are dealt with in detail. (Diagram 1.1) However, the independent results that emerged were evaluated together with other studies, and the results were thoroughly checked. Thus, we have tried to establish in detail the construction type, construction materials and their transformations at the Neolithic settlement of Sumaki Höyük.

1.3.1. Brief syntheses of previous researches

Within the scope of our thesis, ethnological studies carried out in Upper Mesopotamia and its vicinity and data of contemporaneous archaeological settlements were obtained by library work. Contemporaneous settlements to Sumaki Höyük are described in detail, especially regarding the architectural context.

The initial investigations conducted in our study area extend to the mid-19th century. The first information related to the Lower Garzan Basin is in an article written by J.G. Taylor called "Travels in Kurdistan with Notices of the Eastern and Western Tigris and Ancient Ruins in their Neighbourhood". Taylor travelled to the area three times between 1861 and 1863 at the request of the British Government. The main aim of these trips was to collect information about trade and provide statistics; additionally, he noted the magnificent historical remains along his route. Taylor provided information about the ancient town of *Erzen* founded by the Parthians in 298 AD and currently located within the boundaries of Siirt province. Much information obtained from a variety of ancient sources about this town and the different names for the settlement over time are listed. This town was called *Arzanene* by the Romans and was mentioned as *Artzan*, *Aghndsnik, Aghdsen,* and *Khordsen* in Armenian sources. It was called *Arzen* by the Arabs and *Gharzan/Garzan* by Kurds and Turks. (Taylor, 1865: 26) Other names that can be mentioned are *Arzen Su, Khuzu, Huzu, Redhwan Suyu* and *Yezid Khaneh Su.* (Taylor, 1865: 50) In recent years, the name Garzan Stream was changed to Yanarsu Stream.

The most comprehensive and first scientific research in the area was the *Southeast Anatolian Joint Prehistoric Project* in 1963. This research was carried out by a team led by Halet Çambel and Robert J. Braidwood as a joint project of Universities of Istanbul and Chicago. The focus of this expedition was to test Braidwood's theory about transitional stages of the first food production; therefore, the research was carried out primarily on the piedmont area of the Garzan valley at altitudes above 650 m. (Benedict, 1980: 5-6) However, the Sumaki Höyük settlement was not detected.

From this time on, archaeological research completed in the region concerned identifying cultural heritage structures that would be submerged under the Ilısu Dam. Additionally, apart from the study "*Ilısu Baraj Gölü Alanı Paleolitik Çağ Yüzey Araştırmaları*" (Taşkıran & Kartal, 2011), there is no other work on identifying prehistoric settlements. The first research to identify cultural heritage sites that would remain under Ilısu

Dam was completed by a team led by Dr. Guillermo Algaze. The results of this research were published in a preliminary report. (Algaze, et al., 1991: 187-189) Another survey and inventory carried out in this area was the research project titled "*Inventory of Cultural Heritage in the Environs of Garzan Valley and Batman Stream, Ilısu Dam Area*" conducted by Aslı Erim-Özdoğan and Jale Velibeyoğlu in 2002. Sumaki Höyük was discovered in this survey, in which I participated as an archaeology student. (Erim-Özdoğan & Sarıaltun, 2009; Erim-Özdoğan & Sarıaltun, 2011) In scientific terms, the first excavation in the Lower Garzan Basin was at Sumaki Höyük. (Erim-Özdoğan, A. 2009)

Though distant from our study area, the article entitled "*Ergani (Diyarbakır) Çevresinde Kuvaterner'de Meydana Gelen Drenaj Değişiklikleri ve Bölge Jeomorfolojisine Etkileri*" by S. Karadoğan, A. Çağlıyan and E. Durmuş published in 2008 is important concerning an understanding of the regional geomorphology. This study discussed the effects of fluvial system changes on regional morphology in Quaternary on the Ergani Plain and its surroundings. "*Paleo-Environmental Aspects in the Çayönü Area*" by B. Marcollongo and A. Palmieri published in 1992 is another geoarchaeological field study that represents a model for our research. In this article, the Neolithic topography determined by data obtained from the Çayönü Tepesi excavations and the current terrain was compared with geoarchaeological findings.

The study "*Paleo-hydrological Implications of Late Quaternary Fluvial Deposits in and around Archaeological sites in Syria*" by T. Oguchi, K. Hori and C. T. Oguchi from 2008 published in *Geomorphology* journal is another geomorphological study close to our study area. This research investigated ancient fluvial systems from data of prehistoric settlements in Syria and geomorphological studies around them and discusses the effect of the geomorphological evolutionary process on prehistoric settlements in terms of climate and the paleo-environment. The study entitled "*Local Holocene Environmental Indicators in Upper Mesopotamia: Pedogenic Carbonate Record vs. Archaeobotanical Data and Archaeoclimatological Models*" published by S. Riehl, K. E. Pustovoytov, S. Hotchkiss and R. A. Bryson in *Quaternary International* in 2009 encompassed a comparison of calcium deposits adhering to archaeological remains from excavated sites in Northern Mesopotamia involving archaeo-botanical data and paleo-climate models.

A study indirectly relevant to our study area was published by M. Staubwasser and H. Weiss in 2006 in "*Quaternary Research* called "*Holocene Climate and Cultural*

Evolution in late Prehistoric–Early Historic West Asia". This study linked the long duration of arid environments in Holocene in the Eastern Mediterranean with mixed monsoon winds. The reason discussed for the long arid periods during events at 8.2, 5.2 and 4.2 ky was subtropical air currents above the Eastern Mediterranean and Asia and their effect on Near Eastern cultures. A similar example entitled "*Climate Forcing due to the 8200 cal yr BP Event Observed at Early Neolithic Sites in the Eastern Mediterranean*" was published in *Quaternary Research* by B. Weninger et al. in 2006. According to this study the 8.2 ky event had a catastrophic effect, especially on European-Anatolian and Near Eastern Neolithic cultures. The authors focused on the fact that the beginning of farming in southeast Europe started within this period, evidenced by C_{14} dates. The migration of the first farming communities reaching Greece and Bulgaria via different routes was also discussed.

A recently published article "*Interactions between climate change and human activities during the early to mid-Holocene in the eastern Mediterranean basins"* by Jean-Francois Berger et al. in 2016, discuss the RCC records on the 9.2 to 8.2ky events in the Mediterranean zone, and their impact on prehistoric societies. This study questioned the diffusion of Neolithic package from Anatolia to Greece and Balkans using different analysis methods comparable with the absolute dating and archaeological records of various sites in those regions. Although the paper mainly focused on the Western and partly Central Anatolia, and emphasized the role of the 8.2 ky event particularly on beginning of agriculture, data from central and eastern Mediterranean area were also partially discussed. According to many studies, it becomes more evident that '…The earliest spread of Neolithic packages to western and northwestern Anatolia occurred almost a thousand years before the 8.2 ka event….' (Berger, et al., 2016: 1868). In the book "*Climate and Cultural Change in Prehistoric Europe and the Near East*" in Chapter 8 with a heading "Early Holocene Climatic Fluctuations and Human Responses in Greece" C. Perlès discussed the 8.2 ky event and claimed that climatic changes did not make radical effect on human populations in Greece but she also emphasized that more precise interdisciplinary studies are necessary. In the paper "*Early Seventh-Millennium AMS Dates from Domestic Seeds in the Initial Neolithic at Franchthi Cave (Argolid, Greece*)" by C. Perlès et al., 2013, based on the new C_{14} dates, Franchthi Cave (Greece) was occupied by farmers nearly 8.6 ky, before the 8.2ky event. Another recent study *Evidence for the impact of the 8.2-kyBP climate event on Near Eastern early farmers,* by Roffet-Salque et al. 2018. In this article, impact of the 8.2ky event on settlement planning, subsistence strategies, and changes in nutrition habits of Çatalhöyük

East was discussed based on the results from lipid residue analysis of selected pottery sherds, archaeozoological analysis of faunal remains and safe C_{14} dates from the areas, which the pottery sherds and animal bones were collected. Comparing with the 8.2ky event climate modelling, they provided data that Çatalhöyük habitants were influenced by this event and developed their own adaptive strategies.

There are some publications about the relationship and interaction between settlers and the environment. Perhaps the most notable of them was published by Sırrı Erinç in 1980 with the title "*Human Ecology in Southeastern Anatolia*". This article discussed the relationship of archaeological settlements in Southeast Anatolia with morphological structures. A similar article was published by F. Hole in 1997 in *Paléorient* called "*Paleoenvironment and Human Society in the Jezireh of Northern Mesopotamia 20,000-6,000 BP*". This study investigated the relationship between the paleo-environment and human communities in the Jezireh Region of Upper Mesopotamia, emphasizing the effect of climate on societies and the deficiency of data on this topic.

1.3.2. Archaeological and Geoarchaeological field study

In this study, the Neolithic architecture of Sumaki Höyük is discussed in relation to the remains excavated from 2007 to 2014.

All the excavation documents of Sumaki Höyük were used including daily notes and final reports, 1/50 scale daily plans, 1/20 and 1/10 scale plans, 1/20 scale section drawings of baulks, and photographs along with inventory listings. With the aim of determining the horizontal and vertical distribution of Sumaki Höyük Neolithic architecture, all plans and drawings were uploaded to a digital environment.

In Sumaki Höyük excavations, a "grid system" is used. The site was divided into 10x10 m squares using intersecting perpendicular-horizontal lines. Lines in an east-west direction are shown with numbers, while north-south lines are shown with letters. Thus, each square is identified by both a number and a letter, e.g., 14F, 20N, etc. Archaeological excavations were carried out in 27 squares covering an area of 2180 m^2 over five excavation seasons, and natural soil was nearly reached at 900 m^2.

In the architectural remains, the walls, rooms, cells, etc. forming a single structure (assemblage) are all described with a 'structure name'. Structure/building names were

numbered according to phases. For example, N6B1 refers to N (Neolithic), 6 (Phase), B (Structure name), and 1 (Structure number). The same coding scheme was also used for hearths and fire pits. Hearths belonging to Phase N6 are coded as N6O1 (Neolithic, Phase 6, Hearth 1). An example for a fire pit from Phase N5 is N5A1 (Neolithic, Phase 5, Fire Pit 1).

Based on the archaeological findings, our study examined all the buildings and architectural elements one by one. For this, various data including the location of each structure within the excavation system, its plan, its upper and lower elevations, construction materials and techniques, structural elements, and internal arrangements were assessed. (Figure 1.1) After a detailed description of the structural material and techniques, we shall discuss the interpretation of the Sumaki architectural remains. The structures (buildings, hearths and fire pits) of the Neolithic Period are classified according to their plans and their spatial distribution in the context of the phases of the settlement stratigraphy. Related artefactual elements such as stone tools, ground stone objects, clay finds, and pottery were used to determine the settlement patterns.



Figure 1.1: Some blow-ups from field research and lab work

Laboratory analyses of earth and lime samples from buildings, hearths and fire pits as well as various loci of open areas were used for interpretation, and the results will be presented in the relevant section. Additionally, the external area of each structure, associated structural elements, and relationship with other contemporary structures will be examined, in short, all living areas. Thereby, the horizontal distribution of the settlement can be determined. Vertical stratification was also identified in detail to understand differences or similarities concerning architectural perception or land use over time. The settlement pattern, structural distribution and topographic changes of each phase are also described in detail and presented with maps and drawings.

The spatial distribution of Neolithic architectural structures by phase, differences in land use, and the reflection of cultural variability in the architecture will be assessed from a socio-economic perspective. The Neolithic architectural tradition at Sumaki Höyük will also be examined regarding its technology, and compared to contemporary settlements in the Upper Mesopotamia.

1.3.3. Ethnoarchaeological field study

Understanding and interpreting the behaviour of communities is the fundamental principle of prehistoric research. (Bailey, 1983: 2) Although these efforts have yielded results, they are growing closer to each other in terms of ethnological research methods. In general, socio-economic studies attempt to reveal the process of formation and development of a settlement by examining the cultural dynamics and modes of movement within the space-time context between the settlement and social organization models. In particular, the architectural experiences of the semi-nomad tribes of today's world make it possible to evaluate constructions of the Neolithic Period from a different point of view.

The Alikan Tribe, which established temporary campsites as winter quarters in the Lower Garzan Basin, has been studied. Ten of the nineteen winter quarters identified in the basin were periodically followed up from the beginning of our thesis research. For a better representation, some external examples of winter quarters were also observed. Hasankeyf and its surroundings, located on traditional migration routes, particularly the Gercüş-Hasankeyf route, offer good examples. The archives of Garzan Cultural Inventory survey (Erim – Özdoğan & Sarıaltun 2011) were also significant for our documentation. Since the

winter quarters have been surveyed for fifteen years, the structure plans, techniques and alterations in settlement pattern can be described in detail. Field observations have also been supplemented by oral interviews with the semi-nomadic groups. All this data are presented both in maps and other visual methods.

1.3.4. Laboratory analyses

As part of our study, many samples were sent to reputable laboratories. The results are necessary for interpretation of palaeography and architectural construction techniques. Thus, the temporal and spatial change process and characteristics of Sumaki Höyük and its vicinity could be determined.

The samples and their selection criteria can be classified into three groups:

- The first is lime particles detected in the Neolithic structures. Learning more about the lime particles both qualitatively and quantitatively gives us information about Sumaki Höyük Neolithic architecture and its techniques.
- The second group is soil samples taken to reveal the stratification of the settlement and environmental effects over time.

The X-Ray Fluorescence (XRF) method was used to determine the chemical composition of samples taken from the Neolithic phases of Sumaki Höyük and the Garzan Stream terraces. X-Ray Diffraction (XRD) was used to determine the mineral composition of the samples. Scanning Electron Microscopy (SEM) was used to determine the crystallized and mineralized structures of the same samples, and Energy Dispersive X-Ray Spectroscopy (EDX) analyses were performed to determine the chemical properties of the minerals detected. Phytolith and pollen analyses also investigated earth and lime samples collected from Sumaki Höyük architectural structures and open area fills for determination of the type and characteristics of organic materials. $\delta^{13}C$ and $\delta^{18}O$ isotope analyses were also employed for the same samples. The results were compared with those of various lake fillings such as at Lake Van, Lake Zeribar and the Dead Sea to define the paleo-environment of Sumaki Höyük during its Neolithic period.

1.3.4.1. Scanning Electron Microscopy / Energy Dispersive X-Ray Spectroscopy Analyses (SEM/EDX)

SEM/EDX analyses are a comprehensive method especially in re-construction of archaeological materials and micro-analyses of remains. Scanning electron microscopy is the imaging technique used to determine the surface structure of samples. In our study, high-quality images could be obtained by SEM analysis, together with defining the characteristics of samples in archaeological and geomorphological areas. SEM images utilised Philips XL-30S FEG and FEI Quanta 250 FEG instruments at İzmir Institute of Technology, Centre for Materials Research.[3] EDX element analyses are for identifying the chemical properties of samples. In this study, EDX analyses were applied to all SEM samples. The analyses were carried out with a Bruker AXS XFlash EDX detector connected to a scanning electron microscope. SEM imaging and EDX analyses were performed on 69 samples from the Sumaki Höyük Neolithic phases. (See Table 1.1 – 1.3, 4.8 – 4.10 and Figure 1.5 – 1.17 for detailed samples information)

1.3.4.2. X-Ray Diffraction analysis (XRD)

An essential method complementing the SEM / EDX analyses is XRD analysis; an analytical method of identifying and describing the minerals contained in solid samples according to crystal structures. (Shrivastava, 2009: 41-47) By this method, all minerals in the sample can be identified by patent assignment. Information on the number of minerals is also available. In short, the environmental conditions during the deposition process of an example can be understood by means of XRD analysis. (Schreiner, et al., 2004: 1; Creanga, 2009: 60) Specified minerals and related elements are interpreted in our study. In the XRD analyses, a Philips X'Pert Pro device was used at İzmir Institute of Technology, Centre for Materials Research. In this study, XRD analysis was carried out on 10 samples obtained from the geological formation and 32 samples taken from the Sumaki Höyük Neolithic phases. (See Table 1.6 – 1.9, 4.13 – 4.16 and Figure 1.5 – 1.17 for detailed samples information)

[3] By Dr. Gökhan Erdoğan and Uz. Duygu Oğuz Kılıç

1.3.4.3. X-Ray Fluorescence analysis (XRF)

Energy dispersive X-ray fluorescence analysis (XRF) is one of the methods used for elemental analyses in all kinds of samples such as liquids, solids and powder. (Friedman, et al., 1999: 154-156) Many rocks have highly variable mineral composition (Schackley, 2011: 18) hence qualitative and quantitative analyses of elements can be performed by XRF. (Mantler & Schreiner, 2000: 3) Qualitative analyses are used to determine the elements in samples while quantitative analyses determine the percentage of ingredients in samples. X-ray fluorescence analyses were performed to support the elemental chemical and structural data obtained from the SEM / EDX and XRD analyses. The chemical composition of solid specimens taken from the structure walls of the Sumaki Höyük was determined using X-ray Fluorescence (XRF) analysis. The obtained data were evaluated mutually using statistical methods. In the XRD analyses, a Spectro IQ II device was used at the İzmir Institute of Technology, Centre for Materials Research.[4] In this study, XRF analyses were performed on totally 31 samples from the Sumaki Höyük basalt artefact (14), Kıradağ (13) and Karacadağ (4) geological basalt samples, and 30 archaeological samples from the Sumaki Höyük Neolithic phases. (See Table 1.4, 1.5, 4.11, 4.12 and Figure 1.5 – 1.17 for detailed samples information)

1.3.4.4. Dating analysis

Using C_{14} dating methods, the dating of the Neolithic phases and cultural alterations to the settlement were evaluated in a temporal context. Carbonized remains are very few in Sumaki Neolithic deposits. 13 suitable samples collected during the 2007-2014 excavation seasons were examined by the AMS method. Lecce University Center for DAT (Laboratory for Diagnostics) did their dating. (See Table 1.13, Figure 1.5 – 1.17 and Diagram 3.26 – 3.39 for detailed samples information)

[4] By Uz. Mine Bahçeci

1.3.4.5. Phytolith and pollen analysis

The phytolith, which is a siliceous structure found in plant cells, decomposes after decomposition of the organism and can be separated by the microscope in the laboratory. Although phytolith analyses are new technique in archaeological projects, the identification of plants in combination with micro-morphological studies provide beneficial information. One of its greatest advantages for archaeology is the ability to detect the content of organic materials. Thus, paleo-environment interpretations are more reliable. 22 soil samples taken from the Sumaki Höyük Neolithic phases were analysed at the Phytolith Research Institute (PRI) laboratory in India.[5] Ten pollen analyses were also conducted on the same samples. The results were combined with geomorphological and archaeological data from the settlement, giving an idea of the paleo-environmental conditions of the Neolithic Period at Sumaki Höyük. (See Table 1.11, 1.12, 4.18, 4.19 and Figure 1.5 – 1.17 for detailed samples information)

1.3.4.6. Stable isotop analysis

Isotope analyses are quite prevalent for defining climatic and environmental conditions in the past and for establishing the paleo-environment of the study area. 30 lime samples taken from Neolithic structures were sent to the Environmental Isotope Laboratories at Arizona University[6] for isotope analysis. $\delta^{18}O$ and $\delta^{13}C$ of carbonates were measured using an automated carbonate preparation device (KIEL-III) coupled to a gas-ratio mass spectrometer (Finnigan MAT 252). Powdered samples were reacted with dehydrated phosphoric acid in a vacuum at 70°C. The isotope ratio measurement is calibrated based on repeated measurements of NBS-19 and NBS-18 and precision is ± 0.10 ‰ for $\delta^{18}O$ and ± 0.08 ‰ for $\delta^{13}C$. (See Table 1.10, 4.17 and Figure 1.18 – 1.22 for detailed samples information)

[5] By Dr.Sanjay Eksambekar
[6] By Dr. David Dettman



Figure 1.2: Turkey provinces map and location of Batman province

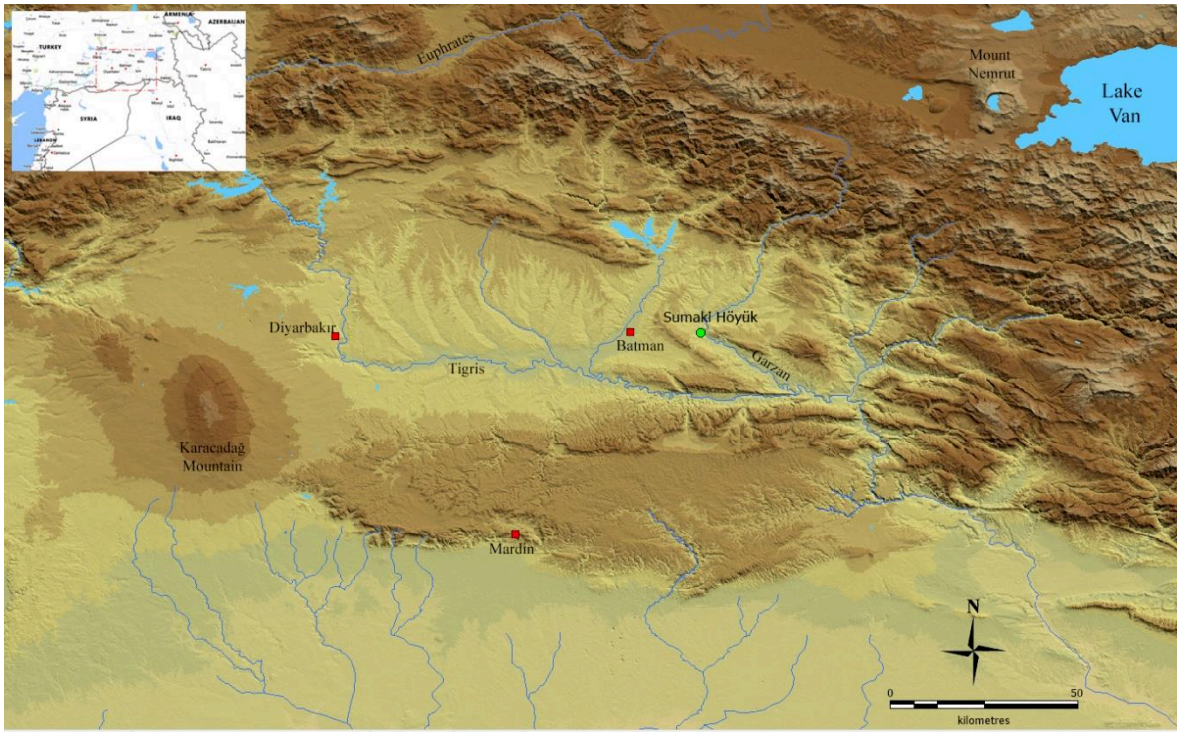


Figure 1.3: Location of the Upper Tigris Basin and Sumaki Höyük

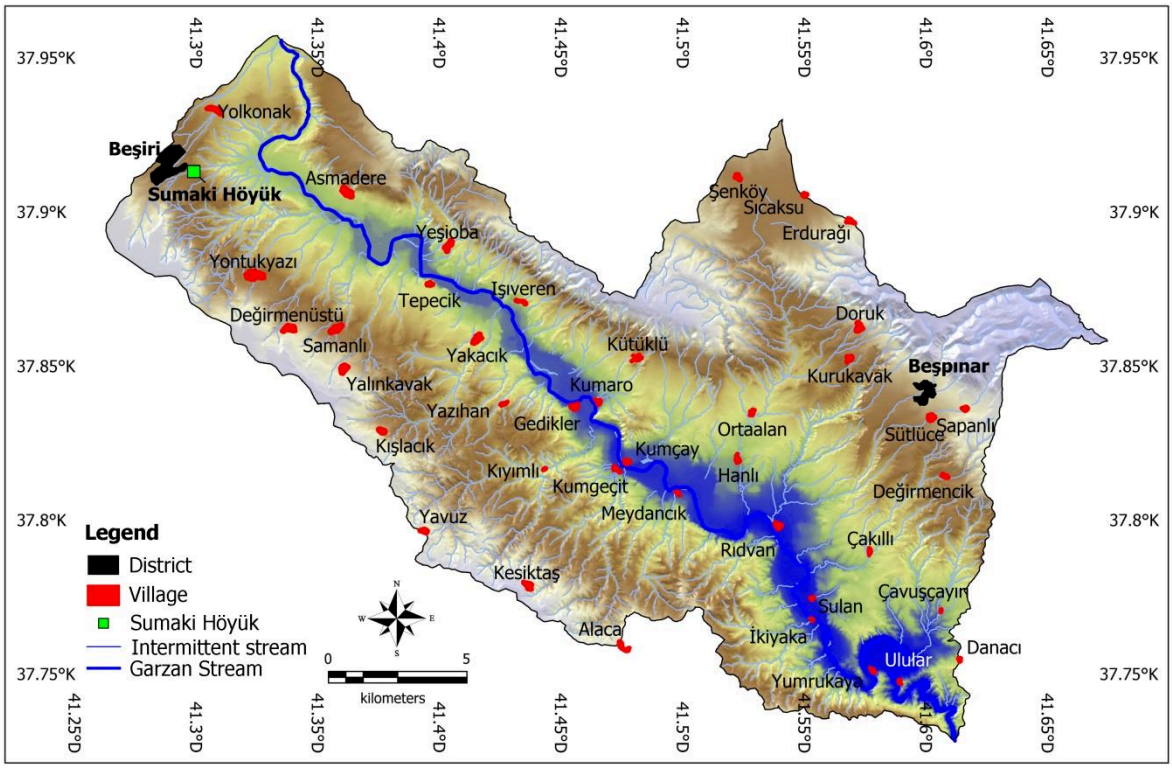


Figure 1.4: Some place in the Lower Garzan Basin

Sample Name	Phase	Area	Unit Name	Material	Trench	Altitude	Coordinates	
							X	Y
IYTE_SMK-e1	N1	A	**Open Space**	Homogeneous Sediment	20L	700,84	41,304396	37,917018
IYTE_SMK-e5		B	**Open Space**	Homogeneous Sediment	15H	702,10	41,303850	37,917317
IYTE_13E.19a	N2	A	**Open Space**	Homogeneous Sediment	20L	700,61	41,304437	37,917057
IYTE_13E.18b		B	**Open Space**	Homogeneous Sediment	14G	702,06	41,303747	37,917409
IYTE_SMK-e2	N3	A	**Open Space**	Homogeneous Sediment	20M	700,28	41,304413	37,916965
IYTE_SMK-e14		B	**Open Space**	Homogeneous Sediment	14H	702,27	41,303706	37,917313
IYTE_SMK-e9	N4	A	**Open Space**	Homogeneous Sediment	21L	700,01	41,304504	37,917015
IYTE_SMK-e10		B	**Open Space**	Homogeneous Sediment	15G	700,62	41,303823	37,917394
IYTE_SMK-eO1	N5	A	**Open Space**	Homogeneous Sediment	20L	699,84	41,304383	37,917019
IYTE_SMK-eO2		B	**Open Space**	Homogeneous Sediment	14G	701,46	41,303778	37,917388
IYTE_13E.19e1	N6	A	**Open Space**	Homogeneous Sediment	21M	699,78	41,304503	37,916989
IYTE_13E.19e2		B	**Open Space**	Homogeneous Sediment	15G	700,40	41,303839	37,917422
IYTE_13E.21f2	N7	B	**Open Space**	Homogeneous Sediment	15H	699,85	41,303856	37,917274

Table 1.1: Locations and detailed information of EDX analysis soil samples from Sumaki Höyük

Sample Name	Phase	Area	Unit Name	Material	Trench	Altitude	Coordinates	
							X	Y
IYTE_SMK-e13	N1	A	**Torrent ??**	Heterogeneous Sediment	20M	701,16	41,304364	37,916962
IYTE_SMK-e11	N2-N1		**Torrent 1**	Heterogeneous Sediment	21M	700,53	41,304562	37,916979
IYTE_SMK-e12	N2-N1			Heterogeneous Sediment	20M	700,60	41,304406	37,916971
IYTE_13E.8a1	N2-N1	B	**Torrent 2**	Heterogeneous Sediment	15F	700,64	41,303897	37,917457
IYTE_13E.8a2	N2-N1			Heterogeneous Sediment	15G	700,58	41,303897	37,917405
IYTE_13E.2c1	N5-N4		**Torrent ??**	Heterogeneous Sediment	15F	700,05	41,303912	37,917484
IYTE_13E.2c2	N5-N4			Heterogeneous Sediment	15G	700,17	41,303911	37,917390

Table 1.2: Locations and detailed information of EDX analysis torrent sediment samples from Sumaki

Sample Name	Phase	Area	Unit Name	Material	Trench	Altitude	Coordinates	
							X	Y
IYTE_13E.18a			**N2B2**	Lime fragment	21M	700,45	41,304460	37,916934
IYTE_SMK-eO9		A	**N2B3**	Lime fragment	21M	700,56	41,304536	37,916940
IYTE_SMK-eO1			**N2B4**	Lime fragment	21M	700,48	41,304484	37,916984
IYTE_SMK-eO8			**N2B6**	Lime fragment	21L	699,80	41,304545	37,917063
IYTE_13E.15a	N2		**N2B8_1**	Lime fragment	15F	701,03	41,303869	37,917513
IYTE_13E.15f1			**N2B8_2**	Lime fragment	15F	701,03	41,303870	37,917513
IYTE_13E.24a		B	**N2B10**	Lime fragment	14G	702,06	41,303690	37,917388
IYTE_13E.23b			**N2B11**	Lime fragment	14G	702,11	41,303715	37,917431
IYTE_SMK-e8			**N2B12**	Homogeneous Soil	14F	701,87	41,303699	37,917447
IYTE_13E.20a			**N4B1_1**	Lime fragment	20L	700,23	41,304432	37,917016
IYTE_13E.20f3			**N4B1_2**	Lime fragment	20L	700,23	41,304432	37,917016
IYTE_13E.20f2			**N4B1_3**	Lime fragment	20L	700,23	41,304432	37,917016
IYTE_SMK-e3		A	**N4B1_4**	Homogeneous Soil	20L	700,16	41,304419	37,917008
IYTE_13E.9d			**N4B2_1**	Lime fragment	21M	700,18	41,304471	37,916935
IYTE_13E.9e			**N4B2_2**	Lime fragment	21M	700,18	41,304470	37,916935
IYTE_13E.21a	N4		**N4B3_1**	Lime fragment	22L	699,42	41,304653	37,917007
IYTE_13E.21f1			**N4B3_2**	Lime fragment	22L	699,42	41,304653	37,917007
IYTE_SMK-e13			**N4B8_1**	Lime fragment	15G	700,21	41,303878	37,917360
IYTE_SMK-e12			**N4B8_2**	Homogeneous Soil	15G	700,30	41,303878	37,917360
IYTE_13E.12a		B	**N4B9**	Lime fragment	15G	700,40	41,303835	37,917424
IYTE_SMK-e11			**N4B10**	Homogeneous Soil	15G	700,72	41,303887	37,917461
IYTE_13E.13e			**N4B13**	Lime fragment	14G	701,44	41,303749	37,917360
IYTE_13E.1a		A	**N5B1_1**	Lime fragment	21M	699,80	41,304504	37,916990
IYTE_13E.1e			**N5B1_2**	Lime fragment	21M	699,80	41,304504	37,916990
IYTE_SMK-eO2			**N5B3_1**	Lime fragment	14G	701,72	41,303699	37,917431
IYTE_SMK-eO2			**N5B3_2**	Lime fragment	14G	701,72	41,303699	37,917431
IYTE_SMK-eO2			**N5B3_3**	Lime fragment	14G	701,72	41,303699	37,917431
IYTE_SMK-eO1			**N5B4**	Lime fragment	14G	701,80	41,303749	37,917409
IYTE_SMK-eO1			**N5B6**	Lime fragment	14F	701,30	41,303714	37,917491
IYTE_SMK-eO1			**N5B7**	Lime fragment	14F	701,29	41,303747	37,917525
IYTE_SMK-e7			**N5B8**	Lime fragment	14H	701,85	41,303748	37,917301
IYTE_13E.12k	N5		**N5B9**	Lime fragment	15F	700,62	41,303884	37,917514
IYTE_13E.25a3		B	**N5B10_1**	Lime fragment	15F	700,66	41,303874	37,917455
IYTE_13E.25d1			**N5B10_2**	Lime fragment	15F	700,66	41,303874	37,917455
IYTE_13E.2a			**N5B11_1**	Lime fragment	15G	700,51	41,303872	37,917420
IYTE_13E.2c3			**N5B11_2**	Lime fragment	15G	700,51	41,303872	37,917420
IYTE_13E.14b			**N5B12_1**	Lime fragment	15H	700,40	41,303877	37,917312
IYTE_13E.14f1			**N5B12_2**	Lime fragment	15H	700,40	41,303877	37,917312
IYTE_13E.14f2			**N5B12_3**	Lime fragment	15H	700,40	41,303877	37,917312
IYTE_13E.4a			**N5B14_1**	Lime fragment	14G	700,48	41,303759	37,917373
IYTE_13E.4c			**N5B14_2**	Lime fragment	14G	700,48	41,303759	37,917373
IYTE_SMK-eO1			**N6B1**	Lime fragment	21M	700,01	41,304501	37,916949
IYTE_13E.6f		A	**N6B2**	Lime fragment	21M	699,80	41,304525	37,916934
IYTE_SMK-e6			**N6B2**	Homogeneous Soil	21M	699,83	41,304525	37,916934
IYTE_13E.7f	N6		**N6B9**	Lime fragment	14F	701,34	41,303705	37,917475
IYTE_13E.10b			**N6B10_1**	Lime fragment	14G	701,42	41,303702	37,917405
IYTE_13E.10e2		B	**N6B10_2**	Lime fragment	14G	701,42	41,303702	37,917405
IYTE_13E.10e1			**N6B10_3**	Lime fragment	14G	701,42	41,303702	37,917405
IYTE_SMK-eO1			**N6B13**	Homogeneous Soil	15G	700,75	41,303854	37,917369

Table 1.3: Locations and detailed information of EDX analysis lime samples from Sumaki Höyük architectural structures

Sample Name	Phase	Area	Unit Name	Material	Trench	Altitude	Coordinates	
							X	Y
IYTE-SMK-fO9	N2	A	N2B3	Lime fragment	21M	700,50	41,304554	37,916939
IYTE-SMK-fO11			N2B4	Lime fragment	21M	700,45	41,304503	37,917052
IYTE-SMK-fO3			N2B5	Lime fragment	21L	700,41	41,304492	37,917052
IYTE-SMK-fO8			N2B6	Lime fragment	21L	699,94	41,304556	37,917047
IYTE-13F-3		B	N2B8	Lime fragment	15F	701,00	41,303898	37,917417
IYTE-13F-5			N2B11	Lime fragment	14G	702,02	41,303724	37,917417
IYTE-13F-4	N4	A	N4B3	Lime fragment	22L	669,45	41,304672	37,917004
IYTE-SMK-fO5		B	N4B8	Lime fragment	15G	700,29	41,303876	37,917367
IYTE-13F-1	N5	A	N5B1	Lime fragment	21M	699,81	41,304500	37,916986
IYTE-SMK-fO2		B	N5B3	Lime fragment	14G	701,70	41,303707	37,917431
IYTE-SMK-fO18			N5B4	Lime fragment	14G	701,78	41,303752	37,917428
IYTE-SMK-fO14			N5B6	Lime fragment	14F	701,28	41,303736	37,917503
IYTE-SMK-fO15			N5B7	Lime fragment	14F	701,25	41,303778	37,917526
IYTE-SMK-fO7			N5B8	Lime fragment	14H	701,80	41,303769	37,917297
IYTE-13F-2			N5B11	Lime fragment	15G	701,50	41,303867	37,917430
IYTE-SMK-fO17	N6	A	N6B1	Lime fragment	21M	700,00	41,304470	37,916941
IYTE-SMK-fO10			N6B2	Lime fragment	21M	699,81	41,304559	37,916926
IYTE-SMK-fO4			N6B7	Lime fragment	20N	700,50	41,304559	37,916878

Table 1.4: Locations and detailed information of XRF analysis lime samples from Sumaki Höyük

Sample Name	Phase	Area	Unit Name	Material	Trench	Altitude	Coordinates	
							X	Y
IYTE-SMK-f8	N2	B	N2B12	Homogeneous Sediment	14F	701,85	41,303681	37,917470
IYTE-SMK-f3	N4	A	N4B1	Homogeneous Sediment	20L	700,20	41,304456	37,917024
IYTE-SMK-fO12			N4B2	Homogeneous Sediment	21M	700,15	41,304479	37,916941
IYTE-SMK-f12		B	N4B8	Homogeneous Sediment	15G	700,23	41,303871	37,917376
IYTE-SMK-f11			N4B10	Homogeneous Sediment	15G	700,68	41,303881	37,917436
IYTE-SMK-f7	N5	B	N5B3	Homogeneous Sediment	14G	701,70	41,303725	37,917430
IYTE-SMK-f6	N6	A	N6B2	Homogeneous Sediment	21M	699,80	41,304550	37,916917
IYTE-SMK-fO6		B	N6B13	Homogeneous Sediment	15F	701,33	41,303728	37,917475

Table 1.5: Locations and detailed information of XRF analysis earth samples from Sumaki Höyük

Sample Name	Phase	Area	Unit Name	Material	Trench	Altitude	Coordinates	
							X	Y
IYTE-13D_14	N2	A	N2B2	Lime fragment	21M	700,45	41,304457	37,916925
IYTE-13D_12		B	N2B8	Lime fragment	15F	701,03	41,303886	37,917508
IYTE-13D_20			N2B10	Lime fragment	14G	702,06	41,303724	37,917387
IYTE_SMK_r08			N2B12	Lime fragment	14F	701,87	41,303713	37,917472
IYTE-13D_16	N4	A	N4B1	Lime fragment	20L	700,23	41,304424	37,917015
IYTE-13D_17			N4B3	Lime fragment	22L	699,42	41,304676	37,917015
IYTE-SMK_rO5		B	N4B8	Lime fragment	15G	700,21	41,303877	37,917363
IYTE-13D_18			N4B9	Lime fragment	15G	700,40	41,303824	37,917424
IYTE-13D_1	N5	A	N5B1	Lime fragment	21M	699,82	41,304497	37,916983
IYTE-SMK_rO18		B	N5B4	Lime fragment	14G	701,80	41,303749	37,917423
IYTE-SMK_rO14			N5B6	Lime fragment	14F	701,30	41,303706	37,917492
IYTE-SMK_rO15			N5B7	Lime fragment	14F	701,29	41,303762	37,917521
IYTE-SMK_r07.1			N5B8	Lime fragment	14H	701,85	41,303737	37,917299
IYTE-13D_7			N5B9	Lime fragment	15F	700,62	41,303891	37,917511
IYTE-13D_2			N5B11	Lime fragment	15G	700,51	41,303885	37,917421
IYTE-13D_11			N5B12	Lime fragment	15H	700,40	41,303881	37,917318
IYTE-13D_4			N5B14	Lime fragment	14G	700,48	41,303758	37,917368
IYTE-SMK_rO17	N6	A	N6B1	Lime fragment	21M	700,01	41,304486	37,916952
IYTE-13D_8			N6B2	Lime fragment	21M	699,80	41,304524	37,916922
IYTE-13D_9		B	N6B10	Lime fragment	14G	701,42	41,303721	37,917404

Table 1.6: Locations and detailed information of XRD analysis of lime samples from Sumaki Höyük

Sample Name	Phase	Area	Unit Name	Material	Trench	Altitude	Coordinates	
							X	Y
IYTE-SMK_rO20	N2	A	N2B2	Homogeneous Soil	21M	700,45	41,304483	37,916940
IYTE-SMK_r02	N3	A	Open Sapce	Homogeneous Sediment	20M	700,28	41,304385	37,916979
IYTE-SMK_r14			Open Sapce	Homogeneous Sediment	14H	702,27	41,303730	37,917303
IYTE-SMK_r03	N4	A	N4B1	Homogeneous Soil	20L	700,16	41,304455	37,917019
IYTE-13D_13			N4B2	Homogeneous Soil	21M	700,45	41,304472	37,916925
IYTE-SMK_r12		B	N4B8	Homogeneous Soil	15F	701,03	41,303871	37,917379
IYTE-SMK_r11			N4B10	Homogeneous Soil	15G	700,72	41,303881	37,917443
IYTE-SMK_r06	N6	A	N6B2	Homogeneous Soil	21M	699,80	41,304545	37,916937

Table 1.7: Locations and detailed information of XRD analysis of earth samples from Sumaki Höyük

Sample Name	Phase	Area	Unit Name	Material	Trench	Altitude	Coordinates	
							X	Y
IYTE-SMK_r13	N1	A	Torrent (?)	Heterogeneous Sediment	20M	701,16	41,304380	37,916958
IYTE-SMK_r01	N1-N2	A	Torrent 1	Heterogeneous Sediment	21M	700,53	41,303882	37,917466
IYTE-SMK_r05		B	Torrent 1	Heterogeneous Sediment	15F	700,64	41,304550	37,916987
IYTE-13D_22	N4-N5	B	Torrent 2	Heterogeneous Sediment	15F	700,05	41,303904	37,917488

Table 1.8: Locations and detailed information of XRD analysis of torrent sediment samples from Sumaki Höyük

Sample Name	Location	Trench	Unit Name	Material	Altitude	Coordinates	
						X	Y
IYTE-SMK_rO4	Area A	20/O	Caliche/Virgin S	Homogeneous Soil	698,57	41,30437	37,91676

Table 1.9: Locations and detailed information of XRD analysis of caliche samples under the Sumaki Höyük

Sample name	Phase	Area	Thrench	Altitude	Material	C14 Date CaLBP	C14 Date CaLBC	Lab Name
SIGL_13Z.7	N1	A	21M	700,98	Lime fragment	8123±50 CalBP	6173±50 CalBC	13Z-7/SARIALTUN/K820
SIGL_13Z.13		B	15F	701,50	Lime fragment			13Z-13/SARIALTUN/K820
SIGL_13Z.15		A	20M	701,10	Lime fragment			13Z-15/SARIALTUN/K820
SIGL_13Z.21		B	15G	701,79	Lime fragment			13Z-21/SARIALTUN/K820
SIGL_13Z.24	N2	B	14G	702,18	Lime fragment	8258±44 CalBP	6308±44 CalBC	13Z-24/SARIALTUN/K820
SIGL_13Z.5		B	15F	704,41	Lime fragment			13Z-5/SARIALTUN/K820
SIGL_13Z.6		B	15F	701,35	Lime fragment			13Z-6/SARIALTUN/K820
SIGL_13Z.25		B	15G	701,60	Lime fragment			13Z-25/SARIALTUN/K820
SIGL_13Z.9		A	21M	700,85	Lime fragment			13Z-9/SARIALTUN/K820
SIGL_13Z.3		B	15G	701,56	Lime fragment			13Z-3/SARIALTUN/K820
SIGL_13Z.16	N3	A	21M	700,73	Lime fragment	8395±28 CalBP	6445±28 CalBC	13Z-16/SARIALTUN/K820
SIGL_13Z.20		B	14G	701,94	Lime fragment			13Z-20/SARIALTUN/K820
SIGL_14Z.1		A	20M	700,77	Lime fragment			14Z-1/SARIALTUN/K820
SIGL_13Z.17		A	21M	700,68	Lime fragment			13Z-17/SARIALTUN/K820
SIGL_13Z.12		B	15F	701,27	Lime fragment			13Z-12/SARIALTUN/K820
SIGL_13Z.8	N4	B	14G	701,83	Lime fragment	8436±52 CalBP	6486±52 CalBC	13Z-8/SARIALTUN/K820
SIGL_13Z.10		B	15G	701,23	Lime fragment			13Z-10/SARIALTUN/K820
SIGL_13Z.22		B	14G	71,80	Lime fragment			13Z-22/SARIALTUN/K820
SIGL_13Z.14		A	20M	700,18	Lime fragment		6511±49 CalBC	13Z-14/SARIALTUN/K820
SIGL_13Z.19		B	15G	701,10	Lime fragment			13Z-19/SARIALTUN/K820
SIGL_13Z.2		A	21M	700,51	Lime fragment	8461±49 CalBP		13Z-2/SARIALTUN/K820
SIGL_13Z.23	N5	A	20M	699,93	Lime fragment	8491±50 CalBP	6541±50 CalBC	13Z-23/SARIALTUN/K820
SIGL_14Z.3		B	15G	700,98	Lime fragment			14Z-3/SARIALTUN/K820
SIGL_13Z.18		B	14G	701,67	Lime fragment			13Z-18/SARIALTUN/K820
SIGL_13Z.1		A	21M	700,20	Lime fragment		6576±60 CalBC	13Z-1/SARIALTUN/K820
SIGL_13Z.4		B	15G	700,91	Lime fragment	8526±60 CalBP		13Z-4/SARIALTUN/K820
SIGL_14Z.2	N6	B	15G	700,79	Lime fragment	8594±49 CalBP	6644±49 CalBC	14Z-2/SARIALTUN/K820
SIGL_13Z.11		B	14G	701,53	Lime fragment			13Z-11/SARIALTUN/K820
SIGL_14Z.4		A	21M	700,08	Lime fragment		6758±90 CalBC	14Z-4/SARIALTUN/K820
SIGL_14Z.5		B	14G	701,40	Lime fragment	8708±90 CalBP		14Z-5/SARIALTUN/K820

Table 1.10: Locations and detailed information of Isotope analysis of lime samples from Sumaki Höyük

Sample Name	Phase	Area	Unit Name	Material	Trench	Altitude	Coordinates	
							X	Y
PRI_14FT.02	N2	A	N2B5	Lime fragment	21L	700,18	41,304485	37,917077
PRI_14FT.21			N2B6	Lime fragment	21L-22L	699,84	41,304558	37,917075
PRI_14FT.19		B	N2B11	Lime fragment	13G-14G	700,21	41,303709	37,917405
PRI_14FT.09	N4	A	N4B3	Lime fragment	22L-22M	699,37	41,304673	37,916998
PRI_14FT.17			N4B4	Lime fragment	21M	700,49	41,304386	37,917052
PRI_14FT.06			N4B5	Lime fragment	21L	700,02	41,304496	37,917037
PRI_14FT.12		B	N4B8	Lime fragment	15G	700,28	41,303875	37,917371
PRI_14FT.15			N4B9	Lime fragment	15F-15G	700,80	41,303845	37,917424
PRI_14FT.07	N5	A	N5B1	Lime fragment	21M	699,78	41,304495	37,916989
PRI_14FT.14		B	N5B3	Lime fragment	14G	701,73	41,303698	37,917404
PRI_14FT.04			N5B12	Lime fragment	15H	700,29	41,303881	37,917313
PRI_14FT.11			N5B13	Lime fragment	15H	700,38	41,303902	37,917301
PRI_14FT.20	N6	A	N6B2	Lime fragment	21M	699,75	41,304528	37,916932
PRI_14FT.18			N6B4	Lime fragment	20M	700,34	41,304373	37,916929
PRI_14FT.08			N6B5	Lime fragment	20N	700,52	41,304384	37,916877
PRI_14FT.13			N6B6	Lime fragment	20N	700,58	41,304398	37,916843
PRI_14FT.22		B	N6B9	Lime fragment	14F	701,37	41,303703	37,917449
PRI_14FT.16			N6B10	Lime fragment	14G	701,30	41,303700	37,917426
PRI_14FT.10			N6B13	Lime fragment	15G	700,88	41,303854	37,917373
PRI_14FT.01			N6B15	Lime fragment	15F-15G	700,45	41,303833	37,917450
PRI_14FT.03	N7	B	131	Lime fragment	15G	700,35	41,303820	37,917403
PRI_14FT.05			262	Lime fragment	15H	699,78	41,303823	37,917275

Table 1.11: Locations and detailed information of Phytolite analysis of lime samples from Sumaki Höyük

Sample Name	Phase	Area	Unit Name	Material	Trench	Altitude	Coordinates	
							X	Y
PRI_14P.1	N2	A	78	Lime fragment	20L	699,91	41,304429	37,917041
PRI_14P.7	N4	B	N4B8	Lime fragment	15G	700,20	41,303874	37,917373
PRI_14P.5	N5	B	N5B12	Lime fragment	15H	700,32	41,303881	37,917315
PRI_14P.10			N5B13	Lime fragment	15H	700,35	41,303904	37,917297
PRI_14P.9	N6	A	92	Lime fragment	20/O	700,27	41,304393	37,916794
PRI_14P.6		B	N6B9	Lime fragment	14F	701,30	41,303704	37,917452
PRI_14P.8			N6B10	Lime fragment	14G	701,26	41,303696	37,917427
PRI_14P.2	N7	B	131	Lime fragment	15G	700,35	41,303829	37,917391
PRI_14P.3			262	Lime fragment	15H	699,83	41,303834	37,917276
PRI_14P.4			14G	Lime fragment	14G	701,19	41,303709	37,917381

Table 1.12: Locations and detailed information of Pollen analysis of lime samples from Sumaki Höyük

CEDAD Lab Name	Level	Period	Phase	CEDAD AMS Date	Material	Location	Altitude	Unite Name	Coordinates	
									x	y
LTL15185A	1	Middle Ages	M1	1186 ± 40 AD	charcoal	15H	701,8	Pit	41,30381	37,91733
			M2							
	2	Neolithic	N1	7325 ± 20 BP *						
			N2	7425 ± 20 BP *						
LTL15193A			N3	7584 ± 50 BP	charcoal	20L	700,29	Open Area	41,30438	37,917
LTL15187A			N4	7613 ± 60 BP	charcoal	21M	700,36	Open Area	41,30448	37,91698
LTL15194A				7645 ± 50 BP	charcoal	15G	700,65	N4B9	41,30383	37,91744
LTL14406A				7647 ± 50 BP	charcoal	15G	700,72	N4B10	41,3039	37,91745
LTL15192A			N5	7700 ± 50 BP	charcoal	14G	701,72	N5B3	41,3037	37,91742
LTL14408A				7712 ± 60 BP	charcoal	15H	700,36	N5B12	41,30388	37,91732
LTL15190A				7741 ± 50 BP	charcoal	15G	700,38	N5B11	41,30389	37,91742
LTL15186A				7752 ± 60 BP	charcoal	20L	699,92	Open Area	41,30442	37,91696
LTL14407A			N6	7810 ± 50 BP	charcoal	21M	699,93	Open Area	41,30452	37,91696
LTL15189A				7821 ± 60 BP	charcoal	15G	700,56	Open Area	41,30383	37,91736
LTL15191A				7859 ± 60 BP	charcoal	15H	700,09	Open Area	41,30389	37,9173
LTL15188A				7871 ± 50 BP	charcoal	14G	701,34	Open Area	41,303760	37,91738
LTL14409A			N7	8127 ± 50 BP	charcoal	14G	701,12	Open Area	41,30368	37,9174

Table 1.13: Locations and detailed information of C14 (AMS) dates from Sumaki Höyük

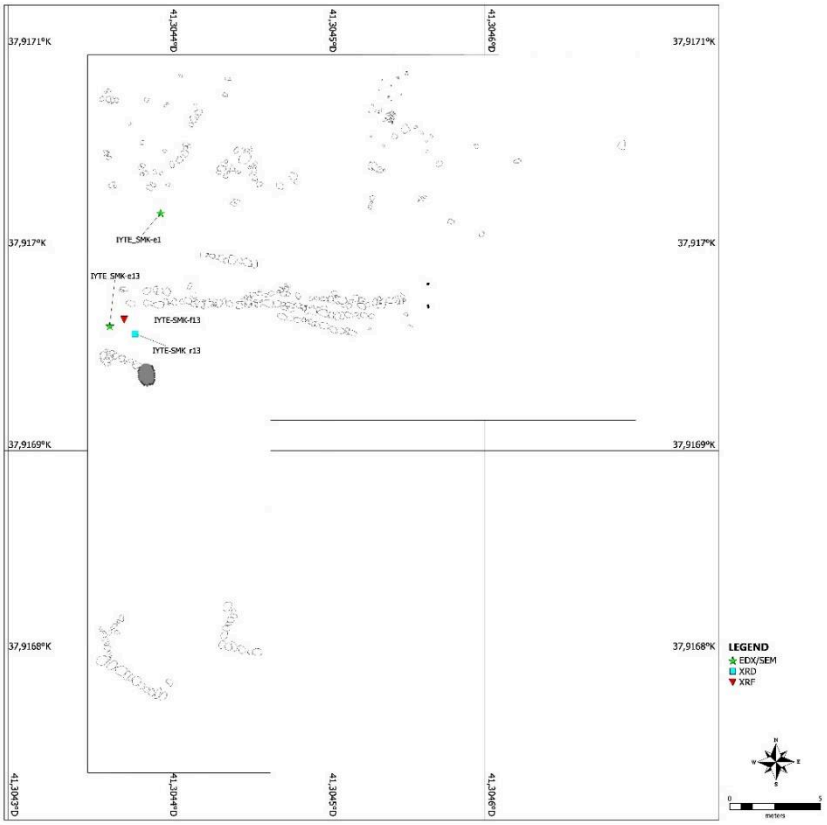


Figure 1.5: Locations of all analysis sample from Phase N1 at the Area A

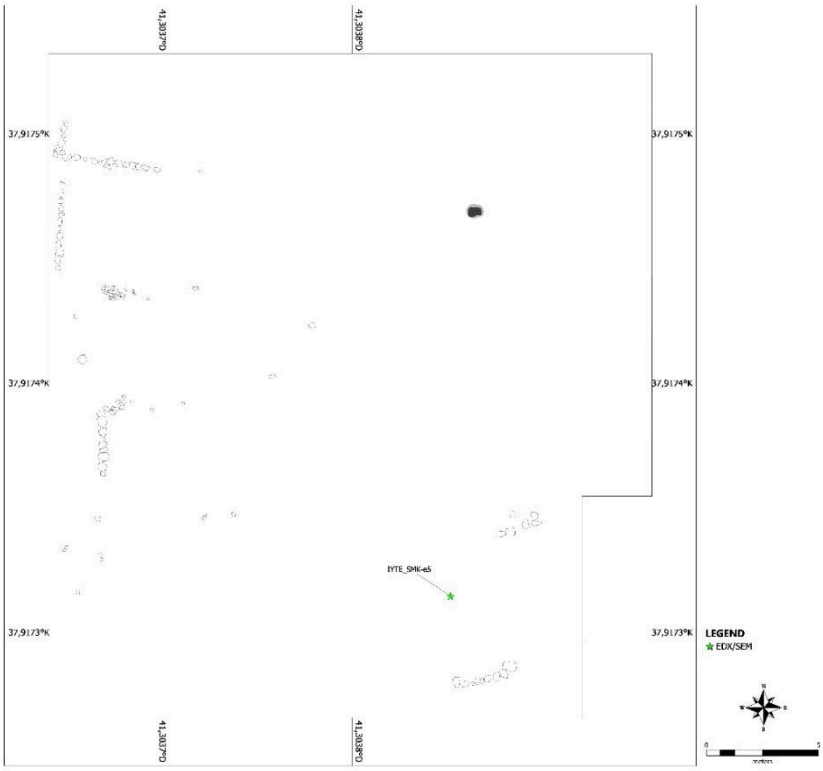


Figure 1.6: Locations of all analysis sample from Phase N1 at the Area B

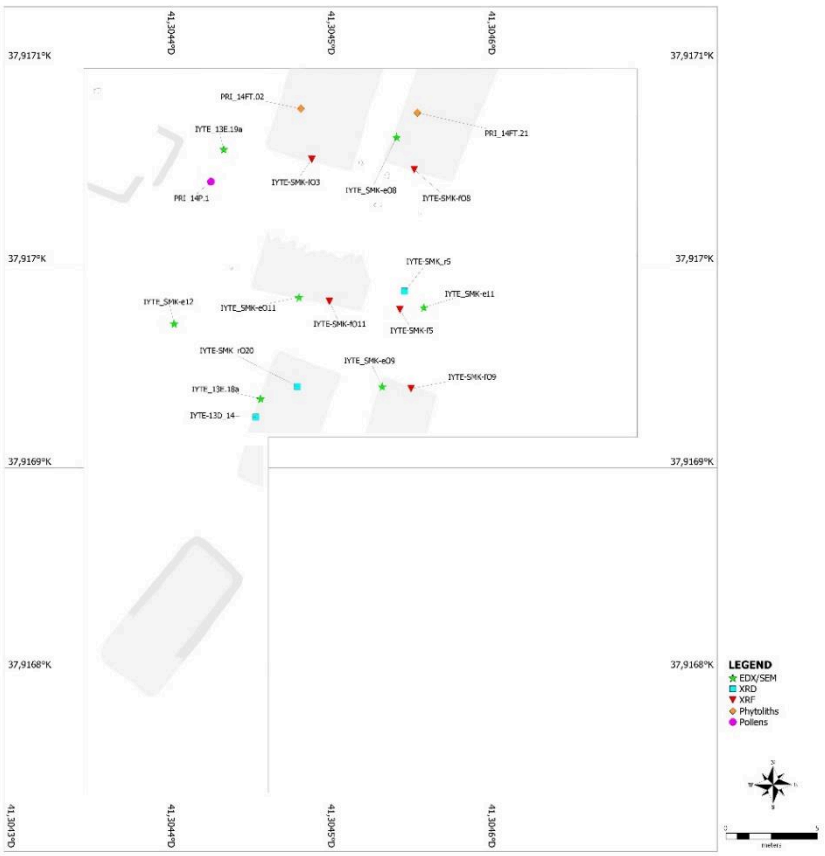


Figure 1.7: Locations of all analysis sample from Phase N2 at the Area A

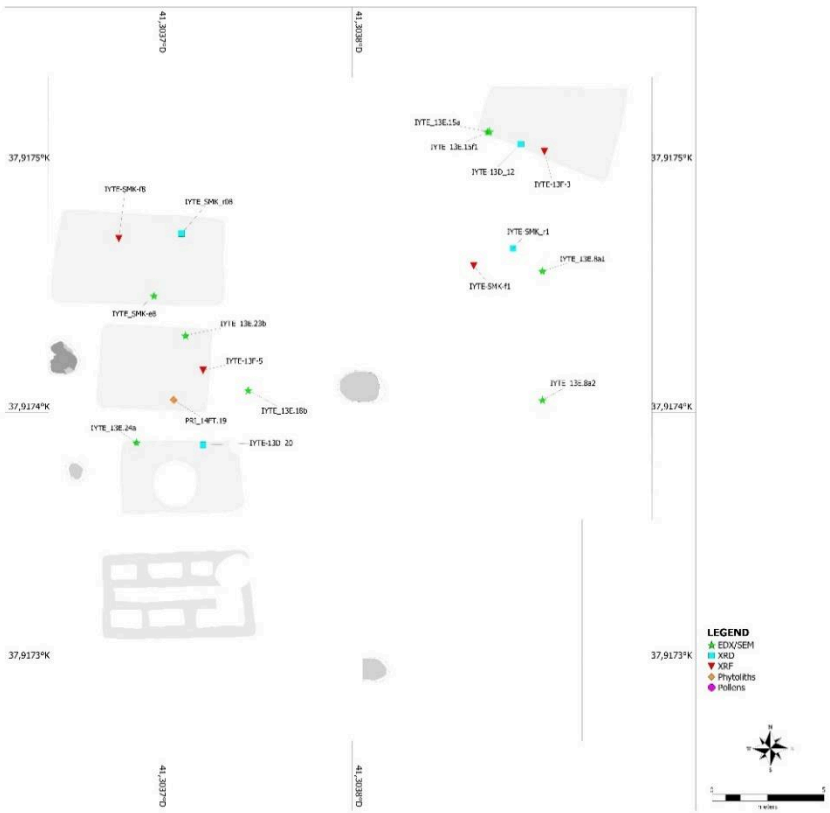


Figure 1.8: Locations of all analysis sample from Phase N2 at the Area B

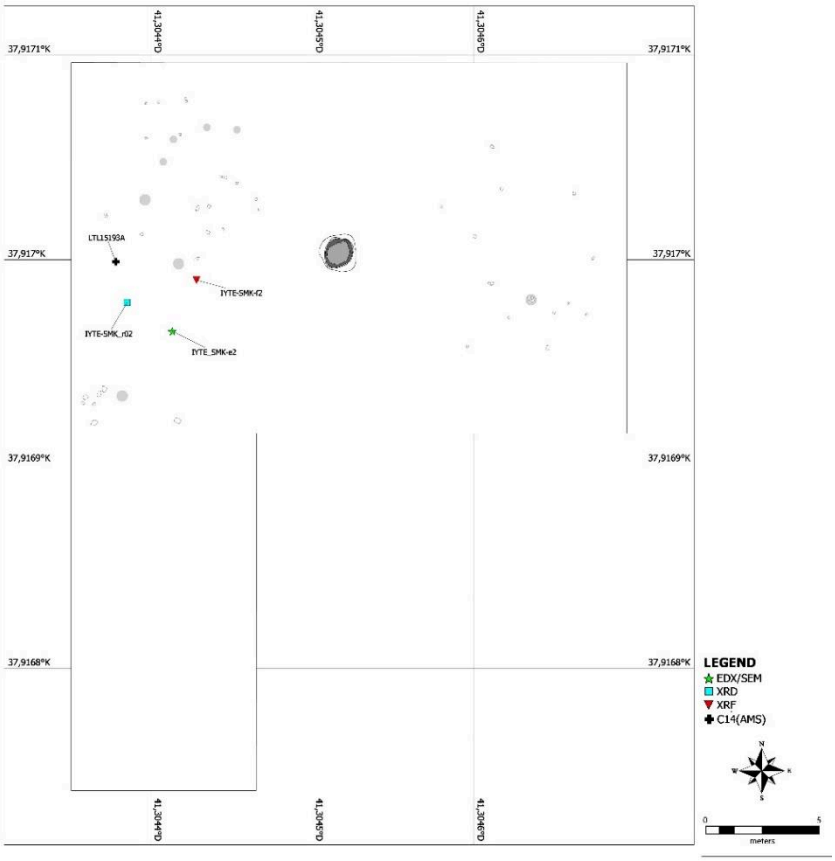


Figure 1.9: Locations of all analysis sample from Phase N3 at the Area A

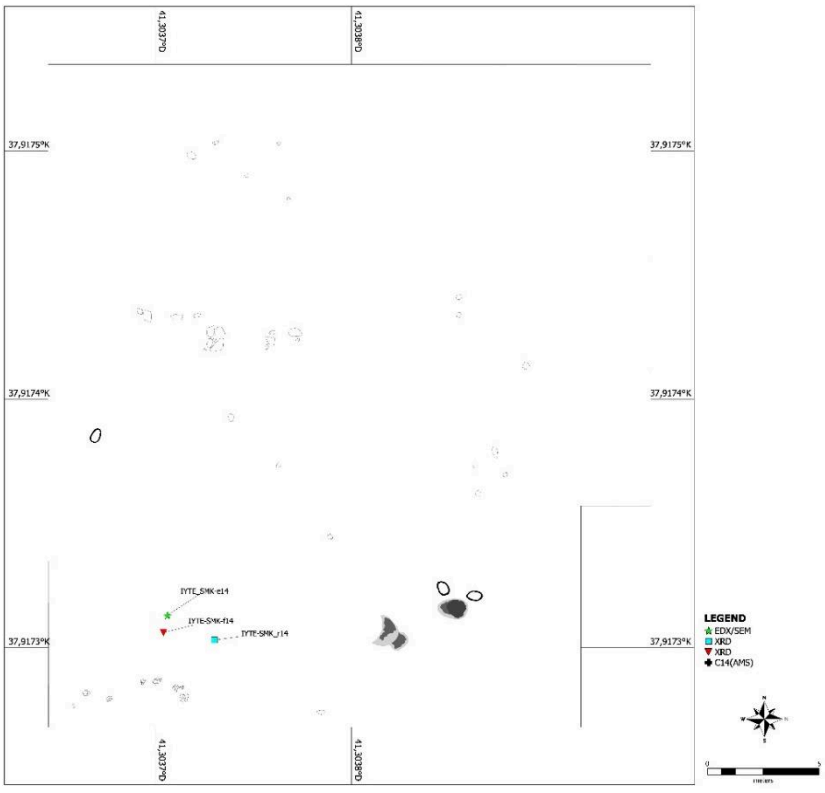


Figure 1.10: Locations of all analysis sample from Phase N3 at the Area B

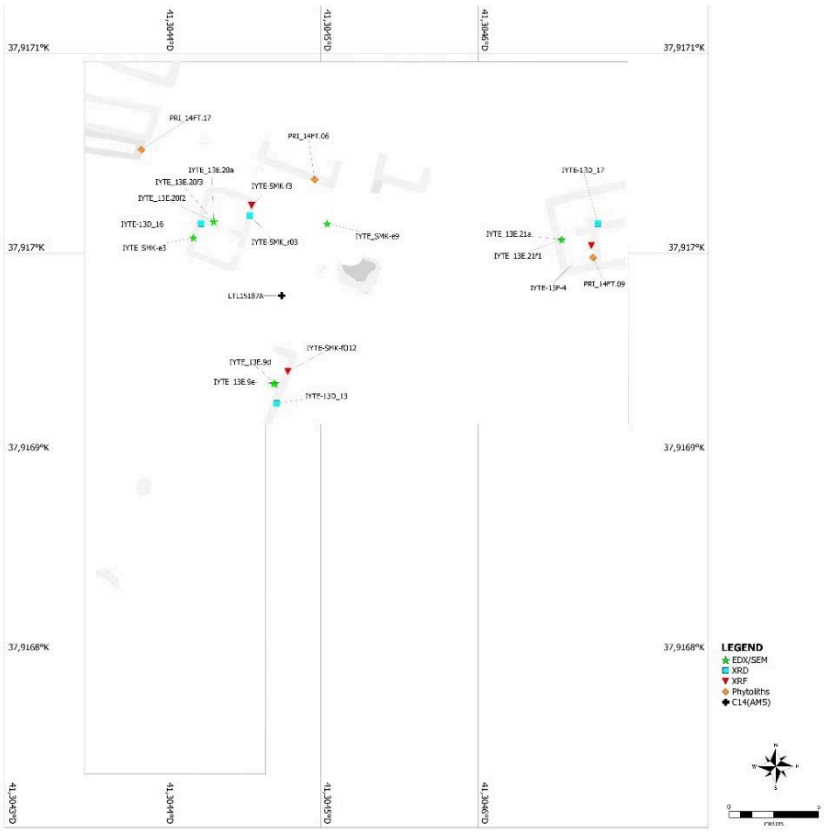


Figure 1.11: Locations of all analysis sample from Phase N4 at the Area A

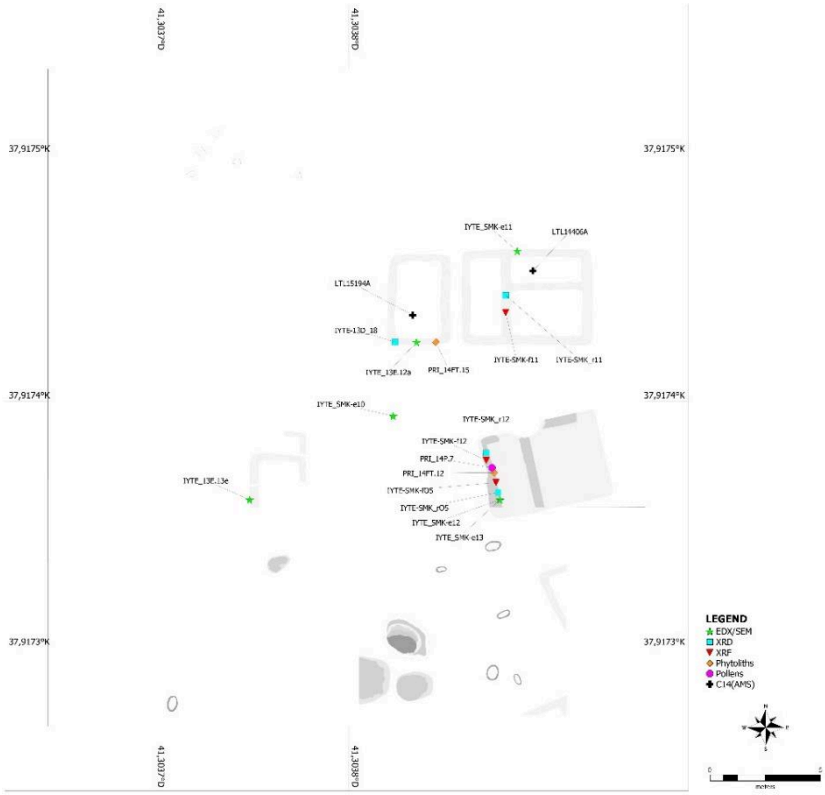


Figure 1.12: Locations of all analysis sample from Phase N4 at the Area B

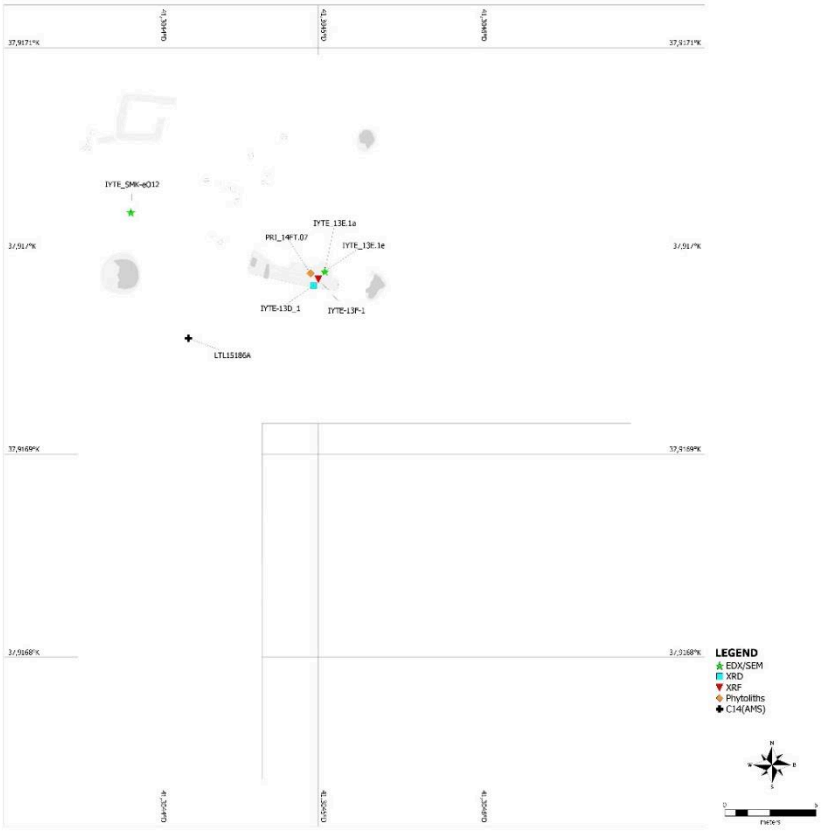


Figure 1.13: Locations of all analysis sample from Phase N5 at the Area A



Figure 1.14: Locations of all analysis sample from Phase N5 at the Area B

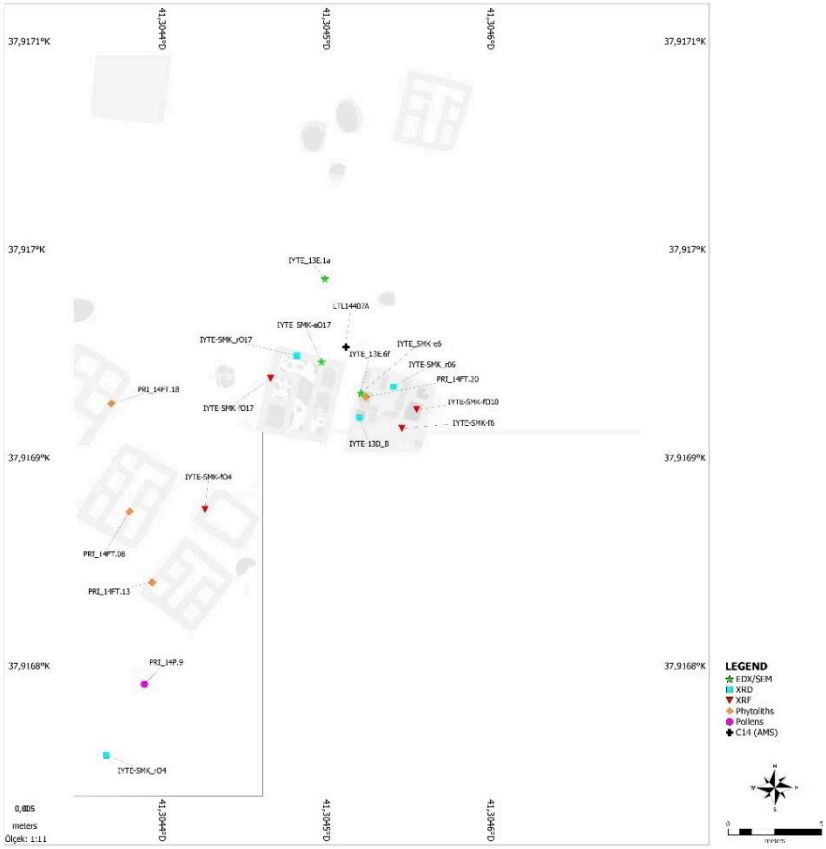


Figure 1.15: Locations of all analysis sample from Phase N6 at the Area A

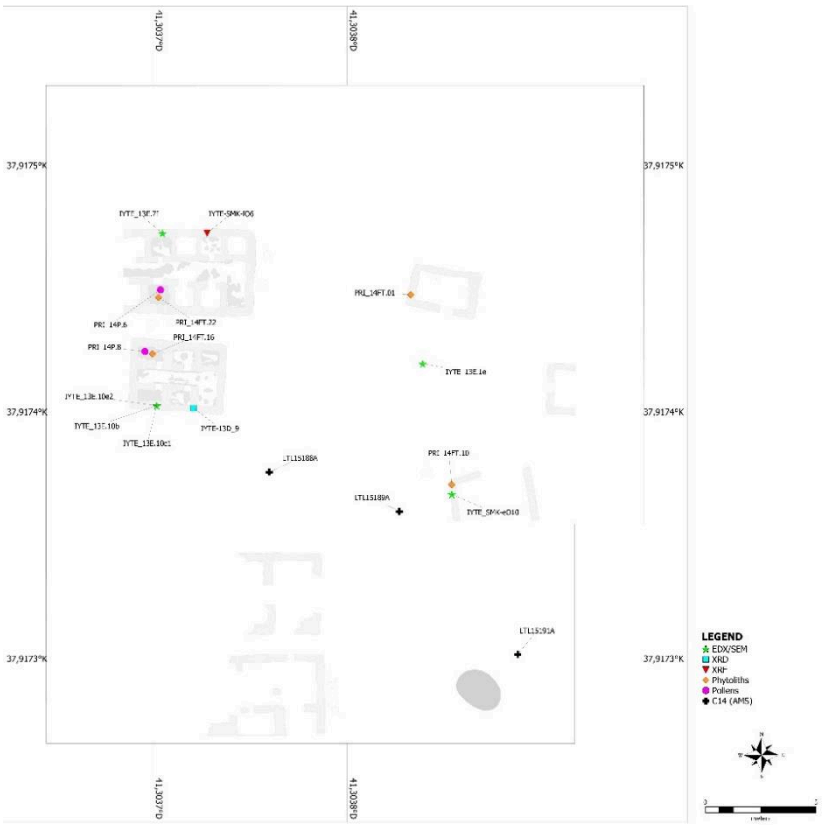


Figure 1.16: Locations of all analysis sample from Phase N6 at the Area B

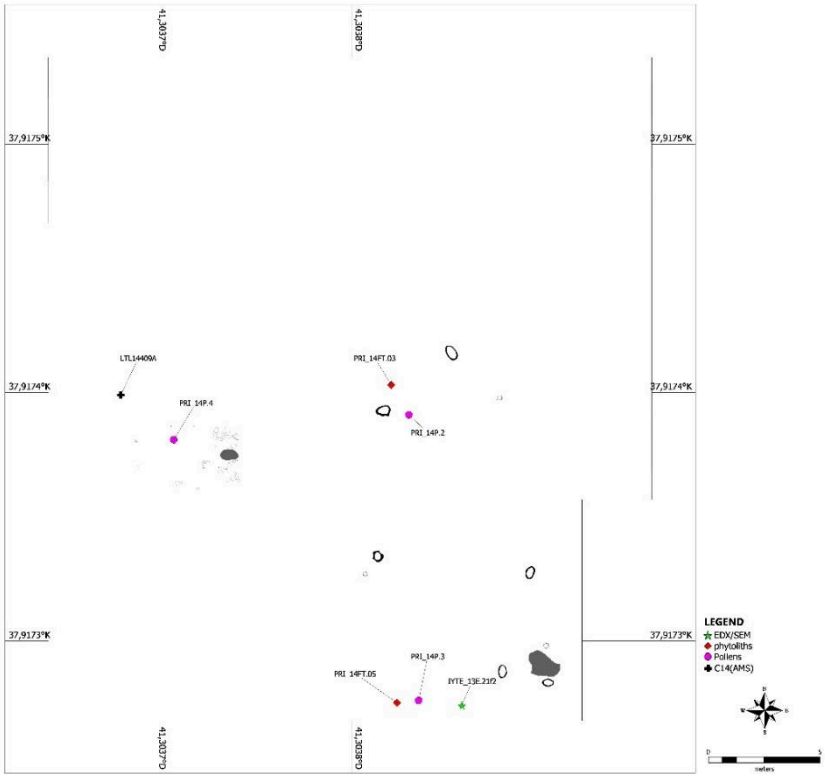


Figure 1.17: Locations of all analysis sample from Phase N7 at the Area B

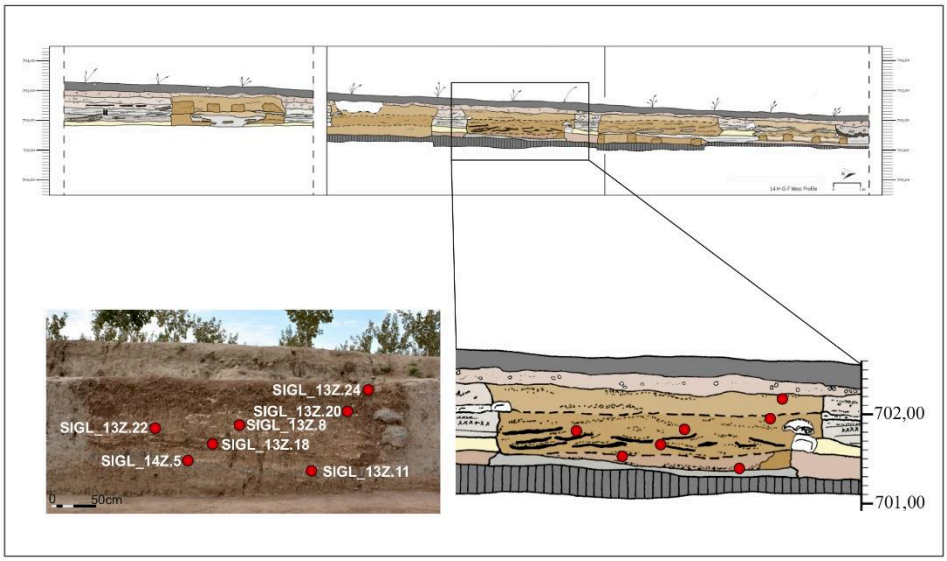


Figure 1.18: Locations of Isotope analysis sample from trench 14G at the Area B

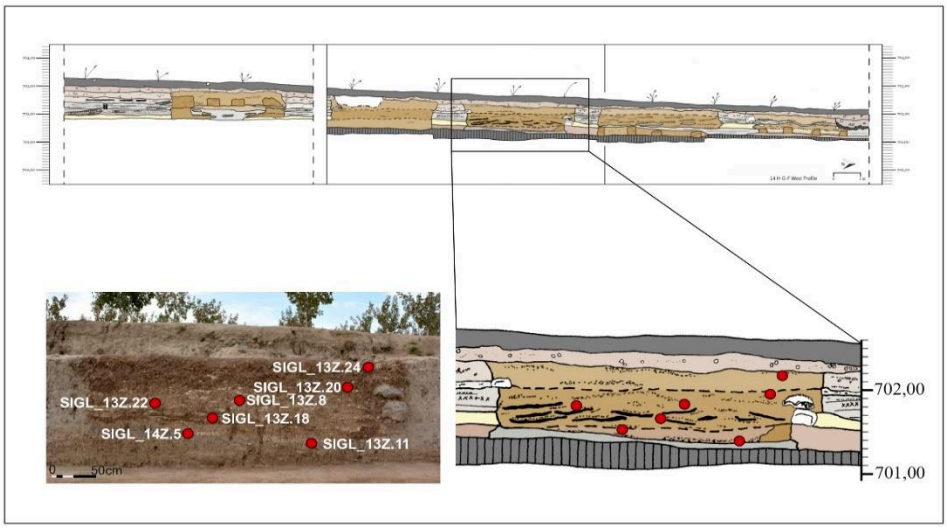


Figure 1.19: Locations of Isotope analysis sample from trench 15G at the Area B

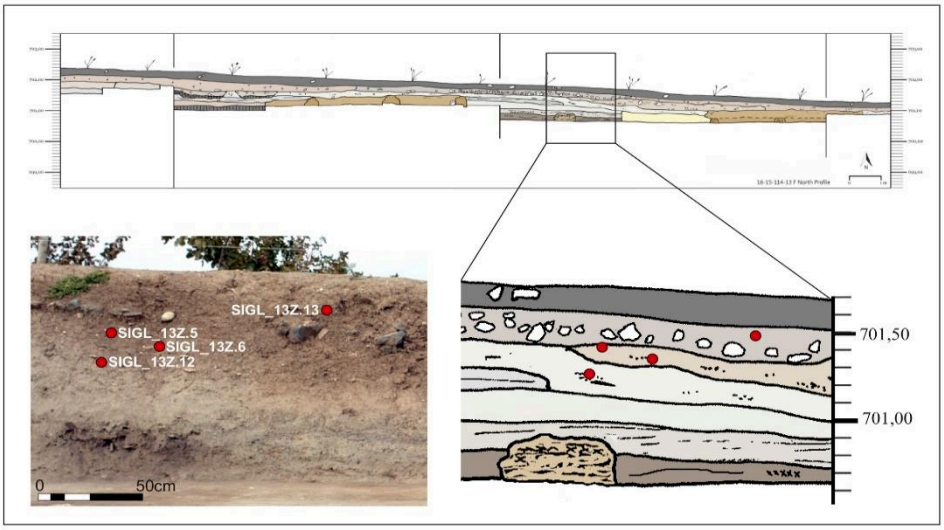


Figure 1.20: Locations of Isotope analysis sample from trench 15F at the Area B

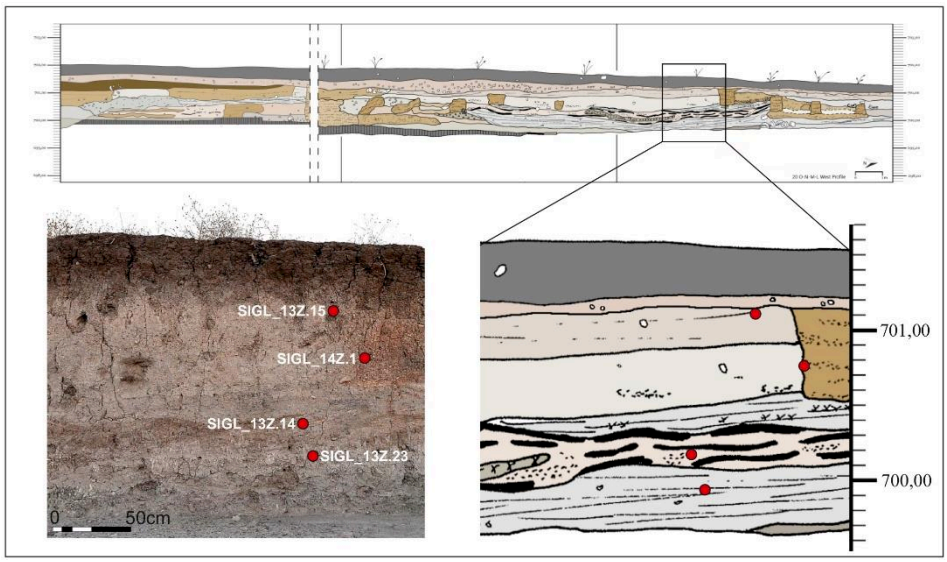


Figure 1.21: Locations of Isotope analysis sample from trench 20M at the Area A

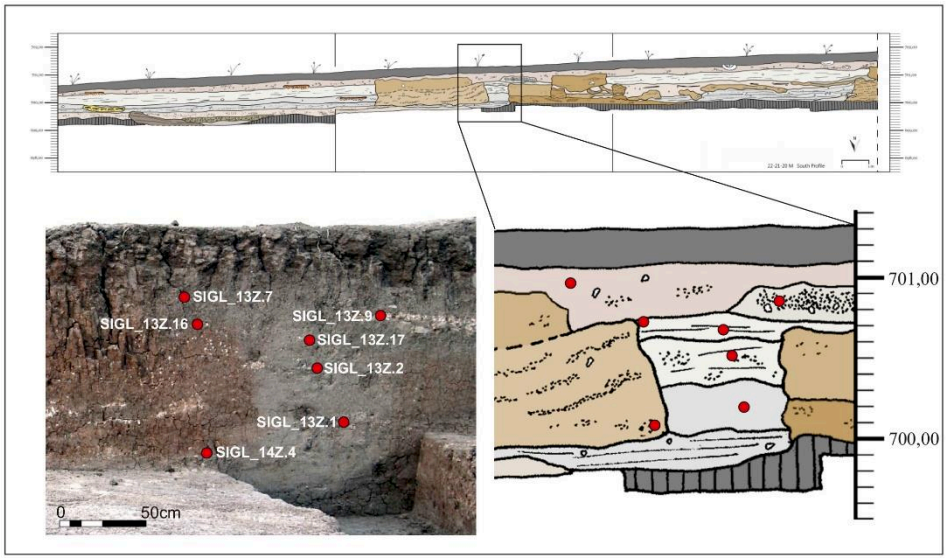


Figure 1.22: Locations of Isotope analysis sample from trench 21M at the Area A

(…).

CHAPTER II
NEOLITHIC ARCHITECTURE AND SOME THEORETICAL APPROACHES

The Neolithic period, bringing a new mode of living, (Özbaşaran, 2013: 1) has had many symbolic and ideological influences on communities. (Watkins, 2011: 30-32) Today, this period that has seen many socio-economic phases within itself also refers to a process that affects the success and problems of later humanity. (Özdoğan & Başgelen, 2007a: VII, IX) The cultural process of the Neolithic period, especially material and cultural items, has progressed quite rapidly. Even then, this new cultural process has not matured in the same direction or time in every region and/or settlement. (Çambel & Braidwood, 1980: 1-2; Bar-Yosef, et al., 1995: 41: Asouti 2006)

The Near Eastern Neolithic Period, dated from 10,000 to 6500 BP (Banning, 1998:188; Kozlowski & Aurenche, 2005: 15), has been classified into two main stages, Pre-Pottery Neolithic (PPN) and Pottery Neolithic (PN), with several sub-units and cultures in terms of technology such as pottery production. These include PPNA, PPNB, PPNC/Final PPNB (Kuijt, 2000: 81; Kuijt & Goring-Morris, 2002: 9; Nishiaki & Le Mière, 2005; Stordeur, 1993) as well as cultural stages such as the Proto-Neolithic, Sultanian, Nemrikian, M'lefaatian and Mureybetian (Kozlowski & Aurenche, 2005: 67-71) for the Pre-Pottery Neolithic Period. It is also used in cultural nomenclatures such as Early PN, Pre-Proto-Hassuna, Proto-Hassuna (Nishiaki & Le Mière, 2005: 55-56), Hassuna, Samarra (Nieuwenhuyse, et al., 2001: 147-148), Yarmukian (Kuijt, 2000: 81), Pre-Halaf and Early Halaf for the Pottery Neolithic Period. Regional names such as Amuq A-B (Helmer, 1989: 111-112) and Balikh IIA-IIIB (Gerritsen, et al., 2008: 245) have also been used.

2.1. Neolithic concept and cultural diversity

The chronological order of archaeological studies was first published in 1816-19 with C.J. Thomsen's "Three Ages System", which is based on technological separation. (Esin, 2004: 24) In his book *Prehistoric Times* (1865) John Lubbock divides the “Stone Age” into two based on technological differences: the Palaeolithic (defined by tools to obtain sharp edges) and the Neolithic (defined by tools made by grinding and burnished techniques to

sharpen). Since that time, the terms Palaeolithic and Neolithic have been widely-used in archaeological terminology. Basically, this distinction, based on the existence of celts in European prehistoric cultures, has led to its long-term evaluation for classification of Neolithic cultures. In other words, the Neolithic Period for Europe is represented by the period between the Mesolithic and the Bronze Ages. This nomenclature, which was used for European prehistoric cultures, was also valid for a long time in other regions. (Özdoğan, 1995b: 269)

Jacques Marie de Morgan identified the earliest tombs discovered in Egypt's Naqada excavations as Neolithic in his book *Recherchessur les origines de l'Egypte : ethnographiepréhistorique et tombeau royal de Négadah*. Although, the Neolithic term began to be used in Near Eastern archaeology, the Near Eastern Neolithic reached up to the mid-20th century compared to the "European Neolithic Period". John Garstang assessed the area considered as the *Holy Land* according to the Three Age System, which is valid in European archaeology. Therefore, the Near Eastern Neolithic Period was expected to carry the same features as its counterpart in Europe, and the presence of the celts, which was predicted to be the key item of this period, was looked for.

The addition of human-environmental relations to the concept of Neolithic, and proposals for the beginning of agriculture, was an important leap in the development of this concept. The American geologist R. Pumpelly (1837-1923) studied the effects of climatic changes on environment. In the Anau region of Turkestan, Neolithic settlements were encountered; thus agriculture, animal husbandry and the beginning of settled life may depend on geographical and climatic conditions. It was assumed that the drought, which was predicted to have occurred at the end of Pleistocene, prompted human communities to search for new nutrients. According to the "Oasis Theory" which suggests that with the diminution of habitable areas due to drought and the disappearance of wild animal herds, humans focused on the wilderness and needed to find new sources to survive; as a consequence, they learned cultivation and took the first step towards the evolution of grains by conscious or unconscious selection. (Bar-Yosef, 1998: 2) With the 'Oasis Theory' proposed by Pumpelly in 1908, the theoretical framework drew attention to the Neolithic concept of archaeologists, anthropologists, sociologists, biologists, zoologists and climate scientists. (Özdoğan, 2004: 45) The Australian archaeologist Gordon Childe interpreted "Neolithic" as an economic revolution reflecting a way of life from the socio-economic point of view, rather from the

concept of a "technological age" defined according to types. Childe referred to "the system of ages" as a cultural development process and describes it as a "lifestyle". He also brought flexibility to cultural history, suggesting that these forms of lifestyle cannot be linked to specific dates because they are not seen everywhere at the same time. Childe describes the stages of cultural development in terms of changes in social life, keeping the theories of social evolutionary stages of savage, primitive, barbaric and civilised, rather than by artifactual typological differences. Childe propounded that the human has an ability to adapt to changing environmental conditions to survive and to change the solutions developed to adapt to nature. (Childe, 1998: 27)

Robert J. Braidwood approached the concept of Neolithic from a different perspective. Braidwood prefers the term ‘Early Farming Communities’, which emphasises the characteristics of the period rather than the Neolithic technological content, defining the development process as “Initial Period of Food Production” and “Developed Village Communities”. Braidwood opposed the role of environmental changes that Childe suggests as the agent in the transition to Neolithic. He considered that environmental changes must have happened not only at the end of the Last Ice Age but also at the end of the previous ice ages. This process is termed "Cultural Readiness", with the conclusion that "food production should be culture, not the active environment". It is suggested that the three basic elements necessary for the Neolithic process to occur are a settled life, agriculture and animal husbandry. He argued that there must be certain conditions for the realisation of these three elements and he developed the theory of the "Natural Habitat Zone". (Braidwood, et al., 1983c: 16) He also defined the area where the transition to food production took as the "Nuclear Zone". (Braidwood, 1995: 15)

Braidwood's geographic area of interest is Southwest Asia, more commonly known as the Near East. Like Childe, Braidwood thought that food production spread from the Near East to Europe. (Braidwood, 1995: 136) Unlike Childe, Braidwood considered that the transition to Neolithic did not occur near the lower basins of large rivers. Braidwood started by identifying places where wild progenitors of the cultivated plants and animals can be found in nature. (Özdoğan, 2004: 46) According to Braidwood, the “Nuclear Zone”, which provides suitable environmental conditions for the transition to food production, is the southern slopes of the Zagros and Southeast Taurus mountains, where wild species of grains, sheep, and goats already existed. This area, which is also suitable for dry farming, is the

northern edge of the Fertile Crescent. Therefore, the foothills of the mountainous region named "Hilly Flanks" are a "Nuclear Zone" for Braidwood. (Braidwood, 1995: 134-136)

As research on the Neolithic Period increased in Anatolia, Mesopotamia and the Levant, different hypotheses on the location of the "Core Area" were suggested. Researchers such as O. Bar-Yosef, O. Henry, and J. Cauvin have proposed the region they identified as the 'Levantine Corridor' as the "Core Area". (Bar-Yosef, 2001: 135, 141) Cauvin also argued for the emergence of the PPNB first occurred in the middle Euphrates, and then "PPNB package" was expanded to North, to eastern Anatolia via migration of middle Euphrates' culture-bearers (Cauvin 2000). In other words, Cauvin has followed the Child's diffusionist paradigm with colonialist mentality. He also claimed that symbolism, especially the symbols of the "female and bull" played main role in Neolithic Revolution, not regarding the development of agricultural economies in cultural phenomenon. However, the Neolithic settlements in different ecological zones of Anatolia, such as sites on the mountain-plain transition zone of Northern Mesopotamia Çayönü and Hallan Çemi, site in the Upper Euphrates basin zone Göbeklitepe, sites in the Upper Tigris zone Körtik Tepe and Hasankeyf Höyük, and sites in the plains of Central Anatolia Aşıklı Höyük and Çatalhöyük, etc. showed the existence of independent neolithization and cultural diversity outside the Levant World, even there are variety in material assemblage in the same zones, In this context, the concept of Neolithic and socio-cultural development is still needed to be discussed.

2.2. Upper Mesopotamian Neolithic in the context of cultural alteration and deterioration

The Neolithic Period, one of the 'critical' era in the prehistoric cultural process, contains many problems. One of these is that the process which began at the end of the PPNB has also been defined as a period of collapse (Kodowaki, 2012: 4; Özdoğan, 2007b: 450; Rollefson, 1989: 135) or degeneration (Bar-Yosef, et al., 1995: 45; Erim-Özdoğan, 2007: 65; Özdoğan, 1997: 35) with a subsequent turnaround. In other words, this time period in PPNB refers to renewal of the economic order, the social structure, the ideological system.

With the beginning of Holocene 12,000 years ago when favourable environmental conditions occurred in the Near East, various communities in different regions created long-lasting permanent habitats. These positive factors increased the size of the settlements and

that resulted in population growth. (Kuijt, 2000: 75; Renfrew & Bahn, 2008: 287; Matthews, 2000: 43-44) With a maturing social structure, common public spaces emerged, defined by the "Plaza", of which the best example is Çayönü settlement. However, specific or public structures, where the initial examples began to show up in PPNA but became apparent in the middle of PPNB, have been identified in many settlements. (Türkcan, 2010: 10; Verhoeven, 2002: 6)

Significant developments are mainly seen in construction technology. In this period, single-roomed subterranean structures of the PPNA were replaced by rectilinear partitioned buildings. One of the significant stages in construction technology was the development of rectangular structures with stone foundations and mudbrick walls. The interior division of buildings, staircases placed at the entrance to structures, (Erim-Özdoğan, 2007: 73), plastered and painted walls, (Kuijt & Goring-Morris, 2002: 150) and similar advanced architectural elements began to be widely used in different regions. However, at the same time, the social order and social organization model based on the settled economy suffered disruptions. (Gebel, 2002: 318) In addition, the 9.2 ka and 8.2 ka events, which caused a serious break in the cycle of climatic change might have played an important role on disruption. For example, archaeobotanical remains from a water well of Atlit Yam – a submerged site on the Coast of Israel – points to colder and more humid climate during PPNC (ca. 8100 - 7500 BP). According to excavation data, ancient sea level of Mediterranean was app. 15-20 m lower than today during PPNB period, and it seems that due to climate change (global warming) the sea level rose rapidly and the well, which is 5.7 m deep and 1.5 m in diameter was not functioned for drinking water and turned to be a garbage pit in the later stage. (Kislev, Hartman & Galili 2004; Galili& Nir 1993) This data clearly shows serious drought.

As a result of all these events and phenomena combined, negative factors for communities in the cultural phase, defined as Late PPNB, Final PPNB or PPNC, began to occur. Sustainability became more difficult with the adverse impact of the environment, population and climate on the cultural structure. Settlements became smaller, were abandoned or had a different character, as well as the the ones on the coastal area were submerged.

The tradition of architectural construction, one of the material cultural elements and also the social order of many LPPNB settlements, began to deteriorate (Erim-Özdoğan, 2007: 81) or a different architectural tradition (Özdoğan, 2007b: 450) emerged.

2.3. Living Areas with concept of space, environment and mobility

The archaeological significance of living quarters is usually based on architectural evidence. Constructions, being tangible cultural items, are also one of the most evident visible remains of past societies. The investigation of space in the architectural context is the most important element for understanding the daily practices of past communities, their social structure and also their organization. (Duru & Özbaşaran, 2014: 124)

In the dynamic relationship between humanity and the environment, both the social order and its structure are shaped. In this process, the objectified space is also a space of production at the same time. (Kurtar, 2013: 3) In this context, structures are a historical accumulation of experience and social preferences rather than a physical area with a purely three-dimensional shape. Therefore, it is necessary to examine not only the geometric and/or technological aspects but also the historical, economic, political, and perceptual viewpoints. Lefebvre evaluates place in three different ways: the first is the perceived space "Spatial Practice", the second is production and technological know-how reflecting "Representation of Space", and the third is symbolizing traditions and culture "Representational Space". (Lefebvre, 1974: 38-39)

The location of structures, the plan and the internal order are shaped according to the needs of the community. The architectural elements such as walls, plaster, floors, interior partitions and hearths reflect the daily life of communities. Further, the location of these items and the construction techniques define the architectural tradition of the community. Ritual behaviours, such as underground burials, also allow us to gain an idea of the beliefs and traditions of the community in question beyond its basic needs.

> *Mekân" ne salt bir soyutlama ve nesne, ne de sadece somut, fiziksel bir şeydir. Bütün boyutları ve biçimleriyle, hem kavram hem de gerçekliktir, yani, toplumsaldır. Bu yüzden, ilişkiler ve biçimler bütünüdür."* (Arslan, 2009: 8)

It is very difficult to identify all traces of daily or short-term individual or collective life in archaeological remains. Perhaps the most important reason is that the possible evidence of daily or seasonal mobility accumulated over time. Mobility is classified in different ways according to the movement of the communities. (Büyükcan-Sayılır, 2012: 566) Where “mobility” is the main determinant data, the duration and quality of this activity are taken into account. From this point of view, communities are described as “nomadic”, “semi-nomadic”, “semi-sedentary” or “sedentary”. The criteria for evaluations based on settlement model and quality are "settlement continuity" and "settlement size". (Kelly, 1992: 44-49) However, it should be noted that the inability to detect mobility is not sufficient to define the community as being “sedentary”. This is also valid in the opposite case. Although the quantity, quality, and strategy of mobilizations vary in different societies and periods, mobility is a way of ensuring that communities have access to more efficient resources. (Halstead & O'Shea, 1989: 3)

2.4. Upper Mesopotamian Neolithic Period

The social system in Upper Mesopotamia, an area of Neolithic formation or maturation having a certain stability over several thousand years, went through radical changes towards the end of the PPNB period. This process of change is expressed by different definitions such as PPNC, late PPNB, Final PPNB, PPN-PN Transition (Hoel, 1997: 41; Kozlowski & Aurenche, 2005: 20; Özdoğan, 2005: 20), Pre-Proto Hassuna, and Post PPNB. (Goldberg & Bar-Yosef, 1989: 73; Maisels, 1993: 80) However, the term PPNC was not fully adopted by all researchers working on the Neolithic Period. In general, Final PPNB is more commonly used for this phase, which emphasises the importance of ongoing elements from the previous phase. (Goring-Morris, 2002: 413)

During the FPPNB period, dated around 9000 CalBP, many settlements in the Near East had become smaller or were abandoned or possessed a different character. (Köhler-Rollefson & Rollefson, 1993: 39) Nevertheless, since there was no mass destruction or violent events in the settlements where a cultural breakdown occurred; on the contrary, it was interpreted as the preference of the communities. (Mellaart, 1975: 67) As a result of the abandonment of sedentary villages in the FPPNB, communities returned to pastoral life. (Verhoeven, 2011: 83) However, socio-economic assessments of this period are still very controversial.

New excavations and research carried out in Neolithic settlements of the Upper Mesopotamia have provided new information. This increase in our knowledge has led to a very different pattern emerging, as well as complementing missing aspects of current knowledge. Thus, in *prehistoric archaeology* of the *Near East* but especially for Upper Mesopotamia, it became necessary to make some changes to long-accepted concepts. Recent studies have revealed new concepts that can be adapted "easily" in defining Upper Mesopotamian Neolithic cultures, e.g. "Mountain Neolithic". (Özdoğan, 2007b: 441) This study participates in the discussions about the cultural mobility process in Upper Mesopotamia and its surroundings between 9000-8000 BC with the architectural data of Sumaki Höyük Neolithic settlement.

2.5. Architecture of Final PPNB to Early PN settlements from Upper Mesopotamia and its vicinity

Under this title, we deal with the stratigraphy and architecture of Neolithic settlements in Upper Mesopotamia and its vicinity contemporaneous to Sumaki Höyük. The settlements were chosen in seven different regions based on their geographical location and culture zone. However, in the choice of settlement, the extent and/or presence of excavations has also been taken into account. Surface survey data have not been specifically addressed since they are not directly linked to our study. Since our thesis is mainly focused on the change in architectural tradition between 9000 and 8000 CalBP, as well as the socio-economic and environmental factors related to this change, only the excavated contemporaneous settlements have been assessed. Accordingly, the regions evaluated are the Upper Tigris Basin, Upper Euphrates Basin, Zagros Mountainous Area and Urmia Region, Jazira and Mosul Region, Khabur and Balikh Basins, Doura Basin, and Rouj Basin. (Figure 2.35) Each region is treated separately under the headings of: architecture of the selected settlements, their stratigraphy, and, if known, details of cultural deposits. (Figure 2.36 – 2.38)

2. 5. 1. Upper Tigris Basin

Despite the fact that the number of settlements excavated in the Upper Tigris Basin has increased significantly in recent years, unfortunately, there are only a handful of

settlements dated between 8000 and 7000 BP. Most of them have Epipalaeolithic and PPNA and/or MPPPB layers.[7] In the Upper Tigris Basin, the FPPNB and EPN periods have only been identified at Sumaki Höyük (Erim-Özdoğan & Sarıaltun, 2018), Çayönü (Erim-Özdoğan, 2011) and Salat Camii Yanı. (Miyake, 2011) (Figure 2.35, 2.36)

2.5.1.1. Çayönü Tepesi

Çayönü Tepesi is located to the north of Diyarbakır city and just north of the Hilar rocks. Today, south of the settlement is Boğazçay Stream and to the north is Bestakot intermittent stream. The Ergani Plain where the settlement is located is surrounded by geographical areas with different characteristics such as the Southeast Taurus Mountains to the north, the Euphrates River to the west, the Tigris River to the east, and a series of mountainous plains cut by these rivers and their tributaries, with the Diyarbakır subsidence basin to the south. (Erim-Özdoğan, 2007: 59-60)

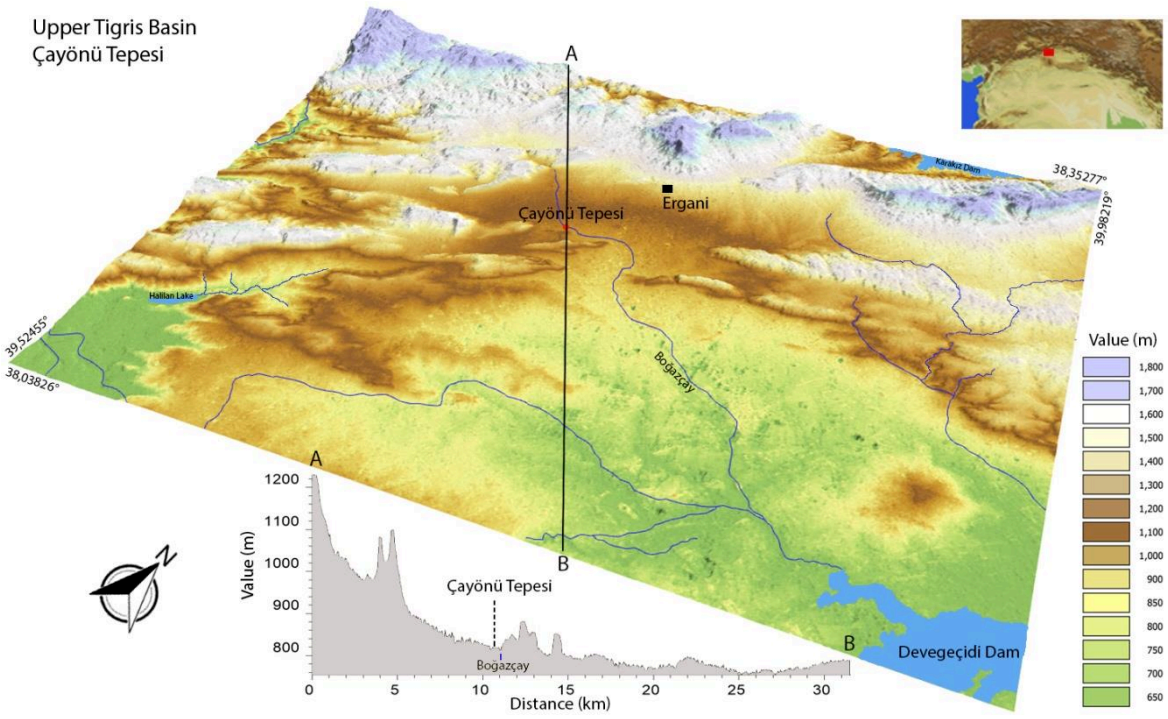


Figure 2.1: 3D DEM and cross-section of the environment of Çayönü Tepesi

The altitude of the settlement is 832 meters. (Figure 2.1) The settlement covers an area of approximately 5.6 hectares and has a culture fill of 4.5 m in the southern part and 6.5

[7] Hasankeyf Höyük (Miyake, et al., 2012); Körtik Tepe (Benz, et al., 2012); Gusir Höyük (Karul, 2011); Hallan Çemi and Demirköy (Rosenberg, 2011a; Rosenberg, 2011b); Çayönü (Erim-Özdoğan, 2011)

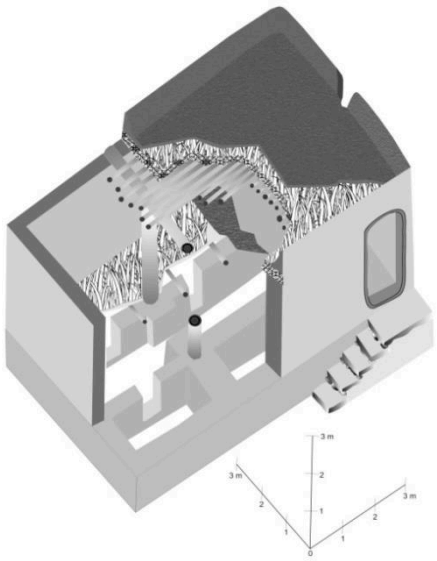
m in the northern part. (Erim-Özdoğan, 2007: 60) At Çayönü Tepesi, the Pre-Pottery Neolithic (Çayönü Main Phase) and Pottery Neolithic, Chalcolithic Period, Early Bronze Age I-III, 2nd Millennium BC and the Iron Age have been defined. (Çambel & Braidwood, 1980: 13, 21-22; Erim-Özdoğan, 2011: 181-189)

One of the most important features distinguishing the Çayönü settlement from other Neolithic settlements is that each phase predominantly has a standardized type of building plan and the building plan was totally changed in the following phase. Therefore, the Çayönü phases are represented by building types and Neolithic phases, but especially the Pre-Pottery Neolithic phases (PPN) are named according to their building types. (Özdoğan, et al., 1994: 106) Çayönü "Main Phase", which is dated to the PPN period, has six subphases. The Pottery Neolithic settlement is located immediately north of the PPN settlement and partially above it. The Pottery Neolithic settlement is divided into two subphases, namely 'Pottery with Kerpiç Architecture (pnk)' and 'Pottery with Stone Architecture (pns)'. Pottery with Kerpiç Architecture Subphase (pnk) was dated to the Middle-Late Neolithic.

The most prominent architectural element of this subphase is the terrace walls built against flooding or torrents. Its architecture consists of interconnected, stone-walled structures. The Pottery with Kerpiç Architecture (pnk) Subphase had been partially disturbed by EBA graves and the Early Iron Age building remains. The thickness of this deposit is about 2.5 meters; however, only a limited part has been excavated. The ashy and dense carbonaceous fillings indicate that perishable construction material was used. (Erim-Özdoğan, 2007: 62)

Within the scope of this study, the architecture of late PPNB such as the Cell Building and Large-Room Building Subphases and the Pottery Neolithic Phases has been described. The Late PPNB period of Çayönü is exemplified by the Cell Building Subphase (c1-3a-b), dated between 9939±161 - 8970±161 CalBP or 7989 ±161 – 7020±161 CalBC. The Large-Room Building Subphas (lr1-3)e, immediately above the Cell Building Subphase is dated between 9273±293 - 8873±137 CalBP or 7323±293 – 6923±137 CalBC.[8] However, the Cell Building Subphase (c1-3a-b) is considered between 8600 to 8300 BP and the Large-Room Building Subphase between 8200 to 8000 BP (Erim-Özdoğan, 2007: 63)

[8] C14 data were taken from the excavation archive.



The Cell Buildings were built with mudbrick walls on stone footings encircling basement floors. (Figure 2.2) It is thought that the main function of the basements constructed by partitioning in different sizes was to protect the living space from floods. None of the cells in the basements have door openings to external area. Therefore, it is foreseen that the basements were entered from multiple openings above. The basement floor, which is opened/closed by a lid on the floor of the main living area, was used for storage and/or graves. (Erim-Özdoğan, 2007: 72-73)

Figure 2.2: Reconstruction model a Cell Building from Çayönü Tepesi

The floors above the basements consist of a single rectangular space and the walls are built with mudbrick blocks. No trace of interior partitioning was detected on the upper floor. According to data from the Çayönü house models and burnt mudbrick fragments with traces of beams in the accumulation of buildings, the cell buildings had flat roofs. The main living quarter raised on stone footings is entered via stone stairs. (Figure Figure 2.3)

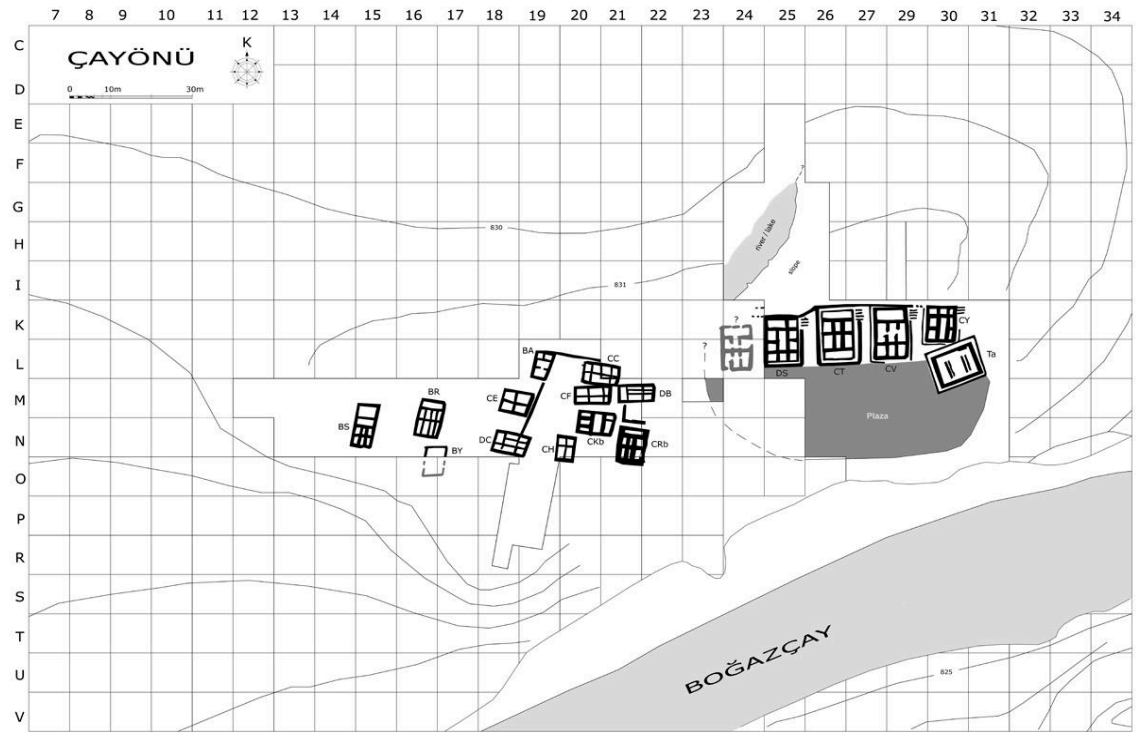


Figure 2.3: Settlement pattern and architecture from Subphase c3

Staircase remains were detected in most of the cell buildings. The layout of the early cell buildings was generally standard, whereas towards the end of this phase, there were some dissimilarities in their plans, such as the number and dimensions of cells as well their construction technique. (Erim-Özdoğan, 2007: 73-74)

From the initial phase of the Cell Building Subphase, due to changes in the water level of the Bestakot Stream, floods occurred which affected the settlement. These floods led to the accumulation of different thicknesses and qualities of filling in almost all parts of the settlement. (Erim-Özdoğan, 2007: 76) These flood events also continued in the Large-Room Building Subphase. Up to the fourth phase (lr4) of this subphase, it is at the forefront of factors that determined the northern boundary of the settlement. It is understood that flood events also continued in the Pottery Neolithic Period, in particular, the presence of multiple terrace walls. The heterogeneous fillings determined locally are more evidence of the continuity of this phenomenon. (Erim-Özdoğan & Yalman, 2004: 69)

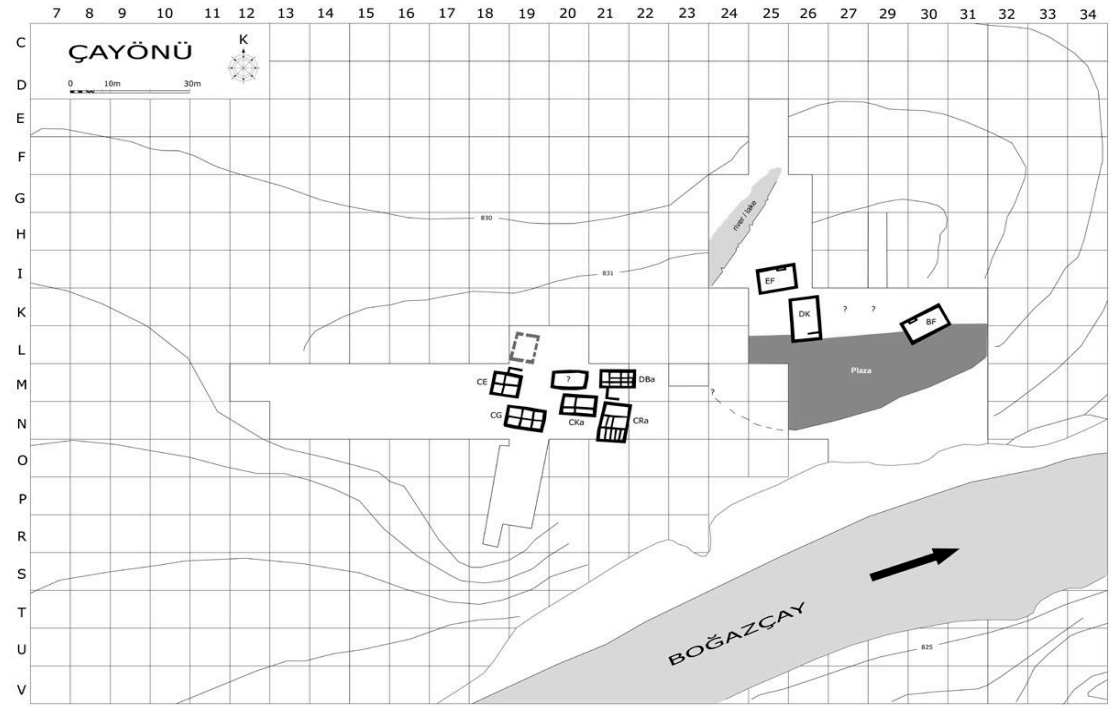


Figure 2.4: Settlement pattern and architecture from Subphases c3b and lr1

In the last phase of the Cell Building Subphase (c3b), important changes were observed in architectural tradition and settlement pattern. Up until this time, the tradition of "burying and abandoning structures" which had been constant at Çayönü settlement ended, and structures were repaired for the first time. Although the tradition of “special buildings” continued with the three rectangular buildings (DK, EA and DT) superimposed on each other

north of the Plaza in the first three phases (lr1-3) of the Large Room Building Subphase, (Figure 2.4) their architectural features such as construction technique and floors or indoor items are not comparable with the previous 'special buildings' of PPNB period

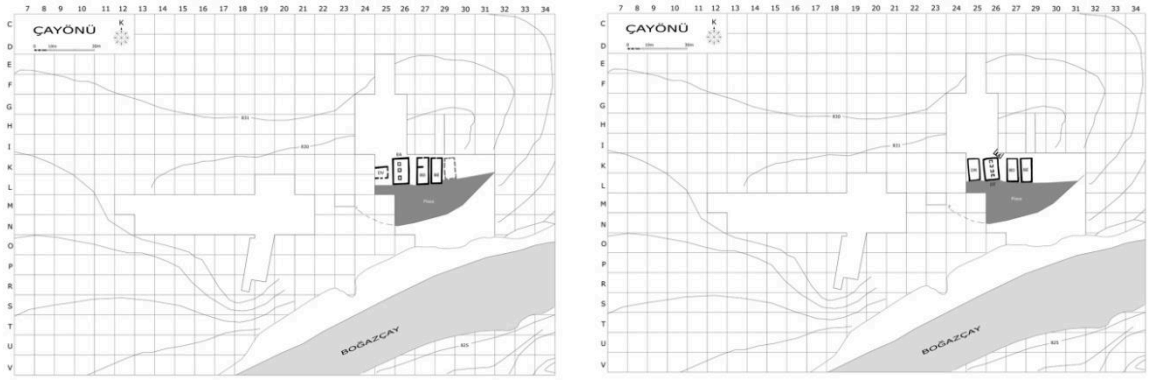


Figure 2.5: Settlement pattern and architecture from Subphases lr3 and lr2

In domestic architecture, the building of two-storey constructions was totally abandoned. (Figure 2.5) The new structures (large room buildings) are rectangular in plan, single-roomed, with rounded corners, and built using a simple stone wall technique. There are no door openings to the structures. It is thought that the entrance to the stone structures was in the interior, similar to stairs of the same height as the walls. In the early examples, mudbrick remnants were found on the stone walls, whereas these were not detected in the following phases. (Erim-Özdoğan, 2007: 79-80)

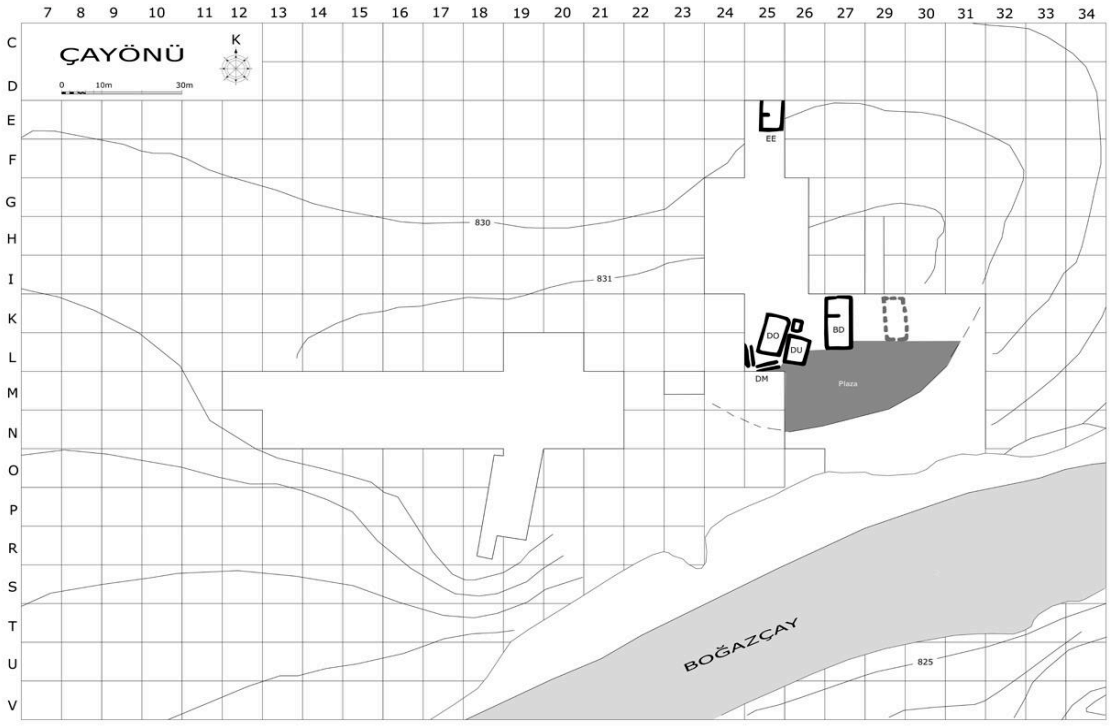


Figure 2.6: Settlement pattern and architecture from Subphases lr4-lr6

The main occupation area of the Large Room Building Subphase is in the eastern part of the site. The random placement of large room buildings disrupted the order of the outer areas. (Figure 2.6) The “Plaza” of the Cell Building Subphase was transformed into a daily use area and later on to a refuse dump. (Erim-Özdoğan, 2007: 79) According to Caneva, a different socio-economic structure similar to “pastoral life” developed. (Caneva, et al., 1998: 203) All these changes in Çayönü settlement have been defined as the "*collapse*" of the PPNB period, based on environmental impacts. (Erim-Özdoğan, 2007: 80-81)

2.5.1.2. Salat Camii Yanı

The Salat Camii Yanı is located on the left terrace of the Salat Stream, a tributary of the Tigris River, (Figure 2.7) and approximately 20 km east of the Bismil district in Diyarbakır Province. (Miyake, 2009: 101)

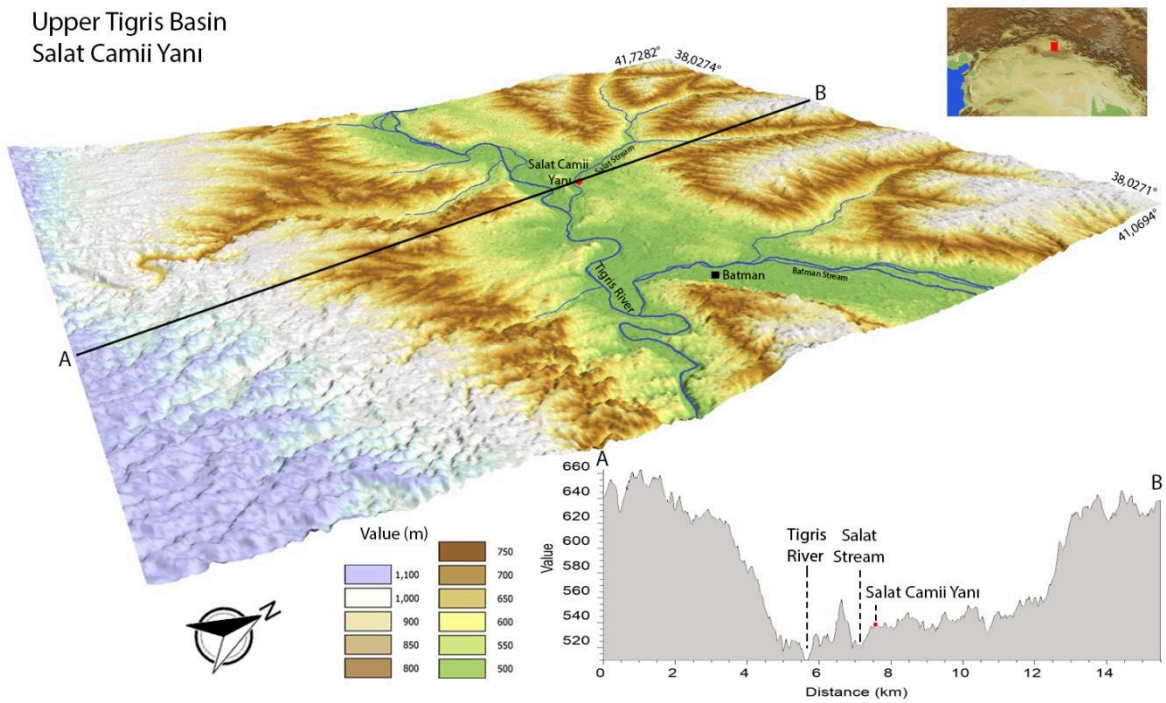


Figure 2.7: 3D DEM and cross-section of the environment of Salat Cami Yanı

It is estimated that the settlement under the modern village covers an area of nearly 2 hectares. The Neolithic layers were disturbed by numerous pits of the Iron Age and Islamic Period. The thickness of the settlement fill is 4.5 meters and the 12 Neolithic layers so far determined are divided into three phases: Phase 1 (Layers 12-8), Phase 2 (Layers 7-3) and Phase 3 (Layers 2-1). (Miyake, 2011: 130) The earliest date was examined 7690±25 BP which has a date 8479±38 CalBP or 6529±38 CalBC. The dates in Phase 2 range from

7690±25 to 7355 ± 25 BP which has a calibrated range from 8479±38 to 8156±38 CalBP or 6529±38 to 6206±38 CalBC. The lates phase (Phase 1) dates range between 7425±35 to 7325±20 which has a calibrated range from 8262±49 to 8123±50 CalBP or 6312±49 to 6173±50 CalBC. [9]

At Phase 1, which defines the earliest period, although there were no structural remains, four stone pavements were determined in different layers. In Layer 12, a pit or depressions were exposed in reddish-brown coloured virgin soil mixed with lime particles. There were flint artefacts and a large number of animal bone fragments on one of the stone pavements. Other stone pavements having a similar character are not well preserved. It is suggested that this area, where only stone pavements were exposed, was an open area or plaza during Phase 1. (Miyake, 2007a: 283) Likewise in Sumaki Höyük, at Salat Camii Yanı, the heterogeneous fills with a lot of stones and disorderly deposited artefacts are directly associated with the floods or overflows. These fills deposited in the collapsed areas of the settlement were interpreted as disturbed stone pavements.

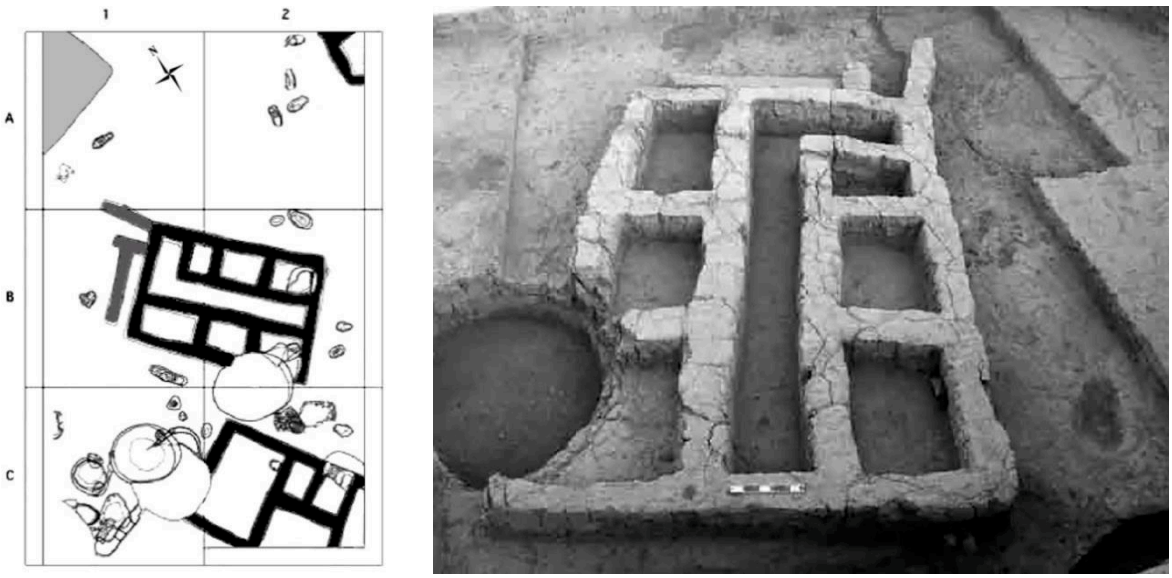


Figure 2.8: Settlement pattern and architecture from Phase 2 (Miyake, 2010a: 444 Çizim 2, 446 Resim 1)

Phase 2 (Layers 7–3) yielded well-preserved architectural structures. Rectangular buildings with pisé walls, oval-shaped hearths, and a subterranean fire pit at a depth of 15 to 20 cm were exposed. (Miyake, 2010a: 437; Miyake, 2010b: 421-422) Buildings with pisé walls on the uppermost layer (Layer 3) of this phase were divided into smaller rooms (cells) with partition walls. The cell buildings without stone footings were built directly on natural

[9] This data was used: http://rcwasia.hass.tsukuba.ac.jp/scy/research/C14.html)

ground. The inner division of the structures consists of a narrow “L” shaped corridor in the middle and three smaller spaces with different sizes on either side of Structure 166. (Figure 2.8) Structure 166 is approximately 5 m long and 3.5 m wide. Two walls were found immediately adjacent to the western edge of this structure, but their relationship with it has not been clearly established. (Miyake, 2007b: 38-40) The structures were deliberately buried with the debris of the walls, and similar constructions were built on top. (Miyake, 2009: 105) Very few materials were found in the rooms. Hearths were also rebuilt on top of each other, like the buildings. (Miyake, 2007b: 38-40) The hearths in the open areas are similar to each other with an average length of 2 m and a width of 1 to 1.5 m. Their edges are low. The parts where edges are not present are thought to be their mouth. The floors of the hearths were laid on stone pavements. (Miyake, 2010a: 439) In Layers 2 and 1 of Phase 3, there are no architectural features since their deposits had already been removed at that time. (Miyake, 2011: 132)

2.5.2. Upper Euphrates Basin

Located in the mountain-plain transition zone of Upper Mesopotamia, this region represents the Upper Basin of the Euphrates River, which separates the Gaziantep and Şanlıurfa plateaus. Suruç Plain lies to the east and the Southeast Taurus mountains to the north of this area. South of the area is bounded by the Sajur Stream basin, north of the area where the Euphrates River turns eastward, making an arc. Here, the settlements of Mezraa-Teleilat, Akarçay Tepe and Gritille are discussed. (Figure 2.35, 2.36)

2.5.2.1. Mezraa Teleilat

Mezraa Teleilat is located about 500 m southeast of Mezraa town in Birecik district. (Figure 2.9) The settlement lies on the eastern terrace of the Euphrates, on a wide alluvial plain surrounded by calcareous ridges. (Karul, et al., 2001: 136) Mezraa Teleilat, with an altitude of 347 m, covers an area of approximately 8 hectares.

The settlement, with a five meter-thick deposit, has five phases. Phase I is dated to the Iron Age, and between Phases II to V are Neolithic. Phase V dates to the Middle PPNB, Phase IV is Late PPNB, Phase III is PPN-PN transition, and Phase II belongs to the PN

period. (Özdoğan, 2007c; Özdoğan, et al., 2011: 35) The dates of Mezraa Teleilat in Phase III range from 8021±55 to 7977 ± 54 BP which has a calibrated range from 8887±100 to 8844±110 CalBP or 6937±100 to 6894±110 CalBC while, Phase II dates range between 7849±61 to 7746±61 which has a calibrated range from 8685±96 to 8522±50 CalBP or 6735±96 to 6572±50 CalBC. And the Phase IV date is 9324±59 BP (10531±90CalBP or 8581±90CalBC) which was represented by a single date. (Özdoğan, 2007c: 199)

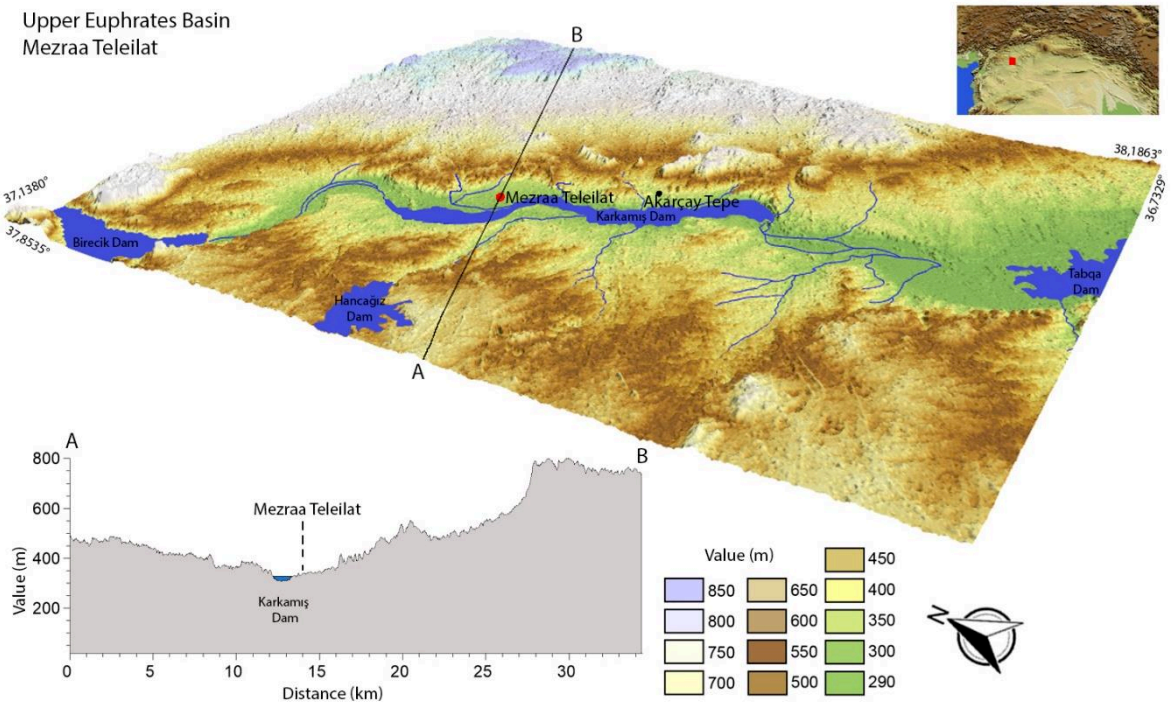


Figure 2.9: 3D DEM and cross-section of the environment of Mezraa Teleilat

The stratigraphy at Mezraa Teleilat continued uninterrupted from the Pre-Pottery Neolithic to the end of the Pottery Neolithic Period. The settlement, which was abandoned for a certain period in the Halaf time, was reoccupied at the beginning of the Iron Age. This second occupation, belonging to the New Assyrian Period, has a monumental palace or temple complex. The final settlement was during the Persian-Akhamenid Period, where limited architectural remains have been identified. (Karul, et al., 2004: 57-63)

In Phase V there is no architecture or remains. The only data that reveals the existence of this phase is the typology of the flint artefacts. The Phase IV, Late Pre-Pottery Neolithic B (LPPNB) period, which was recovered over a limited area, has a minimum of three architectural layers. The architectural tradition of this phase is the cell-plan building with non-standard internal divisions. The structures have mudbrick walls without stone footings in the earliest layer while stone footings started to be used in the succeeding layer. In Phase

IV, quantitive and qualitive features of the artefactual assemblage indicate that the PPNB settlement of Mezraa Teleilat also experienced a cultural breakthrough or change. (Özdoğan, 2007c: 190)

In Phase III, which is called the Pre-Pottery Neolithic to Pottery Neolithic Transition (PPNC), there was a different architectural tradition. This phase reflects a cultural sequence with different architectural traditions in both the preceding and succeeding layers, with constructions of perishable material and ashy layers. It has two subphases: IIIA and IIIB. In Phase IIIB, there are many oval-shaped hearths with stone pavements under their bases, and many post-holes. The superstructure of the constructions is thought to be made of organic materials such as twigs or reeds and supported by wooden posts. (Özdoğan, 2007c: 191-192)

Phase IIIA is the continuation of Phase IIIB. Except for traces of perishable material, there is no permanent structure. Many stones were found scattered in the ashy areas. (Özdoğan, 2007c: 192 Fig.11, 13) The most distinctive feature that separates this phase from Phase IIIB is the presence of a small number of pottery sherds: Dark Faced Burnish Ware (DFBW). (Özdoğan, 2007c: 193) It is not clear how this phase ended. (Özdoğan, 2011: 210)

Phase IIC, representing the earliest Pottery Neolithic Period, is divided into three subphases as IIC3 to IIC1. However, the 2007 excavations revealed the existence of a phase named IID between phases IIIA and IIC. (Karul, 2011: 261-262) The structure of Phase IIC, with stone footings, has rectangular cells on either side of a long wide corridor in the middle. The structures were deliberately filled in. The most significant feature of the similarly-planned structure immediately beneath this one is its kerpiç or pise walls. One of its rooms has been filled with pebbles. (Karul, 2011: 261-262 Fig.3-4)

Generally, the architecture of Phase IIC is rectangular with dimensions of 7.25x5 m. The structures are divided into three longitudinal sections; two long rooms in the middle and small cellular sections in the narrow front. Considering the narrowness of the interior spaces, it is suggested that these parts could either be the basement or foundations. The constructions are positioned in the same direction, leaving wide openings between them. Because of the lack of items that reflect daily use such as fireplaces or workshop areas, it is thought that these activities took place in open spaces. (Özdoğan, 2007c: 195) All the rooms were deliberately filled with stones. The stone vessels within Structure AB have been interpreted as a "death gift" of the building. In the case of Phase IIC3, which is defined as Proto-Hassuna, plant-tempered coarse ware first appears. (Özdoğan, 2011: 210, 212) According to the 2007

excavations, structures with corridors should be considered as Phase IID. It is also worth noting that the 2 m-thick deposit of Phase IID might have two subphases: IID1 and IID2. (Karul, 2011: 262)

Phase IIB of the Hassuna Period of Phase II has three subphases (IIB3 to 1). In Phase IIB, a completely different tradition emerges compared to the architecture and settlement pattern of the previous phase. The constructions, which are separated from each other by a narrow space in Subphase IIB3, encircled an open space. (Özdoğan, 2011: 213) The kerpiç walls on the stone foundations of the "Cell Buildings", the number and size of small rooms (cells) with square plans, are different in every structure. There is no standard size. Some of the hearths in the open space are adjacent to the outer wall of the structures. (Özdoğan, 2007c: 197) While there is no significant change in the plan of buildings in Subsphase IIB2, some of them have been enlarged by means of extensions. (Özdoğan, 2011: 213, 214)

2.5.2.2. Akarçay Tepe

Akarçay Tepe is located just to the west of Akarçay village in the Birecik district of Şanlıurfa. The settlement lies on an alluvial flat terrace on the eastern bank of the Euphrates River, next to Su Stream. The Neolithic settlement, which is 357 meters above sea level, covers an area of approximately 5 hectares. (Figure 2.10)

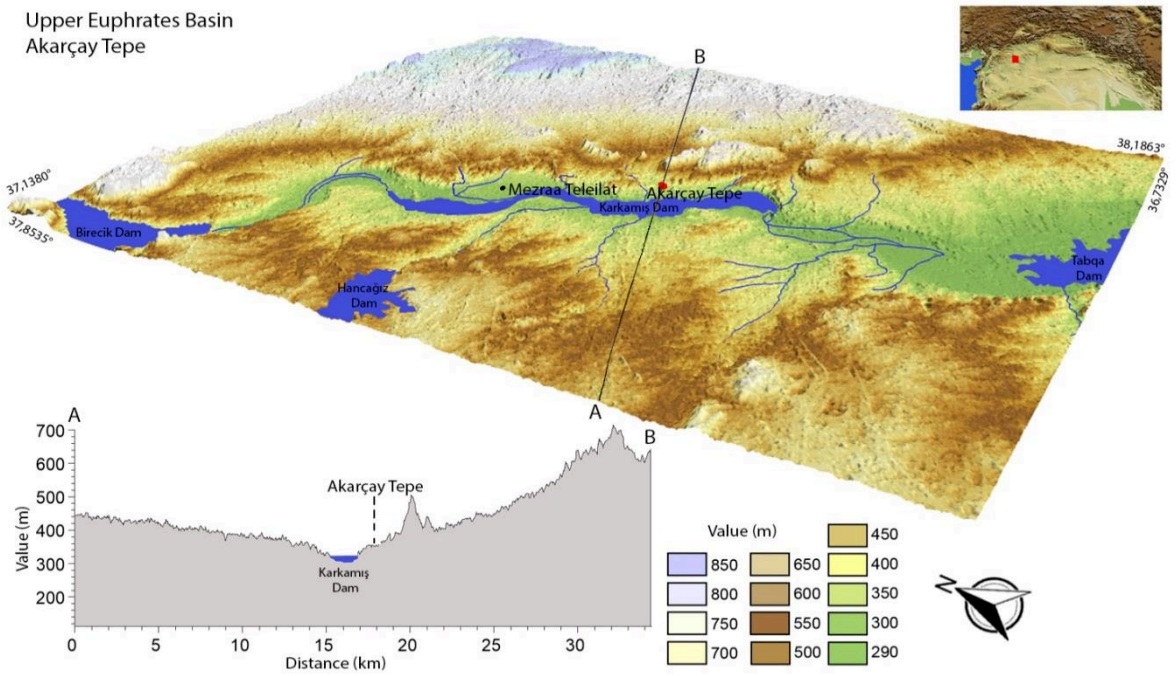


Figure 2.10: 3D DEM and cross-section of the environment of Akarçay Tepe

Akarçay Tepe consists of two adjacent hills. Pre-Pottery Neolithic Period layers are exposed on both hills. Pottery Neolithic Period is only found on the western hill. During the excavations, pottery sherds dating to the Ubeid Period and Early Bronze Age were found in a pit. (Özbaşaran & Duru, 2011: 167)

According to architectural construction and type of building, and also characteristics of the finds, the settlement stratification is as follows: Layer 11-9 Middle PPNB; Layer 8-7 Late PPNB; and Layer 6 defines the Final PPNB period. The layer 5-1 has been dated to the Pottery Neolithic Period. (Özbaşaran & Molist, 2007: 180-183) From the Layer 6 to Layer 1 of this settlement is dated to between 8750±40 and 7280±59 BP which has a calibrated range from 9752±93 to 8097±61 CalBP or 7802±93 to 6147±61 CalBC. (Arimura, et al., 2001: 181; Duru, 2013:340 Tablo 10)



Figure 2.11: Settlement pattern and architecture of Akarçay Tepe (Duru, 2013:339 Şekil 20)

Layers 8 and 7 are the most extensively-exposed layers. (Özbaşaran & Duru, 2011: 169 Fig.10-11) Structures having different plans and construction materials are single-roomed or cell-planned. They have either stone walls or kerpiç walls with stone footings. A single-roomed structure which is called “Structure C" is located in the middle of the open space where is surrounded by other structures. This structure has two renewal phases. The door opening on its west wall of the first (old) phase was blocked in the second renovation.

(Özbaşaran & Duru, 2011: 169, Fig.12-13) In addition, Structures R, T, and G of the same layer are either multi-roomed buildings with different divisions or ones with a "T-shaped" corridor. (Figure 2.11) These structures surround a central open space where various pits, fire pits, and ashy areas were discovered. (Özbaşaran & Molist, 2007: 180-181)

Structure T has kerpiç walls on stone footings. It has a wider room in the middle with smaller rooms (cells) on either wing. It experienced two renewal phases and some of the floors of the rooms and its walls have been plastered. (Özbaşaran & Duru, 2011: 169-170) The structure R with a “T shaped” corridor has a high stone footing. The floors of totally empty rooms were not plastered; however, a very hard compact earthen level has been accepted as a living surface. (Özbaşaran & Duru, 2011: 170)

The only structure uncovered in Layer 6 is the cell-planned building called Structure K. It is similar to the cell buildings of the previous phase in terms of building material and construction technique but its interior divisions are different. This building has three rows of cells on the east-west side and three rows of cells on the north-south side. (Özbaşaran & Molist, 2007: 180) Another special feature of this structure is the existence of different artefacts in the rooms. It is suggested that the cells were for storage and the second floor was for living. (Özbaşaran & Molist, 2007: 181-182; Özbaşaran & Duru, 2011: 171)

Since the structure plans and the artefactual assemblage of Layer 5 do not differ from those of Layer 6, the presence of the earliest pottery fragments dated the layer to the Pre-Pottery Neolithic-Pottery Neolithic Transition Period (PPN-PN transition). (Özbaşaran & Duru, 2011: 171-172) Pottery sherds were found both inside and outside Structures BA and BB. It is believed that the pottery items recovered in this period, which was dated to the end of the PPNB, were imports. (Özbaşaran & Duru, 2011: 173) It is stated that the western part of Cell-Planned Structure BA had already been destroyed in prehistoric times, and here there is a slight inclination in natural topography. Hard, compact earth mixed with tiny pebbles is exposed in the outer space of Structure BA. In this hard fill were found animal bones, flint and obsidian fragments, and the earliest pottery sherds, called "Black Series" in the terminology of Akarçay Tepe. (Özbaşaran & Molist, 2007: 182) Pits, fire pits, ashy areas, post-holes, well plastered hearths or ovens, and platforms were recovered in the open areas. (Özbaşaran & Duru, 2011: 172)

In the Pottery Neolithic Period, the settlement shifted westward. Layers 1-5 of Phases II and I are predominantly exposed in trenches 18-19/F-G and 19-20/K-L. Structure AA covers an area of 12 m^2. On its western part there is a circular structure with two buttress-like projections and two post-holes. Its western part has not been excavated and its southern part was disturbed. (Özbaşaran & Duru, 2011: 173 Fig.22)

2.5.2.3. Gritille

Gritille, which has been totally flooded by the Atatürk Dam, (Figure 2.12) is located in the Samsat district of Adıyaman Province. (Voigt & Ellis, 1981: 87; Voigt, 1988: 215) Situated on the western bank of the Euphrates, the settlement covers an area of approximately 1.5 hectares, and layers from the Neolithic Period, Early Bronze Age, Middle Ages and Ottoman periods have been identified. (Voigt & Ellis, 1981: 89-91)

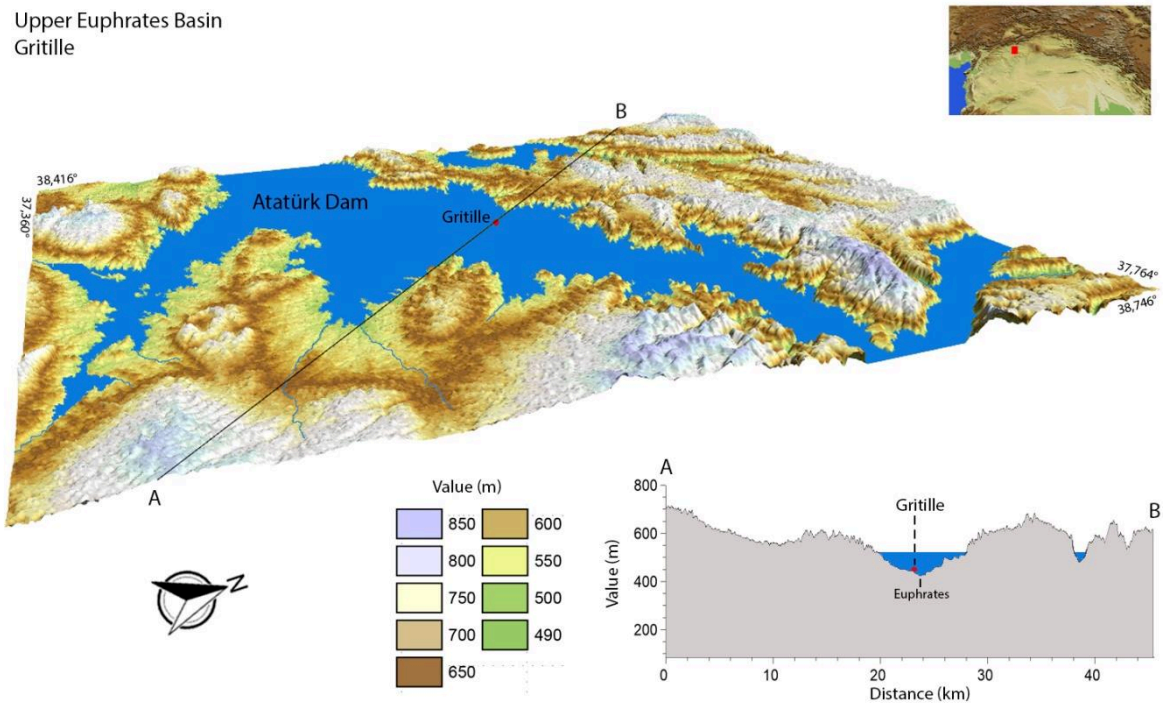


Figure 2.12: 3D DEM and cross-section of the environment of Gritille

The Neolithic layers of about 4 m in thickness are divided into two main phases according to their features: Upper Neolithic Gritille (Phases A and B) and Lower Neolithic Gritille (Phases C, D and Basal). The "Basal Phase", which rests immediately above the virgin soil, represents the oldest Neolithic Period at Gritille. (Voigt, 1988: 220) The very hard erosional surface between Phases C and B clearly distinguishes the early and late stages

of the Neolithic Period. (Miller, 1999: 1; Voigt, 1988: 219) This Neolithic settlement was occupied between 8960 and 7770±150 BP. (Ellis & Voigt, 1982: 319; Ellis, 1983: 118; Ellis, 1984: 68) “Lower Neolithic Gritille” is dated between 8960 and 8075 BP, while “Upper Neolithic Gritille” is dated between 8075 and 7770±150 BP. (Voigt, 1988: 217)

The remains of Phase A, which is the uppermost phase of Neolithic Gritille, have been documented in a very limited area because of serious disturbance of the EBA levels. In this phase were recovered pits, burnt stones, and numerous flint tools and debris. Phase A is separated by fine white matter from Phase B. Although not chemically analysed, it is thought that this powdered lime-like material may be associated with burnt lime fragments in the deep pit in Operation 16. (Voigt, 1988: 219)

Remains of buildings with a clear layout have been recovered in Phase B. Three adjacent buildings were unearthed. The building with red mudbrick walls was directly constructed on the natural topography. It is not certain whether its walls are mudbrick or piled earth. (Ellis, 1984: 67) One of the buildings, rectangular in plan, has small rooms with mudbrick partition walls. The floors of the buildings are compacted earth. These buildings were usually built on top of each other. Structure 2, located in Operation 12, has dimensions of 3x5 meters. Structure 1 is simpler than Structure 2. This two-roomed rectangular structure was added immediately to the south of Structure 2. Having different plans suggests that their function might have been different. The plan of Structure 3, which was recovered in a very narrow area, is similar to the plan of Structure 2. Structure 2 contained a large number of grinding stones and chipped stone tools, while Structures 1 and 3 are almost empty. (Voigt, 1988: 221) Open areas, which are thought to have served as courtyards, have round or oval “fire pits” full of stones and/or ash. (Ellis, 1985: 262)

Two structures with wide mudbrick walls (2.5-3x2 m) have been found in Phase C, and their rooms have been fully excavated. The architecture and settlement pattern of Phase D is different from the succeeding phases. In this phase, there is a stone pavement surrounded by stones larger than those of the pavement. There were no mudbrick remains on the stones. (Voigt, 1988: 220-222) In Phase C, white lime was used as plaster on the walls and floors of the buildings. (Ellis, 1985: 261; Voigt, 1988: 222) No architectural remains were found in the earliest "Basal Phase", with a deposit about 50 cm in thickness. (Voigt, 1988: 220-221)

2.5.3. Zagros Highland Area and Urmia Region

This region lies between the Mesopotamian plains and the Iranian Plateau, starting from the eastern part of the mountainous area of Southeast Anatolia and extending up to the Persian Gulf. This area, consisting of mountain ranges running northwest-southeast parallel to each other, is geographically similar to the region of the Southeastern Taurus mountains; however, it has more severe climatic conditions. The southern slopes of the Southeastern Taurus especially are milder due to the influence of the Mediterranean climate. In recent years, the Neolithic Period has been better understood in this mountainous area. Among the many settlements in the region, Jarmo and Hajji Firuz were examined within the scope of our thesis. (Figure 2.35, 2.36)

2.5.3.1. Jarmo

This settlement is located in the Chemchemal Valley east of Kirkuk city. The Chan-Gawra Stream flows from the western and northern sides of the settlement. Situated in a hilly area about 800 meters in height and on a slope, (Figure 2.13) Jarmo covers an area of 1.3 hectares. Its cultural deposit is nearly 7 meters. Sixteen “floors” or “living debris” have been identified in “Operation A” and other excavation areas. Except for diggings carried out in a step trench, three different areas were excavated. Archaeological publications in the first years named the areas as “Operation I, II and III”; while in later publications these fields are named J-I, J-II and J-III. (Braidwood & Howe, 1960: 39-50) The name of “Operation A” was changed to “J-A”. (Braidwood, 1983a: 164) Excavations mainly concentrated on Operations J-I and J-II. Nine levels were identified in Operation J-I. Some have subphases such as J-I,6a, J-I,6b, and 6 levels were defined in Operation J-II. These levels sometimes relate to each other, sometimes not, in terms of architecture and settlement pattern. For example, although J-II has a structure similar to a "cell-planned building" in level J-I,6, level J-II,6 has multi-room adjacent structures. Or, in Operation J-II there are 4 rows of stone with tauf walls whereas Level J-I,4 contains only tauf walls. As well as the wide exposures, there are also subsidiary operations such as test exposures. (Braidwood, 1983a: 155) According to C_{14} results, the settlement dates to 11240±300 - 6300±250 BP (9290 to 4350 BC). However, it has been suggested that it would be more accurate to date the Jarmo settlement to 7750-

7000 years ago or a bit later, based on archaeological findings rather than contemporary sites. (Braidwood, 1983b: 537-539)

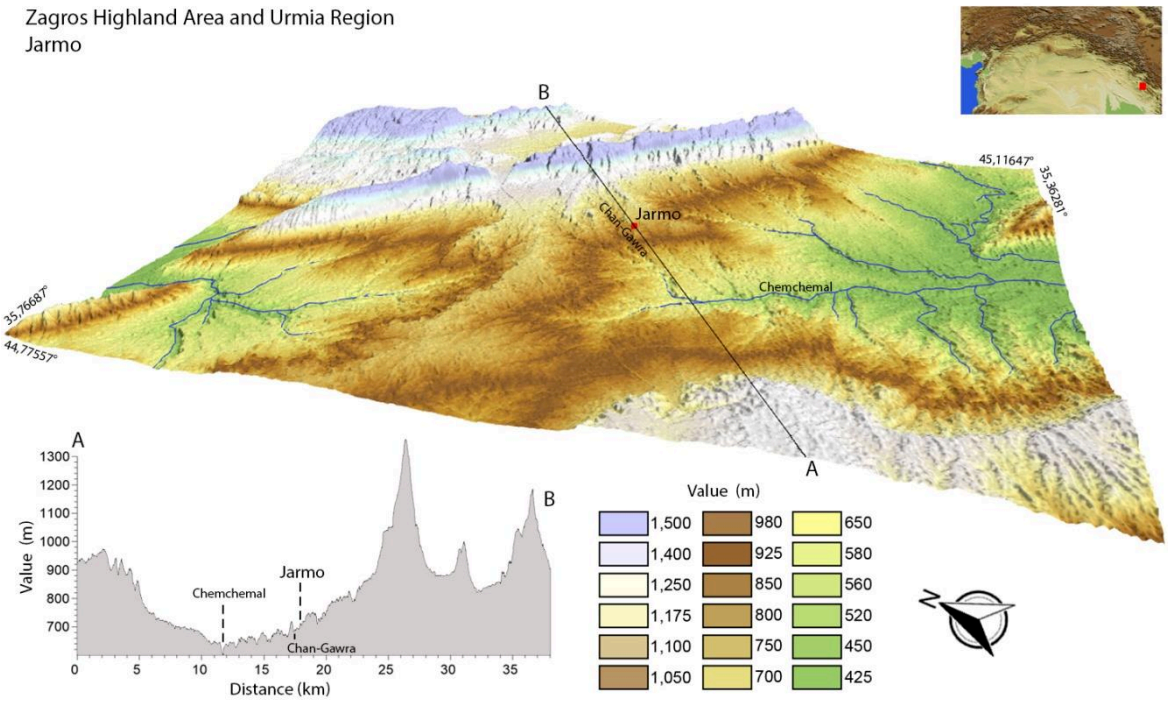


Figure 2.13: 3D DEM and cross-section of the environment of Jarmo

Almost all structures are rectilinear and multi-roomed. Small rooms such as cells are thought to have been used for storage purposes. Similarities to the Grill Buildings of Çayönü Tepesi were revealed in Operations J-I and J-II. Stone rows were used in the later levels, (Figure 2.14) whereas in early levels there were only tauf walls, with a thickness of 40 cm. Most of the compacted earthen floors were flattened and artefacts such as large ground stone pestles, mortars and querns were found on them. The floors were covered with lime, or between their renewal stages, due to lime traces, it is thought that reeds were laid. There are also well-preserved floors with matt remains that exhibit different weaving techniques. (Adovasio, 1975: 224-230) There are many fireplaces in different areas. The architectural structures of Jarmo are thought to have been used for housing in general, although this aspect is not yet fully understood. In Jarmo, orange-coloured buff, fine sandy clayey fillings were also detected. These deposits have been interpreted as the remains of ruined or abandoned structures. (Braidwood, 1983a: 155-163)

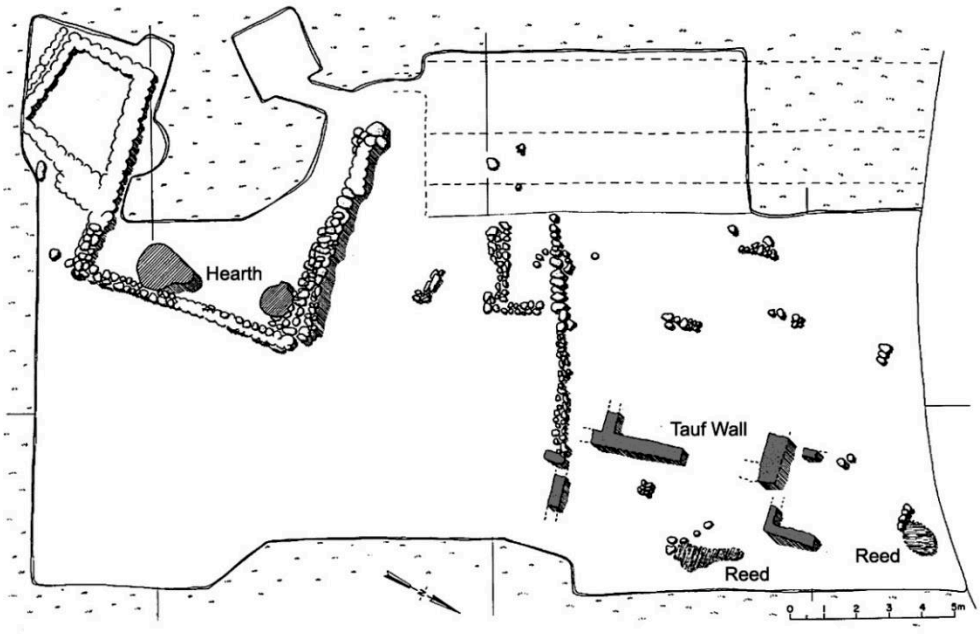


Figure 2.14: Settlement pattern and architecture from J-II, 3 (Braidwood, 1983a: 181 Fig.84)

The Operation J-I area has 9 phases according to architectural data. In this area, consecutive layers of reed surfaces were detected. Some of them have even been defined as short-term interior floorings, since these surfaces were almost the same size as the dimensions of the rooms. The widths of the tauf walls of the buildings are different from each other. It has been suggested that the walls and floors of buildings in this area were often renovated or short-term. The best examples of architectural remains that have been clearly identified are in Phases J-I,6a (Figure 2.15a) and J-I,7. The tauf walls generally were buff colour at Jarmo, but the tauf wall in the area J-I has an orange colour. The reason for this is thought to be the effect of fire since the floor of the stall-like alcoves yielded much ash and charcoal. (Braidwood, 1983a: 159)

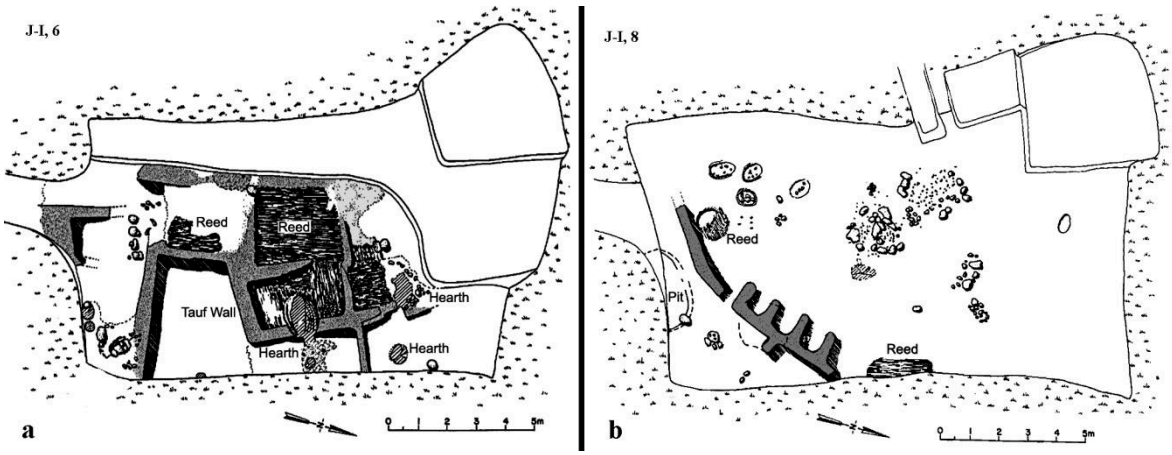


Figure 2.15: Settlement pattern and architecture from J-I, 6a-d, and J-I, 8 (Braidwood, 1983a: 174 Fig.41, 173 Fig.39)

The walls of buildings in Operation J-I were built with the tauf technique. In this area in Phases J-I,8 (Figure 2.15b) and J-I,9 were exposed tauf walls, a multi-room building, and a tauf wall about 5 meters long. The rooms of the multi-roomed building, which were only partly preserved, were approximately 1x1.1 m. In the open areas, archaeologists identified scattered stone rows, stone concentrations, pebbly surfaces, fireplace-like areas and fire areas (fire-pits). The edges of the fire pits were burnt. In these phases, traces of reeds were also detected in the open spaces. (Braidwood, 1983a: 173 Fig.39)

In Phase J-I,7, more building remains were recovered compared to the preceding phase. Some of them, which have a rather complex layout, consist of either a single large room or two or more rooms. In one of them, there was a surface with reed traces 2x1.5 m in dimension. (Braidwood, 1983a:173 Fig.40) An oven remnant, scattered stones, and stone rows between the open spaces of the buildings were also recovered.

In Phase J-I,6, some of the tauf walls which were built in Phase J-I,7 were repaired and reused. The most significant feature of this phase is the abundance of reed traces either inside or outside. The number of ovens increased compared to Phase J-I,7. In Phase J-I,5, the walls of the structures were also built of tauf. The settlement pattern of this phase is very similar to Phases J-I,6 and J-I,7. (Braidwood, 1983a: 174 Fig.41-42)

In Phase J-I,4 very few architectural remains were encountered; the ones found in different areas probably belong to different buildings. All the walls were built with using the tauf technique. In Phase J-I,3, the tauf wall of building and remains of a fireplace in an open area to the north of this wall were recovered.

In Operation J-I, the most spectacular change both in construction technique and building tradition was documented in Phases J-I,2 and J-I,1. The walls were predominantly constructed of stone. (Braidwood, 1983a: 175 Fig.43-44) Fire pits and ashy areas were also exposed. (Braidwood, 1983a: 160-161)

In Operation J-II, six phases with eight layers were identified. The richest architectural remains were in Phase J-II. However, most of the structures which were built in earlier phases were reused in Phase J-II,1. A similar situation also occurred in Phases J-II,4 and J-II,5. (Braidwood, 1983a: 160)

2.5.3.2. Hajji Firuz

Hajji Firuz is located in the north-west of Iran, about 13 km southwest of Urmia Lake and in the northeastern part of Solduz Valley. (Figure 2.16) The mound, which is about 10 m higher than the current level of the plain, continues beneath the plain. (Voigt, 1983: 7)

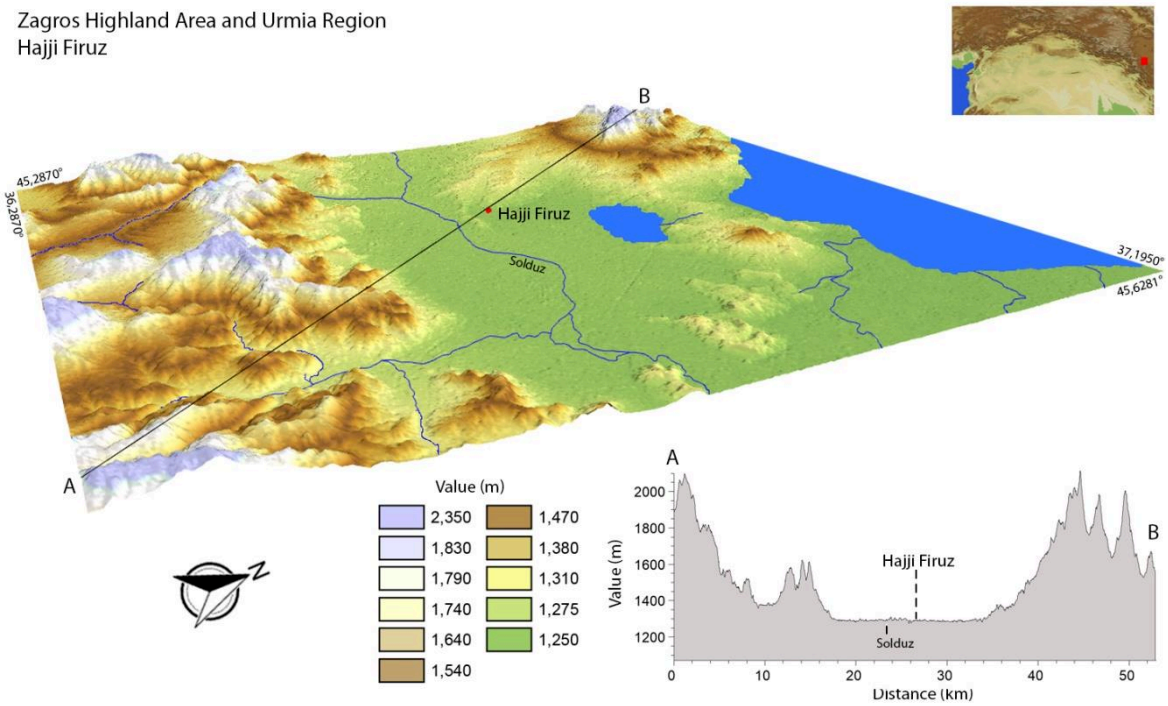


Figure 2.16: 3D DEM and cross-section of the environment of Hajji Firuz

Islamic, Iron Age, Bronze Age, Chalcolithic and Neolithic periods were detected at Hajji Firuz. (Voigt, 1983: 10) The Neolithic fillings had 12 phases. Letter "A" indicates the latest phase and the letter "L" identifies the earliest phase. Phase C is the best-known layer from Hajii Firuz. (Voigt, 1983: 21) The "Hajji Firuz Period", which reflects the earliest period in the stratification of the site, was dated to between 7487±89 and 6870±100 BP or 5537±89 and 4920±100 BC. (Voigt, 1983: 348-349, Appendix C) If we use CalPal calibration on published dates from this site. The calibrated range appear between 8294±81 ±38 to 7633±86 CalBP or 6344±81 to 5683±86 CalBC.

The cultural deposit of the earliest phase (Phase L) is limited. The only building remaining is Structure XVII. There are open areas and ashy deposits that are thought to be the remains of structures exposed in Operation V. Rectilinear Structure XVII, which had been reused in Phase K, (Figure 2.17) had more than two rooms. (Voigt, 1983: 30-31) During Phase K, Structure XVI, which as flimsy walls, was added to it.

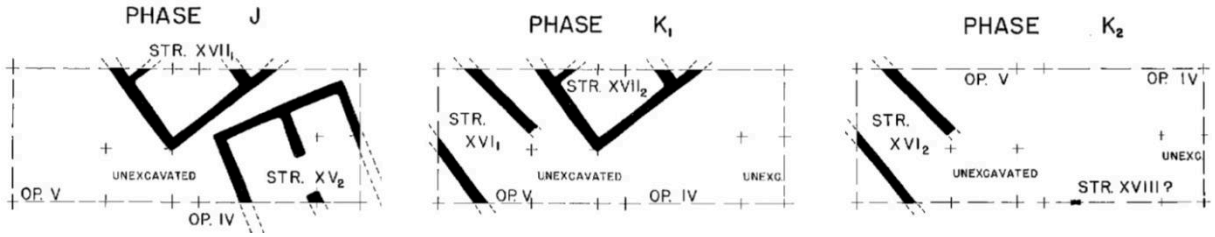


Figure 2.17: Settlement pattern and architecture from Phase J and Phase K (Voigt, 1983: 31 Fig.22-24)

As a general overview, there is continuity in the choice of construction area in the same location. For example, some walls of Structure XVII were reused in Phase C and they were interpreted as the earliest walls of Phase C. This applies even to the superimposition of structures and walls; the buildings of Phases K and H were located more to the north than previous stages. Although there were ashy areas in the open spaces between the structures, there are no remains of fireplaces. (Voigt, 1983: 29-30) Phase F has two subphases (F1-2) according to changes both in use of the area and the orientation of buildings. Structure XI was built in a different direction from the others. The other ones generally run in in a north-south or east-west direction while Structure XI was built more towards the east (at an angle of 35 degrees). (Voigt, 1983: 27-28)

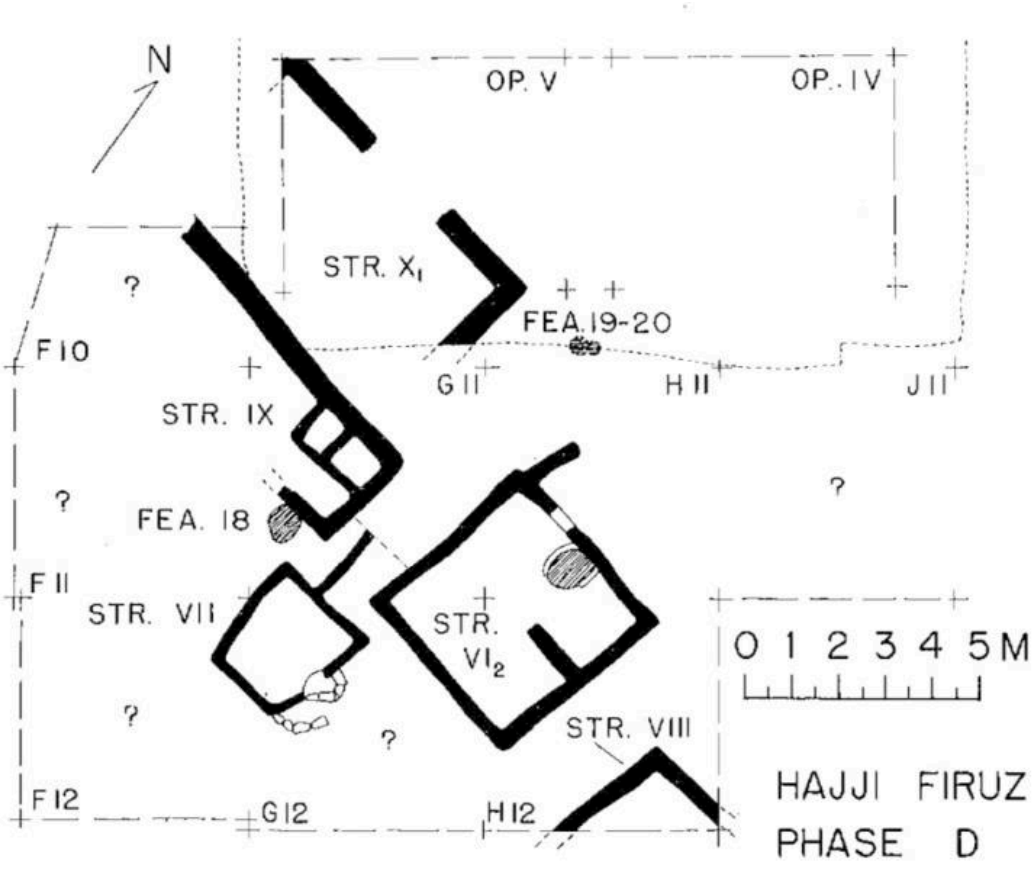


Figure 2.18: Settlement pattern and architecture from Phase D (Voigt, 1983: 26 Fig.16)

Phase C is the most well-known phase. The well-preserved buildings were constructed in a particular order. They have renewal stages. Besides these, there are wall remains in the NW section of the operation area. (Voigt, 1983: 24-25) The buildings had similar features with square or rectangular plans and their length was between 5 and 8 meters. There are streets or large open spaces between them. (Voigt, 1983: 25 Fig.15) In the open spaces were found architectural elements, a pottery workshop and many artefacts. Accordingly, it is clear that the open areas were intensively used. (Voigt, 1983: 313-314)

Most of the Hajji Firuz Neolithic structures were built directly on natural ground. (Voigt, 1983: 45) Their walls were constructed of compressed mud or mudbrick blocks of different sizes. Between the mudbrick blocks, 2.5 – 4.5 cm-thick mortar was used. (Voigt, 1983: 47) Even though plastering of the interior and exterior surfaces of walls could not be found *in situ*, secondary evidence indicates that the walls were plastered. In general, the inner surfaces of walls were occasionally plastered with a mixture of lime and mud. In particular, residues of lime organic material mixed with mudbrick were found on the walls of Structure V. There are also traces of straw and reed mats on the floors. It is assumed that wood-like material was used in the roofing system and that it was supported by wooden posts. (Voigt, 1983: 35)

Small rooms separated by short partition walls are defined as “storage”. (Voigt, 1983: 297 Fig.121) Two structures, which were understood to have been used outside of the household, were determined in Phases C and D. Structure VII had been used for storage (Figure 2.18) while Structure VI has been interpreted as a “Meeting House” because of its plastered platform, hearth, numerous food remains, clay objects and human burials. (Voigt, 1983: 315) In addition, a door opening, which is rare in the Hajji Firuz Neolithic structures, was found in its northern wall. Other door openings were found on the eastern walls of Structures II and VII. (Voigt, 1983: 32)

Structure II of Phase A3, which has been completely exposed, is the best example in terms of plan and inventory to help with functional analysis. Square-planned Structure II had walls constructed with yellowish-brown mudbricks. It had two main sections that were separated into smaller rooms by short partition walls. The partitioning walls are thinner than the exterior walls. The floor of Room 1 was of yellowish earthen clay while in Room 2, in the northern section, there was an uneven earthen floor. Two hearths were found in this structure, one in Room 1 and the other in Room 2. (Voigt, 1983: 37-41)

As a result of ethno-archaeological observation and examination carried out on the settlement's architecture and that of surrounding villages, it was determined that the average lifespan of a mudbrick structure was 30 years. In this context, it was envisaged that the Hajji Firuz Phase A3 structures were used for 30 years without any renewal. However, the constructions of Phases B and C were thought to have been used for a duration half that of the structure in Phase A3. After considering various ethno-archaeological examinations, it might be stated that a mudbrick building can be used for 50 years with good care. (Voigt, 1983: 19)

2.5.4. Jazira and Mosul Region

This area is defined as semi-arid steppes in the southeast of Upper Mesopotamia. (Al-Yaaquby, 2011: 76; Perrin de Brichambaut & Wallen, 1968: 29, 47) The most important topographical factor distinguishing this region from the Mesopotamian plains is the Sinjar mountain range. Between the Zagros mountain range and Khabur Valley, the main water source of the region is the Tigris River. Also, there is a large number of streams and intermittent streams associated with the Tigris River in the Sinjar Mountain range and the western foothills of the Zagros Mountain Range. Among the many settlements in this area, Ginning and Tell Hassuna are examined here. (Figure 2.35, 2.36)

2.5.4.1. Ginning

Ginning is located in Jazira, just north of the Wadi Al-Mur. With an altitude of 330 meters, the settlement covers an area of 0.8 hectares. (Figure 2.19) The settlement could only be excavated for four weeks as a rescue operation. An area of approximately 80.75 m² was opened and by taking a small sounding, 2x1 m virgin soil was reached 2.2 m from the surface. Only the Pottery Neolithic Period layers were able to be unearthed. (Baird & Campbell, 1990: 65) In the sounding, a natural deposit beneath the upper layer with a structure and adjacent open area points to a break in the continuity of the settlement. Below the natural deposit are consecutive layers with well-preserved tauf remains; however, no architecture was identified. Due to lack of pottery sherds in these layers, the excavators have

suggested that they might be PPN deposits, but since the exposed area was rather small, they were cautious in their interpretation. (Baird & Campbell, 1990: 68)

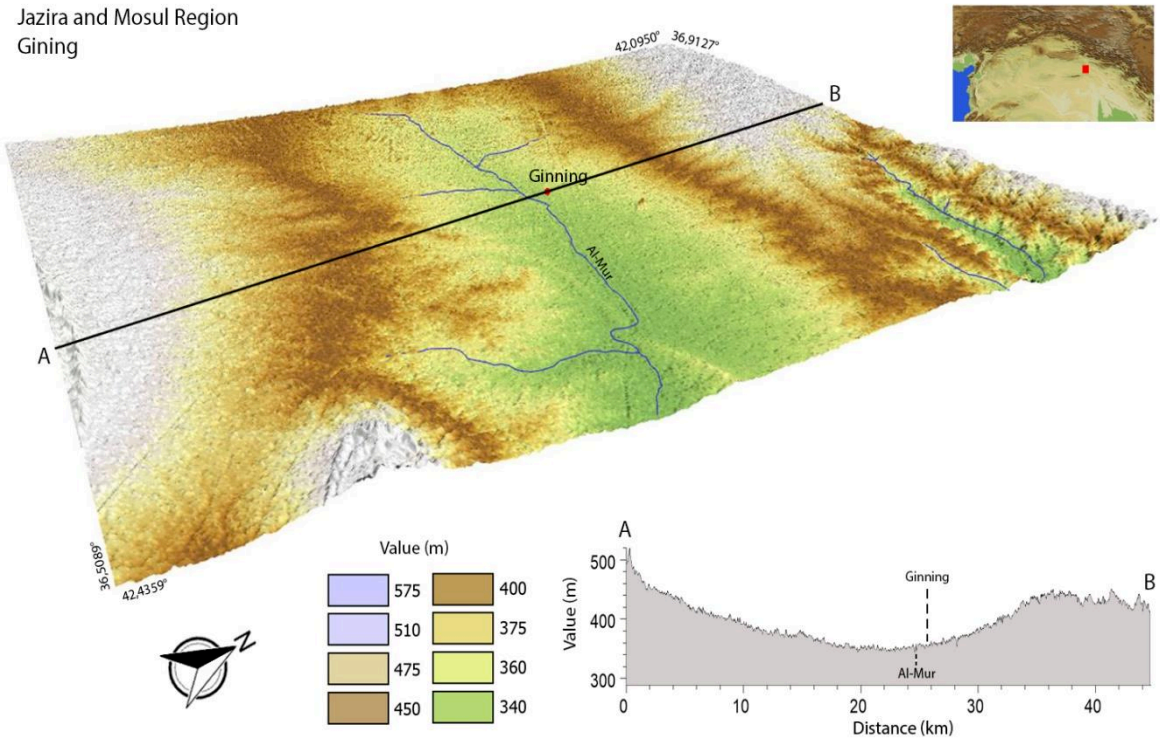


Figure 2.19: 3D DEM and cross-section of the environment of Ginning

The building remains beneath the surface soil were completely exposed. A rectilinear structure composed of small rooms divided by partition walls was found. All the walls were tauf and they were only preserved to 20-30 cm in height; therefore, it was very difficult to distinguish their faces. The structure, which resembles a cell-planned building (Figure 2.20) but whose plan could not be clearly determined, had compacted mud-plastered floors. The rooms generally have two floor levels but it is not well understood whether they are renovations or not. In the open areas, more than one “Fire Pit” was detected. (Baird & Campbell, 1990: 66)

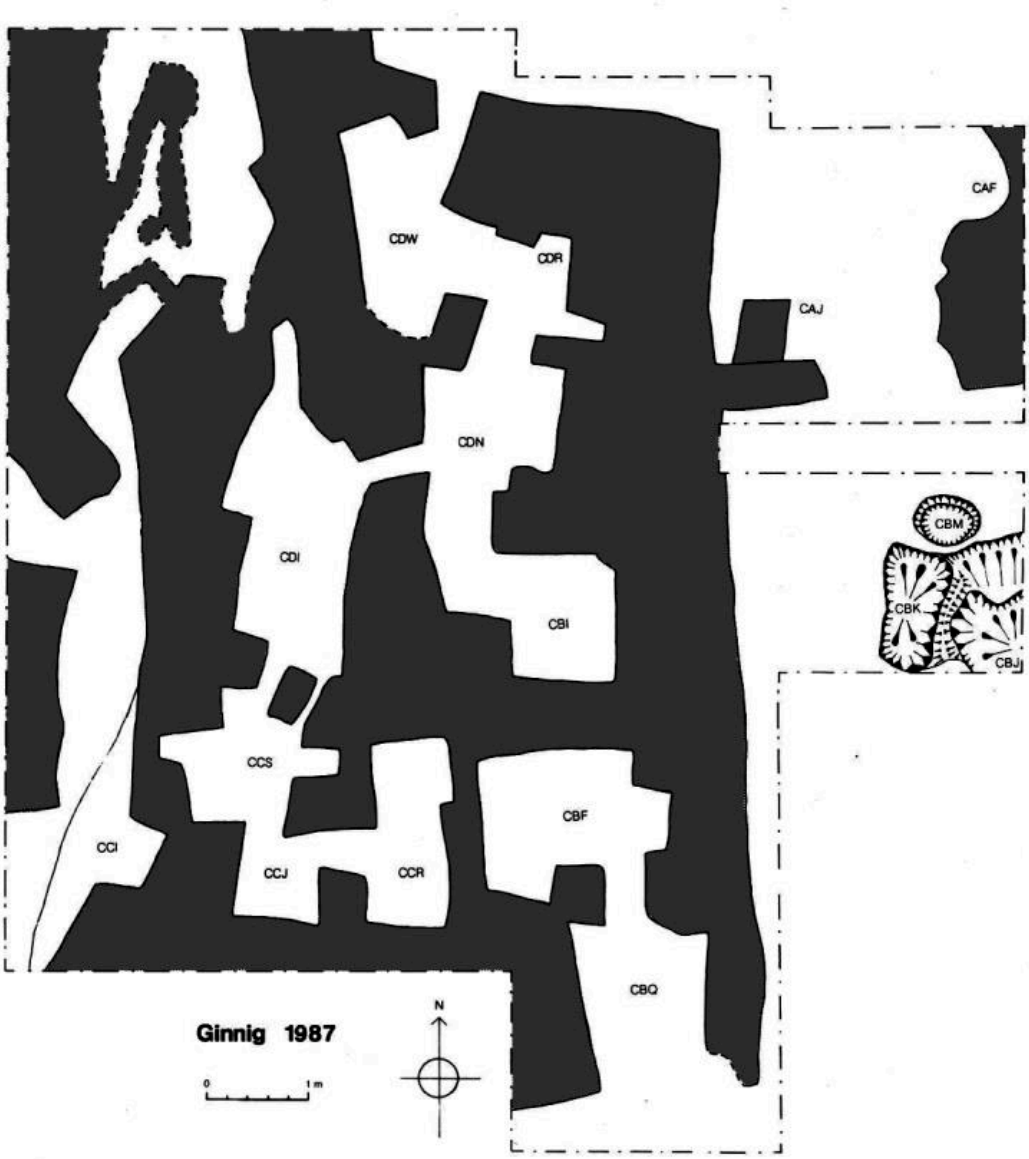


Figure 2.20: Rectangular building in Ginning (Baird & Campbell, 1990: 67 Fig.2)

It is also possible that some of the construction elements considered as walls could be benches. The rooms might have been used for storage since some rooms were very small. A buttress that was added to one of the walls probably aimed to prolong the life of the structure; this increased the irregular shape of the structure and makes it difficult to clarify its plan. Due to these extensions, the renewal stages have not been definitively identified. In the surroundings of this structure tauf remnants and traces were also exposed, probably belonging to other constructions. (Baird & Campbell, 1990: 67-68)

2.5.4.2. Tell Hassuna

Tell Hassuna is located in the Wadi Qasab, which is 5 km northeast of Shura and 25 km southeast of Mosul. Surrounding limestone extends to the immediate east of the mound (Lloyd, et al., 1945: 259) and the site is 7 m above the current level of the plain. The settlement, with an altitude of approximately 300 meters, covered an area of 3 hectares. (Figure 2.21) Fifteen layers were defined in the excavations. The levels are numbered by Roman numerals. Mixed materials belonging to the Assyrian period were found in levels XV-XIII, Ubeid and Halaf in levels XII-XI, Ubeid in levels X-VII, Halaf in levels X-VII, Hassuna Period in levels VI-Ib, and Pre-Hassuna in level Ia. (Lloyd, et al., 1945: 257 Chart 1) In our study, the architecture and elements of levels Ia, Ib and Ic were examined.

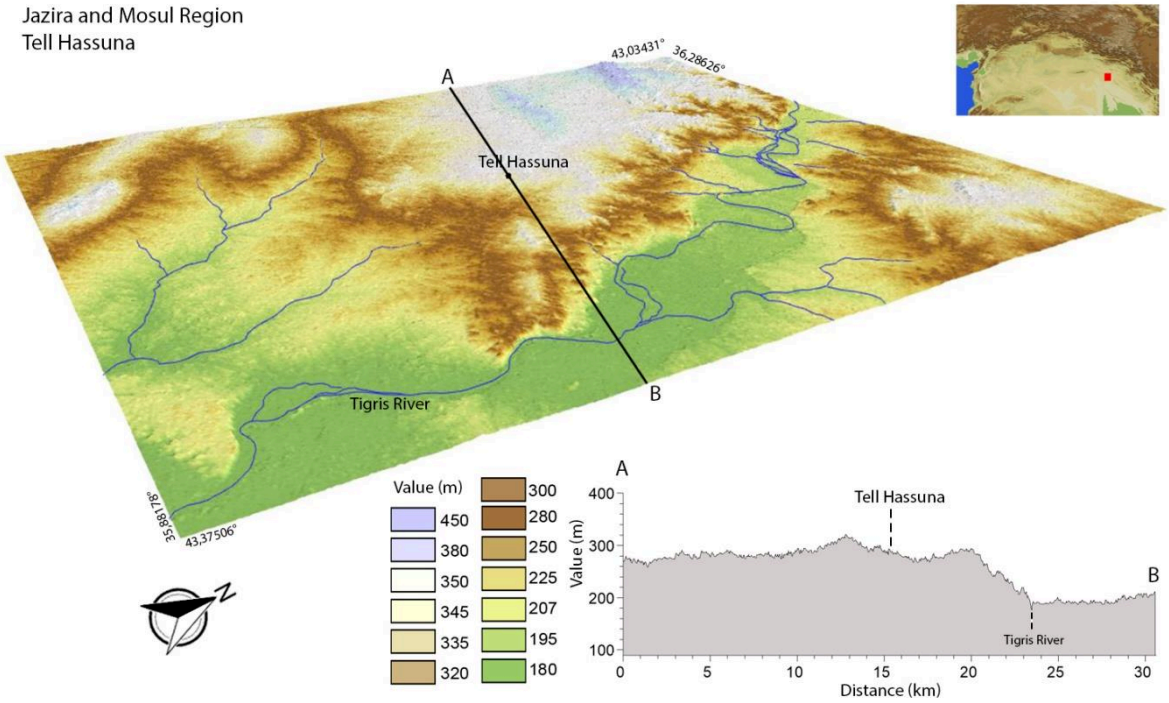


Figure 2.21: 3D DEM and cross-section of the environment of Tell Hassuna

The earliest period of Layer Ia has a deposit approximately 1 m thick with three consecutive campsites. The only architectural remains are oval and/or round fire places. Due to the absence of post-holes, it was anticipated that temporary tents were used rather than "permanent" shelters. In various parts of the exposed area there are many traces of woven reed mats. (Lloyd, et al., 1945: 271)

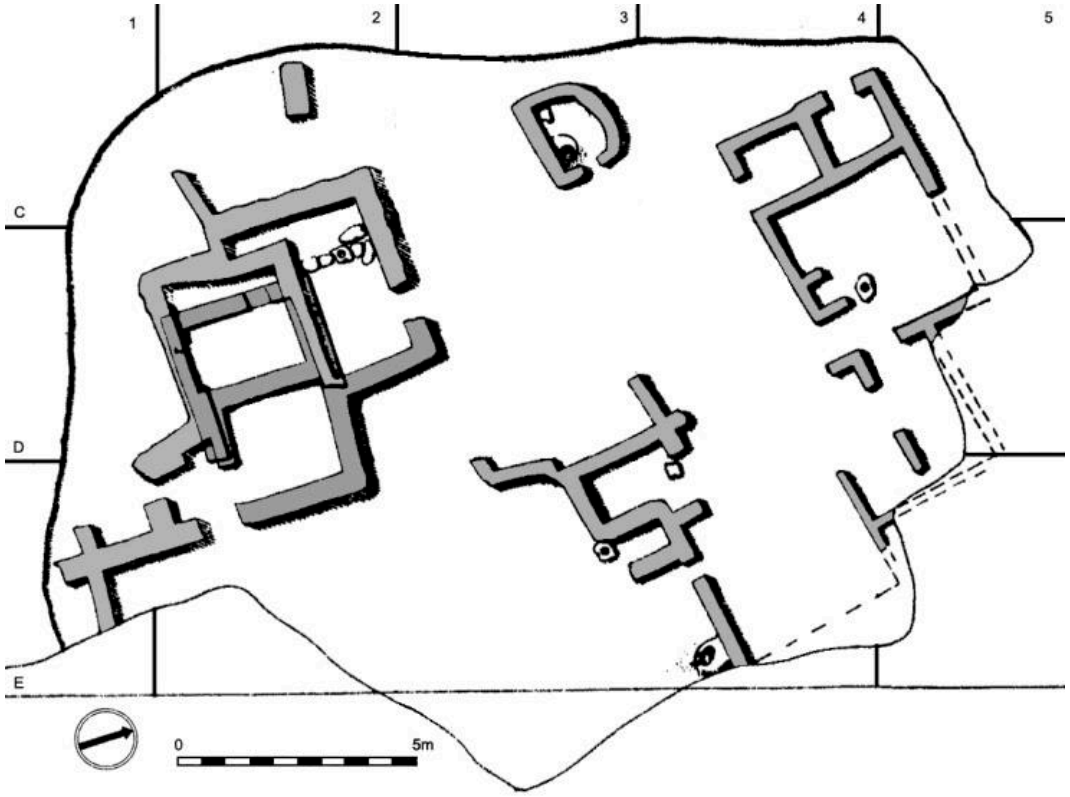


Figure 2.22: Settlement pattern and architecture from Hassuna Phase Ib-Ic (Lloyd, et al., 1945: 403 Fig.28)

In Layer Ib, which has been dated to the Hassuna Period, the previous culture changed significantly. (Figure 2.22) The basic feature of this new architecture is structures built with straw and lime-tempered mudbrick blocks. The mudbrick blocks were not of standard shape. For example, smaller pieces of mudbrick were used to fill various gaps. It is understood that the mudbrick blocks could not have been sundried before being used in constructions. The damaged surfaces of the not properly dried mudbricks placed on top of each other were flattened by roughly plastering the compacted soil. A single-roomed structure was reused after being integrated into a building with at least three rooms in the upper stage. Many architectural remains have been identified in Layer Ic, which was also dated to the Hassuna Period. The walls, with either straight or curved corners, vary between 20 and 45 cm in thickness. These walls are thought to be the remains of at least three different structures. Some of the rooms are grouped around an open space. (Lloyd, et al., 1945: 272-273)

2.5.5. Khabur and Balikh Basins

This region covers the Khabur and the Balikh Stream Basins. Both of the streams, which are the main tributaries of the Euphrates River, flow through the alluvial plains between the mountainous belt of the Upper Mesopotamia and Sinjar mountains. For Khabur Valley, the basin with a part-river system in the northern part was considered. One of the reasons for seperating this area independently from the Middle Euphrates region is that the source waters of both rivers originate in the north and also probably relate to the cultural networks of the northern areas. The other reason is that it has different geographical and climatic features from the Middle Euphrates Steppe Zone, which exhibits the transition characteristics of desert-steppe regions. These two areas, especially the Khabur Valley, represent a cultural and geographical transition zone between the Euphrates and Tigris basins. Among the various settlements in this area, Tell Seker al-Aheimar, Tell Kashkashok II and Sabi Abyad II have been examined. (Figure 2.35, 2.36)

2.5.5.1. Tell Seker al-Aheimar

This site is located on the right terrace of Khabur River in the Upper Khabur Basin. (Nishiaki, 2016: 69) (Figure 2.23) An area of 750 m^2 has been excavated in the settlement which has a size of 300x180 m and a thickness of 11 m filling from the Neolithic Period. According to surface survey data, the site is estimated to have covered 4 hectares. The site has been divided into five different sectors each named using capital letters. Sector C, where Late PPNB architecture and settlement are examined among these five different excavations, the areas (Sector A-E) are the largest exposed area. (Nishiaki & Le Mière, 2005: 55-57; Portilllo, et al., 2014: 108) According to the stratigraphy of Sector C; Level 1 is Chalcolithic Period, Level 2 is Proto-Hassuna, Levels 3 to 8 are Pre-Proto-Hassuna, and Levels 9 to 20 represent the late PPNB period. (Nishiaki, 2011: 63; Nishiaki, 2012: 32) The Pre-Proto-Hassuna phase in Sectors C and E has been dated to between 7900±120 and 7540±45 BP while the late PPNB Period has been dated to 8065±145 BP with a single item recovered in Sector E. (Nishiaki & Le Mière, 2005: 65) The architectural phases of Tell Seker al-Aheimar, and particularly the Pre-Proto-Hassuna and Proto-Hassuna phases, present evidence on the Neolithic Period of Khabur Basin. (Nishiaki, 2012: 2012; Portilllo, et al., 2014: 107) If we use CalPal calibration on published dates from this site. The dates of Sector A range from

7880±110 to 7750±80BP which has a calibrated range from 8755±166 to 8536±77 CalBP or 6805±166 to 6586±77 CalBC. Sector C dates range between 7900±120 to 7780±110 which has a calibrated range from 8771±168 to 8624±150 CalBP or 6821±168 to 6674±150 CalBC. And the date to PPNB period in Sector C which is dated 8065±145 is calibrated 8966±228 CalBP of 7016±228 CalBC) This date is very consistent with the date of the Phase N7 from Sumaki Höyük while the margin of error is high.

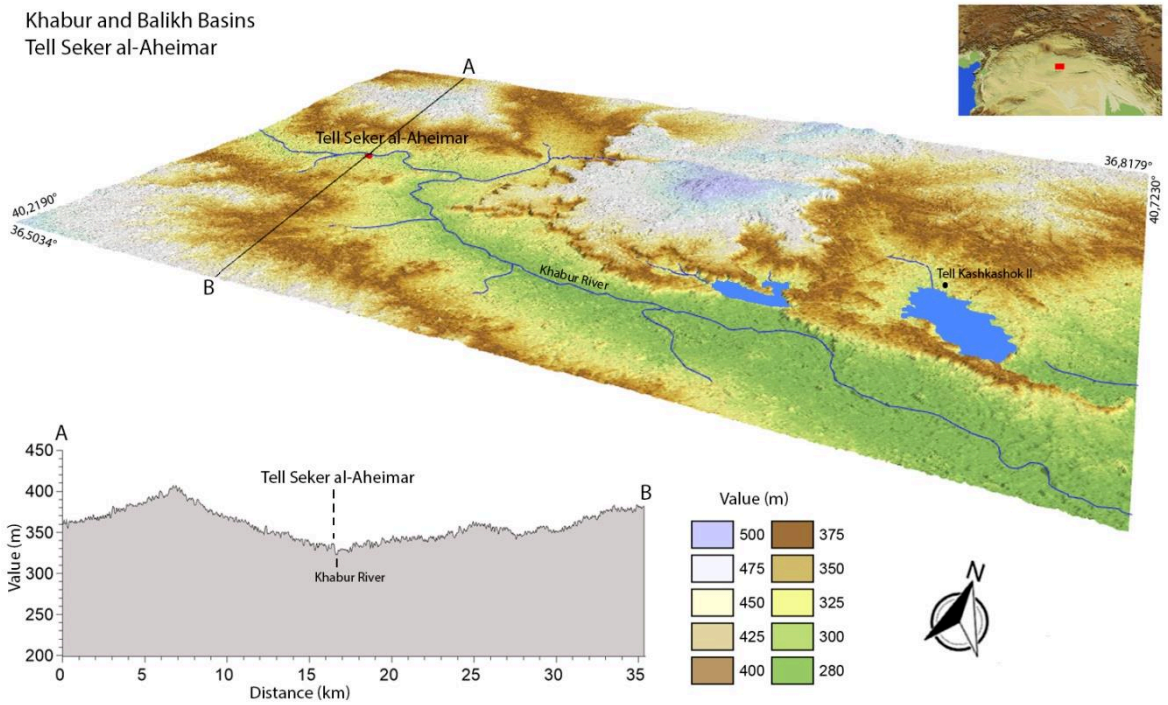


Figure 2.23: 3D DEM and cross-section of the environment of Tell Seker al-Aheimar

PPNB layers were reached in Sectors C and E. Rectilinear structures comprised of small chambers (cells) parallel to each other have a compacted earthen floor. (Nishiaki & Le Mière, 2005: 57) The walls were usually built using the "pise" technique. Also, the walls of the structures in layers 12 and 13, which reflect the LPPNB period, were built with mudbrick blocks having an average size of 40x30 cm. (Nishiaki, 2011: 64; Nishiaki, 2012: 33) The other architectural feature of these phases is the large rectangular "pit-ovens" containing burnt stones. (Nishiaki & Le Mière, 2005: 57) In the PPNB levels of Sector E, there are new types of building and large rectangular pit-ovens (fire pits). The pit-ovens became smaller and more oval in shape. These pit-ovens have been described as "fire pits" at Salat Camii Yanı and Sumaki Höyük. (Miyake, 2010a: 437; Erim-Özdoğan & Sarıaltun, 2018: 57) Multi-roomed large rectangular buildings with high stone footings were the dominant building types. In the final phase of PPNB, single-roomed structures having beaten earth floors with

dimensions of 4x5 m were the new building type. These constructions are defined as “large room buildings”, which are very similar to the ones at Çayönü Tepesi. In this phase, there were also a few structures with approximately 1 m^2 small rooms (cells) with gypsum-plastered floors. (Nishiaki & Le Mière, 2005: 57)

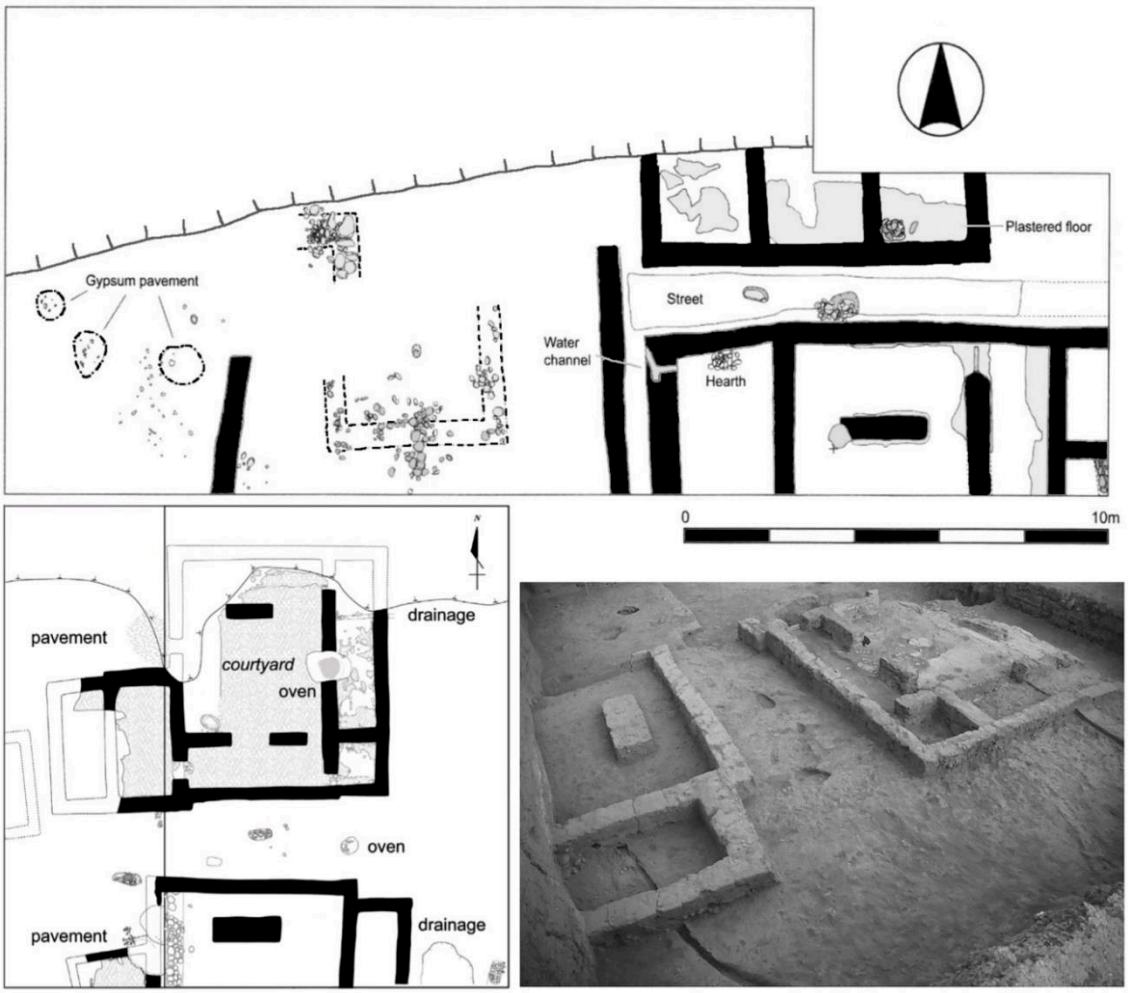


Figure 2.24: Settlement pattern and architecture of Tell Seker al-Aheimar (Nishiaki, 2016: 70 Fig.2; Nishiaki and Le Mière, 2005: 58 Fig.3; Portilllo, et al., 2014: 108 Fig.2)

In sectors A, C and E, the first Pottery Neolithic phase of the settlement lies directly on the PPNB deposits without a break. Although there is no specific change in construction technique and in the pit-ovens tradition of the PPNB phases, there are changes in building plans, such as Cell-Planned Buildings are totally absent. (Figure 2.24) With this phase, usage of stone footings was totally abandoned and the walls became more flimsy. In limited areas, remains of walls hint that “Large Room Buildings” were used. There are also gypsum-plastered floors and benches, and platforms constructed of mud-slabs. The phase above this level is called the Proto-Hassuna Phase according to pottery typology. In the Proto-Hassuna

Phase, pise walls without footings were built directly on the natural ground. The buildings had small rooms (cells) with unevenly-plastered floors. The walls of the rooms were narrow and their floors were lime-plastered. Traces of weeds and reeds have been documented in phytolith analyses from lime and soil samples in different areas such as the structures' floors, open spaces and walls. (Nishiaki & Le Mière, 2005: 57-58; Portilllo, et al., 2014: 108)

The architectural tradition of Tell Seker al-Aheimar is different from the rectangular mudbrick architectural tradition of PPNB settlements in the Euphrates Basin. In addition, intensive usage of obsidian and the presence of *Çayönü Tool* are similar to those of the Late PPNB assemblage in the Upper Mesopotamian Plateaus. (Nishiaki & Le Mière, 2005: 59, 63) One of the interesting and important findings in Tell Seker al-Aheimar is the water well in the LPPNB level. This water well represents the oldest known example in Syria. It is at a depth of 4.5 m with a diameter of 2 m in Sector C in Square E13. The fact that this well was opened in the settlement situated right next to the Khabur River indicates that a water shortage occurred in the settlement. Nishiaki interpreted the opening of the well with the possibility that the Khabur water was probably contaminated and that better quality water was needed. (Nishiaki, 2016: 71) However, considering that there was no industrial waste to pollute the water in question and that domestic waste could not have been so voluminous as to pollute the river, the opening of the well seems to be directly related to the drinking water problem. Also supporting this interpretation are the drought and climatic changes that occurred around 8000 BP in the Near East. Basalt and limestone mortars, pestles and grinding stones which were intentionally thrown into the well might relate to ritual practices.

2.5.5.2. Tell Kashkashok II

Tell Kashkashok II is located in Wadi Al Aweiji in Upper Khabur Basin. Its archaeological deposit is 5 meters high on the current alluvial plain and four layers were identified. (Figure 2.25) Layer 1 having a mixed surface soil probably belongs to the Islamic Period, but the exact date cannot be determined. In Layer 2, approximately one hundred graves belonging to the Ubeid and Uruk periods were exposed. Layers 3 and 4 have been dated to 7880±110-6290±220 BP and belong to the Hassuna Ia Period. (Matsutani, 1991: 5-8, 99) However, these dates presented in the publication are uncalibrated. If we use CalPal calibration method. The dates of Tell Kashkashok II in Layer 3 range from 7880±110 to

7730±90 BP which has a calibrated range from 8755±166 to 8526±82 CalBP or 6805±166 to 6576±82 CalBC. The Layer 4 date represented by a single date. The date of this layer is 6290±220 which has a calibrated 7153±238 CalBP or 5203±238 CalBC.

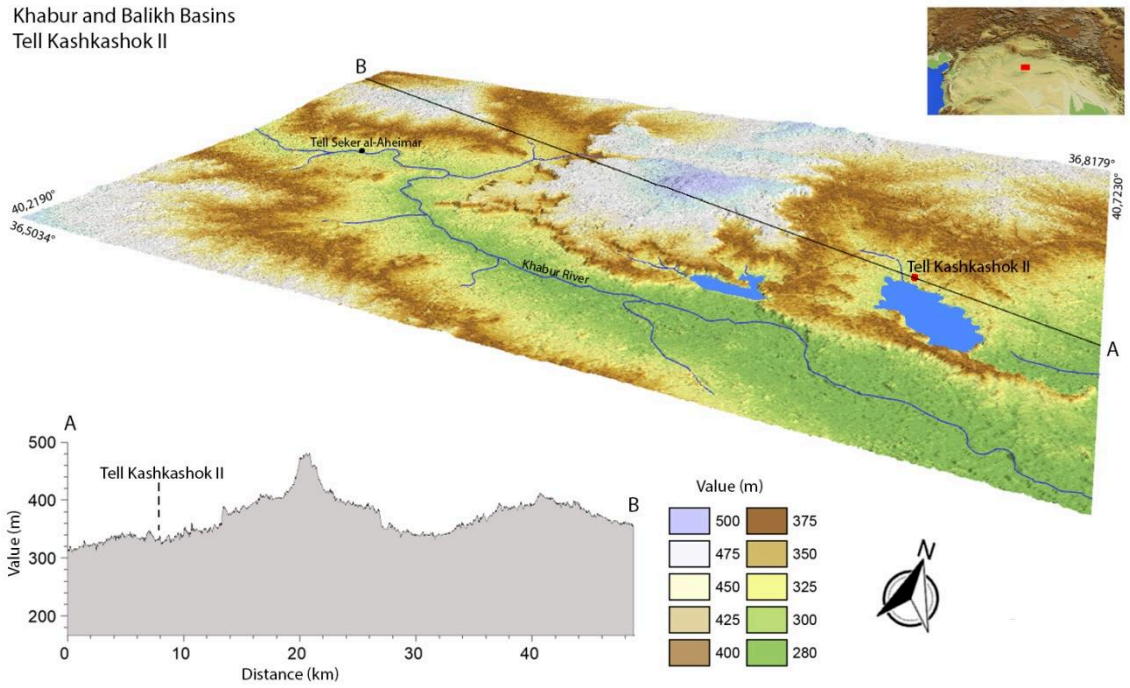


Figure 2.25: 3D DEM and cross-section of the environment of Tell Kashkashok II

Above the Hassuna Ia layers, ashy and reddish-brown fillings associated with this layer have been identified. Beneath this fill, there were dense ash and gypsum fragments in reddish-brown fills. According to this data, it is understood that gypsum was intensively used in constructions in the Hassuna Ia Period and the structures were identified according to the concentrations of reddish-brown earth and gypsum fragments. (Matsutani, 1991: 7)

The earliest settlement in Tell Kashkashok II is represented by Pit House P9 of Layer 4, which was identified as Early Hassuna Ia. This structure was 3.92 m long, 3 m wide and about 1 m deep. It had no plastered floor and no traces of post-holes. In its northern part there was a hearth with dimensions of 140 by 92 cm with thick ash debris containing gypsum particles, burnt animal bones and various artefacts. (Matsutani, 1991: 16-17)

Layer 3 fillings were detected between the virgin soil and "Pit House" and left-over deposits among the Ubeid - Uruk burial pits. Layer 3 has four sublayers. (Matsutani, 1991: 11) In the lowermost one, there is a room that was partially disturbed by pits of the upper layer and surrounded by tauf walls 20 cm in width and 9 cm in height. The inner space of the room was 1.9x1.2 m. The room contained a rectilinear area with gypsum-plastered edges

and flooring, and two gypsum-lined jar-type bins dug into its floor as well as many gypsum fragments hinting that the walls were also plastered as was the rest of the floor of the room. Actually, the room was part of a structure consisting of a few small rooms in two or three rows. To the west of this room, tauf wall remains of another structure in a different direction have been identified. The walls were 1.5 m long, 20-40 cm wide and 20 cm high; however, the layout of the structures could not be identified. (Matsutani, 1991: 13-15, Pl 2-3)

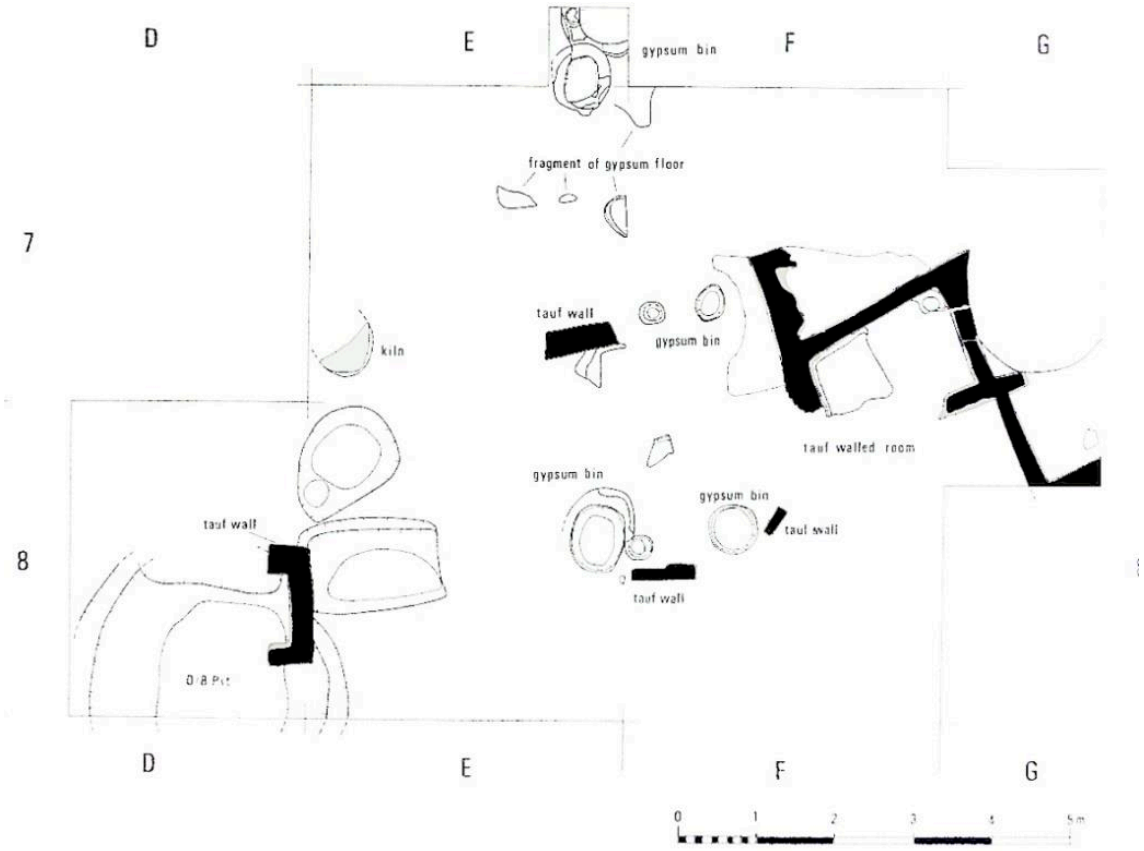


Figure 2.26: Settlement pattern and architecture of Tell Kashkashok II (Matsutani, 1991: Plate 57)

In the following sublayer, tauf walls were detected in several areas but the layout of any construction could not be identified. The third sublayer contained a kiln pit named K103. In the uppermost sublayer there were "…gypsum apparatus (bins) that bisected K103" (Matsutani, 1991: 11, Pl 58) and also five kiln pits (fire pits). This sublayer was heavily disturbed by graves so the architecture could not be determined. (Figure 2.26) Since the fillings of Layers 3 and 4 were not different from each other, both have been dated to the same period. The only feature that distinguishes Layer 4 is the "Pit House" that is thought to have been earlier than the tauf walls. Layer 3 is dated to Late Hassuna Ia Period. (Matsutani, 1991:11, 15)

2.5.5.3. Sabi Abyad II

Tell Sabi Abyad is actually the name of four mounds termed Sabi Abyad I - Sabi Abyad IV (Akkermans, et al., 2006: 132; Nieuwenhuyse, et al., 2010: 74-76; Verhoeven, 2000: 8) located within a short distance of each other and running north-south in the northern part of the Balikh Basin. The altitude of the settlement is 321 meters (Figure 2.27) and it covers an area of approximately 1 hectare. (Verhoeven, 2000: 8 Fig.2) The late PPNB (LPPNB) - Early Pottery Neolithic (PN) stage is divided into 4 phases at Sabi Abyad II. Phases 3 and 4 represent LPPNB, whereas phases 1 and 2 represent the first PN period. (Nieuwenhuyse, et al., 2010: 78 Fig.5) These phases have been dated to 8530-7950 BP (7550-6850 CalBC). (Akkermans, et al., 2006: 143; Nieuwenhuyse, et al., 2010: 79; Verhoeven, 1997: 1)

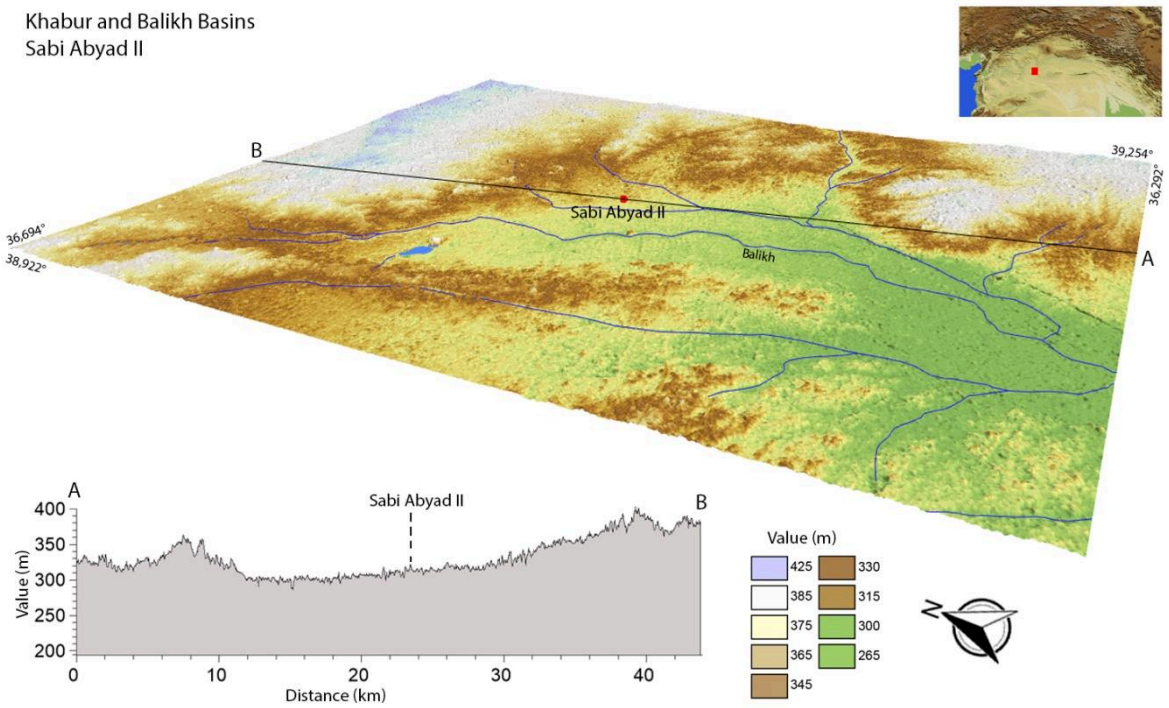


Figure 2.27: 3D DEM and cross-section of the environment of Sabi Abyad II

The main architectural characteristic of the LPPNB-Early PN layers of Sabi Abyad II is rectangular buildings with small rooms surrounded by large open areas. The buildings did not have stone foundations. White plaster residues were found on walls and also on floors. The buildings were almost superimposed and reconstructed at short time intervals. Thirteen multi-roomed rectangular buildings have been exposed in Phase 3. Most of them have irregular plans. Their small rooms (cells) are either square or rectangular in shape.

Buildings were constructed close to each other leaving small open spaces between them but their directions are different. These buildings were usually constructed in Subphases 3C and 3A running N-NW>S-SE while in Subphase 3D the direction is N>S. The buildings were not large; for example, Structure V in Subphase 3C was 7x5 m in dimension. (Verhoeven, 2000: 8-10)



Figure 2.28: Settlement pattern and architecture from Phase 3 (Verhoeven, 2000: 9 Fig.3)

The walls of the buildings in Phase 3 were built with the pise technique. (Figure 2.28) They are orange-brown in colour and 30-35 cm thick. All the walls were built directly on the natural ground. White lime fragments on the walls of several buildings have been interpreted as "plaster". Since door openings could not be detected in most of the small chambers (cells), it is understood that entry to these rooms was from above. It is also thought that the cells were used for storage. Their floors could not be determined precisely. Almost all the structures are nearly empty. Except for a single structure, there were no hearths or ovens in the rooms. (Verhoeven, 2000: 8-10)

2.5.6. Douara Basin

The Doura Basin lies between the Minchar Mountains and the Bishri Mountains, to the south of the Euphrates River and to the north of Palymree. This basin was formed by erosion of the Khawabi El-Kharrar and Jaria Streams. (Borell, et al., 2011: 36) Its climate displays semi-arid and semi-desert transition characteristics. (Besancon, et al., 2000: 18; Borell, et al., 2011: 36; Jagher & Le Tensorer, 2008: 201) Among many settlements of this area, Tell El-Kowm 1, Tell El-Kowm 2/Caracol and Qdeir 1 settlements have been examined in this thesis. (Figure 2.35, 2.36)

2.5.6.1. Tell El-Kowm

Tell El-Kowm is located between the cities Rakka and Palmyra. (Dornemann, 1986: 1 Plate1; Stordeur, 1989: 102) Its altitude is 490 m (Figure 2.29) and it covers an area of approximately 2.8 hectares. (Dornemann, 1986: Plate 3) The site's stratigraphy has been determined by a step-trench on the slope with a width of 3 meters and a length of approximately 50 meters. The step-trench is divided into nine levels (Dornemann, 1986: 1) and Roman numerals are used for their designation. The oldest layer was exposed at Step IX but virgin soil was not reached. (Dornemann, 1986: 5)

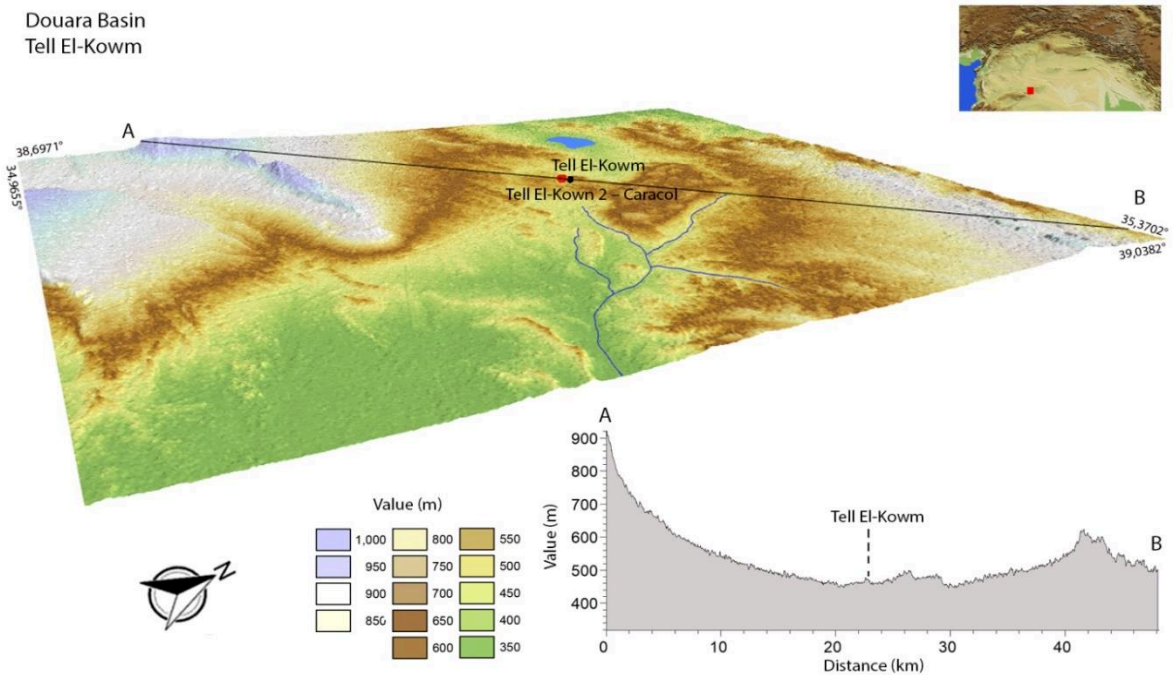


Figure 2.29: 3D DEM and cross-section of the environment of Tell El-Kowm

The settlement consists of five phases. Phase A was detected in Steps IX-VIII and was dated to the Early Neolithic Period. This phase represents the earliest cultural stage of the settlement. Phase B was encountered in Steps VIII-IV, which was dated to the Middle Neolithic Period. Although Steps V-IV have an assemblage from the Middle Neolithic Period, they were identified as Phase C because their fill was different from Steps VIII-IV. Phase D, which was found in Step III, was dated to the Late Neolithic Period. Steps II-I which defined the top filling of the mound were called Phase E and dated to the Post-Neolithic Period. Very few samples were found for C_{14} dating. Therefore, there are only two absolute dates from the carbon samples of Steps IV and II. The sample from Step IV was dated to 7400±45 BP (5450±45 BC) and the one from Step III to 7290±45 BP (5340±45). (Dornemann, 1986: 54) However, these dates presented in the publication were uncalibrated. If we calibrated thise data using by CalPal calibration method, the Steps IV date is 8248±55 CalBP (6298±55 CalBC) and the Step III date is 8103±553 CalBP (6153±53 CalBC). These dates are contemporary with the Sumaki Höyük N1 and N2 phases. Accordingly, the phases have been relatively dated depending on the typology of artefacts. Phase A was dated to 6400-6050 BC, Phase B to 6050-5675 BC, Phase C to 5675-5400 BC, Phase D to 5400-5250 BC, and Phase E was dated after 5250 BC, which is termed Post-Neolithic. (Dornemann, 1986: 55, Tab.11)

No architectural elements were found except white clayey areas at the lowermost level of Step IX; however, a large volume of ash fillings was exposed. The meaning or function of the yellow and white clayey stripes is not fully understood. The thick stripes were interpreted as the floorings while the thin ones are considered to be their renewals. In Step VII, again, many stains in different colours and yellow clayey areas were encountered. A large piece of plaster found in Step VI is connected with the structures of the upper phase. It is thought that archaeological remains drifted from another place due to the fact that these layers are not horizontal. In Step IV, a floor was uncovered with many scattered mudbrick and plaster fragments. In Step IV, two rectangular structures were exposed. Their mudbrick walls and floors have been very thickly plastered. One of the buildings has five rooms. Another building was filled with “decaying rubble fill”. The walls and floors were plastered several times. (Dornemann, 1986: 5-7, 53) The architectural data in Step IV fits with the stratigraphy of Tell El-Kowm 2, which is dated to PPNB. (Dornemann, 1986: 52) In Step III the walls and floors are not well preserved. From this data, it is understood that the site became smaller and was presumably in decline. The general layout of the settlement at this

stage indicates a short-term village. Accordingly, the settlement of Tell El-Kowm seems to have experienced a similar situation to that the Late/Final PPNB communities faced in the Upper Mesopotamia. (Dornemann, 1986: 59)

2.5.6.2. Tell El-Kown 2 – Caracol

The Tell El Kowm 2 - Caracol settlement is located right next to Tell El-Kowm, (Figure 2.30) which has very thick fillings. However, the settlement of Tell El-Kowm 2 is not completely independent from the settlement of Tell El-Kowm. It is likely that Subphase AI, which was the lowest stage of the PPNB Period at Tell El-Kowm-2, was the earliest settlement in this area. (Stordeur, 2000a: 87)

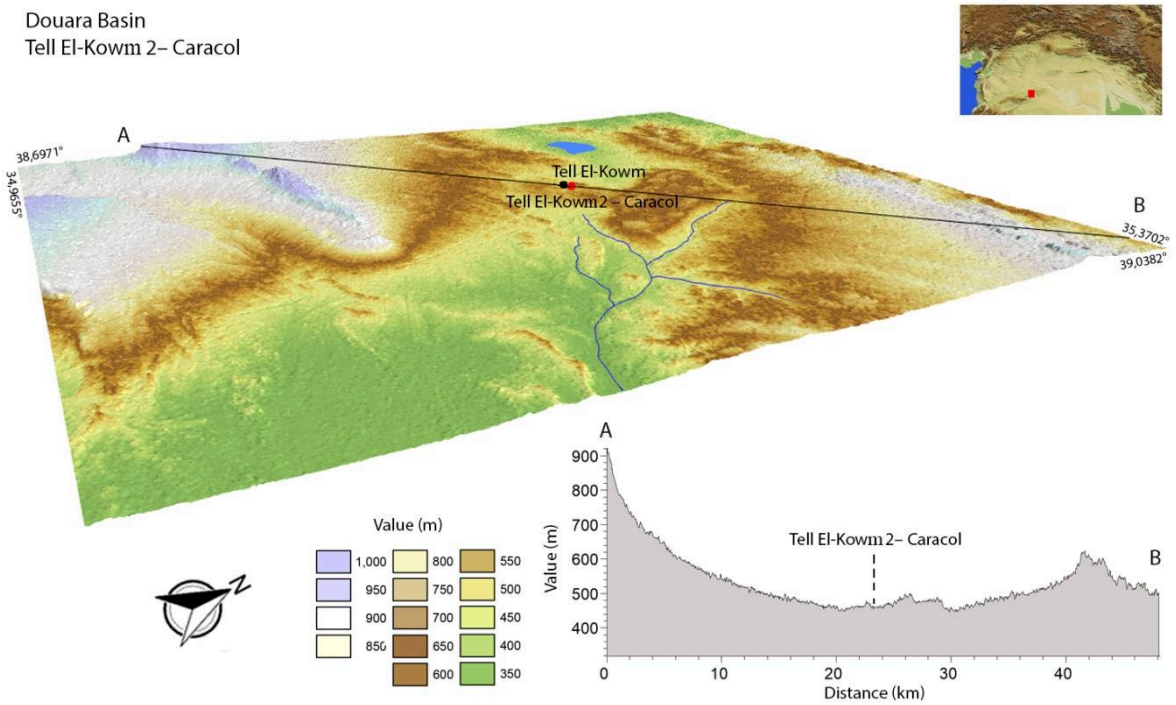


Figure 2.30: 3D DEM and cross-section of the environment of Tell El-Kowm 2 – Caracol

This settlement has an altitude of approximately 471 meters and covers an area of 5200 m^2. Final PPNB, Early PN[10] and Late Chalcolithic / Uruk layers were determined. (Stordeur, 1989: 102) The phases are designated by capital letters. Phase A represents the PPNB period and Phase B the early period of PN, while Phase C belongs to the Late Chalcolithic / Uruk Period. (Stordeur, et al., 2000a: 21) The final PPNB layers of the site

[10] This period is called PNA in excavation terminology. (Stordeur, et al., 2000a: 21)

were dated between 8030±80 BP (7100-6620 CalBC) and 7200±160 BP (6300-5709 CalBC). (Stordeur, 2000b: 305 Table.1; Stordeur, 1993: 188) However, if we recalibrate these dates using the CalPal method, the date of 8030±80 represented 8885±127 CalBP or 6935±127 CalBC and also 7200±160 BP date is represented 8031±158 CalBP or 6081±158 CalBC

The Final PPNB layer has six subphases, called AIV-AI, starting from the top. In particular, the architecture, accumulation, construction techniques of walls or structures' floors, repair or renewal stages, abandonment or demolition data were taken into account in distinguishing the subphases. (Stordeur, et al., 2000a: 22-28; Stordeur, 1989: 102) In the final layer of the PPNB, compressed earth and mudbrick wall techniques were used. Consistently, there are stones in the lower part of walls but they did not function as foundations. Although there is no definite evidence that wood was used in the structures, traces of local reeds were found. Traces of plaster were also found on some walls and in fillings. (Stordeur, et al., 2000b: 37)

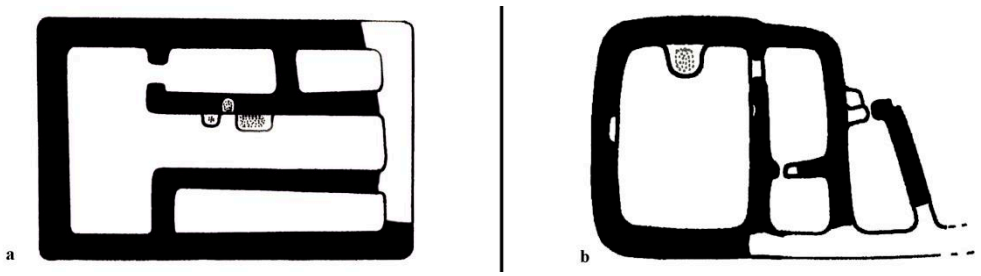


Figure 2.31: Type 1 and Type 2 structure plans from Tell El-Kowm 2 – Caracol (Stordeur et al., 2000b: 39 Fig.2)

The buildings in Tell El-Kowm 2 excavations are divided into two types. Structures Type 1 generally have "T" shaped corridors. (Figure 2.31a) In these structures, small rooms (cells) were arranged on both sides of the corridor which was in the middle. Small rooms are thought to have been used for storage purposes. The structures defined as Type 2 are rectangular buildings consisting of small rooms. (Figure 2.32b) Such structures do not have a standardized plan; they are of different dimensions and have different room plans. (Stordeur, et al., 2000b: 39-40) The remains of Subphase AI, which describes the first Neolithic period of the Tell El-Kowm-2 settlement, are not well preserved. In this subphase, a structure called Building XV with a plastered floor has been identified. Subphases AI and the AII were separated from each other by a sterile deposit. Building XIV, which is in Subphase AII, was found to have been built after the abandonment of Building XV.

Subphase AII has a very shallow deposit. In this phase, Structure XIII, which is associated with open areas and pits, was exposed. (Stordeur, et al., 2000a: 22-24)

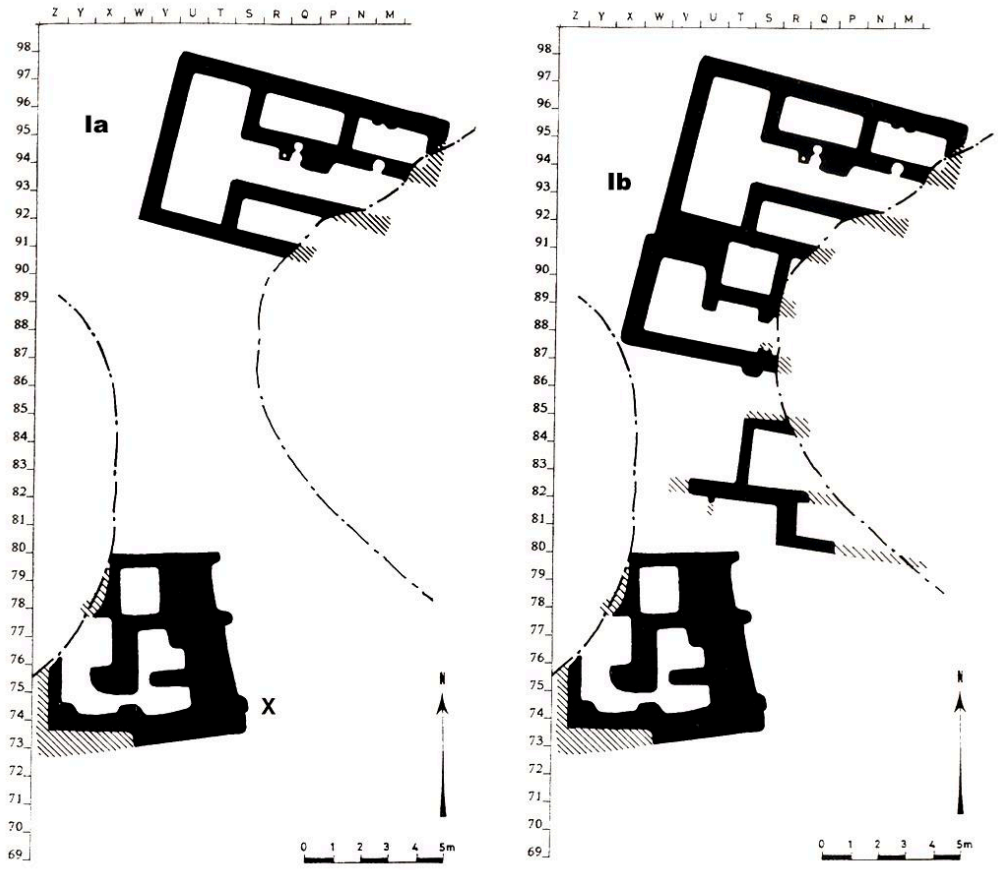


Figure 2.32: Settlement pattern and architecture from Subphase IX and X (Stordeur, 2000a:89 Fig1)

Subphase AIV, which was exposed in an area of about 350 m^2, was quite rich in findings. Buildings I, IV, IX, X, and XII were structures separated from each other by paths or open spaces. (Stordeur, et al., 2000a: 25-27) The most important structure was Building I, with two building stages. Building Ia has a "T" shaped corridor with small rooms (cells) on both sides. (Stordeur, et al., 2000c: 61) This building is allocated as Type 1 according to the excavation classifications. (Stordeur, et al., 2000b: 39) A further structure, as much as half in size of the Building 1 structure plan, was added to Building Ia (Stordeur, et al., 2000c: 69; Stordeur, 1989: 104), namely, Building 1b. It is understood that Building 1a was abandoned or destroyed when Building 1b was in use. (Figure 2.32) In the area where this building is located, another building was built in Subphase AV. There is also a similar situation for Building IX, which was built in two stages, called Building IXa and Building IXb. After Building IV was demolished, these two structures (IXa- IXb) were replaced by Building IV. Although there are traces of abandonment in the southern part of Subphase

AIV, life in the northern section of the settlement continued. For example, Building I built in Subphase AIV was reused in Subphase AV. Subphase AV is similar to Subphase AIV. Building IIa of Subphase AV was built just above Building I. However, no significant relationship was detected between Building Ia and Building IIa. In Subphase AVI, the basement or walls of two structures were identified. (Stordeur, et al., 2000a: 24-28; Stordeur, 2000a: 88-90)

Early PN layers have been identified on pottery sherds found in some pits. No architectural structure or structural element was detected. The absence of architecture or any traces suggests that the settlement at this stage was used by nomadic groups. According to the archaeozoological data of phases A and B, it was concluded that the communities using this area had adopted at least seasonal mobility for cattle grazing or due to arid climatic conditions. (Stordeur, 1993: 203)

2.5.6.3. Qdeir

The Qdeir 1 settlement is located to ca 6 km north of El Kown settlement. It has a shallow deposit surrounded by several sources. Excavations first ran by the Mission d'El Kowm-Mureybet directed by Jacques Cauvin in 1980. Larger-scale excavations were conducted under the directorship of Danielle Stordeur in 1989, 1991 and 1993. Subsequent seasons were initiated by Frédéric Abbès in 1999, and 2001–2003. The site covers an area of nearly 2000 m^2. An area of 200 m^2 have been excavated. (Abbès, 2015)

The settlement was occupied in FPPNB dated to 7560$\pm$340BP (7100-5720 CalBC) (Stordeur, 1993:188). However, if we recalibrate this date using the CalPal method, 7560+340BP date represented 8456+388 CalBP or 6506+388 CalBC. Four phases were identified. Phases II and IV comprise some flimsy structure remains while phases I and III have none. The rectangular structures were directly erected on the natural ground without stone footings (Stordeur, 1993: 190). Basically, Qdeir 1 was defined to be a nomadic desert camp with a workshop of flint artefacts. (Abbès, 2015; Besançon et al., 1982).

2.5.7. Rouj Basin (Tell el-Kerkh 2)

The Rouj Basin, which was included in this study in the context of Upper Mesopotamia, is located in the northwestern part of Syria. (Iwasaki, et al., 1995: 143) To the west of the basin lie the Vastani Mountains and to the east are the Zaviye Mountains. The basin, which is fed by the Orontes River, is about 2-7 km wide and 37 km long. (Akahane, 2003: 12) with various geomorphological structures and climatic conditions that comprise a very rich habitat. (Tsuneki, 2003a: 3) Among many different settlements in the area, only Tell al-Kerkh 2 was examined due to its relevance to our study. (Figure 2.35, 2.36)

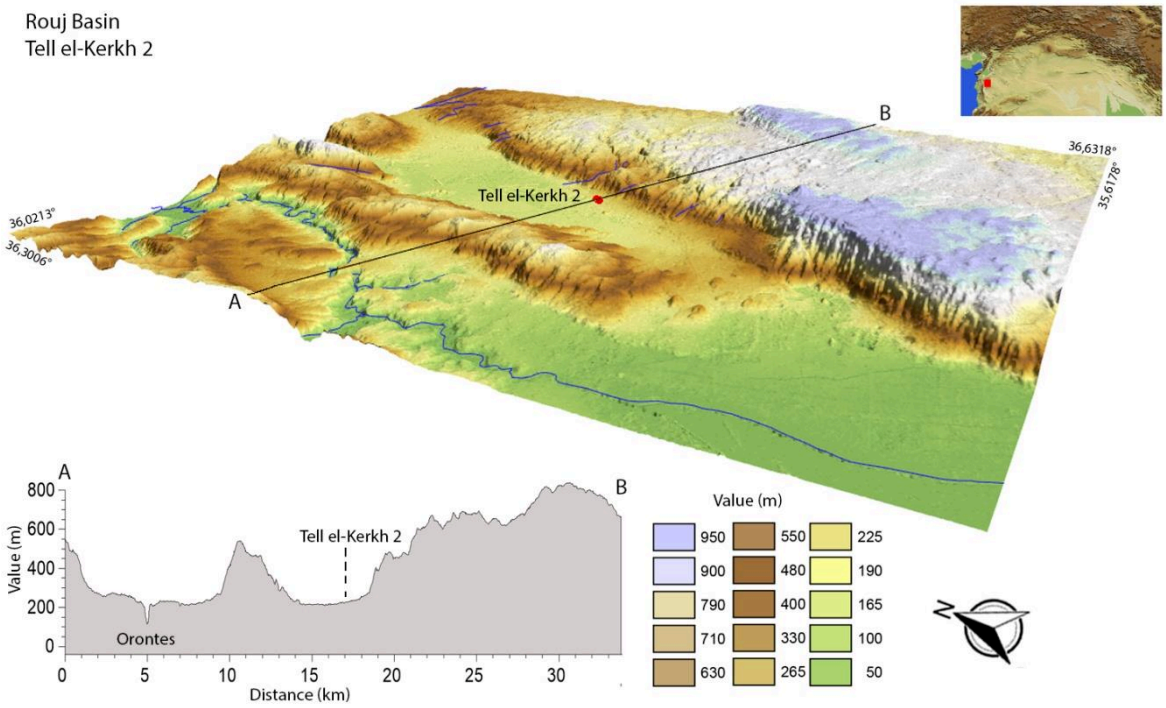


Figure 2.33: 3D DEM and cross-section of the environment of Tell el-Kerkh 2

This settlement is located in the south-west of Tell Ain al-Kerkh and just north-west of Tell el-Kerkh 1 mound. (Tsuneki, et al., 2006: 48, 50 Figure 2; Miyake & Tsuneki, 1996: 110) Tell el-Kerkh 1 about 30 meters high and is the most noticeable mound among others in this area. (Arimura, 1999:7) Tell al-Kerkh 2 (Figure 2.33) has only Neolithic deposits while Tell el-Kerkh 1 has a stratigraphy from the Neolithic Period to the Middle Ages. (Miyake & Tsuneki, 1996: 110)

Tell el-Kerkh 2 has been dated to between 8680 and 8070 BP by two C_{14} dates (Iwasaki & Tsuneki, 2003: 193) which allocate the site to the PPNB and Early Pottery Neolithic Period. However, these radiocarbon dates are incompatible with the excavation

data. For instance, the Level 10 was dated to 8070 BP but the upper phase Level 5 was dated to 8680 BP.

The excavations were carried out in very narrow areas of about 5x5 m in dimension. The total deposit of this limited exposure was 4.3 m. According to the data of architectural remains and fillings, Tell el-Kerkh 2 has 12 layers given numeric names (layers 12 to 1). (Miyake & Tsuneki, 1996: 111) There was no pottery between Layers 12 to 8. Pottery (only 2 fragments) was initially found in Layer 7, while there were many sherds in Layers 6 to 1. Accordingly, Layers 12 to 7 were Late PPNB; Layers 6-5 were PPNB-PN Transition, and Layers 4-1 were dated to the first PN period. (Tsuneki, 2003b: 44-46)

The architectural remains between Layer 12 just above the virgin soil and Layer 8 were very scattered. The deposit of these layers is generally a dark brown coloured earth mixed with lime fragments. The filling of about 1.5 m in thickness could be divided into five different layers according to the changes in soil type and poor architectural features. However, the architectural remains are very limited since the excavated area was very narrow. For example, Layer 11 has been defined by an ash fill with a thickness of only 10 cm and a plastered stone pavement with an area of approximately 1 m^2, which was called "Structure 14". In Layer 9, the shallow ash pit about 50 cm in diameter was thought to belong to a building and was named as “Structure 13”. (Miyake & Tsuneki, 1996: 112; Tsuneki, 2003b: 44, 49 Fig.16, 50 Fig.18)

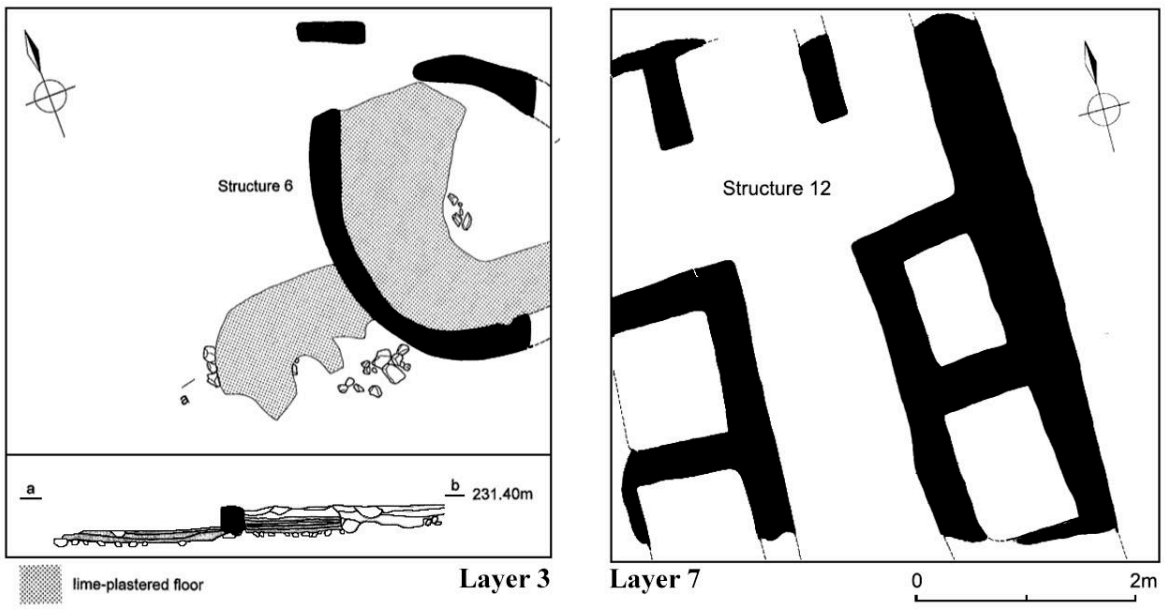


Figure 2.34: Architecture structures from Layer3 and Layer 7 (Miyake & Tsuneki, 1996: 112 fig.4-5)

The best architectural remains of this settlement are in Layer 7 where a rectilinear structure with a corridor, called “Structure 12”, was unearthed. In this structure, there were rectangular small rooms (cells) lined up on either side of the corridor. The walls of the structure have been built directly on natural ground without a stone foundation. The walls were built of reddish-brown soil by the pise technique. These walls of about 60 cm thickness could be separated into reddish-brown soil layers about 5-6 cm thick. Ten dark grey fillings were detected at the junctions of these layers with a thickness of 1-2 cm. A noticeable floor was not found either in the rectangular small rooms about 1 m^2 or in the corridor of Structure 12. (Figure 2.34) Therefore, it has been suggested that the rectangular small rooms may have been used for storage purposes or had a foundation function for the upper structure. (Miyake & Tsuneki, 1996: 112; Tsuneki, 2003b: 45) No pottery fragments were found in the structure. Two sherd fragments in Layer 7 were found on the top of Structure 12. This structure has been dated to the Final PPNB period based on its chipped stone assemblage. (Tsuneki, 2003b: 45, 50 Fig.19)

The architectural remains of Layers 6 and 5 are poorer than those of layer 7. Remains in these layers consist of plastered floors with traces of pise walls and scattered stone concentrations. They have been suggested to be floor or platform remains. In Layers 4, 3 and 2, round structural remains of 2 – 2.5 m in diameter were found superimposed on each other. The best-preserved building is Structure 6 located in Layer 3. (Figure 2.35) This structure had 20 cm high walls with a floor that was renewed four times by plastering. The inner surfaces of the walls and floor were completely burnt. The common feature of round constructions was thick walls and well-plastered floors. However, the wall and plaster techniques, material used in walls, or the stone pavement under plastered floors have different characteristics. Even the function of these round structures is not known. It was suggested that they might be ovens or storage areas. In Layers 2 and 1 there were shallow pits with dark grey fillings and stone concentrations believed to be the remains of hearths. None of them have standard shapes. (Miyake & Tsuneki, 1996: 111; Tsuneki, 2003b: 45,46, 51-53 Fig. 20-25)

2.6. Discussion and Interpretation

There are some problems related to the determination of the cultural regions of the Neolithic settlements. In some areas, the number of excavations can be misleading about the

boundaries of the cultural regions where the settlements can belong. In other words, we are still far from understanding what is happening during the existence and expansion of the Neolithic socio-economic and social organization diversity. Thanks to the studies carried out in recent years; when more data flows, it is difficult to find acceptable answers to old questions. At least this can be shared: the fact that the old questions are not formulated properly and more complex than previously envisaged. In this context, we have to reconsider our current Neolithic perception and re-discuss what the term "Neolithic" means. In addition, the existence of mobile groups or semi-mobile groups during the Neolithic Period and their relationship with permanent settlements is another problem.

Where were the spread areas of this socio-economic adaptation in Northern Mesopotamia and its vicinity? The only reason for mobility was to reach the raw material resource areas such as obsidian or not? or Were the external environmental factors claimed to have been occurred 8,000 years ago, the cause of mobility? Did their winter quarters and summer pastures indicate functional differences? When was the beginning of the semi-nomadic lifestyle in Northern Mesopotamia? or Have these groups continued to exist in some way since the Palaeolithic period, when the moving groups became a pastoral semi-nomadic form? What was the main reason for the semi-nomadism at the end of the LPPNB / FPPNB? Did Sumaki Höyük serve as a seasonal camp and/or temporary settlement on the way to the highlands during the LPPNB / FPPNB and EPN? How should we then interpret the presence of relatively permanent structures such as cell buildings in the early occupation (Phase N6 and Phase N5). Even though, for the time being, there were not several similar sites found along the highland area, Upper Tigris Valley seems to have been developed into some kind of a port of call, probably for mobile groups, before they headed for the highlands, such as Nemrut Dağ, Süphan Dağ, and Lake Van district.

In this study, it is suggested that Sumaki Höyük is one of the important settlement that comprises all these questions above. Since it is not very accurate to answer these questions upon on one site, settlements in which the existence of mobility was discussed and having similar architecture with Sumaki Höyük in the Northern Mesopotamia and its close vicinity were selected. The data of the selected settlements and the architectural data of Sumaki Höyük were evaluated together and some comments were made in the conclusion section.

The existence of pastoral semi-nomads at the end of LPPNB is discussed particularly with two arguments. The first is some noteworthy changes in the settlement pattern while

the second one is the significant changes or partial distortions in the architectural traditions. Within the scope of this thesis, the perishable and flimsy structures of Sumaki Höyük and similar architecture that were exposed in other sites in the Northern Mesopotamia will be discussed. For example, the highly developed Çayönü architecture was transformed into a space where the garbage dump was discarded and the "Plaza", which was partially disrupted during this period, was used as a common area.

There are rectangular stone-walled structures in the winter quarters of the Lower Garzan Basin. There are no mudbrick remnants on the stone walls/surroundings of these structures of pastoral semi-nomads since they are served for an enclosure of tents. It was observed that the struts that provide the tension of the tents are not buried in the ground and therefore do not leave a trace. Accordingly, in many archaeological excavations, it is quite normal that there is no trace of post holes on the edge of the stone surroundings and/or walls. Architectural deteriorations, which were clearly documented at Ain Ghazal and Beidha in the Levant were interpreted as the ‘new tradition’ belong to pastoral semi-nomads (Köhler-Rollefson & Rollefson, 1993: 40) However, in many settlements discussed in this thesis, the phases of this transition and deterioration process are almost absent, except for Mezraa Teleilat, Akarçay Tepe and Çayönü. Possibly after the end of this period, the stone architecture has been replaced by temporary flimsy structures and/or tents. Or many settlements taken into consideration were not permanent settlements. They were either short-term semi-sedentary areas or seasonal sites that were used by mobile groups as temporary camps. Therefore, in the context of this thesis, the settlements from different regions with similar cultural fillings have been selected. For example, the architecture of Tell El-Kowm 2/Caracol settlement in the Doura Basin, which is located in a semi-arid and semi-desert transition area, is also evaluated by the Jarmo settlement, which is found reed traces mostly in walls and floors.

Perhaps the most important reason is that since the semi-nomadic architectural traces can hardly be identified on the field, micromorphological investigations will be helpful. Therefore, this type of data has been either ignored or not discussed in detail as in Mezraa Teleilat. However, in limited exposures, such as Ginning and Tell el-Kerkh 2 excavations reports have very ambitious comments. Such as for Tell el-Kerkh 2: Even if there were not any data on storage-related, the rectangular small rooms have been interpreted as for storage purposes (Miyake & Tsuneki, 1996: 112; Tsuneki, 2003b: 45) In spite of very limited exposures (5x5m), it is written that no pottery fragments were found in the structures, the

only two sherds in Layer 7 were found on top of Structure 12. Accordingly, Layer 7 was dated the FPPNB period based on the chipped stone assemblage (Tsuneki, 2003b: 45, 50 Fig.19). On the other hand, Baird & Campbell (1990) believed that the cell-planned structure in Ginning has been made some additions over time, but there was not any serious evidence to support this interpretation.

One of the interesting and important findings in Tell Seker al-Aheimar is the water well in the LPPNB level dated to 8065 BP. This water well represents the oldest known example in Syria. It is at a depth of 4.5 m with a diameter of 2 m in Sector C in Square E13. The fact that this well was opened in the settlement situated right next to the Khabur River indicates that a water shortage occurred in the settlement. Nishiaki interpreted the opening of the well with the possibility that the Khabur Stream was probably contaminated and that better-quality water was needed. (Nishiaki, 2016: 71) However, considering that there was no industrial waste to pollute the water in question and that domestic waste could not have been so voluminous as to pollute the river at that period, the opening of the well seems to be directly related to the drinking water problem. Also supporting this interpretation are the drought and climatic changes that occurred around 8,000 BP in the Near East. Basalt and limestone mortars, pestles and grinding stones, which were intentionally thrown into the well might relate to ritual practices, welcome to clean water!

In many contemporaneous settlements, lime pieces or limey areas were identified in both the architecture and open areas. Examples include Phases 1 and 2 of Salat Cami Yanı; the LPPNB and Pre-Proto Hassuna levels of Tell Seker al-Aheimar; Phase 3 of Tell Sabi Abyad II; Structure 5 in Phase C in Hajji Firuz; the Hassuna Ia layer of Tell Kashkashok II, and LPPNB layers 12-8 of Tell el Kerkh. In these settlements, limey areas are usually concentrated in brown or orange-coloured pise-walled structures, or on the surface of walls or on floors of rooms and cells in these structures. They are often interpreted as plaster or intensive use of lime in the excavation reports. These interpretations were usually based on field observations rather than detailed XRF, XRD or phytolith analysis. For example, partially-dried mudbrick blocks used in the construction of structures at Tell Hassuna Ib were straw- and lime-tempered. Although not chemically analysed, the powdered lime-like material that separated Phase A from Phase B at Gritille was thought to be associated with burnt lime fragments in the deep pit in Operation 16. In Tell Seker al-Aheimar, traces of weeds and reeds documented in phytolith analyses of lime and soil samples that were taken from the floors of the structures were thought to be related with indoor activities.

Considering that the use of these analyses in archaeology has become widespread in recent years, it is likely that many archaeological interpretations are based on field observations. However, XRF, XRD, EDX and isotope analysis of the calcified remains on the structure walls or in the open areas of Sumaki Höyük display a very different picture.

Conclusively, in the Upper Mesopotamia, between the years 8,000-7,000, there were different communities /settlements - short-term or long-term, sedentary or temporary- living in similar or different physical environments. From the limited number of settlements considered within the scope of this thesis, it is very difficult to make comparisons between cultural regions, especially in the architectural context. The rectangular plan, which is generally seen in the settlements is dominated, the layout of the buildings is not standard in dimension or shape. Even they were either constructed by stone or kerpiç, or piled earth, or mixed material, always compatible with the topography of the area. Except for Çayönü Tepesi, none of the sites have any data on the 'upper living floor' erected on the cell-planned basements. Although, there's no standard in dimension and shape in the cell-planned buildings/ basements, and the ones with 'T' or L-shaped corridors, the cells and the corridors are very small for living. Accordingly, it is thought that the cell-planned buildings with or without corridors in most of the sites such as Salat Camii Yanı, Mezraa Teleilat, Akarçay Tepe, Tell Seker al-Aheimar, Tell El Kowm 2 – Caracol, Tell al-Kerkh 2, and may be Sumaki Höyük have upper living floors.

In most of the site's daily activities such as cooking, knapping, etc. took place in open areas rather than inner spaces. This may be related to socio-economical and/or environmental conditions. Another interesting issue, worth to be touch on here, is that the buildings in almost all the LPPNB/FPPNB and EP sites mentioned above, were seems to be deliberately cleaned before leaving. This situation is also valid for buildings of Sumaki.

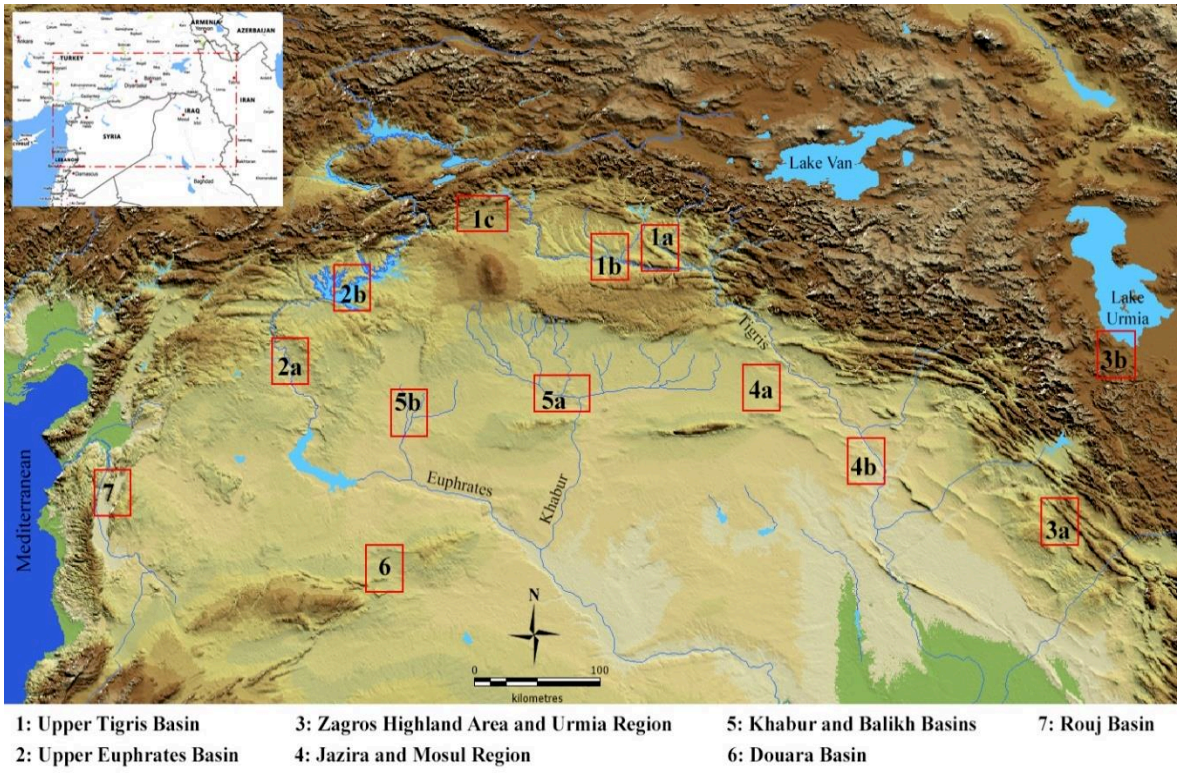


Figure 2.35: Location of the basins and/or regions mentioned in the thesis

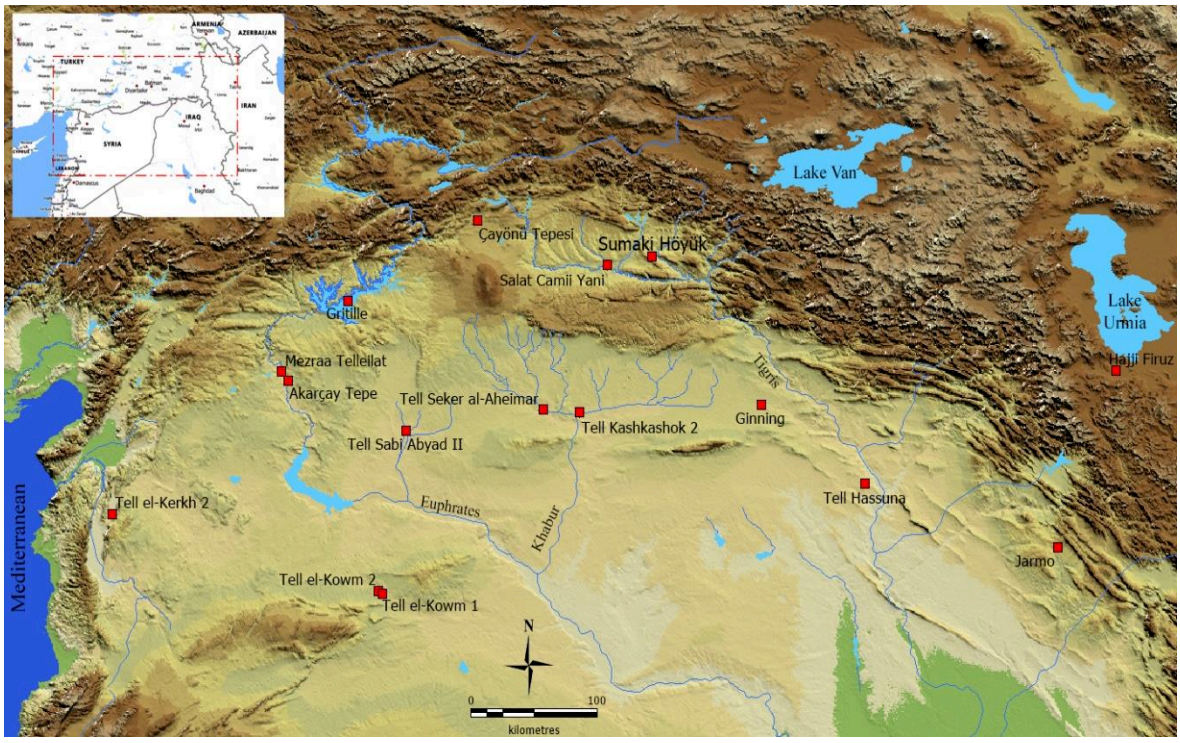


Figure 2.36: Locations of contemporary archaeological sites

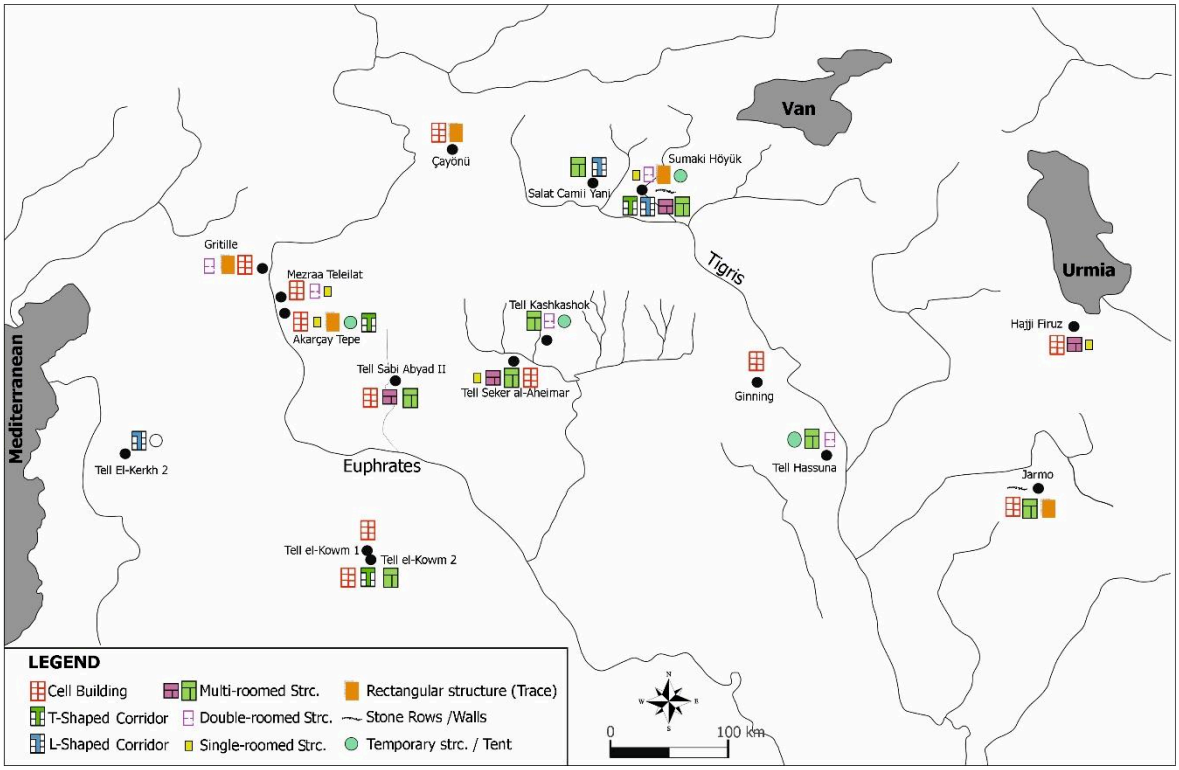


Figure 2.37: Distribution of architectural structure plans of some contemporary settlements at Sumaki Höyük

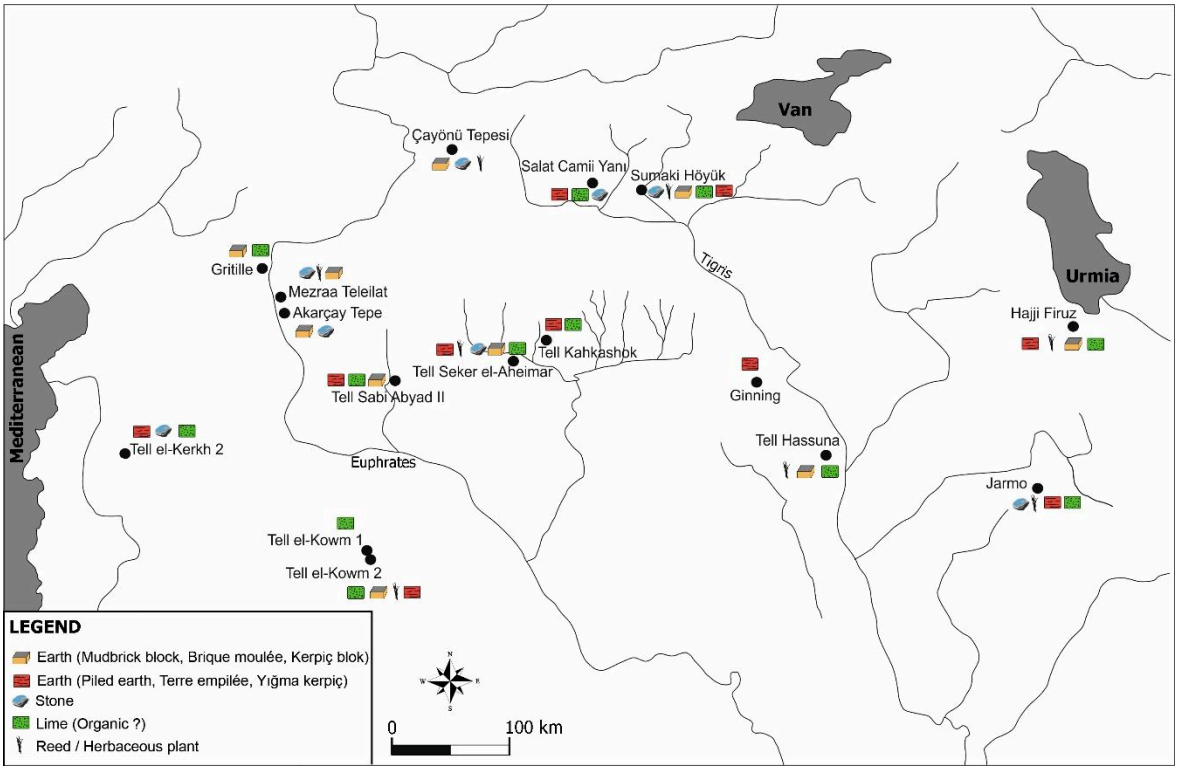


Figure 2.38: Distribution of architectural structure materials of some contemporary settlements at Sumaki Höyük

CHAPTER III

PALEO-ENVIRONMENTAL CONDITIONS AND STRATIGRAPHY OF SUMAKİ HÖYÜK NEOLITHIC SITE

Investigation of the settlement pattern and living model of an archaeological settlement presents an opportunity to understand the architectural tradition and lifestyle of communities as well as examine traces of social organization. In this context, the most important physical evidence to determine the cultural background of a settlement is the accumulation/fill of the layers and spatial organization. Since the size, function, and location of structures or areas used show variability linked to external environmental factors as much as to human activities, this thesis study attempts to reveal the lifestyle of Sumaki Höyük Neolithic society in the framework of Neolithic Period environmental-human relationships. The settlement's topography, climatic characteristics, proximity to raw material sources, paleo-environmental conditions, and effects of human choice are some of these factors.

It is not easy to comprehend the settlement pattern and architectural processes in a Neolithic settlement or to reveal all aspects based on the remains found. In terms of technique and function, there are several methods to understand an architectural structure and/or structural elements in a Neolithic settlement. Among these, use of multiple analysis methods, creating an elevation model of the area and determining paleo-environmental conditions in addition to observation, comparison and field studies can be listed. Another method in terms of understanding and interpreting the daily lives of past communities is ethno-archaeological investigations.

Research projects on prehistoric societies seek answers to a number of questions. Most of the archaeological projects and sometimes geomorphological investigations on the Neolithic Period have mainly focused on three subjects. The first and most controversial one is the transition process and progress to sedentary life, which has partly been enlightened. The second problem is the pottery production process and development in the context of time and space from both technological and artistic aspects. This subject has been partly understood from recent excavation data. The third one mainly concentrates on the transition period between Pre-Pottery Neolithic and Pottery Neolithic periods, and also the background involving cultural disruption or abandoned settlements. The social structure of this transition period and various lifestyle models in different areas are very complex, and it seems that

there is no single answer. This thesis is mainly based on answering some aspects of the third question or aspect by researching through an architectural window.

3.1. General information on Sumaki Höyük

Sumaki Höyük was excavated during a total of five excavation seasons from 2007-2010 and 2014 directed first by Mardin Museum then by Batman Museum, with Dr. Aslı Erim-Özdoğan as the scientific advisor. Sumaki Höyük is also the only Neolithic settlement in all the archaeological surveys and excavations carried out to date in the Lower Garzan Basin. Accordingly, in 2007 excavations were begun at Sumaki Höyük primarily to determine the Neolithic Period stratigraphy of the Lower Garzan Basin. After five seasons, it was understood that Sumaki Höyük was mainly occupied during the early Pottery Neolithic, although it has a phase with PPNB features.

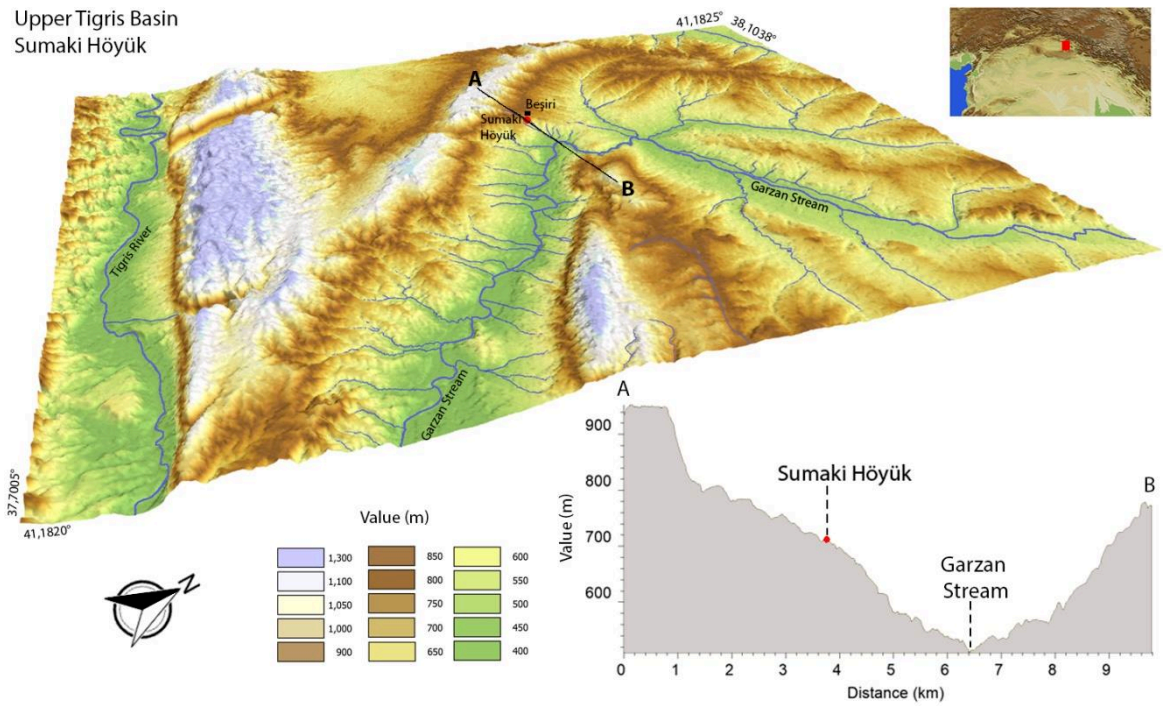


Figure 3.1: 3D DEM and cross-section of the environment of the Sumaki Höyük

Sumaki Höyük is located 1 km east of Beşiri district in Batman province. (Figure 3.1) The settlement is positioned in the northern portion of the Lower Garzan Valley, nearly 2.5 km east of Garzan Stream. (Figure 3.52) The settlement was founded on ground slightly sloping in a southwest-northeast direction on an erosion surface with an elevation of 700.00 - 710.00 meters. (Figure 3.2) Just north of the settlement is Kani Huşur Stream, which flows through a very deep valley.

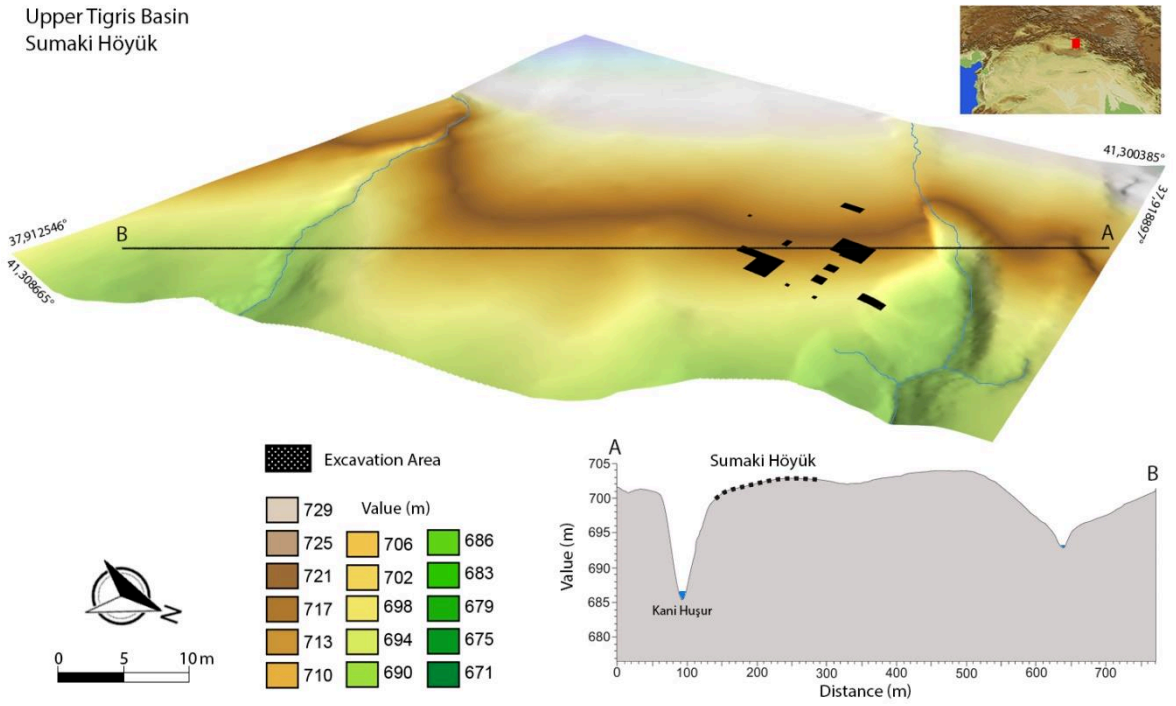


Figure 3.2: DEM and excavation area at Sumaki Höyük

According to excavations and surface research, the settlement has the size of nearly 160x140 meters, with its deepest fill thickness being 2.4 meters. However, as the whole of the Sumaki Höyük settlement has not been excavated, it must be stated that this data is incomplete, albeit partially. With the aim of identifying the western limit of the settlement, trenches 7K-L excavated in 2008 did not identify any archaeological finds, while 3x3 m soundings in both 22G, 22İ and 17R plan squares in 2014 did not encounter any archaeological fill. (Figure 3.50, 3.51) Additionally, in trench 20G, which was excavated between 2008 and 2010, a slope with a steep incline of east-west orientation was identified. Excavations in trenches 20B and 20C in the 2009 excavations found natural soil and Upper Miocene sand sediments below the Middle Age layer. South of square 20R, the topographic terrain changes direction to slope more toward the southeast. Field and mapping investigations in the vicinity identified an area that may be an ancient riverbed. With all this data along with excavation findings and slope determination in the trench sections, an attempt was made to clarify the boundaries of the settlement, if only partly. The dimensions mentioned above are proposed on the basis of all data gathered so far. Additionally, it should be stated that excavation, sounding and architectural distribution data indicate that the main axis of the settlement may have been in a southeast-northwest direction. Probably the settlement was bordered by seasonal streams or tributaries with marsy areas to the north and

south and had the character of a settlement placed on southeast-northwest oriented natural terraces. However, both geographical factors and human activities have changed the topography of the settlement significantly over time. (Figure 3.3)

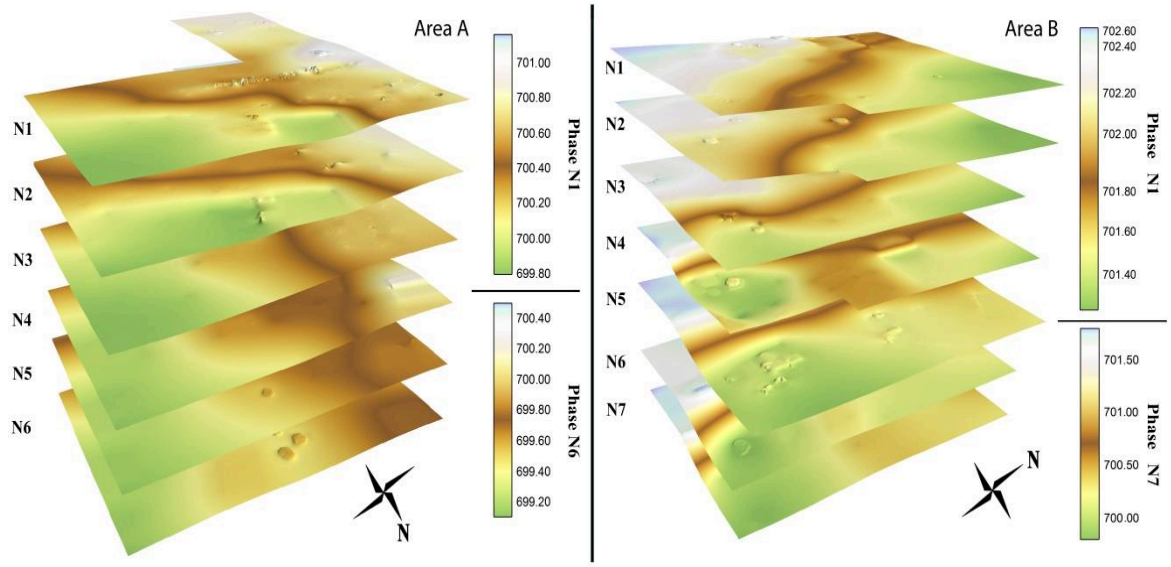


Figure 3.3: Changes in topography by phases at Sumaki Höyük

The Kıradağı basalt flow with very flat topography is located south of the settlement. (Figure 3.26-3.28) This flow, equivalent to a "mesa" in geomorphologic terms, is found above the Upper Miocene-aged claystone, mudstone, sandstone and conglomerates of the Şelmo Formation. Here, there are important geomorphological factors affecting the settlement. Firstly, this basalt mass acts as a reservoir for rainwater seeping into the rock and the underground water meeting the clay layer underneath rises to the surface in slope springs. The water emerging from underground together with seasonal rains constitute the surface flow, which runs down very steep slopes. These slopes formed of clay units are also areas where extreme erosion and landslides are experienced. Due to the heavy basalt mass above, along with the slope instability, landslide events occur very frequently in the area of Sumaki Höyük. (Figure 3.6) Current and paleo-landslide traces may be observed in the form of rupture surfaces, landslide rubble and toes, with irregular sequences on the northwest slope of Garzan valley. There are traces in both the environmental and the excavation data indicating that Sumaki Höyük settlement was indirectly affected by these landslides and soil flow processes.

3.2. Paleo-environmental condition of Sumaki Höyük

In order to understand the paleo-environmental conditions of Sumaki Höyük and its surroundings, detailed geomorphological investigations were made in the Lower Garzan Basin and relevant data was combined and compared with the excavation data. The important geomorphological data have been gained by the hydrography of Garzan River, mass movements and landslide activities, and different soil structures in the Garzan Basin. Besides, various data that hinted rapid climate change since 8000 BC also discussed here briefly with archaebotanical remains and present flora.

3.2.1. Hydrography and river system around Sumaki Höyük

The Tigris River and its tributaries define the hydrography of our study area. (Tolun, 1962: 3) The Upper Tigris Basin has three basins, namely, the Garzan, Bothan and Batman Stream basins. (Altınlı, 1966: 38) This area is a transition zone between Mesopotamia and Anatolia (Doğan, 2005: 79) and has been much fragmented by streams and brooks. It is possible to divide these basins into smaller basins or watersheds within themselves. The three main rivers in the Upper Tigris Basin are oriented north-south. (Figure 3.4) They flow from high areas in the north to lower areas in the south, and the Tigris River flows with great force due to the slope of the river as it rapidly reaches its main bed.

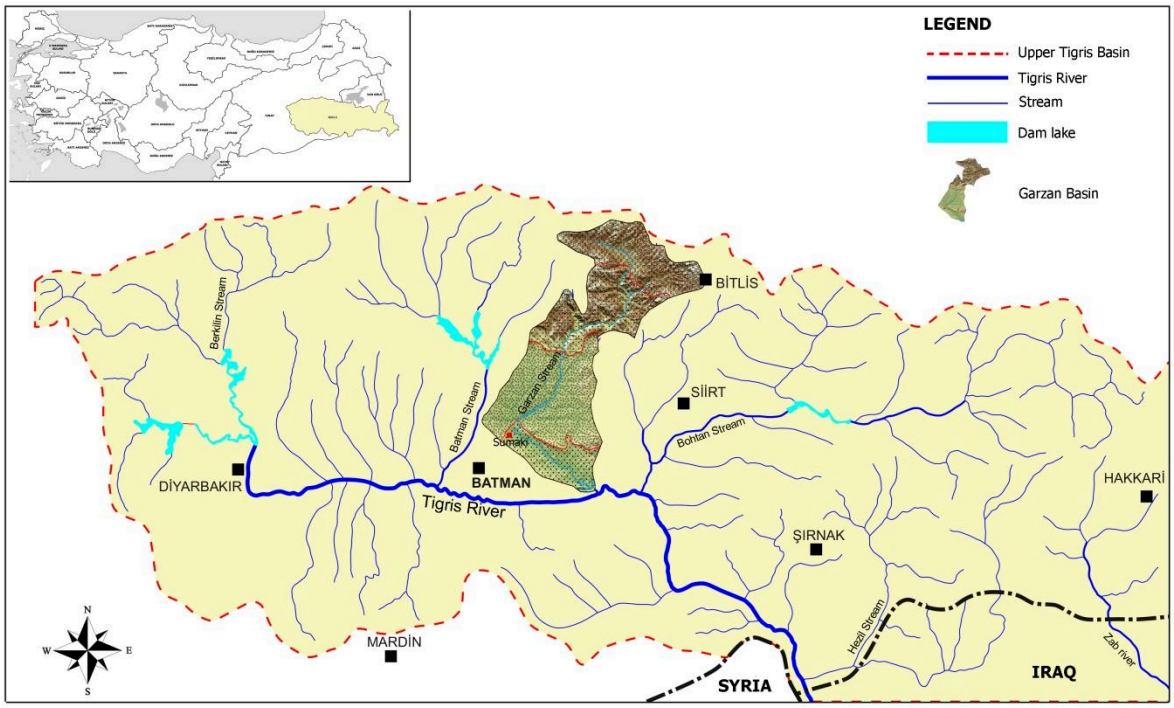


Figure 3.4: Location of the Garzan Basin in the Upper Tigris Basin

There are groundwater springs in the Kıradağı basalt and underlying Şelmo Formation immediately south-west of the study area. (Figure 3.5) These include the Kani Huşur Brook flowing in a deep valley immediately north of Sumaki Höyük, and the Çamaşır and Haraba brooks linked to it, along with Harun Brook directly south of Gre Mare, and the Sırıkçeşme, Seymenlik, Hüseynik and Aydaömer brooks connected to it. The Girremeri Brook flowing south of Merrit Hill and the related Petno and Gevirbeli brooks are also fed by groundwater from the Kıradağı basalt and Şelmo Formation. The Bülbok, Gevirbeli, Muhacir, Avdoömer, Düz, Çırcıpak, Derevin, and Hoti springs also have their sources in these geological units.

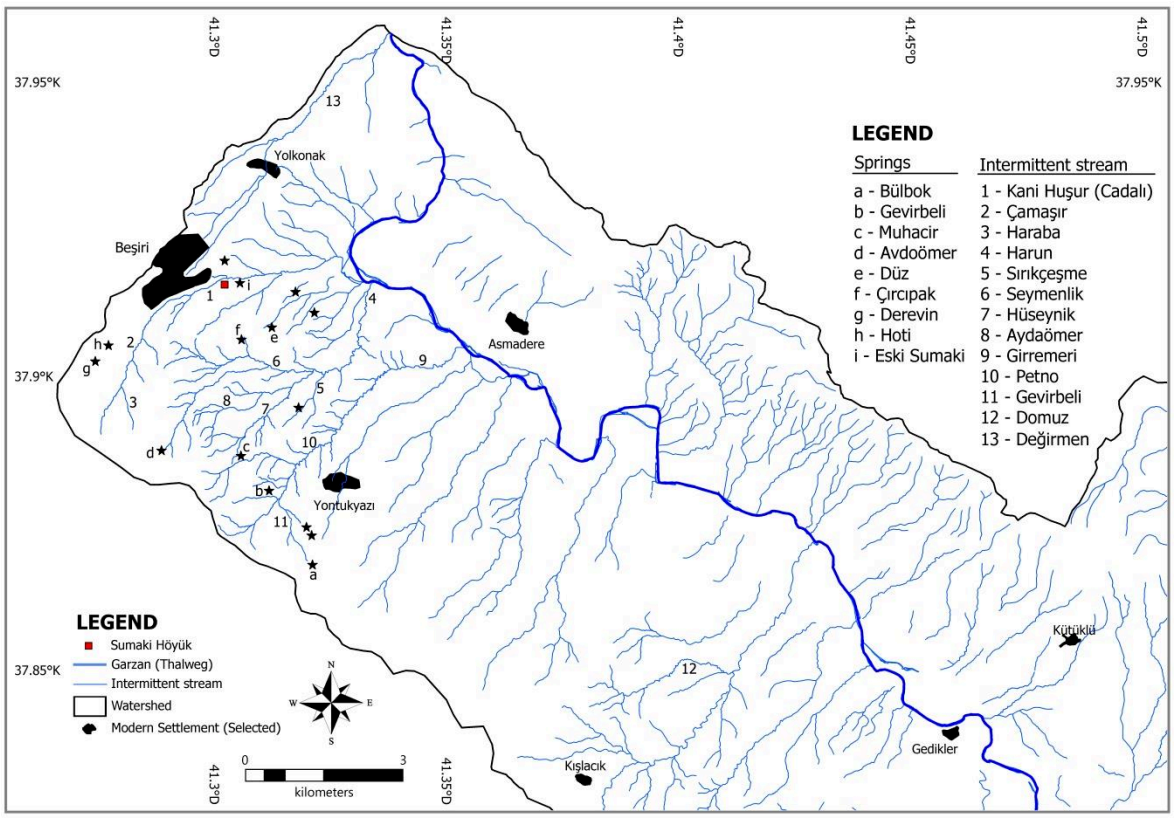


Figure 3.5: Hydrography of the Lower Garzan Basin

The different lithological properties of the basalt layers of Kıradağ and the presence of clay horizons in the looser structure of the underlying Şelmo Formation prevent vertically falling water from seeping to lower levels everywhere. In short, water accumulating along units that avoid seepage of water at different levels instead flows through fractures and joints, as permitted by the geological structure. The existence of numerous springs between Sumaki Höyük and the east slope of Kıradağ is primarily due to this geological structure. Many springs dried up or the path of the water changed direction in the area around Sumaki Höyük

according to archaeological and historical records. An example may be given of the partly-dry spring ca. 200 m northeast of the site (Figure 3.23) and in Kani Şırık Mevkii[11]. Also, the best example of a spring or tectonically-linked water drainage variation was identified in flood fill in the 20N-20/O trenches south of Sumaki Höyük (Figure 3.56-A) and a depression area to the south, according to topographic data. (Figure 3.2)

Haraba Stream flowing NE sourced on Kıradağ turns east in the Beşiri district and enters the Garzan Stream as the Çamaşır Brook. Topographic assessment and field observations show that Haraba Brook used to continue flowing from where Yolkonak village joined Değirmen Brook. The closure and change in direction of Haraba Brook is considered to be an indicator of the thrust line found close to Yolkonak village, and linked to uplift occurring in the eastern portion of the basin. In addition to those, In the Lower Garzan Basin, the hydrographic effect was recorded in different structures over time. Geomorphological sediments supporting the presence of colluvial and lacustrine were identified. (Figure 3.29-3.31)

3.2.2. Landslides around Sumaki Höyük

In any geographical area, geological and/or geomorphological masses change their location not only through erosion. Other elements that move masses are mass movements, which begin when the weight of the mass and the forces holding the mass in place reach a certain level. Together with the degree of the slope, the quality of geological structure and weak plant cover as well as precipitation are the main elements determining mass movements and their effects. (Siler & Şengül, 2016: 134; Sunkar & Tonbul, 2009: 97) This movement may be in the form of mass falls, landslides and rock falls. Masses moving as a result of sliding along a slope due to gravity form surface landforms such as landslide toes, debris accumulation, etc. (Atalay & Bekaroğlu, 1973: 43-46)

Mass movements around Sumaki Höyük are formed by three primary mechanisms. The first one is in the form of collapse or slips, flows and falls. Collapses generally occur in areas with large-scale landslides, while slips affect relatively smaller areas. Collapse movements consist of more than one step, with landslide toes specifically on the slopes of

[11] Kani Şırık Mevkii was identified during the Cultural Inventory survey in 2002. In Kurdish the word "Kani" means spring-fountain. Even in the survey, no spring or fountain remains were identified; although Şırık Spring is still fresh in the memory of villagers.

Kıradağ. (Figure 3.35, 3.36) The slide surface is generally flat and curved. The flow form of mass movements is observed more often in areas with a clayey, sandy or clastic structure. It is particularly effective on the west side of the Garzan Stream where the Şelmo Formation is predominant. Fall mechanisms occur in movements where hard rocks like limestone or basalt break away. Fall movement (Figure 3.37) is evident in the Kıradağı Basalt and Mare Conglomerate in the form of fragmented blocks that have been dragged.

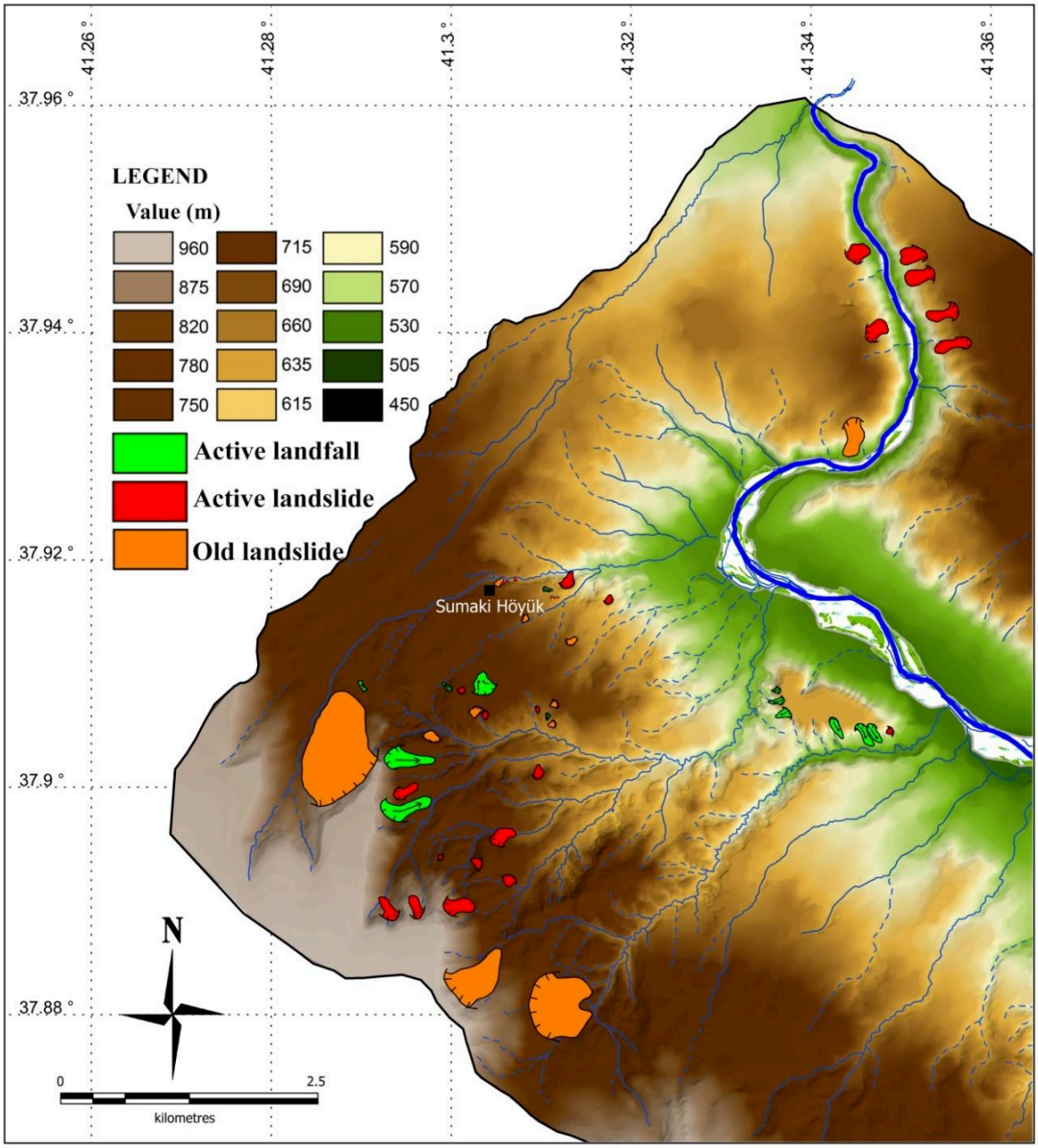


Figure 3.6: Landslides and landfall modeling in the vicinity of Sumaki Höyük

Linked to the topographic structure and slope of the basin and considering the amount of precipitation, its form and duration-season, it is necessary to state the following.

Precipitation falling during the winter and spring in our study area seeps underground or joins the surface flow and acts as a trigger for mass movements. Clayey-sandy-silty geological units saturated with water from precipitation may be a source of mass movements. In periods when precipitation increases, the groundwater accumulating under the cover of Kıradağı Basalt, acting as a reservoir, either reaches the surface through slope springs or passes into the surface flow on the slopes, causing occasional landslides. (Sunkar & Tonbul, 2012: 57-58) Accordingly, mass movements affecting large areas are widely observed on the east slopes of Kıradağ.

Due to the dense, heavy basalt mass above loose units and to the instability of the slope, mass movements occur very frequently and the material is carried over large distances. The best example of this is observed near Tepecik village where basalt blocks from Kıradağ have accumulated on the slope of Garzan Stream. (Figure 3.38) In front of both of these accumulations, in the form of a line, two settlements were detected, Gre Şavo and Gre Keleke, with habitation beginning in 3000-2000 BC. (Erim-Özdoğan & Sarıaltun, 2011:1088-1090) Conclusively, this indicates a large-scale landslide with fragmentation and movement occurring sometime before 3000 BC. Another area where landslide events in clay units are commonly observed is Sumaki Höyük and its surroundings.

Landslides and soil flows at Sumaki Höyük and its environs were spatially modelled with GIS techniques and correlated to geomorphological dynamics and processes effective on the area. (Figure 3.6) The erosion-deposition surfaces where the Sumaki Höyük is located were generally formed in the Quaternary, but more predominantly in the Holocene. Due to the high siltation of this area, sloping piedmont morphology, and geological structure; landforms such as dense slides, collapses and soil flows occurred extensively. Additionally, during archaeological excavations and geomorphological field investigations carried out by us around the settlement, many new landslide fractures were identified. (Figure 3.39, 3.40) Therefore, the area of the settlement was not entirely shaped by paleo-landslides but rather by continuing mass movements, as recently observed.

In the Neolithic layers of Sumaki Höyük, many flood/inundation/soil flow traces have been identified, with two particularly well-defined. (Figure 3.41 – 3.46) Due to these external factors, the settlement was abandoned at intervals. In periods when it was not suitable even for a temporary settlement due to the likelihood of floods, soil flows and suchlike, it is understood that tents were set up in some areas by small groups. Abandonment

of the settlement was not only determined by archaeological data. In the upper levels of Phase N4 fill, a 2-3 cm-thick soil formation was identified which occurred after a probable flood, creating an aqueous environment. (Figure 3.47, 3.48) XRD and XRF analysis show that during the uninhabited periods of the settlement, deposits of different mineralogical composition were transported there by external factors. (Table 3.1) For example, Brucite and Sphalerite are related to an aqueous environment. The presence of Kyanite and Chalcopyrite, sourced in volcanic formations, indicates these minerals were probably transported by slope flows from the Kıradağı basalts.

In trenches 20/O and 20N, a nearly 35 cm-thick swamp/wetland has been clearly identified, which indicates that the settlement was also affected by external factors such as a torrent or landslide after the Neolithic Period. (Figure 3.56-A) Additionally, the steep slope or former river course (?) in trench 20G on the northeastern part of the settlement was filled by a landslide and/or flood. (Figure 3.49) Pottery sherds in some of the Neolithic layers have greenish coloured oxidized surfaces from the effect of a long duration under water. Light archaeological material such as sherds, figurines, chipped stone tools, etc. that were swept away by torrents or inundations have accumulated in depression areas. Since heavy materials like ground stone objects were not exposed to this motion, it is understood that the carrying capacity of the flow rate of the inundation or soil flows in the Neolithic period was relatively low. Heavy flooding or soil flows that disturbed or covered the structures entirely did not occur at Sumaki Höyük and its environs, at least in the Neolithic Period. It should be noted here that our interpretations are predominantly valid for Sumaki Höyük and its close surroundings. To generalise about the Lower Garzan Basin is outside the scope of our study. Finally, it might be emphasised that it is not very conceivable that Sumaki Höyük was the only Neolithic settlement in the Lower Garzan Basin. In other areas, external factors such as more severe soil flows may have covered and sealed permanent and temporal Neolithic settlements. Evidence for this is that during our cultural inventory survey of the Lower Garzan Basin in 2002, a settlement called Kani Kervana dated to the Middle Ages was found under approximately 40 cm of Garzan Stream alluvium. (Erim-Özdoğan & Sarıaltun, 2011: 968-969) The settlement was found by coincidence due to a channel dug for agricultural activities.

3.2.3. Soil structures and the cultural deposits of Sumaki Höyük

The soil types distributed through the Lower Garzan Basin generally developed in anthropogenic steppe fields formed by destruction of partial oak areas under semiarid climate conditions. The soils with broad distribution as per the climate and vegetation are zonal soils. In areas where mass movements were active, and on alluvial floodplains, the dominant type is azonal soil. The basin contains broad areas with brown steppe soils. Sumaki Höyük and its surroundings have blackish-dark brown and clayey yellow-brown soils.



Figure 3.7: Cross-section of trench 22L at Sumaki Höyük

In the environs of Sumaki Höyük, but especially in its southern area, are dark reddish-coloured andosol (Atalay, 2002: 142) soils due to the effect of the Kıradağı basalt. In our study area and its surroundings, reddish-brown soils (aridisol) are common with excessive amounts of limestone fragments in their lower layers. A caliche layer is encountered in the lower layer of these soils due to excessive lime forming as a result of serious drought. (Figure 3.7) In soils with excessive evaporation and insufficient rain, salinization may occur due to alkaline reactions. (Boggs, 2014: 175-179) In other words, with excessive rain, some minerals become chemically soluble in the lower layers of the soil, and tend to rise toward the surface due to capillarity in the dry periods after rain. (Atalay, 2002: 136-137; Dal, 2010: 55; Erpul, et al., 2017: 773) Additionally, at levels where water can rise upward, there is a

direct relationship with external factors as in the cavity structure of building materials and evaporation. As the number of cavities in the material increases, the height that water can reach also increases. Material such as the reed/herbaceous plants used in the Neolithic structures of Sumaki Höyük has very fine cavities, and limey water may rise significantly due to capillarity in these cavities. With evaporation and the rising limey water (Gönül & Çelebi, 2003: 112-113), the cohesion and adhesion forces of objects approach each other. In other words, limey water rising (capillarity) due to evaporation binds to the organic materials used in architecture, or to archaeological materials such as pottery and bones due to the cohesion and adhesion forces, and remains. This process may take several thousands or millions of years. However, accumulations formed in short periods may be observed, as it is in the Holocene-aged Okavango Delta in Botswana. (Graf, et al., 2008: 118)

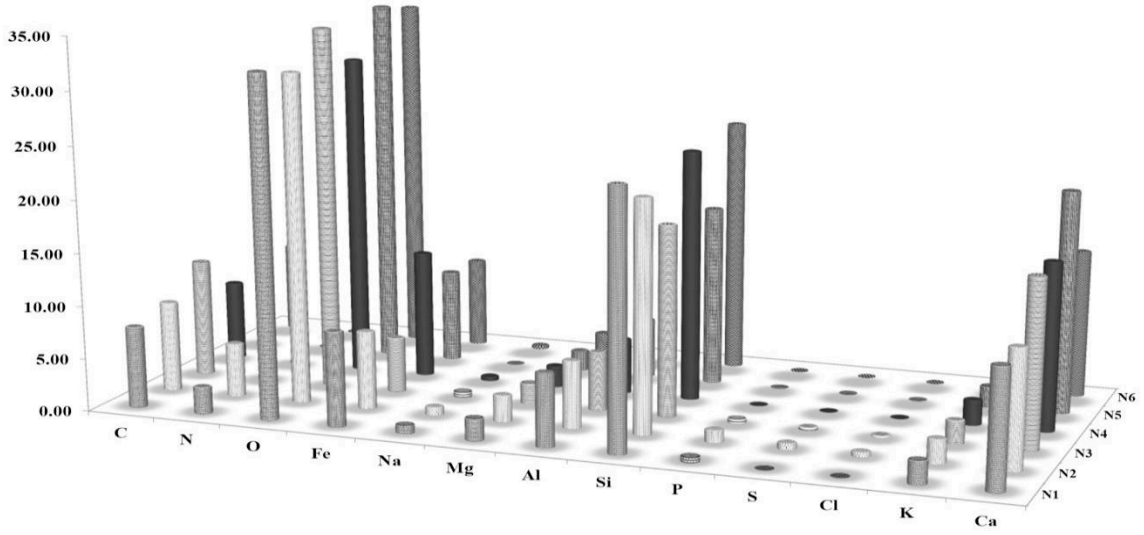


Diagram 3.1: Average of EDX results from Sumaki Neolithic phases

Soil formation or accumulation in settlements is the result of the mutual interaction of climate-organism-human-topography under certain conditions and within a particular process. The physical and chemical characteristics of soil from the deposits of Neolithic phases were determined. According to EDX analysis, the most common elements are O 32.83%, Si 21.58%, Ca 14.93%, Fe 8.53% and C 8.73%. (Diagram 3.1) In Phase N3 fill, the carbon element proportion (C 11.14%) is higher compared to the fill of other phases, while the silicon proportion (Si 18.16%) is lower. In Phase N4, iron (Fe 12.11%) is higher compared to the others. In Phase N5 fill, the calcium proportion is noticeably higher. These differences are mainly related to climate, the amount of lime in fills, and also to the construction tradition of the site. External factors, for instance floods, are also very

important. Flood water and wetland areas identified immediately before Phase N2 and Phase N4 may have affected distribution of the elements.

Evre	Calcite	Qartz	Silicon dioxide	Kyanite	Almandine	Plumbago /Graphite	Cliftonite	Sphalerite	Brucite	Altaite	Chalcopyrite	Anorthite	Carbon	Caminite	İron	Periclase	Sakhaite
N1																	
Sel 1																	
N2																	
N3																	
N4																	
Sel 2																	
N5																	
N6																	
N7	Sediment Analizi Yapılmadı																

Table 3.1: XRD analysis of soil samples taken from Sumaki Höyük Neolithic phases

The mineralogical composition of Neolithic deposits was determined with XRD analysis. The most critical factor in the identification or formation of minerals is architectural tradition as much as external factors like floods, since the percentage of lime in the lime samples from architectural structures as well as the mineral composition of limey fills of phases is almost the same, supporting this argument. The dominant minerals were quartz, calcite, and silicon dioxide. (Table 3.1) In different fills, differing amounts of carbon, iron oxide, magnesium hydroxide and aluminium silicate minerals were also determined. The most important reason for this, together with architectural tradition, is due to differences in decomposition/deposition caused by the flood factor. The mineral composition of flood fills shows a heterogeneous accumulation; however, samples from fills that were not affected by floods are relatively more homogeneous. "Sterile" fills are noted for generally being dominated by calcite, silicon dioxide, and quartz; while earth samples from flood fills were determined as containing minerals not found in archaeological deposits, such as cliftonite, plumbago/graphite, brucite, sakhite, altaite, chalcopyrite, and sphalerite. Their mineral combinations show that these fills were transported by external factors.

3.2.4. Climate

Climate is the mean weather conditions occurring over a very long time in a broad region. Climate controls an area's character and its plant cover due to weather events. (Şensoy, et al., 2008: 1) There are almost countless types of climate. However, as in every branch of science, the scattered types of climatology can be combined to form large climate

belts with many common aspects. Leading the factors determining the character of the climate in Anatolia are pressure and wind systems, along with location. (Turoğlu, 2015: 77)

3.2.4.1. General view of the global climate cycle

Circulation of the atmosphere and oceans affects the transfer of heat and humidity around the planet. Climate is strongly affected spatially and temporally by this circulation. A range of periodic variations and cycles, in astronomic terms called the "Milankovitch Cycles", offers important evidence regarding explaining variations in climate on a macro scale. (Berger, 1988: 264-266; Chapin III, et al., 2002: 23, 43; Türkeş, 2013: 2)

In addition to low-frequency variability in glacial-interglacial cycles, the last million years have seen some very rapid and sudden changes. These cause significant changes and permanent jumps in the climate system and are linked to variations in ocean circulation. (Bond, et al., 1993:143; Dammati, et al., 2014: 766; Street & Grove, 1979: 84) Mediterranean Basin interglacial fluctuations are the most noticeably observed area. During the last glacial cycle, the source of local precipitation in Near East geography was the Mediterranean Basin. (Frumkin, et al., 1999: 317)

On a global scale, climate changes in the Plio-Quaternary began with a clear difference from the evaporitic conditions of the Upper Miocene geological era. With the effect of warm climate conditions, after this period a cold climate cycle occurred, especially in the Upper Pliocene Period. Generally, with a falling trend of temperature, occasional short intervals of warm or more freezing oscillations were observed. (Raymo, et al., 1998: 700; Turoğlu, 2015: 76) Cycles of 100,000 or 41,000 or 19,000 - 23,000 years defined in different models periodically occurring led to warmer and colder climate variations following each other. These cyclical climate changes continued in the Holocene Period in various forms. (Türkeş, 2013: 6) A warming trend beginning after the Last Glacial Maximum occurred about 14,000 years ago. This trend was partly broken by active cooling immediately afterwards with a thousand-year scale called the "Younger Dryas", and periodically continues with sudden climatic changes in the Holocene Period. (Staubwasser & Weiss, 2006: 372) In consideration of orbital factors, the last cyclical variability (Hoek & Bos, 2007: 1904) in summer solar energy in the northern hemisphere rose in 12,000 BP to reach a peak

at 9000 BP. A state similar to the present climate structure was reached in 6000 BP. (Hoel, 1997: 41)

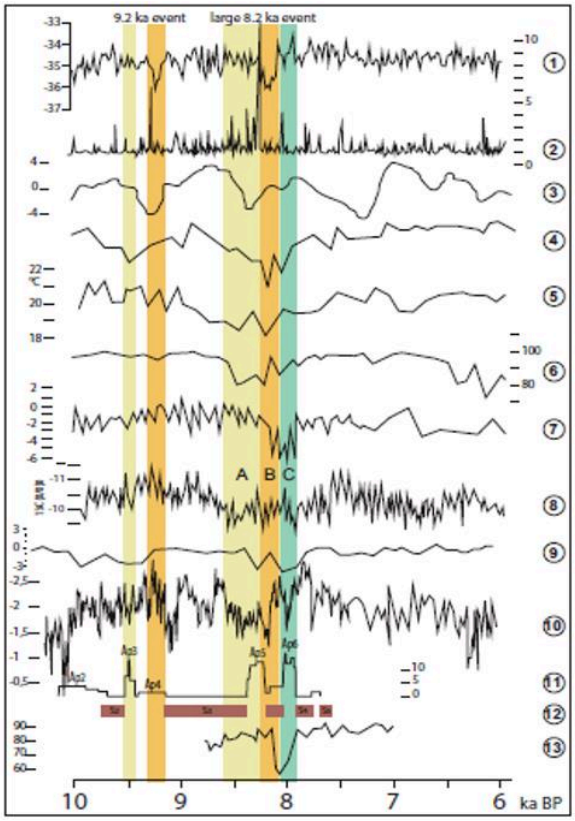


Figure 1. Northern Hemisphere palaeoclimate/pedosedimentary records illustrating Holocene rapid climate changes (RCCs): 1, Greenland GRIP ice-core $\delta^{18}O$ (Grootes et al., 1993); 2, high-resolution GISP2 non-sea-salt (nss) [K+] as a proxy for the Siberian High (Mayewski et al., 1997); 3, ice-rafted debris in North Atlantic (Bond et al., 2001); 4, eastern Aegean SL21 (sea surface temperature, SST) fauna (Marino et al., 2009); 5, MD952043 SST; 6, (C) eastern Mediterranean core LC21 (SST) fauna (Rohling et al., 2002); 7, Steregiou (Romania) pollen-based temperature of peat pollen (Feurdean et al., 2008); 8, Sofular Cave $\delta^{13}C$ (northern Turkey; Fleitmann et al., 2009); 9, Lake Maliq pollen-based temperature of the coldest month (Bordon et al., 2009); 10, Qunf Cave (Q5), ^{18}O (‰ VPDB) (Fleitmann et al., 2003); 11, Sidari valleys 1 and 2 (Corfu), gully erosion/fluvio-colluvial aggradation (CPDF, this study); 12, Sidari valleys 1 and 2, soil formation phases (Corfu) (this study); 13, Tenaghi Philippon northern Greece tree pollen (%) (Pross et al., 2009). Yellow vertical bars underline the 9.2 and 8.2 ka event phases. The yellow, orange and green bars (letters A, B, and C, respectively) represent a possible tripartite temporal structure of the 8.2 ka event (discussed in the text).

Diagram 3.2: Northern Hemisphere paleoclimate and pedosedimentary records, in particular showing the 9.2 and 8.2 ka events (from Berger et al., 2016: 1849 fig.1)

Since the Last Glacial Maximum, the climate is known to have changed by a significant degree (Weninger, et al., 2009: 8; Bar-Matthews, et al., 1999: 89) and our knowledge has been enriched by numerous climate change studies. Sudden climate changes occurring at approximately 2000-year periods are defined as “Rapid Climate Change (RCC)". (Hughen, et al., 1996: 96; Migowski, et al., 2006: 427; Staubwasser & Weiss, 2006: 378-379; Weninger, et al., 2009: 48; Weninger, et al., 2014: 8) These cycles have been calibrated to 9000-8000, 6000-5000, 4200-3800, 3500-2500, 1200-1000 and 600-150 cal years BP, with a current total of six. (Mayewski, et al., 2004: 244-246; Migowski, et al., 2006: 427) Since the beginning of the early Holocene period at least eleven similar events with a much more effective and rapid climatic change which are 10.2, 9.2 and 8.2 ka events are defined. (Berger et al., 2016:1848; Park et al., 2019:9 fig.7) However, the greatest climate change most discussed in archaeological literature that occurred in the Holocene Period is the 8.2 ka event of 8200 years ago. (Morrill & Jacobsen, 2005: 1) Many studies on the 8.2 ka event show differences in terms of dating. (Diagram 3.2) (Ahn et al., 2014:605; Barber

et al, 199:346-347; Berger et al. 2016: 1849 fig.1; van der Plicht 1et al., 2011; 234; Thomas et al., 2007:75 Tab.1) Although there are many studies (Staubwasser & Weiss, 2006; Weninger et al., 2006; Flohr et al., 2016) on the Neolithic cultural changes and/or "*collapse*" of the 8.2 ka event and the phenomenon of migration; The potential impact of the 9.2ka Event on the culture has rarely been explored. (Berger et al., 2016:1848; Flohr et al., 2016:24; Zhang et al., 2018:2767)

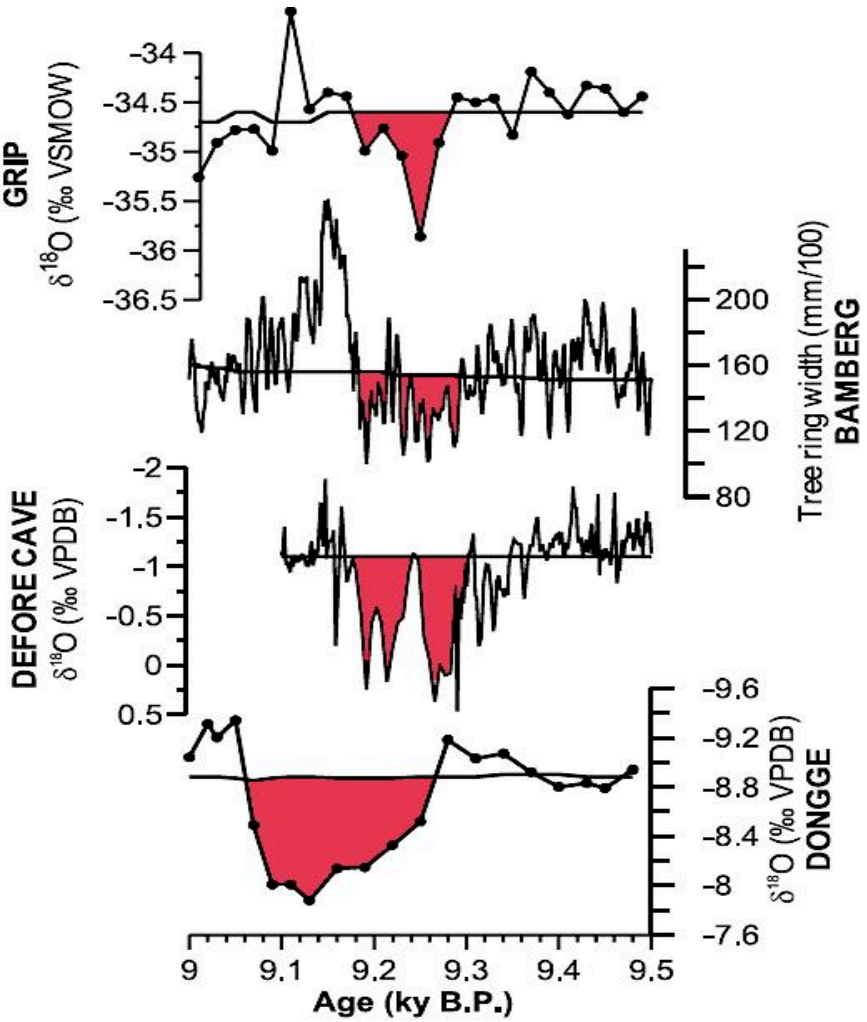


Diagram 3.3: *Comparison of anomalies experienced during 9.2 ka event (from* (Fleitmann, 2008: 4 fig. 3)

A series of paleoclimate record data show that; 9.2 ka in the northern hemisphere is a common and important climate anomaly. This phenomenon is very similar to the climatic anomalies experienced in 8.2 ka. It is characterized by a cold climate in high and medium latitudes, lower latitudes and in the tropic zone is arid climate condition during the 9.2 ka event. (Fleitmann, 2008: 1) There is strong evidence for climate anomaly at about 9.2 ka in the northern hemisphere. (Diagram 3.3) Furthermore, based on the synthesis of other Holocene climate records from the Asian summer monsoon region, it was discovered that

the 9.2 ka event also constitutes the strongest sudden "*collapse*" of the Asian monsoon system. (Zhang et al., 2018: 2767) In addition, samples taken from the Hoti cave to the north of Oman where is in the monsoon climate region is showed that $\delta^{18}O$ values changed during the 9.2 ka event. (Fleitmann et al., 2007: 176) However, it is difficult to estimate the duration of this climate anomaly. But, this process is between less than 150-200 years. (Fleitmann, 2008: 1) The relationship between cultural differentiation and the timing of climate changes of 9.2 ka -8.2 ka is questioned. This suggests that there may be a relationship between cultural changes during sudden climatic events. (Berger et al., 2016: 1859-1860)

3.2.4.2. Climatical conditions of the Near East during the Holocene Period and the 8.2 ka event

From 8600 to 8000 cal years BP, the eastern Mediterranean region had a regular winter/spring cycle at intervals but was under the effect of a very cold polar air mass. (Hoek & Bos, 2007: 1904) As a result of the strengthening of atmospheric circulation above the North Atlantic and Siberia, in periods with RCC such as the 8.2 ka event, a regional airflow came directly from Siberia producing days or even weeks of winter and spring onset conditions. (Mayewski, et al., 2004: 249; Weninger, et al., 2009: 17) During the well-known climate oscillation in Holocene of the 8.2 ka event, glaciers advanced in the northern hemisphere according to North Atlantic and Siberian records: However, this period lasted only a short time. (Morrill & Jacobsen, 2005: 1; Mayewski, et al., 2004: 250)

The long-term trend toward arid conditions in the Near East is related to regionally complex monsoon evolution. (Gat & Carmi, 1987: 522; Staubwasser & Weiss, 2006: 372; Türkeş, 2013: 10; Weninger, et al., 2009: 17) In areas where the monsoon effect prevailed, a reduction in the northward migration of the intertropical convergence zone (ITCZ) balanced the air column over the Eastern Mediterranean region and prevented the formation of rain clouds. Due to this ITCZ effect, aridity was experienced in the Near East throughout the whole year, especially in the summer months. (Alley & Ágústsdóttir, 2005: 1130; Haug, et al., 2001: 1307; Rohling & Palike, 2005: 975) As a result of the southward movement of the subtropical belt, the Mediterranean basin was invaded by Atlantic air currents causing significant cooling. The combination of cold and dry weather with relatively warm sea water partly destabilized evaporation and formed cyclones. (Gat & Carmi, 1987: 514)

In addition to the large- and moderate-scale climatic cycles experienced locally in the Mediterranean Basin and Near East geography as a result of the monsoon effect (Weiss & Bradley, 2001: 610; Weninger, et al., 2009: 15), variable subtropical upper-level currents and current aridity cycles were observed in 8200, 5200, and 4200 CalBP (defined as the 8.2, 5.2 and 4.2 ka events). Although there is a deficiency of records, when assessed together with climatic data a significant reduction in summer monsoon activity was identified around roughly 8.5 and 8.0 ka CalBP. (Rohling & Palike, 2005: 977-978) As a result of the apparent weakening of summer monsoons during this RCC, there were significant fluctuations in precipitation. (Mayewski, et al., 2004: 249) Together with different frequency variables, a visual similarity is noted in anomalies around 8000 CalBP for areas normally affected by monsoons.

The accepted approach to the Rapid Climate Change (RCC), the 8.2 ka event is that as a result of polar heat transported north, meltwater was released and affected the North Atlantic Deep-Water formation and circulation. (Alley & Ágústsdóttir, 2005: 1133; Hoek & Bos, 2007: 1904; Issar & Zohar, 2007: 12; Morrill & Jacobsen, 2005: 1; Rohling & Palike, 2005: 975; Weiss & Bradley, 2001: 610; Wiersma & Jongma, 2010: 547) Any variations in the North Atlantic Deep-Water circulation noticeably affect Near Eastern geography. This circulation system is the primary factor triggering precipitation in the Near East. Northern winds blowing across the Mediterranean toward the Near East gain humidity as they pass over the Mediterranean and may produce rain over Near Eastern terrain.

According to oxygen isotope records primarily from Greenland ice cores, this RCC event was a severe climatic disruption in the northern hemisphere. The results of $\delta^{18}O$ analysis of GISP2 Greenland ice core samples indicate a significant cooling event from 8250 to 8150 CalBP, showing a noteworthy disruption (Hoek & Bos, 2007: 1902 Fig.1) in temperature data for the early Holocene Period. The analysis indicates that Greenland rapidly cooled by 6 (±2) degrees. (Alley, et al., 1997: 484; Alley & Ágústsdóttir, 2005: 1126)

The rapid climate change in the Near East during early Holocene (now named as Northgrippian) is understood from a range of regional differences. The Jordan Valley experienced a very humid period from about 10,000 to 8600 CalBP. After nearly a 200-year cold period around 10,200 CalBP, this short-term cold period was replaced by a milder and humid climate at 10,000 BP. This relatively warmer and more humid period ended suddenly, and a cold period was experienced from 8600 to 8000 CalBP. Both RCC cases (10.2 ka and

8.6 - 8.0 ka CalBP) show that at intervals the Eastern Mediterranean region was under the effect of cold polar air though within a regular winter/spring cycle. In parallel with this cold period, there are falls in the water level of the Dead Sea and Lake Van around 8600 - 8000 CalBP. (Diagram 3.6) When we gather all this data, it is evident that within a certain period the Near East experienced rapid aridity. (Landmann, et al., 1996: 801; Migowski, et al., 2006: 247; Özdemir, et al., 2013: 967-968; Weiss, 2000: 76) (Diagram 3.4) However, according to Soreq Cave data, there were occasional severe rains within this arid period. (Bar-Matthews, et al., 2003: 3182-3185)

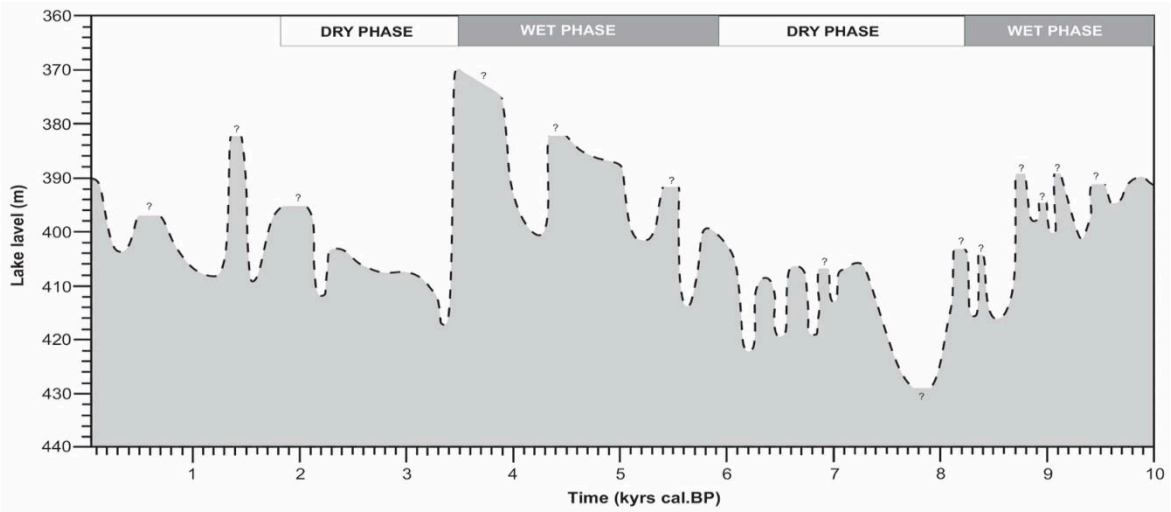


Diagram 3.4: Dead Sea Lake level lchanges (Adapted from Migowski, et al., 2006:427 Fig 4; Litt, et al., 2012: 101 Fig.5d; Stein et al., 2001:279 Fig.7)

The isotope analysis from Soreq Cave in Israel shows extraordinarily high $\delta^{13}C$ curves from 8.5 to 7.0 ky. (Diagram 3.5) These maximum values are more distinct at 8.2, 7.5 and 7.0 ky. In other words, according to Soreq Cave isotope data, the time interval from 8.5 to 7 ky is characterized by a combination of low oxygen isotope values (-6.5 ‰) and very high carbon isotope values (-5.0 to -4.0 ‰). (Bar-Matthews, et al., 1999: 89-92)

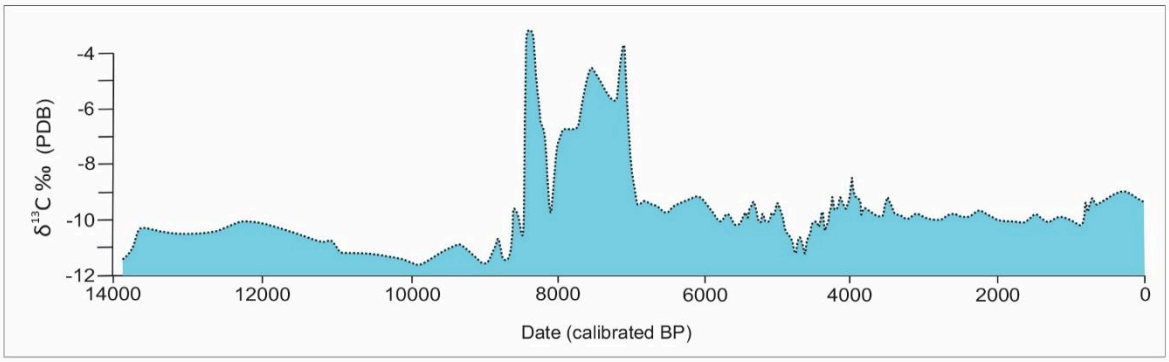


Diagram 3.5: Temporal variation of the $\delta^{13}C$ isotope values of the Soreq Cave (Adapted from Weninger at al., 2009: 16 fig.5 and Bar-Matthews et al., 2003: 3190 adapted from Fig.8D)

Low $\delta^{18}O$ values between the 8.5 and 7 ky periods indicate high annual rainfall. (Bar-Matthews, et al., 1997: 158-160) However, in this time interval, it is necessary to state that a different isotope event was identified in Soreq Cave in parallel with the Holocene cooling event obtained from ice cores. In this brief period (8.2 - 8.0 ka), rapid cooling caused an apparent reduction in precipitation. This short-term arid period occurring in Soreq Cave nearly 8000 BP has been revealed in different studies in Israel, Africa, and the Arabian Peninsula. (Bar-Matthews, et al., 1999: 91) Sediments in deep lakes are essential for geological and geomorphological research, as well as paleoclimate investigations. Deep lakes pioneer paleoclimatic studies or illuminate local/regional geomorphological studies linked to deposition and water level variations (temperature, precipitation, and evaporation).

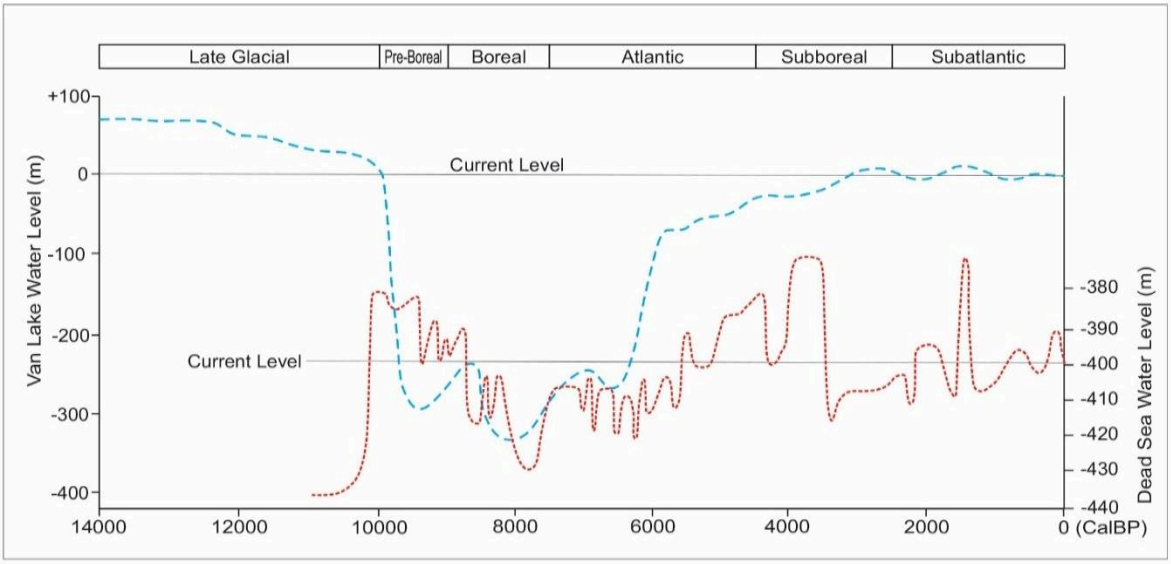


Diagram 3.6: Dead Sea and Lake Van levels changes (Adapted from Migowski et al., 2006:427/Fig 4; Litt et al., 2012: 101 Fig.5d; Stein et al., 2001:279/Fig.7)

The climatic record of Lake Van and the Dead Sea reflects that of the area between the Black Sea, Gulf of Basra and Red Sea. (Staubwasser & Weiss, 2006: 383; Kagan, et al., 2015: 237; Stein, 2001: 278) The Near East's climate is affected by a mutual relationship between the dominant climate types in Europe, North Africa, and Asia. (Bar-Matthews, et al., 1999: 86; Gat & Magaritz, 1980: 82) For example, storms arising in the Atlantic Ocean noticeably affect the Near East. (Gat & Carmi, 1987: 515 Fig.1) Being a transition region between humid climates to the north and dry climates to the south, and in spite of this unique location, paleoclimatic or paleo-environmental research (Akkermans, 2010; Caneva, et al., 1993; Doğan, 2002; Erinç, 1980; Marcollongo & Palmieri, 1992; Kuzucuoğlu, 2002;

Özdoğan, 1997; Pustovoytov, et al., 2007; Riehl, et al., 2009; Van der Plicht, et al., 2011) in northern Mesopotamia is insufficient. Our study hopes to fill this gap to some extent.

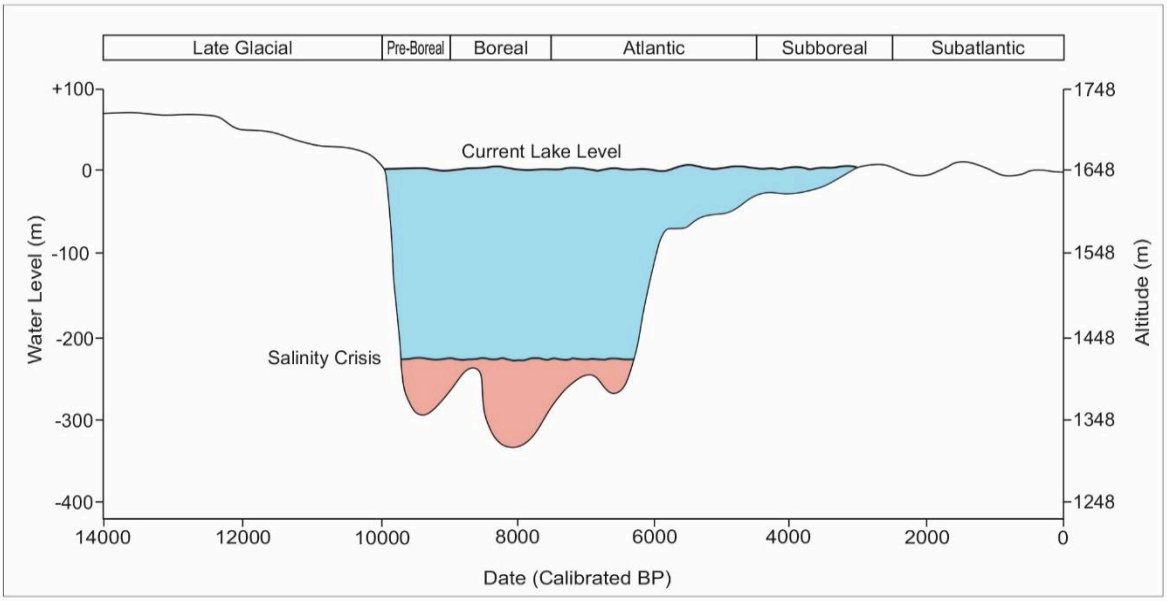


Diagram 3.7: Lake Van level changes (Adapted from Özdemir, vd., 2013: 967 Şekil 3)

The critical location of Lake Van in the path of the atmospheric southwest jet stream and northern belt of subtropical high pressure enables interpretations of the Near East paleoclimate. Due to this, Lake Van has been the focus of many researchers and studies have been conducted to determine paleoclimatic variations. (Degens & Kurtman, 1978; Landmann, et al., 1996; Wick, et al., 2003; Kuzucuoğlu, et al., 2010; Reimer, et al., 2009) Core studies of the lake floor and its terraces are understood to reflect an uninterrupted climatic archive from the Late Pleistocene to the Holocene. Dramatic falls in the water level of Lake Van were observed between 9600 and 6400 CalBP. (Diagram 3.7) The primary cause of drops in the water level is reduced humidity and increased evaporation. Accordingly, in the late glacial stage up to 10,000 BP, the lake rose +40 m above its current level. After this rising stage, rapid falls and small partial rises occurred in the lake level (Pre-boreal, Boreal and Atlantic phases). This fall continued until 6000 CalBP. According to lake cores, the salinity of the lake water reached its maximum level throughout 10,000-6000 cal years BP, which is described as the “Salinity Crisis”. (Özdemir, et al., 2013: 966)

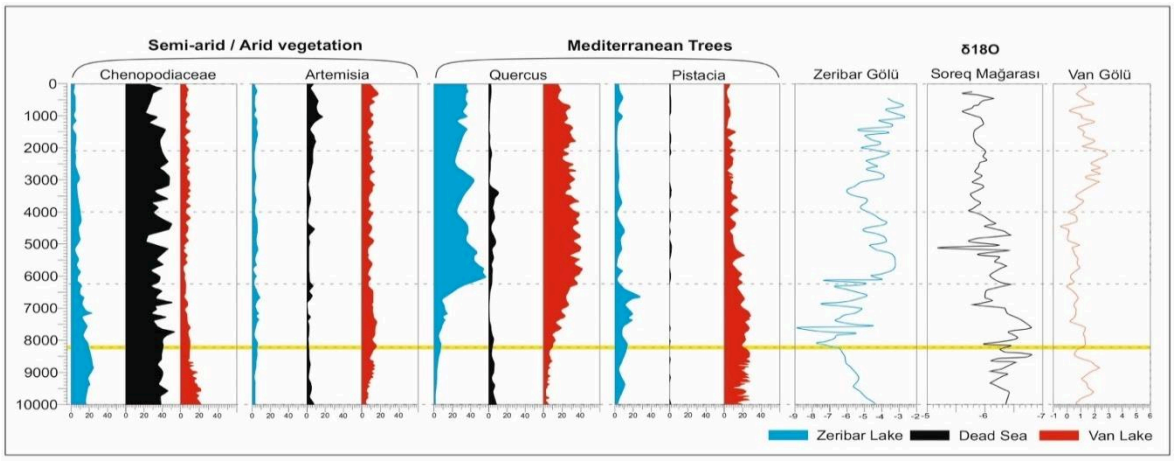


Diagram 3.8: Pollen and oxygen isotope (Adapted from: Dead Sea - Litt et al., 2012:99 / Fig.3; Zeribar Lake - Stevens et al., 2001:750 / Fg.3; Lake Van Wick et al., 2003:670 / Fig.4 and Soreq Cave - Majewski et al., 2004:245; Langgut et al., 2014:8)

Pollen analysis of Lake Van cores has provided information about the vegetation around Lake Van in Holocene. Van Zeist and Woldring (1978) analysed the pollen from Lake Van sediments and divided the period from 9600 CalBP to the present into eight stages. Of these, in the time interval of stages 1-3 more than 90% of pollen is "herbaceous"; accordingly, steppe plant species were dominant in the region from 9600 to 6400 CalBP. A significant portion of the steppe vegetation comprises *Chenopodiaceae*, *Ephedra*, and *Artemisia*. (Diagram 3.8, 3.9) In this time interval, $\delta^{18}O$ data especially reveal small variations in climatic oscillations. Due to minor changes in climate between 9600 to 6400 CalBP, the composition of steppe vegetation is understood to vary toward *Quercus* and *Betula*. (Özdemir, et al., 2013: 967)

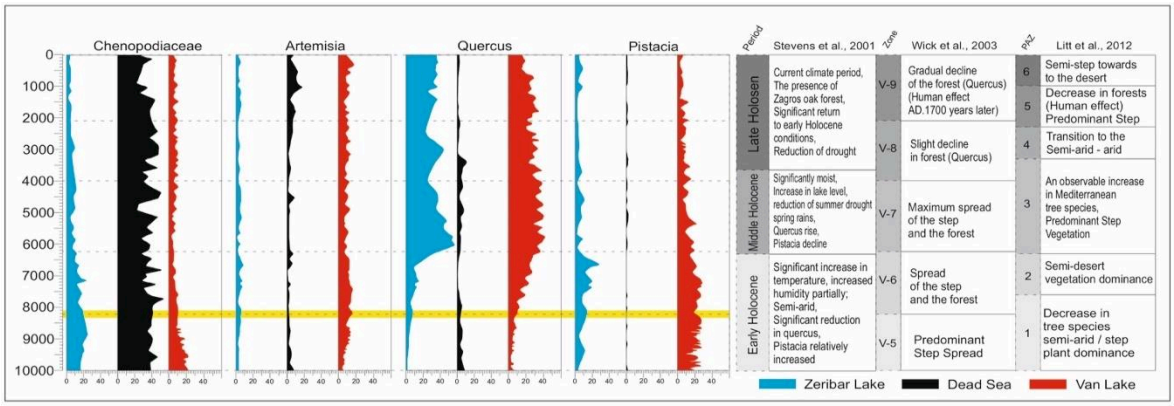


Diagram 3.9: Comparison of adaptive and selected pollen with climate comments (Adapted from: Zeribar Lake- Stevens et al., 2001:750 / Fig.3 and 752-753; Dead Sea - Litt et al., 2012:99 / Fig.3 and 99 -102; Lake Van Wick et al., 2003:670 / Fig.4 and 671 / Tab.1)

The Dead Sea data is a critical and sensitive recorder of Quaternary climate variability in the Near East. (Migowski, et al., 2006: 422; Stein, 2001:272) According to

sediment traces and lake level data from the watershed of the Dead Sea, two large humid stages and more than one rapid arid event were documented during the Holocene Period (10-8.6 ka BP and 5.6-3.5 ky BP). (AL-Khlaifat, 2008: 941; Kagan, et al., 2015: 239-241; Stein, 2001: 280) The Dead Sea comprises two sub-basins, and according to a thinner laminated aragonite series in the Ze'elim area between the two basins, humid conditions were dominant from 10 to 8.6 ka BP. However, there appears to be a very long depositional gap between 8.2 and 5.6 ka BP in Ze'elim. According to the Ze'elim sediments, during the 8.2 ka event, a layer of gypsum and sand was deposited. (Migowski, et al., 2006: 425) This fill indicates shallow water conditions, and it is understood that an apparent fall in water level was experienced in the years around 8200 BP. In this period the lake level fell by about -416 m levels.

3.2.4.3. Climatic conditions of Sumaki Höyük and its environs in the Neolithic Period

The assumption that similar physical factors controlled past variations in $\delta^{18}O$ and $\delta^{13}C$ up to the present day allows us to reconstruct paleoclimatic conditions. Isotope components and composition may be used to determine the annual precipitation amount and temperature for our study area, and from these, inferences can be made on paleoclimate conditions.

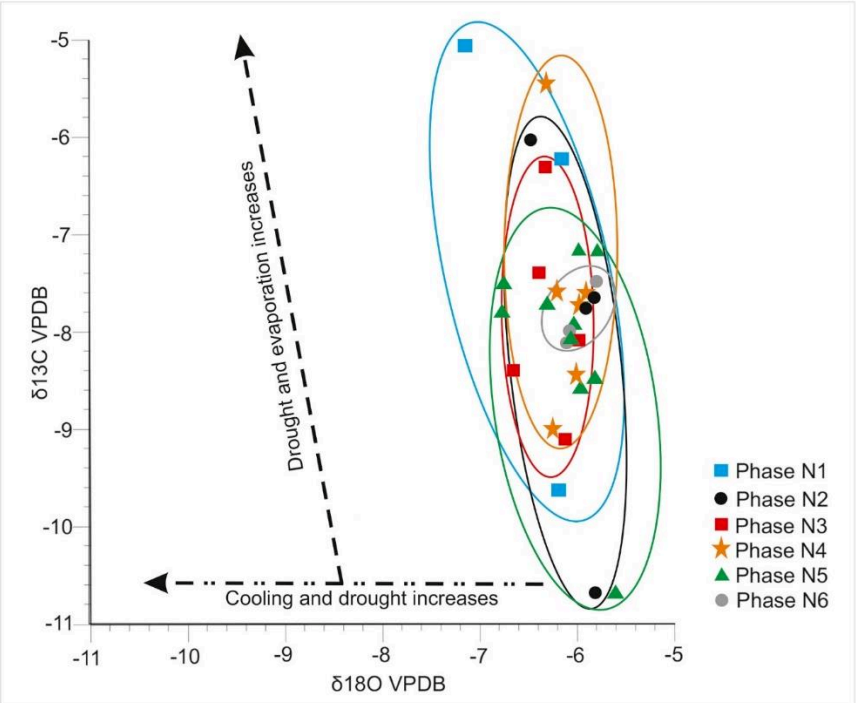


Diagram 3.10: Distribution of $\delta^{18}O$ and $\delta^{13}C$ stable isotope at Sumaki Höyük

In previous sections of this thesis, the relationship and process affecting the oxygen isotope composition and meteoric oxygen isotope in soil carbonates were explained in detail. Carbonate sediments ($CaCO_3$) samples from the Neolithic deposits of Sumaki Höyük were subjected to $\delta^{18}O$ and $\delta^{13}C$ isotope analyses.

The stable carbone isotope data of the samples taken from the architectural walls are collected in a certain area, in addition to this, it also presents very different data especially in Phase 1, Phase 2 and Phase 4. The fact that we have also detected traces of floods and/or torrents in the archaeological fillings corresponding to the beginning or end of these phases makes this situation meaningful. (Diagram 3.10)

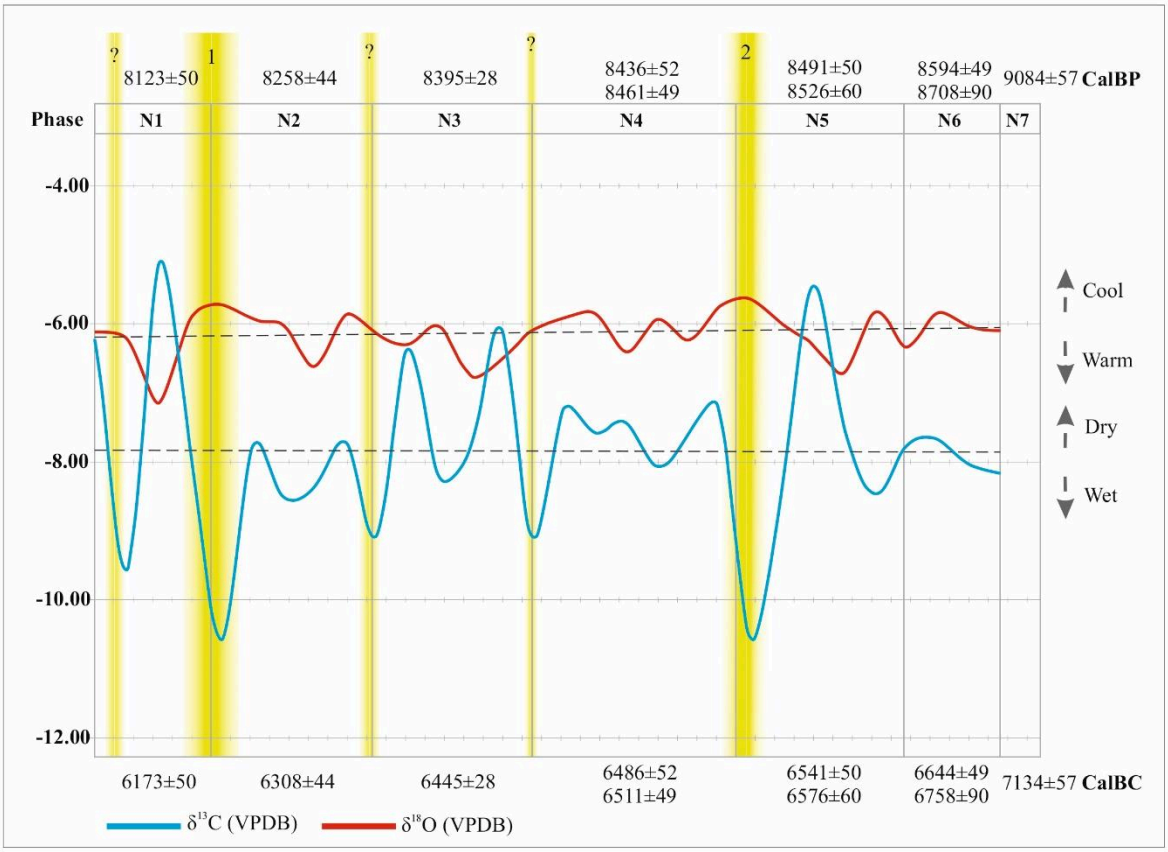


Diagram 3.11: Distribution of $\delta^{18}O$ and $\delta^{13}C$ stable isotope

Carbone isotope analyses determine extraordinarily high $\delta^{13}C$ curves for the years between 9084±57 to 8123±50 CalBP and especially from 8501±56 - 8491±50 CalBP and from nearly 8200-8150 CalBP. According to the $\delta^{13}C$ isotope values, a clearly arid period was identified between those eras. If these maximum $\delta^{13}C$ values are compared with $\delta^{18}O$ isotope values for the same period, it must be stated that a definite warm period existed, especially around 8501±56 - 8491±50 CalBP (end of Phase N5). According to isotope values and archaeological data, immediately before and after this warm - dry period, cold and wetter

periods were experienced. This cold and wet periods are better defined for the years 8526±60, 8491±50 BP - 8461±49 BP, 8436±52, and about 8250-8200 or 8200-8150 CalBP. (Diagram 3.11) Regarding isotope values, after a relatively stable period in Phases N7- N5, between the years 8501±56 and 8491±50 CalBP, the $\delta^{13}C$ curves invert. It is highly probable that more than one wet stage was experienced during these years. A cold-wet period occurred especially between the years 8491±50 and 8491±49 (end of Phase 5) and at nearly 8250-8200 CalBP (end of Phase N2). In these periods, sharp deviation was identified both on the $\delta^{18}O$ and $\delta^{13}O$ curves. XRD analysis show that during the uninhabited periods of the settlement, deposits of different mineralogical composition were transported there by external factors. The deposits of different mineralogical composition support the notion that the settlement area probably experienced wet periods.

3.2.5. Plants identified in the Neolithic deposits of Sumaki Höyük

Upper Mesopotamian geography comprises broad steppe areas with a semiarid to arid climate. In steppe areas between the south slopes of the Southeast Taurus Mountains and the Syrian Desert, natural plants come into leaf in the spring. Among the most common herbaceous steppe plants is the milkvetch (*Astragalus*). (Atalay, 2002: 137) Steppe plants, especially those in lower elevations, grow weaker between May and November due to the severe aridity.

The surface forms and climate in this region affect the lower limit of the natural oak (*Quercus*) forest zone. (Figure 3.8) Oak barrens, which are mainly observed at the edge of steppe areas and high elevations, display an arid forest character. Among oak species, the Aleppo oak (*Quercus infectoria*) is common with other species being *Quercus brantii*, *Quercus libani* and *Quercus cedrorum*. These oak assemblages reach low elevations such as 700 m, mainly around Siirt, Garzan and Silvan. (Sözer, 1984: 24)

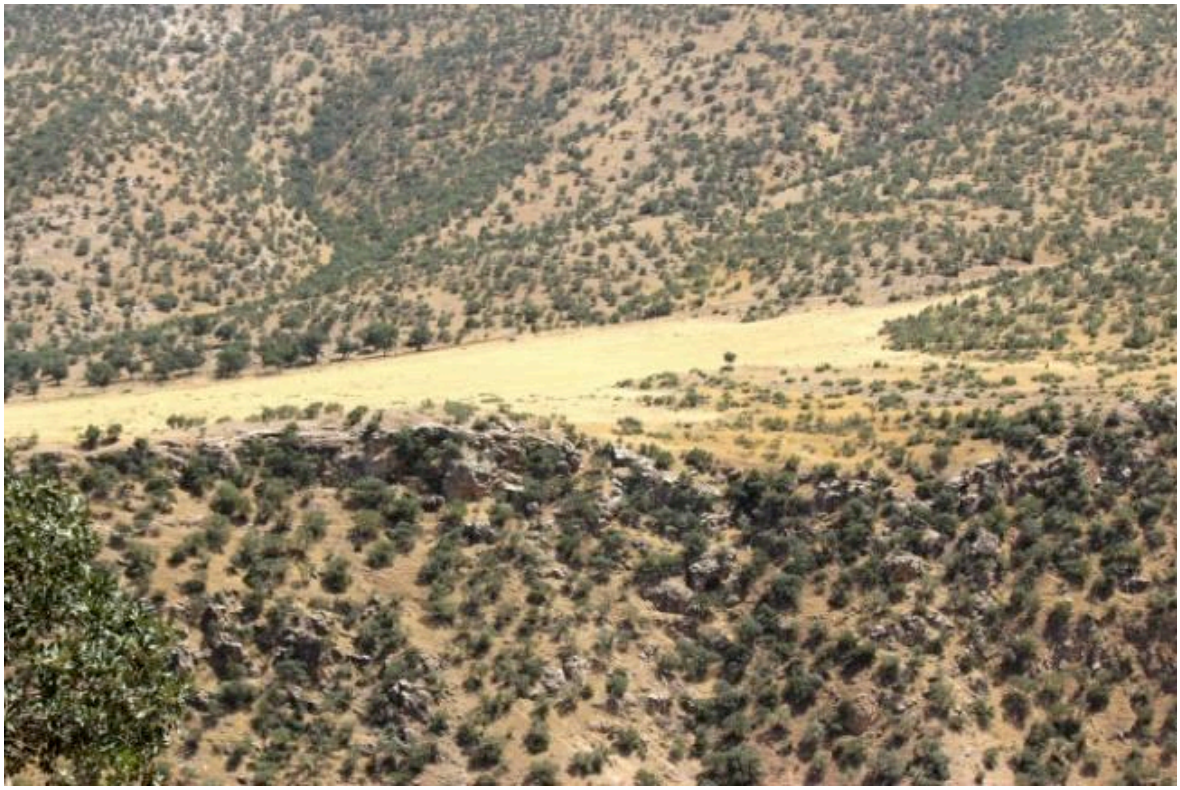


Figure 3.8: Oak communities in the Lower Garzan Basin

In erosion and deposition areas of the Garzan Basin, the plant cover has an anthropogenous steppe character due to destruction of the mountain-plateau steppe and oak areas. Within the basin, the plant cover is thicker in the Garzan Stream floodplains and on the banks. Herbaceous plants and large marshy areas are predominant. (Figure 3.32-3.34) In the eastern section of our study area, on the western slopes of the Garzan Anticline and Kentalan Anticline, and where the Garzan Stream joins the Tigris River, oak woods are sparsely distributed over a broad area. In the western section of the basin on the slopes of Kıradağ are found very weak steppe plants and occasional cultivated nut trees. Herbaceous plants and reeds grow at high elevations within the basin, around natural springs, and on the banks of seasonal brooks.

Examining the soil samples taken from Sumaki Höyük Neolithic deposits by floatation, different plant species were detected[12], dominantly *Triticum/Hordeum*, *Triticum turgidum*, *Triticum*, *Fabaceae*, *Lens culinaris* and *Linum* remains were identified. In addition, the remains of *Chrozophora tinchoria*, *Medicago* and *Lathyrus/Vicia* were also found in these soil samples. (Table 3.2)

[12] By Leman Kutlu

Type	N1-N2	N3	N4	N5	N6	N7	Total
Centaurea type			1				1
Cicer arietinum			1.5				1.5
Fabaceae		0.5	54	9.2	3.5	13	80.2
Ficus carica			1			1	2
Hordeum vulgare			1.5	2		0.5	4
Lens culinaris	1		25	8	3.5	7.5	45
Triticum turgidum	1	6	64.5	10.5	3	4	89
Poaceae			9.4		0.5	0.5	10.4
Triticum/Hordeum	0.5	8	89	27	9.5	34.1	168.1
Triticum	0.5		1	1			2.5
Linum			8	3.3	1	3	15.3
Medicago			3			2.5	5.5
Medicago radiata			4	1		0.5	5.5
Euphorbia falcata						1	1
Rumex			1			1	2
Lolium temulentum			2				2
Boraginaceae			1				1
Chrozophora tinchoria			8	3			11
Lathyrus sativus			2				2
Euphorbiaceae			1				1
Brassicaceae			1				1
Cyperaceae			3				3
Lathyrus/Vicia			0.5	3			3.5
Vicia ervilia			4			2	6
Pisum sativum				2			2

* Numerical data represent seed quantities. (Not all N1 and N2 phases were studied.)

Table 3.2: Distribution of plant residues found in Sumaki Höyük Neolithic Phases

In phytolith analysis[13] of the Sumaki Neolithic layers, multiform *Trichome* phytoliths were identified. However, it should be noted that *Panicoid* phytoliths in most of the samples were poorly preserved. In nearly all samples the presence of fan-shaped bulliform phytoliths compared to other *panicoid bullorma* morphotypes proved that paleoblastic plant cover was predominant. *Chloridoid* and *Festucoid* phytoliths[14] have varying frequencies, with extraordinarily low levels of ridge chloridoids noteworthy in the Neolithic layers. Multiform *Trichome* and long phytoliths were also detected. (Diagram 3.12)

[13] By Sanjay Eksambekar from *Phytolith Research Institute of India*
[14] Short cell grass phytoliths

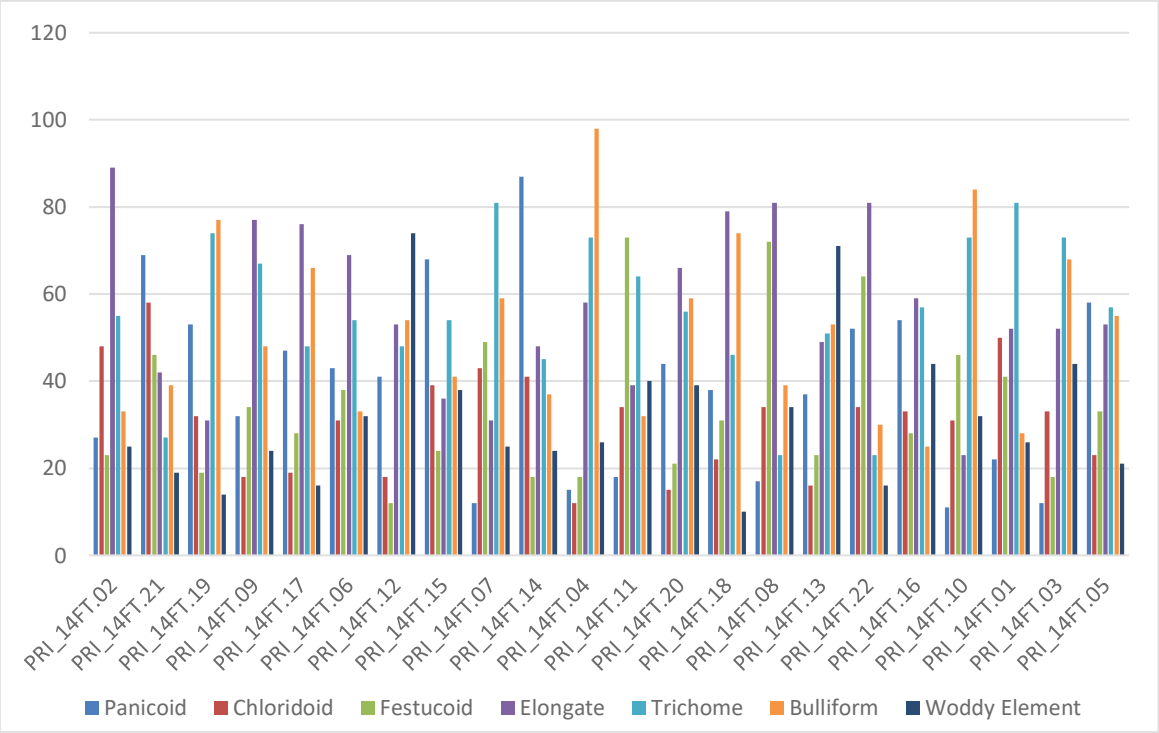


Diagram 3.12: Distribution of ratios of phytoliths from Sumaki Neolithic Phases

According to the phytolith taphonomy created by the Phytolith Research Institute (PRI) in India, the surfaces of fossilized plant remains are rounded, and the corners are disrupted. The potential reason for surface disruption of plant fossils in appropriate climate conditions for growing the flora is large-scale destruction of vegetation, such as animal grazing or floods/torrents. Considering that the living area at Sumaki was also used by animals and the clear evidence of floods/torrents, deformation on the phytoliths becomes meaningful. The phytolith samples from open areas were predominantly affected by this type of destruction. In phytolith analysis, the basic method for identifying plant types is based on defining their shape, with distinctions according to their structure and combination. For example, as found in *Graminea* and other families, rough-pointed *Trichomes* are grouped separately under *Trichome* due to their shape classification. Plant fossil samples were also identified using the "Phytolitharium Phytolith" database. In pollen analysis, *Poaceae* are dominant but *Apocynaceae, Verbenaceae, Cesalpiniaceae, Liliaceae, Calenduleae, Sparagaceae*, and *Malvaceae* pollens are also present. (Diagram 3.13)

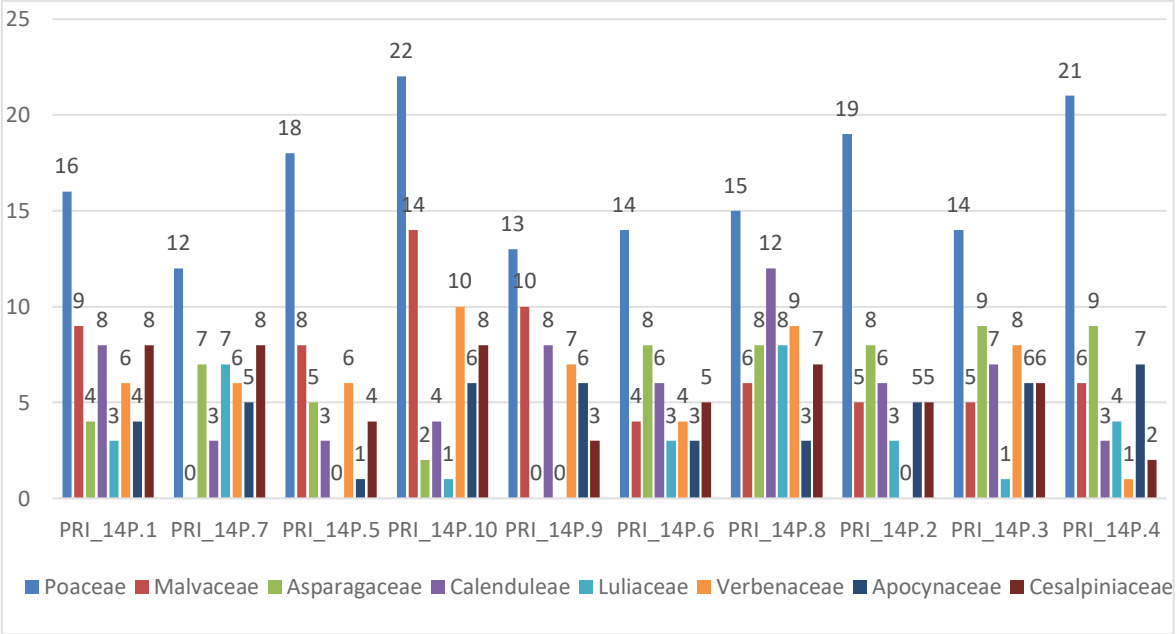


Diagram 3.13: Distribution of pollen data according to Neolithic phases at Sumaki Höyük

Based on anatomic origin and structural characteristics, the dominant plant cover of Phases N6 - N4 at Sumaki Höyük is, in general, the *andropogonea*/reed species. In later phases such as N3 - N1, plant cover is represented by *Chloridoid* and *Festucoid* pasture. (Diagram 3.14) Consequently, it is clear that wet-dry-wet alternations were experienced in the habitation area and its environs.

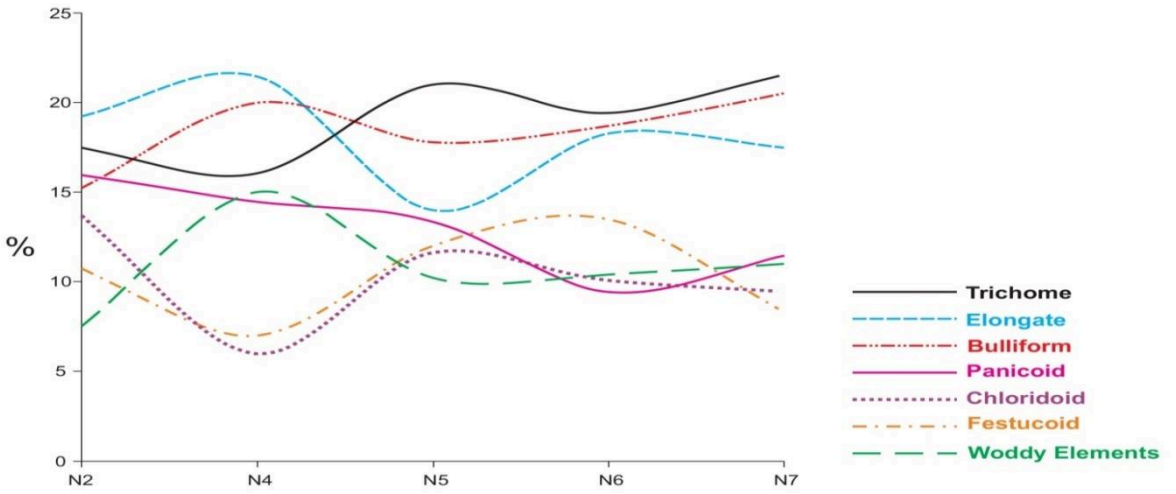


Diagram 3.14: Distribution of phytoliths by Neolithic phases at Sumaki

3.3. Stratigraphy of the settlement

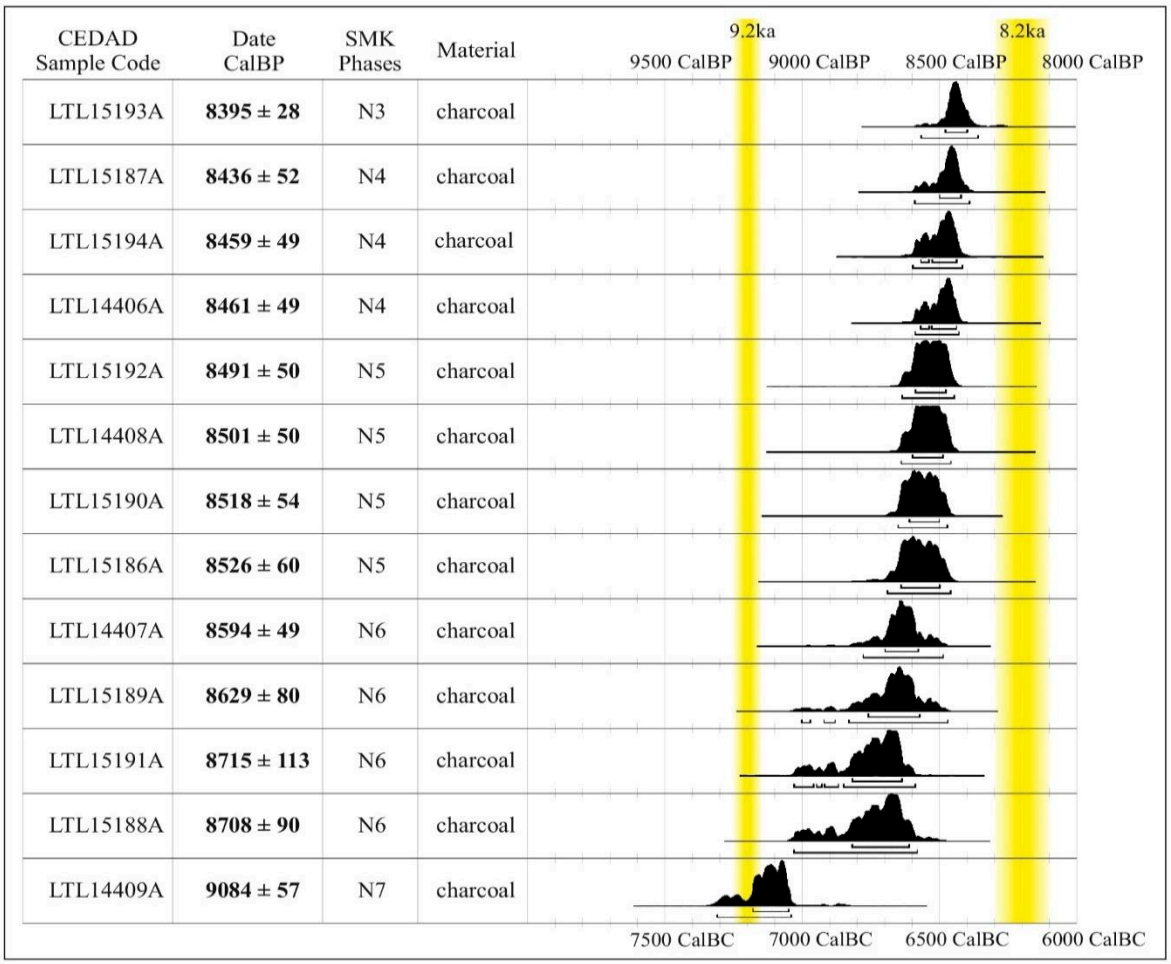
The Sumaki Höyük Neolithic settlement has been dated to between 9084±57 - 8123±50 CalBP (7134±57 - 6173±50 CalBC). (Table 3.3; Diagram 3.15) After Çayönü Tepesi, this settlement also has the privilege of being the settlement with the largest area of excavation (2180 m2) and research conducted in Northern Mesopotamia, and especially within the Upper Tigris Basin.

Level	Period	Phase	CalPal Calibrated Date	CEDAD AMS Date	CEDAD Calibrated Date (%65)	CEDAD Calibrated Date (%95)	CalPal Calibrated Date	CEDAD Lab Name
1	Middle Ages	M1	1116±52 CalAD	1186 ± 40 AD	770 - 890 AD	760 - 970 AD	833±51 CalAD	LTL15185A
		M2						
2	Neolithic	N1	8123±50 CalBP	7325 ± 20 BP *			6173±50 CalBC	
		N2	8258±44 CalBP	7425 ± 20 BP *			6308±44 CalBC	
		N3	8395±28 CalBP	7584 ± 50 BP	6480 - 6400 BC	6570 - 6360 BC	6445±28 CalBC	LTL15193A
		N4	8436±52 CalBP	7613 ± 60 BP	6500 - 6420 BC	6590 - 6390 BC	6486±52 CalBC	LTL15187A
			8459±49 CalBP	7645 ± 50 BP	6570 - 6540 BC	6600 - 6420 BC	6509±49 CalBC	LTL15194A
			8461±49 CalBP	7647 ± 50 BP	6570 - 6540 BC	6590 - 6430 BC	6511±49 CalBC	LTL14406A
		N5	8491±50 CalBP	7700 ± 50 BP	6590 - 6480 BC	6640 - 6450 BC	6541±50 CalBC	LTL15192A
			8501±56 CalBP	7712 ± 60 BP	6600 - 6490 BC	6640 - 6460 BC	6551±56 CalBC	LTL14408A
			8518±54 CalBP	7741 ± 50 BP	6610 - 6500 BC	6650 - 6470 BC	6568±54 CalBC	LTL15190A
			8526±60 CalBP	7752 ± 60 BP	6640 - 6500 BC	6690 - 6460 BC	6576±60 CalBC	LTL15186A
		N6	8594±49 CalBP	7810 ± 50 BP	6700 - 6580 BC	6780 - 6490 BC	6644±49 CalBC	LTL14407A
			8629±80 CalBP	7821 ± 60 BP	6760 - 6570 BC	6830 - 6470 BC	6679±80 CalBC	LTL15189A
			8715±113 CalBP	7859 ± 60 BP	6820 - 6610 BC	7030 - 6580 BC	6765±113 CalBC	LTL15191A
			8708±90 CalBP	7871 ± 50 BP	6820 - 6640 BC	6850 - 6590 BC	6758±90 CalBC	LTL15188A
		N7	9084±57 CalBP	8127 ± 50 BP	7180 - 7050 BC	7310 - 7040 BC	7134±57 CalBC	LTL14409A

Table 3.3: C_{14} dates (AMS) from Sumaki Höyük

Based on excavation and surface research data, Sumaki Höyük represents two different periods. These are the Neolithic Period (N), defining the first period of occupation, and a Middle Age (M) layer with traces of possibly a small farm or a small external settlement area. The fill thickness from the Neolithic Period is 1.9 meters. Inhabited between the Final PPNB and Proto Hassuna periods, Sumaki Höyük settlement is divided into seven phases (N1 - N7) with differing settlement patterns in three areas (A, B and C). (Figure 3.50, 3.51, 3.53 – 3.55) However, the phases generally comprise more than one subphase or construction level. These subdivisions are not designated in order to more easily understand the cultural process of the settlement and prevent number confusion. Another reason is that it is very hard to abruptly differentiate these subphases or construction levels from each other due to both Sumaki Höyük's architectural characteristics and external factors experienced during the fill deposition process, as well as the variable structure of Neolithic Period

topography. However, when necessary these subdivisions will be explained and interpreted under the phase headings.



CEDAD Sample Code	Date CalBP	SMK Phases	Material
LTL15193A	**8395 ± 28**	N3	charcoal
LTL15187A	**8436 ± 52**	N4	charcoal
LTL15194A	**8459 ± 49**	N4	charcoal
LTL14406A	**8461 ± 49**	N4	charcoal
LTL15192A	**8491 ± 50**	N5	charcoal
LTL14408A	**8501 ± 50**	N5	charcoal
LTL15190A	**8518 ± 54**	N5	charcoal
LTL15186A	**8526 ± 60**	N5	charcoal
LTL14407A	**8594 ± 49**	N6	charcoal
LTL15189A	**8629 ± 80**	N6	charcoal
LTL15191A	**8715 ± 113**	N6	charcoal
LTL15188A	**8708 ± 90**	N6	charcoal
LTL14409A	**9084 ± 57**	N7	charcoal

Diagram 3.15: C_{14} dating of Sumaki Höyük

The Middle Age fill is occasionally 30 cm thick, but generally is a very shallow fill of about 20 cm in thickness. (Figure 3.56, 3.57) However, the fill thickness in trenches 20B and 20C is 1.6 meters. This area is the northernmost portion of Sumaki Höyük settlement and is located on a very steep slope beside the Kani Huşur Stream. Here no architectural structure or element was identified; the Middle Age fill was a complex pile of pottery sherds, animal bones, and stones. As understood from excavation data and the character of the deposit, the main reason for the thickened Middle Age fill in this area was geographic factors such as landslides and inundations. Around the stone foundations of the Middle Age structure identified in Area B was 14 Middle Age pits (Figure 3.70) of different levels and sizes, whereas in areas A and C, no pits or architectural structures or elements were encountered. Above the Middle Age filling is 10-25 cm-thick brown clayey, sandy and stony heterogeneous fill covering the whole settlement. The Neolithic Period sherds were not

detected during the surface survey because the Neolithic phases of Sumaki Höyük were totally sealed by this heterogeneous filling.

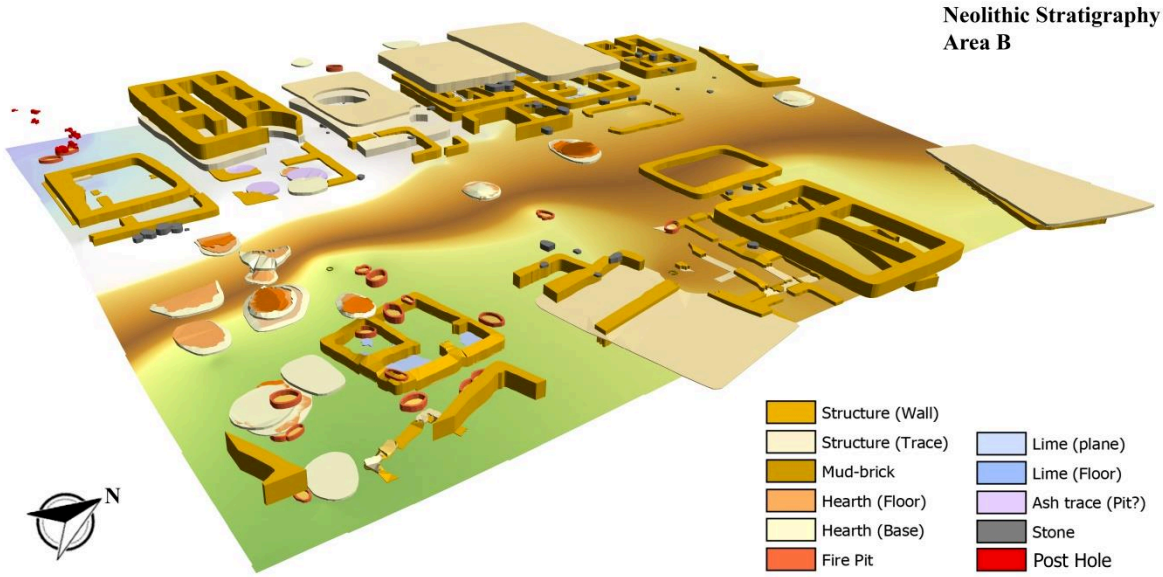


Figure 3.9: Neolithic stratigraphy modeling of Area B at Sumaki Höyük

To identify the Neolithic phases of Sumaki Höyük, mainly architectural remains, (Figure 3.9; Diagram 3.16) accumulations of open areas, pottery distribution and natural effects of the deposition process were taken in consideration. However, in detailed examination of the layers the presence of other materials such as clay objects, stone tools, etc. was also noted. Lastly, all data were compared with the deposits of the cultural fills.

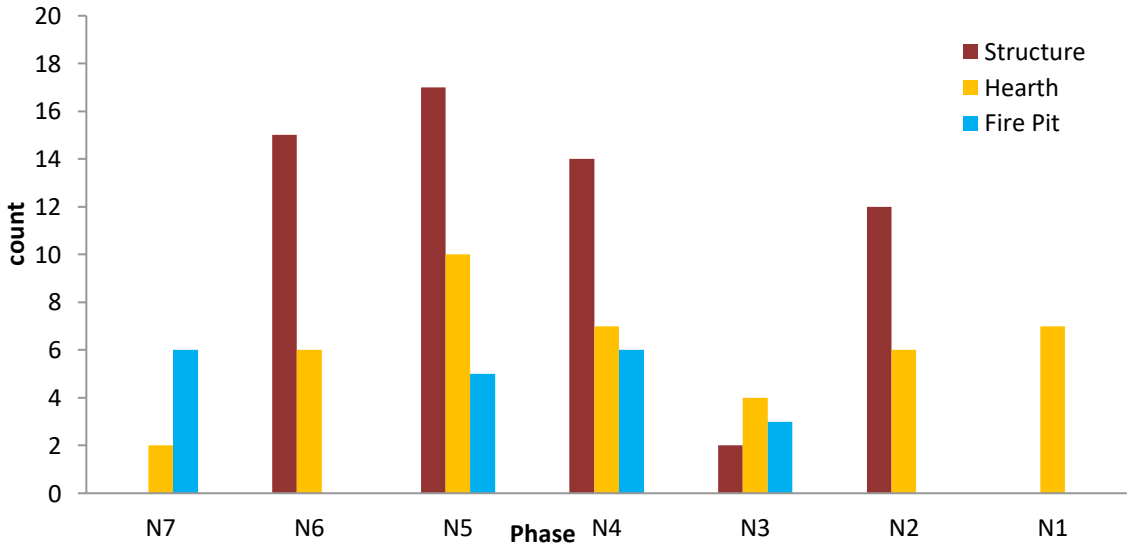


Diagram 3.16: Distribution of architectural structures and elements by Neolithic phases

3.3.1. Phases N7

The earliest occupation of Sumaki Höyük Phase N7 is dated to 9084±57 CalBP (7134 ±57 CalBC) according to a single C_{14} date. (Table 3.3) The deposit of Phase N7 was randomly distinguished in an approximately 250 m^2 in Area B on the natural soil (Figure 3.10, 3.58) Even though the virgin soil was reached in many parts of areas A and C, not a single remainder of Phase N7 was found. The significant characteristic of this phase is the presence of well-burnished, mineral-tempered (mainly basalt) hole-mouth pottery. Large fragments of pots were recovered under Structure N5B14 of Phase N5 near hearth N7O1 and under Structure N6B10 of Phase N6. A series of post-bases or holes in different locations are thought to be stretcher/carrier systems for temporary dwellings, but their plan cannot be identified. Besides, two hearths (N7O1 -N7O2) and six fire pits (N7A1-A6) were revealed. The dimensions of the round- or oval-shaped fire pits change between 36x53 cm and 43x66 cm, and their depths are between 6-11 cm. Voluminous amounts of calcified organic material were found around fire pit N7A1 and around hearths N7O1 and N7O2.

The filling of Phase N7 was grey coloured earth mixed with small stones, random lime fragments, and ashy areas. (Figure 3.57 C-F) In different parts of the open areas (in trenches 15G and 15H), calcified organic material traces were also encountered. It seems that the settlement of Phase N7 was affected by drought and evaporation after experiencing an aqueous environment.

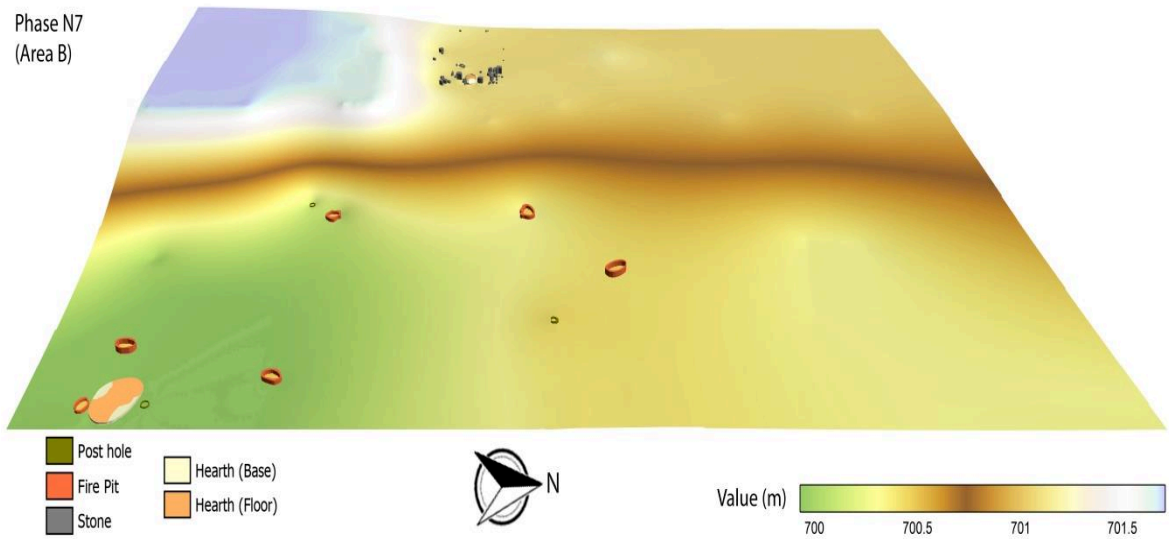


Figure 3.10: Settlement pattern and architecture from Phase N7 at Area B

According to the phytolith and pollen analysis of calcified organic material samples from Phase N7, nearly 50% of them reed or herbaceous plant remains were identified. Among the phytoliths, high frequencies of *Trichome, Bulliform*, and silicified woody elements were observed. Following *Panicoid, Trichome*, and *Bulliform* phytoliths, subtypes of other phytoliths were also identified. (Diagram 3.17; Figure 4.325 - 4.330) The natural structure of well-preserved phytoliths is clear. Pollen analysis identified *Poaceae* pollens dominantly, together with *Apocynaceae*, *Verbenaceae*, *Cesalpiniaceae*, *Liliaceae*, *Calenduleae*, *Asparagaceae*, and *Malvaceae* pollens. (Figure 4.331, 4.332)

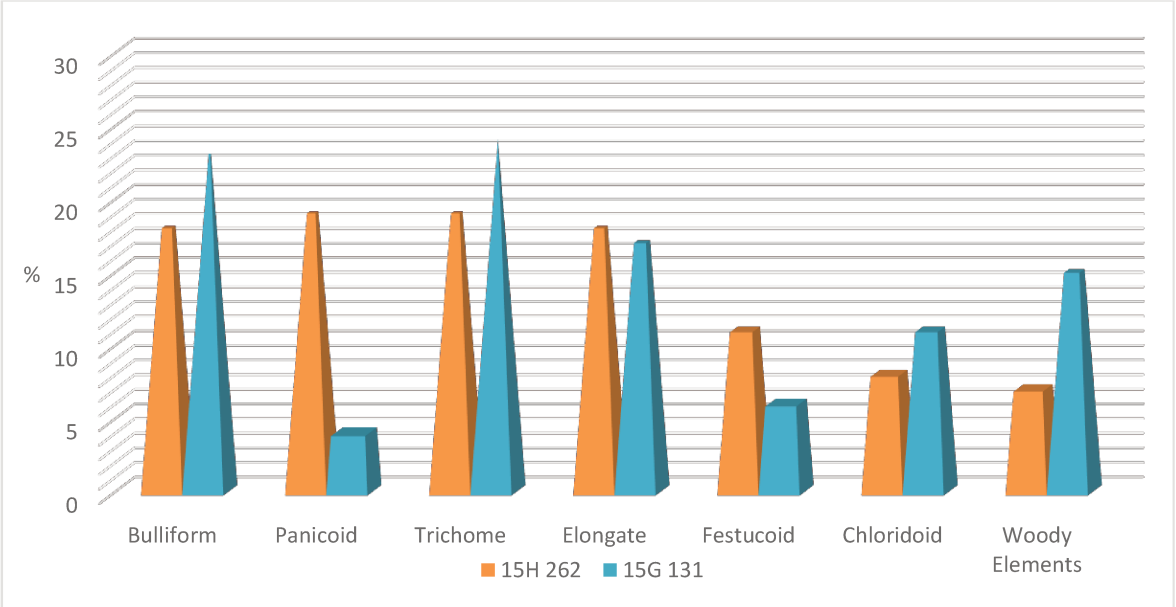


Diagram 3.17: Phytolith analysis of lime samples from Phase N7

3.3.2. Phases N6

The following phase, Phase N6, which is dated to 8708±90 – 8594±49 CalBP (6758±90 - 6644±49 CalBC), has been exposed over an area of 956 m^2 in areas A and B. The site was densely inhabited and there was a radical change in the settlement pattern. Buildings were erected directly on the ground without stone footings and were located by leaving spaces in between low terraces of the natural topography in areas A and B. The primary plan type is Cell Buildings with an 'L' or a 'T'-shaped long rooms (corridor) in the middle and almost-square cells on either wing. (Figure 3.11, 3.12, 3.59, 3.60) There are also smaller single-roomed dwellings. All buildings were constructed using the piled earth technique. Besides the difference in the settlement strategies of Phase N7 and Phase N6, another distinctive feature of Phase N6 is an entire absence of pottery.

Phase N6 seems to display a sedentary character, at least for a while. Though the settlement appears to have a particular pattern in this phase, there is no specific social organization indicating planned use and supporting a long-term settled lifestyle such as unique buildings, massive permanent structures, and different external organizations, architectural elements reflecting ritual traditions, and underfloor burials or burial areas, as identified in many other PPNB settlements. In open areas where a few hearths were found between the buildings, no clear organization was encountered. Additionally, buildings constructed of twigs, reeds, and piled earth sitting directly on the natural topography of the Neolithic Period without stone footings had no paved or plastered floors. Although the settlement of Phase N6 was permanent, with more flimsy architecture and simple internal–external area organization, it is construed to have had a shorter lifespan than other PPNB sites.

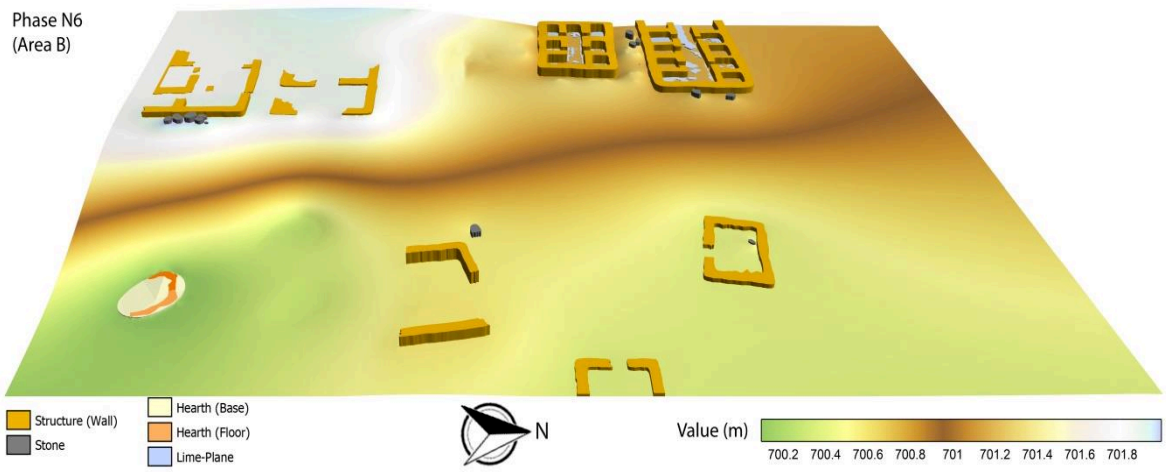


Figure 3.11: Settlement pattern and architecture from Phase N6 at Area B

Although the settlement character and building techniques of Phase N7 and Phase N6 are different from each other, their hearth constructions are similar. There was no hearth inside any of the buildings. Most of them were disturbed and one was left unfinished. The size of the hearths, with plaster floors 2 cm thick, varies from 47x80 cm to 155x209 cm. Except for hearths N6O6 and N7O2, all have single floors on stone pavements. Only hearths N6O6 and N7O2 were constructed without stone pavements, directly on earth. But this type of construction is not widely seen in Sumaki Höyük. The surfaces of the hard floors of the hearths are regular, rough and generally cracked. According to sieving and flotation, both the hearths and their close surroundings yielded edible plants such as *Fabaceae*, *Lens*

culinaris and *Triticum/Hordeum*. The fire pits, which were intensely used in Phase N7, disappear in Phase N6.

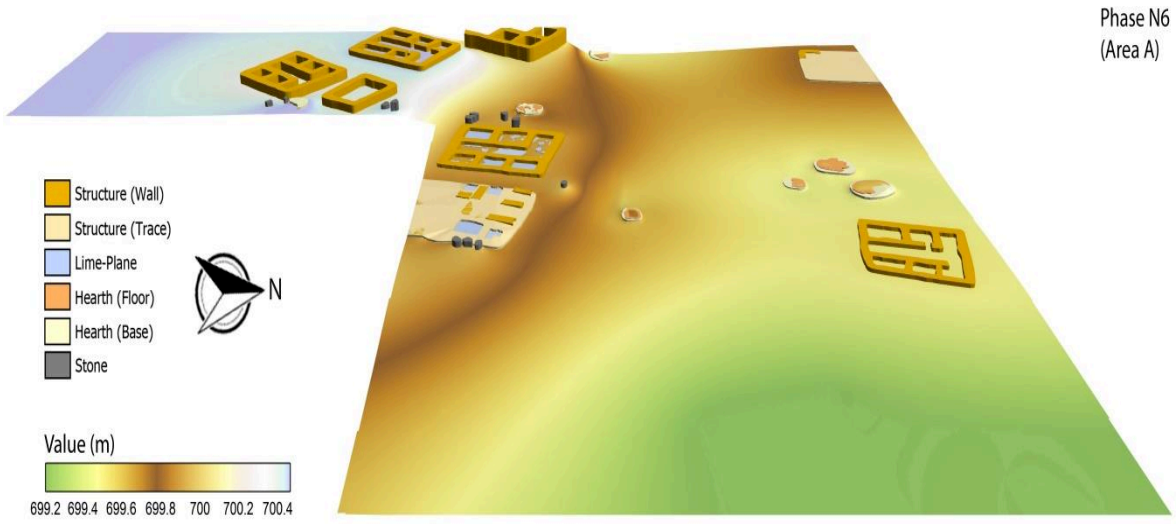


Figure 3.12: Settlement pattern and architecture from Phase N6 at Area A

The archaeological deposit of open areas in Phase N6 was light grey, occasionally yellowish-grey, hard, lime-rich fill with low ash content. (Figure 3.56, 3.57) Another distinctive character of this deposit, which covered nearly the whole area, was that it had a layered appearance. The primary cause of this layering was the formation of surfaces with a different character linked to wet and dry levels due to external factors like rain and sun. Furthermore, occasionally intense ashy and limey fills are noteworthy in the trench sections. The ashy fill is not widely distributed, and the reason for it not being detected during excavations is related to these levels being very thin, not more than 1 cm thick. Ashy fills notably increased in the areas surrounding hearths. Accordingly, the amount of ash observed with a very thin fill is understood to be the waste from hearths. The lime-rich fill is possibly the remains of organic material from either architectural elements or waste features. The lime fragments are hazelnut-sized, and there is no trace of plaster on any of their edges. As documented in the winter quarters of semi-nomads in the Lower Garzan Basin, similar organic material was distributed randomly within the settlement or more densely around disturbed structures. Accordingly, these separate lime areas in the open areas of Phase N6 may be the traces of dispersed structures.

In Area A, mainly in trenches 22L and 22M, a mixed fill level with dense lime-rich, ash-rich fill containing small pebbles was identified. Since this mixed fill is in the external area, not the occupation area of Phase N6, it cannot be associated with structures or

architectural elements. As well, in the south-central part of trench 22M a blue-grey fill with a diameter of 3 meters was identified within the natural earth without archaeological material. According to geomorphological investigations, a natural depression and this blue-grey fill formed due to the accumulation of watery mud in this area over a specific period. Similar traces in trenches 22M - 20M were also identified immediately beside an area where the natural soil exhibits a vertical slope in a section where the surface partially flattened out. Accordingly, the topography of Phase N6 displays rows of natural terraces with southwest-northeast and east-west orientation. In relatively flat areas, the surface has a slightly undulating appearance.

Investigation by XRD analysis of earth samples taken from Phase N6 fill determined calcite with a calcium carbonate composition and the organic carbon mineral of graphite along with cliftonite, silica and quartz crystals. (Table 3.1) Both field observations and SEM images show that these samples have different grain sizes and different mineralogical composition. SEM images of samples identified micritic envelopes on sand and stone grains, and also observed scalenohedral and rhombohedral crystal structures together with acicular crystals. Calcium carbonate minerals were also clearly seen around tubes formed by organic remains. Additionally, samples were identified with SiO_2 gels filling the natural cavities. The clearest one is silicon dioxide gel filling a *Panicum* plant remnant. Investigation of earth and lime samples of Phase N6 with EDX identified the following elements with their mean values; O (43.08%), Ca (21.01%), C (12.29%), Si (11.65%) and Fe (6.3%); the elements N, Na, Mg, Al, P, S, and Cl were identified with proportions from 4% to 0.17%. (Diagram 3.1)

Lime samples from structures were investigated with XRF and it was observed that the elements Ca (29%), Si (45%), Fe (7%), Al (5%) and Pd (5%) were dominant. Ni, Zn, Sr, Rb, Na, K, S, P, Cl, Cu, Ze, etc. were also identified in minimum amounts. (Diagram 3.18) Lime samples taken from this phase have a mean stable isotope composition of $\delta^{18}O$ = -6.08 ‰ and $\delta^{13}C$ = -7.90 ‰ V-PDB. (Diagram 3.11) The close isotopic values indicate the presence of a stable climate; even tiny fluctuations are observed. Possibly much drier or rainy periods were experienced during these fluctuations compared to previous or later periods.

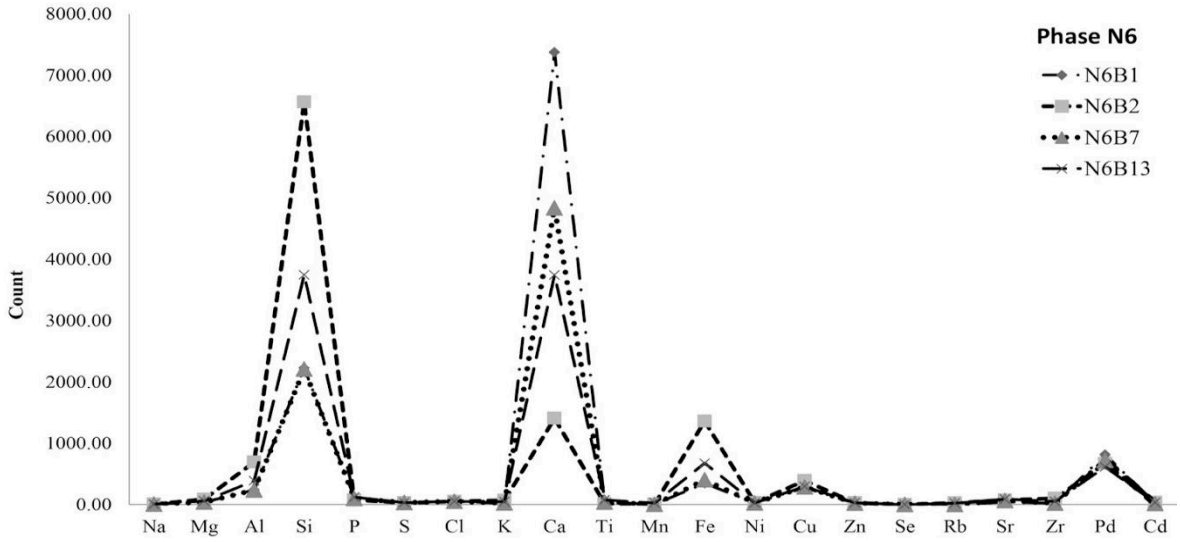


Diagram 3.18: Comparison of XRF analysis results taken from Phase N6 structures

3.3.3. Phases N5

The succeeding Phase N5 is dated to 8526±60 - 8491±50 CalBP (6576±60 - 6541±50 CalBC) according to four C_{14} date, (Table 3.3) has a similar character to previous phase, Phase N6, and was recovered in an area of 865 m^2, with 625 m^2 in Area B, 200 m^2 in Area A, and 40 m^2 in Area C. (Figure 3.13, 3.14, 3.61, 3.62, 3.71) Area B seems to be more intensively occupied than before, keeping the same pattern on low terraces of the natural topography as it was in Phase N6 while Area A was less settled. In Area C very limited structural remains were recorded.

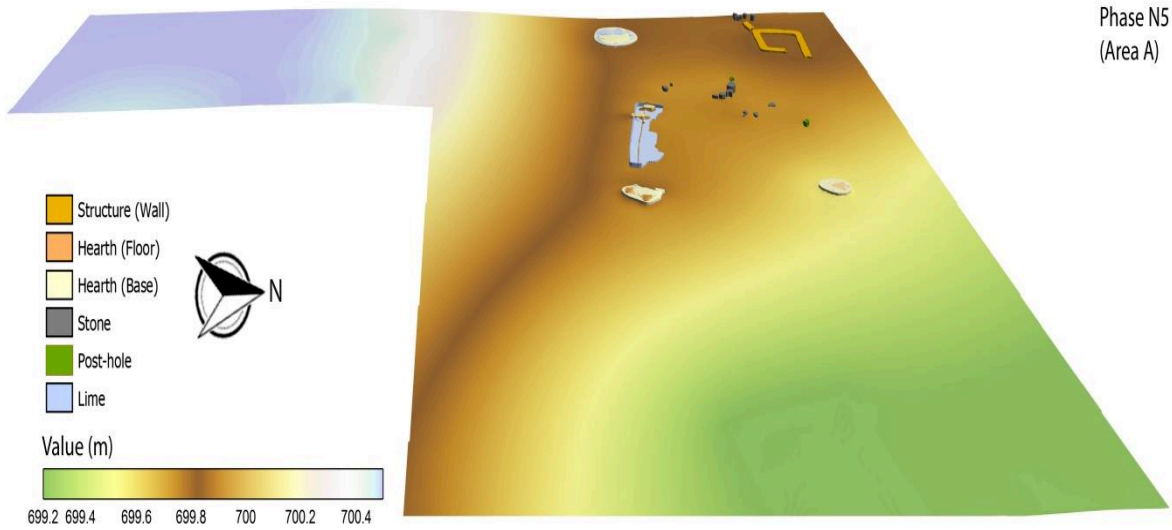


Figure 3.13: Settlement pattern and architecture from Phase N5 at Area A

Either in building layout or construction technique, notable changes are recognised in Phase N5. While the practice of Cell Building continued, multi-roomed and double-roomed buildings appeared. Single-roomed structures were also in use. Additionally, the lime floor in multi-roomed structure N5B12 is the only interior floor in Sumaki Höyük Neolithic settlement. Single-roomed buildings display two different traditions. They were either built by the piled earth technique as they were in Phase N6 or were 'temporary' structures that had only reed surroundings (probably with a flimsy upper cover), as is documented in structures N5B14 and N5B15. Close to these 'temporary' structures, are fire pits similar to the ones in Phase N7. It should particularly be emphasised here that these structures are located in the same area as the Cell Buildings. In this phase, ten hearths were exposed with five in Area A and five in Area B. (Table 4.5) There are generally stone pavements beneath their plastered floors although some examples were identified directly on the ground. All have a single floor except for one.

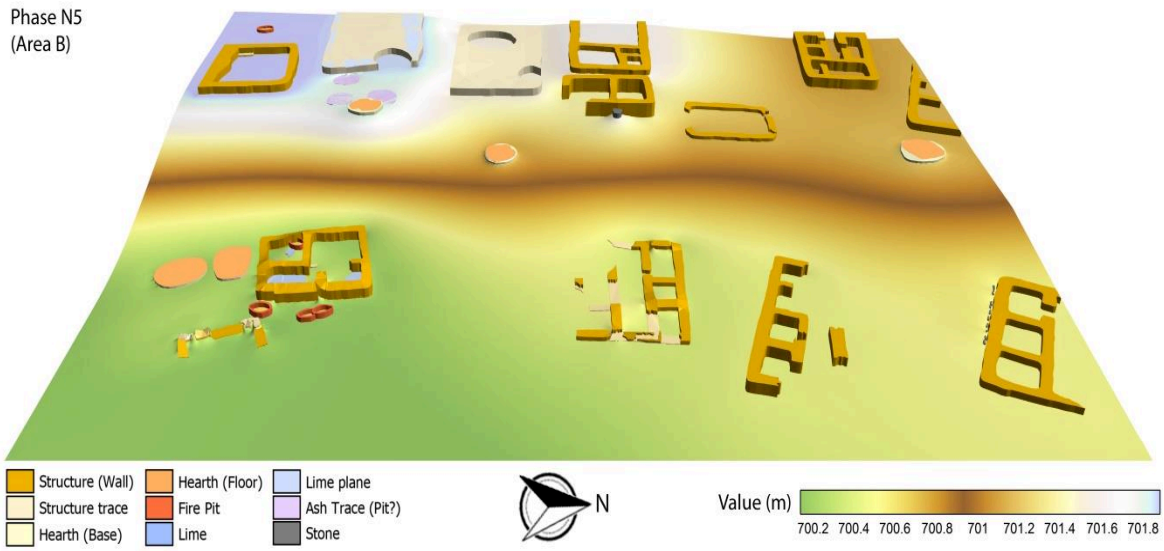


Figure 3.14: Settlement pattern and architecture from Phase N5 at Area B

Apart from these, grinding stones, which we identified to have abundant secondary use in Phase N1 at Sumaki Höyük, were obtained *in situ* from this phase, especially in the west front room of Structure N5B6. Another distinctive feature of this phase is that the pottery usage identified in Phase N7 and abandoned in Phase N6 reoccurs after an approximately 200-year interval.

The fill of Phase N5 was grey-coloured and contains carbon fragments and ash in areas A, B, and C. Additionally, in the southeast corner of trench 14H, northwest of trench

20M and southwest of trench 20L, dark-grey fill with dense carbon fragments was observed while in different areas (Figure 3.56, 3.57) heterogeneous fill with mixed sequences of stones, pottery sherds, bones and obsidian tool fragments were identified. This heterogeneous fill was concentrated mainly in the east-northeast part of trench 15F and southeast of trench 15G in the open area between the structures N5B11 and N5B12 while it was occasionally scattered between structures in trenches 14G and 14F, and also in trenches 18G, 20G and 22M. This stony heterogeneous fill is directly related to the torrents that occurred by the end of Phase N5, which is also supported by trench sections and geomorphological observations.

When the relationship between the torrent accumulation areas with the topography of the period is addressed, it is natural that geographic events occurring between the years 8491±50 and 8461±49 CalBP (6541±50 and 6511±49 CalBC) would deposit material in areas permitted by the topography. Digital elevation models were integrated with archaeological data and the accumulation areas were analysed. The irregular characteristics identified in the sequential accumulation areas of the archaeological layers show that these torrents occurred suddenly. Regarding the torrent geometry in tandem with the archaeological material, it was found that, obsidian/flint tools and flakes, animal bones, ground stone fragments and a few pottery sherds were deposited in a disorderly manner.

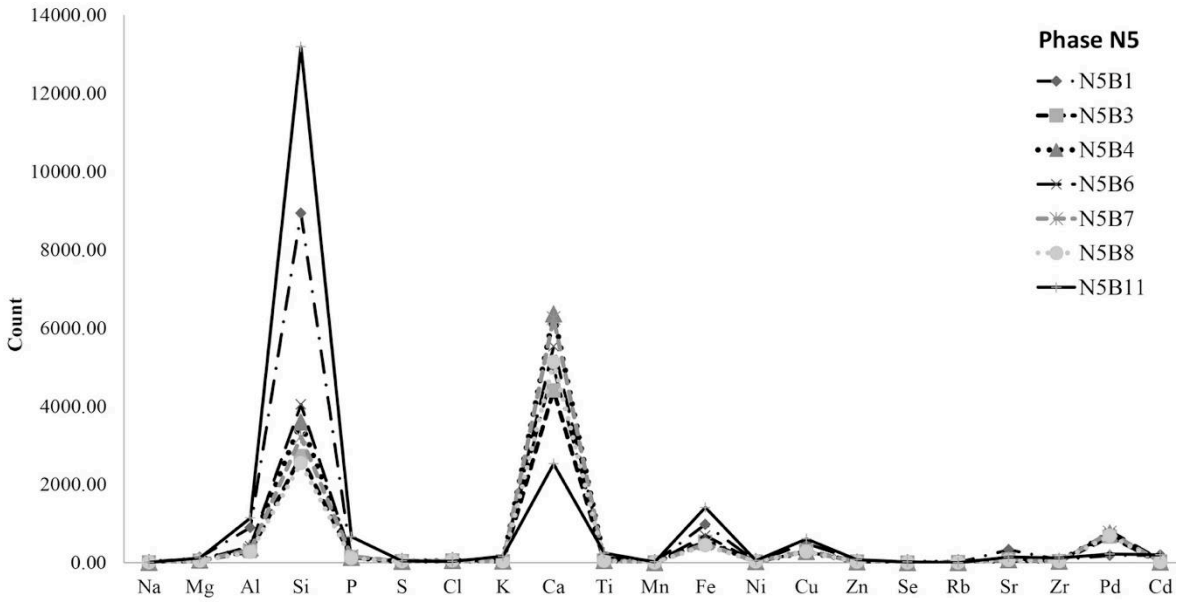


Diagram 3.19: Comparison of XRF analysis results taken from Phase N5 structures

Earth and lime samples taken from the fills of Phase N5 were investigated and interpreted micro-morphologically and micro-archaeologically. Occasional micritic

envelopes were observed on the sand and stone grains from samples. SEM images found scalenohedral, prismatic, granular, and stalactitic crystal structures along with acicular crystals in some samples. Very clear calcium carbonate minerals were observed surrounding tubes formed by organic remains. The minerals surrounding the tubes are generally hexagonal and pointed-tipped mixed crystal structures. It was determined that SiO_2 gels filled natural cavities. The clearest one is silicon dioxide gels filling *Panicum* plant remains. Investigation of Phase N5 earth and lime samples with the EDX method found mean element ratios of O (46.95%), Ca (19.72%), C (14.93%), Si (8.85%), and Fe (2.44%). N, Na, Mg, Al, P, S and Cl elements were also identified at mean ratios of 4% to 0.24%. (Diagram 3.1) Investigation of the same samples with the XRF method observed the following elements dominating; Ca (37%), Si (40%), Fe (5%), Al (4%), and Pd (2%), together with very small amounts of Ni, Zn, Sr, Rb, Na, K, S, P, Cl, Cu, and Ze. (Diagram 3.19)

Investigation of earth samples taken from the fills of Phase N5 with the XRD method identified them having a calcium carbonate composition, calcite minerals and the organic carbon mineral of graphite along with cliftonite, spharite, silica and quartz crystals. (Table 3.1) Samples taken from torrent sediments had a more complex mineral composition. The minerals in these fills were determined to include iron, brucite and sakhaite in addition to the minerals listed above. Stable isotope composition of lime samples in this phase is mean $\delta^{18}O$ = -6.29‰ and $\delta^{13}C$ = -7.31‰ V-PDB. However, an evident fluctuation was identified in isotope values from the years 8491±50 and 8461±49 CalBP (6541±50 and 6511±49 CalBC) equivalent to the interval between phases N5 and N4. Values of $\delta^{18}O$ = -5.64 ‰ and $\delta^{13}C$ = -10.57 ‰ V-PDB, showing that a colder and rainier climate was experienced compared to the previous period, is more evidence for this torrent event. (Diagram 3.11)

Comparative examination of the isotope values of different samples from Phase N5 indicates the presence of warm-wet and warm-dry climates; however, shortly before the end of Phase N5 a cold-wet climate was extant. (Diagram 3.11) The warm-dry climate was replaced by a colder and rainier period which caused flash floods and torrents. These severely damaged the settlement and the buildings of Phase N5. A rather heterogeneous accumulation covered almost all the settlement, but particularly Area B. Irregular sequences, disorderly-deposited pottery sherds, obsidian/flint tools and flakes, animal bones, and fragments of ground stone objects in the archaeological layers also show that these floods/torrents occurred suddenly. XRD analysis of samples taken from flood/torrent fills

reveals a rather complex mineral composition and confirms that flood waters from outside areas carried minerals such as iron, brucite, and sakhaite to the settlement. (Table 3.1)

3.3.4. Phases N4

Following this break in occupation, Phase N4, which is dated to 8461±49 - 8436±52 CalBP (6511±49 - 6486±52 CalBC) (Table 3.3) was identified in a total area of 840 m² covering 440 m² in Area B, 350 m² in Area A, and 50 m² in Area C.

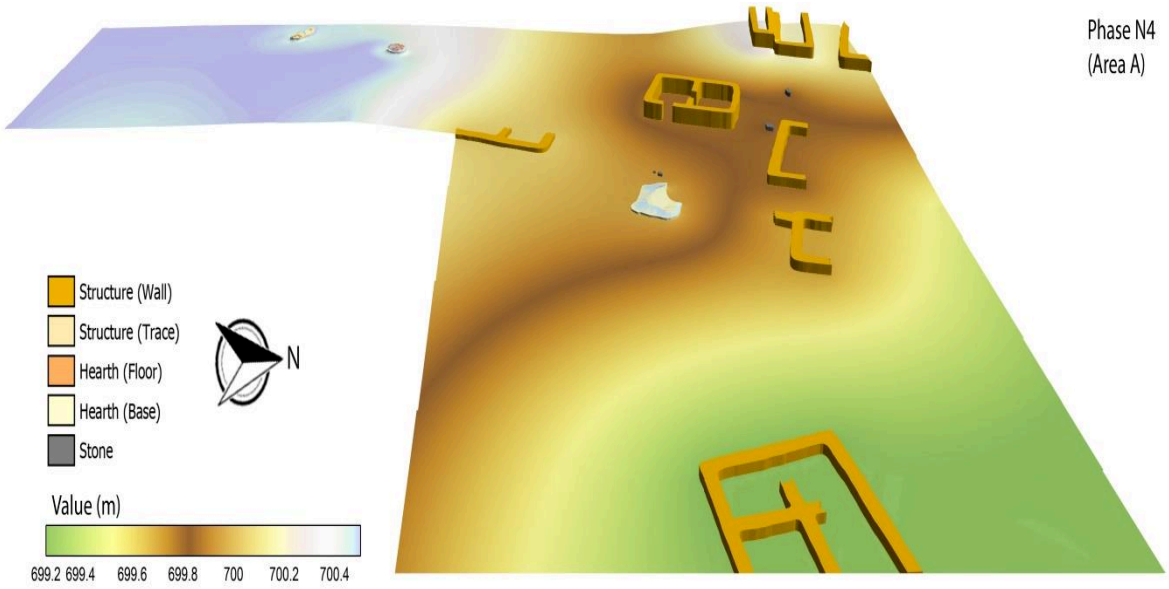


Figure 3.15: Settlement pattern and architecture from Phase N4 at Area A

In Phase N4 there is a change in both architectural conception and settlement pattern. In areas A and B, the structures encircled a common space. (Figure 3.15, 3.16, 3.63, 3.64, 3.71) The Cell building tradition was ended. However, the construction of multi-roomed and double-roomed buildings with piled earth walls continued, and the number of temporary single-roomed short-duration dwellings with reed surroundings/walls and probably covered by tents or flimsy material increased. The fire pit tradition continued along with these structures. (Diagram 3.16; Figure 3.63, 3.64) The hearths are not much different from the previous ones, but are larger. There is also an increase in their number, and they are usually concentrated in particular areas. Some have renewed floors. Almost all the bases of hearths have mottled surfaces due to intensive usage.

The cultural deposit of Phase N4 was generally grey in Area B with thin lines formed of occasionally dense lime fragments. These lime fragments are hazelnut-sized, but none had

any traces of plaster on their edges. The grey fill was sometimes mixed with ash. As areas with dense ash were near hearths, this ash-rich fill is interpreted as being associated with hearths and fire pits. The Phase N4 fill in Area A was generally light buff and light grey in colour. (Figure 3.56) Contrary to the grey and occasionally lime fragment-rich fill identified in Area B, the proportion of lime fragments in fill from Area A is relatively less. (Figure 3.57) In specific areas, but especially in the south half of trench 20M, reddish-brown scattered soil levels were identified. This reddish-brown fill generally had similar features to the structural traces. (Figure 3.56-D)

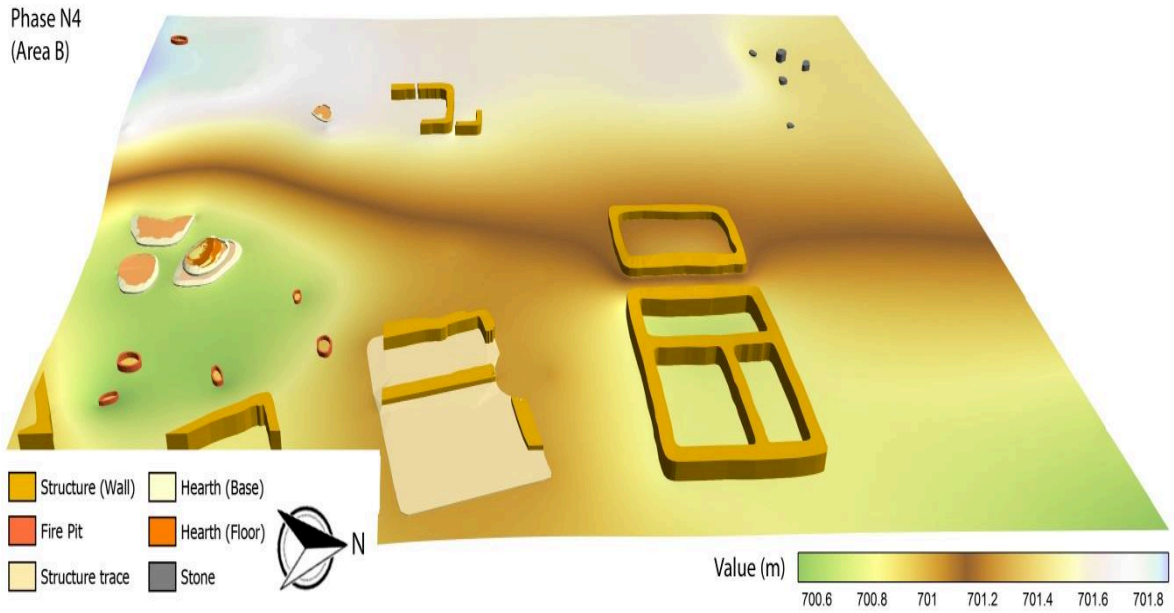


Figure 3.16: Settlement pattern and architecture from Phase N4 at Area B

Earth and lime samples taken from Phase N4 fill were investigated and interpreted in terms of micro-morphology and micro-archaeology. Samples were observed to occasionally have micritic envelopes on the sand and stone particles. SEM images of the samples showed scalenohedral, prismatic, granular and stalactitic crystal structures along with acicular crystals being observed. Very clear calcium carbonate minerals were also determined surrounding the tubes formed by organic remains. The minerals surrounding these tubes are generally sharp-tipped mixed crystal structures of aragonite. Apart from these, SiO_2 gels fill the natural cavities. The clearest example is silicon dioxide gels filling *Panicum* plant remains.

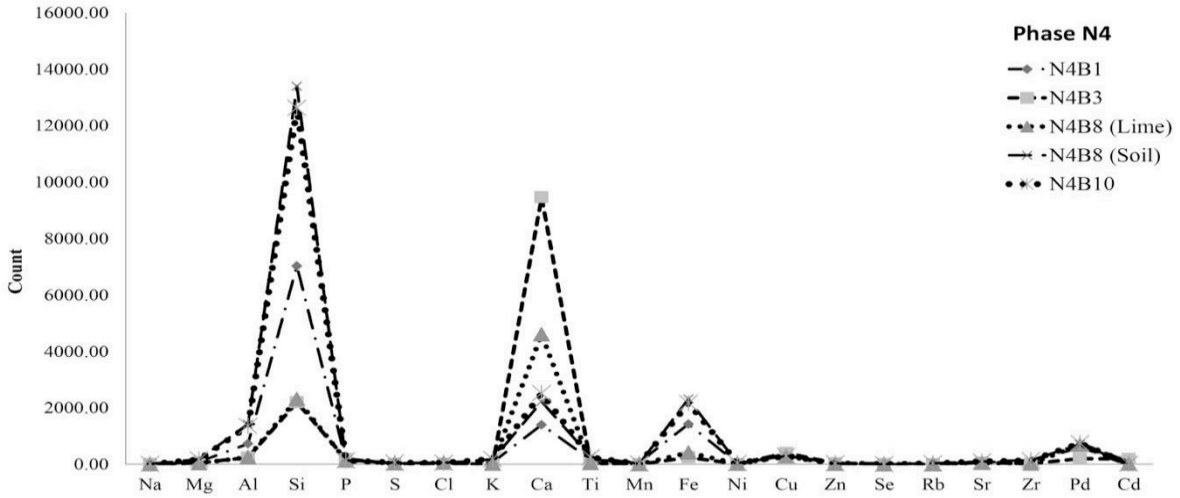


Diagram 3.20: Comparison of XRF analysis results taken from Phase N4 structures

Investigation of Phase N4 soil and lime samples with EDX determined mean element proportions of O (48.11%), Ca (21.17%), C (12.66%), Si (9.57%), and Fe (5.17%). Na, Mg, Al, and K were also present at proportions of 4% to 0.43%. (0.43% to 4%) (Diagram 3.1) Examination of the same samples with XRF found Ca (32%), Si (43%), Fe (8%), Al (5%), and Pd (4%) were dominant; very small amounts of Ni, Zn, Sr, Rb, Na, K, S, P, Cl, Cu, and Ze were identified as well. (Diagram 3.20) XRD analysis of earth samples taken from Phase N4 fills determined calcite with a calcium carbonate composition along with carminite, silicon and quartz. (Table 3.1)

Comparative investigation of isotope values identified that cold-wet, warm-dry and cold-dry sequential climates were experienced. The stable isotope composition in this phase with means of $\delta^{18}O$ = -6.02 ‰ and $\delta^{13}C$ = -7.52 ‰ V-PDB (Diagram 3.11) were very close to each other, indicates the presence of a more stable climate during this phase. However, smaller isotope fluctuations were observed compared to the previous and later phases. Possibly, during this fluctuation era, drier or rainier periods were experienced compared to past or subsequent years.

The light brown earth line of 3-4 cm thickness identified in different trench sections, western section of trench 15G in area B and western section of trenches 20L-20M in Area A, above the Phase N4 filling shows that geomorphologically, this area was not used for a specific period. Accordingly, after Phase N4 Sumaki Höyük became deserted again. The settlement organization of the newcomers was different from the Phase N4 inhabitants.

3.3.5. Phase N3

Phase N3 is dated to 8395±28 CalBP (6445±28 CalBC) according to a single C_{14} dating (Table 3.3). It covers a total area of 693 m² scattered through 421 m² in Area B, 242 m² in Area A and 30 m² in Area C. The architectural tradition radically changes in this phase. (Figure 3.17, 3.18, 3.65, 3.66, 3.71, 3.72) The settlement pattern and architectural tradition of Phases N6-N4 disappear. Lasting nearly 250 years, the permanent settlement transforms into a temporary "campsite" with features partly similar to Phase N7. Oval tents now replace the practice of permanent buildings, and according to the distribution of artefacts, intensive usage of open areas. Hearth and fire pits are similar to those of the previous phases. The hearths in Area B are concentrated in particular areas, as is seen in Phase 4. It seems that the hearths were used for longer than the structures. Oval-shaped fire pits are larger than the ones of previous phases: their dimensions range from 36x67 cm to 58x92 cm and their depth is 7-12 cm. After Phase N3, the fire pit tradition comes to an end.

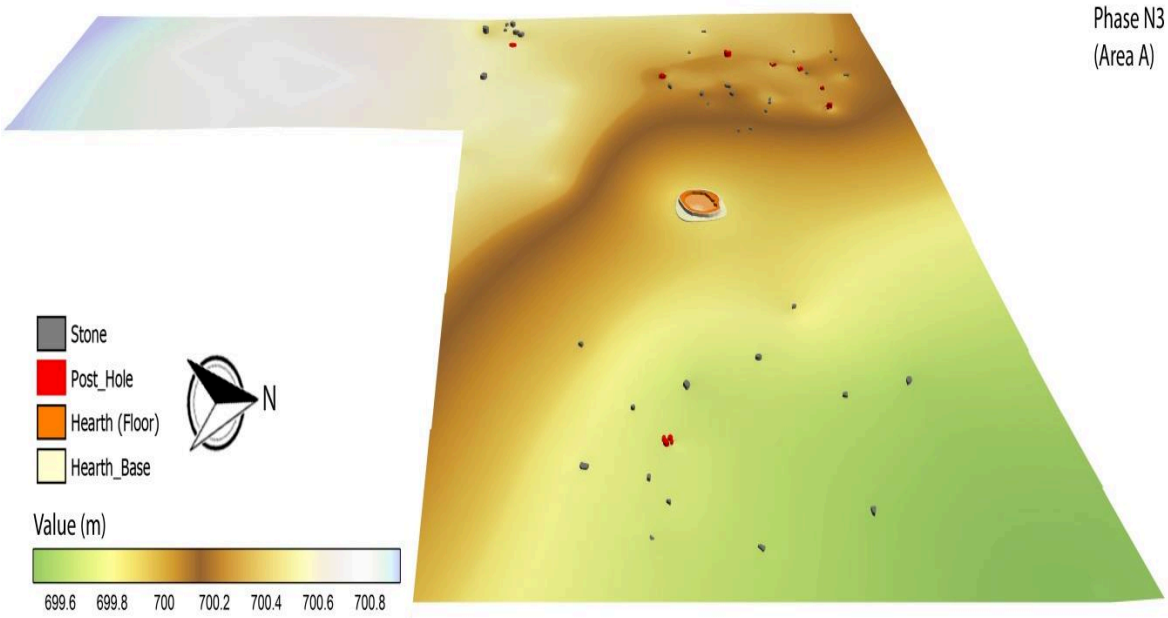


Figure 3.17: Settlement pattern and architecture from Phase N3 at Area A

The Phase N3 filling is very shallow compared to the other phase fills, but it is incredibly varied. The fill generally has the appearance of thin consecutive beds with a light grey and occasionally lead-grey, colour. Dense lime fragments and stony mixed fill were also identified. Scattered ash-rich fill was determined in different areas around hearths and fire pits.

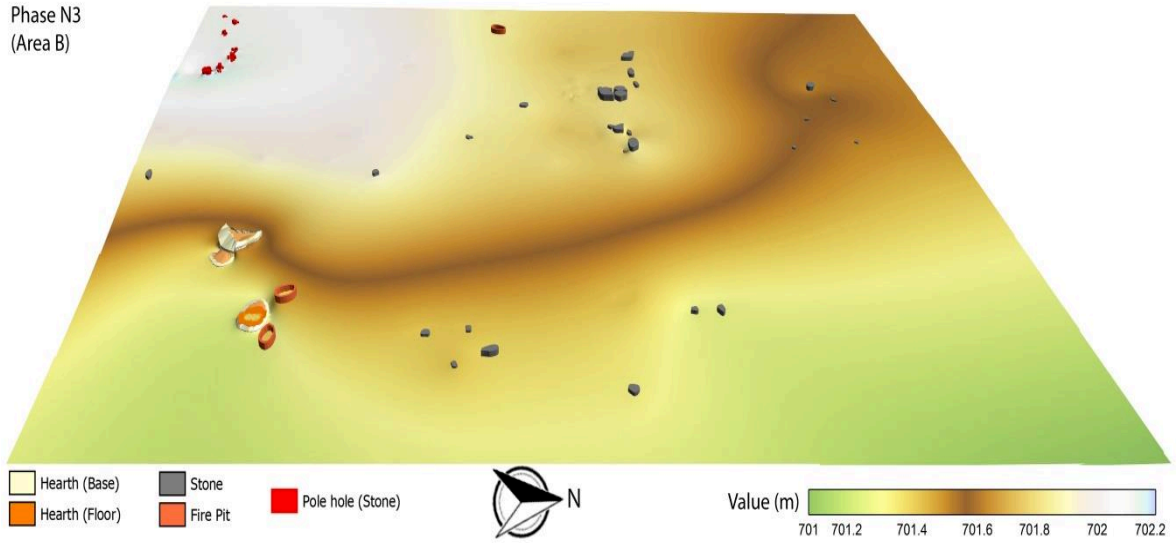


Figure 3.18: Settlement pattern and architecture from Phase N3 at Area B

Earth samples of Phase N3 fill were micro-morphologically and micro-archaeologically investigated and interpreted. Earth samples taken from fills were examined with XRD analysis. Samples taken from Area A were found to contain anorthite (calcium feldspar), calcite, silicon, and quartz minerals. Their chemical composition is calcium carbonate, silicon dioxide, and calcium aluminium silicate compounds. (Diagram 4.121) Samples from Area B were identified as containing cliftonite, graphite, calcite, and quartz minerals. Their chemical composition is calcium carbonate, carbon, and silicon dioxide compounds. (Diagram 4.122)

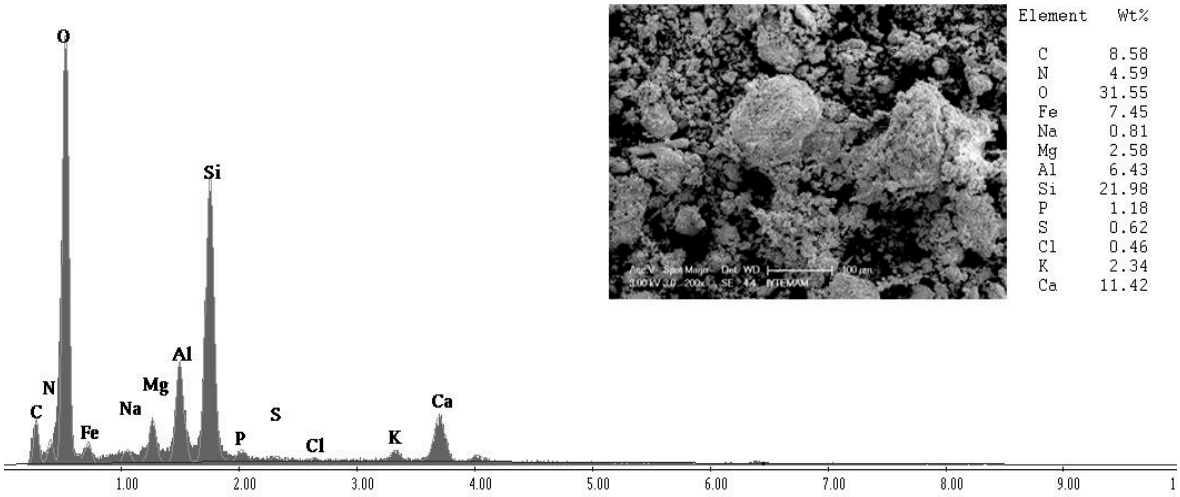


Diagram 3.21: EDX analysis results of soil samples taken from Phase N3 at Area A

Investigation of SEM images of earth samples from both areas (A and B) revealed micritic envelopes on sand grains. Acicular crystal formations were also identified. Examination of samples from Area A with EDX identified mean element values of O

(31.55%), Ca (11.42%), C (8.58%), Si (21.98%), Fe (7.45%), and Al (6.43%). (Diagram 3.21) Mean element proportions in Area B are O (33.83%), Ca (14.06%), C (8.59%), Si (24.13%), Fe (8.57%), and Al (6.16%). (Diagram 3.22)

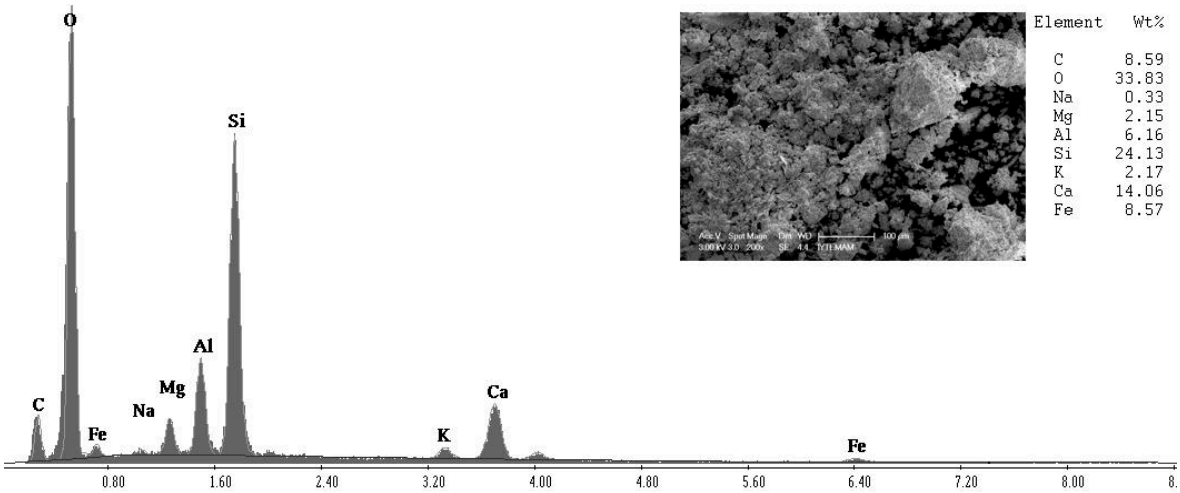
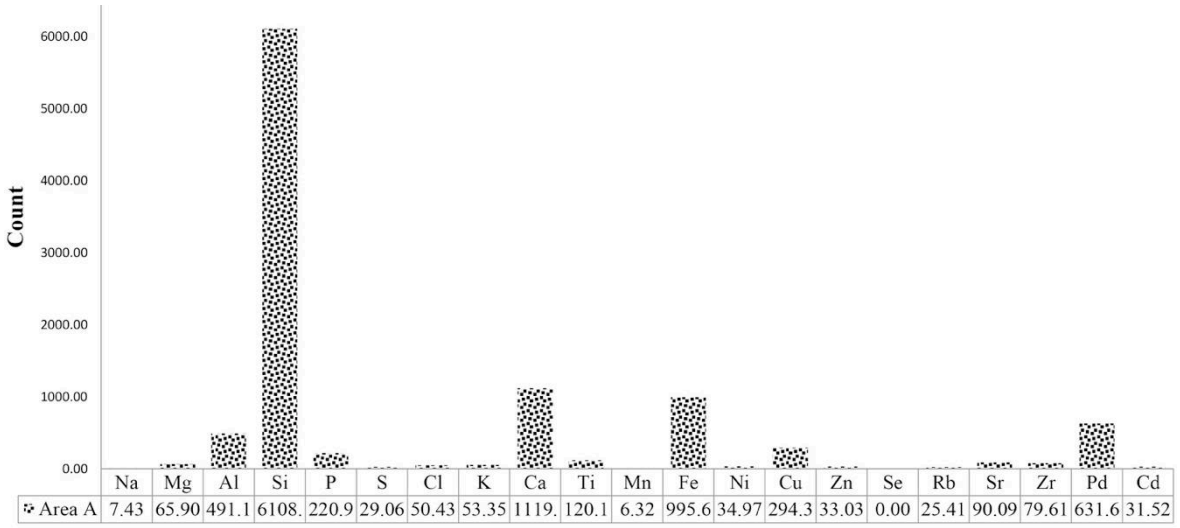


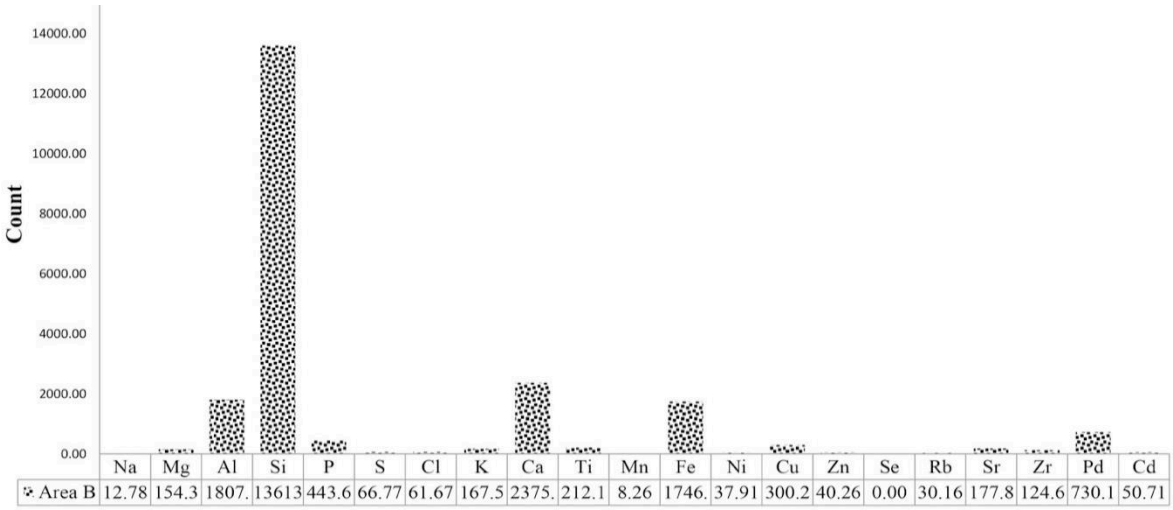
Diagram 3.22: EDX analysis results of soil samples taken from Phase N3 at Area B

Lime and earth samples were also investigated using the XRF method. In both areas, the elements and their ratios are not very different. In the samples from Area A, Ca (11%), Si (58%), Fe (9%), Al (5%), and Pd (6%) were dominant (Diagram 3.23) while in Area B, Ca (11%), Si (61%), Fe (8%), Al (8%), and Pd (3%) were dominant. Minimal amounts of Ni, Zn, Sr, Rb, Na, K, S, P, Cl, Cu and Ze were also identified. (Diagram 3.24)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
Area A	7.43	65.90	491.1	6108.	220.9	29.06	50.43	53.35	1119.	120.1	6.32	995.6	34.97	294.3	33.03	0.00	25.41	90.09	79.61	631.6	31.52

Diagram 3.23: XRF analysis results of soil samples taken from Phase N3 at Area A



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
Area B	12.78	154.3	1807.	13613	443.6	66.77	61.67	167.5	2375.	212.1	8.26	1746.	37.91	300.2	40.26	0.00	30.16	177.8	124.6	730.1	50.71

Diagram 3.24: XRF analysis results of soil samples taken from Phase N3 at Area B

Comparative examination of isotope values from this phase identified warm-dry and cold-rainy periods that were experienced sequentially. The mean stable isotope composition for this phase is $\delta^{18}O$ = -6.34‰ and $\delta^{13}C$ = -7.52‰ V-PDB. The arid curve is obvious in two samples especially, which had values of $\delta^{18}O$ = -6.35‰ and $\delta^{13}C$ = -6.31‰ V-PDB and $\delta^{18}O$ = -6.06‰ and $\delta^{13}C$ = -6.53‰ V-PDB, respectively. (Diagram 3.11) According to these values, it is understood that a warmer and drier climate was experienced compared to the previous and subsequent periods. Clear fluctuation peaks observed in graphic interpretations of the isotope values indicate the presence of a more irregular climate, contrary to the generally more stable climate in Phase N4. This change in climate might be the dominant factor accounting for the area not being occupied permanently.

3.3.6. Phase N2:

Phase N2 was identified over a total area of 1204 m², with 495 m² in Area B, 669 m² in Area A, and 40 m² in Area C. (Figure 3.19, 3.20, 3.67, 3.68, 3.71, 3.72) Since there is no C_{14} dating, this phase is relatively dated to about 8250 - 8200 CalBP (6350-6300 CalBC) (Table 3.3) The settlement pattern and spatial distribution density were recreated similar to phases N6 and N4. In this phase, the Circular Temporary Structures from Phase N3 are replaced by rectangular temporary structures. (Table 4.7)

The buildings were located beside each other and built following the topography of the period. The original architectural tradition of this phase is single-roomed temporary

buildings. However, three buildings constructed of piled earth walls, a Cell building (N2B9) and two single-roomed buildings (N2B1 and N2B7) were identified. Cell building, which dominate the architecture in phases N6 and N5, reoccurred in this phase but did not become popular. Hearths of this phase are similar to those of the previous phases. All the hearths have hard plastered floors with generally even, rippled and slightly cracked surfaces on stone pavements. (Table 4.5) Some of the hearths were used for a long time and their plastered floors were renewed several times; for example, N2O2 had four renovated floors. There are thin heterogeneous fills between the superimposed plastered floors and lime debris was found around some of the hearths.

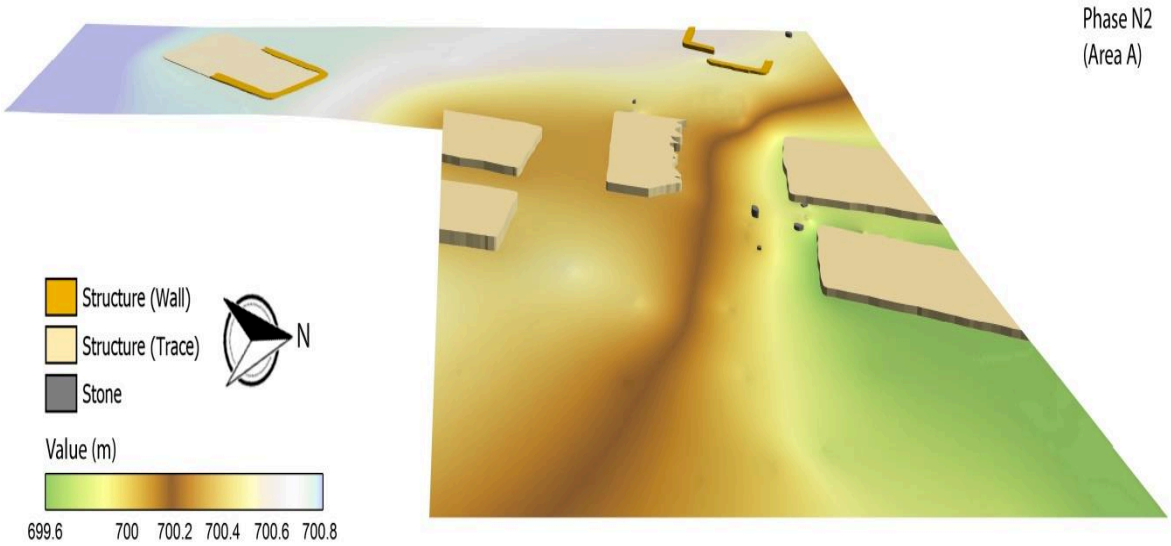


Figure 3.19: Settlement pattern and architecture from Phase N2 at Area A

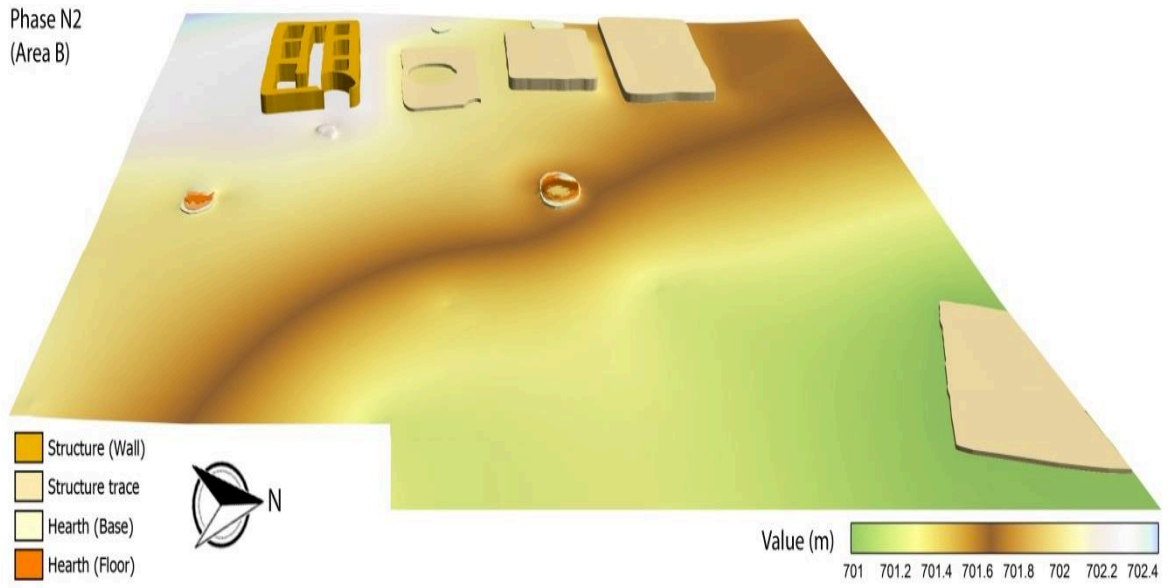


Figure 3.20: Settlement pattern and architecture from Phase N2 at Area B

The fill of Phase N2 is generally grey-buff colour, occasionally with dense stones and partly ashy. Towards the end of this phase, a flood level was identified which greatly disturbed the ground, with inundated buildings and other features. Affecting nearly the whole settlement, flow and sedimentation data indicate that the flood had southwest-northeast orientation. (Figure 3.56, 3.57) Trench 14F in Area B, trench 22L in Area A, and trench 18G in Area C are the areas where the flood/torrent left most sedimentation. (Figure 3.41 – 3.46) When the accumulation areas due to this flood/torrent are assessed in terms of the topography of the period, it is evident that the settlement topography allowed accumulation in areas due to geographic events occurring about 7400 years BP. Digital elevation models were integrated with archaeological data to analyse these sedimentation areas. Thus, these sedimentation areas were determined to be the result of flood/torrents that occurred irregularly and suddenly. The similarity between the mineral composition of the flood in this phase and the floods of Phase N5 indicates that the direction and the triggering factors were the same. (Table 3.1) Pottery sherds, obsidian/flint tools and flakes, animal bones, and ground stone fragments in the archaeological layers were deposited in a disorderly manner in the heterogeneous sedimentation area, as they were in Phase N5. This heterogeneous fill with a lot of stones is directly associated with the flood/torrents occurring in the later stages of this phase. Since there is no regular surface, the flooding probably happened more than once. The settlement was abandoned sometime after the flood/torrent, and the spatial perception and settlement strategy radically changed in the following Phase N1. (Table 3.4)

Earth and lime samples taken from Phase N2 fill were investigated and interpreted in terms of the micro-morphology and micro-archaeology aspects. Lime samples were observed to have occasional micritic envelopes around the sand and stone grains. However, the formation of micritic envelopes was more defined in samples taken from flood/torrent fill. SEM images of lime samples taken from structures revealed scalenohedral, prismatic and granular crystal structures along with some acicular crystals found.

Examination of earth samples from Phase N2 fill with EDX analysis identified mean O (31.65%), Ca (12.04%), C (7.92%), Si (21.59%), Fe (7.98%), and Al (6.78%). N, Na, Mg, P, and K were also identified with proportions from 5% to 1.09%. (Diagram 3.1) According to EDX analysis of the lime samples, O (45.29%), Ca (26.27%), C (17.03%), Si (4.84%), Fe (2.29%), and Al (1.65%) were dominant. The reason for higher carbon and calcium is related

to the presence of organic material within these lime fragments. Likewise, the cause of predominantly silicon proportions in samples taken from the soil and flood/torrent fill is associated with the sand and stone content in these fills.

Samples of soil taken from Phase N2 fill had a mineral composition that was determined by XRD analysis. Earth samples from Phase N2 fill were seen to contain calcite, silicon, quartz, and anorthide minerals. The torrent fills have a more complex mineral composition. Samples from these fills were determined to contain calcite, quartz, and silicon along with sphalerite, brucite, altaite, and chalcopyrite. (Diagram 3.13) The lime samples generally comprised calcite, quartz, and silicon. The mineral composition of samples from torrent fills especially is very similar to the mineral composition of torrent samples from Phase N5. It is proposed that both the orientation of the torrent and triggering factor were the same due to the similarity of sedimentation as well as mineral composition.

Earth and lime samples taken from seven structures were also investigated with the XRF method. According to the analysis, Ca (14%), Si (59%), Fe (9%), Al (5%) and Pd (4%) were dominant in earth samples. In lime samples, the element ratios were mean Ca (47%), Si (31%), Fe (5%), Al (3%), and Pd (5%). In both earth and lime samples, low amounts of Ni, Zn, Sr, Rb, Na, K, S, P, Cl, Cu, and Ze were also identified. (Diagram 3.25) The XRF and EDX analysis results support each other.

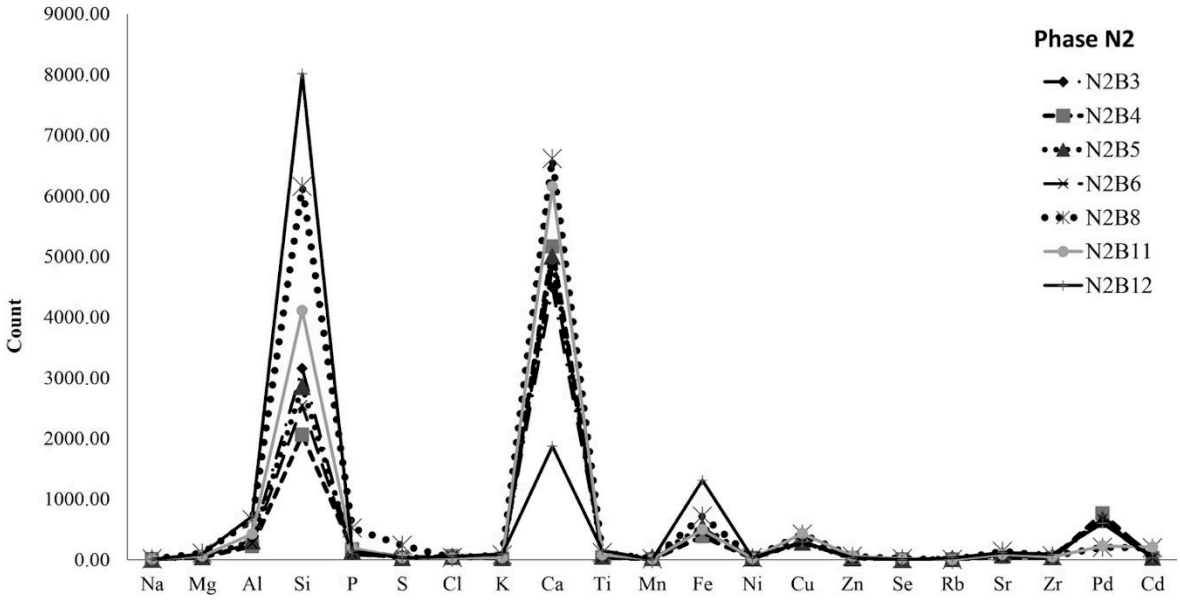


Diagram 3.25: Comparison of XRF analysis results taken from Phase N2 structures

Stable isotope composition in this phase was $\delta^{18}O$ = -6.05‰ and $\delta^{13}C$ = -8.68‰ V-PDB. This rate also shows that a warmer and more humid climate was experienced compared

to other phases. (Diagram 3.16) However, there is clear fluctuation in isotope values at 8200±50 CalBP (6300 ±50 CalBC) equivalent to phases N2 to N1. Values of $\delta^{18}O$ = -5.71‰ and $\delta^{13}C$ = -10.64‰ V-PDB indicating that a colder and wetter period was experienced compared to the previous period provides more evidence of this torrent event. These isotope ratios are nearly the same as the $\delta^{18}O$ = -5.64‰ and $\delta^{13}C$ = -10.57‰ V-PDB identified in Phase N5 from 8491±50 and 8461±49 CalBP (6541±50 and 6511±49 CalBC). After the cold and rainy period occurring in Phase N2, a very definite warmer and drier period is seen. This arid period had isotope values of $\delta^{18}O$ = -5.91‰ and $\delta^{13}C$ = -7.72‰ V-PDB.

The settlement was abandoned sometime after the flood/torrent, and the spatial perception and settlement strategy of the site radically changed in Phase N1 that followed.

3.3.7 Phase N1

The final habitation of the Neolithic settlement, represented by Phase N1, was relatively dated to about 8150 - 8100 CalBP (6150 - 6100 CalBC) according to comparative chronologic data. (Table 3.3) Since the fill of this phase is not well-preserved in every part of the site, the dimensions of the settlement cannot be estimated. The architectural tradition in this phase displays a different style to nearly all the previous phases. In this phase, stone is the dominant building material. This occupation is represented by rows of large left-over basalt grinding stones placed in different directions, sometimes forming corners. These rows may surround the tents or reed dwellings of semi-nomads. (Figure 3.21, 3.22, 3.69 - 3.72)

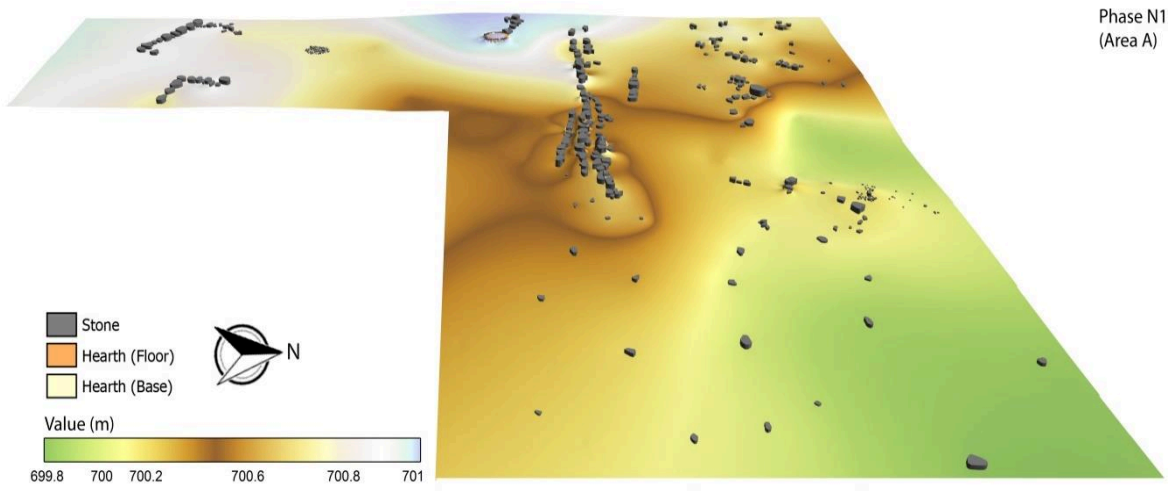


Figure 3.21: Settlement pattern and architecture from Phase N1 at Area A

Based on ethnographic examples, the stone rows of Phase N1 are similar to the stone surroundings of tent dwellings in the winter quarters of nomads in the Lower Garzan Basin. During ethno-archaeological fieldwork in the winter quarters of nomads in the Lower Garzan Basin, I observed that tents, which were set up on sloping land or with one side near a slope, were always protected by stone rows or walls. (Table 4.5) (Sulan and Bazivan) All the hearths of this phase have stone pavements. (Figure 3.56-A) Except for one hearth, the others have only a single-plastered floor on stone pavements. As with the architecture, noteworthy changes are observed in artefact assemblages. Plant-tempered either plain or red-washed ware in different forms exhibit significant changes in the form and quality of clay objects; and different bone tools display an entirely different tradition than previous phases.

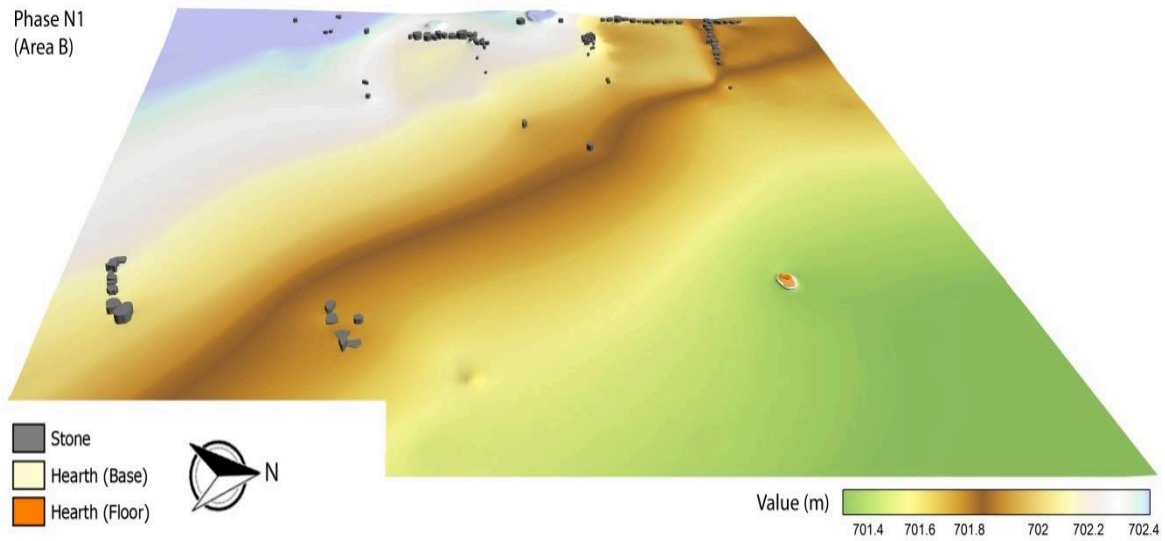


Figure 3.22: Settlement pattern and architecture from Phase N1 at Area B

The deposit of Phase N1 consists of light brown, grey and light grey earth and contains a higher density of walnut-sized pebbles compared to other phases. However, the intensive lime fragments observed in previous phases are virtually non-existent in the fill from this phase. All fills of Phase N1 are heterogeneous. (Figure 3.56, 3.57) Immediately above Phase N1 and below Middle Age layers, there is a swamp-like fill containing no archaeological material identified as 20-35 cm thick in all of trench 20/O and the southern half of trench 20N in Area A. (Figure 3.56-A) The existence of this fill may explain Sumaki Höyük being left uninhabited till the Middle Ages.

If we briefly summarise the Neolithic stratigraphy/phases of Sumaki Höyük based on their settlement character and external environmental effects, from the earliest to latest they are:

Phase	Cultural Stage	Date (CalBP)
N7	Temporary campsite with pottery	9084±57
N6	Permanent settlement without pottery	8708±90 - 8594±49
N5	Permanent settlement by different groups (?) and partly temporary campsite with a little pottery	8526±60 - 8491±50
	Torrent > break	8491±50 - 8461±49
N4	Permanent settlement	8461±49 - 8436±52
	Torrent > break ??	8436±52 (?)
N3	Temporary campsite similar to Phase N7	8395±28
N2	Intensively-occupied temporary campsite and partly permanent settlement	8258±4
	Torrent > break	~ 8.200 - 8.150
N1	Temporary campsite of different culture a new pottery tradition	8123±50

Table 3.4: Sumaki Höyük stratigraphy and variation of settlement strategy

3.4. Brief summary and Discussion

This multi-disciplined study comprises data from geomorphological survey in the Lower Garzan Basin sedimentological and paleoclimatic analysis of various samples taken from the Neolithic deposits of Sumaki Höyük, archaeological records of the site and detailed study on trench section, and combination of all these data. In general, this chapter focuses on the changes in the settlement process, strategies of inhabitation and also human-environment interaction due to various research and study. In this context, I have tried to define, to interpret and to discuss the different natural and cultural effects on the stratigraphy of Sumaki Höyük Neolithic settlement and its close environs.

The data obtained from the geological units and the geomorphological accumulation areas in and around the site played an important role for understanding the Neolithic topography of Sumaki Höyük and its environs as well as external factors experienced in the different phases, and their effect on settlement strategy and also on material-based choice in architecture. Accordingly, the geomorphological data were investigated by spatial and morphometric distributions, such as the landslide traces around the Sumaki Höyük, the soil structure and the possible vegetation diversity. Analyses of various soil samples taken from

the Sumaki Höyük fillings and its surrounding area are integrated with other data and discussed in the micro-archaeological context.

Landslide events that occurred in clayey units directly affected the settlements of Sumaki Höyük and its surroundings. The data on landslides and earthflow were modelled by GIS techniques and linked with the geomorphological dynamics and processes. The erosion-accumulation surface where the Sumaki Höyük settlement is located was generally formed in Pliocene-Pleistocene but particularly in the Holocene Period. Flooding, overflow and earth flow traces, of which two are quite apparent, have been detected in the Neolithic layers of Sumaki Höyük. Due to these external factors, the settlement was abandoned at intervals.

Confirmation of the abandonment of the settlement does not rely solely on archaeological evidence. For example, in the uppermost part of Phase N4 fillings, 2-3 cm-thick soil lines, possibly formed after floods or inundation, are observed. XRD and XRF analyses show that different soils were transported to the settlement and different mineral compositions were formed in periods when habitation was partially interrupted. An approximately 35 cm-thick swamp/wetland fill, clearly detected in squares 20/O and 20N, indicates that the site was also affected by external factors such as floods, landslides and overflows after the Neolithic Period. In addition, in trench 20G, it was determined that the steep slope (stream bed?) on the eastern edge of the settlement was filled with landslide/flood material. Especially in the phases N4 and N2, greenish oxidation is seen on the surface of pottery sherds from remaining underwater for a long time. It can be stated that very strong floods, overflows or soil runoff which would dislodge or cover the structures did not take place, at least in the Neolithic period around Sumaki Höyük.

Based on the soil carbon isotope data of Sumaki Höyük and also some climatic data from the Near Eastern caves and lakes such as Lake Van, Dead Sea, and/or Soreq Cave, one of the most important factors in occurrence of these landslides are the presence of unstable climate structure, with cold-and-humid, warm-and-dry alternations were experienced sequentially between 9084±57 - 8123±50 CalBP (7134±57 - 6173±50 CalBC). Based on these data, it is likely that Sumaki Höyük may not be the only Neolithic settlement in the Lower Garzan Basin. Sedentary or temporary Neolithic settlements with a shallow filling would have been completely sealed by more rigorous landslides or similar external factors.

Apart from all these, both the archaeological data of the Tell Seker al-Aheimar settlement, the isotope data of the Soreq Cave, and the changes in the water level in Lake Van proved that the fluctuations in the period and the dramatic changes in the physical

environment were experienced. The mobility of the communities in the period studied is most likely as a result of the changes in the physical environment affecting the cultural environment. Of course, this process of interaction is mutual interaction. Therefore, changes in the cultural environment as a result of changes in the physical environment also change the appearance of the physical environment.

Changes in physical and cultural environment at the Sumaki Höyük settlement is a good example of interaction of multiple variations. The distribution of buildings according to the phases was constructed in harmony with the natural topography in all phases. The effects of the natural environmental issues seem to be limited to the relatively empty spaces outside the buildings and these accumulation areas had been used always as common areas in the succeeding phases. Another example, due to intensive occupation and the usage of the physical environment, a stream that ran in the eastern part of trench 20G dried up and might have shifted to another area. When all these are evaluated together, physics can change the culture of changes in the environment, architectural perception and building material as well as the physical structure of the natural environment as a result of human influence. This can be described as a mutual dialectic change and adaptation between cultural and physical environment, which we could be called "*Paleo-Milieu*".



Figure 3.23: A headwater is located on the northeast slope of Sumaki Höyük



Figure 3.24: View of the İkiköprü Channel from southeast



Figure 3.25: View of the Ulular Channel from north



Figure 3.26: View of the Kıradağı Basalt and Sumaki Höyük from Asmadere village

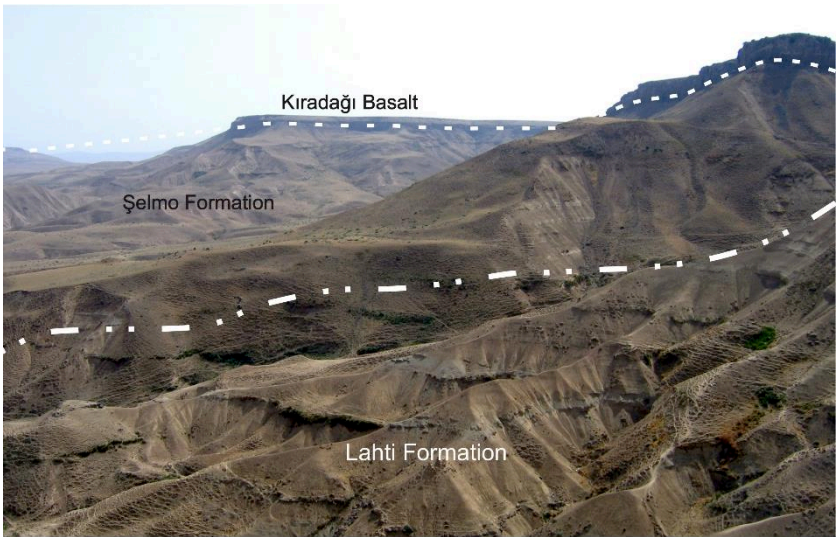


Figure 3.27: Kıradağı basalt and other geological formation



Figure 3.28: Cross-section of the Kıradağı basalt

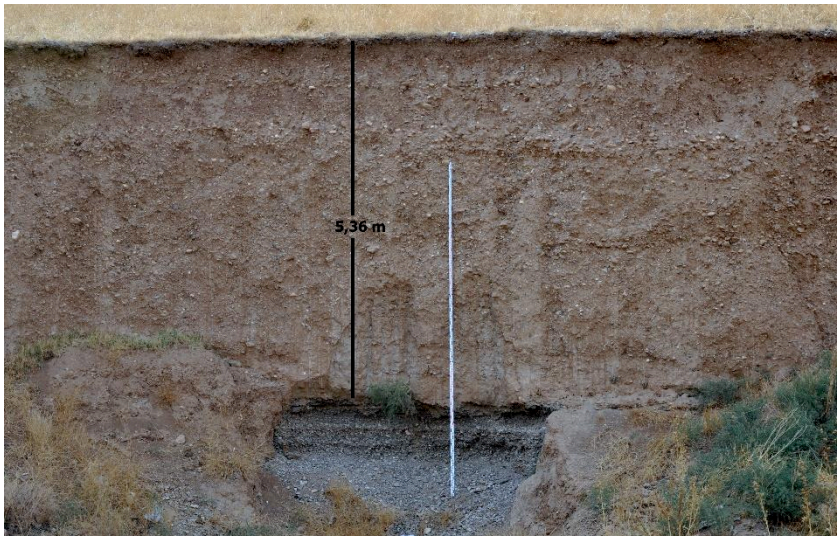


Figure 3.29: Colluvial and hydrographic deposition traces in front of Rıdvan village



Figure 3.30: General view hydrographic deposition traces between Asmadere and Yeşiloba villages



Figure 3.31: Detail view hydrographic deposition traces between Asmadere and Yeşiloba villages



Figure 3.32: Propagation of reeds and herbaceous plants near Sulan Kom



Figure 3.33: Propagation of reeds and herbaceous plants near Sulan village



Figure 3.34: A natural reed belt along the Garzan Stream



Figure 3.35: Mass movements and landslides area on the eastern outskirts of Kıradağı



Figure 3.36: Mass movements and landslides area on the eastern outskirts of Kıradağı



Figure 3.37. Falling and/or drifting of blocks detached from the Mare Tepesi conglomerates



Figure 3.38: Drifting of blocks detached from the Kıradağı Basalt, near Tepecik village



Figure 3.39: Mass movements and current landslide traces, on the northeastern slope of Sumaki Höyük



Figure 3.40: Current landslide traces, on the northeastern slope of Sumaki Höyük



Figure 3.41: Torrent / flood sediment in trench 22L form Area A (Torrent 1)



Figure 3.42: Obsidian core and blade in flood/torrent sediment (trench 22L)



Figure 3.43: Obsidian core in flood/torrent sediment (trench 22L)

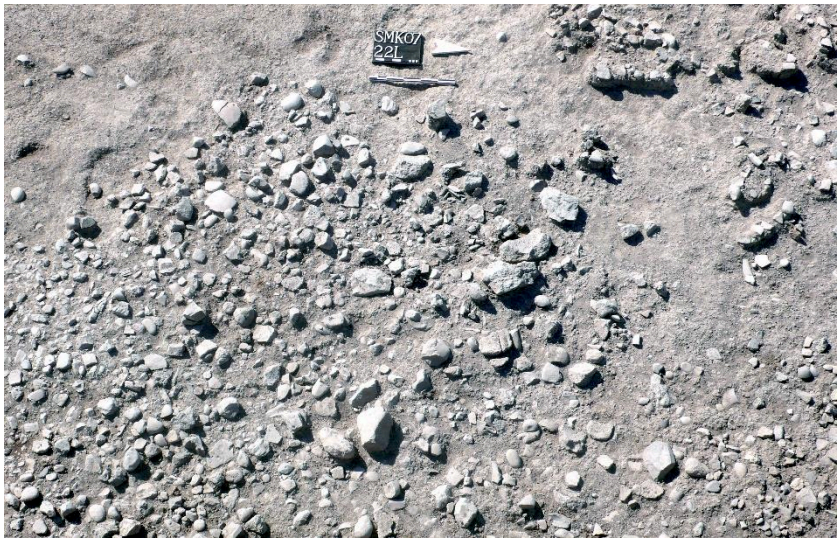


Figure 3.44: Torrent / flood sediment in trench 15F form Area B (Torrent 1)



Figure 3.45: Torrent / flood sediment in trench 20C form Area C (Torrent 1)



Figure 3.46: Torrent / flood sediment in trench 15F form Area B (Torrent 2)



Figure 3.47: Thin earth line between Phase 4 and Phase 3 from Sumaki Höyük



Figure 3.48: Thin earth line between Phase 4 and Phase 3 from Sumaki Höyük



Figure 3.49: Natural steep slope in trench 20G

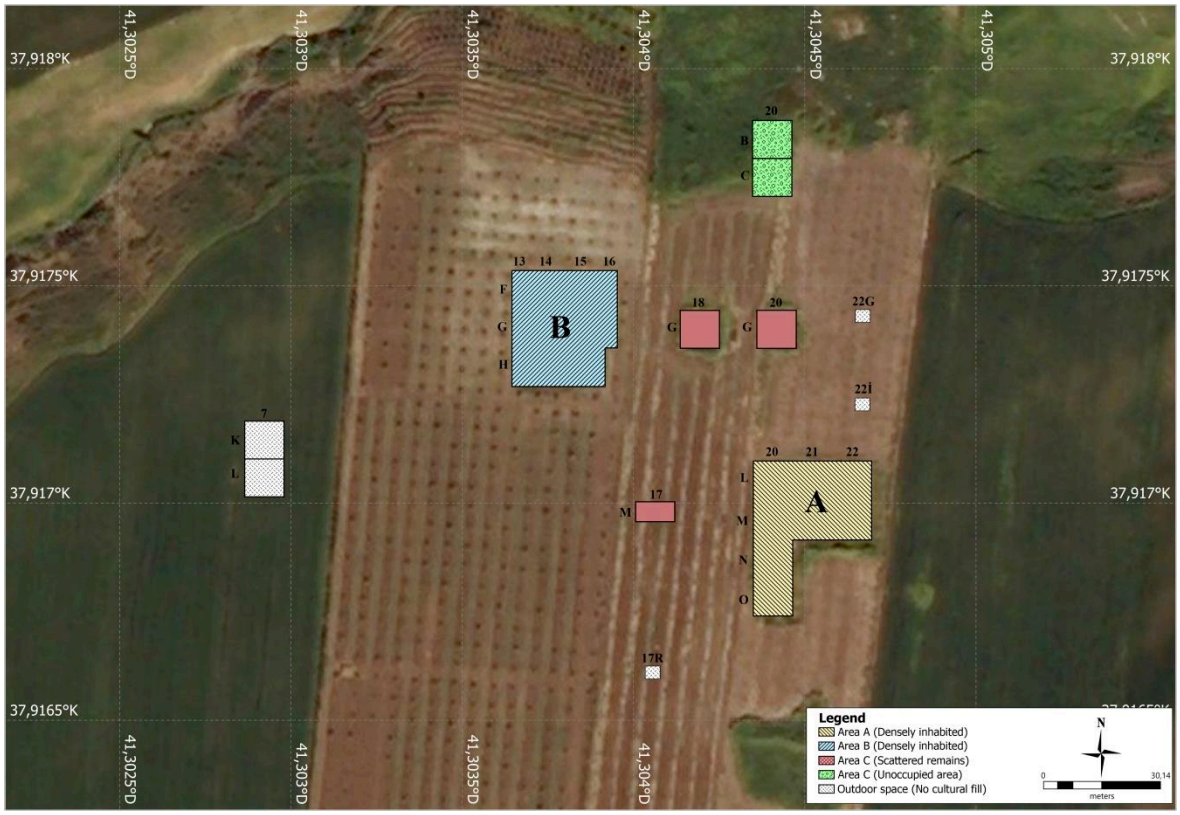


Figure 3.50: Sumaki Höyük excavated areas



Figure 3.51: Sumaki Höyük Excavated areas, from North



Figure 3.52: Location of Sumaki Höyük



Figure 3.53: General view of Sumaki Höyük excavation area from north



Figure 3.54: General view of Area A from the South



Figure 3.55: General view of Area B from the west

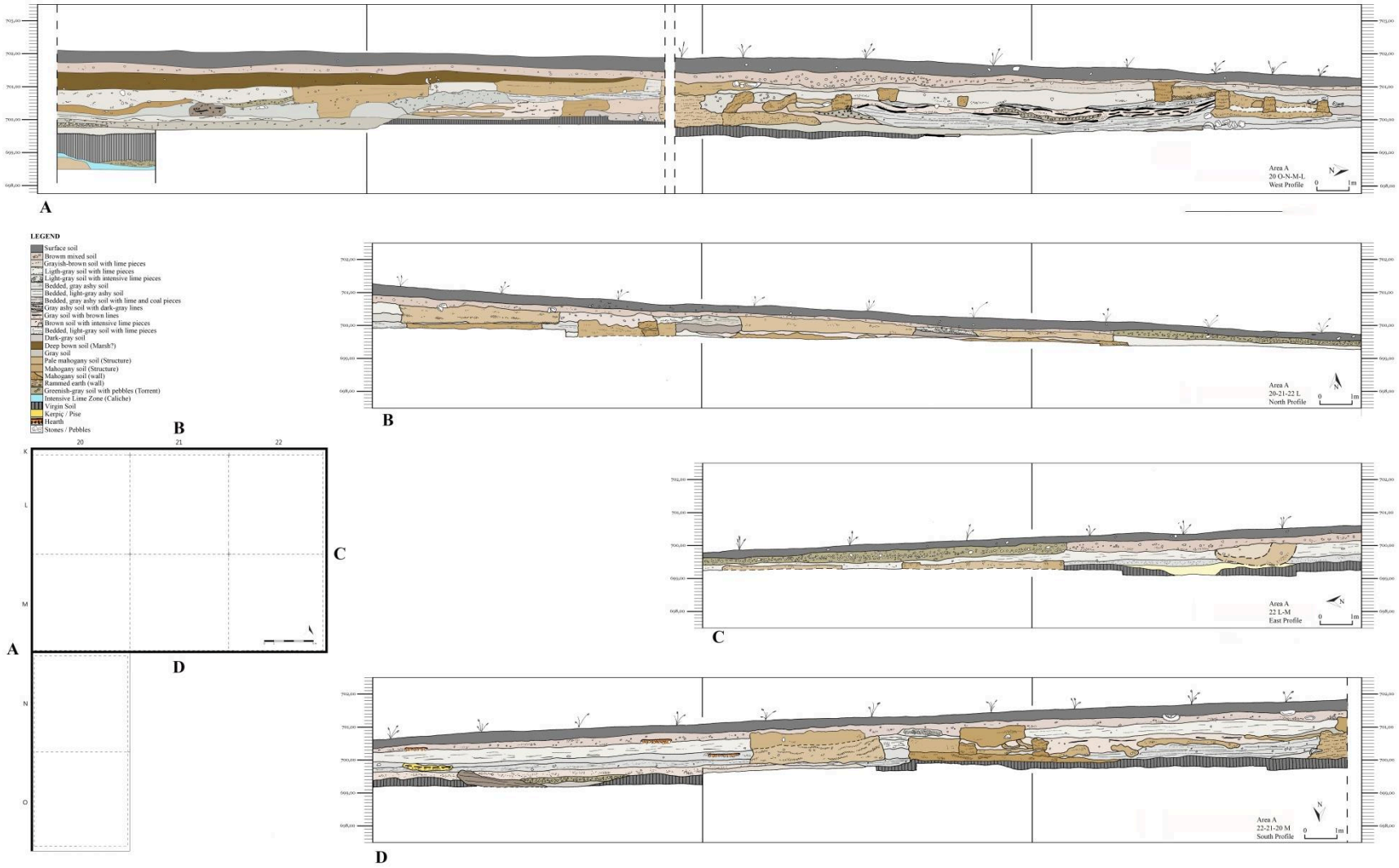


Figure 3.56: Profile drawings of Sumaki Höyük Area A

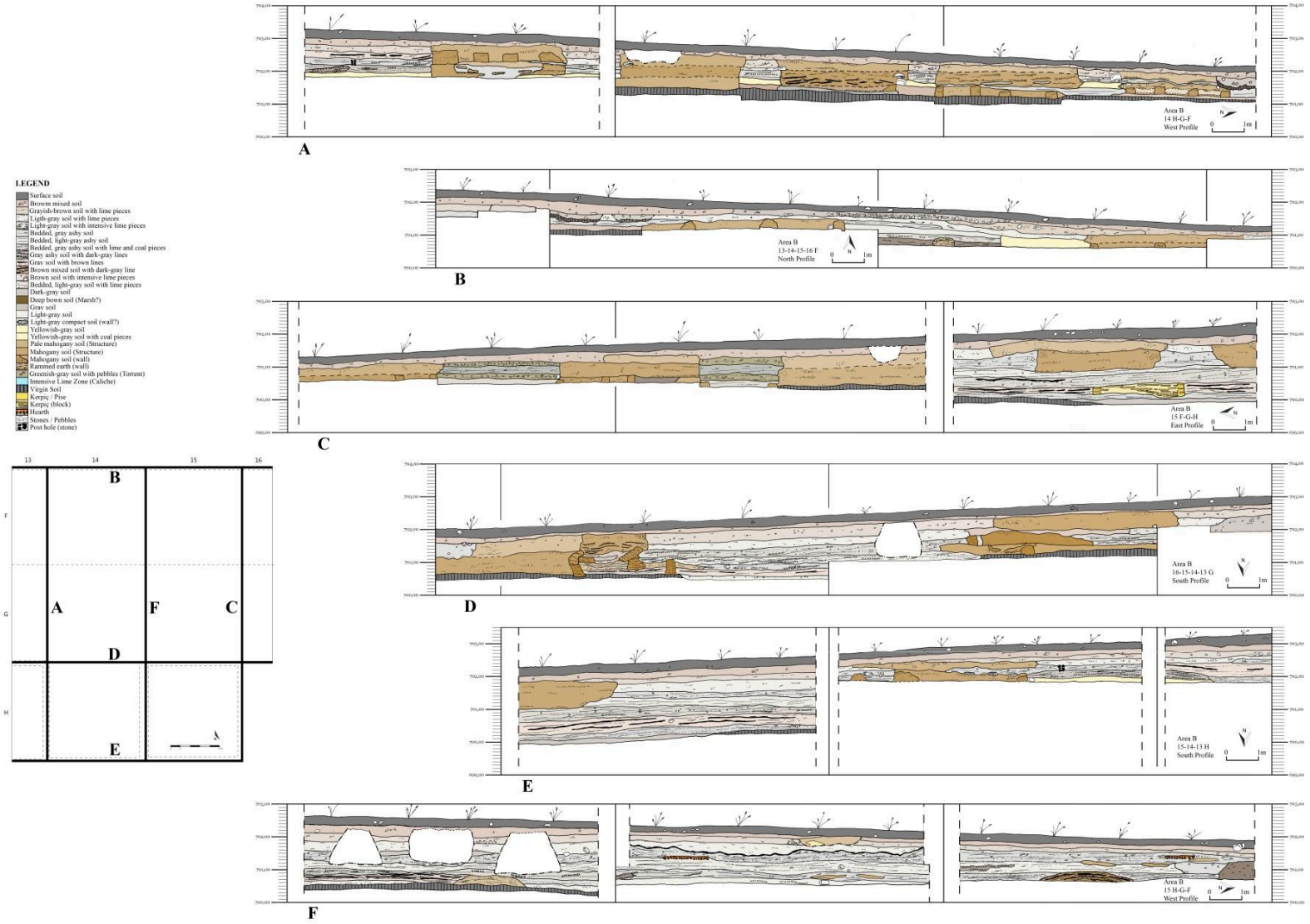


Figure 3.57: Profile drawings of Sumaki Höyük Area B

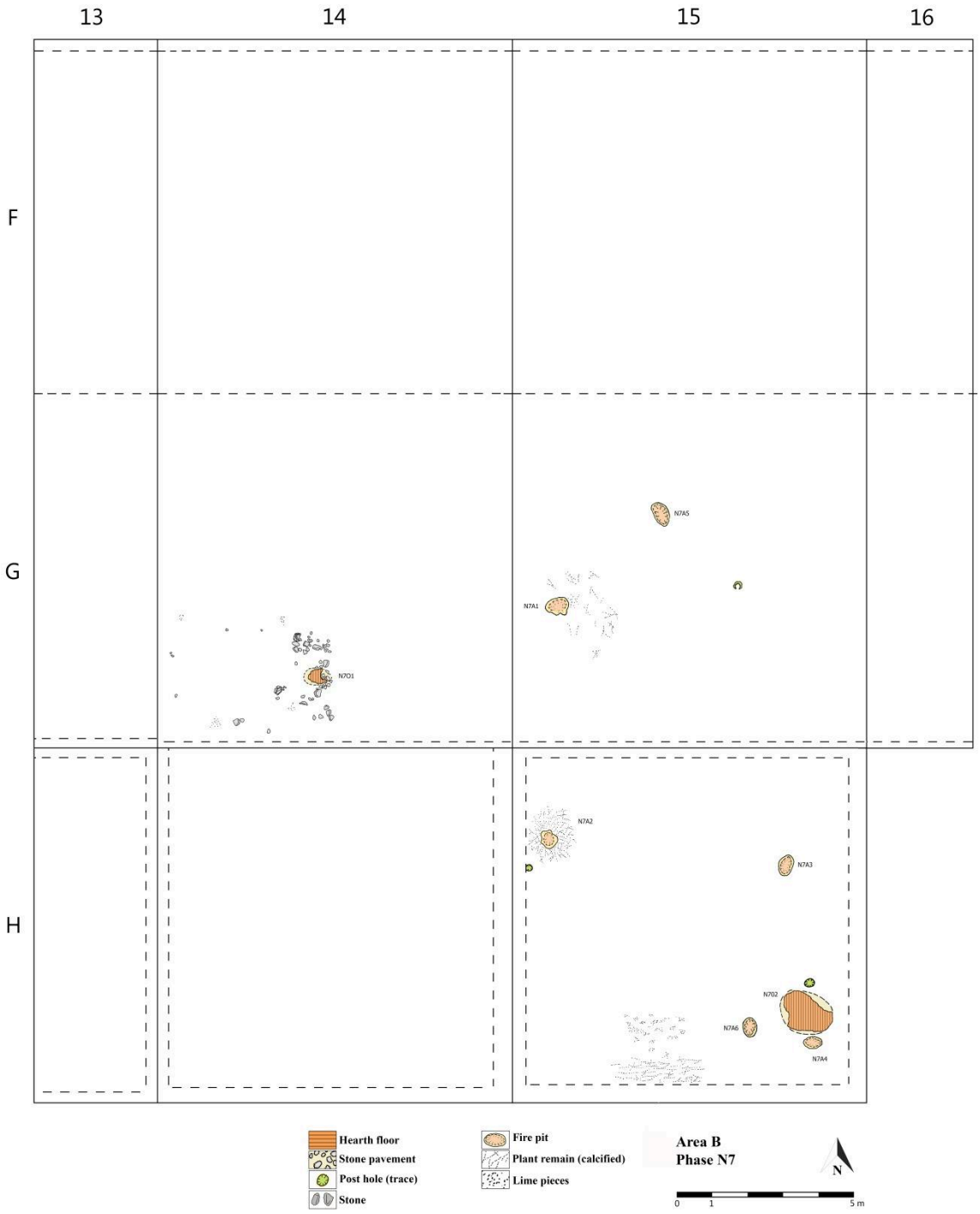


Figure 3.58: Settlement pattern and architectural plan Phase N7 in Area B

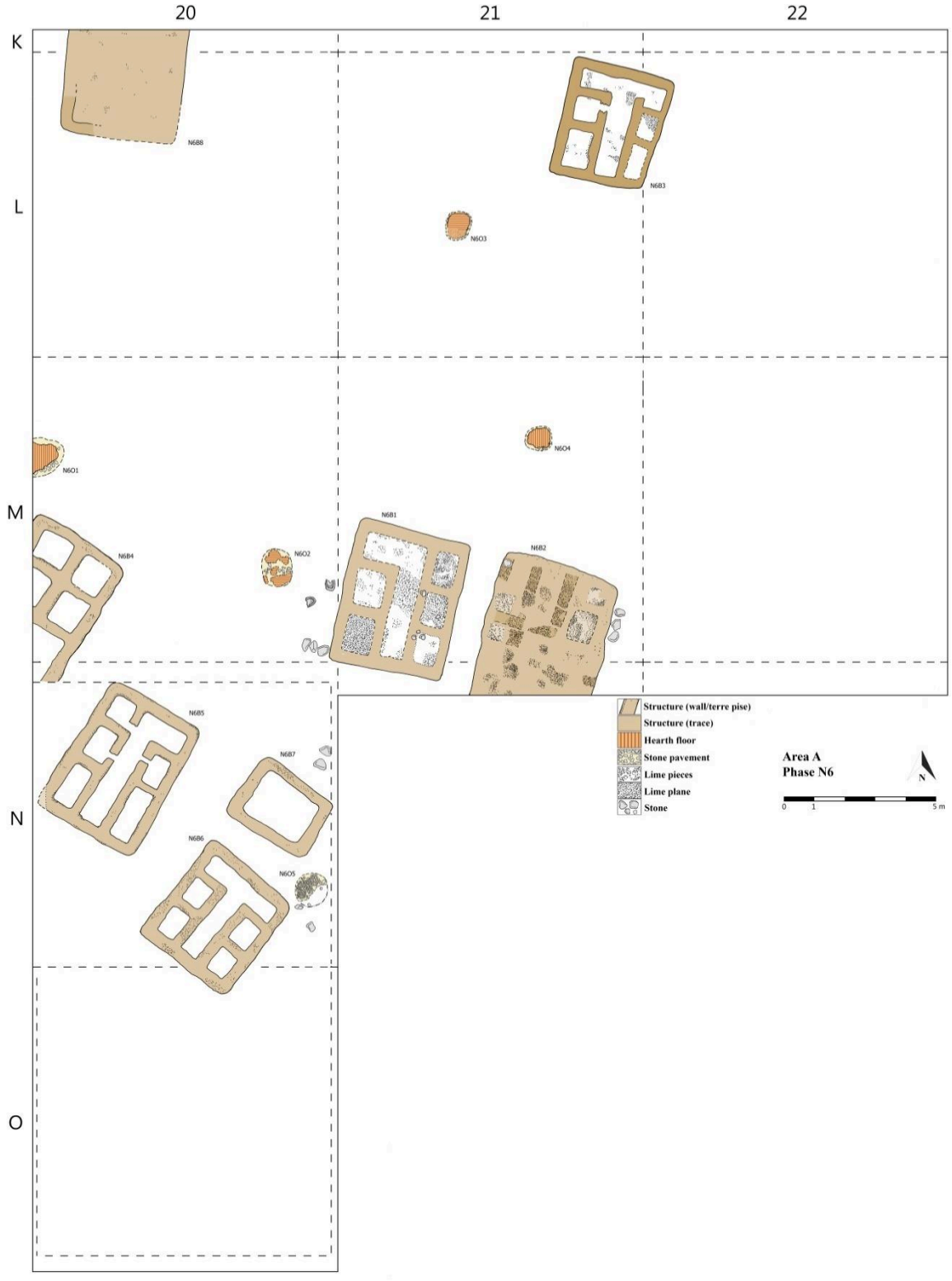


Figure 3.59: Settlement pattern and architectural plan Phase N6 in Area A

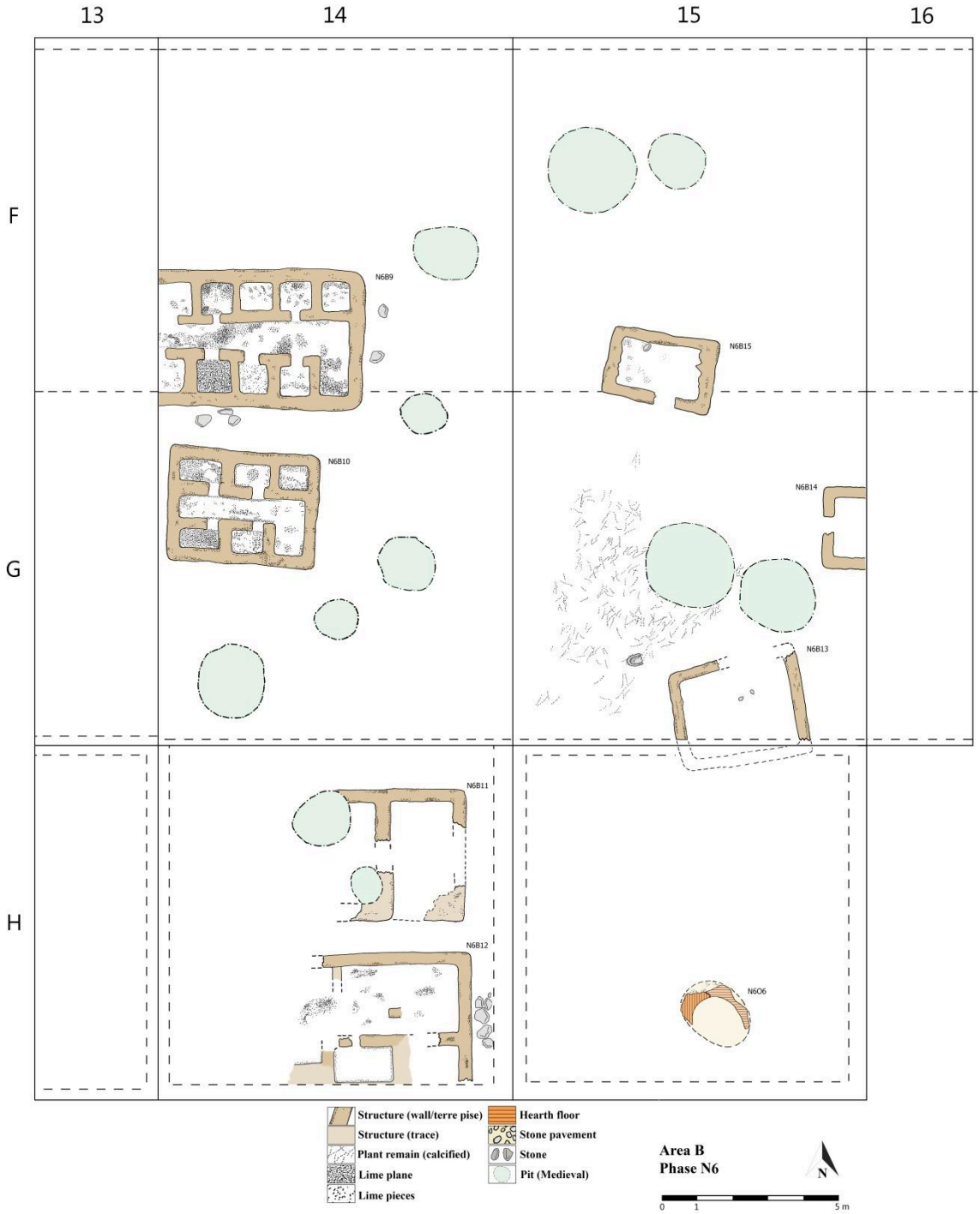


Figure 3.60: Settlement pattern and architectural plan Phase N6 in Area B

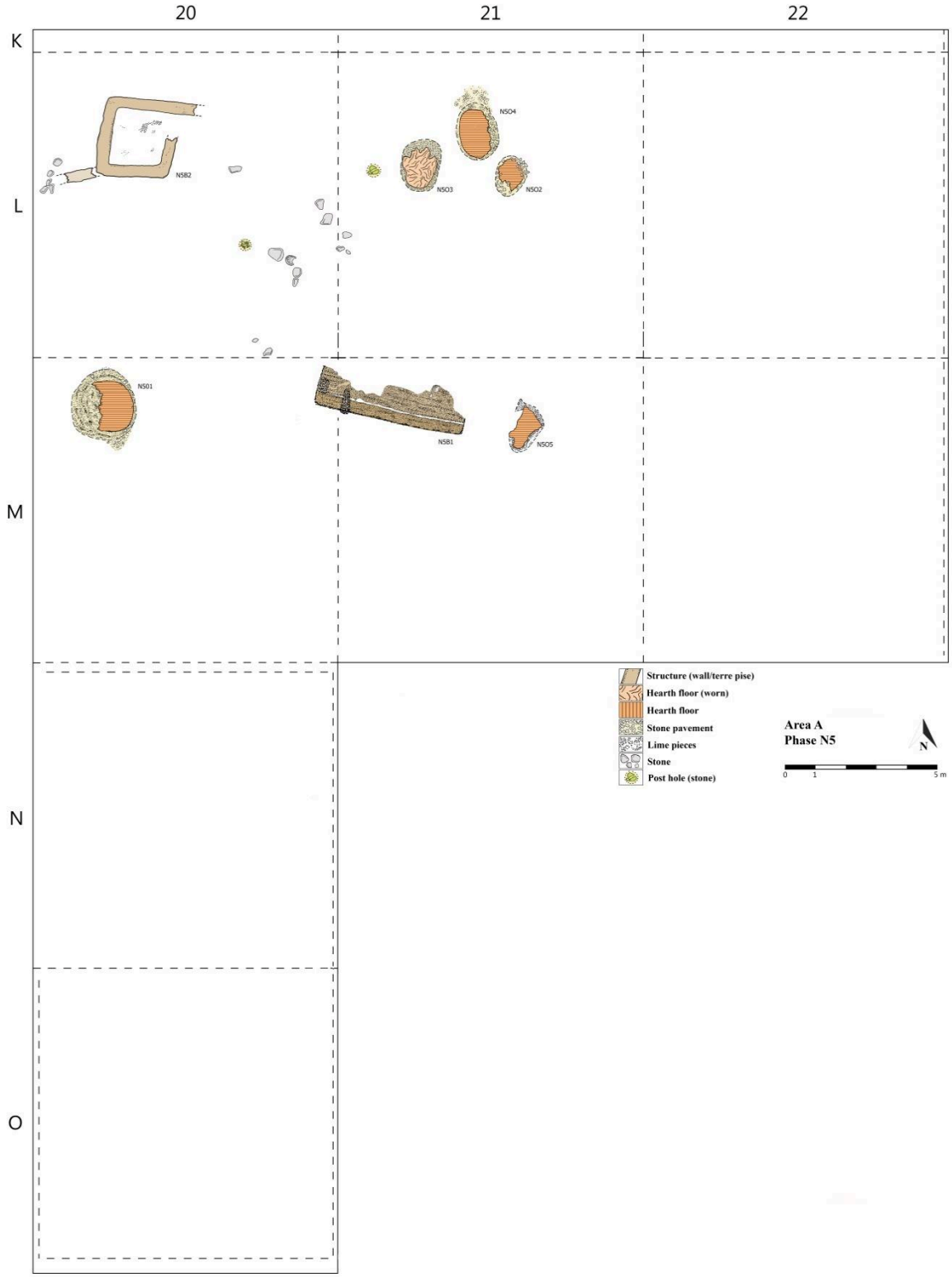


Figure 3.61: Settlement pattern and architectural plan Phase N5 in Area A

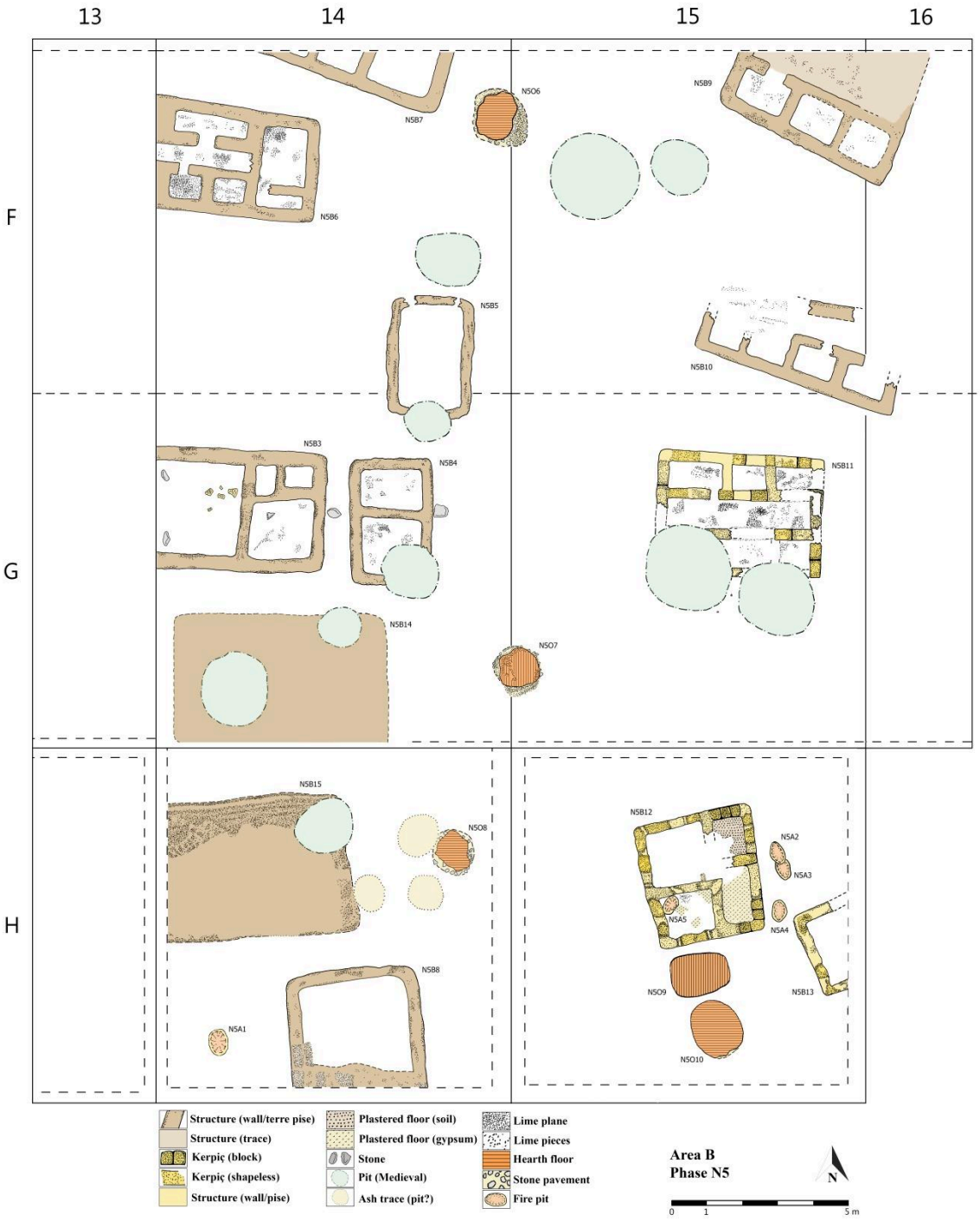


Figure 3.62: Settlement pattern and architectural plan Phase N5 in Area B



Figure 3.63: Settlement pattern and architectural plan Phase N4 in Area A

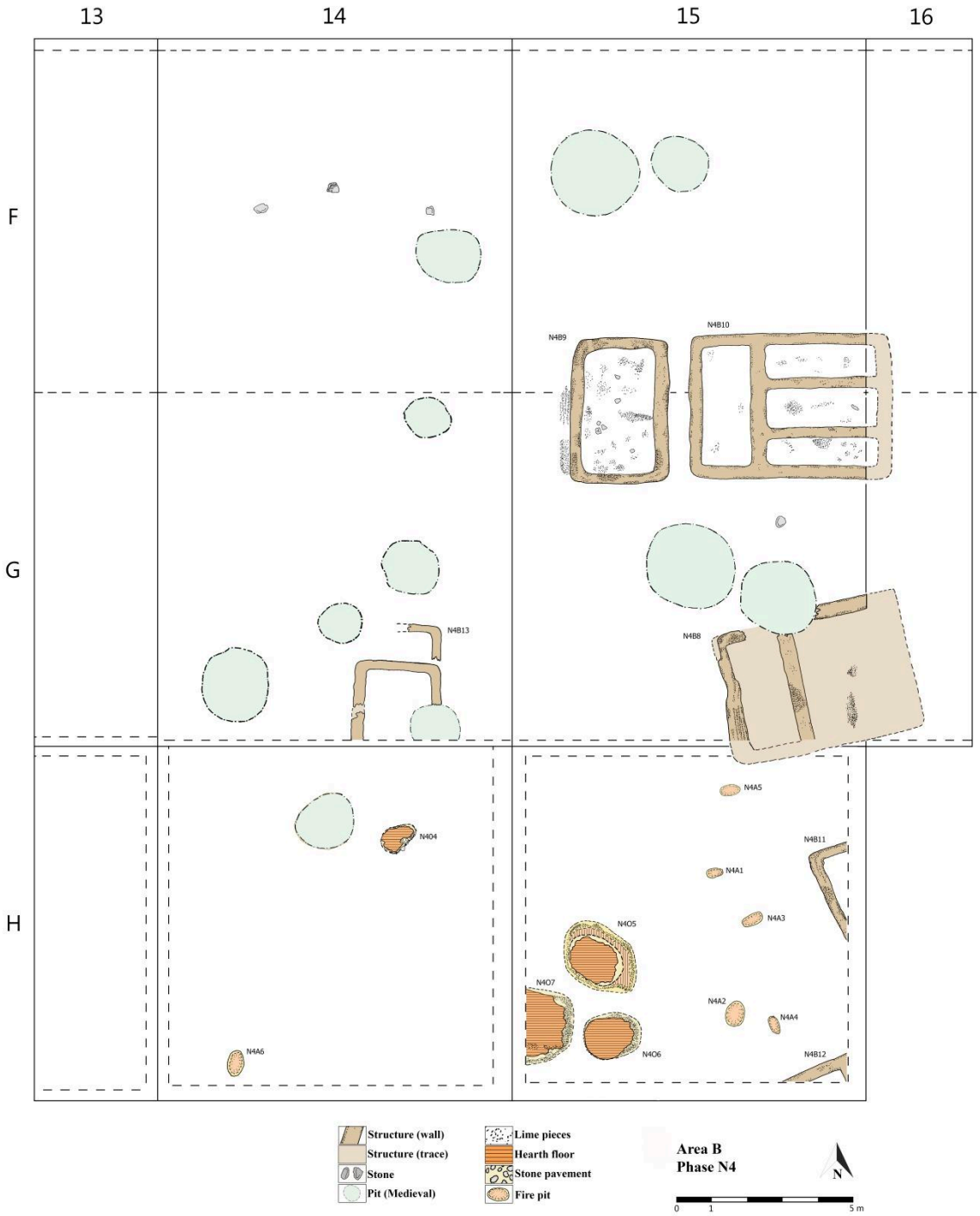


Figure 3.64: Settlement pattern and architectural plan Phase N4 in Area B

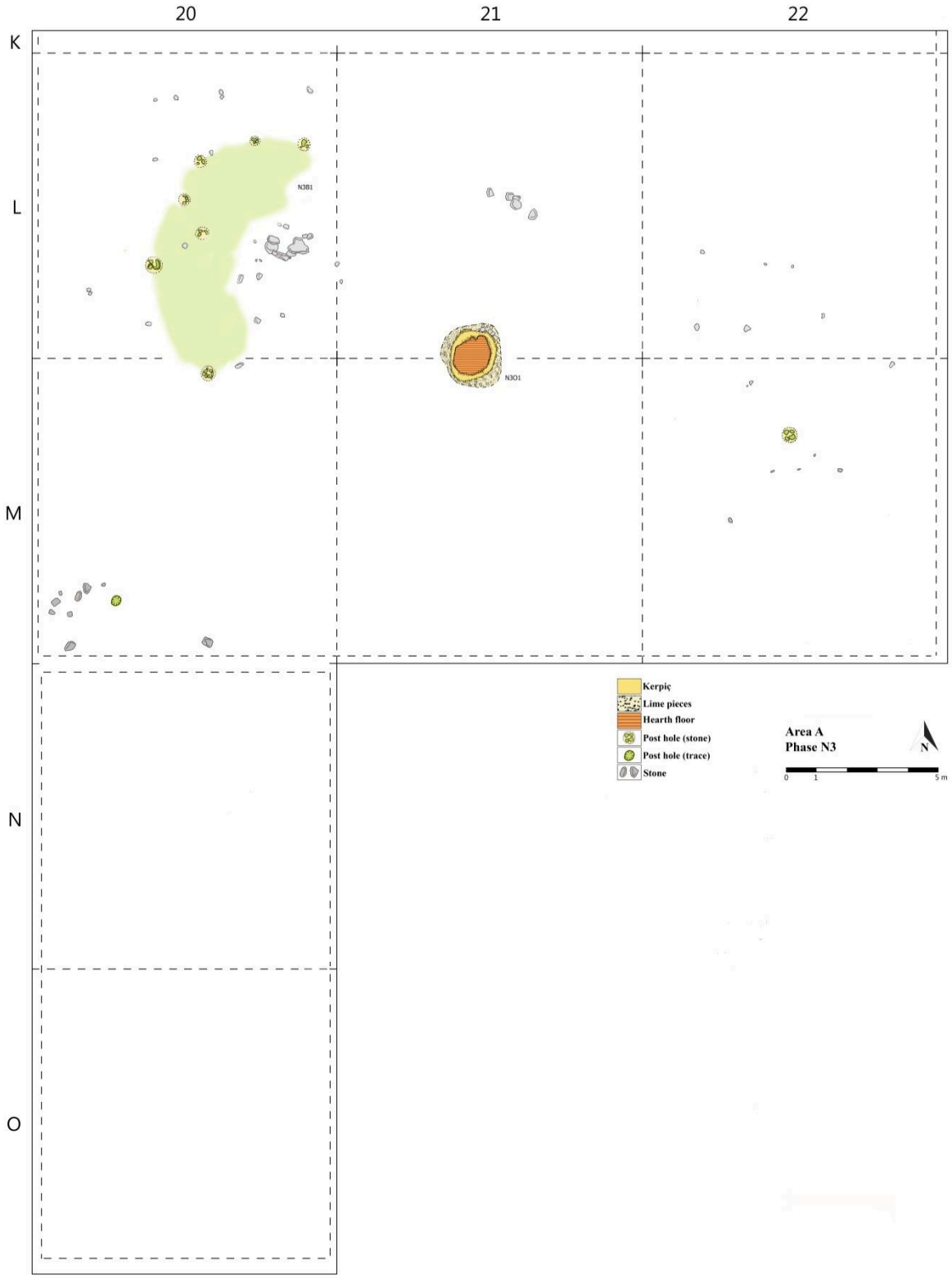


Figure 3.65: Settlement pattern and architectural plan Phase N3 in Area A

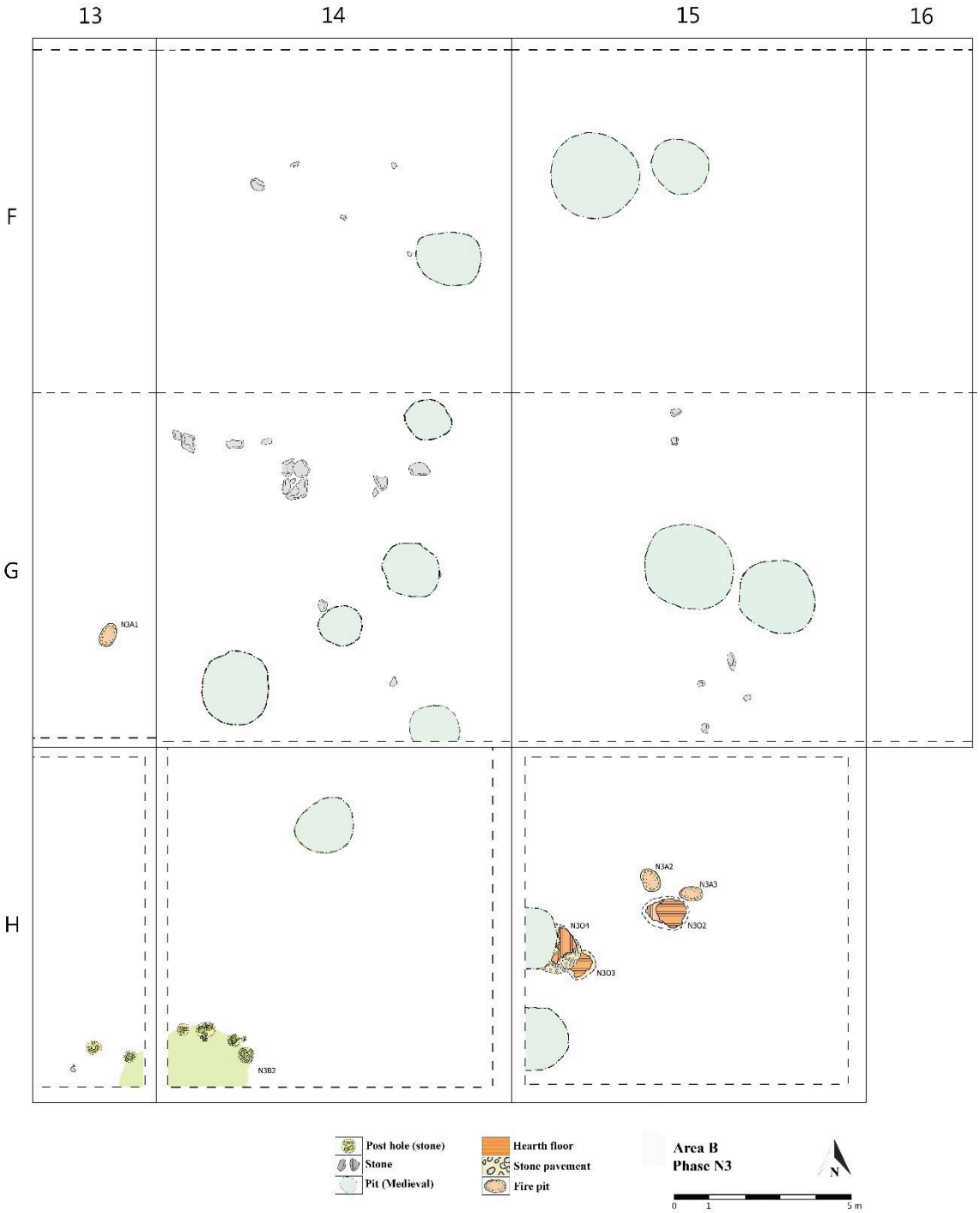


Figure 3.66: Settlement pattern and architectural plan Phase N3 in Area B

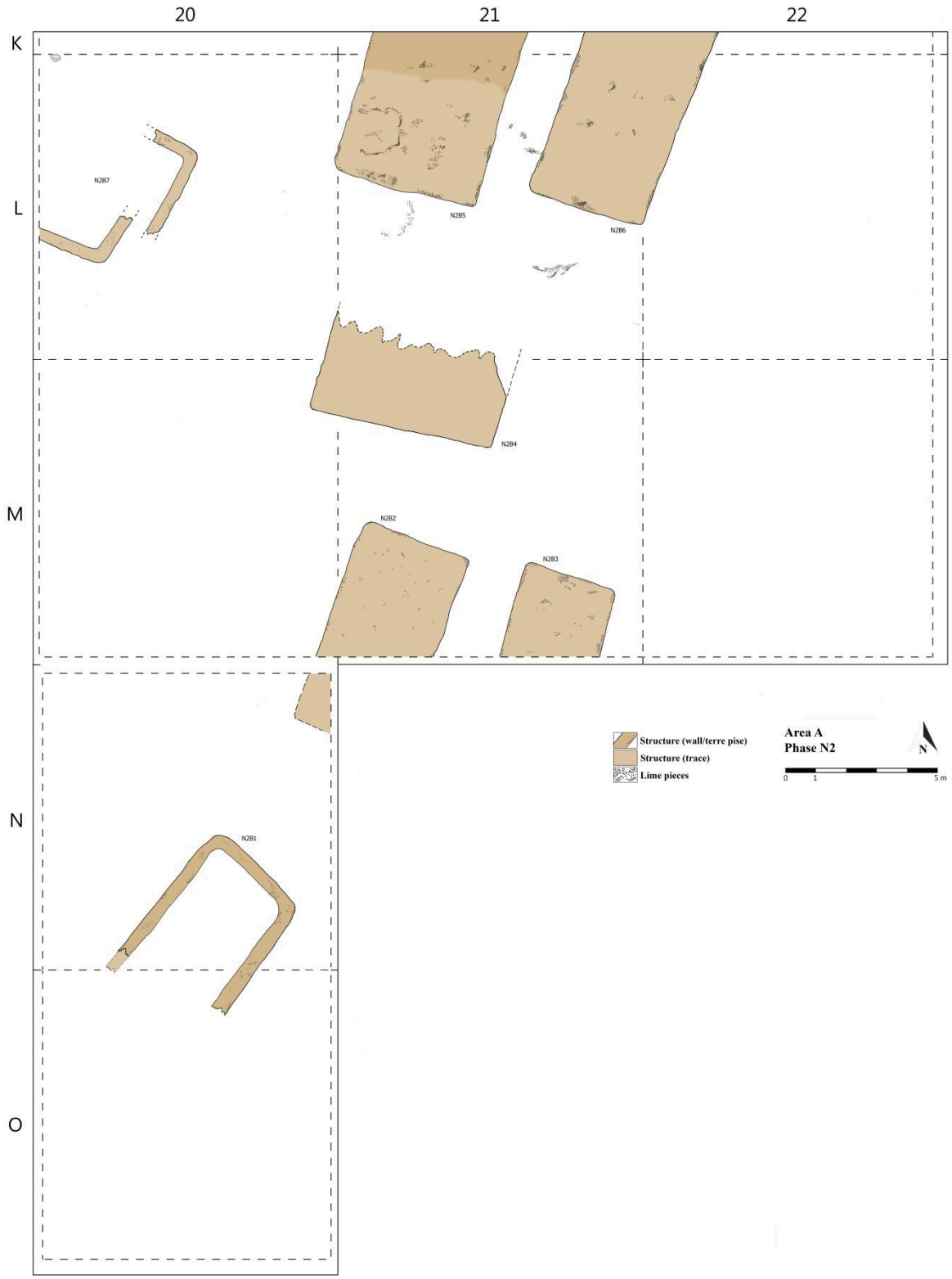


Figure 3.67 Settlement pattern and architectural plan Phase N2 in Area A

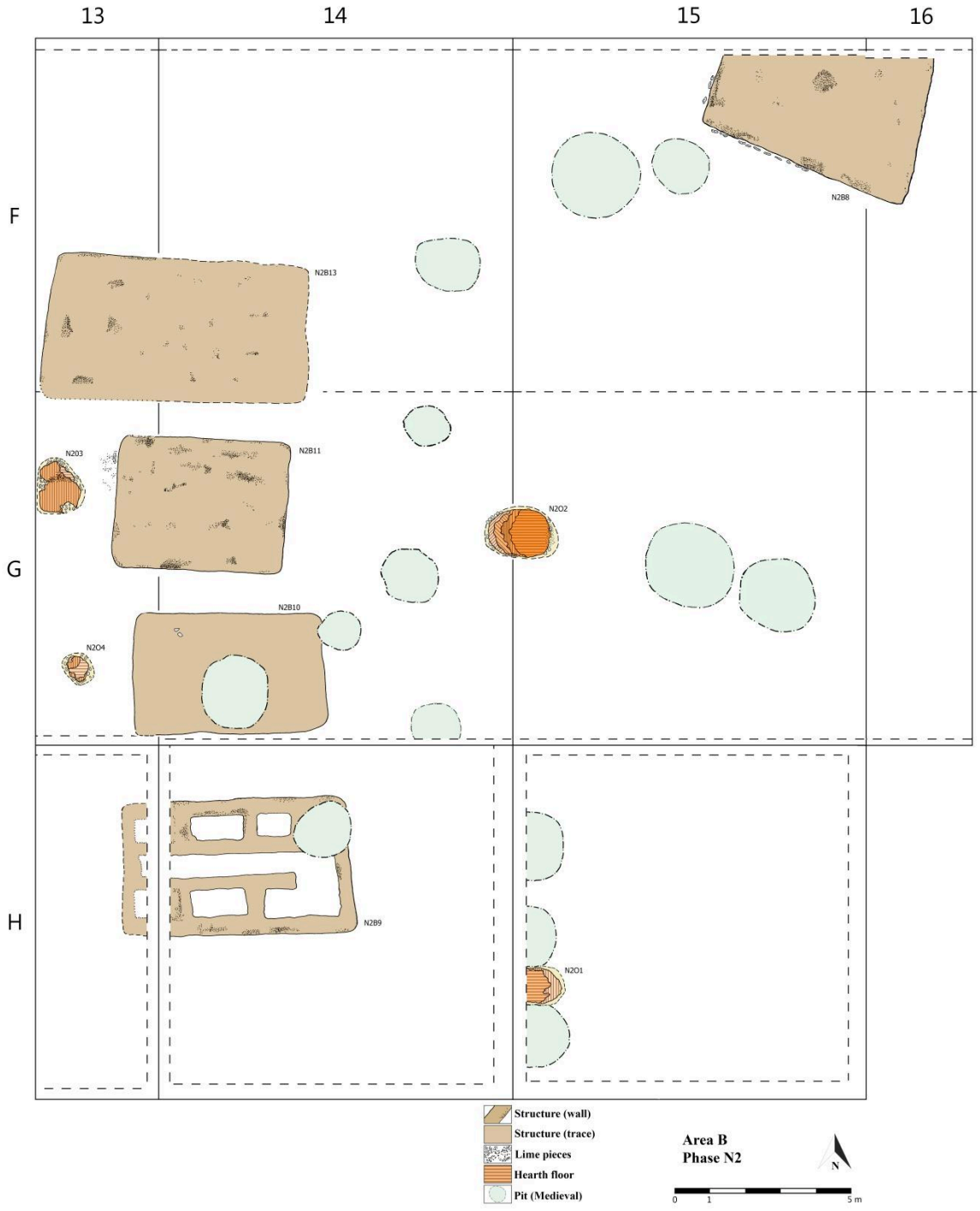


Figure 3.68: Settlement pattern and architectural plan Phase N2 in Area B

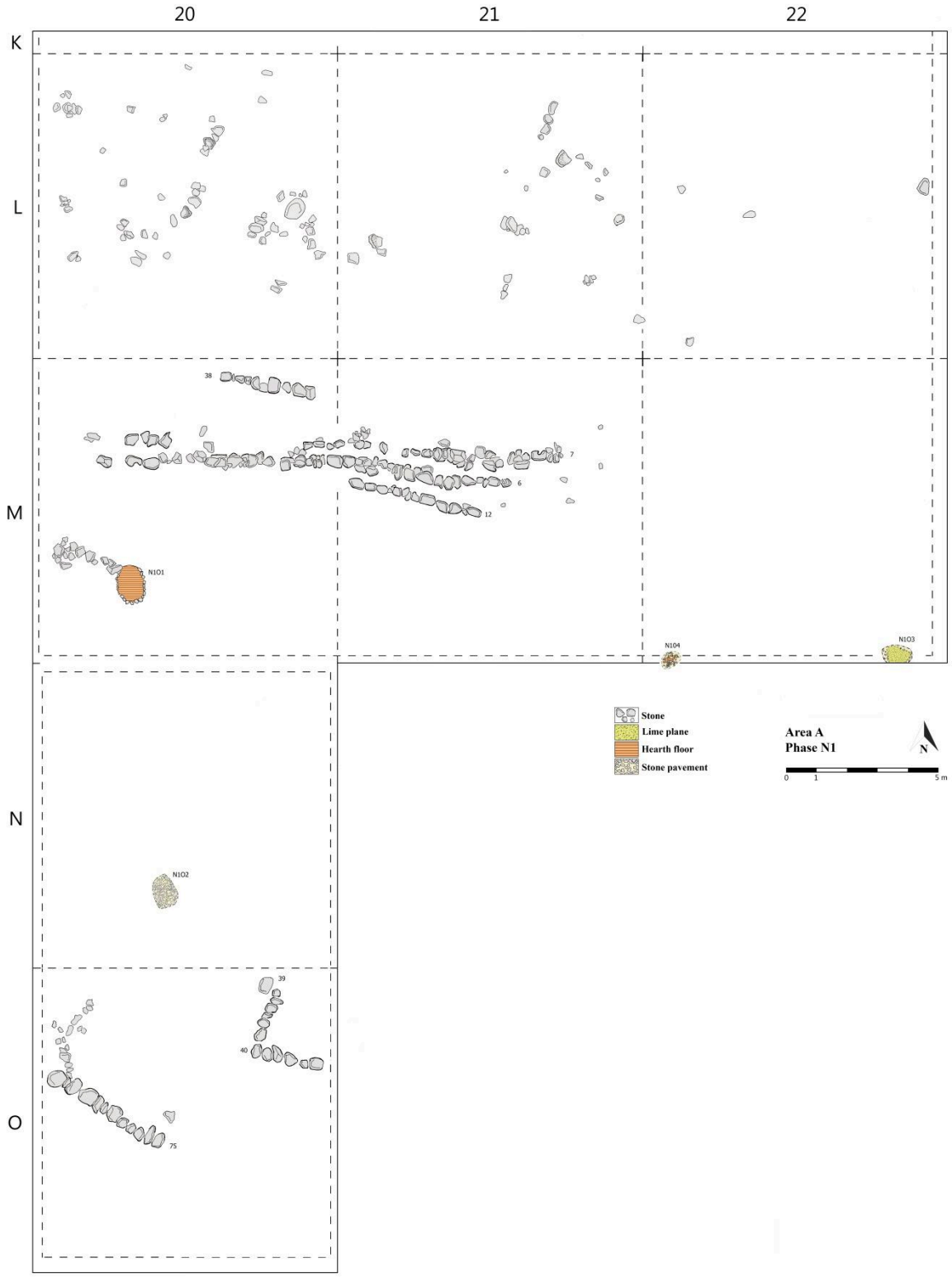


Figure 3.69: Settlement pattern and architectural plan Phase N1 in Area A

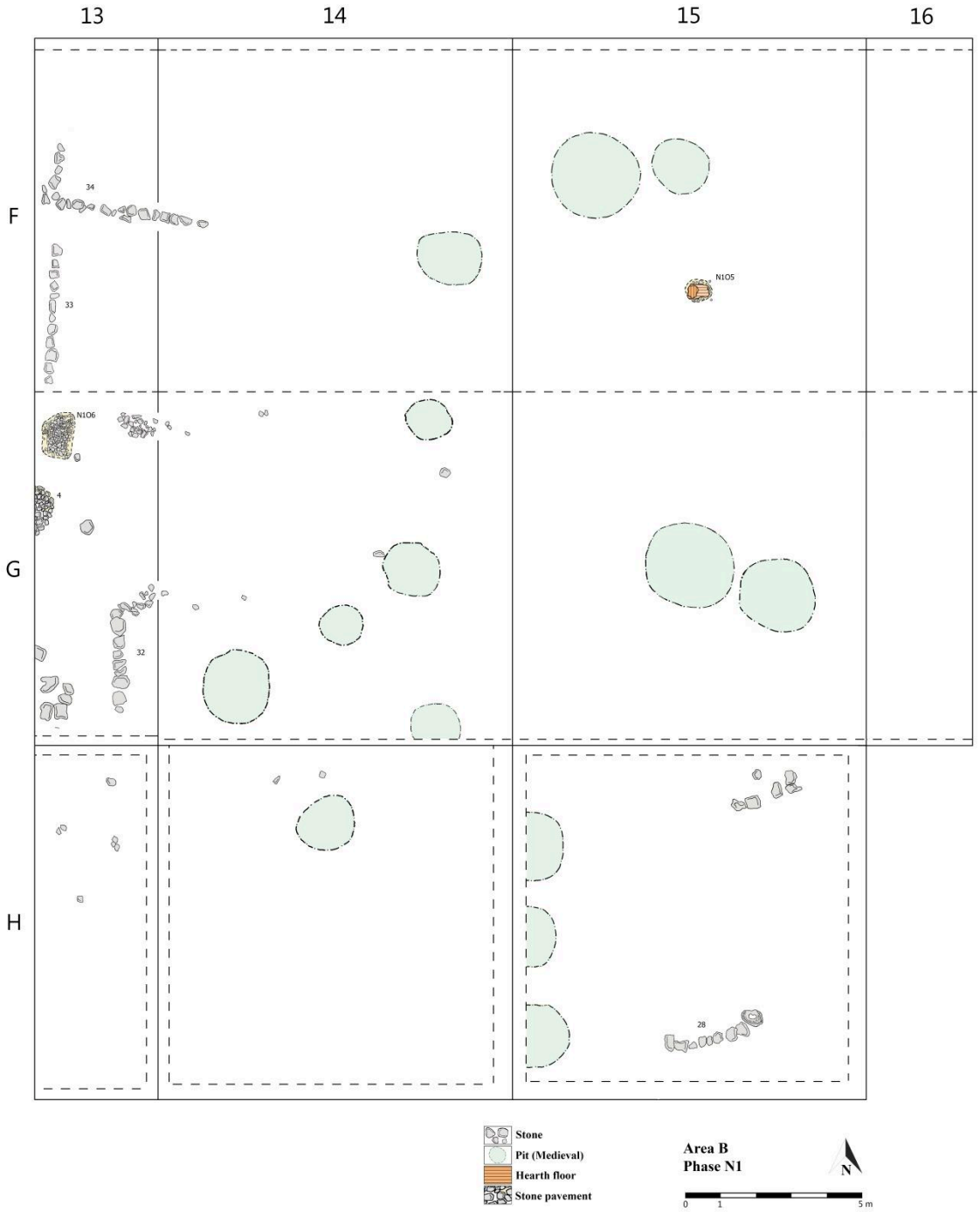


Figure 3.70: Settlement pattern and architectural plan Phase N1 in Area B

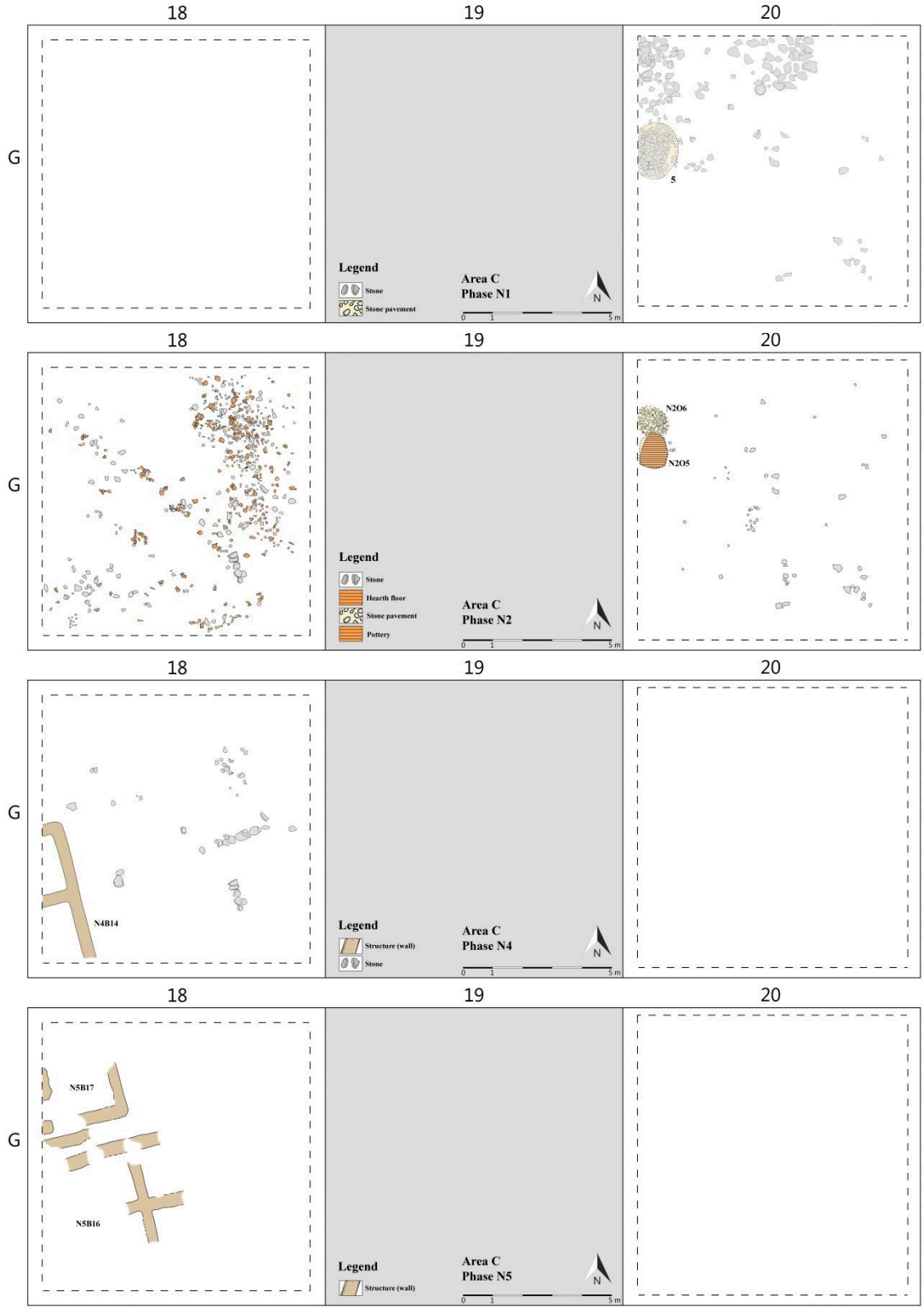


Figure 3.71: Settlement pattern and architectural plan between phases N5-N1 from trench 18G-20G in Area C

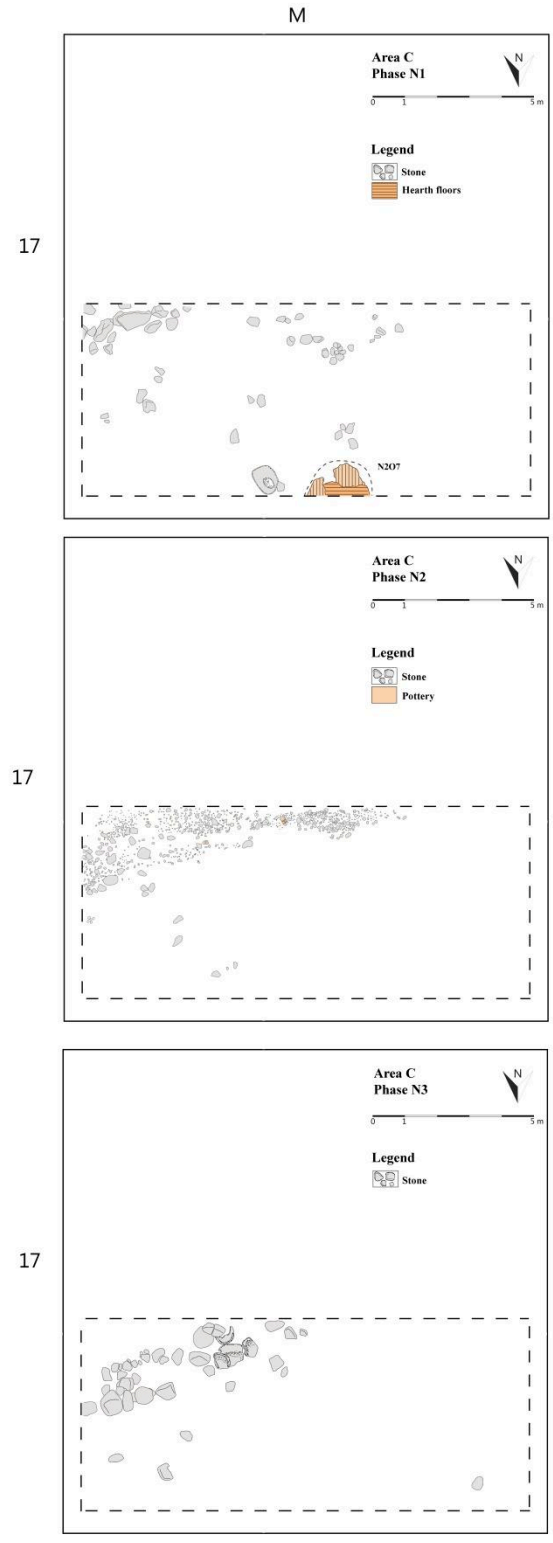


Figure 3.72: Settlement pattern and architectural plan between phases N3 to N1 from trench 17M in Area

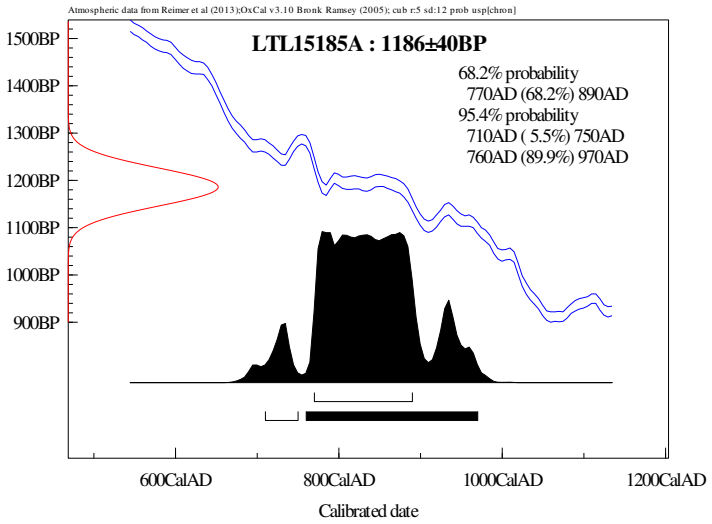


Diagram 3.26 AMS radiocarbon date from Middle Age level (M) at Sumaki Höyük

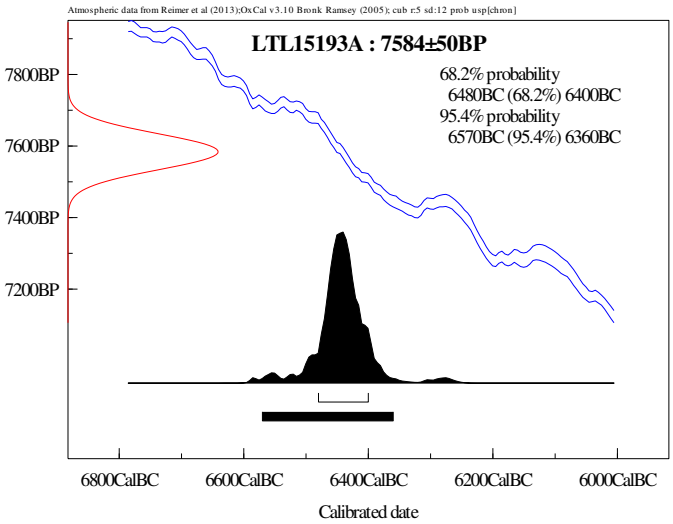


Diagram 3.27: AMS radiocarbon date from Phase N3 at Sumaki Höyük

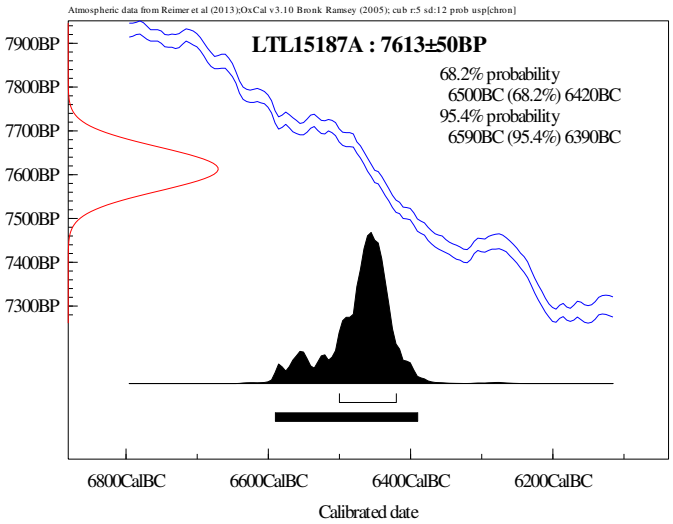


Diagram 3.28: AMS radiocarbon date from Phase N4 at Sumaki Höyük

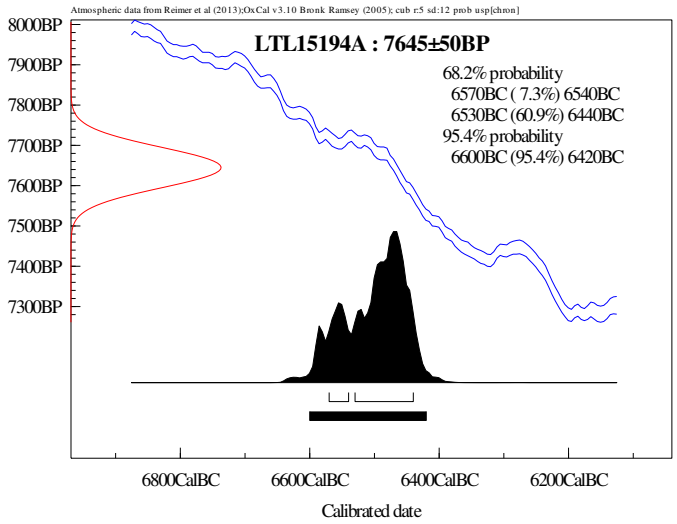


Diagram 3.29: AMS radiocarbon date from Phase N4 at Sumaki Höyük

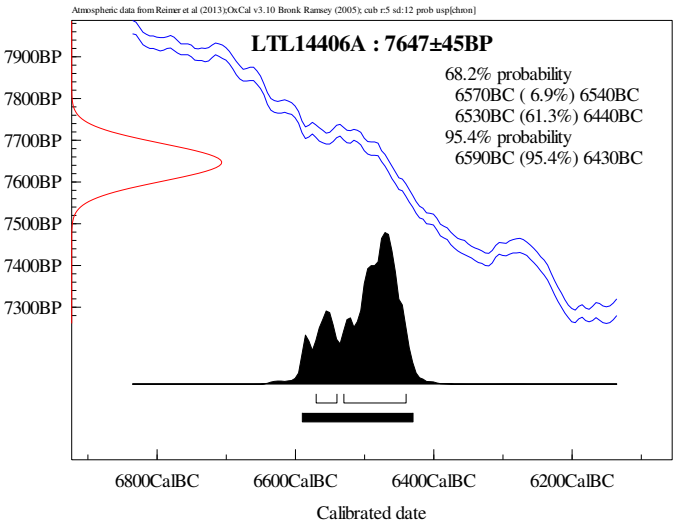


Diagram 3.30: AMS radiocarbon date from N4 at Sumaki Höyük

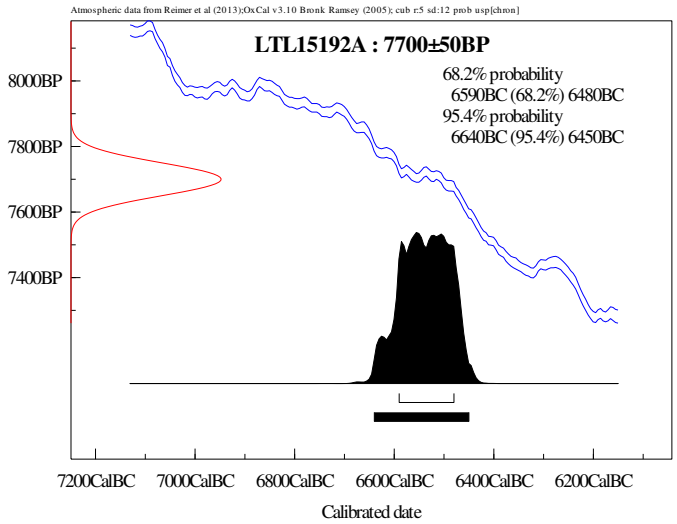


Diagram 3.31: AMS radiocarbon date from Phase N5 at Sumaki Höyük

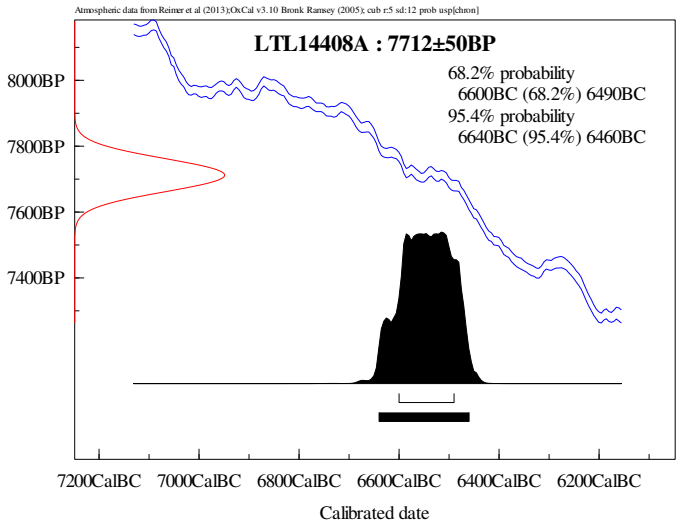


Diagram 3.32: AMS radiocarbon date from Phase N5 at Sumaki Höyük

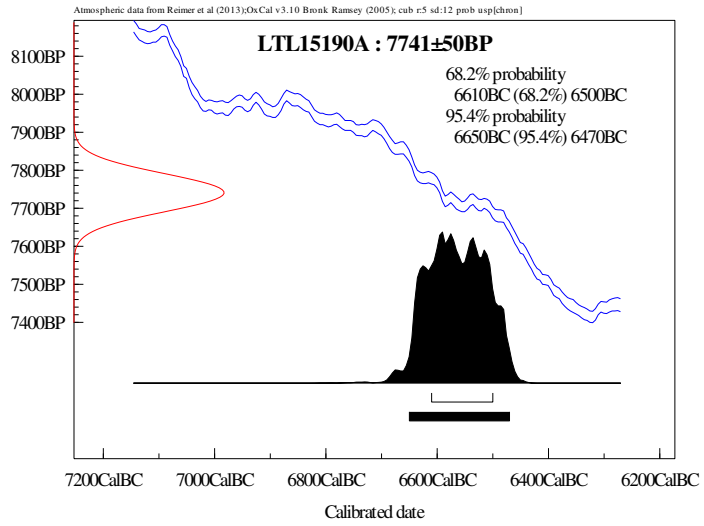


Diagram 3.33: AMS radiocarbon date from Phase N5 at Sumaki Höyük

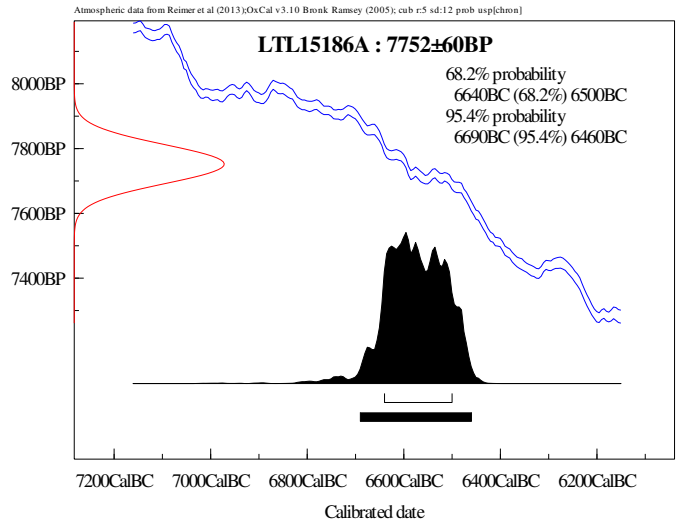


Diagram 3.34: AMS radiocarbon date from Phase N5 at Sumaki Höyük

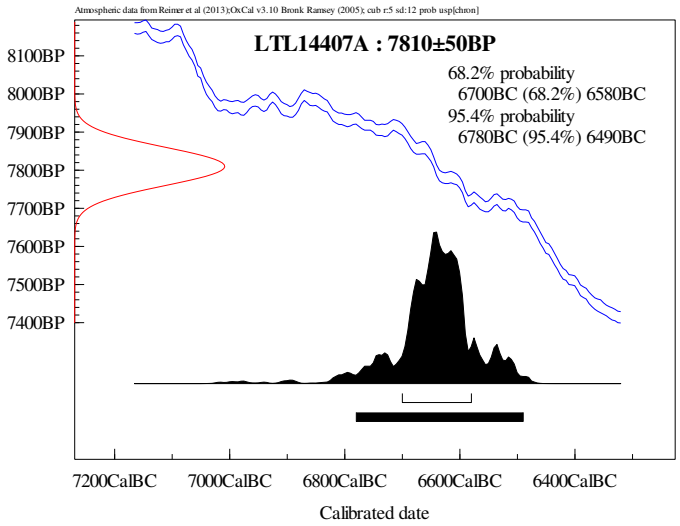


Diagram 3.35: AMS radiocarbon date from Phase N6 at Sumaki Höyük

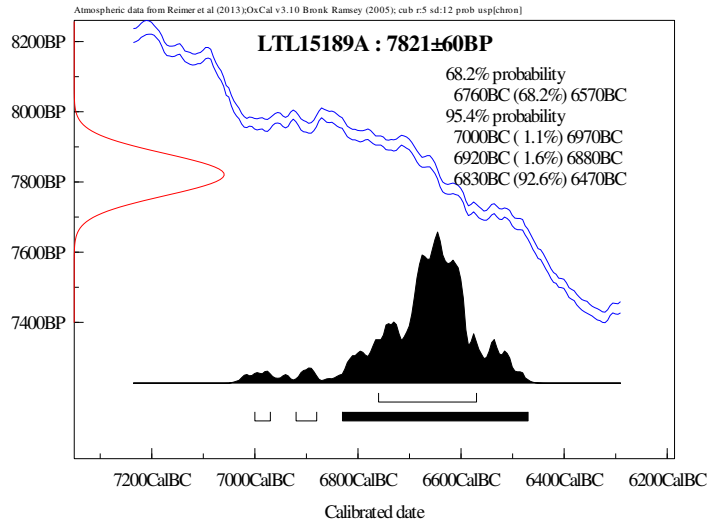


Diagram 3.36: AMS radiocarbon date from Phase N6 at Sumaki Höyük

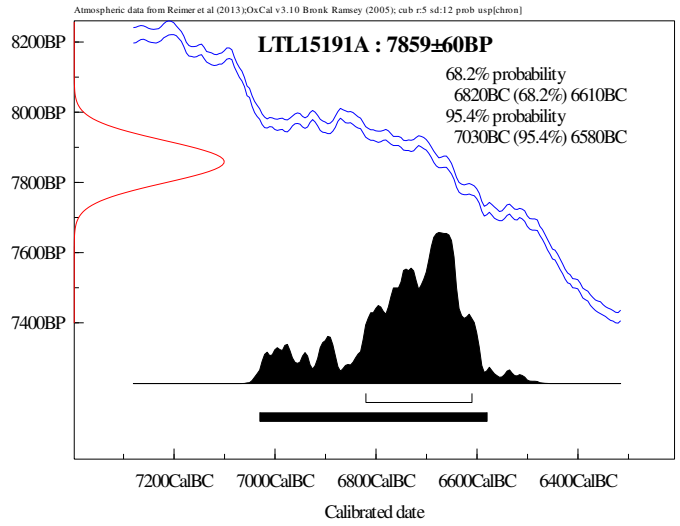


Diagram 3.37: AMS radiocarbon date from Phase N6 at Sumaki Höyük

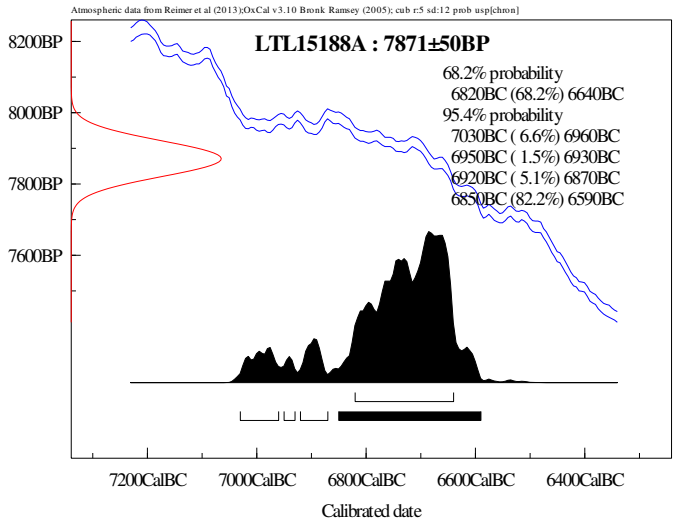


Diagram 3.38: AMS radiocarbon date from Phase N6 at Sumaki Höyük

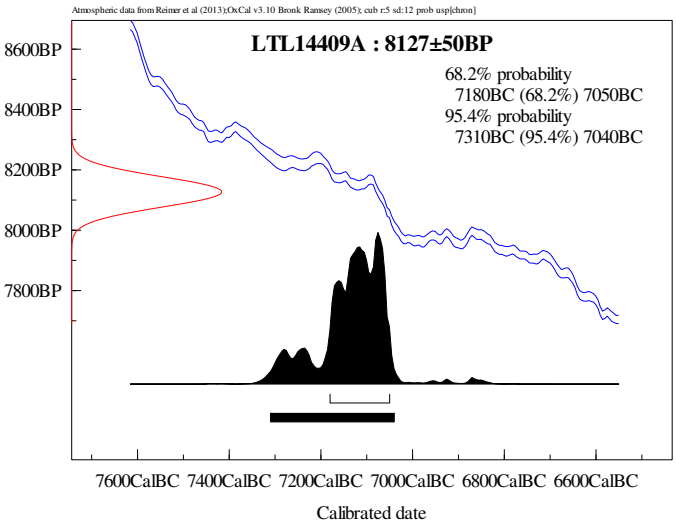


Diagram 3.39: AMS radiocarbon date from Phase N7 at Sumaki Höyük

CHAPTER IV

DESCRITION AND MICROARCHAEOLOGICAL INVESTIGATIONS OF SUMAKİ HÖYÜK NEOLITHIC ARCHITECTURE

In this capter, firstly, the building materials and construction techniques of Sumaki Höyük architectural tradition will be explained. Then the architecture of the settlement according to the phases will be presented in detail. (Table 4.2 – 4.6) Some analytic results obtained from architectural structures and items will also be given for each structure.

4.1. Construction material and methods

From prehistory to the present, one of the greatest needs of humanity is the need for protection and shelter. The materials used in the structures that people built to meet their various needs are soil, stone, wood, herbaceous plants and reed. Although there is a significant dominance in the use of soil materials in the Near East, both archaeological and ethnological data show that materials such as stone, reeds or brushwood have been used in architecture from prehistoric times to the present. Many ethnological studies are proving that reed and brushwood are frequently used by semi-nomadic groups in the Near East. (Dede, 1997; Dirican & Akyol, 2019; Erdim, 1979; Kamp, 2000; Karaosmanoğlu & Yılmaz, 2013; Tuztaş &Çobancaoğlu, 2006; Uysal & Öztürk, 1997).

The quality of material used in the construction process, architectural traditions of the period and variations in living area are the most basic elements reflecting the social life, economy and cultural structure of societies. In other words, architecture, space and construction material properties indicate the lifestyle of past societies, daily habits, social structure and social organization. Humans prefer a place with appropriate natural conditions to live. While the instinct to find a suitable habitat takes priority in the early stages, due to an accumulation of knowledge and increasing needs, the desire to alter natural conditions in their own favour has motivated people to indulge in a second activity, that of building structures. The basic construction materials were mainly local, such as wood, reeds and herbaceous plants, earth, pebbles and cobbles.

At the beginning of the Neolithic period, the houses had a very local identity. Construction materials such as bush-twigs, animal skins, stones and soil are easily used in the environment. The soil was initially used for plastering over organic material, such as

wattle-and-daub technique, such as twigs or reed. Its basic principle is to use mud to plaster over a structural framework with reeds, straw or branches. The clearest archaeological evidence of this technique is plaster remains with branch traces. No plaster with branch traces has ever been found in Sumaki Höyük. Soon, this technique became widespread with the discovery of a construction technique obtained by shaping the sludge and drying it in the sun. The use of this construction technique, especially in the Near East, has continued to be the main material of architecture since the spread of concrete for 9000 years. (Oates, 1990:388; Guillaud, 2003:42; Tuztaş & Çobancaoğlu, 2006:95) This construction material, bearing various names in different regions, is usually called adobe or tauf in Mesopotamia. In the archaeological sense, these names are varied according to both production techniques and shapes and their contributions: adobe, pise, tauf, cob…

Nearly 9000 years ago, in parallel with the change in climate, there were changes in the nutritional economy and therefore in the social organization model. Perishable construction materials such as reeds, straw or branches have been used in structures' framework, walls, or post-holes constructed throughout the course of history. Construction material formed of reeds, branches or herbaceous plants has the quality of an auxiliary material in architecture, generally with load-bearing, protective or enclosing functions. They are used in different parts of buildings in traditional architecture in different parts of the world as posts and beams within walls, roof framing, window or door frames, floor covering, and central posts to support the roof or as holders binding the piled earth fill.

Earth is one of the most easily accessible construction materials. To obtain kerpiç, it is necessary to consciously include additives like grass, straw or animal hair in the soil. (Perello, 2015: 1) Raw earth has the ability to absorb water and hardens after drying; however, after a certain duration, crumbling occurs as a result of drying. It is necessary to use a binding element in the mud. Chopped straw or woody plants are the most appropriate additive materials. Sometimes sand may also be added. The mixture obtained by kneading this with water is called “kerpiç mud”. The elastic material produced by kneading water into soil containing a certain amount of chopped woody plants can be shaped in moulds or by hand and the construction material acquired by drying this in the sun is called “kerpiç”. Kerpiç mud has been shaped in various forms for different functions in traditional Anatolian architecture.

In the Near East during the Neolithic Period, kerpiç was commonly used in the main walls and internal divisions of structures as floors in spaces, in the construction of architectural elements such as silos and hearths or in roof construction. In the early stages, kerpiç used as a construction material was not standard; it was used with different techniques in the same period with new methods being added over time, as revealed in many different Neolithic settlements. For example, at Çayönü Tepesi, kerpiç lumps were used in the wall constructions during the Channelled Building and Cobble Paved Building subphases whereas in the following Cell Building Subphase rectangular kerpiç blocks started to be used. Different sized kerpiç were also used in Layer Ib of Tell Hassuna as well as in phases C and D of Hajji Firuz.

It is necessary to question the very simple and / or schematic descriptions in archaeological publications to more precisely address the history of the use of land as a construction material in general but in particular the use of land in different techniques. Randomly used definitions sometimes do not fit and sometimes create confusion. In this confusion, especially the definitions of "adobe" and "pisé" should be questioned and clarified as terms. This distinction has not been taken into account in many publications describing prehistoric architectural traditions. (de Chazalles, 2011:153) It was followed by Olivier Aurenche's pioneering work with his doctoral dissertation, and later on, both Aurenche et al. And Sauvage published in detail the land use and diversity and construction techniques in architecture. (Aurenche et al., 2011; Sauvage 2016) Thanks to these studies, the confusion of meaning especially regarding soil wall construction techniques and naming have been partially alleviated. In soil wall classification, different names are made in architectural structures according to the material itself, consistency and application method. (Aurenche et al., 2011:14) For example, mud plaster, which is a simple plaster for us today, is called "simple earth floor an if applied on the floor and" simple earth wall plaster an if applied on the wall. However; At the beginning of the Neolithic Period, in the Near East, the rounded architectural structures of simple organic flips such as brushwood and the plastering of the outer and inner parts of the top cover are called the attle “wattle-and-daub" method. (Shaffer, 1993:59; Guillaud, 2003:51) In other words, the definition of plastered walls is quite inadequate in this technique. Therefore, in defining the soil wall technique, not only the material itself; consistency and application the form is also very important.

According to the Aurenche et al., 2011 (Figure 4.1) earth implementations are classified as follows;

a) Massive earth (*terre massive*) that groups together the piled earth (without formwork)
b) Cutting sod earth (la motte engazonée découpée),
c) Bricks (brique, molded brick, mud-brick, adobe or kerpiç)
d) Wattle and daub or plastered (garnissage or torchis) (Aurenche et al., 2011:17)

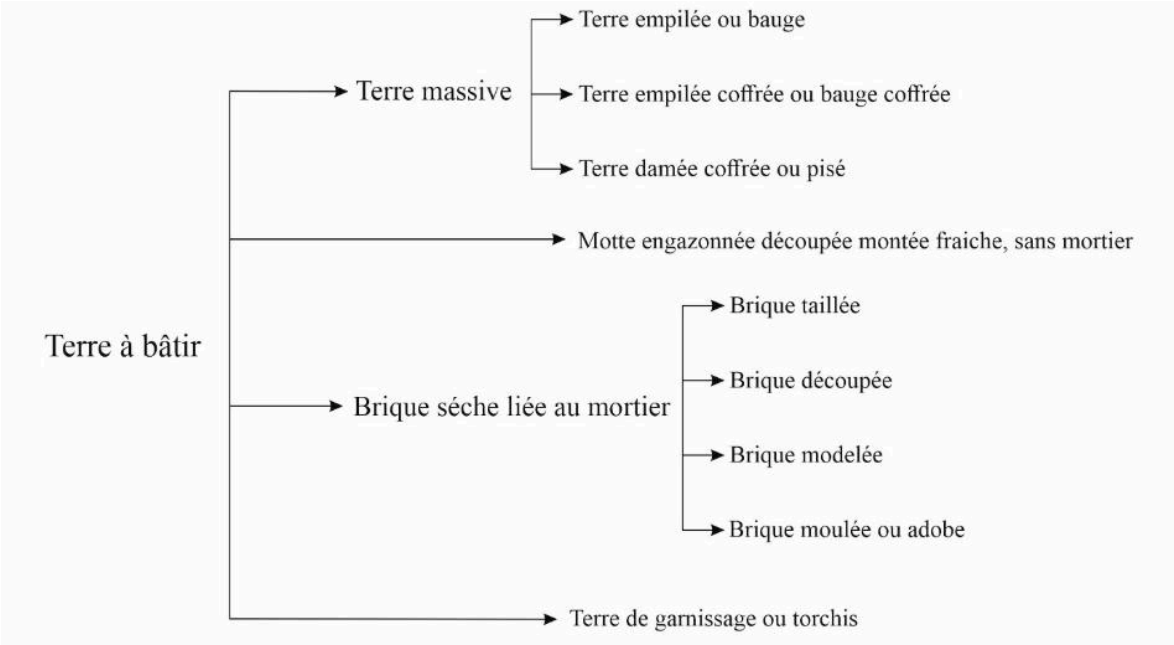


Figure 4.1: Classification of earth implementation (Aurenche et al., 2011:16 fig.2)

The term piled earth (terre empilée-yığma kerpiç) proposed as a new term in this study is expressed in two different words in English: “mass cob” which defines homogeneous soil walls and “cob blocks” which defines heterogeneous soil walls. (Aurenche et al., 2011:19) However, the term çalış “piled earth (terre empilée-yığma kerpiç)” ker was used in this thesis. However, the term "massive piled earth (terre massive empilée-massive mudbrick) has been used in more massive walls and in the walls where we have clearly identified different layers of soil. Martine Sauvage also uses the term “terre massive empilée” in his work which is name “*Les debuts de la consruction en terre au Proche-Orient*”. In this study, the term “terre massive empilée” was preferred in the definition of the soil walls of Sumaki Höyük architecture. (Sauvage, 2016) Aurenche et al. divide the walls made by “piled earth (terre empilée-yığma kerpiç)” technique into two groups: “terre empilée sans coffrage or bauge” and “terre empilée et coffrage or bauge

coffrage". However, the term "piled earth (terre empilée-yığma toprak or yığma kerpiç)" was used in this thesis. As much as we can identify during the excavations, *formwork* (coffrage / kalıp) data are also explained in detail. The most important point to keep in mind in this study is that all of the wall patterns we found around the soil walls of Sumaki Höyük are herbaceous plants / reeds. However, even in very close examples in terms of wall construction techniques, sometimes edge constraints "moulds" are unfortunately not detected. I don't think it would be very useful in terms of understanding the subject, using a separate term for what we can identify from the limiting elements, and a very different term for those we cannot detect, in order to avoid terminological confusion and error. On the contrary, the complexity of this term seems to lead to the conclusion that there are two separate architectural traditions in the same period of time in Sumaki Höyük, thus causing misinterpretation.

Another issue that I consider useful is the inaccuracy of a term used by Martine Sauvage for Sumaki Höyük in her publication. In this study, the term all "*dalles d'argile (clay slabs)"* was used. (Sauvage, 2016: Fig.3) However, in Sumaki Höyük Neolithic settlement, this type of application is not found during the excavations in which I was actively involved. And there are blocks cut from raw soil and used in architecture. According to the results of micromorphological analysis on these blocks, it was cut from caliche layer. In this study, the term "brique taillée (duripan-ham toprak kesimi)" used proposed by Aurenche et al. (Aurenche et al., 2011:24) In addition, konu "wickerwork (clayonnage-sepet örgü)" and "mud-brick (brique moulée-kerpiç blok)" architecture, which we clearly define in the Sumaki Höyük architectural tradition technique data. (Sauvage, 2016: Fig.2)

Martine Sauvage described the class of soil implementations more simply and slightly differently from Aurenche et al.2011, and also Bérengère Perello 2015. As mentioned by Sauvage the soil implementations are classified (Sauvage, 2016) that the earth construction material form:

a) Wickerwork (*clayonnage*),
b) Daub slabs (*hourdis de torchis*),
c) Massive earth stacked (*terre massive empilée*),
d) Pise molded between banches (*pisé moulé entre des banches*) and
e) sun-dried or baked bricks (*briques séchés au soleil ou cuites au four*).

Bérengère Perello categorized (Perello, 2015) the distinctions as follows;

a) Mudbrick (*brique*),
b) Wattle-and-daub (*torchis : terre sur armature végétale*),
c) Cob (*bauge*) and the last one
d) Rammed earth/pise (*pisé ou mur en terre banchée*).

Apart from all these, there are many different definitions and techniques, even in mud brick applications. The properties of mudbrick material may vary depending on the type of mudbrick soil, the amount of water, the methods and duration of moulding and drying. In the traditional architecture of adobe, Anatolia and Mesopotamia, the most common usage is the applications made with the block or compacted soil. The main aspects of mudbrick production and usage; It is divided into four groups as "*Kerpiç Tuğla*", "*Dövme Kerpiç*", "*Omurgalı Kerpiç*" and "*Yığma Kerpiç*". (Eriç, 1980:81-82; Ulusoy-Binay et al., 2017:165)

With the soil material easily accessible from the natural environment, adobe is obtained as a construction material after a simple process. Since clay soil is generally used in mudbrick construction, it contains aluminium and silica in its chemical composition. Besides, different metal oxides such as iron, magnesium and titanium oxide have been detected in this construction material. However, it should be noted that all these works were carried out through modern mudbrick applications. Expecting that the soil used in each region and every period to contain the same minerals is a quite ambitious and wrong generalization. However, the absence of organic substances in the adobe soil is the most important distinguishing feature. In addition to the organic material, samples containing shale and sand particles were added to the raw soil. (Eric, 1980: 81)

In these distinctions, many of which are based on modern ethnoarchaeological studies, adobe practices can be recovered as follows:

a) *Kesilerek çıkarılan kerpiç*: In the mudbrick application which is cut out, it is generally provided by cutting directly from the layers composed of clay, silt and fine sand accumulated as a result of floods at the rivers and lakes. Examples of this type of mudbrick are frequently encountered on the garden walls around Lake Van. (Dede, 1997: 66)
b) *Dövme tekniği kerpiç*: In the mudbrick application made with the forging technique, the area around the soil wall will be formed with a wooden mould, the prepared

sludge is filled into the mould and then the mud is forged with the help of a tool. (Eric, 1980: 82; Houben and Guillaud, 2003: 204)

c) *Omurgalı kerpiç*: The carinated mudbrick walls are similar to the mudbrick applications made in the forging technique but there are some differences. In this technique, as in the forging technique, moulds are placed on the inner and outer parts of the wall to be formed. However, unlike the forging technique, dense clay soil is used in this application. (Kömürcüoğlu, 1967: 65) Furthermore, wooden bars are placed vertically and vertically of the prepared mould. (Eric, 1980: 82)

d) *Hatıllı kerpiç*: Dense clay soil is also used in the timber application. The prepared mud is poured on the wall covered with wooden moulds and then beaten and compacted. The most important difference that distinguishes this technique from other mudbrick applications is; carrier beams placed between prepared moulds. (Tuztas and Cobancaoglu, 2006: 99-100; Dede, 1997: 69)

e) *Yığma Kerpiç*: The mudbrick mud prepared in masonry adobe application is stacked on top of each other with a shovel and the wall is raised. After a waiting period of about 10 days, the wall surfaces are trimmed with a sharp shovel. (Houben and Guillaud, 2003: 178; Zaky Hasan and Morkoc, 2019: 90). There is also the opposite definition of this definition. According to this; The walls formed by superimposing block mudbricks on top of each other without any wooden poles or beams between the mudbrick material obtained by wetting the soil are called "mud brick". (Tuztaş and Çobancaoğlu, 2006: 97)

f) *Kerpiç blok/Mud brick*: In the adobe block application, the sludge obtained by kneading the additives thoroughly with water is obtained by pouring into moulds prepared in various sizes. Commonly used in traditional village architecture, the blocks are rotated and dried at intervals. (Erinç, 1980: 81) However, the drying phase of the blocks should not be too fast. (Komurcuoglu, 1967: 58)

g) *Karma Sistem Kerpiç*: Mixed System Adobe is mostly applied in rural areas of Anatolia and the tradition of the filling system between masonry system and wood frame is seen together. (Tuztaş and Çobancaoğlu, 2006: 101-102) When all these are taken together, the construction and use of soil walls in architecture is quite complex and has the same misconceptions.

Aurenche et al., 2011 "*Essai* de *classification* des *modalités* de *mise* en *œuvre* de la t*erre crue* en *parois verticales* et de *leur nomenclature"* was used as the main source of this thesis for the mutual evaluation of all criteria. However, M. Sauvage 2016 "*Les debuts de la consruction en terre au Proche-Orient*" was also partially used for the different features of the Sumaki Höyük settlement. In many Neolithic settlements of Sumaki Höyük, the term is pise in Mesopotamia and Levant archeology was preferred for the definition of soil wall. (Miyake, 2010a: 437; Miyake, 2010b: 421-422; Miyake & Tsuneki, 1996: 111, 121; Nishiaki, 2011: 64; Nishiaki, 2012: 33; Stordeur, et al., 2000b: 37; Tsuneki, 2003b : 45; Flohr et al., 2015: 145; Karacalı and Urfalıoğlu, 2018: 66) In this thesis, the term ise pise özellikle is not particularly used. The most important reason for this; it is quite difficult to claim that this earth wall application (pise or pisé), which is a misuse of repeated and repeated use and terminological blockage, was used before the Middle Ages according to the above mentioned publication. (Aurenche et al., 2011: 22) Although this study clearly demonstrates, it is quite wrong to assume that such a practice exists, especially in the Neolithic period.

Phase	Area	Name	English	French	Turkish	Sides	Wall surface
N2	A	**N2B1**	Piled earth	Terre empilée	Yığma kerpiç	Unable to determine	unplastered
		N2B2	Wickerwork	Clayonnage	Sepet örgü	Thin line	
		N2B3	Wickerwork	Clayonnage	Sepet örgü	Thin line	
		N2B4	Wickerwork	Clayonnage	Sepet örgü	Thin line	
		N2B5	Wickerwork	Clayonnage	Sepet örgü	Thin line	
		N2B6	Wickerwork	Clayonnage	Sepet örgü	Thin line	
		N2B7	Piled earth	Terre empilée	Yığma kerpiç	Unable to determine	unplastered
	B	**N2B8**	Wickerwork	Clayonnage	Sepet örgü	Thin line	
		N2B9	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	Unable to determine	unplastered
		N2B10	Wickerwork	Clayonnage	Sepet örgü	Thin line	
		N2B11	Wickerwork	Clayonnage	Sepet örgü	Thin line	
		N2B12	Wickerwork	Clayonnage	Sepet örgü	Thin line	
N3	A	**N3B1**	Post-Hole	Poteau	Dikme Deliği	With stone	
	B	**N3B2**	Post-Hole	Poteau	Dikme Deliği	With stone	
N4	A	**N4B1**	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	with wattle frame	unplastered
		N4B2	Piled earth	Terre empilée	Yığma kerpiç	with wattle frame	unplastered
		N4B3	Piled earth	Terre empilée	Yığma kerpiç	with wattle frame	unplastered
		N4B4	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	Unable to determine	unplastered
		N4B5	Piled earth	Terre empilée	Yığma kerpiç	Unable to determine	unplastered
		N4B6	Piled earth	Terre empilée	Yığma kerpiç	Unable to determine	unplastered
		N4B7	Piled earth	Terre empilée	Yığma kerpiç	Unable to determine	unplastered
	B	**N4B8**	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	with wattle frame	unplastered
		N4B9	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	with wattle frame	unplastered
		N4B10	Piled earth	Terre empilée	Yığma kerpiç	Unable to determine	unplastered
		N4B11	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	Unable to determine	unplastered
		N4B12	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	Unable to determine	unplastered
		N4B13	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	Unable to determine	unplastered
	C	**N4B14**	Piled earth	Terre empilée	Yığma kerpiç	Unable to determine	unplastered
N5	A	**N5B1**	Wickerwork	Clayonnage	Sepet örgü	Thin line	
			Duripan	Brique taillée	Masif yığma kerpiç	Unable to determine	unplastered
		N5B2	Piled earth	Terre empilée	Yığma kerpiç	Unable to determine	unplastered
	B	**N5B3**	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	with wattle frame	unplastered
		N5B4	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	with wattle frame	unplastered
		N5B5	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	with wattle frame	unplastered
		N5B6	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	Unable to determine	unplastered
		N5B7	Piled earth	Terre empilée	Yığma kerpiç	Unable to determine	unplastered
		N5B8	Piled earth	Terre empilée	Yığma kerpiç	Unable to determine	unplastered
			Duripan (??)	Brique taillée (??)	Ham toprak kesimi (??)	Unable to determine	unplastered
		N5B9	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	Unable to determine	unplastered
		NBB10	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	Unable to determine	unplastered
		N5B11	Duripan	Brique taillée	Ham toprak kesimi	Unable to determine	unplastered
		N5B12	Duripan	Brique taillée	Ham toprak kesimi	Unable to determine	unplastered
			Mud-brick	Brique moulée	Kerpiç blok	Unable to determine	unplastered
		N5B13	Duripan	Brique taillée	Ham toprak kesimi	Unable to determine	unplastered
		N5B14	Wickerwork	Clayonnage	Sepet örgü	Thin line	
		N5B15	Wickerwork	Clayonnage	Sepet örgü	Thin line	
	C	**N5B16**	Piled earth	Terre empilée	Yığma kerpiç	Unable to determine	unplastered
		N5B17	Piled earth	Terre empilée	Yığma kerpiç	Unable to determine	unplastered
N6	A	**N6B1**	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	Unable to determine	unplastered
		N6B2	Piled earth	Terre empilée	Yığma kerpiç	Unable to determine	unplastered
			Duripan (??)	Brique taillée (??)	Ham toprak kesimi (??)	Unable to determine	unplastered
		N6B3	Piled earth	Terre empilée	Yığma kerpiç	Unable to determine	unplastered
		N6B4	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	Unable to determine	unplastered
		N6B5	Piled earth	Terre empilée	Yığma kerpiç	with wattle frame	unplastered
		N6B6	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	Unable to determine	unplastered
		N6B7	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	Unable to determine	unplastered
		N6B8	Piled earth	Terre empilée	Yığma kerpiç	Unable to determine	unplastered
			Wickerwork	Clayonnage	Sepet örgü	Unable to determine	
	B	**N6B9**	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	with wattle frame	unplastered
		N6B10	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	with wattle frame	unplastered
		N6B11	Piled earth	Terre empilée	Yığma kerpiç	Unable to determine	unplastered
		N6B12	Piled earth	Terre empilée	Yığma kerpiç	with wattle frame	unplastered
		N6B13	Massive piled earth	Terre massive empilée	Masif yığma kerpiç	with wattle frame	unplastered
		N6B14	Piled earth	Terre empilée	Yığma kerpiç	Unable to determine	unplastered
		N6B15	Piled earth	Terre empilée	Yığma kerpiç	with wattle frame	unplastered

Table 4.1: Comparative Terminology of Construction Techniques at Sumaki Höyük

At Sumaki Höyük, as in some contemporary settlements like Jarmo, Tell Seker al-Aheimar and Tell el-Kowm, the main construction material is piled earth and perishable material. (Figure 2.38) In nearly all buildings, reeds and/or herbaceous plant remains were encountered. In Sumaki Höyük Neolithic architecture, reeds, branches, and herbaceous plants mainly function to bind the walls in order to increase the resistance and durability of piled earth fill. Traces or remains of wooden posts with load-bearing capability were also identified. Both archaeological and mineralogical data indicate that the outer traces of some rectangular-planned constructions, which may have been covered with perishable materials, were surrounded by reeds and/or woody plants. The organic construction material used in the architecture was identified as reeds and herbaceous plants by SEM images and phytolith analysis. In common areas outside structures, due to the hard drought after the aqueous environment was experienced, partially calcified reed traces have also been detected. These reed traces can be interpreted as waste construction material or the last remains of destroyed structures. The building material of Sumaki Höyük Neolithic architecture was predominantly perishable material such as reeds, branches and earth. However, in the uppermost phase (Phase N1) the choice of stone as a construction material for retaining walls is noteworthy.

4.2. Cluster Analysis of the construction material from Sumaki Höyük

Sumaki Höyük Lime and soil samples taken from Neolithic architectural walls were examined by cluster analysis. As a result of this analysis, it was determined that lime samples were divided into 4 groups and soil samples were divided into three groups. According to the dendrogram and 95% similarity criteria, all the data obtained in XRF analyzes were taken into consideration and Group 1 was the largest group with 13 samples. Group 2 is represented by one example, Group 3 by two examples Group 4 is represented by one example. (Diagram 4.1)

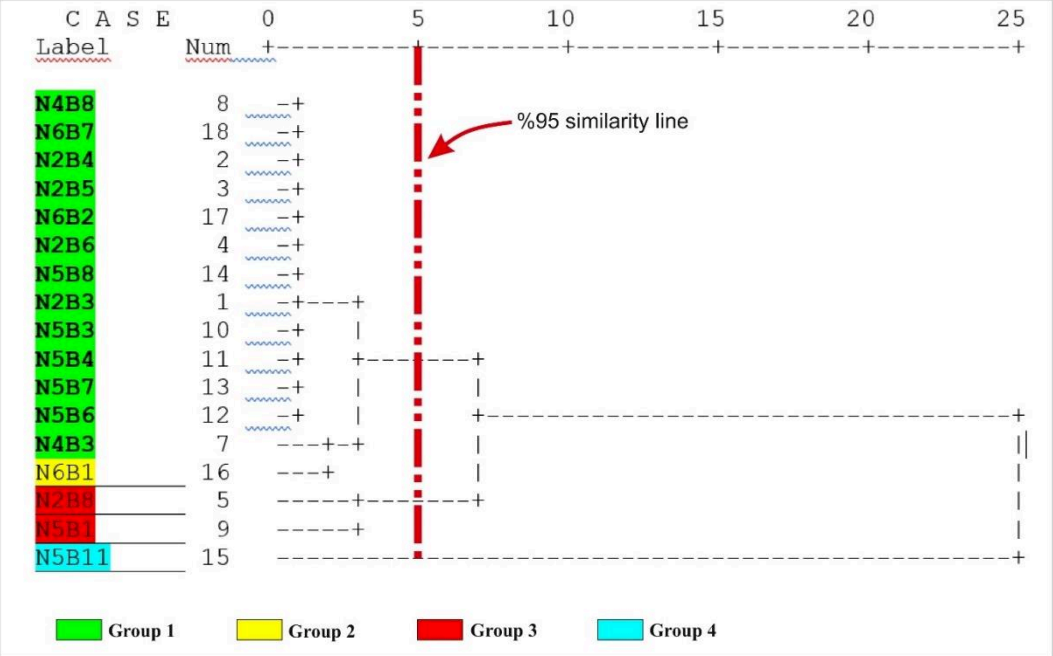


Diagram 4.1: Clustering of lime samples from all data according to XRF analysis

Lime samples were divided into 3 groups according to 95% similarity criteria in the classification made using only aluminum and silicon values used in the origin analysis of silicon based materials instead of all data. 1 group is the largest group as in the first table and is represented by 15 examples. (Diagram 4.2) Group 2 is represented by an example (N5B1). Group 3 is represented by an example (N5B11).

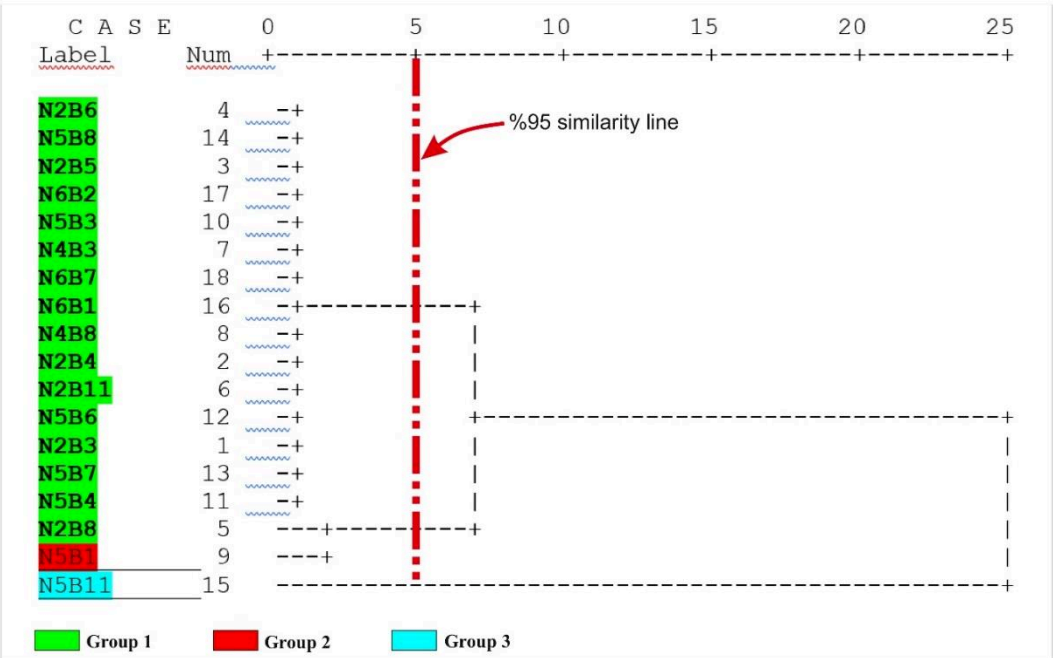


Diagram 4.2: Clustering of lime samples from Al ann Si data according to XRF analysis

The clustering of soil samples taken from the Neolithic architectural walls of Sumaki Höyük is somewhat more complex. Again, it was determined that soil samples were divided into 3 groups according to dendrogram and 95% similarity criteria. The first group was the largest group with four samples, while the second group was represented by two third groups and two groups. A total of eight soil samples were again divided into three groups according to the dendrogram analysis, taking into account Al and Si. In both examination parameters, the results almost overlap. (Diagram 4.3)

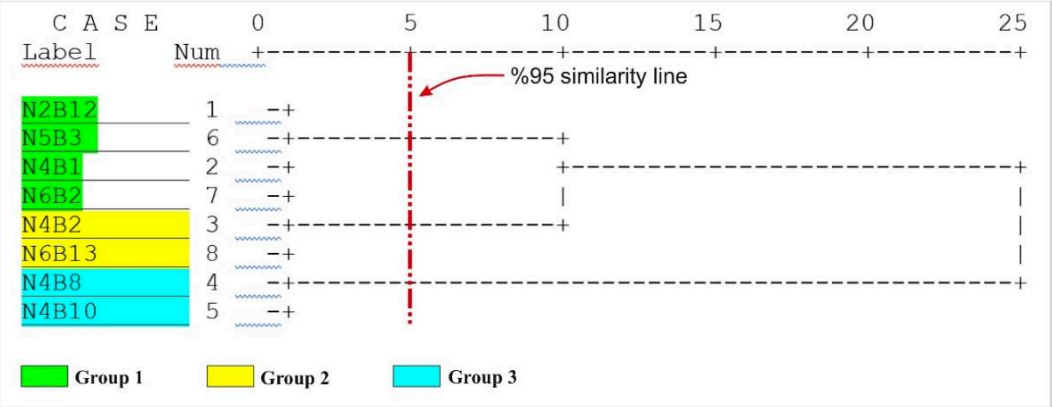


Diagram 4.3: Clustering of earth samples from all data according to XRF analysis

Since earth and wood were the main construction materials in Sumaki Höyük Neolithic architectural tradition, the stone was only used as an auxiliary construction material. Stone was used to supporting or protecting the structure generally as a simple row around the structures. The stones in rows or in enclosures were arranged by partially matching each other. The gaps between them did not reveal any mortar.

Stones could be inserted under the post-holes carrying the tent or around the edges. The primary function of flat stones under posts was preventative, by transmitting the pressure of the heavy weight of the roof to the floor via the pole. A flat stone was placed buried within the floor, just as it may be above the floor of traditional kerpiç or stone buildings in Anatolia. Stones around the post prevent the wooden post from sliding and ensure the wooden post remains fixed. Similar practices have also been seen in the traditional buildings of Anatolia in different periods. Basalts around the posts at Sumaki Höyük were generally small in size and the majority were rough; occasionally ground stone fragments were also used. In Sumaki Höyük there are no flat stones placed under posts. The stones used in rows that were identified in Sumaki Höyük Neolithic settlement were nearly all

basalt. Within the study area, basalt units are found on Kıradağı 2.35 km south/southwest in a beeline from Sumaki Höyük.Basalt samples taken from the Sumaki Höyük Neolithic settlement, Kıradağı and Karacadağ formations have determined five main and eight independent groups. The groups are as follows:

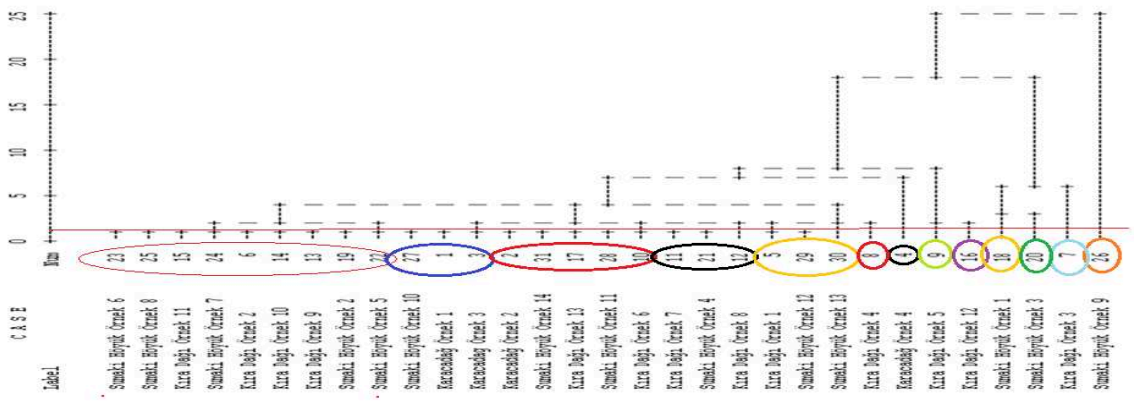


Diagram 4.4: Comparison and clustering of basalt samples according to XRF analysis

According to these groupings, 14 samples of Sumaki Höyük formed a cluster with five samples in Group 1; two with Group 3 and Group 5; and one with Group 2 and Group 4 with Kıradağ basalts. Therefore, 10 of 14 basalt samples that were collected from Sumaki Höyük were matched with Kıradağı samples. In other words, these 10 samples have similar chemical composition with Kıradağ basalts. Only one sample (Group 2) of Sumaki Höyük have a similar chemical composition with Karacadağ basalts. (Diagram 4.4)

According to the XRD analysis results of the samples taken from Sumaki Höyük basalts, Kıradağı and Karacadağ basalt flows identified different minerals. (Diagram 4.91 – 4.100) Witherite, Bytownite and Periclase minerals were not detected in Sumaki Höyük and Kıradağı basalt samples, while they were determined in Karacadağ samples. Diopside, Jadeite, and Oligoclase minerals are examined in the basalt samples of Sumaki Höyük and Kıradağı, however, these minerals were not found in the Karacadağ samples. Although Zeolite, Feldspar, Berlinite, Ilmenite, and Magnetite minerals were identified in the Kıradağı formation, they were not found in the Sumaki Höyük and Karacadağ samples. These results may be that due to the limited number of samples and/or the periodic formation variation in the Kıradağı basalt. Since Calcium and Albite minerals were clearly identified in soil samples taken from Sumaki Höyük Neolithic deposits, their presence in the Sumaki Höyük basalt samples indicates these minerals were probably contaminate the grinding tools is noteworthy. (Diagram 4.5)

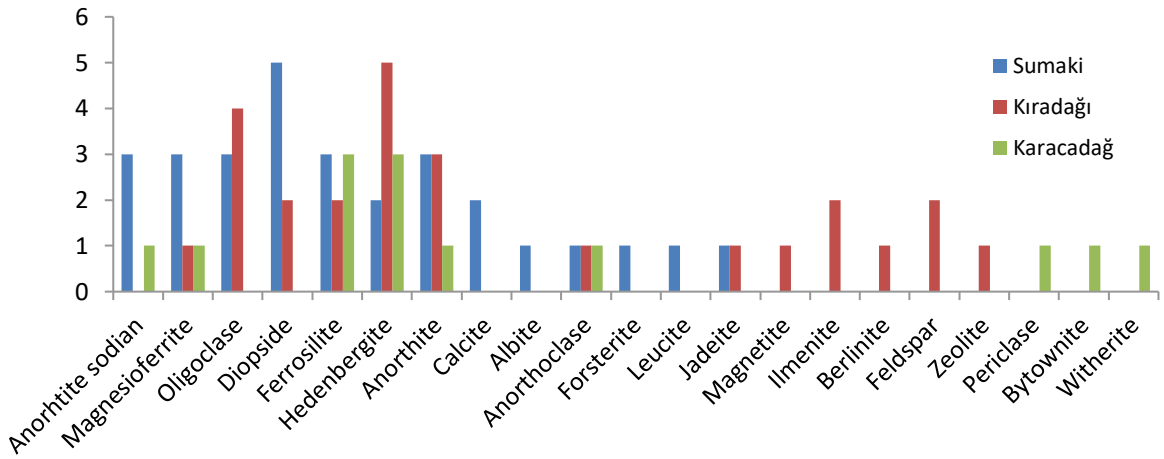


Diagram 4.5: Comparison of basalt samples according to XRD analysis

According to XRD analysis, in the Sumaki Höyük, ground stone tools made of basalt with a similar petrographic structure to the Kıradağı basalt have been obtained. Accordingly, previous interpretations that local volcanic material was intensively used in the Sumaki Höyük have been proved correct.

The natural basalt used in construction of the early phases (Phases N7 to N4) functioned as supporting material. A very small amount of ground stone fragments was also found in "secondary use". In later phases (Phases N3 - N1), the majority of stones in the structures were ones that had been used for grinding functions in the early phases.

4.3. Architectural elements and construction techniques

Elements such as walls, floors, hearths and fire pits to be used in structures are called "structural elements". These elements are sometimes constructed together with the buildings and become inseparable parts of living spaces. The processing methods and usage of kerpiç, stone, and wood, as explained in the "materials" section, will not be repeated here; only the aim, use and construction techniques of structural elements will be examined and presented. Under this heading, structural elements will also be interpreted together with my ethno-archaeological observations in the Lower Garzan Basin.

4.3.1. Earth walls / Stone rows

Walls are the main construction element forming a structure with different partitions. Apart from the construction material, the width, quality, and construction practice of the

walls are directly related to the aim and meaning of the space. The main construction material in Sumaki Höyük Neolithic architecture is reeds, woody plants, and earth, as mentioned above. Except for Phases N3 - N1, walls and/or rows made of stone were not identified.

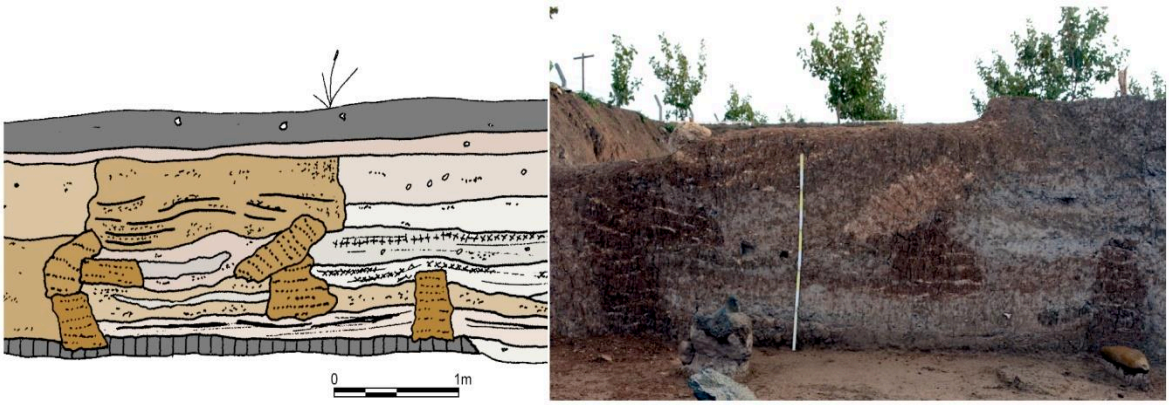


Figure 4.2: Traces of piled earth walls in the south trench section of 15G

Enclosures made of reeds/woody plants were identified as rectangular temporary structures. These enclosures were determined by 2-3 cm-thick lime fragments. These lime fragments do not have the characteristics of plaster but are generally the size of hazelnuts. (Figure 4.2) Micro-morphological and phytolith analysis of these lime fragments show that they contain reed and/or herbaceous plant remains. Additionally, in the ethno-archaeological field study of the Lower Garzan Basin, rectangular temporary structures surrounded by reeds or branches were identified. These structure types used by semi-nomadic groups have reed enclosures 10-12 cm in thickness. Examples with tent cover have a reed enclosure height of nearly 1 m; while in structures made only of reeds, the enclosures reach the upper cover. Enclosures made of branches, on the other hand, have a height of nearly 40 cm; with a thickness varying between 8 and 15 cm depending on their size and/or weaving techniques. The reed and/or branch enclosures do not have load-carrying capabilities, rather they have occlusive functions. This type of structural element identified in Sumaki Höyük was interpreted as having a mean height of 1 meter, from ethno-archaeological observations, but usually they do not exceed 50 cm, some were even represented by very low fill of below 10 cm.

Another wall type in Sumaki Höyük settlement is piled earth (*Terre emplileé/Yığma kerpiç*), Mud-brick (Brique moulée /Kerpiç tuğla) walls and also Duripan technique, but the piled earth technique was predominant. Buildings having this type of walls were constructed directly on natural ground. Walls with edges bounded by reeds or woody plants have an

appearance in the form of layers with different thicknesses. With a mean thickness of 7 cm, the generally reddish-brown raw earth was laid. (Figure 4.2) These homogeneous earth layers with a very soft structure are quite recognizable in the wall cross-sections. Analysis of lime fragments between the layers identified dense amounts of plant remains. Regarding all these data, it is thought that plants were placed on top of partly-wetted earth in the bounded area and then compressed. However, in structures N6B4 and N4B8, light brown homogeneous levels were identified between the reddish-brown earth layers. This data indicate that sometimes woody plants and sometimes different soils were spread between these layers. Boundary traces of reeds or herbaceous plants were mostly identified at the edge of many buildings; in particular, the continuous traces around the face of walls in Structures N4B1, N4B2, N4B3 and N5B5 are very clear. The walls, which were constructed by limiting the edges with reed or herbaceous plants, were of different thicknesses. The main walls generally had a mean thickness of 28 to 41 cm, but there are walls with a thickness between 18 cm and 46 cm. No connection was identified between wall thickness and the function of buildings.

This type of wall technique was not identified in any architectural structures of the modern winter quarters of semi-nomads. This technique was only determined in the construction of feeding troughs in Sulan Kom and Bazivan Kom. These feeding troughs were bounded by branches or reeds on two sides, with earth filled inside. Among the earth fill, plant (herbaceous) interlayers were randomly identified. The lengths of feeding troughs varied but were generally 30-35 cm in thickness.



Figure 4.3: Caliche layer in the sounding of trench 20/O

Walls where the piled earth technique was also used together with the kerpiç block technique were only identified in Phase N5. This wall technique in Area B is very clearly seen in Structure N5B12. However, partial traces of this technique were identified in structures N5B11 and N5B13. (Table 4.2 - 4.4) In Structure N5B12, except for 5 kerpiç blocks in the upper rows, the kerpiç sizes were not the same. The kerpiç blocks were irregularly placed in upper or lower rows inserted in layers made with the piled earth technique. The earth filling above and/or below the kerpiç blocks was flattened either during construction or due to compression by the upper rows of kerpiç and was in direct contact with both blocks. Although no trace of mortar was identified between these earth layers and the kerpiç blocks, there were mortar traces between kerpiç blocks. The kerpiç blocks in the upper rows of Structure N5B12 have oval-curved sides and mean dimensions of 30x35x6 cm. In contrast to the structural walls made with piled earth, there were more varieties of earth used in the construction of these walls. Occasionally it was brown sandy earth, occasionally yellow-clay earth, and on occasion lime-rich soil was used. Analysis of these limey soils found nearly no proportion of plant material within them. This shows that this lime was taken raw from the caliche layer above the Miocene sandstones that the settlement sits on. This raw fill immediately above the caliche layer (Figure 4.3) is clearly observed in trenches 20/O and 22M; however, where this material was obtained could not be identified archaeologically. Our determinations related to this material are based on geomorphological investigation and observation.



Figure 4.4: Stone row from Phase N1

In the upper phase of the settlement (Phase N1), stone rows and/or stone wall remains are clearly encountered. These rows of stones were used as enclosures surrounding the structure and/or as support material. Stone rows surrounding the structures were in a single row with thickness varying from 25 to 55 cm. The main reason for this diversity is that the stones were placed irregularly. In the central exposed area of Area A, parallel stone walls and/or rows were recovered in an east-west direction. They were in a single series and occasionally increased to 3-4 rows in height. There was no mortar between the stones, but occasionally earth filling was observed. Nearly all the stones were large grinding stones and their fragments. (Figure 4.4)

Stone was also used as a supportive material in post edges or as stabilising stones around posts in the tent. Flat stones were not used under any posts in the Sumaki Höyük Neolithic phases. In ethno-archaeological field studies, structures surrounded by rows of stones with tent covers were detected in some of the winter quarters. Sometimes stone surroundings or stone rows and reed surroundings were used together. These stone rows were constructed for support on one or two sides of structures, specifically those located on slopes. The best existing examples of these retaining rows are in Sulan Kom. It was also observed in some winter quarters that sometimes disruptions in stone walls or rows were repaired with either wood or earth in sacks.

Accordingly, since most of the stone rows were uncovered on the slopes of Sumaki Höyük Neolithic settlement, it is obvious that the structures had been supported. Since no plaster on the edges of the stone rows or kerpiç remains were encountered in their upper sections, there is a strong possibility that the upper coverings might have been tents or perishable material, as observed in ethnological investigation of the Lower Garzan Basin. The absence of post-holes within the structures or along the enclosure edges might be due to the inhabitants' mobile character, as identified in ethno-archaeological data.

Phase	Area	Name	Plan	Number of rooms or space	Door
N2	A	**N2B1**	Single-roomed with walls	Single room	?
		N2B2	Single-roomed	Single space	-
		N2B3	Single-roomed	Single space	-
		N2B4	Single-roomed	Single space	-
		N2B5	Single-roomed (?)	Single space (?)	-
		N2B6	Single-roomed	Single space	-
		N2B7	Undefined	Single room (?)	?
	B	**N2B8**	Single-roomed	Single space	-
		N2B9	Cell Building	Five cells + corridor	?
		N2B10	Single-roomed	Single space	-
		N2B11	Single-roomed	Single space	-
		N2B12	Single-roomed	Single space	-
N3	A	**N3B1**	Tent (round /oval)	Single space (?)	-
	B	**N3B2**	Tent (round /oval)	Single space (?)	-
N4	A	**N4B1**	Double-roomed	Two rooms	+
		N4B2	Double-roomed (?)	Two rooms (?)	?
		N4B3	Multi-roomed	Four rooms	?
		N4B4	Double-roomed	Two rooms	?
		N4B5	Undefined	At least a single room	?
		N4B6	Undefined	At least a single room	?
		N4B7	Undefined	Undetermined	-
	B	**N4B8**	Double-roomed	Two rooms	?
		N4B9	Single-roomed with walls	Single room	-
		N4B10	Multi-roomed	Four rooms	-
		N4B11	Undefined	At least 1 room	?
		N4B12	Undefined	At least 1 room	?
		N4B13	Double-roomed (?)	Two rooms	?
	C	**N4B14**	Double-roomed	Two rooms	?
N5	A	**N5B1**	Undefined	Single space (?)	?
		N5B2	Single-roomed with walls	Single room	+
	B	**N5B3**	Multi-roomed	Two cells + two rooms	-
		N5B4	Double-roomed	Two rooms	-
		N5B5	Single-roomed with walls	Single room	?
		N5B6	Cell Building	Three cells + single room	-
		N5B7	Multi-roomed (?)	At least three rooms	?
		N5B8	Single-roomed with walls (?)	1 room	-
		N5B9	Cell Building	More than three cells	?
		NBB10	Cell Building	More than four cells	?
		N5B11	Cell Building	Five or six cells	-
		N5B12	Multi-roomed	Four rooms	-
		N5B13	Undefined	At least a single room	?
		N5B14	Single-roomed	Single space	-
		N5B15	Single-roomed	Single space	-
	C	**N5B16**	Multi-roomed (?)	Four rooms (?)	?
		N5B17	Undefined	At least a single room	?
N6	A	**N6B1**	Cell Building	Five cells + corridor	-
		N6B2	Cell Building	More than four cells	?
		N6B3	Cell Building	Four cells + corridor	-
		N6B4	Cell Building	Five cells without corridor	-
		N6B5	Cell Building	Five cells + corridor	-
		N6B6	Cell Building	Four cells + corridor	-
		N6B7	Single-roomed with walls	Single room	-
		N6B8	Undefined	At least a single room	?
	B	**N6B9**	Cell Building	Nine cells + corridor	?
		N6B10	Cell Building	Five cells + corridor	-
		N6B11	Cell Building (?)	Four cells + corridor (?)	?
		N6B12	Cell Building (?)	More than two cells + corridor (?)	?
		N6B13	Single-roomed with walls	Single room	?
		N6B14	Undefined	Single room (?)	+
		N6B15	Single-roomed with walls	Single room	+

Table 4.2: Architectural structures plans and partitions at Sumaki Höyük

Phase	Area	Name	Interior filling texture	Interior filling color	Living surface
N2	A	**N2B1**	Partly ashy and calcified	Brown	Small stones
		N2B2	Partly calcified	Reddish-brown	Undetermined
		N2B3	Very little calcified	Reddish-brown	Ground stone fragments
		N2B4	Low ash, calcified	Reddish-brown	Undetermined
		N2B5	Low ash, calcified	Reddish-brown	Undetermined
		N2B6	Calcified in places	Reddish-brown	Some stones
		N2B7	Undetermined	Reddish-brown	Undetermined
	B	**N2B8**	Partly densely calcified	Reddish-brown	Stone tools
		N2B9	Partly ashy and very little stony	Light reddish-brown	Undetermined
		N2B10	Calcified in places	Light reddish-brown	Ground stone fragments
		N2B11	Very little calcified	Dark reddish-brown	Undetermined
		N2B12	Calcified and ashy in places	Reddish-brown	Undetermined
N3	A	**N3B1**	Densely ashy	Greyish brown	Undetermined
	B	**N3B2**	Densely ashy and carbon in places	Grey and dark grey	Undetermined
N4	A	**N4B1**	Stony, ashy, calcified in places	Reddish-brown , grey	Small stones
		N4B2	Stony, low ash	Dark reddish-brown , light grey	Undetermined
		N4B3	Partly densely calcified	Reddish-brown, grey	Undetermined
		N4B4	Partly calcified with little stones	Dark reddish-brown	Undetermined
		N4B5	Low ash and calcified	Dark reddish-brown, light grey	Undetermined
		N4B6	Calcified, coarse stone debris	Reddish-brown , grey	Undetermined
		N4B7	Very very little chalky and stony	Light reddish-brown	Undetermined
	B	**N4B8**	Limely, ashy with little stones	Light reddish-brown	Some stones
		N4B9	Densely calcified and partly stony	Reddish-brown	Stone tools and lime pieces
		N4B10	Partly calcified with a few stones	Reddish-brown	Undetermined
		N4B11	Calcified with little stones	Light reddish-brown	Undetermined
		N4B12	Very little ashy and randomly calcified	Light reddish-brown	Undetermined
		N4B13	Partly calcified and randomly stony	Reddish-brown	Undetermined
	C	**N4B14**	Partly calcified	Reddish-brown	Undetermined
N5	A	**N5B1**	Densely calcified	Light grey, pale reddish-brown	Lime surface
		N5B2	Very little ashy and calcified	Reddish-brown	Undetermined
	B	**N5B3**	Densely calcified and randomly stony	Reddish-brown, dark grey	Stone tools and lime pieces
		N5B4	Occasionally calcified, with a few stones	Brown and Reddish-brown	Some stones
		N5B5	Ashy, partly densely calcified	Reddish-brown, dark grey	Some stones
		N5B6	Occasionally calcified with stones	Reddish-brown	Groundstone
		N5B7	Randomly calcified	Light reddish-brown	Undetermined
		N5B8	Densely calcified and partly ashy	Reddish-brown, partly grey	Some stones
		N5B9	Occasionally calcified with a few stones	Dark reddish-brown, grey	Undetermined
		NBB10	Randomly ashy and partly chalky	Dark reddish-brown, grey	Undetermined
		N5B11	Very densely calcified, randomly stony	Reddish-brown, grey	Undetermined
		N5B12	Very densely calcified, partly ashy	Brown, grey and partly yellowish	Plastered floor
		N5B13	Very densely calcified, randomly stony	Brown, greenish yellow	Undetermined
		N5B14	Randomly calcified	Light reddish-brown	Some stones
		N5B15	Densely calcified, partly stony	Dark reddish-brown, grey	Lime surface
	C	**N5B16**	Densely calcified	Reddish-brown	Undetermined
		N5B17	Densely calcified	Reddish-brown	Undetermined
N6	A	**N6B1**	Densely calcified, partly stony	Reddish-brown, grey, dark grey	Lime surfaces in some cells
		N6B2	Calcified and stony in place	Dark reddish-brown	Lime surfaces in some cells
		N6B3	Densely calcified	Dark reddish-brown	Undetermined
		N6B4	Randomly, partly stony	Reddish-brown, light grey	Lime surface in some cells
		N6B5	Partly calcified, stony and ashy	Light reddish-brown	Some stones
		N6B6	Partly calcified and stony	Reddish-brown	Stone tools
		N6B7	Partly calcified	Light reddish-brown, grey	Undetermined
		N6B8	Randomly calcified	Reddish-brown	Undetermined
	B	**N6B9**	Densely calcified, partly ashy	Reddish-brown, dark grey	Lime surfaces in some cells
		N6B10	Densely calcified, randomly ashy	Reddish-brown	Lime surfaces in some cells
		N6B11	Dense calcified, a few stones	Light reddish-brown, grey	Undetermined
		N6B12	Partly densely calcified	Dark reddish-brown	Undetermined
		N6B13	Densely calcified, a few stones	Dark reddish-brown, light grey	Undetermined
		N6B14	Densely calcified	Reddish-brown	Undetermined
		N6B15	Partly calcified and stony	Reddish-brown	Some stones

Table 4.3: Properties of architectural structures fillings at Sumaki Höyük

Phase	Area	Name	Wall width (cm)		Wall / Filling height (cm)	Dimensions (m)		M2	Ratio
			Exterior	Interior		Long axis	Short axis		
N2	A	**N2B1**	32-43	None	7	?	3,98		
		N2B2	2-3	None	24	6,71	3,72	25	1,8
		N2B3	1-2	None	36	?	3,15		
		N2B4	1-2	None	23	6,10	?		
		N2B5	1-3	None	22	?	4,70		
		N2B6	2-3	None	24	?	4,02		
		N2B7	32-35	?	14	?	?		
	B	**N2B8**	2-3	None	10	6,14	?		
		N2B9	42-45	29-46	37-62	6,10	3,37	21	1,8
		N2B10	1-3	None	11	5,32	3,19	17	1,7
		N2B11	2-3	None	35	4,90	3,74	18	1,3
		N2B12	1-3	None	16	7,45	4,03	30	1,8
N3	A	**N3B1**	None	None	21	?	?		
	B	**N3B2**	None	None	25	?	?		
N4	A	**N4B1**	30-34	26-28	42	4,36	2,91	13	1,5
		N4B2	41-43	30-31	13	?	?		
		N4B3	37-43	37-43	23	?	4,62		
		N4B4	30-31	28-35	37-48	?	3,18		
		N4B5	34-43	None	27	?	4,55		
		N4B6	36-44	?	26	?	3,02		
		N4B7	38-46	?	38	?	?		
	B	**N4B8**	31-45	39-44	12-36	5,43	3,94	21	1,4
		N4B9	28-43	None	40	4,09	2,83	12	1,4
		N4B10	33-44	28-42	40	5,75	4,13	24	1,4
		N4B11	29-32	?	46	?	?		
		N4B12	32	?	50	?	?		
		N4B13	20-29	20-23	29	?	2,27		
	C	**N4B14**	40-42	40-42	11	?	?		
N5	A	**N5B1**	4-7	?	18	5,02	?		
		N5B2	32-43	None	8	3,04	2,43	7	1,3
	B	**N5B3**	31-42	18-34	37	4,90	3,38	17	1,4
		N5B4	30-32	22-27	50	3,53	2,38	8	1,5
		N5B5	22-34	None	18	3,36	2,48	8	1,4
		N5B6	33-36	21-36	35	?	3,08		
		N5B7	33-38	25-34	24	?	?		
		N5B8	34-37	None	26	?	3,84		
		N5B9	36-40	22-31	19	5,26	?		
		NBB10	26-34	20-35	28	5,94	?		
		N5B11	26-32	25-30	20	4,76	3,43	16	1,4
		N5B12	28-34	22-30	30	3,51	3,37	12	1,0
		N5B13	30-35	None	23	?	2,48		
		N5B14	1-3	None	27	6,11	3,67	22	1,7
		N5B15	3-7	None	35	5,54	3,87	21	1,4
	C	**N5B16**	28-41	?	10	?	?		
		N5B17	32-43	?	8	?	?		
N6	A	**N6B1**	31-42	26-35	14	4,72	3,84	18	1,2
		N6B2	33-38	33-38	14	?	4,03		
		N6B3	30-37	21-30	10	3,81	3,4	13	1,1
		N6B4	27-46	27-46	47	?	3,46		
		N6B5	32-43	21-34	18	4,80	3,52	17	1,4
		N6B6	34-42	33-40	29	3,90	3,47	14	1,1
		N6B7	31-40	None	26	2,90	2,23	6	1,3
		N6B8	32-35	None	7	?	3,95		
	B	**N6B9**	36-45	26-35	24	?	3,88		
		N6B10	30-39	27-36	35	4,31	3,12	13	1,4
		N6B11	33-42	?	9	?	3,68		
		N6B12	34-37	?	22	?	3,72		
		N6B13	28-34	None	38	3,74	2,86	11	1,3
		N6B14	25-31	?	11	?	2,29		
		N6B15	24-31	None	14	3,12	1,98	6	1,6

Table 4.4: Dimensions of architectural structures at Sumaki Höyük

4.3.2. Hearths

All of the places where fires were lit for cooking, heating and other purposes at Sumaki Höyük Neolithic settlement were in open common areas. None of the buildings yielded fire pits, hearths or ovens. In the upper fill and surroundings of many hearths, the remains of lentils, wheat, barley, figs or edible plants were identified. Accordingly, hearths were architectural elements used for cooking rather than for lighting or heating within structures. These cooking areas may be interpreted as where social relationships were consolidated as people gathered in these areas. In the Neolithic phases, 42 hearths were identified. (Table 4.5)



Figure 4.5: Construction stages and cross section of a hearth (N1O1)

The hearths of Sumaki Höyük are rounded or oval-shaped. Most of them were constructed with a single plastered floor on a stone pavement. (Figure 4.5) Hearth bases on natural ground were only recovered in Phases N4 and N5. The stones used in the pavements were usually of fist-size angular basalt, pebbles, ground stone fragments, and rarely, limestone. All could have been naturally found in the area surrounding the settlement. Between the stone pavements and plastered earthen floors, stone tempered earth was laid to produce a flat surface. The hearth floors generally have rough surfaces. Due to intense use

or construction techniques, fractures are observed in the surfaces. Ten hearths had renovated bases. Especially in phases N2 and N3, base renewals were frequent.

Phase	Area	Name	Type	Inclination and Direction	Pavement	Plastered floor										Context
						Hardness	Color	Surface		Dimensions (cm)						
								Feature	Quality	Number	Thickness				Short axis	Long axis	
N1	A	**N1O1**	Oval / U-shaped	North	+	Very hard	Yellowish grey	Smooth	Slightly cracked	1	2				102	128	Open space
		N1O2	Oval / Round (?)	?	+	None									84	115	Open space
		N1O3	Oval / U-shaped	?	+	None									52	84	Open space
		N1O4	Oval / Round (?)	?	+	Medium hard	Dark grey	Rippled	Densely cracked	1	1,5				43	75	Open space
	B	**N2O5**	Oval	West	+	Hard	Grey-dark, grey	Smooth	Cracked	2	2	1,5			67	79	Open space
		N1O6	Oval	?	+	None									102	118	Open space
	C	**N1O7**	Oval / Round	South	+	Very hard	Grey-yellowish grey	Slightly rippled	Densely cracked	3	2	1	2		70 (?)	130	Open space
N2	B	**N2O1**	Oval	West	+	Very hard	Grey, light grey	Smooth	Densely cracked	2	2	1,5			102 (?)	109	Open space
		N2O2	Oval	West	+	Very hard	Yellowish grey, light grey	Smooth	Slightly cracked	4	1	1,5	2	1	134	190	Open space
		N2O3	Oval	North	+	Hard	Grey, light grey	Smooth	Cracked	3	2	1	1,5		121	159	Open space
		N2O4	Round	Northwest	+	Very hard	Light grey, grey	Smooth	Slightly cracked	2	1	1,5			72	95	Open space
	C	**N2O5**	Oval / U-shaped	North	+	Hard	Bluish light grey	Rippled	Densely cracked	1	2				92	120	Open space
		N2O6	Oval	North	+	None									73	112	Open space
N3	A	**N3O1**	Round	South	+	Very hard	Yellowish buff-grey	Slightly rippled	Slightly cracked	2	2	1			199	207	Open space
	B	**N3O2**	Oval	West	+	Very hard	Dark grey, grey	Rippled	Cracked	2	2	1,5			92	135	Open space
		N3O3	Round (?)	?	+	Hard	Light grey, grey	Slightly rippled	Slightly cracked	2	3	2			78	89	Open space
		N3O4	Oval / Round	South	+	Hard	Light grey	Rippled	Densely cracked	1	1,5				67	102	Open space
N4	A	**N4O1**	Oval / Round	?	+	Medium hard	Grey	Rippled	Densely cracked	1 (?)	2				68 (?)	147	Open space
		N4O2	Oval (?)	South	+	Hard	Dark grey	Slightly rippled	Densely cracked	1	3				76	98	Open space
		N4O3	Oval / Round	Northwest	+	Very hard	Bluish grey	Smooth	Cracked	1	2				144	181	Open space
	B	**N4O4**	Oval (?)	?	+	Very hard	Grey	Smooth	Densely cracked	1	2				64	95	Open space
		N4O5	Oval	Southeast	+	Very hard	Light grey, yellowish grey	Smooth	Slightly cracked	3	2	3	2		162	229	Open space
		N4O6	Oval / U-shaped	South West	-	Very hard	Bluish dark grey	Smooth	Slightly cracked	1	2				125	162	Open space
		N4O7	Round	North	-	Hard	Dark grey	Rippled	Cracked	1	2				117 (?)	189	Open space
N5	A	**N5O1**	Round	North	+	Very hard	Light grey	Smooth	Slightly cracked	1	3				211	223	Open space
		N5O2	Oval	North	+	Hard	Bluish grey	Slightly rippled	Densely cracked	1	2				98	128	Open space
		N5O3	Oval	South	-	Medium hard	Light grey	Rippled	Densely cracked	1	1				128	164	Open space
		N5O4	Oval	South	-	Medium hard	Bluish dark grey	Rippled	Densely cracked	1	2				110	163	Open space
		N5O5	Oval	Northeast	+	Very hard	Bluish light grey	Smooth	Slightly cracked	1	2				95 (?)	154	Open space
	B	**N5O6**	Oval / Round	East	+	Very hard	Light grey	Rippled	Densely cracked	1	2				129	134	Open space
		N5O7	Round	East	+	Very hard	Bluish dark grey-buffy	Smooth	Cracked	2	2	1			106	111	Open space
		N5O8	Oval / Round	South	+	Hard	Dark grey	Rippled	Densely cracked	1	1				109	116	Open space
		N5O9	Oval / U-shaped	East	-	Very hard	Bluish dark grey	Smooth	Slightly cracked	1	3				118	167	Open space
		N5O10	Oval	Southeast	-	Hard	Dark grey	Rippled	Cracked	1	2				145	164	Open space
N6	A	**N6O1**	Oval / Round	Northeast	+	Medium hard	Bluish dark grey	Smooth	Slightly cracked	1	1,5				102 (?)	126	Open space
		N6O2	Oval	South	+	Medium hard	Light buffy	Smooth	Slightly cracked	1	2				99	120	Open space
		N6O3	Oval	North	+	Medium hard	Dark grey	Rippled	Cracked	1	2				84	91	Open space
		N6O4	Oval	West	+	Hard	Dark grey	Rippled	Slightly cracked	1	2				77	84	Open space
		N6O5	Oval / Round	Northeast	+	None									86 (?)	109	Open space
	B	**N6O6**	Oval	Southeast	-	Medium hard	Dark grey	Rippled	Cracked	1	2				155	209	Open space
N7	B	**N7O1**	Undetermined	?	+	Medium hard	Orangish buff	Rippled	Densely cracked	1	2				47	80	Open space
		N7O2	Oval	Northwest	-	Medium hard	Dark grey	Slightly rippled	Slightly cracked	1	2				121	156	Open space

Table 4.5: Statistical data of the hearths at Sumaki Höyük

In nearly every phase, the hearths were generally located in wide open areas between buildings and partly near the edges of by buildings. Hearth remains were more intensive in certain areas of Area A in Phase N6 and Area B in phases N4 and N3. Accordingly, hearths may be interpreted as being commonly used by the community, and not the property of families. Four hearths (N3O1, N4O3, N5O5 and N6O4) belonging to different phases were identified partially overlapping. (Figure 3.222) In the context of the architectural distribution of the settlement, it is understood that cooking areas were concentrated in certain areas and an attempt was made to continue this tradition. A similar situation was also observed in the Upper Tigris Basin settlement of Salat Cami Yanı where six separate hearths partly overlapping each other were uncovered. (Miyake, 2006: 116)

Ashy areas were only detected within and in close proximity to the hearths. These ‘ash pits’ consisted of 2-4 cm of shallow fill. Additionally, the open areas were generally ashy and grey in colour. This shows that the ash was haphazardly disposed of in open areas; hence it is logical that no clear ash pits were identified in the excavations.

4.3.3. Fire Pits

Another example in the literature of cooking areas is the "roasting pit" or "fire pit", which are small and shallow pits constructed by digging into the earth and lighting the fire inside. Instead of the term "roasting pit", defining a functional characteristic, in this thesis the more technical term "fire pit" is preferred.

Many fire pits were identified in the Sumaki Höyük Neolithic phases. Twenty fire pits were recovered in phases N7-N3 while in phases N1 and N2 no traces or remains of fire pits were encountered. (Diagram 3.16)Although almost the same number of fire pits was determined in phases N7 and N5, there was not a single one found in Phase N6, the intervening phase. Thus, it is considered that Sumaki Höyük settlement might have been occupied by a different group in Phase N6. (Table 3.4) Both the architectural variations and lack of pottery in Phase N6 support this assumption.

The fire pits, like hearths, were identified in open areas between structures at varying levels. As seen in Area B in Phase N5, after some fire pits (N5A2 and N5A3) were destroyed, new ones were constructed in the same locus. (Figure 4.279 – 4.281) If it is considered that the new pits were constructed with frequent location changes at nearly the same level in very

close areas, then perhaps these fire pits were not in regular use for a long time. These fire pits generally have oval, round or droplet shapes with unplastered sides, a length varying from 49 to 92 cm, and a width varying from 24 to 58 cm. (Table 4.6) They were mainly filled with grey or dull grey-coloured ash. Very clear burn traces in different colours (orange, brown or dark grey) were observed around their edges. In a small number of them, burned stones were found. It is noteworthy that these stones are the same type of stones used for pavements under the hearth bases. It is considered that these stones might have been used for the same function as stones under hearths. Carbonized plant remains are encountered in their inner deposits. According to preliminary investigation by flotation, the majority of them were wood fragments. Small amounts of lentils, legume family, cereals such as emmer wheat, and barley were also identified.

Phase	Area	Name	Shape	Inner filling	Inner filling color	Edge Color	Dimensions (cm)				Context
							Edge thickness	Depth	Short axis	Long axis	
N3	B	**N3A1**	Oval	Slightly ashy, stony	Grey, yellowish buff	Orangeish buff	2-3	10	42	66	Open space
		N3A2	Waterdrop	Ashy	Light grey	Dark grey	1-2	9	35	60	Open space
		N3A3	Oval	Ashy	Dark grey	Dark grey	2-3	12	52	71	Open space
N4	B	**N4A1**	Waterdrop	Ashy, partly stony	Yellowish grey	Dark grey	2-3	9	30	62	Open space
		N4A2	Oval	Slightly ashy, stony	Grey	Dark grey	1-2	7	48	72	Open space
		N4A3	Oval	Ashy and a few stones	Dark grey, yellowish buff	Dark grey	2-3	9	31	60	Open space
		N4A4	Oval	Slightly ashy and stony	Dark grey, yellowish buff	Light brown	1-2	11	36	57	Open space
		N4A5	Waterdrop	Ashy	Grey, yellowish buff	Dark grey	2-3	10	46	74	Open space
		N4A6	Oval	Densely ashy	Dark grey, yellowish buff	Dark grey	3-4	11	42	73	Open space
N5	B	**N5A1**	Oval	Slightly ashy	Dark grey, yellowish buff	Orangeish buff	2-3	6	53	72	Open space
		N5A2	Waterdrop	Ashy, with a few stones	Grey	Dark Bullet	2-3	16	39	64	Open space
		N5A3	Waterdrop	Densely ashy, partly stony	Dark grey, deep grey	camel hair	1-2	17	41	67	Open space
		N5A4	Oval	Ashy, partly stony	Dark grey	Dark brown	2-3	8	41	63	Open space
		N5A5	Oval	Slightly ashy, stony	Yellowish buff	Dark grey	2 -5	17	39	57	Open space
N7	B	**N7A1**	Oval	Dense lime traces and ashy	Yellowish buff, grey	Dark brown	2 -5	11	43	66	Open space
		N7A2	Round	Dense lime traces and ashy	Yellowish buff, grey	Dark brown	2-4	9	47	49	Open space
		N7A3	Oval	Densely ashy with carbon	Dark grey	Dark grey	1-2	10	40	61	Open space
		N7A4	Oval	Densely ashy	Dark grey, yellowish buff	Dark brown	2-4	6	36	53	Open space
		N7A5	Oval	?	?	Brown	2-3	?	41	68	Open space
		N7A6	?	Densely ashy	Deep grey	?	?	7	?	40	Open space

Table 4.6: Statistical data of the Fire Pits at Sumaki Höyük

Fire pits are more common in the Pre-Pottery Neolithic Period and are known from many settlements in the Near East from the LPPNB/Final-PPNB period and the Pottery Neolithic Period. (Miyake, 2010a: 437; Özbaşaran & Duru, 2011: 169 Fig.10-11; Baird & Campbell, 1990: 65; Nishiaki & Le Mière, 2005: 57; Matsutani, 1991: 11; Braidwood,

1983a: 173 Fig.39) Sumaki Höyük and Salat Cami Yanı are of specific importance in proving that this tradition continued in the Upper Tigris Basin until the Proto-Hassuna Period. However, these fire pits began to reduce during that period and then disappeared, as observed in both Sumaki Höyük and Salat Cami Yanı excavations. (Miyake, 2008: 107)

4.4. Description and microarchaeological observations of Sumaki Höyük Neolithic architecture

Dated to 9084±57 - 8123±50 CalBP (7134±57 - 6173±50 CalBC), the Sumaki Höyük is the Neolithic settlement having undergone the most extensive excavations in Northern Mesopotamia, especially in the Upper Tigris Basin in the context of the Late PPNB and the following period. In this section, the Sumaki Höyük Neolithic architecture will chronologically be described and presented in detail from earliest to latest. (Table 4.2 - 4.4, 4.7) Micro-morphological analysis of samples taken from structures and architectural elements will also be interpreted.

Plan > Phase	N7	N6	N5	N4	N3	N2	N1	Total
Cell Building		10	4			1		**15**
Multi-roomed Strc.		4	2					**6**
Double-roomed Strc.			1	6				**7**
Single-roomed Strc.(with wall)		3	3	1		2		**9**
Single-roomed Strc.(without wall)			2			9		**11**
Stone rows/walls		1					10	**11**
Tent with Post-hole	1				2			**3**
Indeterminate planned Strc.		2	3	5				**10**
Total	**1**	**20**	**15**	**12**	**2**	**12**	**10**	**72**

Table 4.7: Distribution of architectural plans of the Sumaki Höyük Neolithic Phase

4.4.1. Phase N7 architecture

Phase N7 is the earliest inhabitation of the Sumaki Höyük. It was identified in a very a limited part of Area B, and Phase N7 cultural fill is distributed over a 250 m² area. According to the single C_{14} data, Phase N7 is dated to 9084±57 CalBP. (Table 3.3)

There are no clear building remains in this phase. Three post-bases or holes which were identified in various parts of trenches 15G and 15H, might have been related to temporary structures or tents. Only two hearths and five fire pits were revealed. The

significant characteristic of this phase is the presence of well-burnished, mineral-tempered pottery. Large fragments were recovered under Structure N6B10 of Phase 6 near hearth N7O1.

4.4.1.1. Architectural remains

The only indication of structures found in different areas in Phase N7 is post-holes that might be traces of temporary structures or tents. The internal diameter of the post-holes varies from 16 to 24 cm, with plaster surrounding the edges of one. The post-hole immediately southwest of the fire pit N7A2 was identified to have 1-2 cm thick lime remains around it. The lime remains, and the plaster traces around posts exposed in trench 15G, show a very different character. All have a grey internal fill with little ash. Earth samples of this fill were investigated by flotation, but no carbonized or calcified branches or wood fragments were identified. Most probably, the groups using these posts removed them when leaving or moving. Ethno-archaeological studies to understand the architectural tradition and settlement strategy of groups using the Lower Garzan Basin as winter quarters determined many examples of semi-nomadic groups taking wooden poles with them when migrating.

4.4.1.2. Hearths

Two hearths were identified in Phase N7, one in trench 14G and the other in trench 15H. (Table 4.5)

4.4.1.2.1. Hearth N7O1

This was found in the southeastern part of trench 14G in Area B on the reddish-brown natural earth. It covers an area of approximately 2 m^2 at elevations of 701.10 – 701.22. It had a single plastered floor with a stone pavement. The partly-preserved plastered floor was approximately 47x80 cm in size. (Figure 4.6, 4.207, 4.208) The stone pavement was made of basalt and pebbles of different sizes between 3x3x5 - 15x20x25 cm. Between the stone pavement and the plastered floor was a layer of pebble and sand-tempered greyish buff-coloured filling. The plastered floor was an orange buff colour about 2 cm in thickness with traces of burning. The surface of the medium hard floor was rippled and densely cracked.

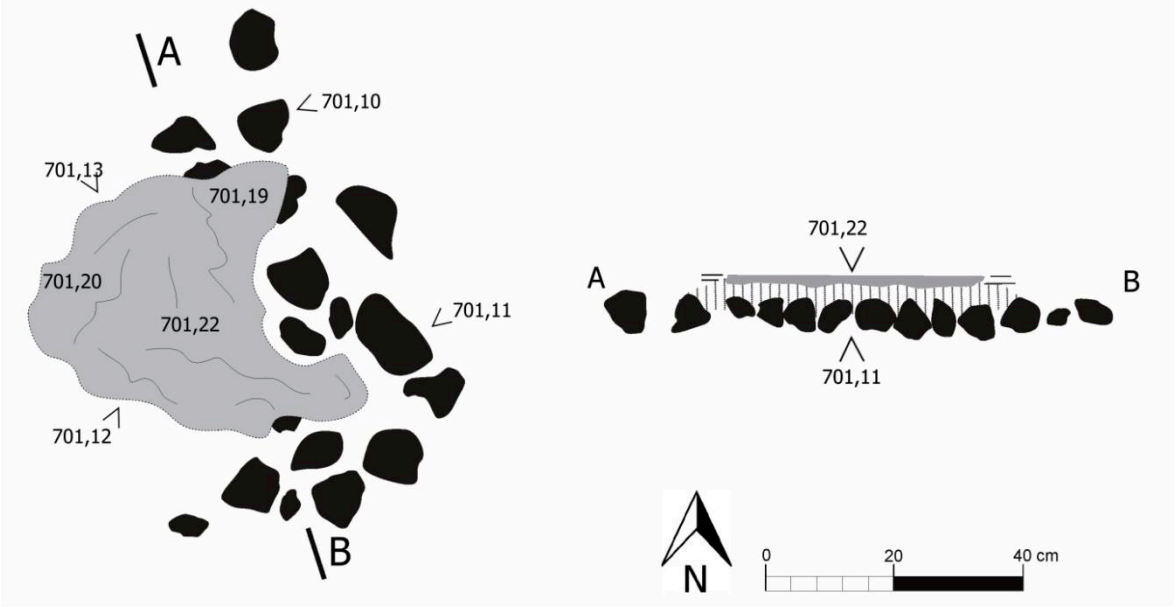


Figure 4.6: Hearth N7O1 and its cross-section

Just nearby the hearth, half a pot of Basalt Tempered Burnished Ware, which represents the earliest pottery of Sumaki Höyük, was found. Within a 1 m^2 area, a group of artefacts comprises flint hammer stones, grooved stones, handstones, and grinding stones as well as a small number of animal bones and obsidian fragments. In the examination of earth samples taken from the northern part of the hearth by flotation, a tiny amount of plant remains, only *Triticum/Hordeum*, could be detected. (Table 3.2)

4.4.1.2.2. Hearth N7O2

This was found in the southeastern part of trench 15H in the open area in Area B on the greyish buff homogeneous soil. The hearth covers an area of approximately 1.12 m^2 between the elevations of 699.80 to 699.87. The oval-shaped hearth had a single plastered floor without a stone pavement. The plastered floor was 121x156 cm in size. (Figure 4.7, 4.209) Based on the floor remains, the hearth slightly inclined to the east. Its partly destroyed plastered floor was dark grey-coloured about 2 cm in thickness with traces of black burning. The surface of the medium hard plastered floor was slightly rippled and cracked.

Examining the soil samples taken from the plastered floor by floatation different plant species were detected, dominantly *Triticum/Hordeum, Fabaceae, Lens culinaris*, and *Triticum turgidum* ssp. *Linum*, *Euphorbia falcate*, and *Vicia ervilia* remains were also identified. (Table 3.2)

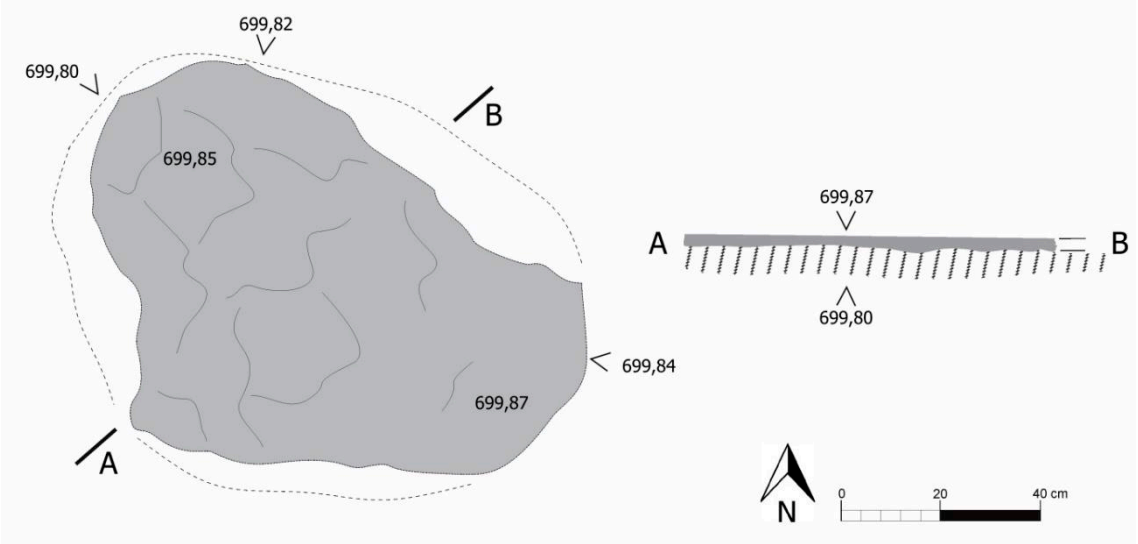


Figure 4.7: Hearth N7O2 and its cross-section

4.4.1.3. Fire Pits

Six fire pits were identified in Phase N7; four of them were in trench 15H and the rest were in trench 15G. (Table 4.6)

4.4.1.3.1. Fire Pit N7A1

This was located in an open area in the western part of trench 15G in Area B. The oval-shaped fire pit was between the elevations of 700.30 – 700.41. Dug in a light grey ashy soil, the fire pit was 43x66 cm in size and 11 cm deep. (Figure 4.8) On its edge, there is a dark-brown line due to burning with 2-5 cm thickness. There were no signs of plastering on its sides or its bottom. Its inner deposits were yellowish buff, grey and orange in places. Near the fire pit, yellowish buff-coloured soil traces were also found. (Figure 4.273) This yellowish-coloured soil with similar features to the inner deposit was probably waste ash deposited near the pit after the fire was extinguished.

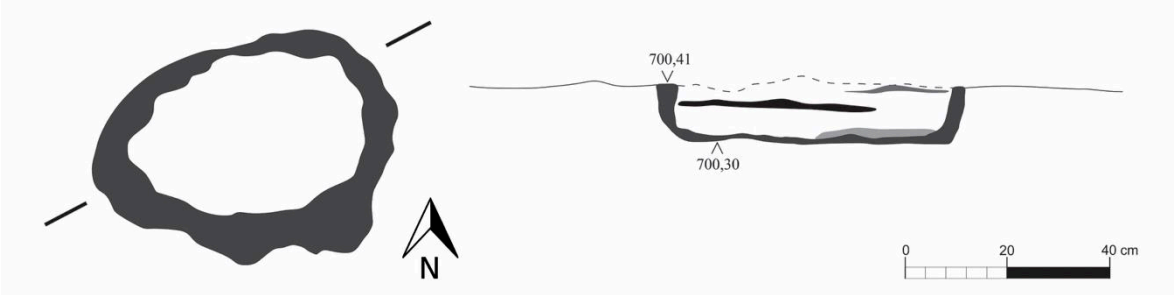


Figure 4.8: Fire Pit N7A1 and its cross-section

Intense amounts of calcified organic material were found around the fire pit. According to micro-morphological and phytolith analyses, the calcified organic material contains herbaceous plant remains. Among the phytoliths, high frequencies of *Trichome, Bulliform,* and Silicated Woody Elements were observed. Plant remains that were detected in earth samples taken from the top fill and around the fire pit by flotation are mainly *Triticum/Hordeum*, *Fabaceae*, and *Lens culinaris*. *Linum*, *Medicago*, and *Rumex* seeds were also identified. (Table 3.2)

4.4.1.3.2. Fire Pit N7A2

This was located in an open space in the northwestern side of trench 15H in Area B. The round-shaped fire pit was between the elevations of 700.08 to 700.17. Dug in a light grey ashy soil, the fire pit was 47x49 cm in size and 9 cm deep. (Figure 4.9) On its edge, there is a brown line due to burning with 2-4 cm thickness. There were no signs of plastering on its sides or its bottom. It was filled with yellowish buff- and grey-coloured ash. On its southwest side there was a post-hole 14 cm in diameter. If the temporary character and function of the fire pits are taken into account, this post-hole should have been associated with another architectural structure or element.

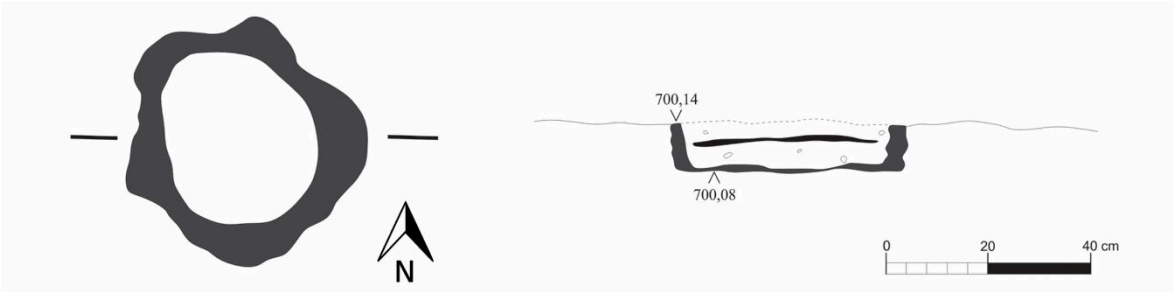


Figure 4.9: Fire Pit N7A2 and its cross-section

Voluminous amounts of calcified organic material, which were very similar to those found around the Fire Pit N7A1, were detected around this fire pit. (Figure 4.274, 4.275) Accordingly, it can be stated that these lime particles were traces of calcified herbaceous plant remains. Plant remains that were detected in earth samples taken around the fire pit by flotation are mainly *Fabaceae*, *Medicago radiate* from the same family, and *Poaceae* family include *Triticum/Hordeum*, and *Triticum turgidum ssp*. (Table 3.2)

4.4.1.3.3. Fire Pit N7A3

This was located in an open space in the western part of trench 15H in Area B. The oval-shaped fire pit was between the elevations of 699.93 to 700.03. Dug in a light grey dense ashy and limey soil, the fire pit was 40x61 cm in size and 10 cm deep. (Figure 4.10) On its edge, there is a dull greyish-yellowish buff line due to burning with 1-2 cm thickness. (Figure 4.276, 4.277) There were no signs of plastering on its sides or its bottom. It was filled with dull grey-coloured dense ash. Plant remains were not detected in soil samples taken from its close surrounding, instead, many animal bone fragments were found.

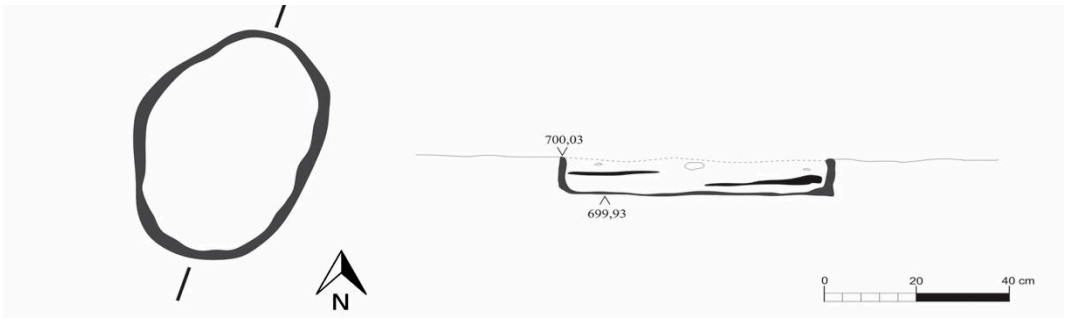


Figure 4.10: Fire Pit N7A3 and its cross-section

4.4.1.3.4. Fire Pit N7A4

This was located in an open space in the southeastern part of trench 15H in Area B. The oval-shaped fire pit was between the elevations of 699.84 to 699.90. Dug in a grey ashy and sandy deposit, the fire pit was 36x53 cm in size and 6 cm deep. (Figure 4.11) On its edge, there is a dark brown line due to burning with 2-4 cm thickness. There were no signs of plastering on its sides or its bottom. Plant remains that were detected in earth samples taken from its inner deposit by flotation are mainly *Triticum/Hordeum* and *Fabaceae* family (*Lens culinaris*, *Medicago radiate,* and *Vicia ervilia*). *Ficus carica* seeds were also identified. (Table 3.2)

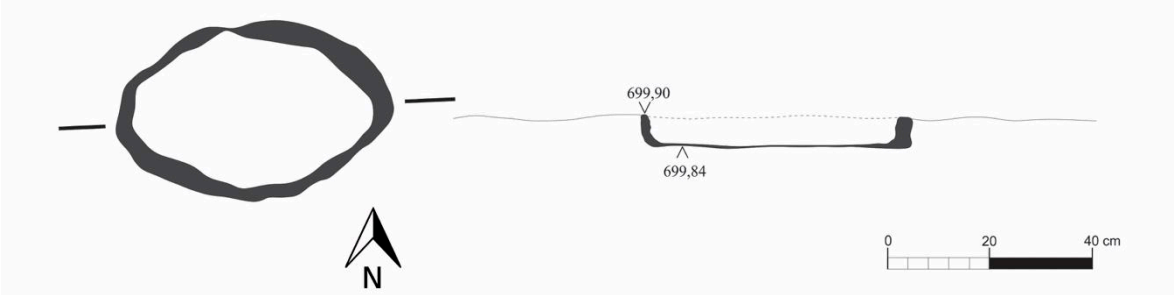


Figure 4.11: Fire Pit N7A4 and its cross-section

4.4.1.3.5. Fire Pit N7A5

This was located in the centre of trench 15G in Area B, under the wall of the Structure N6B11. The upper level of the oval-shaped fire pit was at the elevation of 700.41. Dug in a grey ashy and lime-poor deposit, the fire pit was 41x68 cm in size. On its edge, there is a brown line due to burning with 2-3 cm thickness. Its interior fill was not excavated. (Figure 4.278)

4.4.1.3.6. Fire Pit N7A6

This was located in the southern part of trench 15H in Area B partially below Hearth N6O6. The oval-shaped fire pit was between the elevations of 699.87 to 699.94. It was about 7 cm deep and 40 cm long. It was dug in a grey ashy and sandy deposit. The fire pit was filled with dark dull grey ashy soil. Since its interior was not excavated, filling determinations were based on the cross-sectional data generated during excavation.

4.4.2. Phase N6 architecture

Architectural structures and elements of Phase N6 are distributed in areas B and A. In Area C, this phase is not represented. According to C_{14} dating from both areas, Phase N6 is dated to 8708±90 – 8594±49 CalBP (Table 3.3) Identified over a nearly 956 m² area, Cell Buildings dominate the Phase N6 architectural tradition. Single-roomed structures were also revealed. (Figure 3.59, 3.60) In both areas, architectural structures were built on natural terraces complying with the topography.

Being the first organized settlement pattern in Sumaki Höyük, ten Cell Buildings and three single-roomed structures were identified in Phase N6. In the open areas, there are six hearths; five of them in Area A while one was determined in Area B. (Table 4.5) No hearth was encountered in any of the structures. All the hearths are single-based, with only one hearth found not to have a plastered floor. Generally, there are stone pavements underneath the plastered floor constructed of fist-sized basalt, ground stone fragments, and broken pebbles. The fire pits, which were intensely used in Phase N7, do not appear in this phase. (Diagram 3.16).

Of the Cell Buildings with dominant distribution in Phase N6, four have "L-shaped," and two have “T-shaped” corridors. Only one does not have a corridor. The T-shaped corridor buildings have four cells, while the L-shaped corridor buildings have five cells, except for one building. Since the other three Cell Buildings have largely been destroyed, their corridor plan has not entirely been identified. The dimensions of the Cell Buildings are generally the same, except for Structure N6B9 in trenches 14G-14F of Area B, which was larger than the others. This largest L-shaped corridor building has nine cells. (Figure 3.60) The single-roomed structures of Phase N6 are generally smaller than the Cell Buildings. Another noteworthy characteristic is the existence of doorways, especially in two structures. These structures with doors at the same level as their living surfaces have only one floor, at variance with the Cell Buildings.

The width of the Cell Building walls varies from 21 to 46 cm while the walls of the single-roomed structures are 26-37 cm wide. None of the faces of these walls are even. They occasionally thin out a little and occasionally undoubtedly widen, but there are no buttresses to strengthen these broader areas. There are no traces of plastered flooring within the rooms of single-roomed structures or cells of the Cell Buildings. The floor or walls from the upper floor of the Cell Buildings have not been preserved. The upper floor formed a single living space and most probably was used by laying mattresses or *kilim*-like coverings above a flimsy flat surface of branches or herbaceous plants, as documented in the cell buildings of Çayönü Tepesi. No plastered flooring fragments fallen from the upper floor were identified at either the edges of the external walls or within the cells. Although the flat floor surface in the cells of some structures especially Cell Buildings N6B1, N6B2, N6B9 and N6B10 were covered in dense lime, there was no trace of plastering on any of these lime surfaces. SEM images of lime samples identified large amounts of organic material. This is probably due to the remains of herbaceous plants forming the floor of the upper level falling into the cells and creating a level of lime, caused by sudden climatic changes and evaporation. Phytolith and pollen analysis of the same samples found data supporting the presence of reeds and herbaceous plants. The phytoliths contained high frequencies of *Trichome, Bulliform, Panicoid*, and silicified woody forms. *Elongate, Chloridoid* and *Fustucoid* forms were also found. (Figure 4.325 - 4.330) The lime and earth samples from structures contained *Apocynaceae, Verbenaceae, Cesalpiniaceae, Liliaceae, Calenduleae, Asparagaceae, Malvaceae*, and *Poaceae* pollen. (Figure 4.331, 4.332)

4.4.2.1. Structures

Reflecting the first organized and planned settlement at Sumaki Höyük, Phase N6 was determined to contain fifteen architectural structures or remains. Of these, ten were Cell Buildings and three were single-roomed structures. The plan of the two structures could not be clarified. Eight of the structures were in Area A, and seven were in Area B. There were no structural remains identified in Area C. (Table 4.2 - 4.4, 4.7)

4.4.2.1.1. Structure N6B1

This structure is located in Area A, southwest of trench 21M between the elevations of 699.90 to 700.04 meter. The structure was constructed following the slope of the natural topography without a stone foundation. The Cell Building has an "L-shaped" corridor in the centre. (Figure 4.12, 4.93 – 4.95, 4.333) The walls have been preserved to a height of 14 cm. The partition walls, which appear to be partially destroyed, are lower than the main walls.

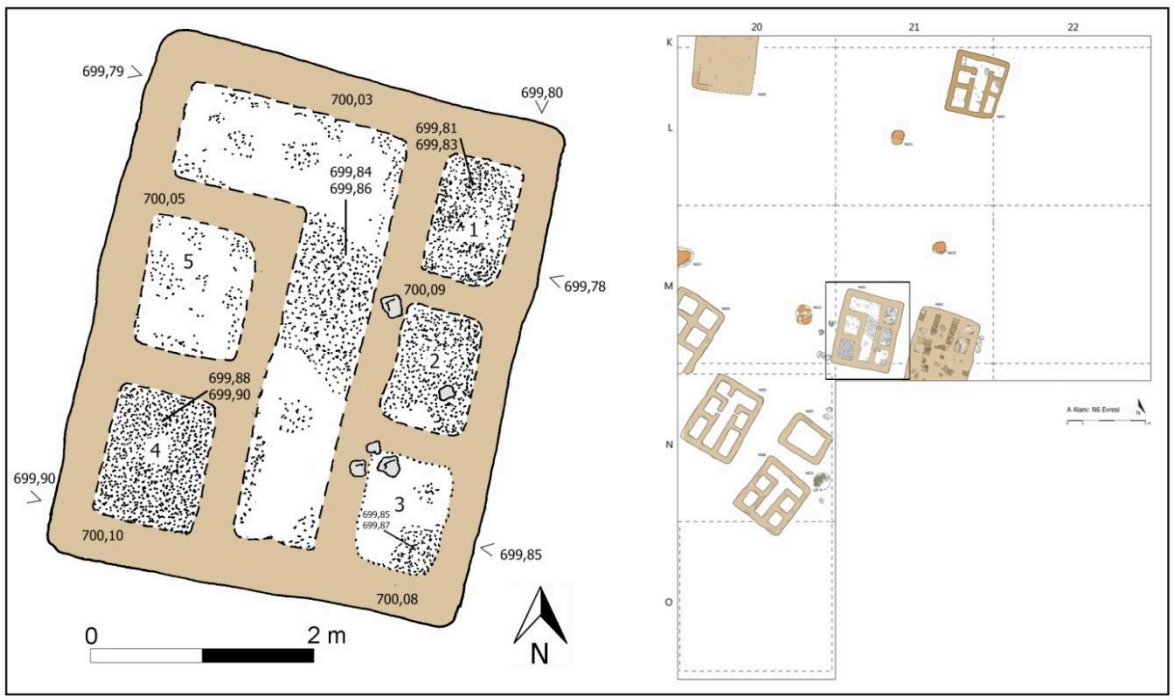


Figure 4.12: Location and plan of Structure N6B1

The structure was built on the north slope of a natural terrace with southwest-northeast orientation. It has a width of 384 cm in the east-west direction and is 472 cm long in the north-south direction. Covering an area of nearly 18 m^2, the cells of the structure are almost 1 m^2 in size. Though there is no very significant difference in the thickness of the

bearing walls and partition walls, the bearing walls are 31-42 cm thick and the partition walls are 26-35 cm thick. The western bearing wall is thicker than the others.

The Cell Building has three cells along the east wing and two cells on the west side with an "L-shaped" corridor in between having the dimensions of 370 cm long and 77 cm wide. The cells are 75x94 cm to 98x116 cm in size. Cells numbered 4 and 5 on the west wing are larger than the ones on the east side. None of the cells have doorways. Lime surfaces in the cells numbered 1, 2 and 4 and in some parts of the corridor simultaneously form the floor level of the structure. There are no traces of plaster on these lime surfaces. As mentioned above, the lime surfaces are directly related to the evaporation and calcification process of organic structural material. The internal fill of the cells is very similar to the outer areas with a grey colour and low ash content but a lot of lime fragments. There were no graves found within the cells or under the lime surfaces.

Occasional lime fragments appear to have bound the walls. Continuing as weak and uncertain lines, their thickness varies from 1 to 3 cm. The internal fill of walls is homogeneous reddish-brown loose earth. Within the walls, calcified surfaces are observed at nearly 4-5 cm intervals. These surfaces, which continue irregularly between the layers, did not have mortar characteristics. Organic remains are observed on SEM images of lime samples taken from within the walls. (Figure 4.291) Earth samples taken from wall fills were identified to contain calcite, quartz, iron, and nitrate after XRD analysis. Their chemical compositions comprise calcium carbonate, silicon dioxide, iron oxide and sodium nitrate compounds. The sodium nitrate compound indicates the presence of aridity. (Diagram 4.101)

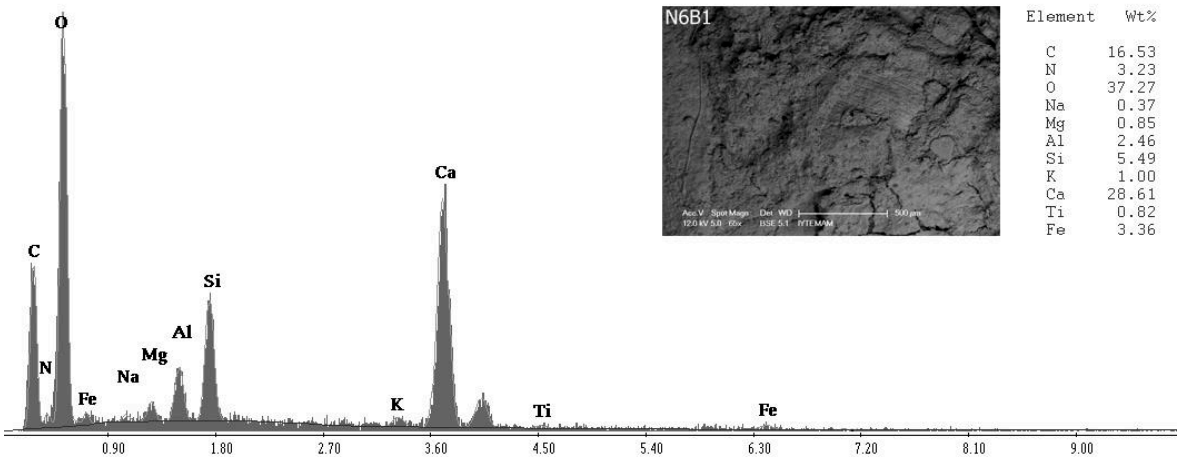
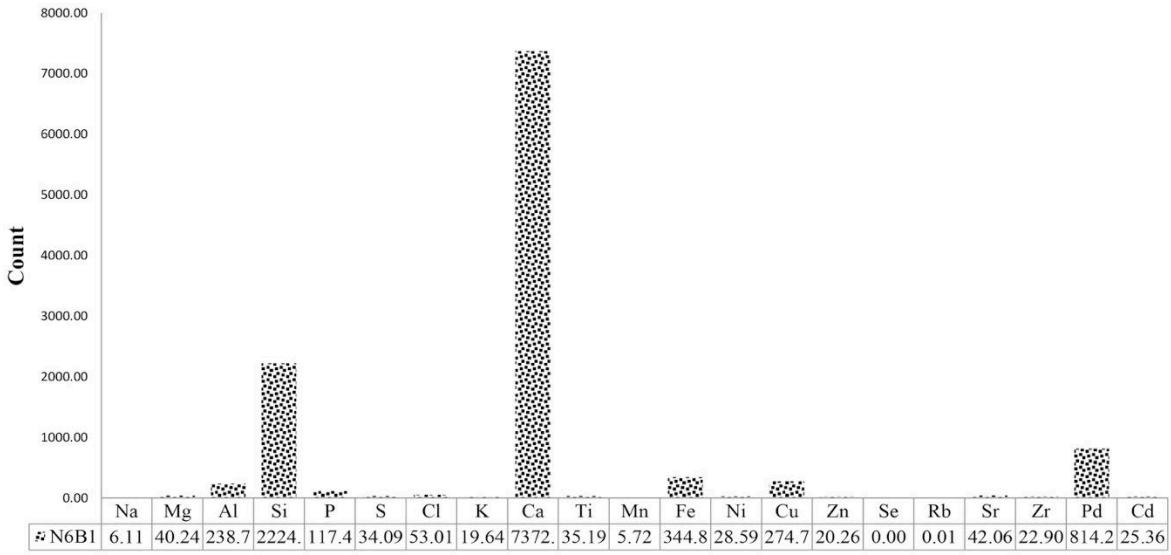


Diagram 4.6: EDX analysis of lime samples taken from Structure N6B1

Occasional aragonite crystals and SiO_2 gels covering organic material have been observed on SEM images of lime samples. Their EDX analysis identified O (37.27%), Ca (28.61%), C (16.53%), Si (5.49%), and Fe (3.36%) elements. N, Na, Mg, Al, K, and Ti were also detected with proportions from 3% to 0.37%. (Diagram 4.6) According to XRF analysis of the lime samples, it was observed that Ca (63%), Si (19%), Fe (3%), Al (2%), and Pd (7%) are dominant with very small amounts of Ni, Zn, Sr, Rb, Na, K, S, P, Cl, Cu, and Ze elements. (Diagram 4.7)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N6B1	6.11	40.24	238.7	2224.	117.4	34.09	53.01	19.64	7372.	35.19	5.72	344.8	28.59	274.7	20.26	0.00	0.01	42.06	22.90	814.2	25.36

Diagram 4.7: XRF analysis of the lime samples taken from Structure N6B1

In the examination of earth samples taken from the open area between structures N6B1 and N6B2 by flotation, minimal amounts of plant remain, only *Triticum* or *Hordeum*, and *Poaceae*, were identified. (Table 3.2)

Accordingly, both the main walls and partition walls of Structure N6B1 were constructed with the piled earth technique. The lime lines partially identified on the faces of the walls are the remains of woven reeds or herbaceous plant material used during ramming. Due to this wall technology, it is unlikely that the roof was earthen. However, considering the density of lime fragments indicating organic material, it may be stated that the structure was covered with a light material such as reeds or branches.

4.4.2.1.2. Structure N6B2

This structure is located in Area A, in the southeast section of trench 21M and 1 m to the east of structure N6B1 between the elevations of 699.86 to 700.00 meter. The Cell Building was not well-preserved. Partially preserved walls and cells were determined in an area of nearly 1 m^2. (Figure 4.13) The walls have been preserved to a height of 6-8 cm. The structure was constructed on the north slope of a natural terrace parallel to the structure N6B1 with southwest-northeast orientation following the slope of the natural topography without a stone foundation.

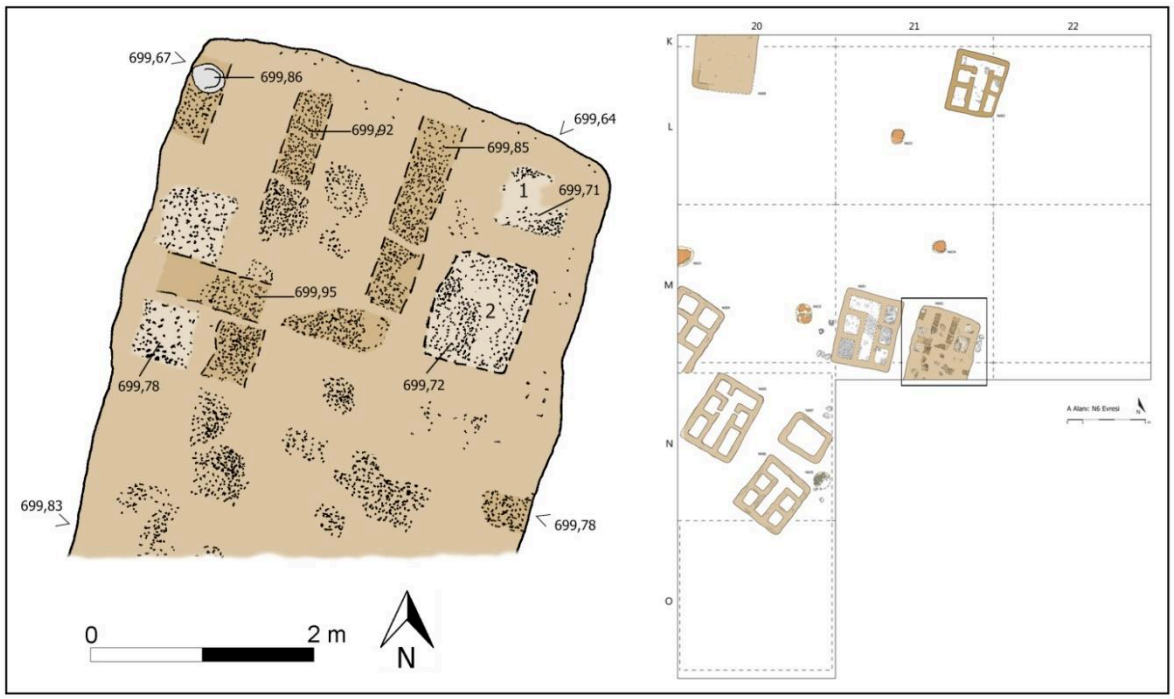


Figure 4.13: Location and plan of Structure N6B2

The structure is 403 cm wide in the east-west direction. Since its southern portion is outside the exposed area, its north-south dimensions could not be determined. Its exposed part is 433 cm long. Based on the dimensions of the other cell buildings, it is stated that this structure covered an area of nearly 20 to 22 m^2. The well-preserved cell is 82x99 cm in size. Three cell traces are also identified, but their dimensions could not be detected. The walls are 33-38 cm thick.

The Cell Building has a corridor in the centre with traces of cells on either wing; however, the corridor plan has not entirely been identified. Occasional thin lime fragments appear to have bound the walls and the cells. The internal fill of walls is homogeneous reddish-brown loose earth. (Figure 4.96 – 4.98) There are no traces of plaster or mortar found

on the walls. Regarding the other structures having similar plan, the walls of this structure were constructed by the piled earth and probably duripan technique. Organic remains are observed on SEM images of lime samples taken from the walls. (Figure 4.292)

Earth samples taken from wall fills were identified to contain calcite, quartz, and diamide minerals after XRD analysis. Their chemical compositions comprise calcium carbonate, silicon dioxide, and diamino fumaric diamide compounds. (Diagram 4.102)

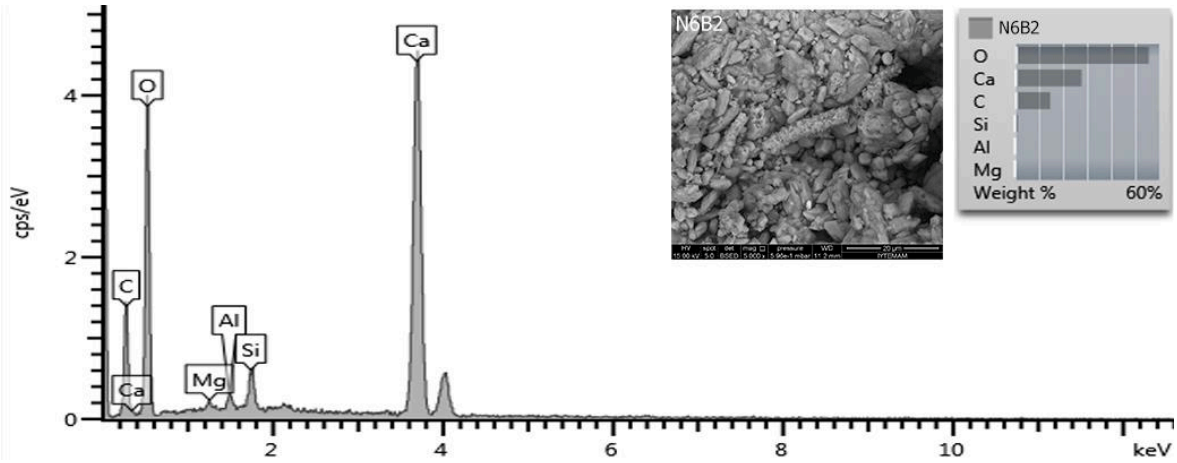


Diagram 4.8: EDX analysis of lime samples taken from Structure N6B2

Scalenohedral crystal structures are observed on SEM images of samples taken from the structure. Calcium carbonate minerals were clearly identified surrounding tubes formed by organic remains. Lime samples taken from wall fills were identified to contain elements O (55.63%), Ca (27.70%), C (14.74%), Si (1.23%), Al (0.48%), and Mg (0.23%) after EDX analysis. (Diagram 4.8)

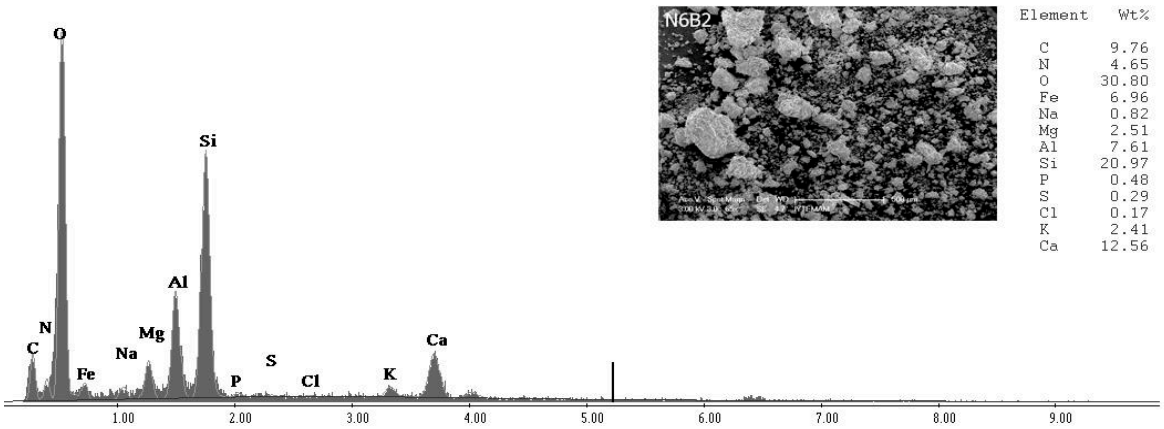
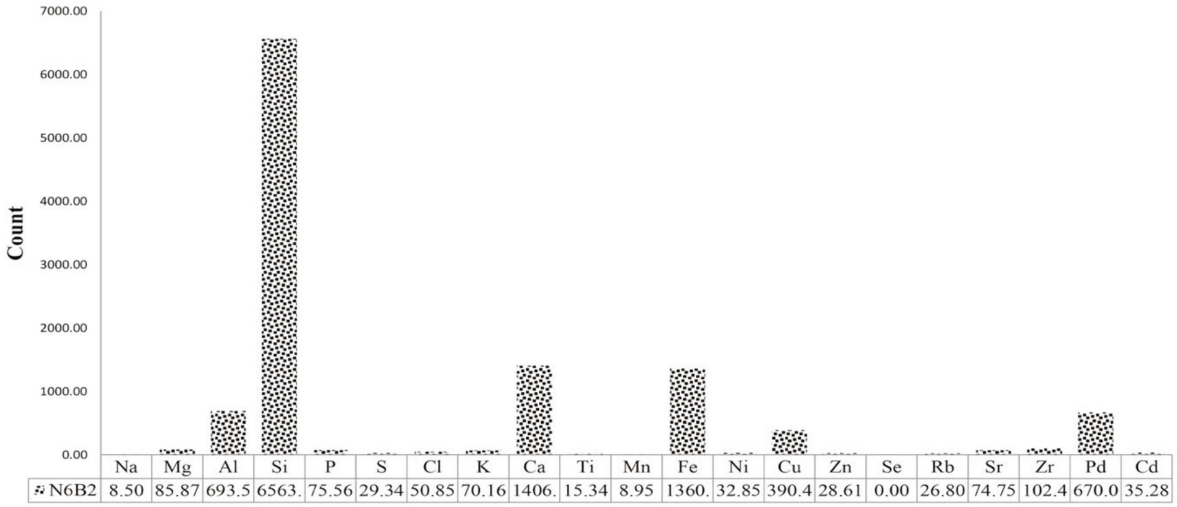


Diagram 4.9: EDX analysis results of soil samples taken from Structure N6B2

On SEM images of reddish-brown earth samples, micritic envelopes on sand and stone grains and acicular-shaped calcium carbonate crystals are observed. (Figure 4.293)

Their EDX analysis identified the following elements with their mean values; O (30.80%), Ca (12.56%), C (9.76%), Si (20.97%), Fe (6.96%), and Al (7.61%). The elements N, Na, Mg, P, S, Cl and K were identified with proportions from 3% to 0.17%. (Diagram 4.9)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N6B2	8.50	85.87	693.5	6563.	75.56	29.34	50.85	70.16	1406.	15.34	8.95	1360.	32.85	390.4	28.61	0.00	26.80	74.75	102.4	670.0	35.28

Diagram 4.10: XRF analysis of the soil samples taken from Structure N6B2

XRD analysis of soil samples observed various minerals such as calcite, quartz, albite, berzelianite, monticellite, and brucite. Their chemical compositions comprise calcium carbonate, silicon dioxide, sodium calcium aluminum silicate, copper selenide, calcium magnesium silicate, and magnesium hydroxide compounds. According to their XRF analysis, it was observed that the following elements dominating; Si (56%), Ca (12%), Fe (12%), Al (6%), and Pd (6%), together with very small amounts of Ni, Zn, Sr, Rb, Na, K, S, P, Cl, Cu, and Ze. (Diagram 4.10)

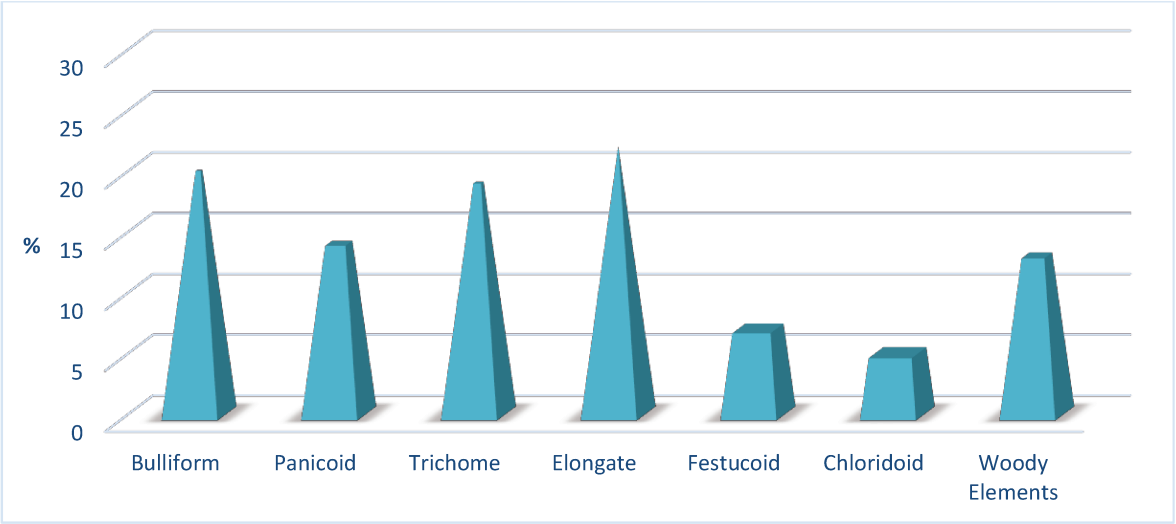


Diagram 4.11: Distribution of phytoliths in the lime samples taken from Structure N6B2

Phytolith analysis of lime samples observed reed or herbaceous plant remains. The phytoliths contained high frequencies of *Trichome*, *Bulliform*, *Panicoid*, *Elongated*, and *Silicified Woody Forms*. Different shapes of *Chloridoid* and *Fustucoid* forms were also defined. (Diagram 4.11; Figure 4.325 - 4.330)

4.4.2.1.3. Structure N6B3

This structure is located in Area A in northeast of trench 21L and northwest of trench 22L between the elevations of 699.53 to 699.64 meter. The walls have been preserved to a height of 10 cm, but the walls in the southeast part are lower, only 4-5 cm high. The structure was constructed following the slope of the natural topography without a stone foundation. The structure was constructed immediately south of a natural rise with southwest-northeast orientation. Regarding a natural slope with a north orientation in trenches 20M and 21M, in this area the inclination is towards south and east.

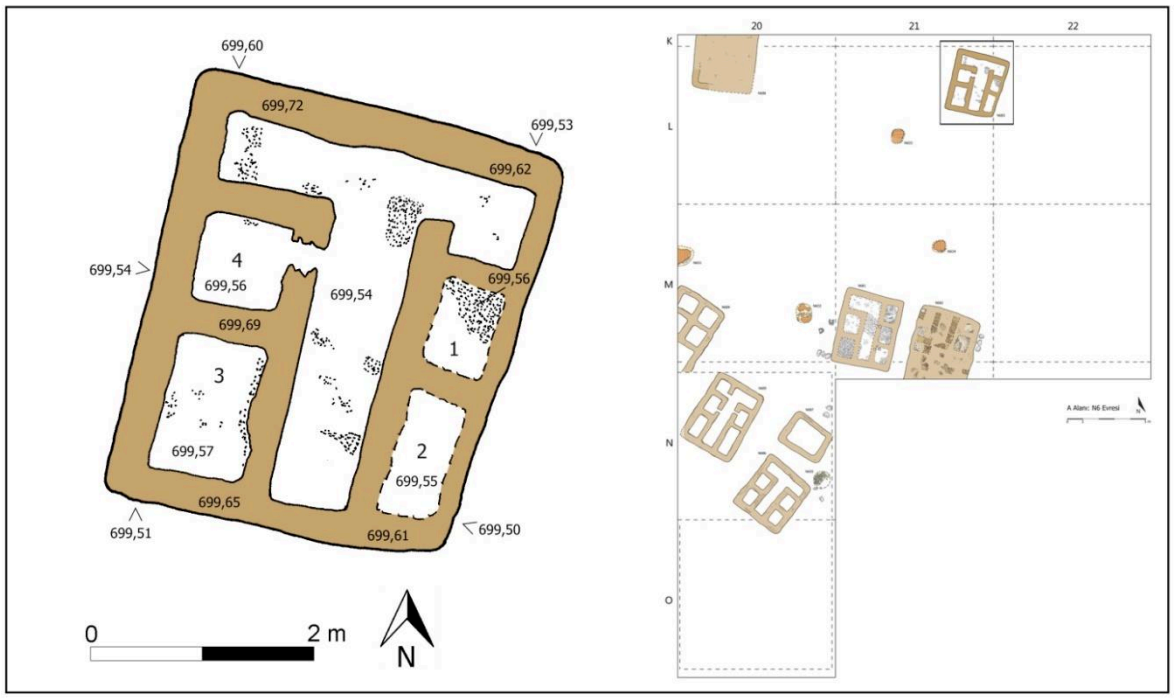


Figure 4.14: Location and plan of Structure N6B3

The structure is 314 cm wide in the east-west direction and 381 cm long in the north-south direction. Covering an area of nearly 13 m^2, the cells of this structure are smaller compared to those of the other Cell Buildings. (Figure 4.14) The cells are 119x77 cm to 76x54 cm in size. The thickness of the bearing and partition walls are different; the bearing walls are 30-37 cm thick, and the partition walls are 21-30 cm thick. Both the bearing and

the partition walls in the east section of the structure are narrower than those in the west section. The internal fill of walls is homogeneous black-dark brown loose earth.

The Cell Building has pairs of cells along the east and west wings with a T-shaped corridor in between having the dimensions of 320 cm long and 76 cm wide. The 'T' part of the corridor appears to be partially divided at its eastern end. Here might be a cell, as within the L-shaped corridor structures but data allowing determination of a cell plan were insufficient. (Figure 4.99 – 4.101)

The cells having different dimensions are generally small. Cell number 3, is more substantial than the others. None of the cells have doorways except for the cell number 4, however it is not clearly defined. There are no plaster floors in either cells or in the corridor. The internal fill of the cells is grey-buff colour with low lime content. Occasionally intense lime fragments are noteworthy within cells and the corridor. A 54 cm long lime line was clearly observed having the same thickness with the walls in the northeast part of the corridor, however, its function was not clarified. There are no graves found within the cells or under the floor levels.

4.4.2.1.4. Structure N6B4

This structure is located in Area A in southwest of trench 20M with its southern section outside the trench between the elevations of 700.03 to 700.50 meter. The Cell Building has no corridor in the centre; all cells are side by side. (Figure 4.15, 4.102, 4.103) The walls and the fill have been preserved to a height of 47 cm. Based on the clear traces observed in the trench section, both the limits of the walls and their construction technique was clearly identified. The partition walls are lower and partially destroyed. The bottom surfaces of the main walls slightly incline to the north, as in the structures N6B1 and N6B2.

It was constructed on the north slope of a natural terrace with a southwest-northeast orientation nearby the structures N6B1 and N6B2 in the same area (nearly 8 meters west), and following the slope of the natural surface without a stone foundation. A very steep slope was observed immediately south of the structure N6B4. Accordingly, it is understood that the steep slope with an undulating surface to the south was partially flattened during the construction of this structure. Based on the corner of the wall in its northwest section, the width of the structure is 346 cm in the east-west direction. As the southern section of the

structure remains outside the exposed area, the dimensions in the north-south direction could not be determined. The uncovered section is 546 cm long in the northeast-southwest direction. Covering an area of nearly 19 m^2, the cells of the structure have areas of nearly 1.1 m^2. There was no difference in the thickness of the bearing walls and partition walls; both are 27-46 cm thick. There was no plaster floor remains identified within cells. The internal fill of the cells is very similar to the outer areas with a light-grey colour stone-poor fill. There are no graves found within the cells or under the floor levels.

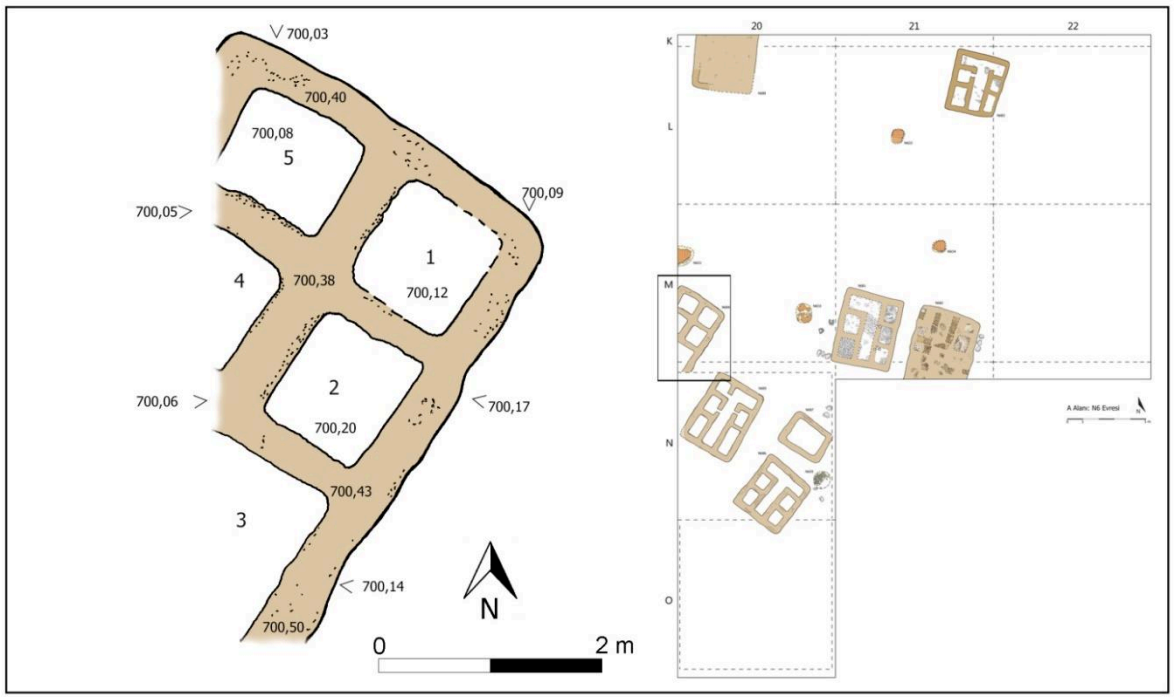


Figure 4.15: Location and plan of Structure N6B4

The Cell Building has four side-by-side cells, and in the southern section possibly has a larger cell (room?). There is no corridor identified. The cell dimensions are nearly the same, varies from 103x105 cm to 111x96 cm. None of the cells have door openings. This structure has small amounts of lime traces. Based on the wall section observed in the southern cross-section of trench 20M, the wall construction technique of this structure was somewhat different from the others. Although the structure N6B4 was constructed by the piled earth technique with a homogeneous dark-brown loose internal fill, light brown homogeneous levels were identified between the dark-brown earth layers instead of lime-rich lines. (4.104) Accordingly, soil used between the bedding of the walls of this structure was different in terms of colour and texture. This data indicate that woody plants were less used during ramming compared to those in the other structures.

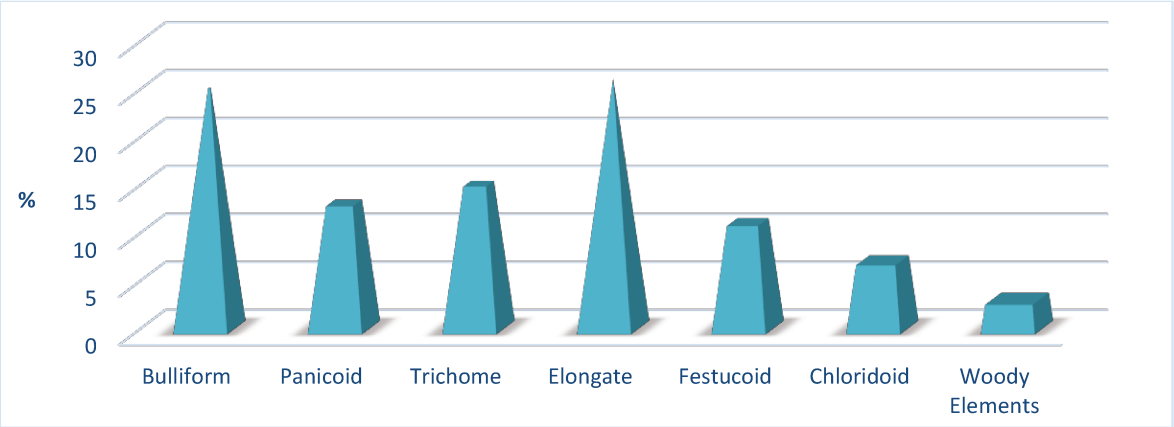


Diagram 4.12: Distribution of phytoliths in the lime samples taken from Structure N6B4

According to the phytolith analysis of the lime fragments, reed or herbaceous plant remains were identified. Multiform *Elongate* phytoliths were dominant. The phytoliths contained high frequencies of *Trichome, Bulliform, Panicoid*, and *Silicified Wwoody Forms*. The frequency of *Chloridoid* and Fustucoid forms are higher compare to those found in the other structures. (Diagram 4.12; Figure 4.325 - 4.330)

4.4.2.1.5. Structure N6B5

This structure is located in Area A, in northwest of trench 20N and south of trench 20M between the elevations of 700.45 to 700.63 meter. The structure was constructed with southwest-northeast orientation nearby other structures in the same area, and following the slope of the natural topography without a stone foundation. The structure sits on a mildly undulating surface in the upper section of a natural terrace immediately to south of the structures N6B1, N6B2, and N6B4. The walls have been preserved to a height of 12 cm.

The Cell Building is 352 cm wide in the east-west direction and 480 cm long in the north-south direction. Covering an area of nearly 17 m^2, except for one, the cells are smaller than 1 m^2. Though there was no significant difference in the thickness of the bearing and partition walls, the bearing walls are 32-43 cm thick and the partition walls are 21-34 cm thick. (Figure 4.16, 4.335) The Cell Building has three cells along the west wing and two cells on the east side with an east-oriented L-shaped corridor in between having the dimensions of 398 cm long and 72 cm wide.

The cells have different dimensions varying from 68x175 cm to 62x98 cm. Cells number 2 and 3 in the southern section of the structure are longer and larger in size compared to cells in the north. Though, there are no door openings in the relatively large cells, smaller cells have door openings. These doorways with a width of 20 cm are very narrow for a passage. There were no plaster floor remains within the cells or the corridor. The internal fill of the cells is grey-buff colour occasionally limey, and ashy with small amounts of lime fragments. (Figure 4.105 – 4.107) There were no graves found within the cells or under the lime surfaces.

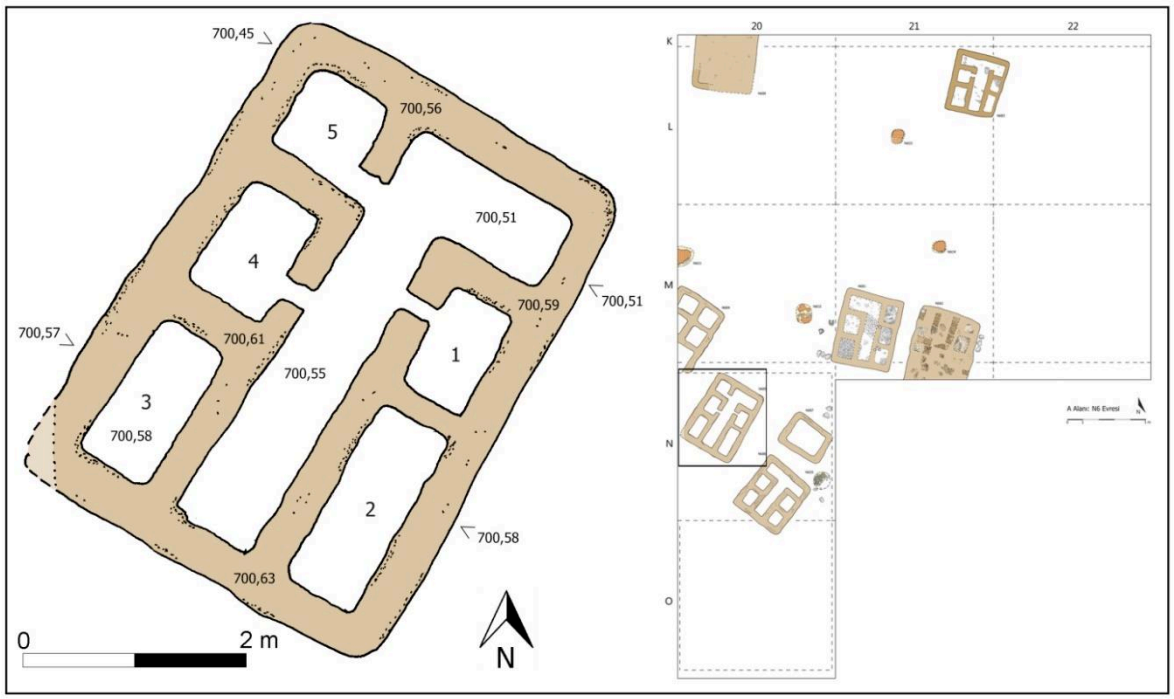


Figure 4.16: Location and plan of Structure N6B5

Occasional lime fragments appear to have bound the walls. Continuing as weak and uncertain lines, their thickness varies from 1 to 3 cm. The internal fill of bounded walls is homogeneous dark reddish-brown loose earth. Plaster traces were not encountered on the lime lines. Considering the architectural tradition of Sumaki Höyük and the construction technology, the walls of the structure N6B5 were constructed by the piled earth technique. The lime lines identified on the faces of the walls are the remains of woven reeds or herbaceous plant material used during ramming.

Phytolith analysis of lime samples identified reed and/or herbaceous plant remains. The natural structure of well-preserved phytoliths is clear. The elongate and *Festucoid* forms of phytolith were dominant. *Trichome*, *Bulliform*, *Panicoid*, *Chloridoid* and *Silicified Wood Forms* were also defined. (Diagram 4.13)

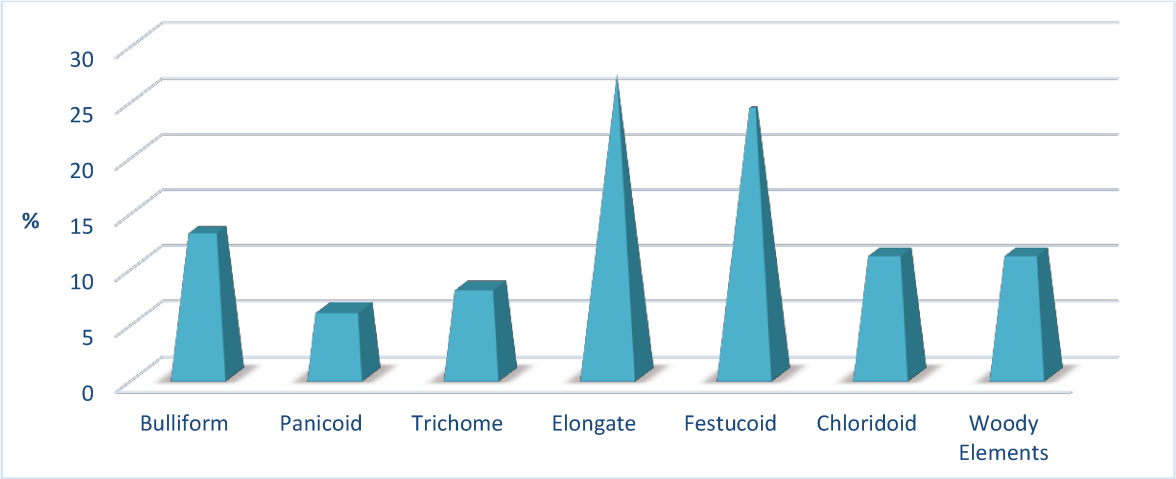


Diagram 4.13: Distribution of phytoliths in the lime samples taken from Structure N6B5

4.4.2.1.6. Structure N6B6

This structure is located in Area A, in southeast of trench 20N and north of trench 20/O between the elevations of 700.38 to 700.67 meter. The structure was constructed following the slope of the natural topography without a stone foundation. The bottom levels of the walls slope slightly to the south indicating a natural terrace surface incline somewhat to the south in this phase. The fill of Phase N6 and the traces in the trench sections also support this fact.

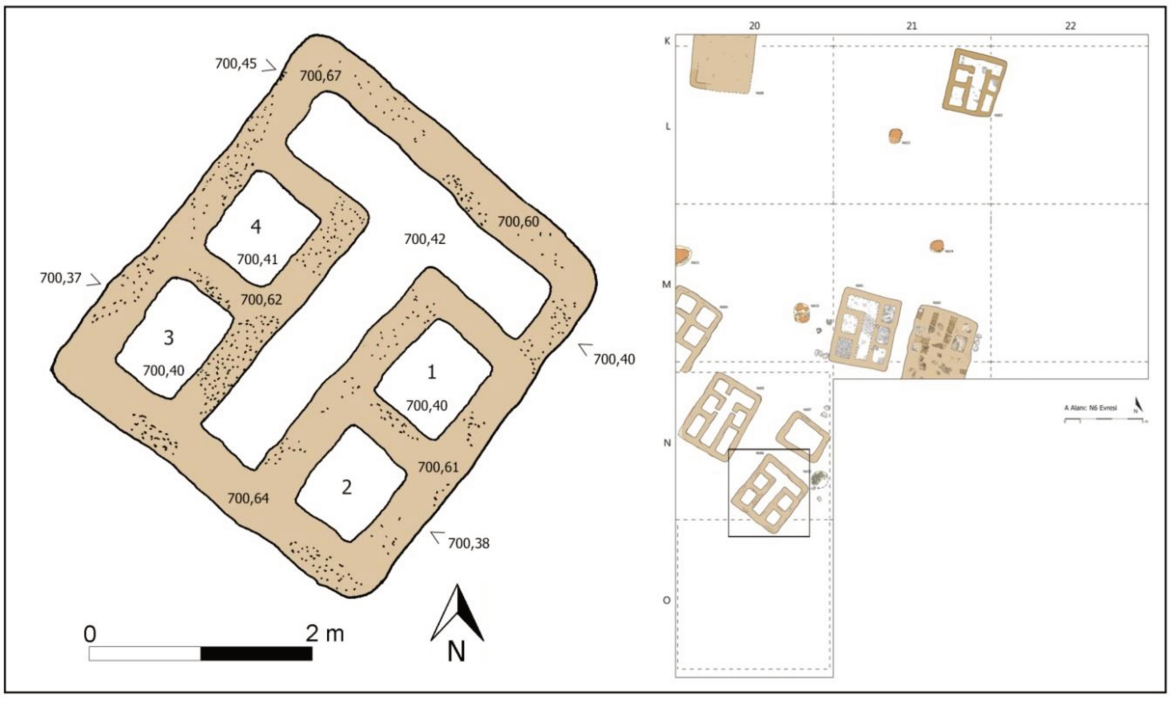


Figure 4.17: Location and plan of Structure N6B6

Similar to the other Cell Buildings exposed in Area A, this structure was constructed with southwest-northeast orientation. It has a width of 347 cm in the east-west direction and is 390 cm long in the north-south direction. Covering an area of nearly 14 m^2, the dimensions of cells are very close to each other, varies from 68x93 cm to 70x84 cm. None of the cells have doorways. (Figure 4.17) The walls have been preserved to a height of 29 cm. There is no very significant difference in the thickness of the bearing walls and partition walls, the bearing walls are 34-42 cm wide and the partition walls are 33-40 cm wide.

The Cell Building has pairs of cells on the east and the west wing with a T-shaped corridor in between having the dimensions of 307 cm long and 62 cm wide. (Figure 4.108, 4.109, 4.334) Although there is no any archaeological material found in the cells, in the northern section of the T-shaped corridor, a group of finds comprises of stone tools (predominantly hammer stones), an animal jaw and an obsidian flake (Figure 4.110) covering an area of nearly 1 m^2 was exposed between the elevations of 700.40 to 700.53. There were no pottery sherds among the finds. This level was defined the living surfaces of the corridor and the cells. The bottom level of the wall is at an elevation of 700.38 in this area. In this context, the walls of the structure were in the same level as its living surfaces, therefore it is understood that the walls have been constructed directly on the existing ground. There are no graves found within the cells or under the floor levels.

The internal fill of the structure is grey colour with low lime content. The homogeneous reddish-brown filling of the walls is very loose. Occasional lime fragments appear to have bound the walls. Continuing as weak and uncertain lines, their thickness varies from 1 to 2 cm. Within the walls, calcified surfaces are observed at nearly 4-7 cm intervals. These surfaces, which continue irregularly between the layers, did not have mortar characteristics. Considering the architectural tradition and construction technology of Sumaki Höyük, Structure N6B6 was constructed by the piled earth technique.

4.4.2.1.7. Structure N6B7

This structure is located in Area A, in east of trench 20N between the elevations of 700.40 to 700.66 meter. This rectangular structure was classified as a single-roomed structure. The structure was directly constructed on the natural surface following the slope of the natural topography without a stone foundation.

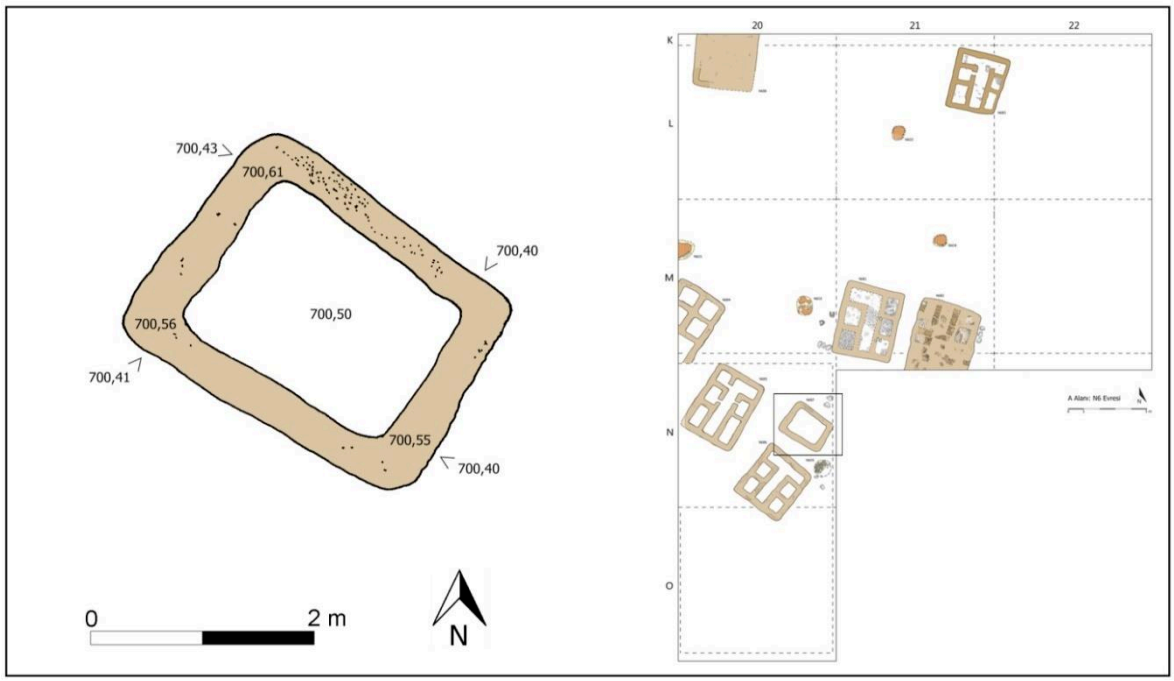


Figure 4.18: Location and plan of Structure N6B7

Per other structures in this area, this structure has a length of 290 cm in the northwest-southeast direction and is 223 cm wide in the southwest-northeast direction. (Figure 4.18, 4.343) Covering an area of nearly 6 m^2, the internal dimensions of the structure are minimum 208x153 cm. The walls are 31-40 cm thick and 26 cm high. As there is no any plaster floor remains or hardened floor surfaces or archaeological material detected within the room, the living surface of the structure could not be determined. There were no graves found within the room or under floor levels.

The internal fill of the structure is grey-buff occasionally limey. The large stone in the southeast corner of the structure is thought to have been used as a wall support or as a weight holding an upper light cover. (Figure 4.111, 4.112) A similar stabilization technique was also identified during ethno-archaeological field studies in the Lower Garzan Valley: a thread-like material tied to a stone to keep the light top cover is less affected by external factors such as wind, etc. Probably this stone had the same function. At 6-10 cm intervals in the wall section, calcified surfaces were also identified. These calcified surfaces, which continue irregularly between the layers, did not have mortar characteristics. The homogeneous reddish-brown filling of the walls is very loose. Considered with the architectural tradition and construction technology of Sumaki Höyük, the Structure N6B7 were constructed by the piled earth technique.

4.4.2.1.8. Structure N6B8

This structure is located in Area A, in northwest of trench 20L and southwest of trench 20K between the elevations of 700.76 to 700.84 meter. The limits of the structure were only determined by reddish-brown soil traces and unprecise wall remains in the southwest corner. (Figure 4.19, 4.113)

This structure with rectangular/square plan appears to have a single room but the partitioning in this badly-preserved structure could not precisely be determined. Therefore, it is classified as an ‘indeterminate planned building'. Its fill has been preserved to a height of 7-8 cm. In its southwest corner section, the only preserved wall has a height of 7 cm and is 32-35 cm wide. The structure was constructed following the slope of the natural topography with the north-south orientation without a stone foundation. The east-west dimension of the structure was 395 cm. Since its northern section remains outside the exposed area, the dimensions in the north-south direction could not be determined, the remaining portion has a length of 346 cm. The structure did not have any plaster floor remains or hardened floor surface or partition walls.

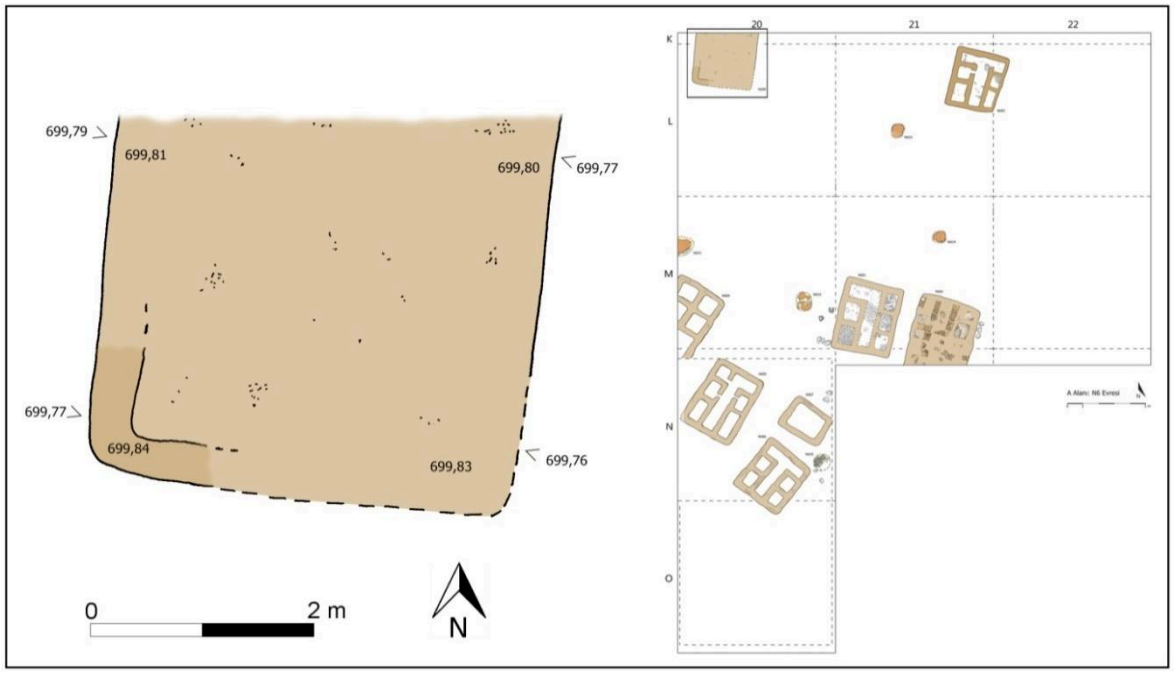


Figure 4.19: Location and plan of Structure N6B8

4.4.2.1.9. Structure N6B9

This structure is located in Area B, in southwest of trench 14F and northwest of trench 14G between the elevations of 701.15 to 701.44 meter. The structure was constructed on the undulating surface of a terrace with a very steep incline towards the east, following the slope of the natural topography without a stone foundation.

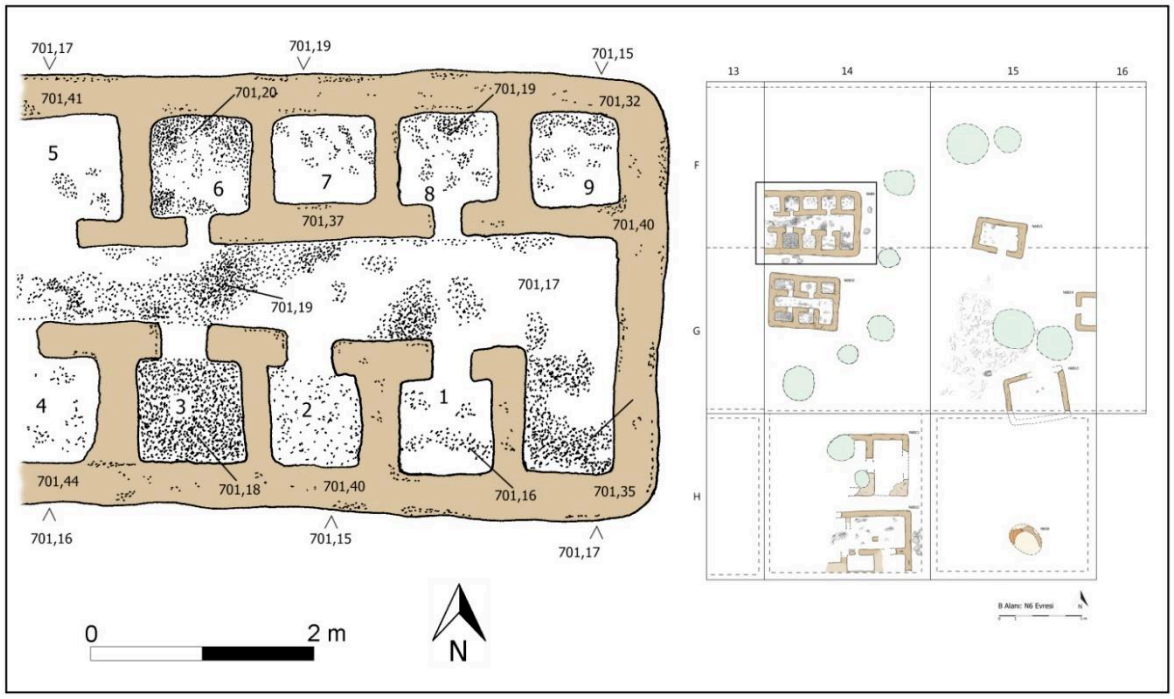


Figure 4.20: Location and plan of Structure N6B9

The structure has a width of 388 cm in the north-south direction. Since its west section remains outside the exposed area, the dimensions in the east-west direction could not be determined. (Figure 4.20, 4.114 – 4.116) Its exposed portion is 593 cm long. In the western part, the half-revealed cell is considered to be the last cell. The walls have been preserved to a height of 21 cm in the east, and 24 cm in the west. The thickness of the bearing and the partition walls are different; the bearing walls are 36-45 cm wide, and the partition walls are 26-35 cm wide.

The Cell Building has four cells along the south wing and five cells in the north side with an L-shaped corridor in between having the dimensions of 549 cm long and 75 cm wide. The square-planned cells have very close measurements, from 82x84 cm to 90x91 cm. Except for two cells, the others have door openings varies from 20 cm to 40 cm wide.

Lime surfaces intensify especially in the cells numbered 3, 4 and 8, and in the west section of the corridor. These lime surfaces without plaster traces represent the floor level of

the structure. (Figure 4.117 – 4.119) As mentioned above, these lime surfaces are directly related to the evaporation and calcification process of organic construction material. There were no any artefacts found within the fill or on the lime surfaces of the cells and the corridor. Therefore, the structure might have been cleaned before being left. The internal fill of the cells is very similar to the outer areas with a grey colour and low ash content but a lot of lime fragments. There are no graves found within the cells or under the floor levels.

Occasional lime fragments appear to have bound the walls. Continuing as weak and uncertain lines, their thickness varies from 1 to 3 cm. The internal fill of bounded walls is homogeneous reddish-brown loose earth. Within the walls, calcified surfaces are observed at nearly 5-9 cm intervals. These surfaces, which continue irregularly between the layers, did not have mortar characteristics. There was no plaster surface at the bottom or top of the reddish-brown bedding. SEM images of these lime samples clearly show organic remains. (Figure 4.294)

SEM images of lime samples clearly show rhombohedral-shaped calcium carbonate minerals surrounding tubes formed by organic remains. (Figure 4.294d) Analysis of minerals surrounding the tubes by the EDX method identified the elements O (58.44%), Ca (25.30%), C (15.28%), Si (0.64%), and Al (0.33%). (Diagram 4.14)

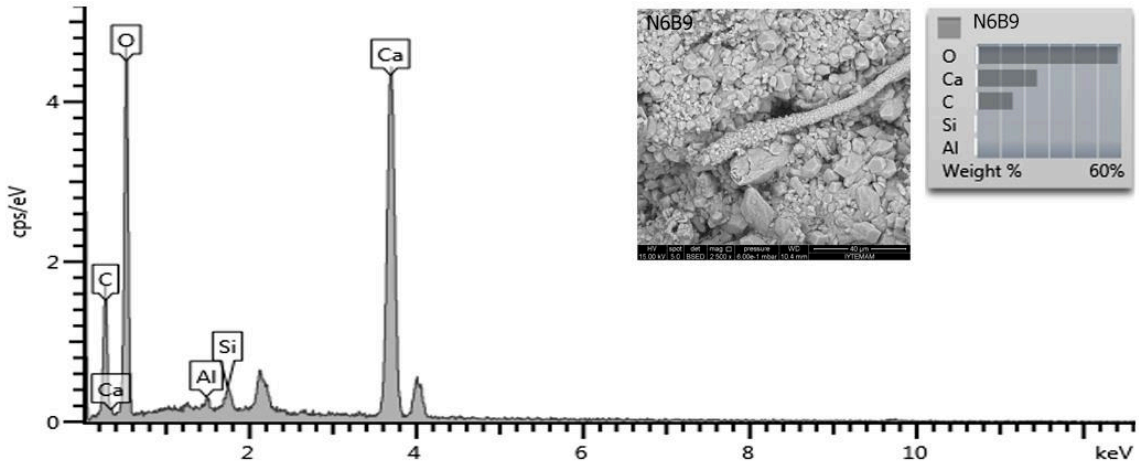


Diagram 4.14: EDX analysis of lime samples taken from Structure N6B9

Phytolith analysis of lime samples identified reeds or herbaceous plant remains. The phytoliths contained high frequencies of elongate, *Fuscoid*, and *Panicoid* phytoliths. *Trichome*, *Bulliform*, *Chloridoid*, and *Silicified Woody Forms* were also identified. The *Bulliform* and *Trichome* phytoliths have subtypes such as long, pointed and bulky *Trichomes.* (Diagram 4.15; Figure 4.325 - 4.330) Pollen analysis of the same samples

identified *Apocynaceae, Verbenaceae, Poaceae, Cesalpiniaceae, Liliaceae, Calenduleae, Asparagaceae,* and *Malvaceae* pollens. (Figure 4.331, 4.332)

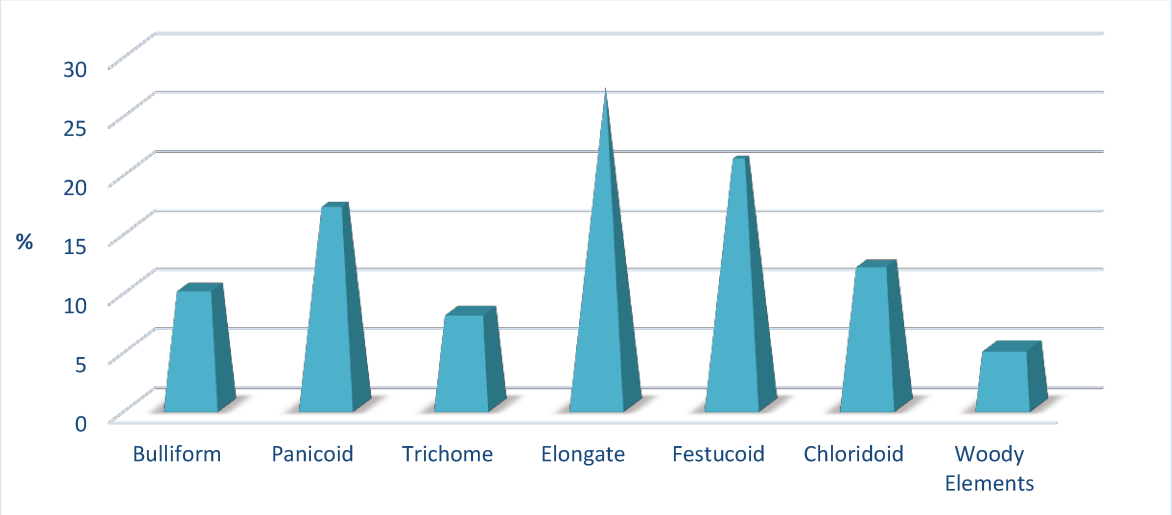


Diagram 4.15: Distribution of phytoliths in the lime samples taken from Structure N6B9

Accordingly, based on this data, the walls of the structure N6B9 were constructed by the piled earth technique. The lime lines partially identified on the faces of the walls are the remains of woven reeds or woody material used during ramming. Due to this wall technology, it is unlikely that the roof was earthen. Considering the intensity of lime fragments indicating organic material used in the wall construction, it may be stated that the structure was covered with a light material such as reeds or branches.

4.4.2.1.10. Structure N6B10

This structure is located in Area B, northwest of trench 14G between the elevations of 701.13 to 701.48 meter. The structure is on a steep terrace sloping towards east. The structure was constructed following the natural topography of the slope with a slight incline toward the northeast without a stone foundation. There is a nearly 20 cm difference between the southwest and northeast edge of the natural surface. Accordingly, in Phase N6, the terrace surface, at least in the section where the structure N6B10 was built, had an incline towards northeast. This inclination is also observed in the trench sections. The occurrence of this slope is directly related to the 10-15 cm-thick fill comprises pottery and ground stone tools of Phase N7 under the Structure N6B10. Accordingly, it appears that the structure N6B10 has been constructed at the northern limits of the Phase N7 settlement.

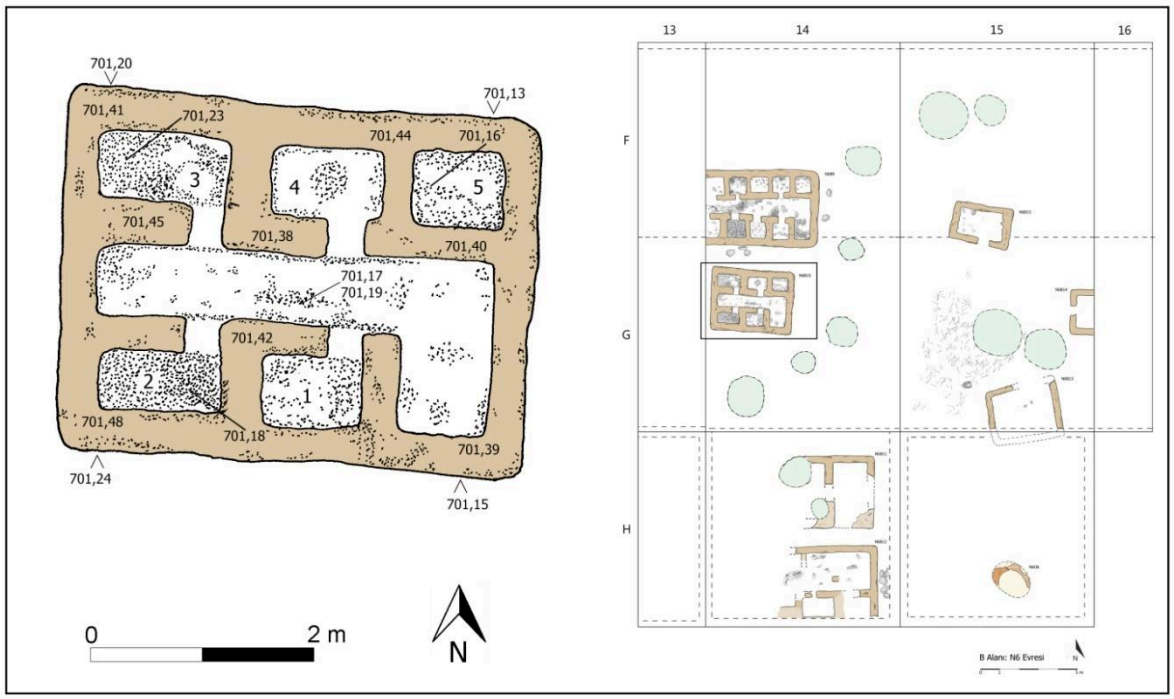


Figure 4.21: Location and plan of Structure N6B10

Covering an area of nearly 13 m^2 the structure is 431 cm long in the east-west direction and is 312 cm wide in the north-south direction. The walls have been preserved to a height of 31 cm in the east and 35 cm in the west. The bearing walls and partition walls have nearly the same thickness, namely, bearing walls are 30-39 cm thick, and partition walls are 27-36 cm thick. (Figure 4.21)

The Cell building has two cells along the south wing and three cells on the north side with an L-shaped corridor in between having the dimensions of 363 cm long and 59 cm wide. (Figure 4.120 – 4.122) The rectangular cells have the dimensions of 54x110 cm and 64x85 cm with mean sizes of 0.60 m^2. Except one, doorways were identified in the other cells with a width of 27-32 cm. There were no graves found within the cells or under the floor levels.

Lime surfaces were observed within the cells and the corridor. These lime surfaces without plaster traces were notably very intense in the corridor, in the cells number 2 and 3, and on faces of the walls. (Figure 4.124) As mentioned above, these lime surfaces are directly related to the evaporation and calcification process of organic construction material.

Occasional lime fragments appear to have bound the walls. Continuing as weak and uncertain lines, their thickness varies from 1 to 4 cm. (Figure 4.125) The internal fill of these bounded walls is homogeneous reddish-brown loose earth. In the wall sections, calcified

surfaces are clearly observed between the bedding at 4-8 cm intervals. (Figure 4.123) These surfaces, which continue irregularly between the layers, did not have mortar characteristics. Besides, there were no regular surfaces at the bottom or top of the reddish-brown bedding. SEM images of lime samples taken from within the walls clearly showed organic remains. (Figure 4.295)

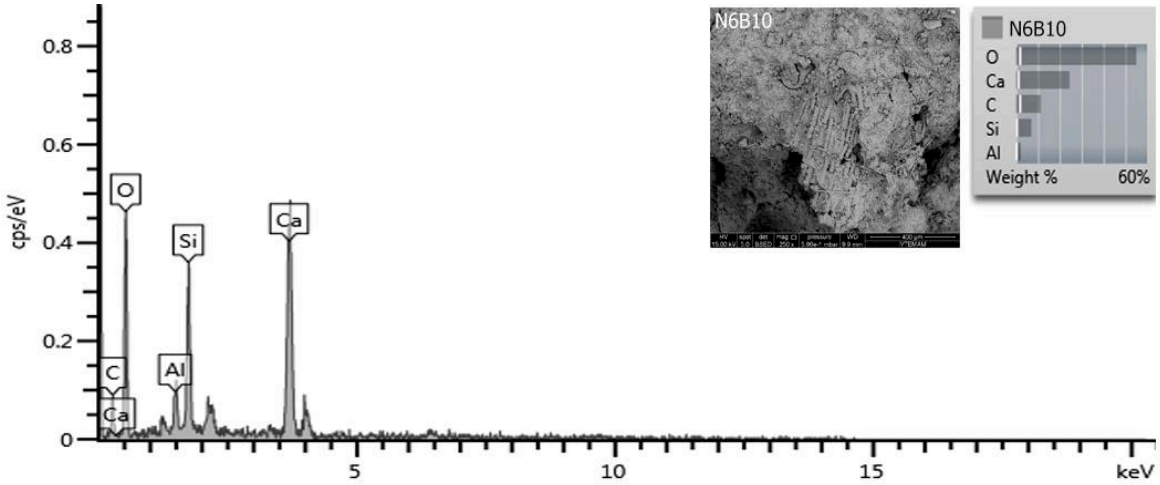


Diagram 4.16: EDX analysis of lime samples taken from Structure N6B10

EDX analysis of the lime samples taken from within the walls observed the following the elements O (55.05%), Ca (24.50%), C (11.29%), Si (7.03%), and Al (2.13%). (Diagram 4.16) Analysis of minerals surrounding the tubes by the EDX method the crystals found mean element ratios of O (47.06%), Ca (25.46%), C (12.87%), Si (6.57%), Al (1.15%), and Fe (6.90%). (Diagram 4.17)

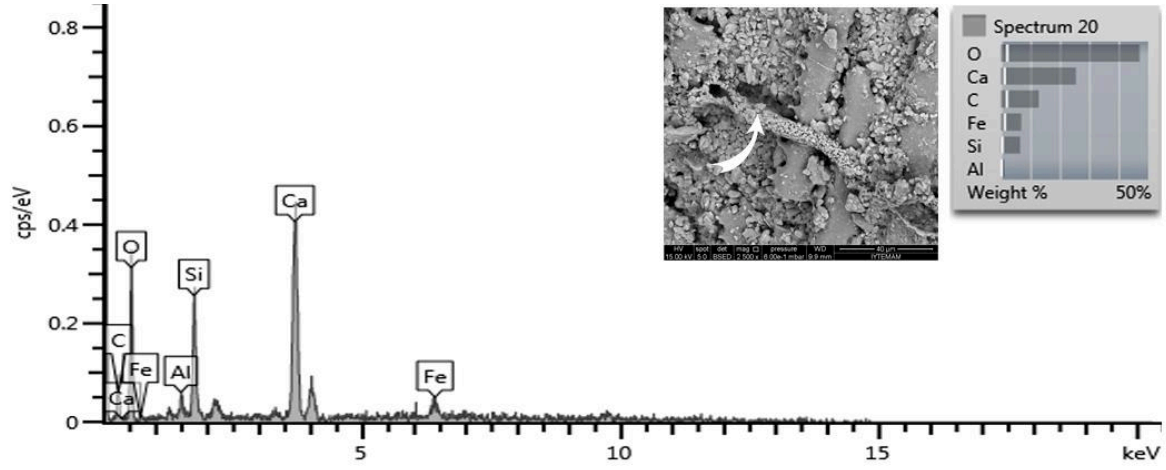


Diagram 4.17: EDX analysis results of tubes found in lime samples from Structure N6B10

SiO_2 gels filling the organic cavities are observed on SEM images of the same lime samples. The clearest is silicon dioxide gel (SiO_2) filling a *Panicum* plant remnant. Detailed

analysis of these areas with EDX method identified the elements O (41.42%), Ca (5.29%), C (12.38%), and Si (40.91%). (Diagram 4.18)

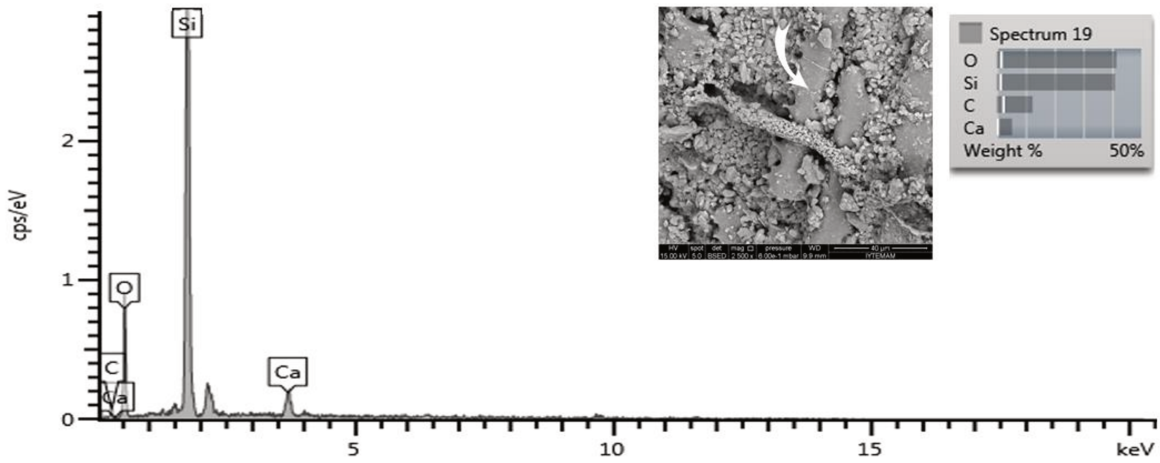


Diagram 4.18: EDX analysis of plant remains found in the lime samples taken from Structure N6B10

Investigation of same samples with the XRD method identified just calcite, silica, quartz minerals. Apart from calcium carbonate, other chemical composition comprises silicon dioxide compounds. (Diagram 4.103)

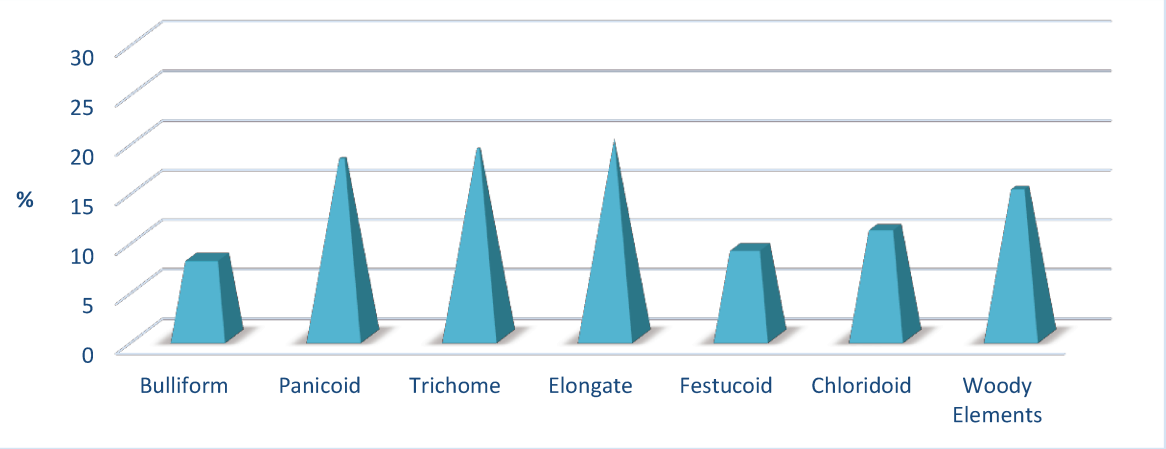


Diagram 4.19: Distribution of phytoliths in the lime samples taken from Structure N6B10

According to phytolith analysis the lime samples contains reeds or herbaceous plant remains. The phytoliths contained high frequencies of *Trichome*, *Panicoid*, *Elongate* and *Silicified Woody Forms*. *Bulliform*, *chloridoid*, and *fustucoid* forms were also present. (Diagram 4.19; Figure 4.325 - 4.330) Pollen analysis of the same samples identified *Poaceae* and *Calenduleae* pollens dominantly, together with A*pocynaceae, Verbenaceae, Cesalpiniaceae, Liliaceae, Asparagaceae,* and *Malvaceae* pollens. (Figure 4.331, 4.332)

Considering the architectural tradition and construction technology of Sumaki Höyük, walls of the structure N6B10 were constructed by the piled earth technique. The

lime lines partially identified on the faces of the walls are the remains of woven reeds or woody material used during ramming. Due to this wall technology, it is unlikely that the roof was earthen. However, considering the density of lime fragments indicating organic material, it may be stated that the structure was covered with a light material such as reeds or branches.

4.4.2.1.11. Structure N6B11

This structure is located in Area B, northeast of trench 14H between the elevations of 701.86 to 701.95 meter. Its western half, which remains under the Structure N5B15 of Phase N5, has been disturbed. (Figure 4.22, 4.126) The eastern portion of the structure has also been disturbed by the ash pits and the hearth N5O8 of Phase N5. Accordingly, the plan of the structure was partially determined by the remains of some walls and wall corners. The preserved walls have a height of 7-9 cm. The structure was constructed following the slope of the natural topography without a stone foundation. There was no Phase N7 fill defined under the structure or in its close surroundings.

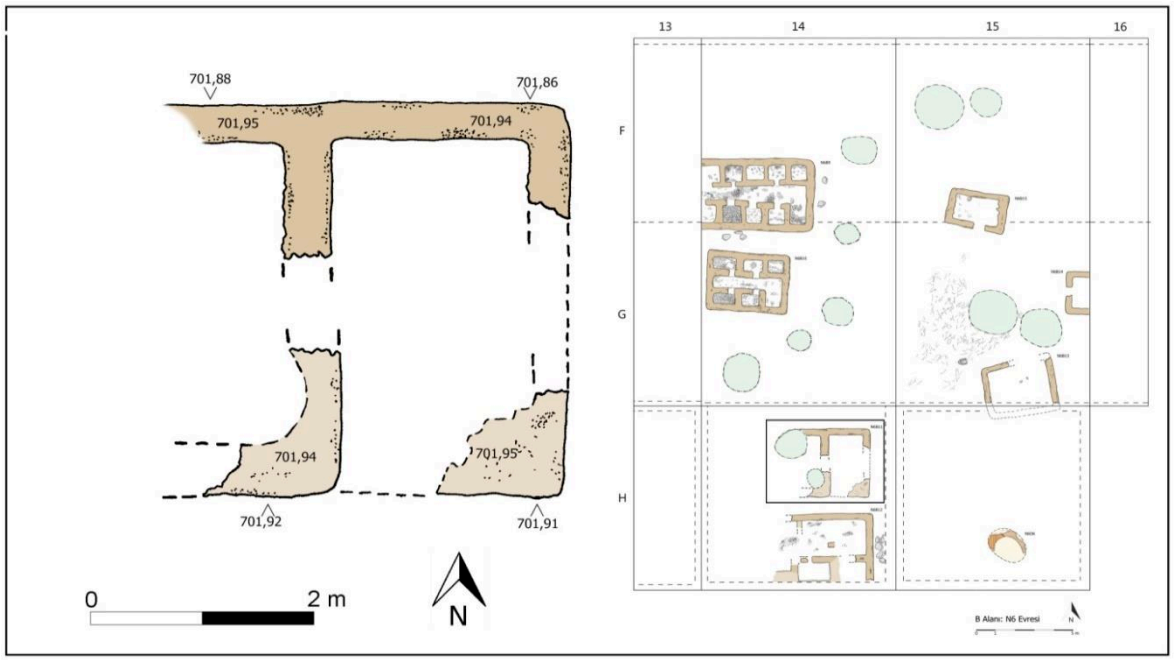


Figure 4.22: Location and plan of Structure N6B11

The structure has an east-west orientation following the other cell buildings in Area B. The structure is 368 cm wide in the north-south direction. As its western part has been destroyed, the length in the east-west direction could not precisely be measured; the preserved section is 375 cm long. The walls with clear edges are 33-42 cm wide.

Though none of the cells clearly identified, it appears that the cells are larger than 1 m². The partially preserved cell number 4 is 175 cm long and has a width of more than 107 cm. The limits of other three cells were not clearly identified. It is unknown whether a corridor existed. Therefore, T-shaped or L-shaped corridor classification for this building is insufficient. There were no plaster floor remains or hardened floor surfaces identified. Considering the architectural tradition of structures with similar plans and construction technology of Sumaki Höyük, this structure was constructed by the piled earth technique.

4.4.2.1.12. Structure N6B12

This structure is located in Area B, in the northeast section of trench 14H between the elevations of 701.84 to 702.10 meter. Since its west and northwest sections remain under the Structure N5B8, the structure was not well-preserved. (Figure 4.23, 4.127, 4.128)

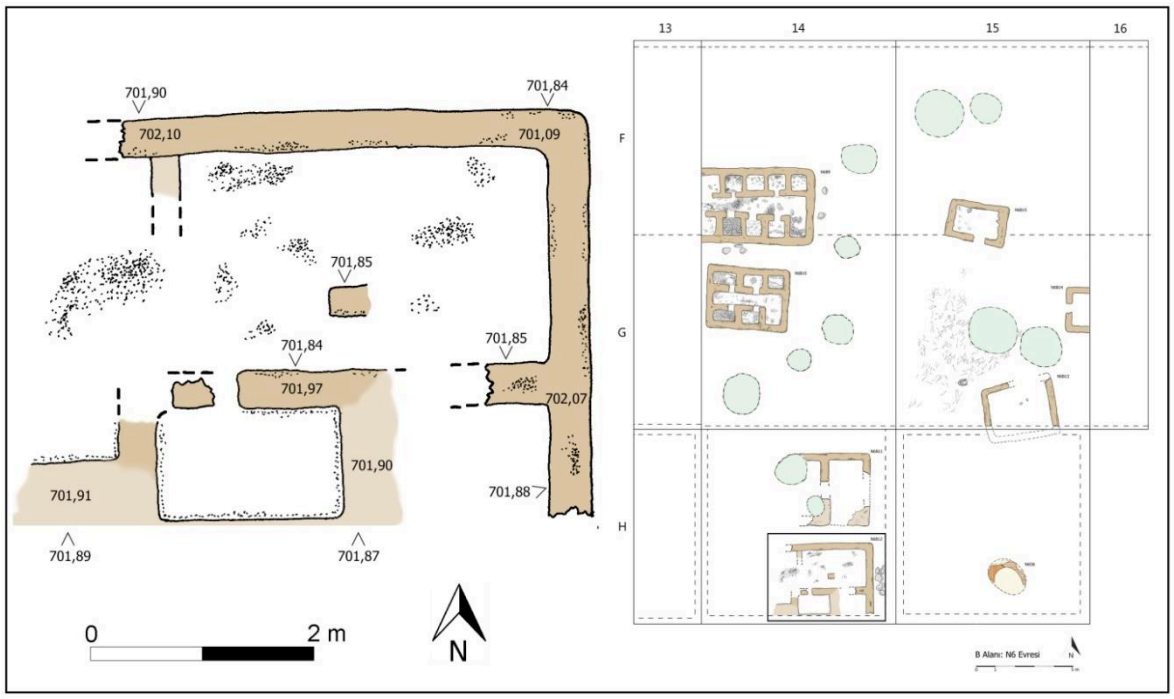


Figure 4.23: Location and plan of Structure N6B12

Based on the partially preserved walls, wall corners and general layout the structure is classified as a Cell Building. The thickness of its remaining portion under the structure N5B8 is 4-5 cm. The walls and cell traces in this area are the only remains of the structure. In the east section, the identified walls forming its eastern boundary have a height of 16 cm. The walls sit on a natural terrace with an undulating surface, similar to the Structure N6B11.

The structure was constructed following the slope of the natural topography without a stone foundation. There was no fill of Phase N7 identified under or in its close surroundings.

The structure has an east-west orientation following the other Cell Buildings in Area B. The structure is 372 cm wide in the north-south direction. Since, its west section partially remains under the Structure N5B8, the length in the east-west direction could not be determined. The exposed portion is 524 cm long. The identified walls have a width of 34-37 cm, however the south bearing walls and the walls of cell number 2 are thicker.

Except for one, the limits of the cells could not be determined. However, based on the clearly identified Cell number 2 with the dimensions of 169 cm long and 94 cm wide, the cells appear to be larger than 1 m². There are no traces of plaster floor. Although the corridor plan has not entirely been identified, it has at least two wings. Cell traces are more apparent in the south section of the structure. Lime lines are occasionally observed both on the wall faces of the bearing and the partition walls of the cells. Occasional lime fragments appear to have bound the walls of cell number 2. Continuing as weak and uncertain lines, their thickness varies from 1 to 2 cm. The internal fill of walls is homogeneous dark reddish-brown loose earth. Considering the wall construction technology of Sumaki Höyük, this structure was constructed by the piled earth technique.

4.4.2.1.13. Structure N6B13

This structure is located in Area B, in the south profile edge of trench 15G and partly under the trench cross-section between the elevations of 700.55 to 700.93 meter. The northeast portion of the structure has been badly disturbed by a deep Middle Age pit while its eastern part remains under the Structure N4B8. Additionally, the east wall of the structure N5B13 and the partition wall in the central section of the structure N4B8 are overlapping. This fact is clearly observed in the south part of trench 15G. Based on the walls and general layout, the structure classified as a single-roomed structure. (Figure 4.24, 4.129)

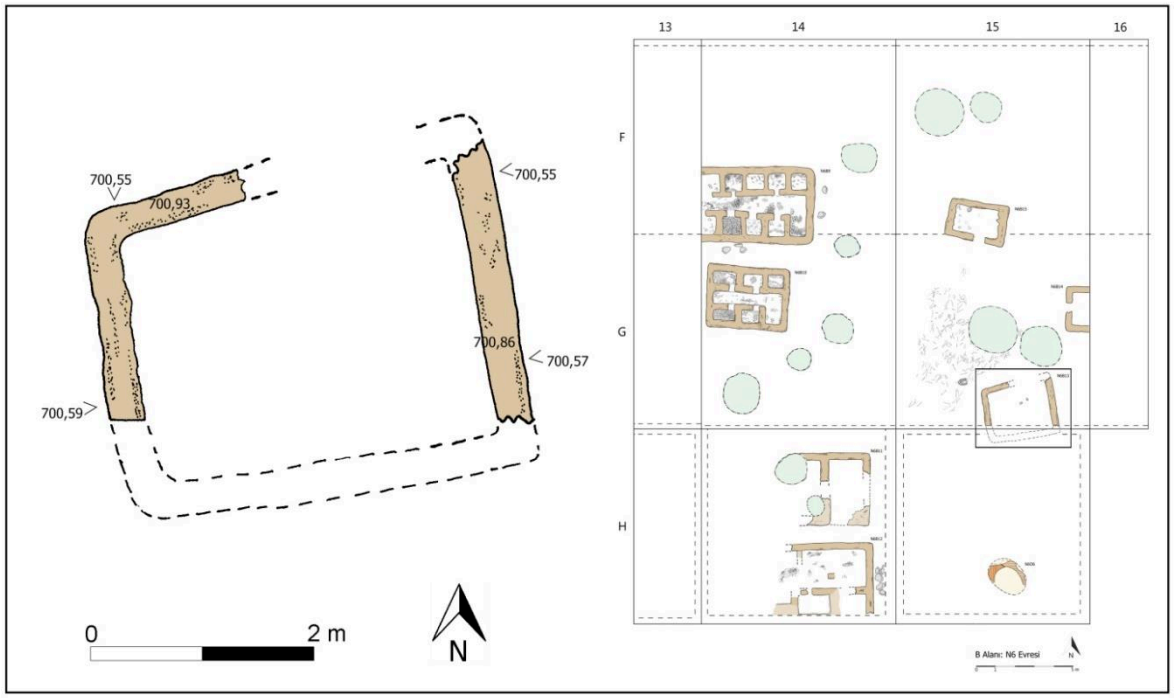


Figure 4.24: Location and plan of Structure N6B13

The walls sit on a surface sloping slightly to the east. The traces in the cross-section of trench 15G clearly shows the occurrence of this slope. The rectangular structure was 374 cm long in the east-west direction and was 286 cm wide in the north-south direction. Covering an area of nearly 11 m^2 . The walls with clear edges are 28-34 cm in width. There are no plaster floor remains identified within the structure.

Occasional lime fragments appear to have bound the walls. Continuing as weak and uncertain lines, their thickness varies from 1 to 3 cm. The internal fill of the bounded walls is homogeneous reddish-brown loose earth. Within the walls, calcified surfaces are observed at nearly 6-8 cm intervals. These surfaces, which continue irregularly between the layers, did not have mortar characteristics. There were also no flat surfaces at the bottom or top of the reddish-brown bedding. (Figure 4.130) SEM images of lime samples taken from within the walls clearly showed organic remains.

SEM investigation of lime samples observed occasional scalenohedral-shaped calcium carbonate minerals. Acicular crystal formations were also identified. Analysis of these lime samples by EDX identified the following elements with their mean values; O (33.83%), Ca (14.06%), C (8.59%), Si (24.13%), Fe (8.57%), and Al (6.16%). Na, Mg, and K were identified with proportions from 2% to 0.13%. (Diagram 4.20)

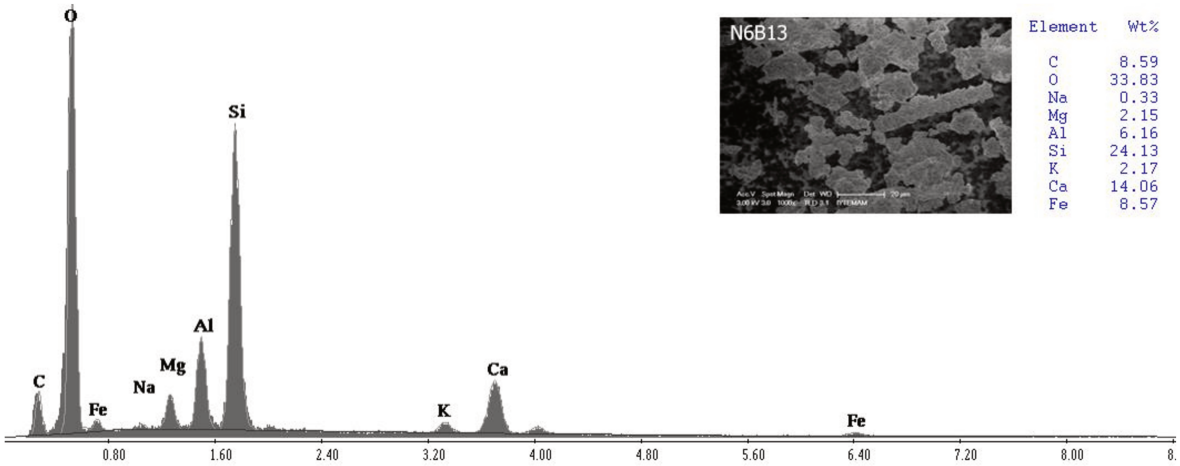


Diagram 4.20: EDX analysis of soil samples taken from Structure N6B13

According to phytolith analysis, the lime samples contain reeds or woody plant remains. Multiform *Panicoid* phytoliths were dominant with high frequencies of elongate, *Fuscoid* and *Panicoid* elements. *Trichome, Bulliform, Chloridoid* and *Silicified Woody Forms* were also found. The *Bulliform* and *Trichome* phytoliths have subtypes such as long, pointed and bulky *Trichomes*. (Diagram 4.21; Figure 4.325 - 4.330) Soil samples that were taken from immediately east outside of the structure encountered small amounts of plant remains. Examination by flotation identified *Triticum* or *Hordeum*, *Lens culinaris*, and *Triticum turgidum* spp. (Table 3.2)

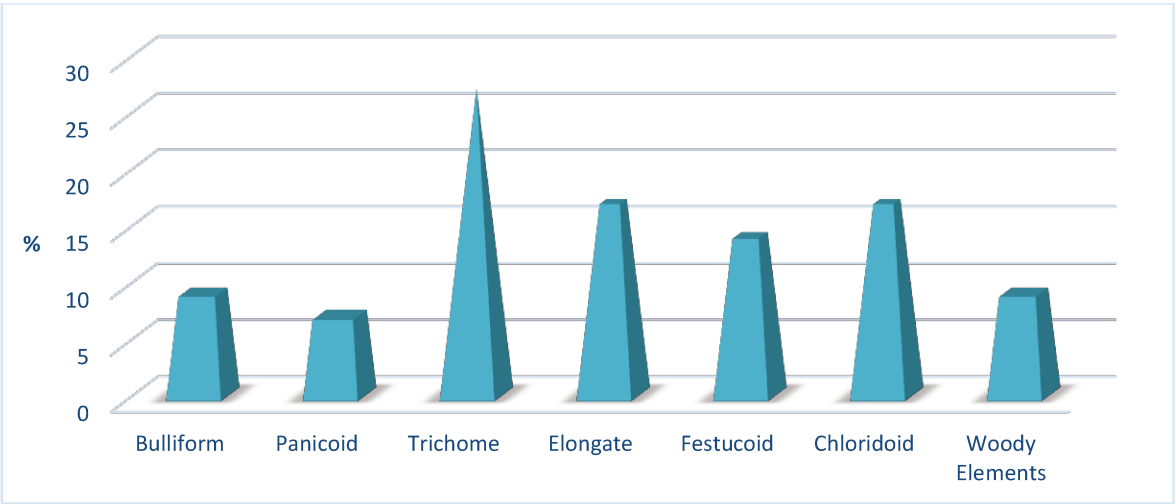


Diagram 4.21: Distribution of phytoliths in the lime samples taken from Structure N6B13

Considering all these data, the walls of structure N6B13 were constructed by the piled earth technique. The lime lines partly identified on the faces of the walls are the remains of woven reeds or woody material used during ramming. Due to this wall technology, it is unlikely that the roof was earthen. However, considering the density of lime fragments

indicating organic material, it may be stated that the structure was covered with a light material such as reeds or branches.

4.4.2.1.14. Structure N6B14

This structure is located in Area B, in the east profile edge of trench 15G and partly under the baulk between the elevations of 700.39 to 700.50 meter. Based on the wall remains and general layout, this structure is similar to a single-roomed structure. (Figure 4.25) However, the exposed portion may be the west section of a double-roomed structure similar to the structure N5B4. Therefore, this structure is classified as an 'indeterminate planned structure'.

The rectangle structure is 229 cm wide in the north-south direction, and a section measuring 124 cm was revealed in the east-west direction. The walls are 25-31 cm wide. Its narrow west wall with a nearly 45 cm-wide doorways is at the same level with the living surface of the structure. There are no traces of plaster floor. Its earth walls are very similar to other structures with a homogeneous reddish-brown very loose filling. Considering the wall construction technology of Sumaki Höyük, the walls were constructed by the piled earth technique.

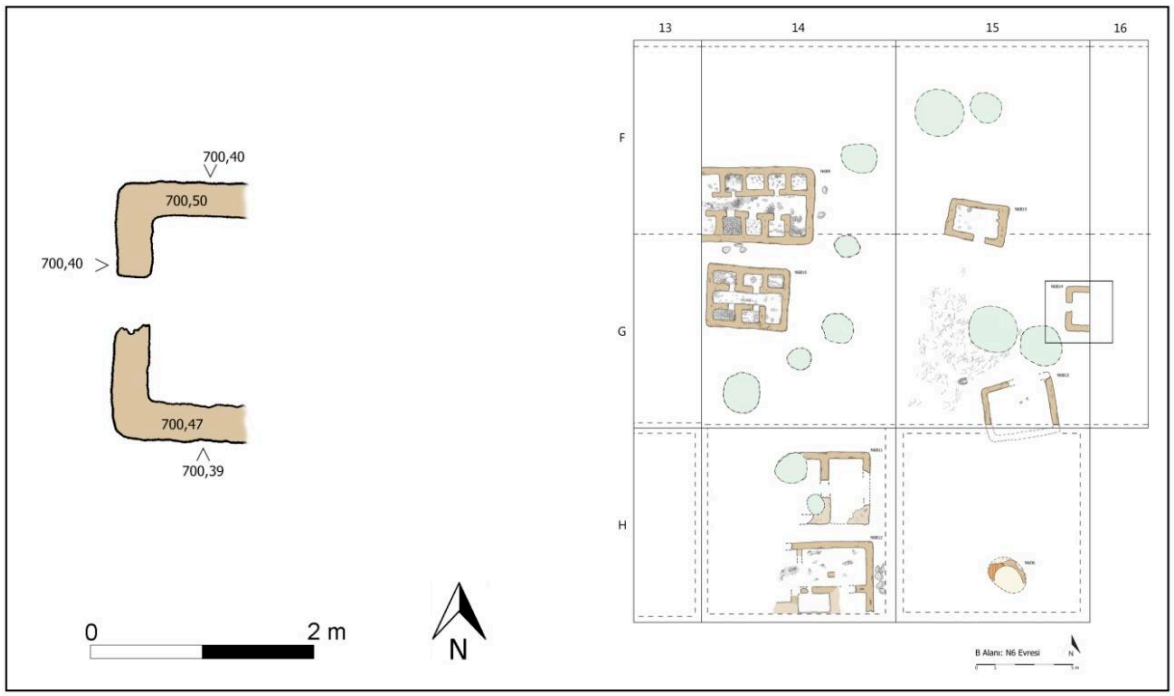


Figure 4.25: Location and plan of Structure N6B14

4.4.2.1.15. Structure N6B15

This structure is located in Area B, in the north part of trench 15G and south of trench 15F between the elevations of 700.40 to 700.54 meter.

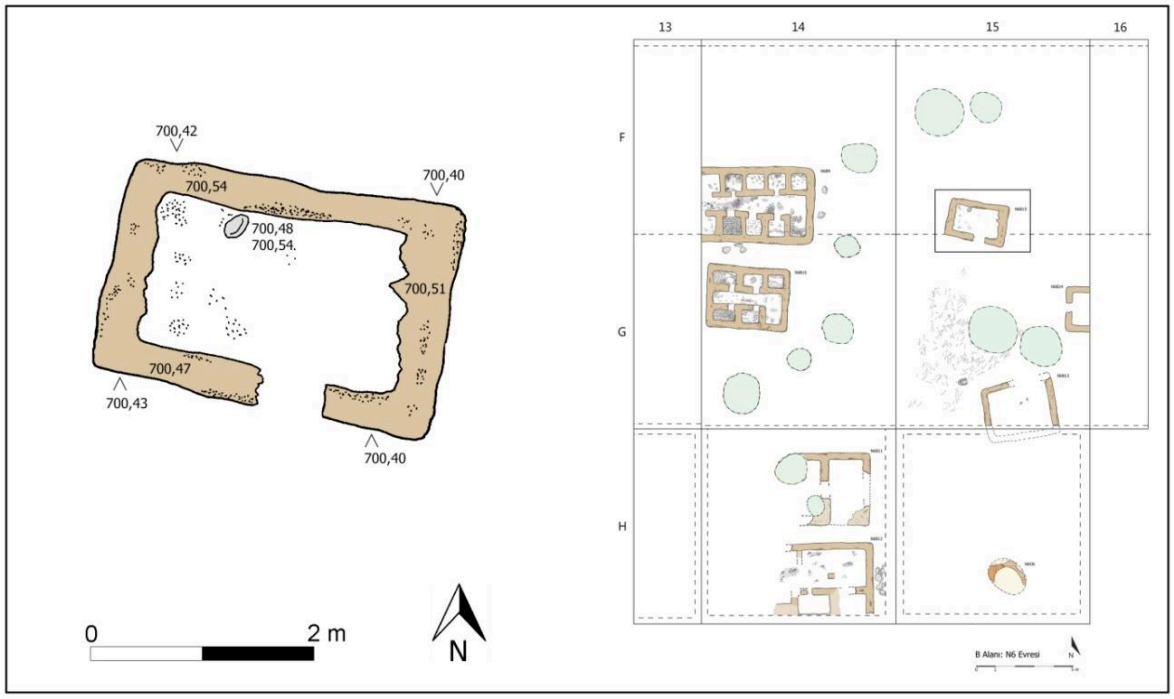


Figure 4.26: Location and plan of Structure N6B15

The structure is classified as a Single-roomed structure. (Figure 4.26, 4.131) The northwest-southeast-oriented structure has a length of 312 cm in the east-west direction and is 198 cm wide in the north-south direction. (Figure 4.344) Covering an area of nearly 6 m^2, the interior size of room is 234x131 cm (3 m^2). The walls are 24-31 cm wide and the south wall and external area linked with a nearly 56 cm-wide doorway is at the same level.

In the examination of earth samples taken from the south part of the structure and from the doorway by flotation minimal amounts of plant remains, only *Triticum* or *Hordeum*, and *Fabaceae,* were identified. Phytolith analysis of lime samples identified reeds and/or herbaceous plant remains. *Trichome* and elongate forms are dominant. *Festucoid*, *Bulliform*, *Panicoid, Chloridoid* and *Silicified Woody Forms* were also identified. The frequency of *Trichome* phytoliths are higher compared to other morphotypes. (Diagram 4.22)

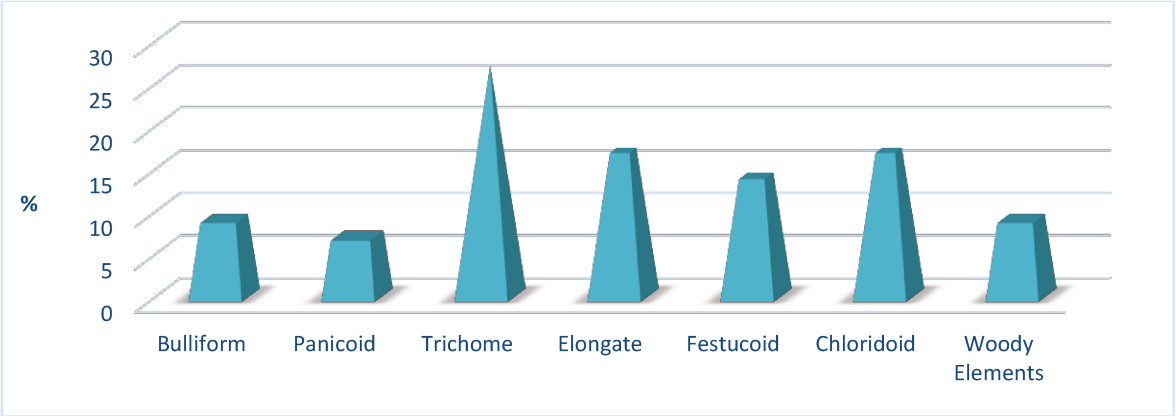


Diagram 4.22: Distribution of phytoliths in the lime samples taken from Structure N6B15

4.4.2.2. Hearths

In Phase N6, six hearths were identified with five in Area A and one in Area B. (Table 4.5)

4.4.2.2.1. Hearth N6O1

This was located in an open space in the eastern part of trench 20M in Area A, approximately a meter north of the Cell Building N6B4 on the reddish-brown natural soil. Its western part was not exposed. (Figure 4.210) It had a single bluish dark grey-coloured plastered floor with a stone pavement. The hearth slightly inclined to the northeast. The oval/rounded-shaped hearth has a width of 1.26 m in the north-south direction. However, since its western part remains in the unexcavated area, the dimensions of east-west direction could not be determined; its exposed portion was 1.02 m. The pavement was made of basalt and pebbles of different sizes between 4x5x8 - 6x8x17 cm. Between the stone pavement and the plastered floor was a layer of greyish buff-coloured filling in 3-4 cm thickness. The surface of the plastered floor, which was 1.5 cm in thickness, was slightly cracked.

4.4.2.2.2. Hearth N6O2

This was located in an open space in the southeastern part of trench 20M, 185 cm west of the Cell Building N6B1 in Area A on the bluish-grey, and locally reddish-brown natural soil. It covers an area of approximately 1 m^2 between the elevations of 699.85 to 699.97. It had a single light buff-coloured plastered floor with a stone pavement. The hearth

slightly inclined to the south. The oval-shaped hearth was 120 cm in the north-south direction and 99 cm in the east-west direction. The pavement was made of basalt and pebbles of different sizes between 2x4x7 - 5x9x15 cm. (Figure 4.211, 4.212) Between the stone pavement and the plastered floor was a layer of yellowish grey buff-coloured stone-tempered 4 cm-thick filling. The partly-preserved plastered floor was 2 cm in thickness. The surface of the very hard plastered floor was slightly cracked and smooth. To the east of the hearth, two broken ground stones were found *insitu*.

4.4.2.2.3. Hearth N6O3

This was found in an open space in the southeastern part of trench 21L in Area A on the bluish-grey and locally reddish-brown natural soil. It covers an area of approximately 1 m^2 between the elevations of 699.46 to 699.55. It had a single dark grey-coloured plastered floor with a stone pavement. (Figure 4.213, 4.214) The hearth slightly inclined to the north. The oval-shaped hearth was 91 cm in the north-south direction and 84 cm in the east-west direction. The stone pavement was made of basalt and pebbles of different sizes between 3x5x7 - 4x8x11 cm. Between the stone pavement and the plastered floor was a layer of light grey-coloured sandy filling about 2 cm in thickness. Its southern part was disturbed. The surface of the medium hard floor was cracked.

4.4.2.2.4. Hearth N6O4

This was located in an open area in the northeastern part of trench 21M in Area A on the bluish-grey natural earth. This hearth was the lowest of the four superimposed hearths. It covers an area of approximately 1 m^2 between the elevations of 699.65 to 699.75. It had a single dark grey-coloured 2 cm-thick plastered floor with a stone pavement. The hearth inclined to the west. The dimensions of the oval-shaped hearth were 84 cm in the north-south direction and 77 cm in the east-west direction. Its eastern part was disturbed. The pavement was made of basalt and pebbles of different sizes between 4x5x8 - 6x8x17 cm. Between the stone pavement and the plastered floor was a layer of sand- and tiny pebble-tempered yellowish grey-coloured 3 cm-thick filling. The surface of the hard floor was densely cracked.

4.4.2.2.5. Stone Pavement / Hearth N6O5

This was located in an open space in the southeastern part of trench 20N in Area A. The hearth/stone pavement covers an area of approximately 1 m^2 between the elevations of 700.48 to 700.56. Its southeast half was destroyed. The dimensions of the oval/rounded-shaped feature were 109 cm in the northeast-southwest direction and 86 cm in the northwest-southeast direction. The main reason for defining this feature as the hearth since it had a similar type of stone pavement of the hearth bases. (Figure 4.215) It is likely that the plastered floor was left unfinished. The pavement was made of basalt and pebbles of different sizes between 3x6x8 - 5x9x13 cm.

4.4.2.2.6. Hearth N6O6

This was located in an open space in the southern part of trench 15H in Area B. Hearth N6O6 is underneath the hearth N5O10, and since they could not be removed during the 2014 season, only its northwest and the east-southeast portions were exposed. Based on these data, the hearth was between the elevations of 700.10 to 700.18. The dimensions of the oval-shaped hearth were 209 cm in a northwest-southeast direction and 155 cm in a southwest-northeast direction. The single plastered floor was directly constructed on the yellowish grey-coloured ashy soil without a stone pavement. Its dark grey-coloured plastered floor was 2 cm in thickness with lime traces. The hearth slightly inclined to the east.

4.4.3. Phase N5 Architecture

Phase N5 settlement lies directly above the Phase N6 settlement. According to C_{14} this phase is dated to 8526±60 - 8491±50 CalBP. (Table 3.3) Intensely used in Phase N6 and with an organized settlement strategy, the settlement pattern in Area A changed in Phase N5. This area was not much occupied while the settlement pattern in Area B continued with a very similar pattern. Structures in Area B were built on terraces following the topography of the period and were more densely and closely situated than Phase N6. In Phase N5, even the Cell Building tradition continued, and buildings with different plans - multi-roomed structures and two-roomed structures - appeared. Single-roomed structures were still in use. (Table 4.7) Accordingly, it seems there was no regularity in the plan type of Phase N5.

Seventeen structures were uncovered with thirteen in Area B, two in Area A, and two in Area C. (Figure 3.61, 3.62, 3.71)

In three of the Cell Buildings, the cells are arranged around a corridor. As the other cell building is very badly disturbed or destroyed, it is unknown whether a corridor existed. The "T-shaped" or "L-shaped" corridor classification defined in the previous phase cannot be mentioned for this phase. Accordingly, in Phase N5 the tradition of Cell Buildings continues with some variations both in plans and construction techniques. Furthermore, as observed in Structure N5B6, a room was added to the long axis of the cell building. Multi-roomed structures began to be used for the first time. Each of them has a different plan. The common feature of the multi-roomed structures is that they have more than two rooms with different dimensions and layouts. It is necessary to state that some apparent changes occurred in the wall construction technique for structures of Phase N5. Kerpiç blocks were determined in Structures N5B8, N5B11, N5B12, and N5B13 in Area B. Kerpiç blocks having substandard sizes were used together with the piled earth wall technique. They were of a variety of lengths, even within the same structure. Some of these blocks have mortar traces, especially between the kerpiç blocks at the southeast corner of structure N5B12.

The structural data of this phase in areas A and C are limited. In Area A, the remains of two structures and five hearths, with three very close together, were identified. Additionally, there were scattered large stones in the fill that could not be associated with any structure. Structure N5B2 with a partly clear plan in Area A is a single-roomed structure. However, as the outline of the rectangular Structure N5B1 could not be clarified, the data obtained indicate that this structure is also a single-roomed structure. Structural remains in Area C have been destroyed. Though walls and corner turns could be partly determined, the plans could not be clarified. There were no hearth or fire pits within or around the structures or open areas in Area C. All the fire pits were in Area B.

Some of the floors in the Cell Buildings are covered with dense lime without any traces of plaster on their surfaces. SEM analysis of these lime samples identified great amounts of organic material. This surface is highly likely to be the remains of dense woody plants forming the floor of the upper storey, which fell into the cells and formed a layer of lime due to sudden climate variations and evaporation. According to phytolith and pollen analysis of the lime samples, reeds or herbaceous plant remains were identified. High frequencies of *Trichome, Bulliform, Panicoid* and silicified woody forms were observed and

elongate, Chloridoid, and *Fustucoid* forms were found as well. (Figure 4.325 - 4.330) *Apocynaceae, Verbenaceae, Cesalpiniaceae, Liliaceae, Calenduleae, Asparagaceae, Malvaceae*, and *Poaceae* pollens were also identified. (Figure 4.331, 4.332)

In this phase, ten hearths were exposed with five in Area A and five in Area B. (Table 4.5) There are generally stone pavements beneath their plastered floors although some examples were identified directly on the ground. Apart from one of them, all had a single floor. The thickness of the plastered floor varies between 1-3 cm. Areas/lines formed of debris-like lime fragments were identified above and around hearths N5O1, N5O4, N5O5, N5O6, and N5O7. Fire pits, which were not used in Phase N6, reappeared. Five fire pits were located in Area B. Three of them are very close to each other in trench 15H and two were constructed on top of each other. Investigations with sieving and flotation found plant remains such as *Triticum turgidum, Fabaceae, Lens culinaris, Linum, Medicago, Chrozophora tinctoria,* and *Lathyrus/Vicia*, led by *Triticum/Hordeum*, in the internal fill of these fire pits. (Table 3.2) Soil samples from above and around the floors of the hearths identified similar plants. Apart from these, grinding stones, which we identified to have abundant secondary use in Phase N1 at Sumaki Höyük, were obtained *in situ* from this phase, especially in the west front room of Structure N5B6. (Figure 4.147) Another important detail from this phase is that the pottery usage identified in Phase N7 and abandoned in Phase N6 reoccurs.

The fill of Phase N5 is grey-coloured and contains carbon fragments and ash in areas A, B, and C. Additionally, in the southeast corner of trench 14H, northwest of trench 20M and southwest of trench 20L, dark-grey fill with dense carbon fragments is observed while in different areas, (Figure 3.56, 3.57) heterogeneous fill with mixed sequences of stones, pottery sherds, bones and obsidian tool fragments were identified. This heterogeneous fill was concentrated mainly in the east-northeast section of trench 15F and southeast of trench 15G in the open area between the structures N5B11 and N5B12, occasionally scattered between structures in trenches 14G and 14F, and in trenches 18G, 20G and 22M. This stony heterogeneous fill is directly related to the torrents that occurred by the end of Phase N5, which is also supported by trench sections and geomorphological observations. In the southern parts of trenches 22M and 20/O where Phase N5 is not represented, and in areas with weaker human influence, different types and thicknesses of accumulation formed. There are ash fills represented by broken brown lines, especially in sections of trenches 14H

and 20L. The texture of these brown lines is very similar to the type of earth used in the architecture, so it is suggested that they are associated with construction activities.

4.4.3.1. Structures

In Phase N5, four Cell Buildings, four multi-roomed structures, one two-roomed structure and five single-roomed structures were uncovered. The plan of three structures could not be clarified. Two of the structures are in Area A, thirteen are in Area B, and two are located in Area C. (Table 4.2 - 4.4, 4.7)

4.4.3.1.1. Structure N5B1

Structure N5B1 is located in Area A in the northwest section of trench 21M between the elevations of 699.74 – 699.92 meter. Structure N5B1 was constructed on grey, occasionally intensely ash-rich fill. Although the southern part of the structure was revealed, data allowing determination of its plan were insufficient in the exposed area.

The wall corners of its southern section were identified. Measurements based on these boundaries found that this disturbed structure was 502 cm long in an east-west direction. In the north-south direction, a portion 145 cm long was partly preserved. (Figure 4.27) Lime lines with 4-7 cm thickness and 7-10 cm height were identified in its southern section. (Figure 4.132 – 4.134) According to mineralogical examination, and there were dense plant remains within this lime. Compact lime surfaces were also defined within the structure. In 2-3 cm-thick lime covering nearly the whole interior of the structure, there is no trace of plaster. Within, below and above this lime surface, there are fist-sized stones without plaster traces. SEM images of lime samples clearly show calcified plant remains. According to phytolith analysis of the same lime samples, only abundant reed/woody plant remains were identified. As a result, it is understood that this surface represents the calcified remains of a surrounding architectural element made of woody plants which fell into the structure. Ethno-archaeological studies in the Lower Garzan Basin also identified samples of reed surroundings which had fallen into structures.

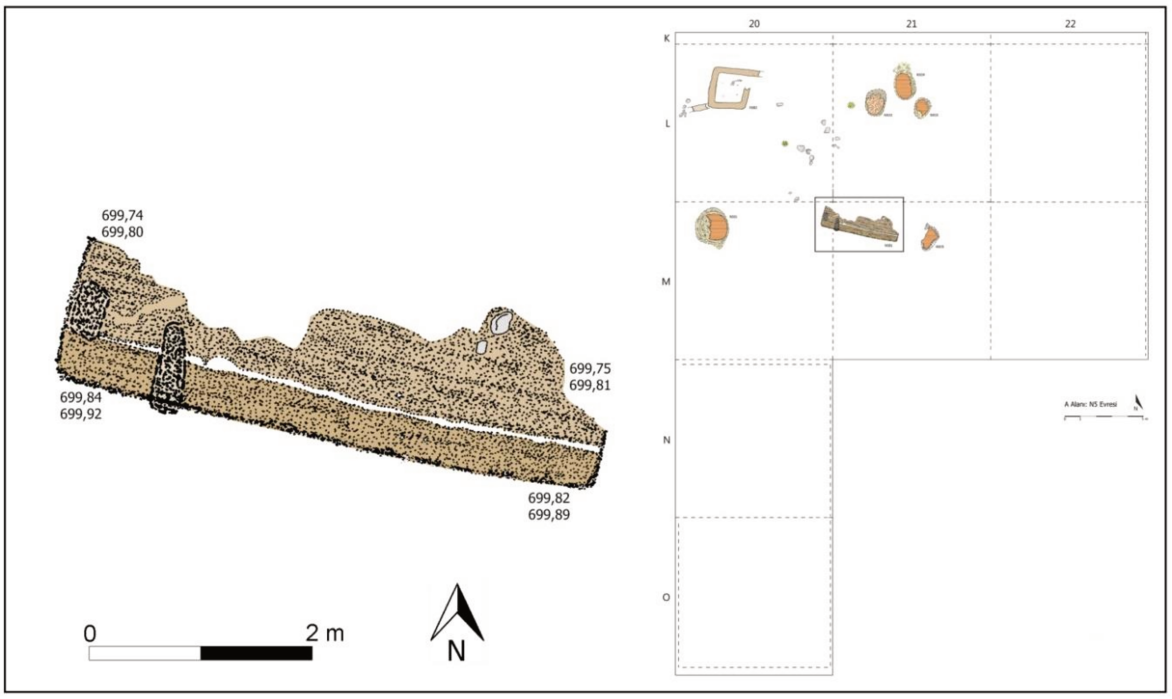


Figure 4.27: Location and plan of Structure N5B1

These types of construction usually have tents as the upper covering. The general appearance of Structure N5B1 is very similar to these modern examples. In the eastern part of the structure there are two lime blocks 26-28 cm in width, possibly used as a partition wall. Reddish-brown earth was identified under one of the blocks while the other one sat on grey, ash-rich fill similar to the fill under the structure. The edges of the two duripans cut into the lime surface mentioned above. (Figure 4.134) Phytolith analysis of lime samples observed *Bulliform, Trichome* and *Festucoid* forms with high frequency. Different forms of *Bulliform* and *Trichome* phytoliths were identified. *Panicoid*, *Chloridoid* and silicified woody forms were also defined. (Diagram 4.23)

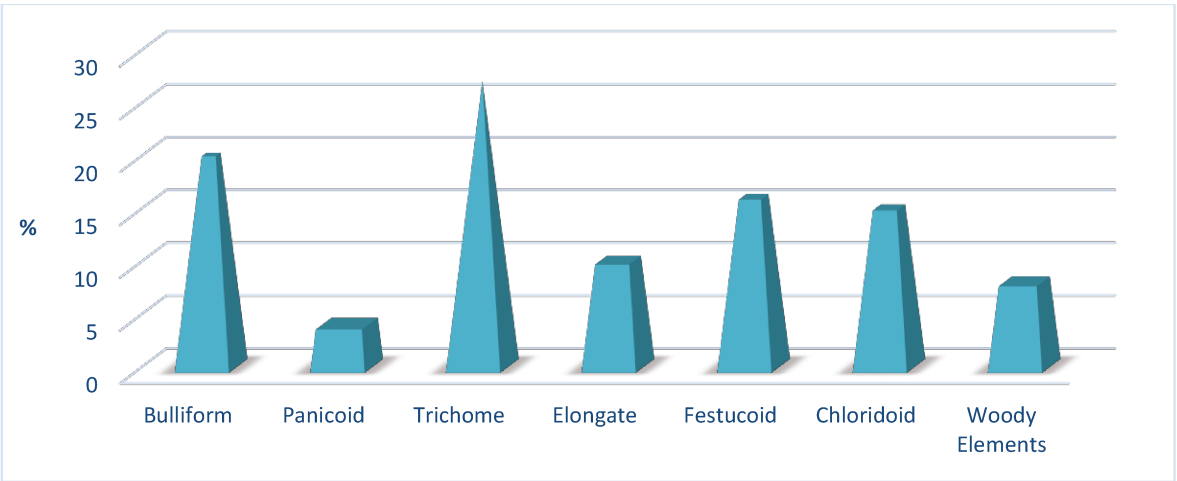


Diagram 4.23: Distribution of phytoliths in the lime samples taken from Structure N5B1

XRD analysis of earth samples taken from the structural fill identified silica, quartz, covellite and nitratine minerals apart from calcite. Their chemical composition is calcium carbonate, silicon dioxide, chalcopyrite and sodium nitrate compounds, indicating the presence of aridity. (Diagram 4.104)

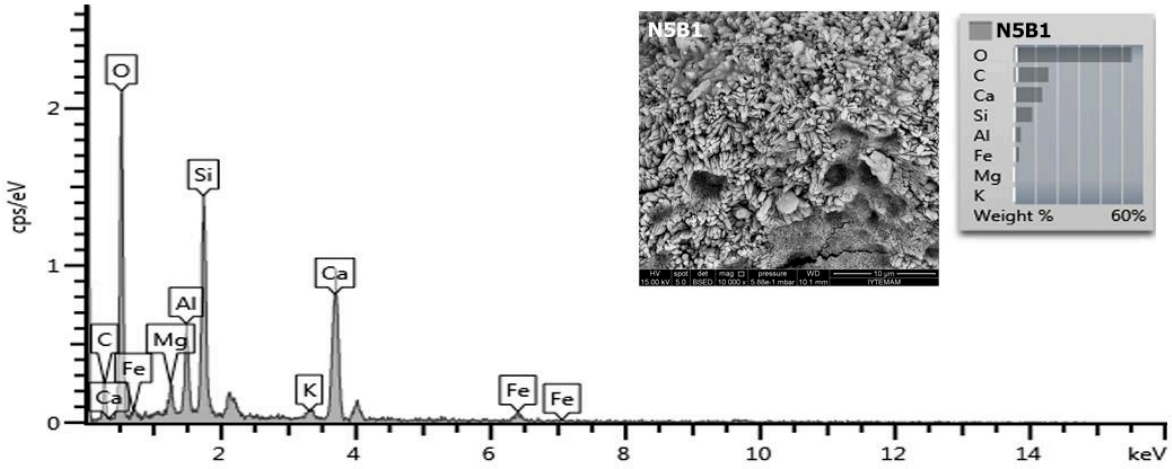


Diagram 4.24: EDX analysis of lime samples taken from Structure N5B1

SEM images of lime samples observed scalenohedral-shaped calcium carbonate minerals. (Figure 4.296c) Investigation of the same samples with EDX analysis identified the elements O (54.55%), Ca (13.17%), C (16.06%), Si (8.60%), and Fe (2.53%). Mg, Al, and K were also identified at rates from 3% to 0.37%. (Diagram 4.24)

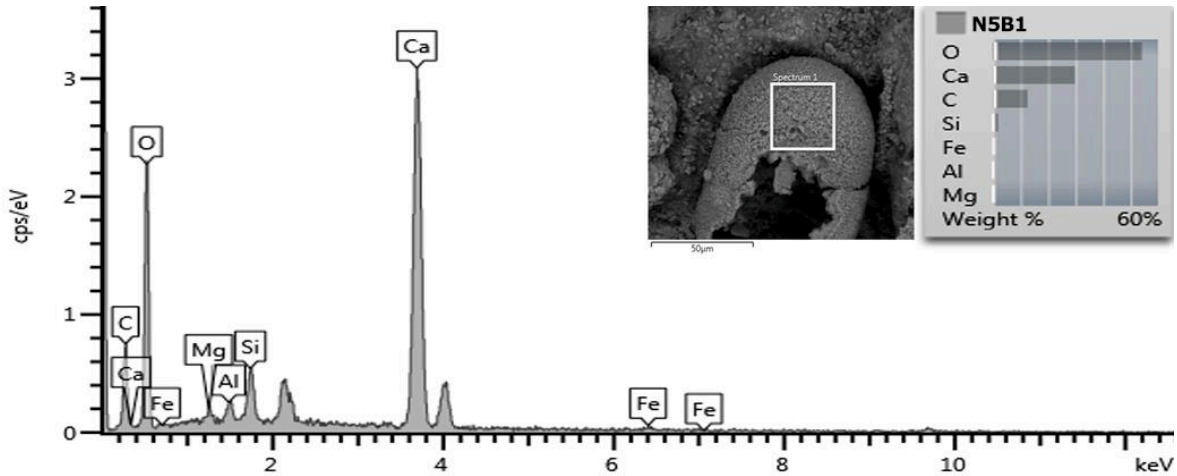
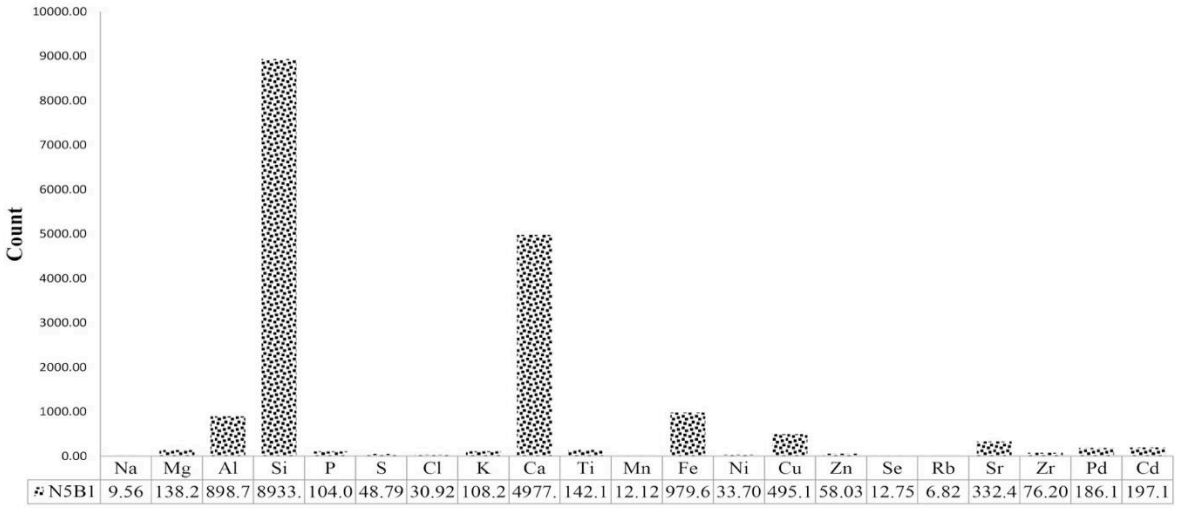


Diagram 4.25: EDX analysis results of insect chitin found in lime samples taken from Structure N5B1

Investigation of insect chitin determined on SEM images identified the elements O (54.01%), Ca (29.68%), C (12.49%), Si (1.79%), Fe (0.89%), Mg (0.44%), and Al (0.70%). (Diagram 4.25; Figure 4.296d)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N5B1	9.56	138.2	898.7	8933.	104.0	48.79	30.92	108.2	4977.	142.1	12.12	979.6	33.70	495.1	58.03	12.75	6.82	332.4	76.20	186.1	197.1

Diagram 4.26: XRF analysis of the lime samples taken from Structure N5B1

Analysis of lime samples using the XRF method observed that Ca (28%), Si (50%), Fe (6%), and Al (5%) elements were dominant with very small amounts of Ni, Zn, Sr, Rb, Na, K, S, P, Pd, Cl, Cu, and Ze. (Diagram 4.26) Additionally, in 7741 ± 50 years BP when the structure N5B1 was being used, its stable isotope composition was $\delta^{18}O$ = -6.72‰ and $\delta^{13}C$ = -7.54‰ V-PDB. (Diagram 3.11) When assessed together with the other Sumaki Höyük isotopes, it can be concluded that this period had a warmer and drier climate compared to previous and later periods.

4.4.3.1.2. Structure N5B2

This is located in Area A in the northwest section of trench 20L between the elevations of 699.83 to 699.92 meter on a light-grey filling with layered appearance and low ash content. Based on the wall remains and general layout, the structure is classified as a single-roomed structure.

This rectilinear structure is 304 cm long in the east-west direction and 243 cm wide in the north-south direction. Covering an area of nearly 7 m^2, the internal dimensions of the room are 177x175 cm; in other words, it is a small structure. (Figure 4.28, 4.135 – 4.137) Its north wall extends almost 50 cm to the east. In the northeast section, an opening which is thought to be the entrance of the structure was determined. Outside the southeast corner of

the structure, a wall fragment was exposed, but its relationship to the structure N5B2 could not be clarified.

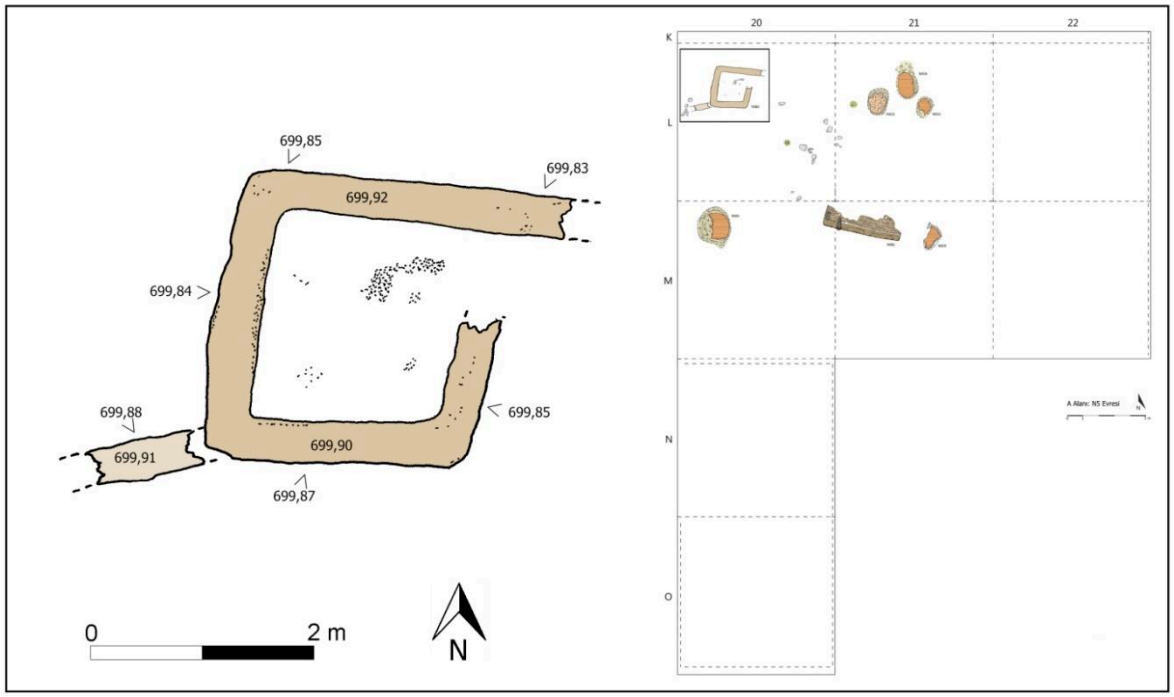


Figure 4.28: Location and plan of Structure N5B2

The walls without a stone foundation are 32-43 cm wide. The homogeneous reddish-brown very loose earth walls were constructed following the slope of the natural surface. Considering the architectural tradition and construction technology of Sumaki Höyük, the walls were built by the piled earth technique.

4.4.3.1.3. Structure N5B3

This is located in Area B, in the northwest section of trench 14G between the elevations of 701.48 to 701.85 meter. Based on the wall remains and general appearance, this structure is classified as a multi-roomed structure. The structure has two cells and two large rooms. This structure appears to be 'transitional building' regarding to its plan between the Cell Buildings and the multi-roomed structures. (Figure 4.29) The walls have been preserved to a height of 37 cm. The structure was constructed on a yellowish grey-coloured ash-poor and occasionally hard fill following the slope of the natural topography without a stone foundation.

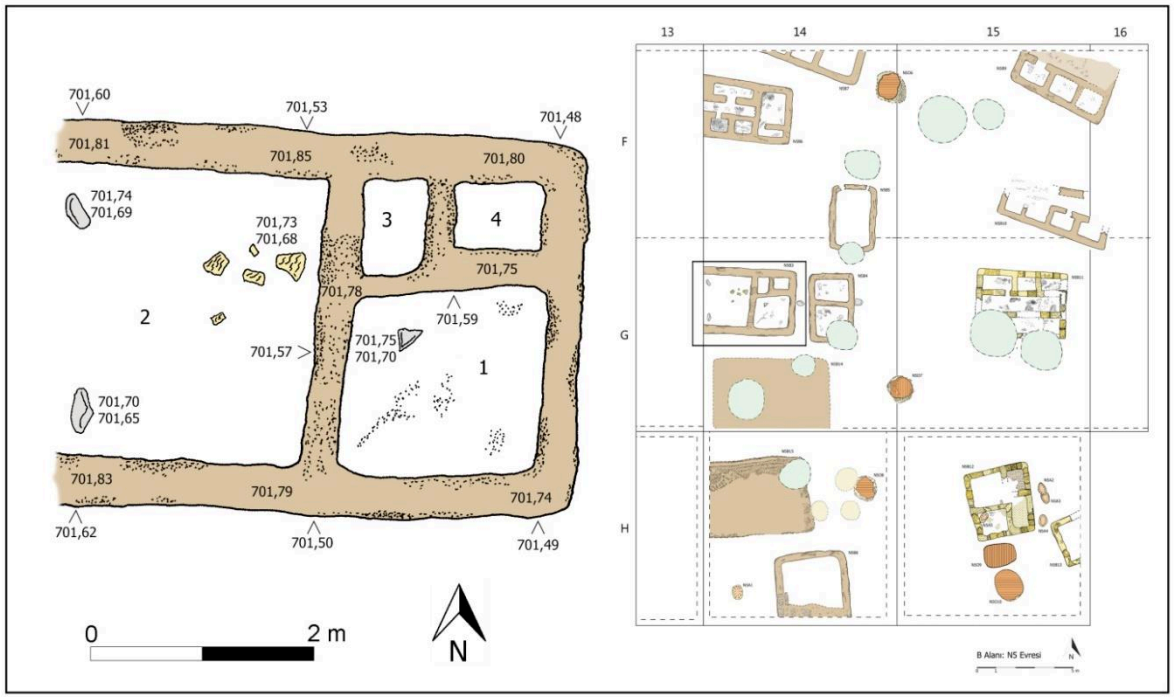


Figure 4.29: Location and plan of Structure N5B3

The structure is located on the east-west oriented natural terrace slightly sloping toward the east. In the north-south direction, it has a width of 338 cm, (Figure 4.337) very similar to the dimensions of the other cell buildings. However, as its western limits remains outside the exposed area the dimensions could not be determined. Its exposed section is 490 cm long. Based on the trench cross-section and the length-width ratio of structures with similar plans, the large room with more than half excavated is assumed to be the last space in west. The thickness of the bearing walls and partition walls are different. The bearing walls are 31-42 cm wide, and the partition walls are 18-34 cm wide. However, the thickness of the partition walls is entirely different from each other; such as the partition walls between the cells are thinner.

Occasional lime fragments appear to have bound the walls. Continuing as weak and uncertain lines, their thickness varies from 2 to 4 cm. (Figure 4.138) The internal fill of these bounded walls is homogeneous reddish-brown loose earth. Within the walls, calcified surfaces are observed at nearly 5-8 cm intervals. These surfaces, which continue irregularly between the layers, did not have mortar characteristics. Organic remains are clearly observed on SEM images of lime samples taken from within the walls.

The structure has two cells and two rooms. On the west wing, there is a rectangular room (number 2) with the dimensions of 295x282 cm (nearly 9 $m^{2)}$. There are two cells and

a room exposed in the east side of this room. The two neighbouring cells have the dimensions of 87x56 cm and 78x60 cm. The room immediately south of them (number 1) has the dimensions of 165x177 cm. None of the cells and rooms has door openings. Accordingly, Structure N5B3 may have a second floor similar to the other Cell Buildings.

The internal fill of the rooms is grey and intensely ashy. In the large room number 2, plastered floor remains of a hearth with burning traces were identified. (Figure 4.139, 4.140)

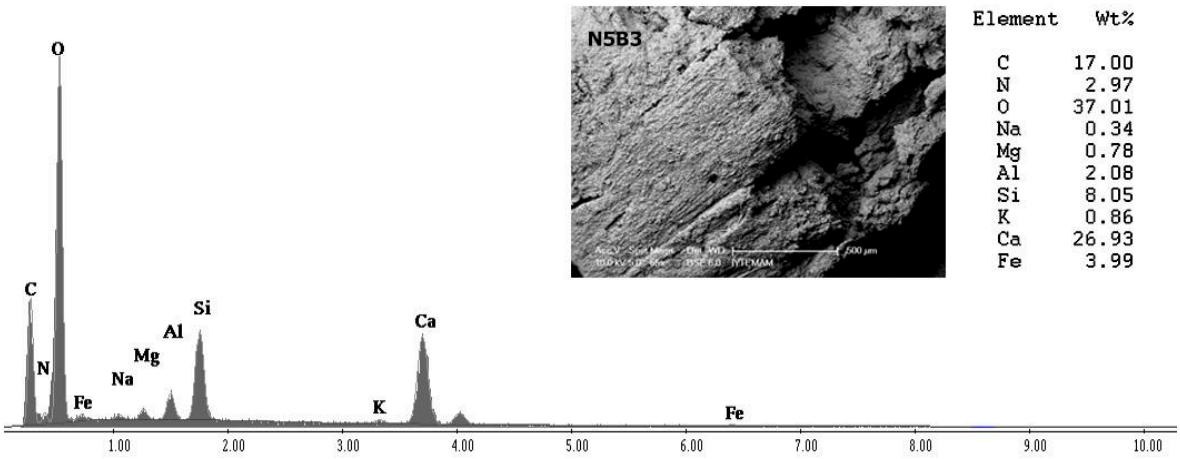


Diagram 4.27: EDX analysis of lime samples taken from Structure N5B3

Calcium carbonate minerals with scalenohedral shapes are observed on SEM images of lime samples taken from within the walls and internal fill of the structure. Additionally, samples were identified with SiO_2 gels filling the organic cavities. The clearest is silicon dioxide gel filling a *Panicum* plant remnant. (Figure 4.297) Calcium carbonate minerals have accumulated within the silicon dioxide gels. Acicular-shaped crystals were also observed in the soil samples. (Figure 4.298) EDX analysis of the lime samples identified the following elements with their mean values; O (37.01%), Ca (26.93%), C (17.00%), Si (8.05%), and Fe (3.99%), together with the elements N, Na, Mg, Al, and K with proportions from 3% to 0.34%. (Diagram 4.27)

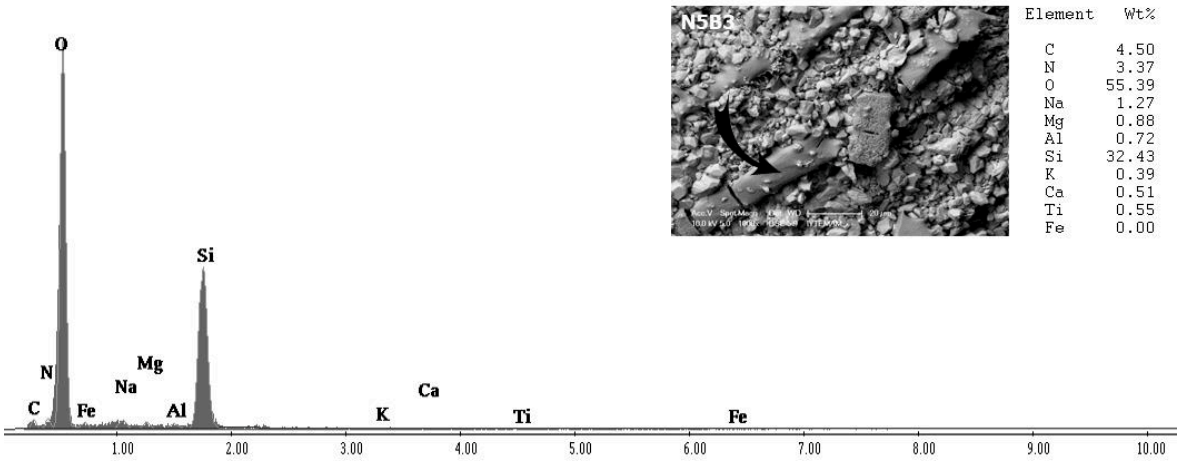


Diagram 4.28: EDX analysis results of SiO2 gels found in lime samples taken from Structure N5B3

Analysis of areas filled with SiO_2 gels by the EDX method observed an increase in the proportions of silicon. The ratios of the element in the gels were O (55.39%), Ca (0.51%), C (4.50%), and Si (32.43%). N, Na, Mg, Al, K, and Ti were identified with proportions from 4% to 0.39%. (Diagram 4.28)

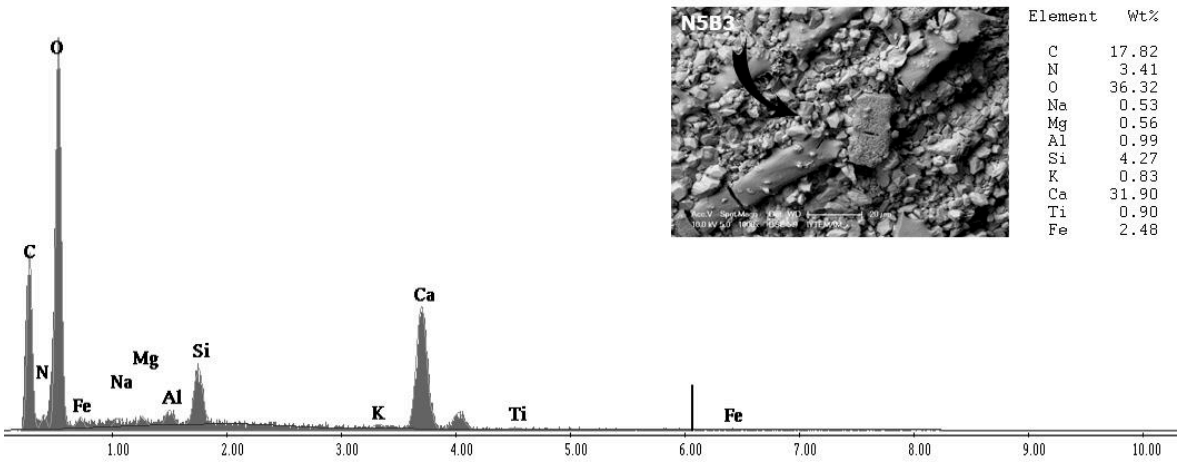
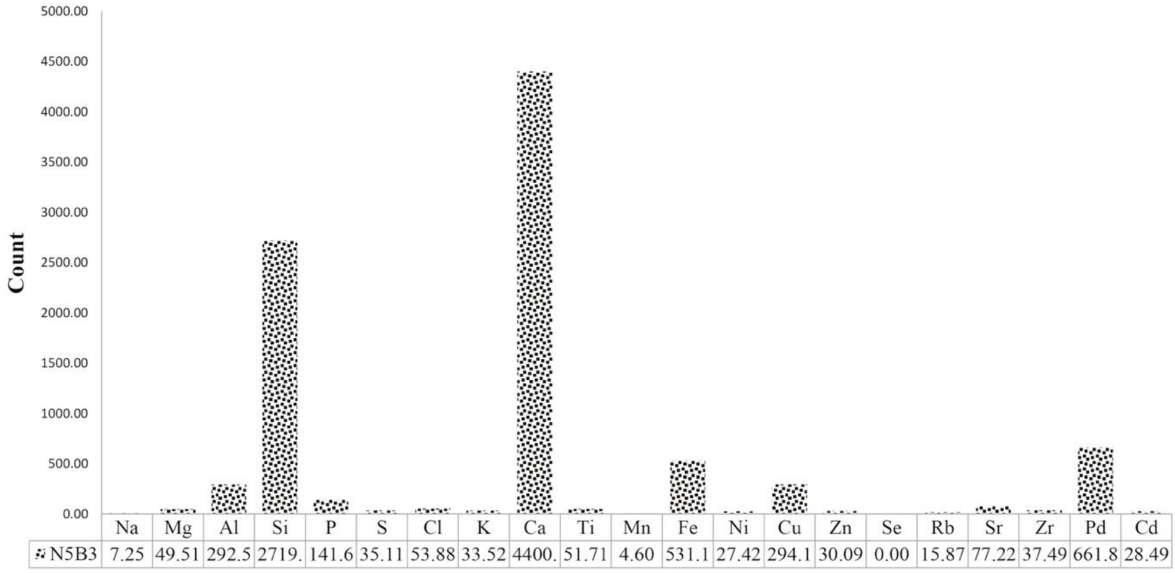


Diagram 4.29: EDX analysis results of lime fragment around the SiO2 gels found in lime samples taken from Structure N5B3

Analysis of the same samples with carbonates surrounding these areas filled with SiO_2 gels found calcium peaks. It was also observed that O (36.32%), Ca (31.90%), C (17.82%), and Si (4.27%) elements were dominant, together with the elements N, Na, Mg, Al, K, Fe, and Ti at rates from 4% to 0.39%. (Diagram 4.29)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N5B3	7.25	49.51	292.5	2719.	141.6	35.11	53.88	33.52	4400.	51.71	4.60	531.1	27.42	294.1	30.09	0.00	15.87	77.22	37.49	661.8	28.49

Diagram 4.30: XRF analysis of the lime samples taken from Structure N5B3

Investigating the same lime samples with XRF method observed the following elements dominating; Ca (28%), Si (50%), Fe (6%), and Al (5%), together with trace amounts of Ni, Zn, Sr, Rb, Na, K, S, P, Pd, Cl, Cu, and Ze. (Diagram 4.30)

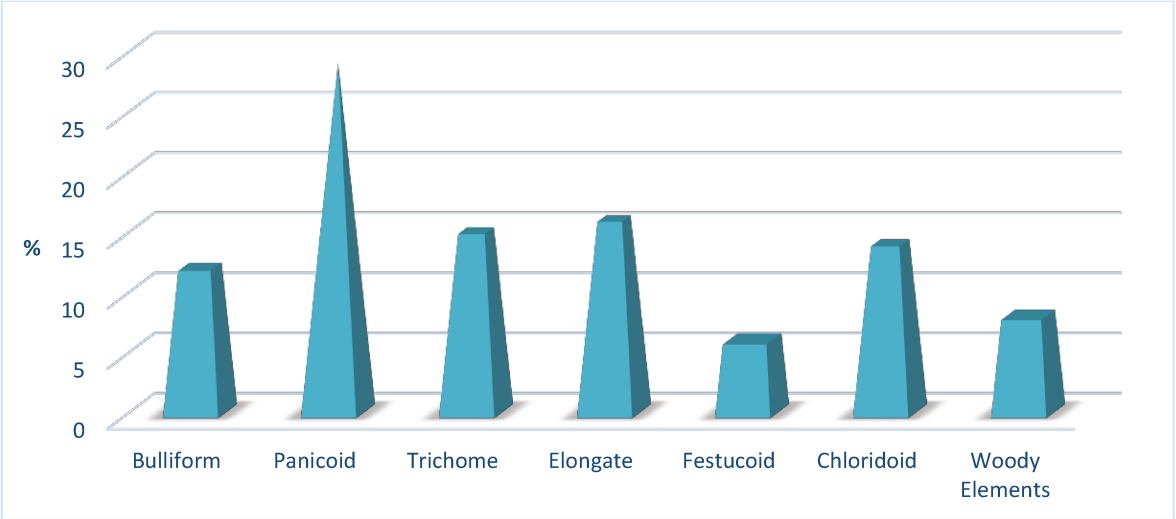


Diagram 4.31: Distribution of phytoliths in the lime samples taken from Structure N5B3

Phytolith analysis of the lime samples identified reed or herbaceous plant remains. The phytoliths contained high frequency of *Panicoid* forms. *Trichome*, elongate *Chloridoid*, *Bulliform*, *Festucoid*, and *Silicified Woody Forms* were also identified. (Diagram 4.31) *Panicoid* phytoliths have multiple forms, such as dominantly short and long-shafted rounded forms. Saddle-shaped *Chloridoid*, rectangular/square formed *Festucoid* phytoliths and other *Silicified Woody Forms* were also observed. (Figure 4.325 - 4.330) Considering the architectural tradition and construction technology of Sumaki Höyük, both the bearing and

the partition walls of the structure N5B3 were constructed by the piled earth technique. Probably its upper cover was made of light material.

4.4.3.1.4. Structure N5B4

This is located in Area B, in the northeast of trench 14G between the elevations of 701.38 to 701.87 meter. The walls have been preserved to a height of 50 cm. Based on the wall remains and general appearance, this structure classified as a double-roomed structure. (Figure 4.30, 4.141) The structure was constructed at the edge of an east-west oriented natural terrace, on a slope inclined toward the east.

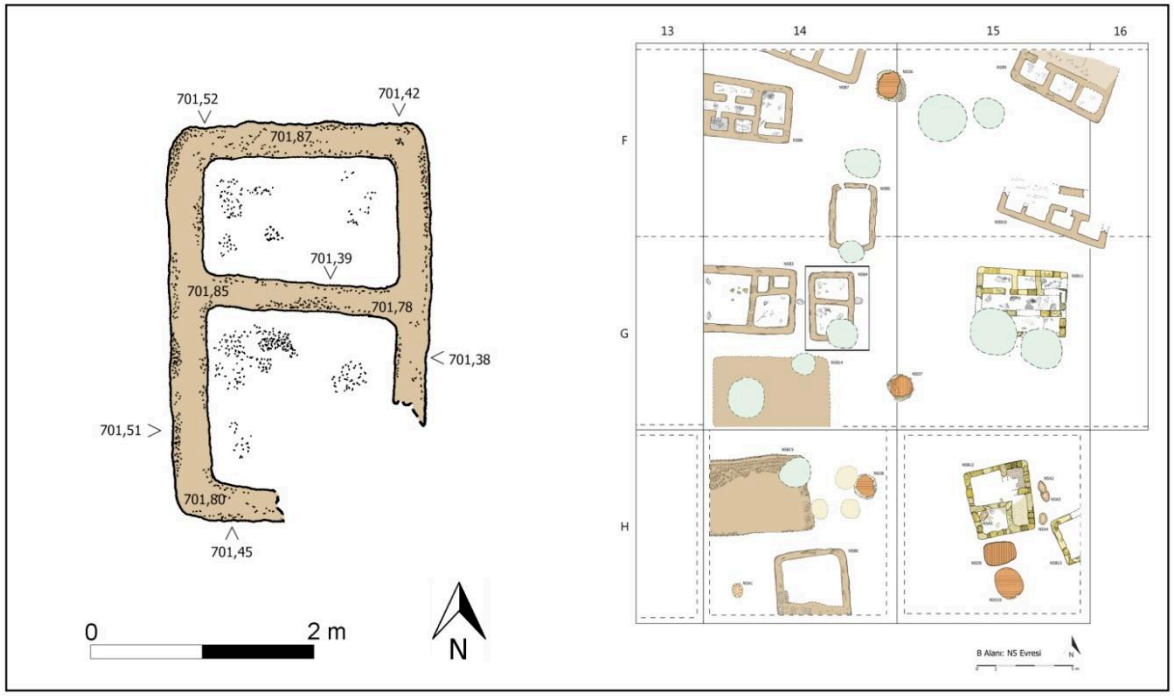


Figure 4.30: Location and plan of Structure N5B4

The structure was constructed with a north-south orientation, contrary to other structures in the same area, had a width of 238 cm in the east-west direction and a length of 353 cm in the north-south direction. (Figure 4.340) The bearing walls are 30-32 cm thick while the partition walls are 22-27 cm thick. The walls in the eastern part are at least 25 cm higher than the walls in the western section. Lime line traces are clearly identified on both faces of the walls and in their internal fill. Lime lines at 4-5 cm intervals between reddish-brown bedding on either faces of the walls in the south and east section of the structure are notably well-defined. (Figure 4.142, 4.143)

The structure has two rooms. The north room is 108x77 cm in size (nearly 2 m^2). The south room with a size of 156x170 cm (2.6 m^2) is larger than the north one. The structure has no door openings either between the rooms or to outer space. A large stone between the elevations of 701.43 to 701.54 observed outside the structure appears to be the living surface of the structure.

The internal fill of the bounded walls is homogeneous reddish-brown loose earth. The inner fill of the rooms is grey, intensely ashy, and stone-poor. Lime fragments locally intensified within the rooms. These lime fragments may be the remains of herbaceous plants forming the upper cover falling into the rooms and creating a level of lime.

The earth fill within the walls is only distinguished from the external area by its colour and the clear lime lines. Considering the architectural tradition and construction technology of Sumaki Höyük, the walls of Structure N5B4 were constructed by the piled earth technique.

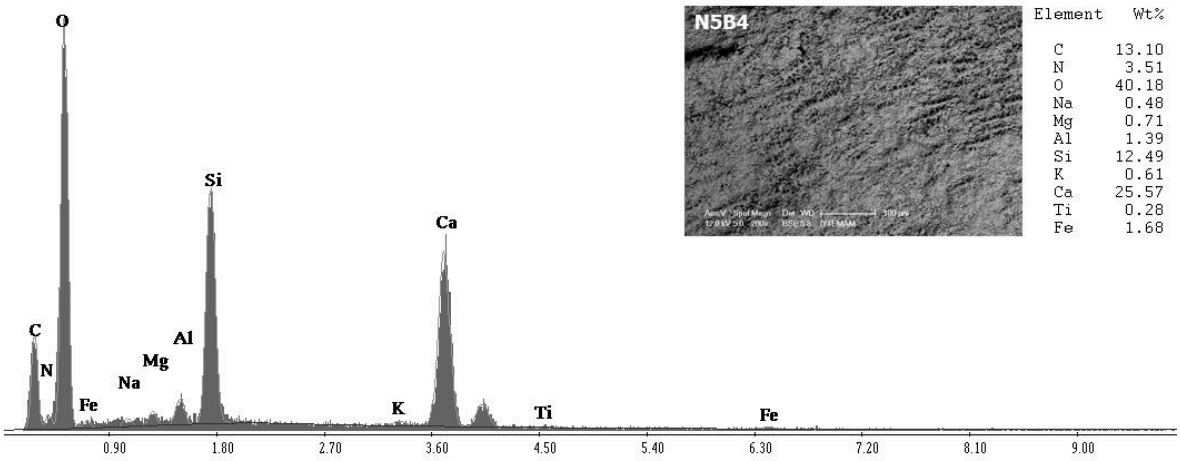
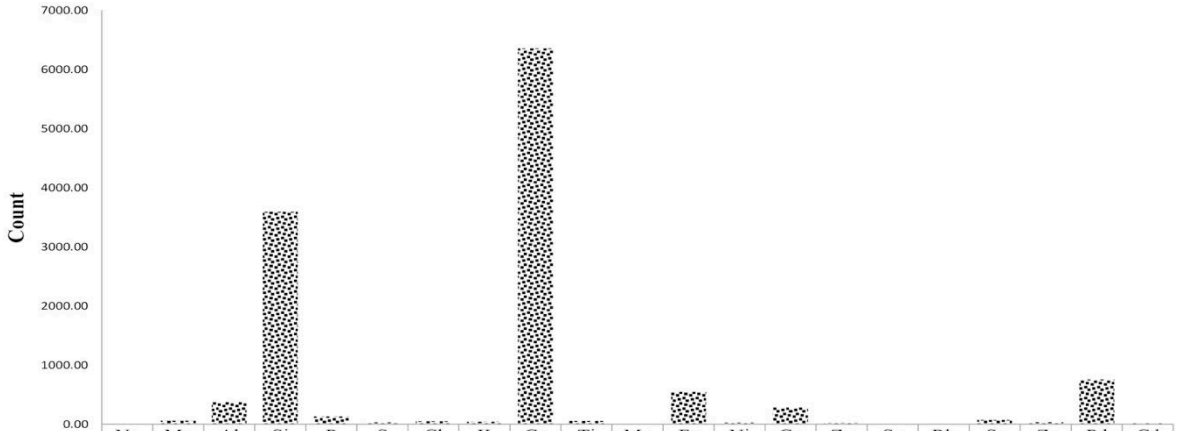


Diagram 4.32: EDX analysis of lime samples taken from Structure N5B4

SiO_2 gels filling the organic cavities are observed on SEM images of the lime samples. The clearest is silicon dioxide gel filling a *Panicum* plant remnant. (Figure 4.299) Examination of lime samples with the EDX method identified the elements O (40.18%), Ca (25.57%), C (13.10%), Si (12.49%), Al (1.39%), and Fe (1.68%), together with very small amounts of Na, Mg, K, and Ti. (Diagram 4.32)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N5B4	7.31	61.70	375.5	3594.	134.2	32.59	53.28	41.96	6357.	55.76	0.74	548.3	29.01	281.6	20.46	0.01	0.01	72.60	35.75	757.2	15.68

Diagram 4.33: XRF analysis of the lime samples taken from Structure N5B4

Investigation of the same samples with the XRD method identified as containing calcite, silica, quartz, villiaumite, and nitratine minerals. Their chemical composition is calcium carbonate, silicon dioxide, sodium fluoride, and sodium nitrate compound. The sodium nitrate compound indicates the presence of aridity. (Diagram 4.105) XRF analysis of the lime samples observed the following elements dominating; Si (29%), Ca (51%), Fe (4%), Al (3%), and Pd (6%), together with traces amounts of Ni, Zn, Sr, Rb, Na, K, S, P, Cl, Cu, and Ze. (Diagram 4.33)

4.4.3.1.5. Structure N5B5

This is located in Area B, in the southeast of trench 14F and northeast of trench 14G between the elevations of 701.15 to 701.43 meter. Based on the wall remains and general appearance, the structure classified as a single-roomed structure. (Figure 4.31, 4.144 – 4.146) The structure was constructed with an east-west orientation at the edge of an undulating natural terrace sloping toward the east, similar to the Structure N5B4. The walls, which have been preserved to a height of 18 cm, were constructed directly on the natural ground.

The rectangular single-roomed structure was 248 cm long in the east-west direction and 336 cm wide in the north-south direction. (Figure 4.341) The internal dimensions of the structure are 176x283 cm with an area of nearly 8 m^2. The structure has no doorway. Though the southern part of the structure was partially disturbed by a pit the entrance was either in this disturbed area or at a higher level. The badly-preserved walls are 22-34 cm thick.

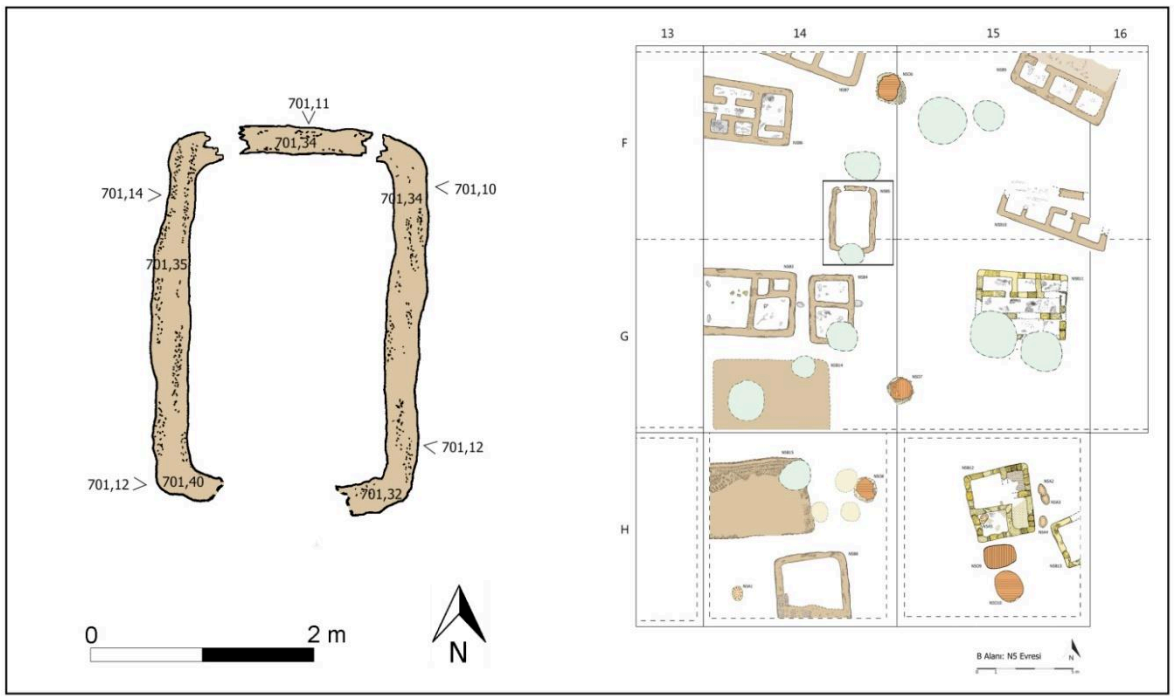


Figure 4.31: Location and plan of Structure N5B5

Although there are no traces of plaster floor remains or hardened floor surfaces detected in the structure, scattered small stones were found at nearly the same level as the walls. The walls occasionally appear to be bounded by lime fragments. On both faces of the wall, but on the western wall, compact lime lines with 2-5 cm thickness are clearly observed. The internal fill of the bounded walls is homogeneous reddish-brown loose earth. There were no mortar or plaster surfaces identified on either faces of the walls. Considering the architectural tradition of structures with similar plan and the wall construction technology of Sumaki Höyük, this structure was constructed by the piled earth technique.

4.4.3.1.6. Structure N5B6

This is located in Area B in the northwest of trench 14F between the elevations of 701.12 to 701.47 meter on a grey intensely ashy fill following the slope of the natural surface without a stone foundation. Based on the wall remains and general layout, the structure is classified as a Cell Building. However, some differences in its plan are noteworthy compared to the Cell Buildings of Phase N6. Firstly, the presence of a room on the east side of the structure; secondly an L-shaped or a T-shaped corridor plan appears not be used; third the dimensions of the cells can easily be regarded as rooms. Therefore, considering its plan, the

structure appears to be a ‘transitional structure’ between Cell Buildings and Multi-roomed Structures. The walls have been preserved to a height of 35 cm. (Figure 4.32, 4.147 – 4.149)

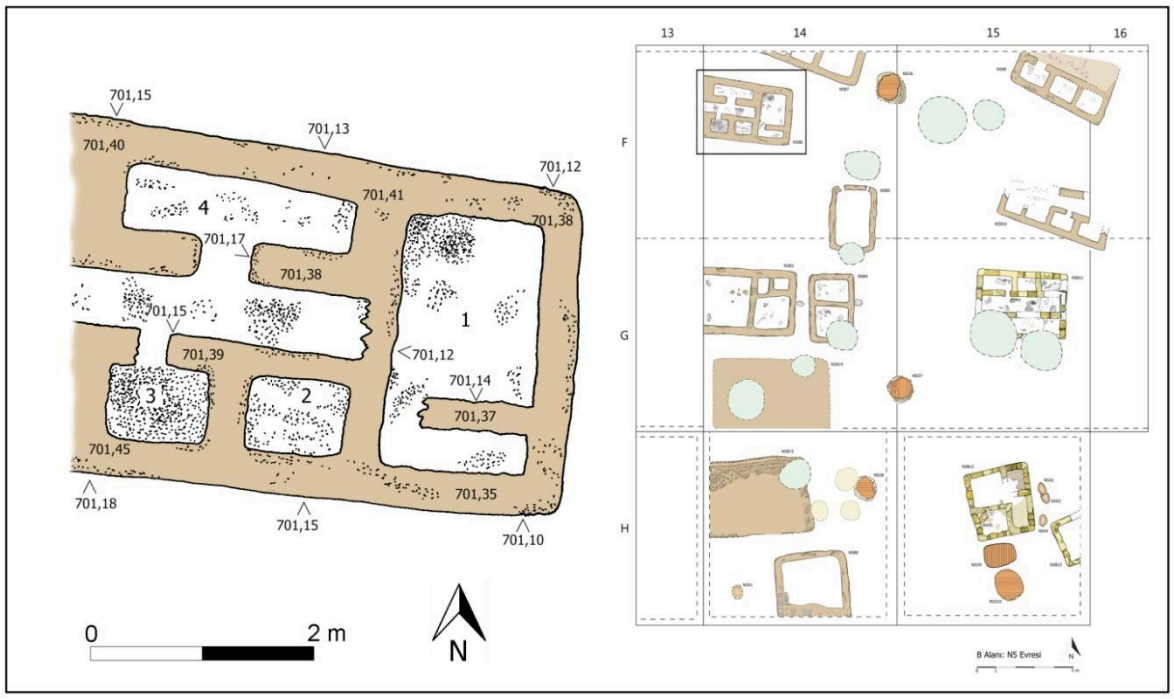


Figure 4.32: Location and plan of Structure N5B6

Per structures in the same area, N5B6 is constructed on an undulating flat surface on the east-west oriented natural terrace. Its exposed part is 471 cm long in the east-west direction. Since its western section is outside the exposed area the dimensions in the east-west direction could not clearly be measured. This rectangular structure has a width of 308 cm in the north-south direction. Its area within the trench is nearly 14 m^2. Based on this data, the area of the structure is not more than 16 m^2. The main walls are 33-36 cm wide, and the partition walls are 21-36 cm wide.

The structure has two cells along the south wing and a longer one on the north side with a corridor in between having the dimensions of 274 cm long and 55 cm wide. The northern cell and the two southern cells have different plans and sizes. The rectangular cell in the north is narrow and long with the dimensions of 209x56 cm. The two cells to the south have very similar measurements, namely, 91x68 cm and 92x66 cm. Except for one, the other two cells have doorways. The doorway of the northern large cell is 45 cm wide, and the ones of smaller cells on the south side have a width of 26 cm. There is no doorway linked these cells and the corridor to the room in the west.

Lime surfaces were identified in cell number 2. These lime surfaces defined the floor level of the cell; however, plaster traces were not encountered on these lime surfaces. As mentioned above, the lime surfaces are directly related to the evaporation and calcification process of organic structural material. Except for the two grinding stones found *in situ* in the west room, neither the fills of cells and the corridor or the lime surfaces contain any archaeological material. There are no graves found within the cells or under the floor levels.

Occasional lime fragments appear to have bound the walls. Continuing as weak and uncertain lines, their thickness varies from 1 to 3 cm. The internal fill of walls is homogeneous reddish-brown loose earth. At 3-7 cm intervals in the wall section, calcified surfaces were also identified. These surfaces, which continue irregularly between the layers, did not have mortar characteristics. There is also no regular surface at the bottom or top of the reddish-brown bedding. Considering the architectural tradition and the wall construction technology of Sumaki Höyük, this structure was constructed by the piled earth technique. Due to this wall technology, it is unlikely the upper cover was an earthen roof. Considering the wall technology and the density of lime fragments indicating organic material, it may be stated that the structure was covered with a light material such as reeds or branches.

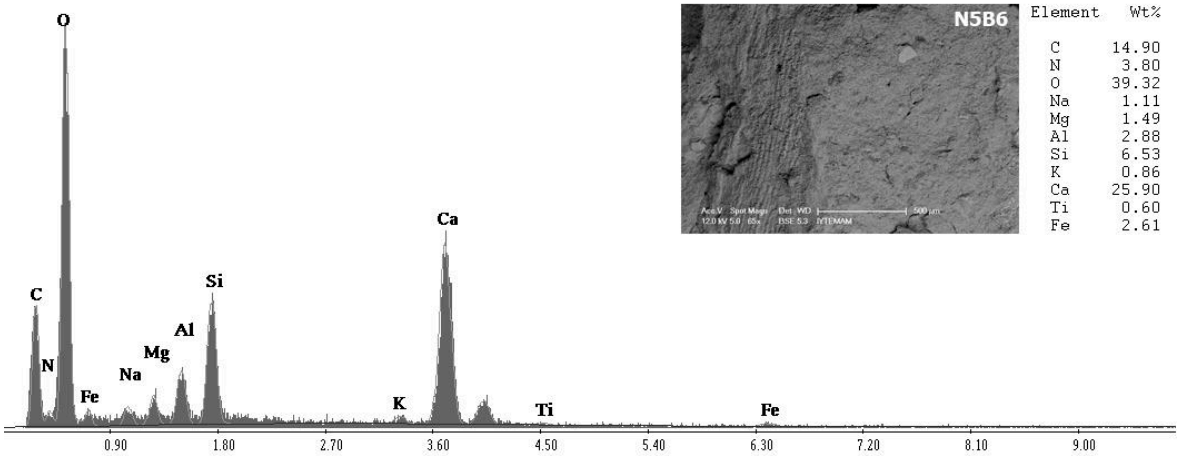
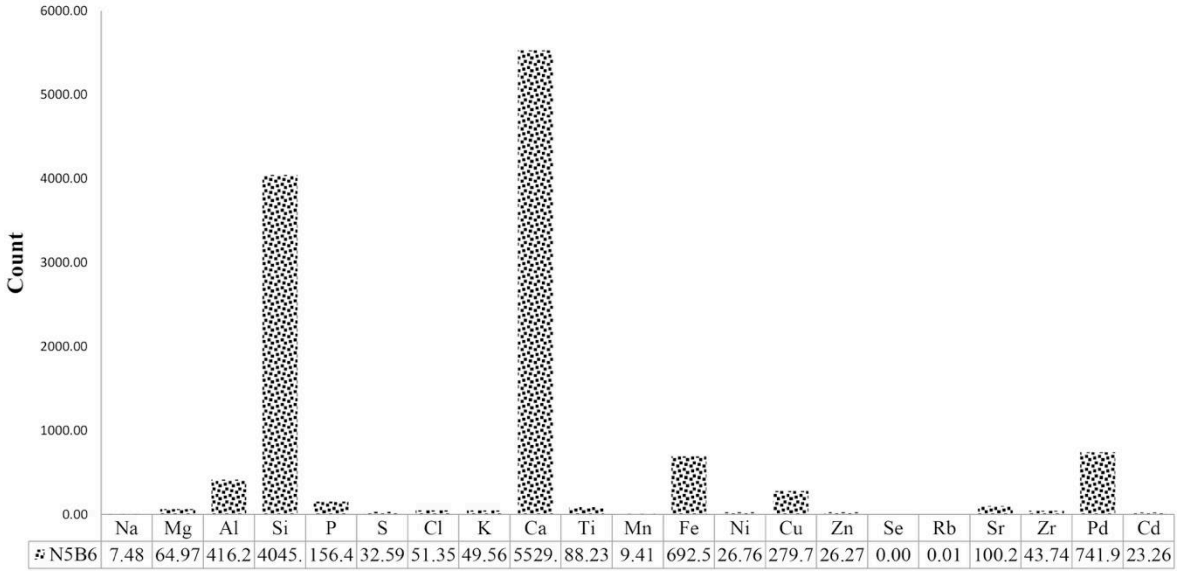


Diagram 4.34: EDX analysis of lime samples taken from Structure N5B6

SiO_2 gels filling the organic cavities are observed on SEM images of the lime samples. (Figure 4.300) Their EDX analysis identified the elements O (39.32%), Ca (25.90%), C (14.90%), Si (6.53%), Al (2.88%), and Fe (2.61%) with traces amounts of Na, Mg, K, and Ti. (Diagram 4.34) XRD analyses of the same samples were identified as containing calcite, silica, quartz, altaite, and iron minerals. Their chemical compositions

comprise calcium carbonate, silicon dioxide, iron oxide, and lead telluride compounds. (Diagram 4.106) According to their XRF analysis, it was observed that the following elements dominating; Si (33%), Ca (45%), Fe (6%), Al (3%), and Pd (6%), together with traces amounts of Ni, Zn, Sr, Rb, Na, K, S, P, Cl, Cu, and Ze. (Diagram 4.35)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N5B6	7.48	64.97	416.2	4045.	156.4	32.59	51.35	49.56	5529.	88.23	9.41	692.5	26.76	279.7	26.27	0.00	0.01	100.2	43.74	741.9	23.26

Diagram 4.35: XRF analysis of the lime samples taken from Structure N5B6

4.4.3.1.7. Structure N5B7

This is located in Area B, in the north of trench 14F between the elevations of 701.16 to 701.40 meter on a grey ashy fill. The structure having at least three rooms is classified as a multi-roomed structure. It appears to be constructed following the slope of the natural surface without a stone foundation. The structure was built on a natural terrace with southeast-northwest orientation on a surface slightly inclined to the east. (Figure 4.33, 4.149) Since its northern section is outside the exposed area, the structure could not clearly be measured. Its exposed section is 494 cm long in the southeast-northwest direction and 136 cm wide in the northwest-southeast direction. The walls have been preserved to a height of 24 cm. The bearing walls are 33-38 cm wide, and the partition walls are 25-34 cm wide.

The internal fill of the walls is homogeneous reddish-brown loose earth. Considering the architectural tradition of structures with a similar plan and the wall construction technology of Sumaki Höyük, the structure was constructed by the piled earth technique.

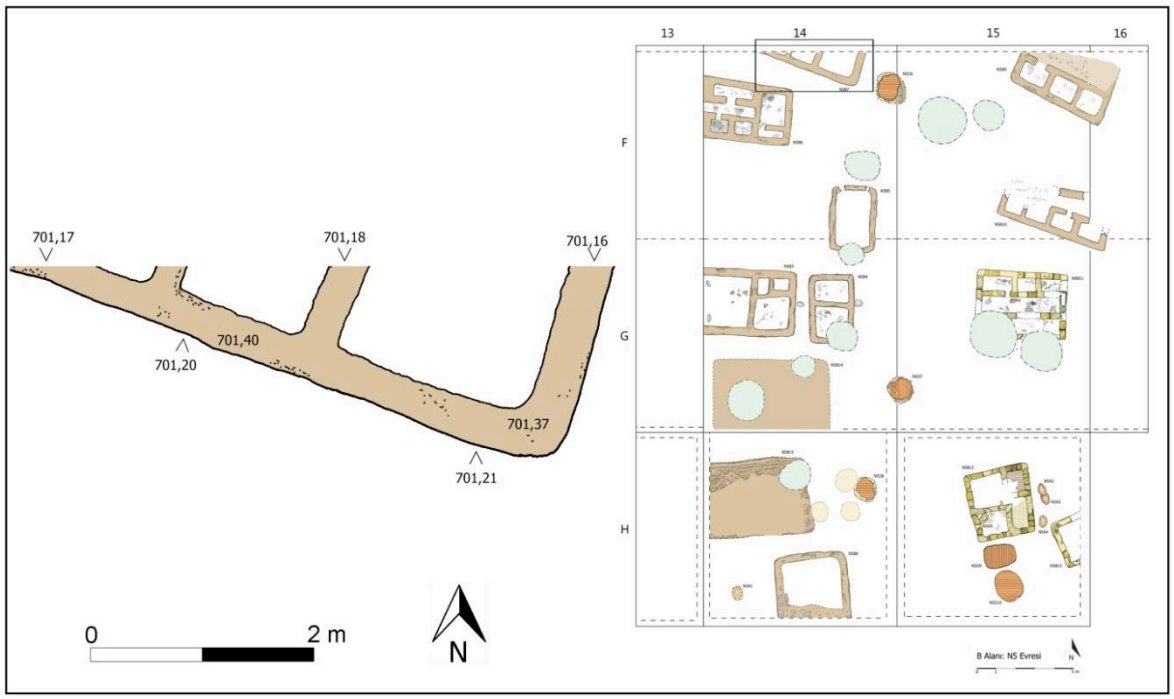


Figure 4.33: Location and plan of Structure N5B7

On SEM images of the lime samples, scalenohedral and acicular crystal structure surrounding the cavities formed by organic material are observed. (Figure 4.301) The sharp-tipped crystals are aragonite minerals. Zinc with 24.11 ppm value identified by the XRF method also shows that this crystal is aragonite. Investigation of the same lime samples with EDX analysis identified the elements O (38.51%), Ca (29.17%), C (15.87%), Si (5.44%), Al (2.10%), and Fe (2.48%), together with traces amounts of Na, Mg, K, and Ti. (Diagram 4.36)

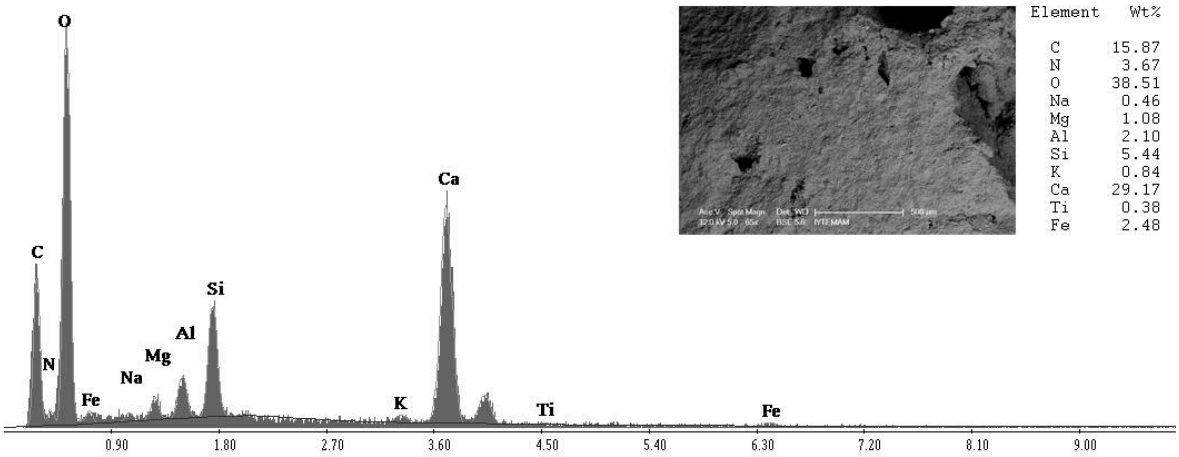
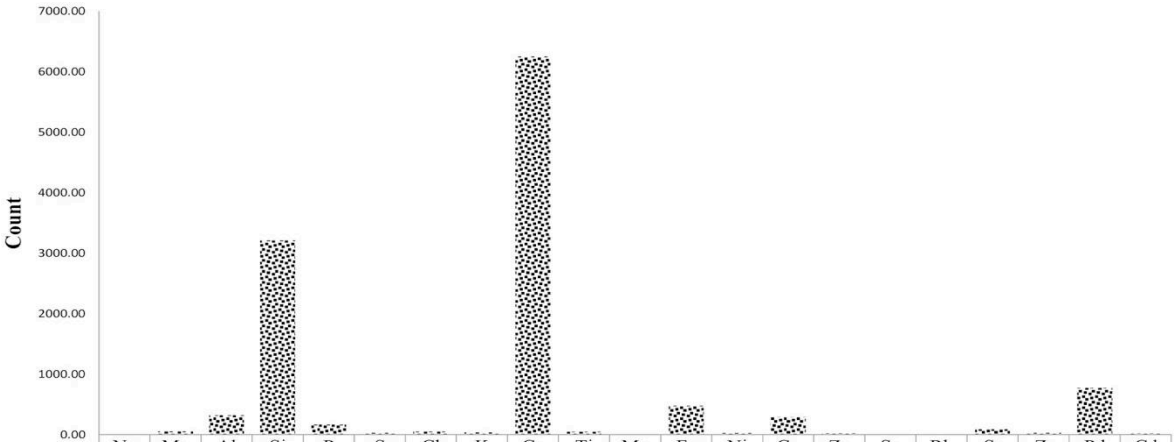


Diagram 4.36: EDX analysis of lime samples taken from Structure N5B7

Lime samples were identified to contain calcite, silica, quartz, and covellite minerals after XRD analysis. Their chemical composition is calcium carbonate, silicon dioxide, and copper sulphur compounds. (Diagram 4.107)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N5B7	7.54	53.89	321.7	3211.	167.6	31.27	53.21	36.91	6249.	50.39	2.28	479.1	27.77	289.2	24.11	0.00	0.01	90.49	30.58	771.8	20.06

Diagram 4.37: XRF analysis of the lime samples taken from Structure N5B7

XRF analysis of the same samples observed the following elements dominating; Si (27%), Ca (52%), Fe (4%), Al (3%), and Pd (6%), together with very small amounts of Ni, Zn, Sr, Rb, Na, K, S, P, Cl, Cu, and Ze. (Diagram 4.37)

4.4.3.1.8. Structure N5B8

This is located in Area B in the south of trench 14H between the elevations of 701.90 to 702.16 meter on a grey ashy fill without a stone foundation. Based on the wall remains and general layout, the structure is classified as a single-roomed structure; however, considering the size and plan of the structure, there may be another room existed outside the exposed area. Its layout is very similar to the layout of the structure N5B3. Therefore, it may be the remains of a multi-roomed structure. The walls have been preserved to a height of 22 cm. (Figure 4.34, 4.150 – 4.152)

The structure sits on a slightly higher terrace than the terrace where the structures N5B3 and N5B6 built on. Contrary to the structure N5B3, the north-south oriented structure N5B8 sits on a natural terrace with an undulating flat appearance. Its exposed section is 384 cm wide in the east-west direction. Since its southern part is outside the exposed area, the dimensions in the north-south direction could not be detected. The remaining section has a

length of 339 cm. The walls are 34-37 cm thick. The only room with a rectangular plan is 306x243 cm in size. This room covering an area of 8 m^2 has a grey ash-poor fill. No door opening was detected. There were no plaster floor remains or hardened floor surfaces identified.

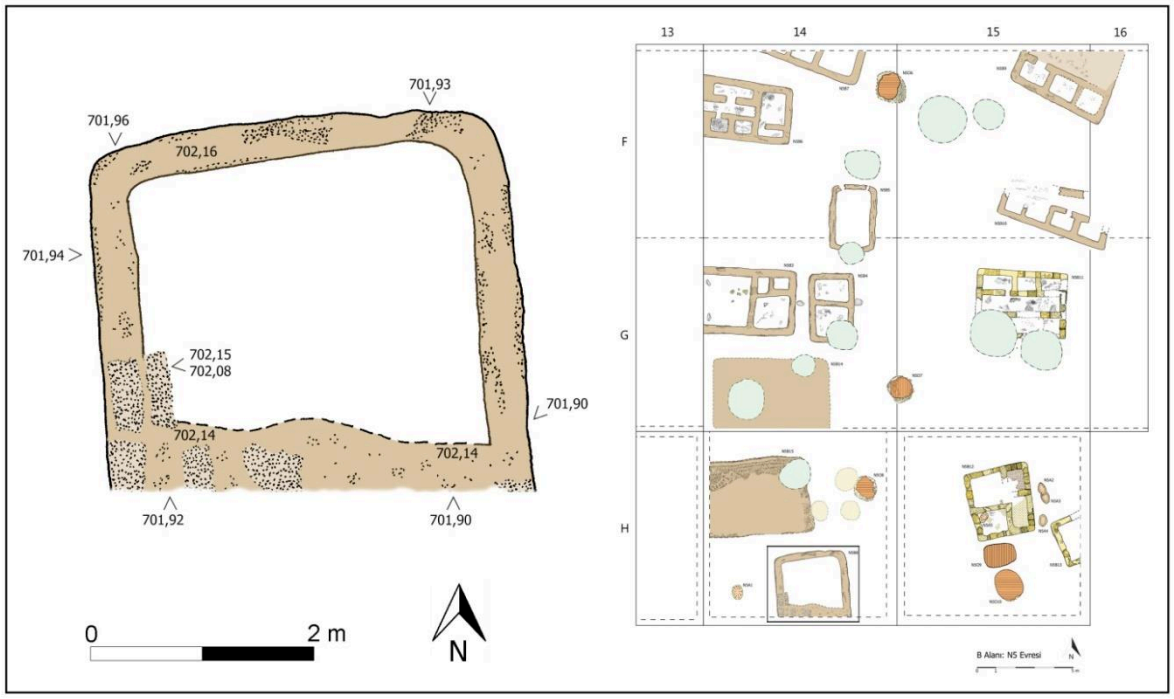


Figure 4.34: Location and plan of Structure N5B8

Occasional lime fragments appear to have bound the walls with homogeneous reddish-brown loose earth. In the south cross-section of the structure, six block-like lime traces were identified between the bedding of piled earth walls. The lengths of these block-like lime traces are different, though the widths are the same. Considering this data, the structure was constructed by using the piled earth and the kerpiç blocks technique. (Figure 4.152)

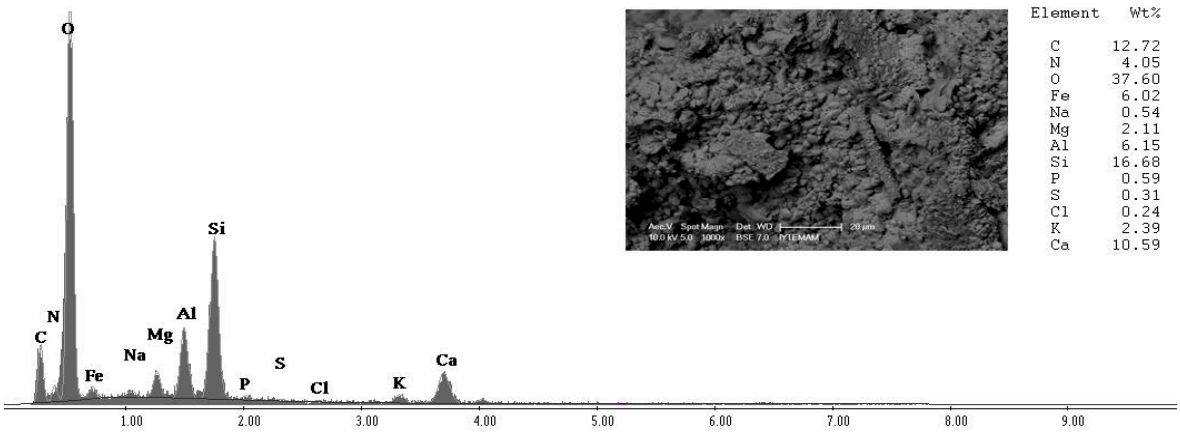
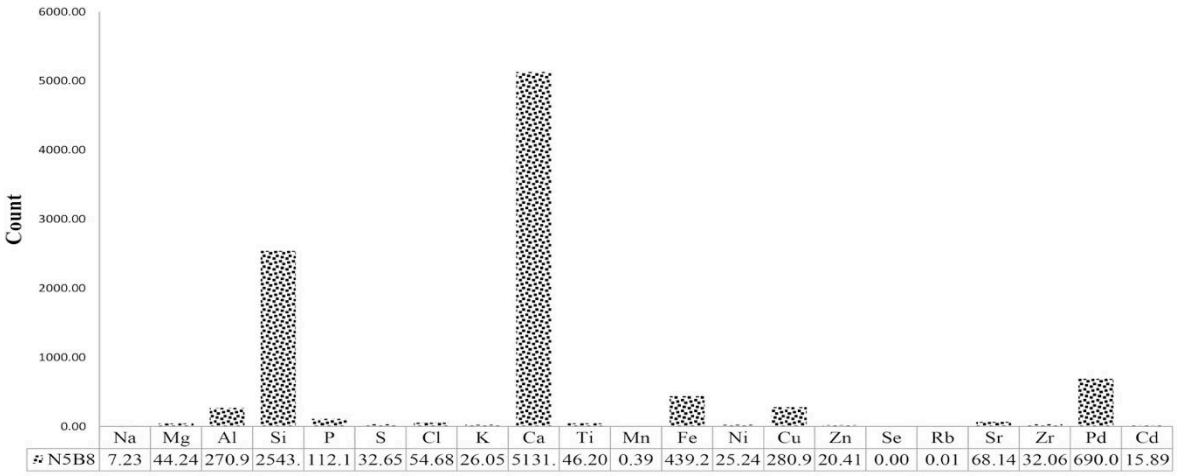


Diagram 4.38: EDX analysis of lime samples taken from Structure N5B8

SiO_2 gels filling the organic cavities are partially observed on SEM images of the lime samples. (Figure 4.32a-c) Calcium carbonate minerals with scalenohedral crystal structure were found surrounding tubes formed by organic remains. (Figure 4.302d) Investigation of lime samples with EDX analysis identified the elements O (37.60%), Ca (10.59%), C (12.72%), Si (16.68%), Al (6.15%), and Fe (6.02%) with very small amounts of Na, Mg, P, S, Cl and K. (Diagram 4.38)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N5B8	7.23	44.24	270.9	2543.	112.1	32.65	54.68	26.05	5131.	46.20	0.39	439.2	25.24	280.9	20.41	0.00	0.01	68.14	32.06	690.0	15.89

Diagram 4.39: XRF analysis of the lime samples taken from Structure N5B8

Investigation of the same samples with XRD analysis only identified calcite and graphite minerals. (Diagram 4.108) Their chemical composition is calcium carbonate and carbon compounds. According to the XRF analysis of the same samples, it was observed that Si (26%), Ca (52%), Fe (4%), Al (3%), and Pd (7%) elements are dominant with very small amounts of Ni, Zn, Sr, Rb, Na, K, S, P, Cl, Cu, and Ze. (Diagram 4.39)

4.4.3.1.9. Structure N5B9

This is located in Area B, in the northeast of trench 15F and northwest of trench 16F between the elevations of 700.50 to 700.69 meter. Based on the wall remains and general appearance, this structure is classified as a Cell Building. Contrary to structures located on the upper terrace, the structure N5B9 was constructed with a southeast-northwest orientation on an undulating flat surface, on the eastern part of the lower terrace along with the structures N5B3 and N5B6. The walls have been preserved to a height of 19 cm.

The structure is 526 cm long in the southeast-northwest direction. Its northern part is outside the exposed area. The remaining section is 236 cm in the southwest-northeast direction. Regarding the exposed section, there is a corridor between the cells, but its plan has not entirely been identified. (Figure 4.35, 4.153, 4.154) The widths of the bearing and the partition walls are different. The bearing walls are 36-40 cm wide, and the partition walls are 22-31 cm wide.

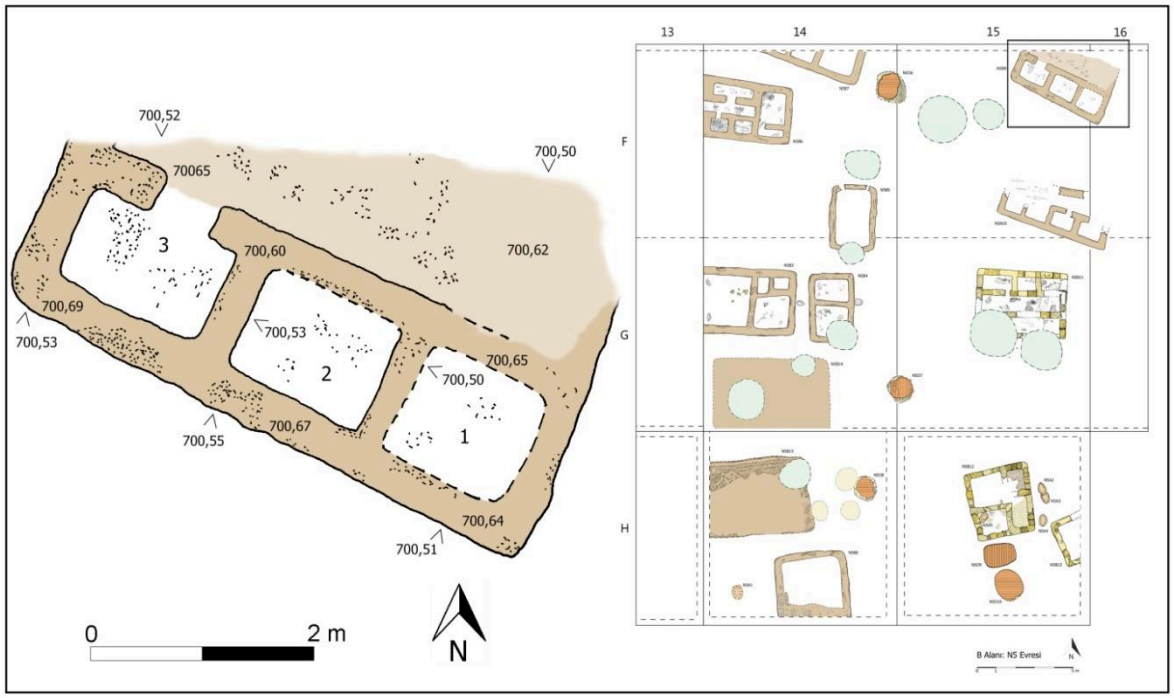


Figure 4.35: Location and plan of Structure N5B9

The exposed south section has three cells with a corridor in the north. The corridor has a length of nearly 440 cm. The dimensions of cells are different sizes varies from 87x143 cm to 110x123 cm. Cell number 3 located in the south is longer than the others. This cell and the corridor are linked by a 56 cm-wide doorway. Other cells have no door openings.

Plaster floor remains or hardened living surface have not entirely been identified within the cells or the corridor, instead found limey areas and fist-sized stones at an elevation of 700.56. There is no grave found within the cells or under the floor levels.

Occasional lime fragments appear to have bound the walls with thickness from 1 to 3 cm. Plaster traces were not encountered on the scattered lime lines with very rough surfaces. The internal fill of walls is homogeneous dark reddish-brown loose earth. Considering the architectural tradition and wall construction technology of Sumaki Höyük, the structure was built using the piled earth technique.

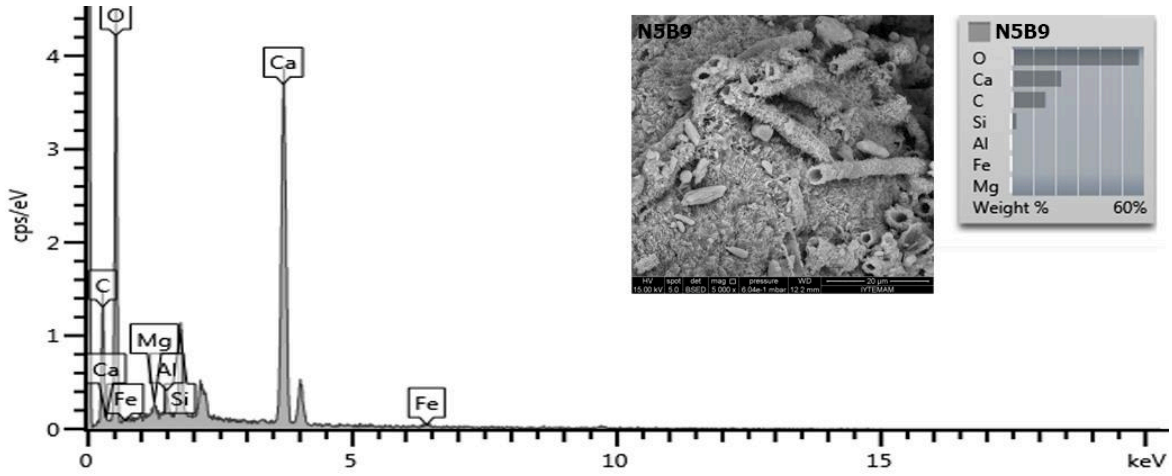


Diagram 4.40: EDX analysis of lime samples taken from Structure N5B9

On SEM images of lime samples, very clear scalenohedral, and stalactite-shaped calcium carbonate minerals around tubes formed by organic remain are observed. (Figure 4.303) The sharp-tipped and stalactite-shaped crystals are very clear. The minerals surrounding these tubes are generally sharp-tipped mixed crystal structures of aragonite. EDX analysis of the lime samples identified the elements O (57.70%), Ca (22.68%), C (15.58%), Si (2.51%), Al (0.63%), Mg (0.32%), and Fe (0.57%). (Diagram 4.40) Investigation of lime samples with the XRD method were identified as containing calcite, silica and quartz minerals. Their chemical composition is calcium carbonate and silicon dioxide compounds. (Diagram 4.109)

4.4.3.1.10. Structure N5B10

This is located in Area B, in the southeast of trench 15F and northeast of trench 15G between the elevations of 700.40 to 700.68 meter. Based on the wall remains and general appearance, the structure is classified as a Cell Building. (Figure 4.36, 4.155) The structure was constructed with the southeast-northwest orientation on a slightly undulating surface similar to the structure N5B9. It is located on the eastern part of the lower terrace along with the structures N5B3 and N5B6. The walls have been preserved to a height of 28 cm.

The structure is 594 cm long in the southeast-northwest direction. Its northern part was destroyed. This destruction may directly have related to torrents occurring towards the end of Phase 5. Its preserved southern section appears to have a corridor; however, its plan has not entirely been identified. The bearing walls and the partition walls have different widths. The bearing walls are 26-34 cm wide, and the partition walls are 20-35 cm wide.

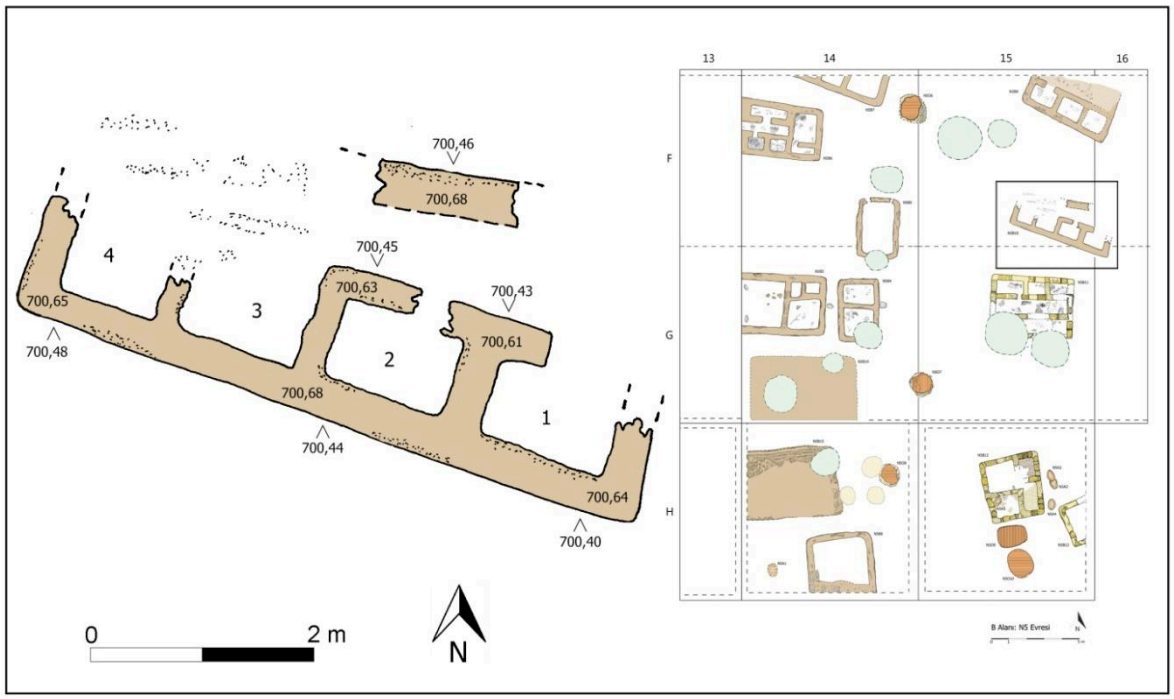


Figure 4.36: Location and plan of Structure N5B10

The preserved southern portion of the building has four cells along with a corridor in north. The dimensions of the cells are almost the same. Cell number 2 with clear limits is 75x113 cm in size. This cell was linked by a 33 cm-wide doorway to the corridor. Even the northern limits of the other cells have been destroyed, their lengths were measured between 92 cm and 118 cm. Due to the destruction, the presence of doorways in these cells was not clear. The cells and corridor did not have any plaster floor remains or hardened floor surfaces, or any artefactual material. There were no graves found within the cells or under the floor levels.

Occasional lime fragments appear to have bound the walls. Continuing as weak and uncertain lines, their thickness varies from 1 to 2 cm. The internal fill of bounded walls is homogeneous reddish-brown loose earth. At 6-8 cm intervals in the wall section, calcified surfaces were also identified between bedding. These surfaces, which continue irregularly between the layers, did not have mortar characteristics. There was no regular surface at the bottom or top of the reddish-brown bedding. Organic remains are observed on SEM images of lime samples taken from within the walls.

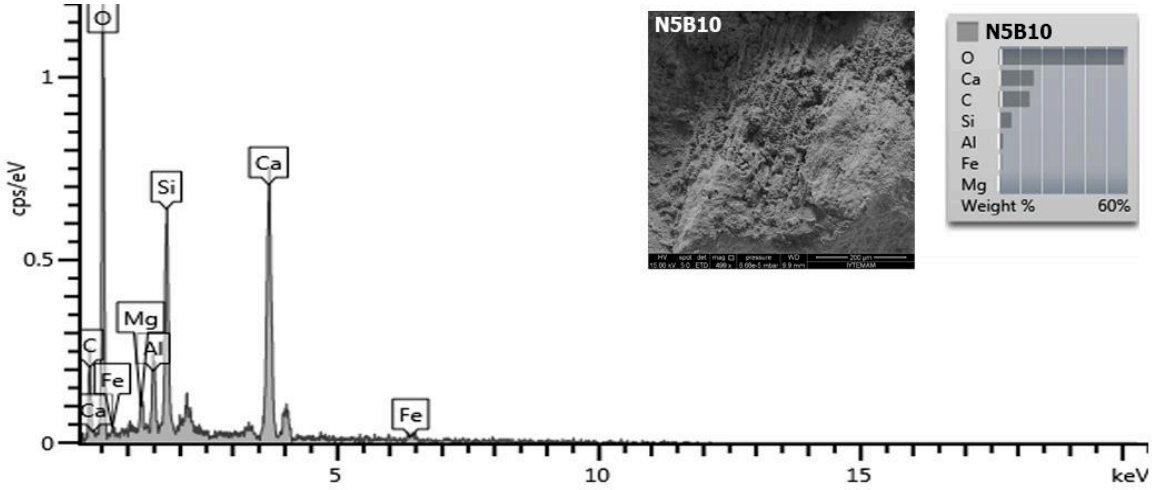


Diagram 4.41: EDX analysis of lime samples taken from Structure N5B10

SiO_2 gels filling the organic cavities are observed on SEM images of the lime samples taken from the internal fill of the cells. (Figure 4.304) The clearest is silicon dioxide gel filling a *Cyperaceae* plant remnant. EDX analysis of the lime samples identified the elements O (58.28%), Ca (16.41%), C (14.47%), Si (6.14%), Al (2.12%), Fe (1.64%), and Mg (0.93%). (Diagram 4.41) Investigation of plant remains by EDX analysis identified crystals contained the elements O (67.01%), Ca (14.15%), and Si (14.46%) with traces amounts of Al, P, Mn, and Fe. (Diagram 4.42) Silicon peak in this area clearly show silicon dioxide gel filling plant remnants. There are very a few granular crystal structures covering plant remains filled with silicon dioxide.

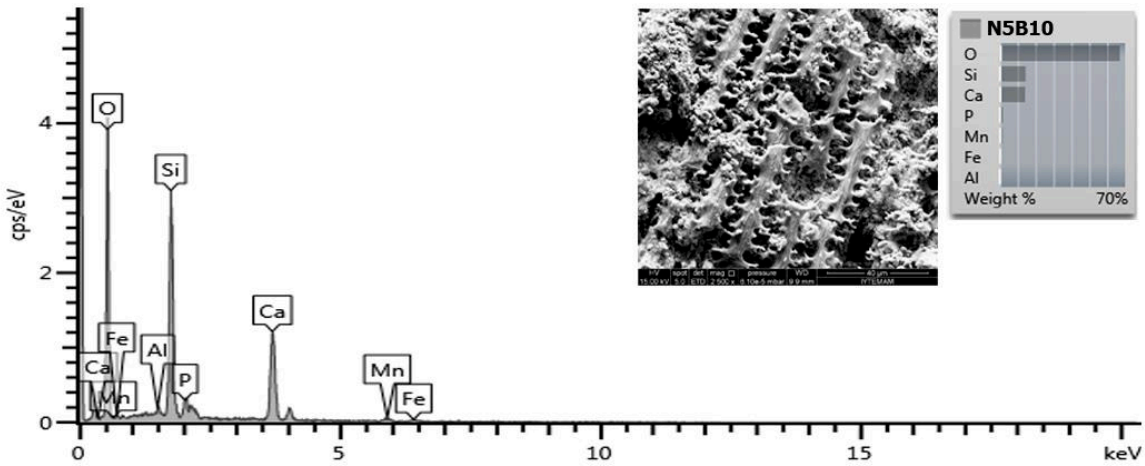


Diagram 4.42: EDX analysis of plant remains found in the lime samples taken from Structure N5B10

4.4.3.1.11. Structure N5B11

This is located in Area B, in the northeast section of trench 15G between the elevations of 700.38 to 700.58 meter. According to its wall remains and general appearance, the structure is classified as a Cell Building. The structure is located on the lower terrace with a slightly undulating appearance, similar to the structures N5B9 and N5B10. However, contrary to other structures on the lower terrace, it was built with east-west orientation along with the structures on the upper terrace. The walls have been preserved to a height of 20 cm.

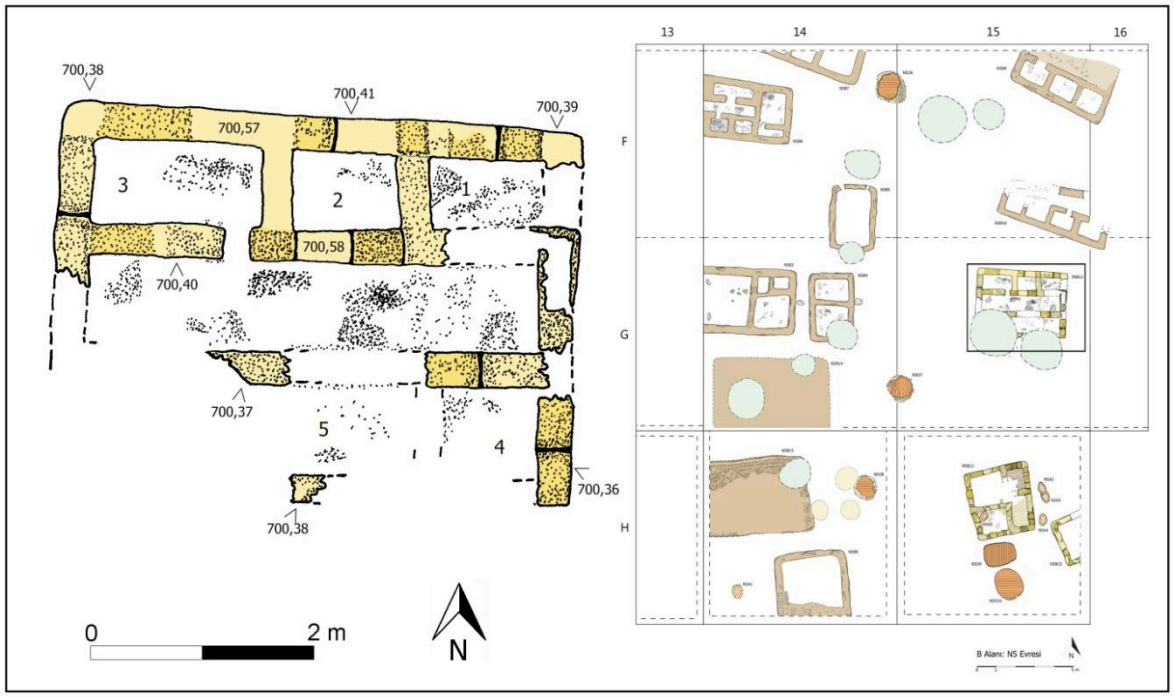


Figure 4.37: Location and plan of Structure N5B11

The structure is 476 cm long in the east-west direction and is 343 cm wide in the north-south direction. The Cell Building has five cells; three cells along the north wing and two cells in the south side. (Figure 4.37, 4.156 – 4.158) However, there may have been three cells in the south wing as the southwest corner of the structure was disturbed by a deep Middle Age pit. Since the corridor having the dimensions of 410 cm long and 76 cm wide was partially destroyed, its plan has not entirely been identified.

The cell dimensions are different, from 80x86 cm to 73x151 cm. Cell number 3 in the northern section of the structure having a 22 cm-wide doorway is longer than the others. The width of the bearing and the partition walls are nearly the same. The bearing walls are 26-32 cm wide, and the partition walls are 25-30 cm wide.

The cells and the corridor did not have any plaster floor remains or hardened living floors; however, occasionally dense 2-3 cm-thick lime surfaces were identified. These lime surfaces were defined the floor level of the structure. Due to the entire absence of archaeological material in fills of the cells and the corridor, it appears that the structure was thoroughly cleaned before it was left. There are no graves found within the cells or under the floor levels.

The noteworthy characteristic of this structure is the clear difference in the wall construction technique; in the walls both piled earth technique and the duripans were used together. Duripans having substandard sizes, indicate the absence of standard-sized molds. The 4-7 cm-thick duripans were irregularly placed in upper or lower rows inserted in layers made with the piled earth technique. (Figure 4.158) In contrast to the structural walls made with piled earth, there were more varieties of earth used in the duripans. Occasionally, it was milk-white lime-rich earth, occasionally dirty white earth, and on occasion grey buff coloured soil was used. The limey earth was probably taken raw from the caliche level above the Miocene sandstones that the settlement sits on. The caliche layer is observed nearly 1 m below the natural soil in two soundings in trenches 20/O and 22M. Analysis of the whitish lime-rich soils from the caliche level identified having similar mineralogical property to the white-coloured duripans. However, contrary to the samples taken from the caliche layers, organic remains are observed on SEM images of the duripans. (Figure 4.305)

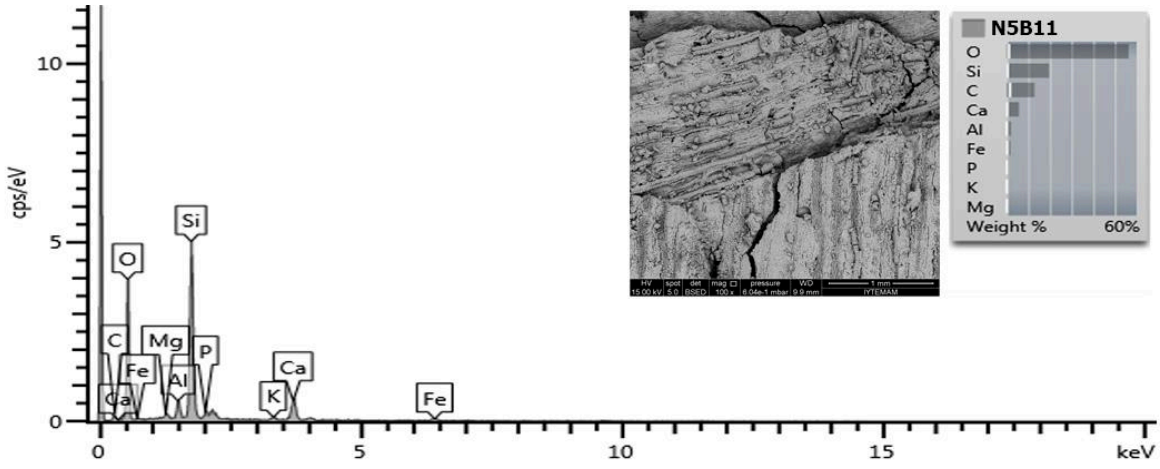


Diagram 4.43: EDX analysis of lime samples taken from Structure N5B11

Calcified SiO_2 gels filling the organic cavities are observed on SEM images of the lime samples taken from the cells. The clearest ones are silicon dioxide gel filling *Gramineae*, *Cyperaceae*, *Ericaceae*, and *Panicoideae* plant remnants. (Figure 4.305b-d) Investigation of lime samples with EDX analysis identified the elements O (56.27%), Ca

(5.64%), C (12.85%), Si (19.58%), Al (1.99%), and Fe (1.59%) with traces amounts of Na, Mg, P, and K. (Diagram 4.43)

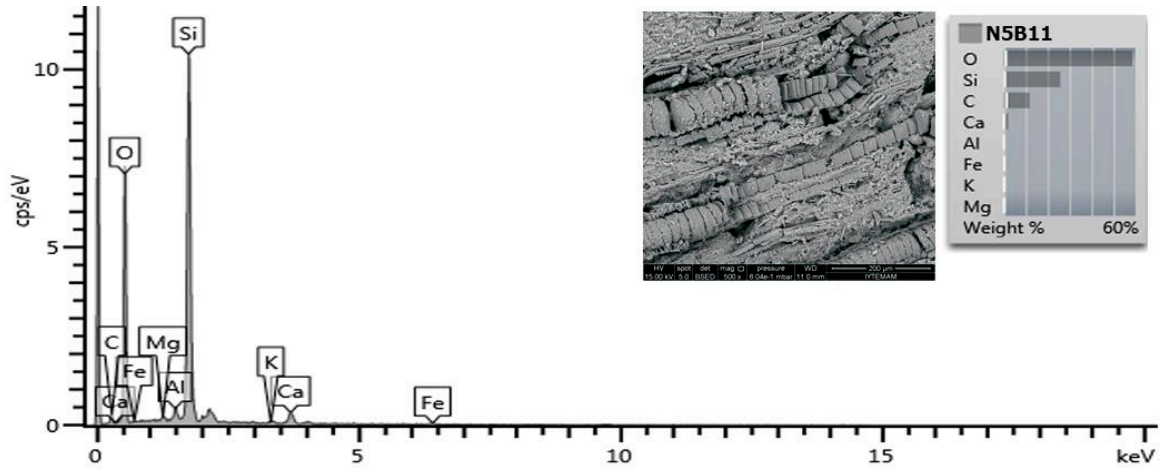
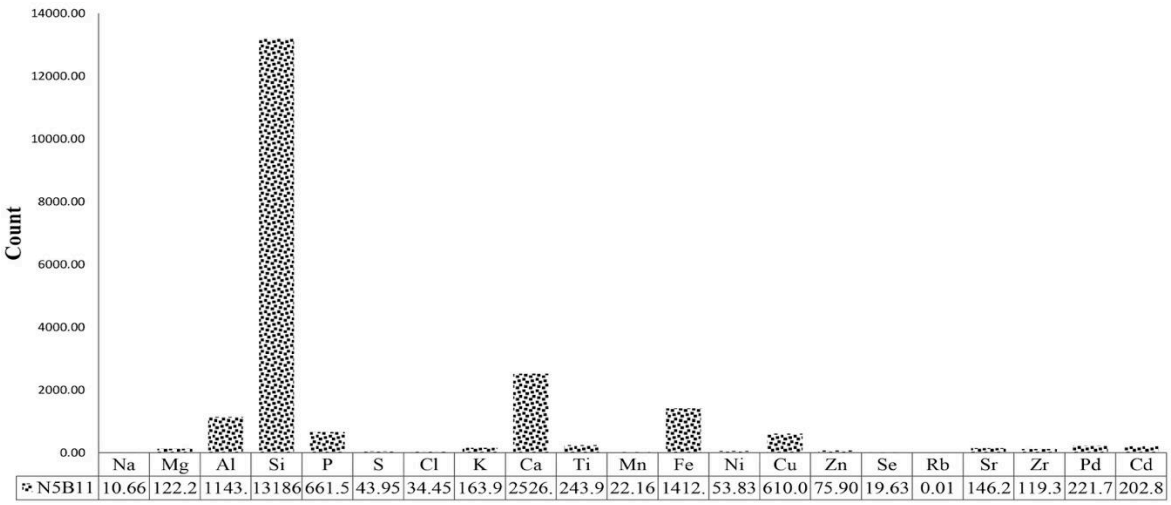


Diagram 4.44: EDX analysis of plant remains found in the lime samples taken from Structure N5B11

Analysis of plant remains by EDX method identified the crystals in these areas contained O (58.57%), Ca (1.96%), C (11.79%), and Si (25.63%) elements. (Diagram 4.44) The high rate of silicon in this area clearly shows that these plant remains were filled with SiO_2 gel. Small proportions of scalenohedral and granular crystal structures accumulate around the plant remains filled with silicon dioxide. (Figure 4.305c)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N5B11	10.66	122.2	1143.	13186	661.5	43.95	34.45	163.9	2526.	243.9	22.16	1412.	53.83	610.0	75.90	19.63	0.01	146.2	119.3	221.7	202.8

Diagram 4.45: XRF analysis of the lime samples taken from Structure N5B11

Investigation of lime samples with the XRD method were identified as containing calcite, quartz and graphite minerals. Their chemical composition is calcium carbonate, silicon dioxide, and carbon compounds. (Diagram 4.110) Investigation of the same samples with the XRF analysis observed that the following elements dominating; Si (63%), Ca

(12%), Fe (7%), Al (5%), and P (3%), together with very small amounts of Ni, Zn, Sr, Rb, Na, K, S, Pd, Cl, Cu, and Ze. (Diagram 4.45)

4.4.3.1.12. Structure N5B12

This is located in Area B, almost in the centre of trench 15H between the elevations of 700.10 to 700.40 meter. Based on the walls and general appearance of the structure, it is classified as a multi-roomed structure. (Figure 4.38, 4.159) Contrary to the other structures of Phase N5 in Area B, the structure N5B12 was constructed with southeast-northwest orientation. Sitting on a slightly undulating surface, the structure is located on the lower terrace along with the structures N5B9, N5B10, and N5B11. Structure N5B12 mainly sits on a greyish buff fill, however, in the structure cross-sections identified occasional yellow-coloured ashy and lead-grey dense ashy fill within this greyish buff fill. The preserved walls without a stone foundation are 30 cm high.

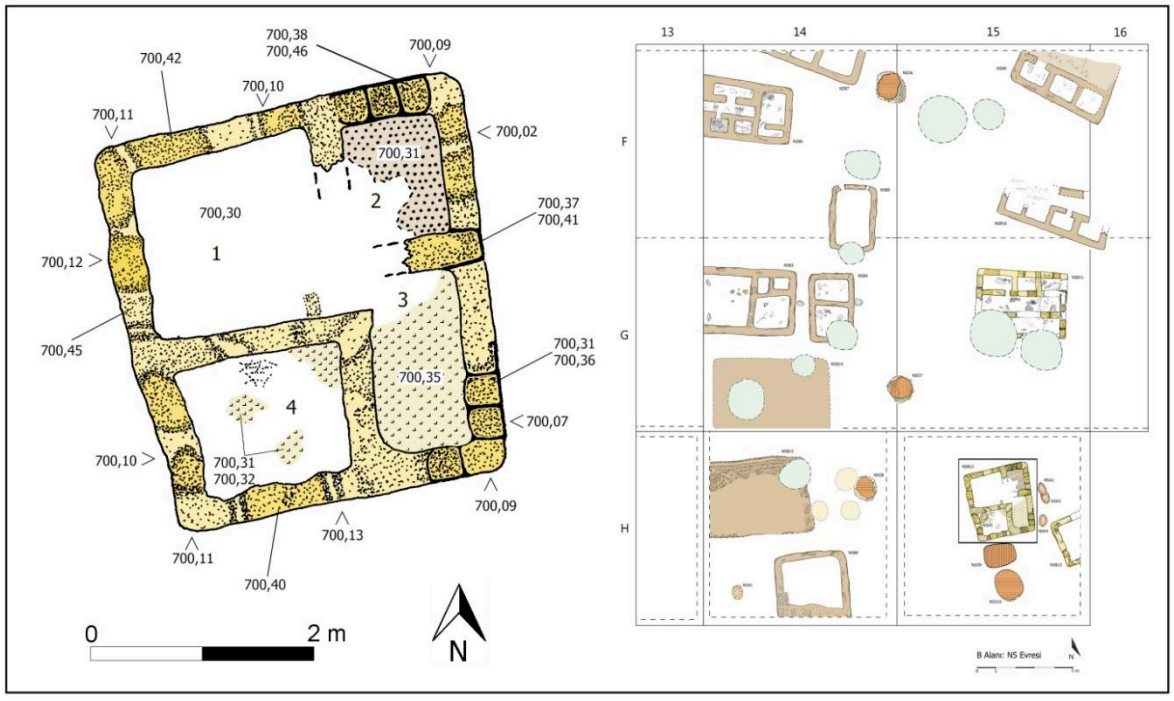


Figure 4.38: Location and plan of Structure N5B12

The rectangular structure is 351 cm long in the east-west direction and 337 cm wide in the north-south direction. The bearing walls are 28-34 cm wide, and the partition walls are 22-30 cm wide. The structure has four rooms. The dimensions of the rectangular rooms are different from each other with the sizes of 87x109 cm and 160x167 cm. (Figure 4.338) The intersection of the room's number 1, 2 and 3 has partially been destroyed, therefore,

doorways between the rooms could be identified. There is no door opening detected in the preserved walls of the room number 4. There is a nearly 20 cm elevation difference between the plaster floors and the bottom level of the walls. (Figure 4.161)

Nearly 1 cm-thick gypsum plastered floors were identified in two rooms, namely, rooms number 3 and 4. (Figure 4.160) The plaster floor continuing to the edges of the walls in the room number 3 was randomly be distinguished in the room number 4. In room number 2, a yellowish-brown coloured surface was identified nearly at the same level as the other plaster floors. Covering almost the entire room, this yellowish-brown surface is interpreted as the disrupted floor remains. Room number 1 did not have any plaster floor remains. An entire absence of material within the rooms pointed that the structure was cleaned when it was left.

Another noteworthy characteristic of the structure N5B12 is simultaneously usage of the duripantechnique and kerpiç block technique. Except for 5 kerpiç blocks in the upper rows, the sizes of the kerpiç blocks are different. Since the kerpiç block sizes were not the same, it is understood molds have substandard sizes. The 5-10 cm-thick kerpiç blocks were irregularly placed in upper or lower rows inserted in layers made with the duripantechnique. The earth filling above and/or below the kerpiç blocks was flattened either during construction or due to compression by the upper rows of kerpiç and was in direct contact with both blocks. (Figure 4.162 – 4.164) Although no trace of mortar was identified between these earth bedding and the kerpiç blocks, there were clear mortar traces between kerpiç blocks in the upper rows. The kerpiç blocks in the upper rows have oval-curved sides and mean dimensions of 30x35x6 cm. In contrast to the structural walls made with piled earth, there were more varieties of earth used in the construction of these walls. Occasionally it was brown sandy earth, occasionally yellow-clay earth, and on occasion lime-rich soil was used. The kerpiç blocks in the upper rows contain rich organic material whereas the samples that were taken from the yellowish brown- or greenish grey-coloured kerpiç blocks in the lower rows found nearly no proportion of plant material within them.

Phytolith analysis of lime samples identified reeds, or herbaceous plant remains. The phytoliths contained high frequencies of *Bulliform, Trichome* and *Elongate* form. *Festucoid, Panicoid* and *Chloridoid* and *Silicified Woody Forms* were also identified. The proportions of *Festucoid*, *Panicoid* and *Chloridoid* phytoliths were relatively low. (Diagram 4.46) Pollen analysis of the same samples identified *Poaceae* pollens dominantly, together with

Malvaceae, Apocynaceae, Verbenaceae, Cesalpiniaceae, Liliaceae, Asparagaceae, and *Calenduleae* pollens.

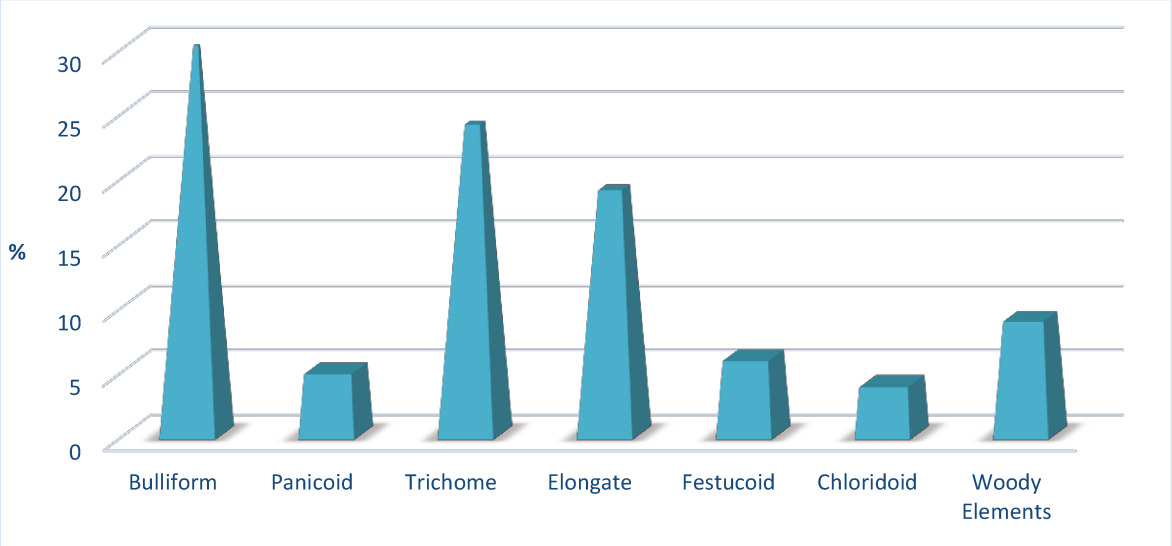


Diagram 4.46: Distribution of phytoliths in the lime samples taken from Structure N5B12

In the examination of earth samples taken from the structure fill by flotation *Triticum or Hordeum*, and *Pisum sativum* were identified while in the examination of earth samples taken from the open area immediately north of it, found *Triticum turgidum ssp*, *Fabaceae, Hordeum vulgare, Lens culinaris, Medicago radiata, Lathyrus* or *Vicia*, and *Pisum sativum*. (Table 3.2)

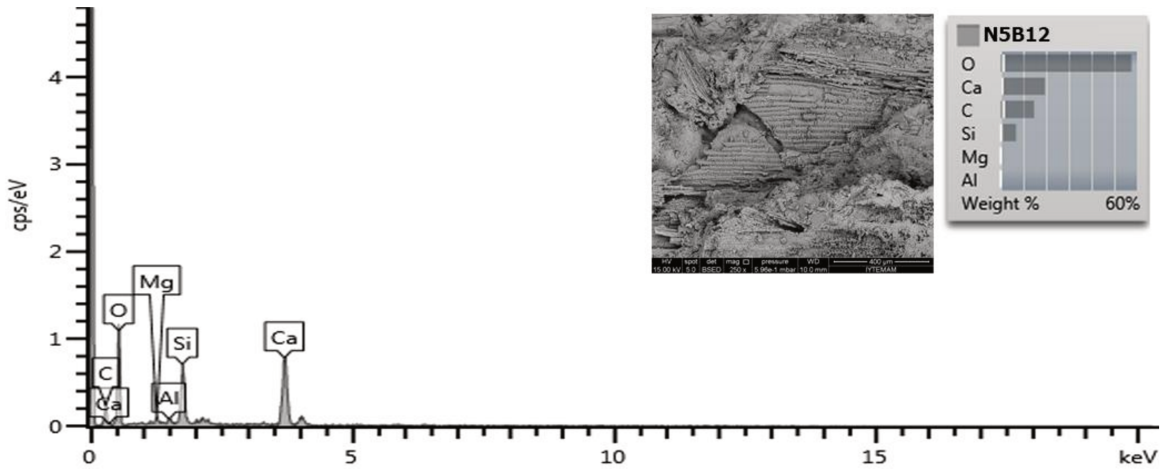


Diagram 4.47: EDX analysis of lime samples taken from Structure N5B12

SiO_2 gels filling the organic cavities are observed on SEM images of the lime samples. (Figure 4.306) The clearest ones are silicon dioxide gel filling the *Gramineae, Cyperaceae* and *Ericaceae* plant remnants. Investigation of lime samples with the EDX

analysis identified the elements with mean ratios O (57.65%), Ca (19.56%), C (14.71%), Si (6.77%), Al (0.59%), and Mg (0.72%). (Diagram 4.47)

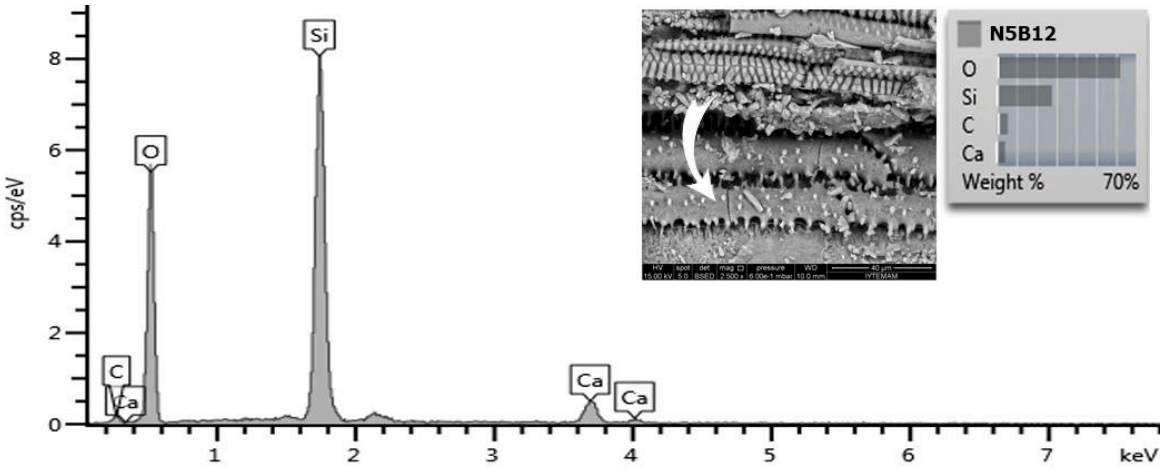


Diagram 4.48: EDX analysis of plant remains found in the lime samples taken from Structure N5B12

Investigation of calcified plant remains identified on SEM images with EDX analyses identified crystals in this area comprise O (62.06%), Ca (4.37%), C (5.70%), and Si (27.87%) elements. The proportion of silicon confirmed the presence of SiO_2 gels within these crystals. (Diagram 4.48)

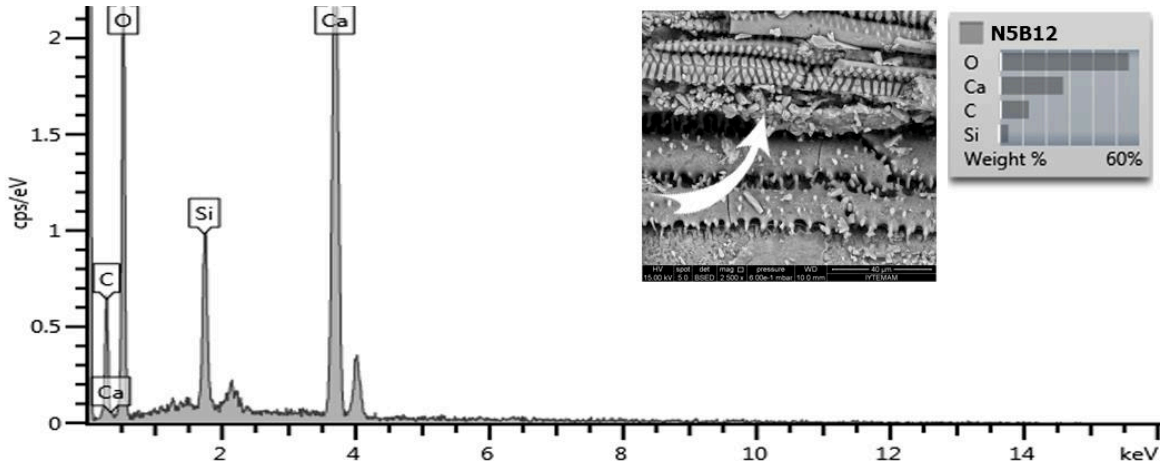


Diagram 4.49: EDX analysis results of lime fragments around the plant residues found in lime samples taken from Structure N5B12

Scalenohedral crystal structures accumulated around the silicon dioxide filling plant remains. Analysis of these accumulations by EDX method identified O (55.52%), Ca (27.54%), C (12.83%), and Si (4.10%) elements. (Diagram 4.49) Contrary to plant surfaces, calcite and carbon elements increased in these accumulation areas, while the Si proportion reduced. According to XRD analysis of the calcified lime samples identified as containing calcite, quartz, magnesium, and enstatite minerals. Their chemical composition comprises

calcium carbonate, silicon dioxide, magnesium silicate, and copper silicate hydroxide hydrate compounds. (Diagram 4.111)

4.4.3.1.13. Structure N5B13

This is located in Area B in the east profile edge of trench 15H between the elevations of 700.19 to 700.42 meter. Only the eastern section of the structure was uncovered, the rest was outside the exposed area. Based on the wall remains and general layout of the structure, it may be a single-roomed structure. (Figure 4.39, 4.165) However, there may be another room existed in the east section outside the exposed area. Similar to the structure N5B4, this exposed section may be the west room of a double-roomed structure. Therefore, the structure is classified as an ‘indeterminate planned structure'.

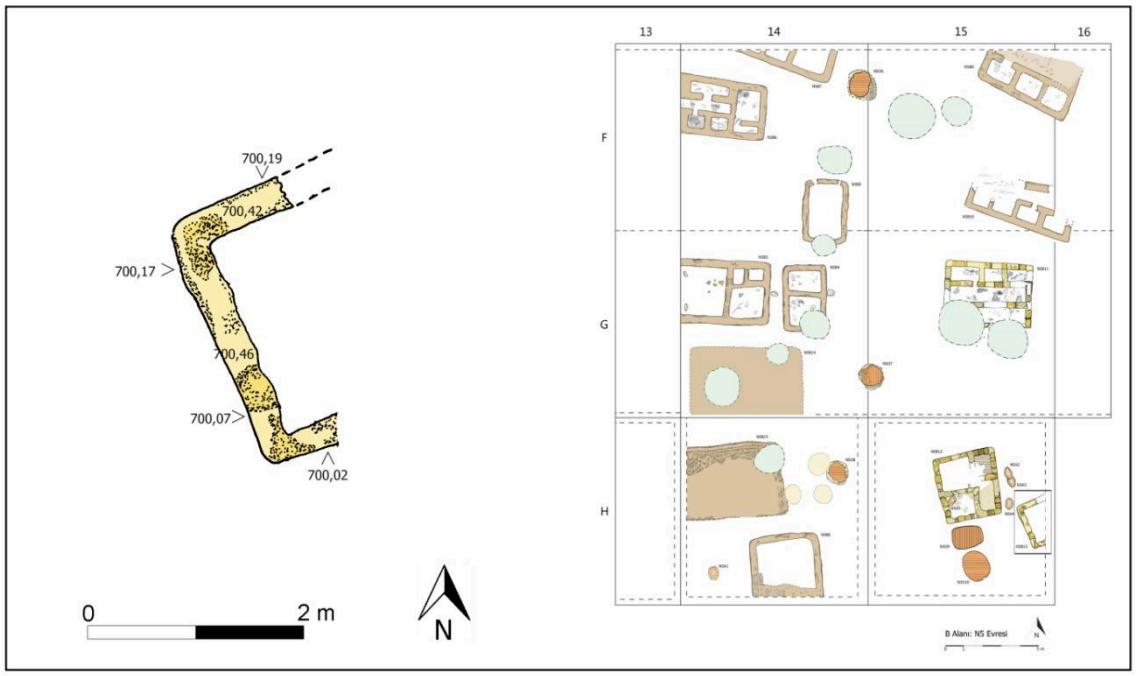


Figure 4.39: Location and plan of Structure N5B13

The structure is 248 cm wide in the north-south direction, and the exposed section is 121 cm wide in the east-west direction. The walls identified with clear edges have a width of 30-35 cm. There was no plaster floor remains identified. The 5-10 cm-thick kerpiç blocks were irregularly placed in upper or lower rows inserted in layers made with the duripan technique. Since the duripan sizes were not the same, it is understood molds have substandard. The earth fills above and/or below the duripans were flattened either during construction or due to compression by the upper rows of kerpiç and were in direct contact

with both duripans. No trace of mortar was identified between these earth bedding and the duripan fragments. As in structure N5B12, there were more varieties of earth used in the construction of the walls the structure N5B13.

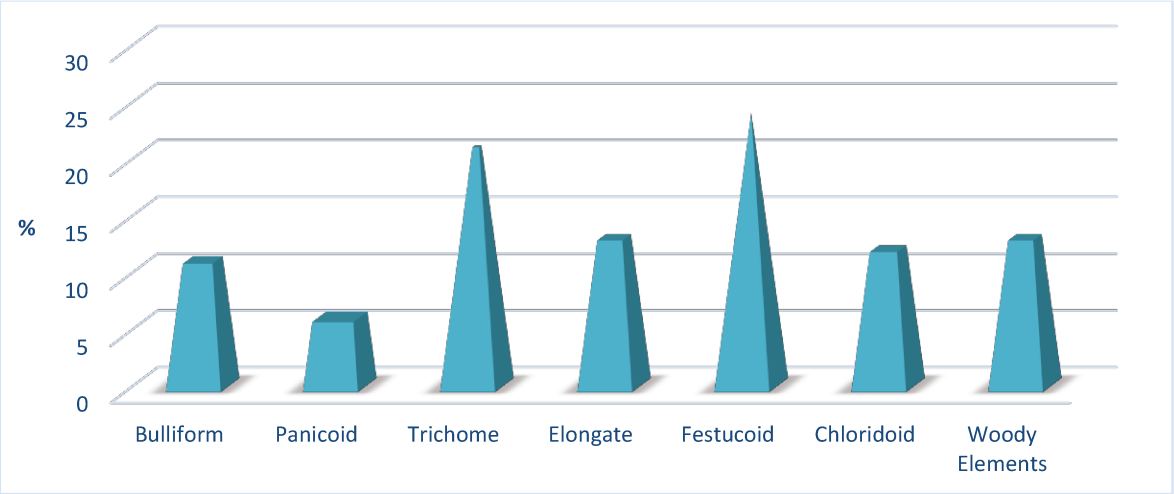


Diagram 4.50: Distribution of phytoliths in the lime samples taken from Structure N5B13

Phytolith analysis of lime samples identified reeds or woody plants. The phytoliths contained high frequencies of *Trichome* and *Festucoid* forms. *Elongate*, *Bulliform*, *Panicoid*, *Chloridoid*, and *Silicified Woody Forms* were also identified. (Diagram 4.50; Figure 4.325 - 4.330) The phytoliths found within the lime samples are diagnostic and well-preserved. Pollen analysis of the same samples identified *Poaceae* pollens dominantly, together with *Malvaceae, Apocynaceae, Verbenaceae, Cesalpiniaceae, Liliaceae, Asparagaceae*, and *Calenduleae* pollens. (Figure 4.331, 4.332)

4.4.3.1.14. Structure N5B14

This is located in Area B, in the southwest of trench 14G between the elevations of 701.30 to 700.57 meter. Based on the traces and general appearance, the structure is classified as a single-roomed structure. As per this type, it was a temporary structure without walls probably surrounded by reeds with flimsy upper cover. The fill has been preserved to a height of 27 cm. The structure was seriously disturbed by two Middle Age pits. (Figure 4.40, 4.166)

The structure has 611 cm in length in the east-west direction and is 367 cm wide in the north-south direction. Forming a large rectangular single room, plaster floor and inner partitions were not identified. Its living surface was not defined.

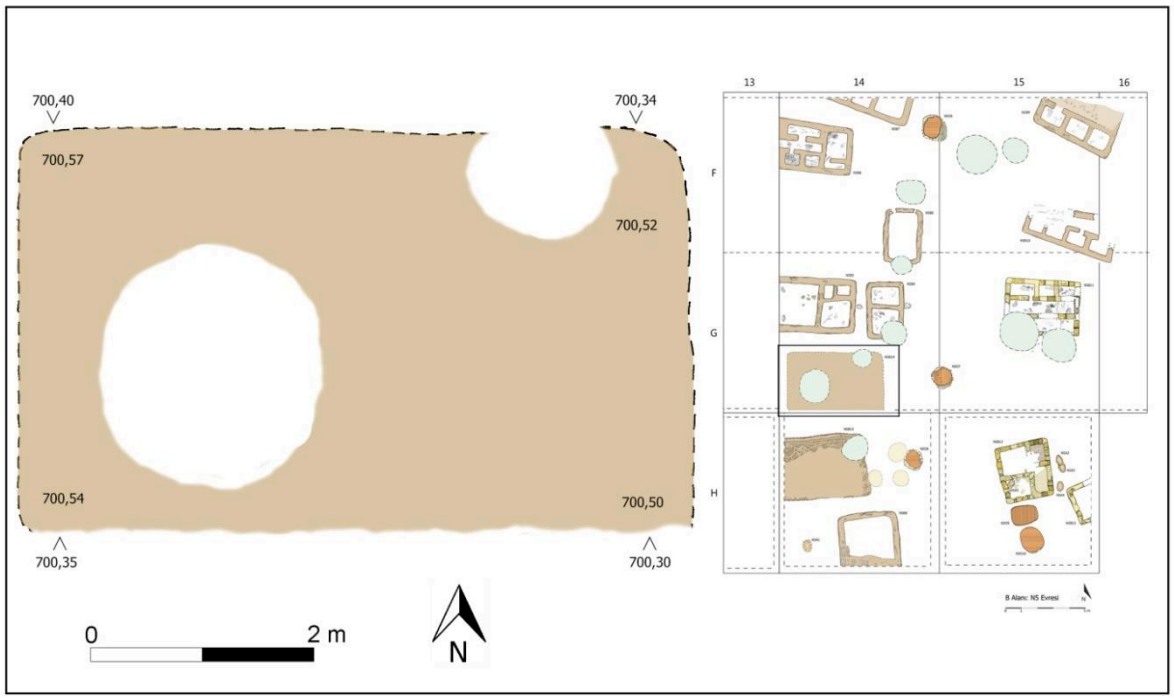


Figure 4.40: Location and plan of Structure N5B14

The layout of the structure is only distinguished from the external area by its colour and the weak lime lines. The structural filling is light reddish-brown. On this context, these traces are probably remains of a temporary structure with a reed surrounding. Similar traces were commonly observed in our ethno-archaeological field studies in the Lower Garzan Basin. The best examples are in the winter quarter of Bazivan Kom.

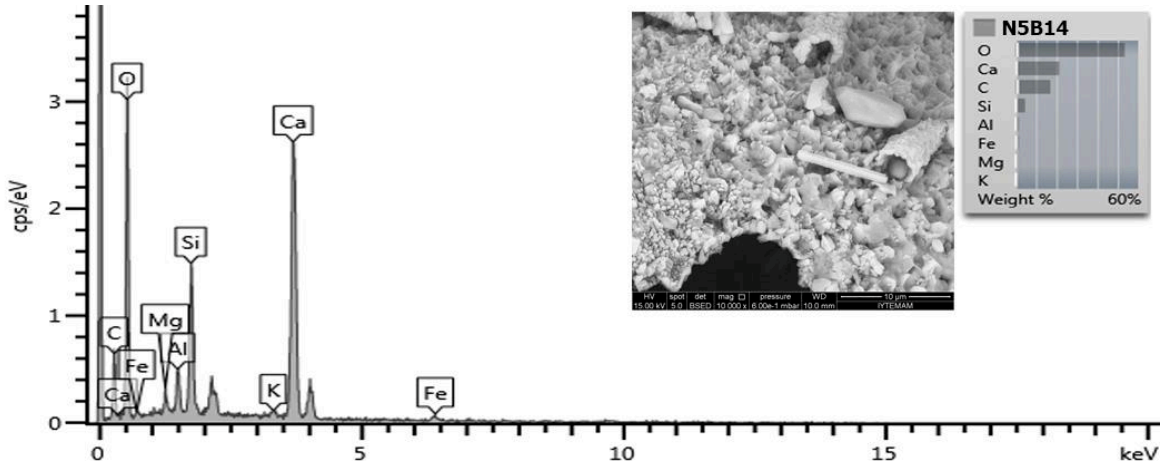


Diagram 4.51: EDX analysis of lime samples taken from Structure N5B14

SEM images of lime samples observed scalenohedral, stalactite and acicular crystal structures. (Figure 4.307) Sharp-tipped and stalactite-shaped crystals were very clearly observed around tubes left by organic remains and insect chitin. EDX analysis of lime samples identified the elements O (53.33%), Ca (21.33%), C (16.98%), and Si (4.58%) with trace amounts of Al, Mg, K, and Fe. (Diagram 4.51)

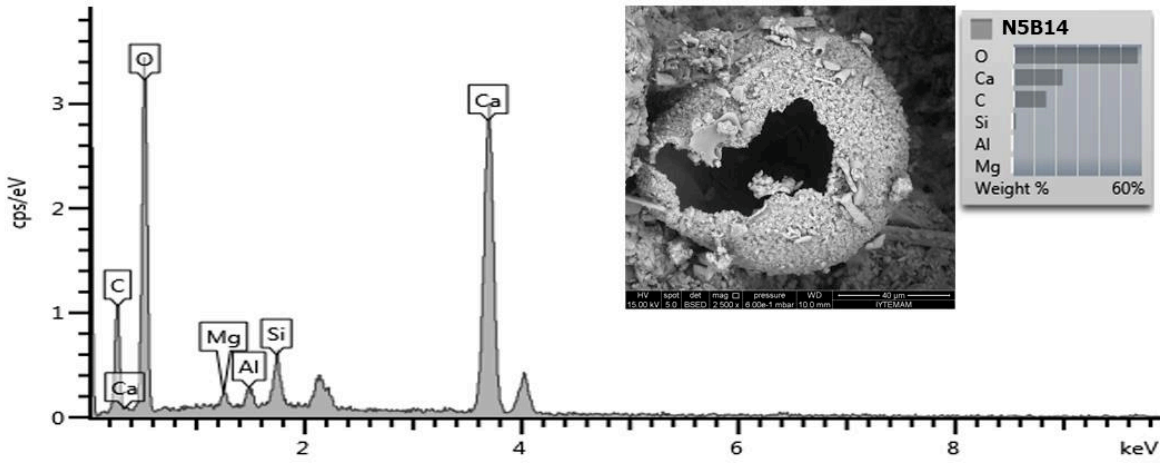


Diagram 4.52: EDX analysis results of insect chitin found in lime samples taken from Structure N5B14

Investigation of lime samples containing the insect chitin with the EDX analysis identified the elements O (58.14%), Ca (23.33%), C (15.71%), Si (1.60%), Al (0.68%), and Mg (0.55%). (Diagram 4.52; Figure 4.307b-c) XRD analysis of the same lime samples were identified as containing calcite, quartz, and nitratine minerals. Their chemical composition, which comprises calcium carbonate, silicon dioxide, and sodium nitrate compounds, indicates the presence of aridity. (Diagram 4.112)

4.4.3.1.15. Structure N5B15

This is located in Area B, in the northwest of trench 14H and trench 13H between the elevations of 701.87 to 701.12 meter. Based on the traces and general appearance, the structure is classified as a single-roomed structure. (Figure 4.41, 4.167) As per this type, it was a temporary structure without walls, probably surrounded by reeds with flimsy upper cover. Similar to the other contemporary structures in the area, it sits on a grey, ashy occasionally stone-rich fill. The structure was constructed on a natural terrace with an undulating flat surface in east-west orientation along with the other structures. The area appears to be a higher terrace than the terrace where the structures N5B3 and N5B6 built on. The structure is 554 cm long in the east-west direction and is 387 cm wide in the north-south

direction. The structure has reed surroundings with curved corners. Surrounding the structure, but dominantly in the northern side, there is 3-7 cm-wide and nearly 60-82 cm-high lime traces with organic content. On this surface did not identify any plaster remains. This surrounding with a height of at least 1 m appears to have fallen into the structure.

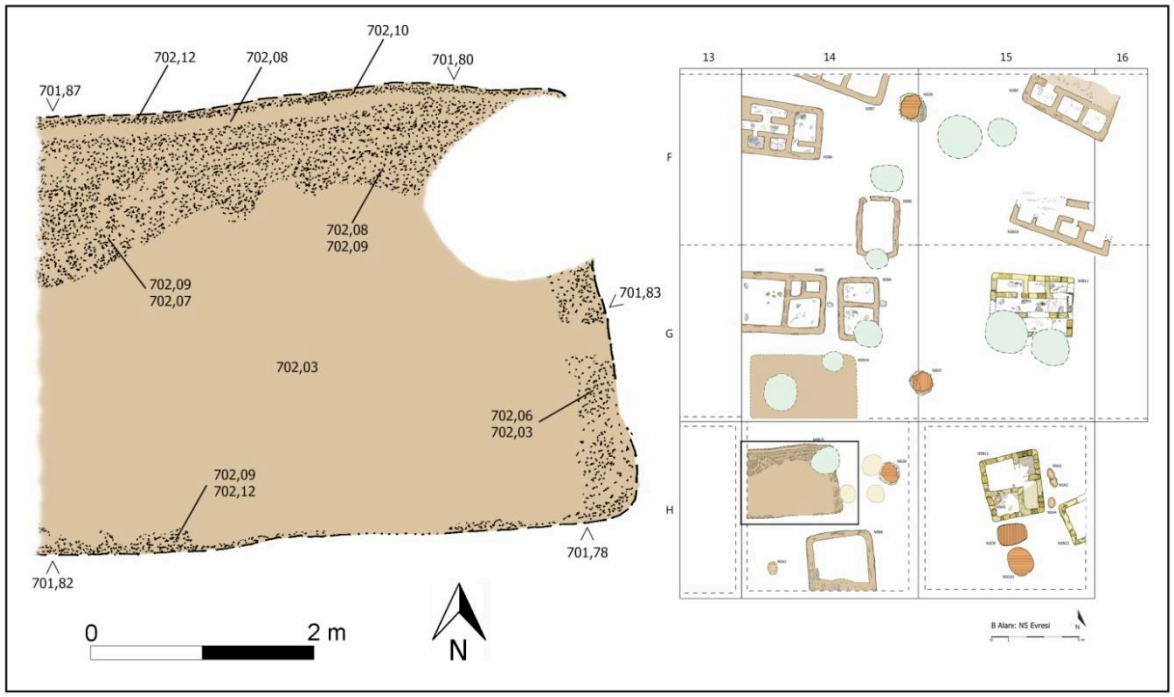


Figure 4.41: Location and plan of Structure N5B15

4.4.3.1.16. Structure N5B16

This is located in Area C on a surface like a terrace in the east side of trench 18G between the elevations of 699.28 to 699.38 meter. The western part of the badly-destroyed structure is outside the exposed area. The walls have been preserved to a height of 10 cm. Based on the wall remains and general appearance, this structure is similar to the multi-roomed structures. (Figure 3.71) Covering an area of nearly 18 m^2, the widths of its walls are 28-41 cm. The face of the walls is only distinguished from the external area by its colour and occasional lime fragments. The internal fill of walls is homogeneous reddish-brown loose earth. Four rooms having different dimensions were only distinguished by traces, but their limits are not clear. The internal deposits of the rooms are greyish buff-coloured ash-poor content. There were no plaster floor remains identified in the rooms.

4.4.3.1.17. Structure N5B17

This is located in Area C in the northeast of trench 18G between the elevations of 699.31 to 699.39 meter. The structure was constructed on a terrace inclined towards east, along with the structure N5B16. It is badly destroyed and its western portion remains outside the exposed area. The walls have been preserved to a height of 8 cm. According to the wall remains and general appearance, this structure is similar to a single-roomed structure. Covering an area nearly 10 m^2, its walls are 32-43 cm thick. The faces of the walls are only distinguished from the external area by colour and occasional lime fragments. The internal fill of walls is homogeneous light reddish-brown loose earth. The inner deposits of the structure are greyish-brown occasionally stony. There were no plaster floor remains identified. (Figure 3.71)

4.4.3.2. Hearths

In Phase N5, ten hearths were identified with five in Area A and five in Area B. (Table 4.5)

4.4.3.2.1. Hearth N5O1

This was located in an open space in the northwestern part of trench 20M in Area A. It covers an area of approximately 2 m^2 between the elevations of 699.80 to 699.93. It had a single, light grey-coloured plastered floor with a stone pavement. Based on the floor remains, the hearth slightly inclined to the north. (Figure 4.216)

The roundish-shaped hearth was 223 cm in the north-south direction and 211 cm in the east-west direction. The pavement was made of basalt and groundstone fragments of different sizes between 3x5x7 - 6x8x15 cm. Between the stone pavement and the plastered floor was a layer of greyish buff-coloured sand-and stone-tempered 4-5 cm-thick filling. The surface of the very hard plastered floor, which 3 cm in thickness, was densely cracked. A compact lime fills almost surrounded the entire hearth, however there were no plastering or burning traces on the surface of this lime fill.

4.4.3.2.2. Hearth N5O2

This was one from the triple hearth group located in the northern part of trench 21L in Area A, to the east of Hearth N5O3 and south of Hearth N5O4. (Figure 4.217, 4.218) It covers an area of approximately 1 m^2 between the elevations of 699.50 to 699.62. There was very loose lime debris around the hearth 2-4 cm in thickness without any plaster traces. The hearth had a single bluish grey-coloured plastered floor with a stone pavement. Based on the floor remains, the hearth slightly inclined to the north.

The dimensions of the oval-shaped hearth were 128 cm in the north-south direction and 98 cm in the east-west direction. Its plastered floor was 2 cm in thickness. The pavement was made of basalt and pebbles of different sizes between 4x5x9 - 6x7x16 cm. Between the stone pavement and the plastered floor was a layer of white-coloured homogeneous 2 cm-thick filling. This homogeneous filling was very similar to the fill within the walls of the structures N4B11 and N4B12 in terms of colour and texture. There are few pottery fragments found just to the north of the hearth. Plant remains were neither identified in this area, nor in the soil samples that were taken from the top of the hearth.

4.4.3.2.3. Hearth N5O3

This was the other hearth from the triple hearth group located in the northern part of trench 21L in Area A. It lies to the west of hearth N5O2 and to the southwest of hearth N5O4. (Figure 4.219 – 4.221) The hearth covers an area of approximately 1.8 m^2 between the elevations of 699.55 to 699.64 and it was on the grey-coloured ashy surface. It had a single light grey-coloured plastered floor without a stone pavement. Based on the floor remains, the hearth slightly inclined to the south. The oval-shaped hearth was 164 cm long in the north-south direction and 128 cm wide in the east-west direction. The plastered floor with a thickness of 1 cm was built on the greyish buff-coloured homogeneous sandy layer nearly a depth of 3-4 cm, which was laid on the grey coloured ashy surface. The surface of the medium hard floor was densely cracked.

4.4.3.2.4. Hearth N5O4

This was the other hearth from the triple hearth group located in the northern part of trench 21L in Area A. It lies to the northwestern of Hearth N5O2, and to the northeastern of

the Hearth N5O3. The hearth covers an area of approximately 1.7 m^2 between the elevations of 699.52 to 699.65. Its single, bluish dull grey-coloured plastered floor very slightly inclined to the south. On its northern part, debris-like lime fragments were identified without traces of plastering or burning.

The oval-shaped hearth was 163 cm long in the north-south direction and 110 cm wide in the east-west direction. The hearth was placed on the reddish-brown earth. Between the reddish-brown earth and the plastered floor was a layer of homogeneous sandy buff coloured-soil about 3-4 cm in thickness. The plastered floor, which has been partially destroyed, was 2 cm in thickness. Its surface was densely cracked.

In the examination of earth samples taken from the close vicinity of the hearth by flotation plant remains such as *Triticum/Hordeum, Triticum turgidum ssp*, and *Fabaceae* were detected.

4.4.3.2.5. Hearth N5O5

This was located in an open space in the northeastern part of trench 21M in Area A; it is to the east of the Structure N5B1 and it is between the hearths N6O4 and N4O3. (Figure 4.222, 4.223) The hearth covers an area of approximately 1.5 m^2 and it was on greyish buff, stony and ash-poor filling between the elevations of 699.80 to 699.92. On its northern part, a loose debris-like lime fragments were detected. It had a single bluish light grey-coloured plastered floor with a stone pavement. Based on the floor remains, the hearth inclined to the northeast.

The oval-shaped hearth was 154 cm long in the north-south direction and 95 cm wide in the east-west direction. Its western section could not be excavated since it was beneath the Hearth N4O3. The stone pavement was made of basalt, pebbles and ground stone fragments of different sizes between 4x6x7 - 6x8x14 cm. Between the stone pavement and the plastered floor was a layer of a homogeneous yellowish buff sandy 4 cm-thick filling. The surface of the very hard plastered floor with 2 cm thickness was slightly cracked and smooth.

4.4.3.2.6. Hearth N5O6

This was located in an open space in the northeastern part of trench 14F and the northwestern part of trench 15F in Area B. It covers an area of approximately 1.3 m^2 between the elevations of 701.21 to 701.35. Debris-like lime lines without traces of plastering or burning were determined around the hearth and on its plastered floor. The hearth, which had a single light grey-coloured plastered floor with a stone pavement inclined to the east. (Figure 4.224) The dimensions of the rounded-shaped hearth were 137 cm in the north-south direction and 129 cm in the east-west direction. The pavement was made of basalt and pebbles of different sizes between 5x6x8 - 6x9x15 cm. Between the stone pavement and the plastered floor was a layer of homogeneous yellowish grey sandy 4-5 cm-thick filling. The 2 cm-thick plastered floor was partially disturbed, and its tough surface was densely cracked and smooth.

4.4.3.2.7. Hearth N5O7

This was located in an open space in the southeastern part of trench 14G and the northwestern part of trench 15G in Area B on the grey ashy surface. It covers an area of approximately 1.1 m^2 between the elevations of 701.21 to 701.36. There were very loose debris-like lime lines without traces of plaster or burning identified around the hearth. (Figure 4.42) It had two superimposed plastered floors with a stone pavement. The hearth inclined to the east. (Figure 4.225 – 4.227)

The dimensions of the round-shaped hearth were 106 cm in the north-south direction and 111 cm in the east-west direction. The pavement was made of basalt and pebbles of different sizes between 4x5x7 - 6x8x13 cm. Between the stone pavement and the first plastered floor was a layer of sandy yellowish buff-coloured 3-4-thick filling. The first plastered floor was a bluish-grey colour about 1 cm in thickness. The surface of this floor was densely cracked with traces of burning. After that, a yellowish stone-tempered 2 cm-thick filling was laid on the first plaster floor and a new floor was plastered. The second 2 cm-thick floor has a buff colour with a rippled and slightly cracked surface.

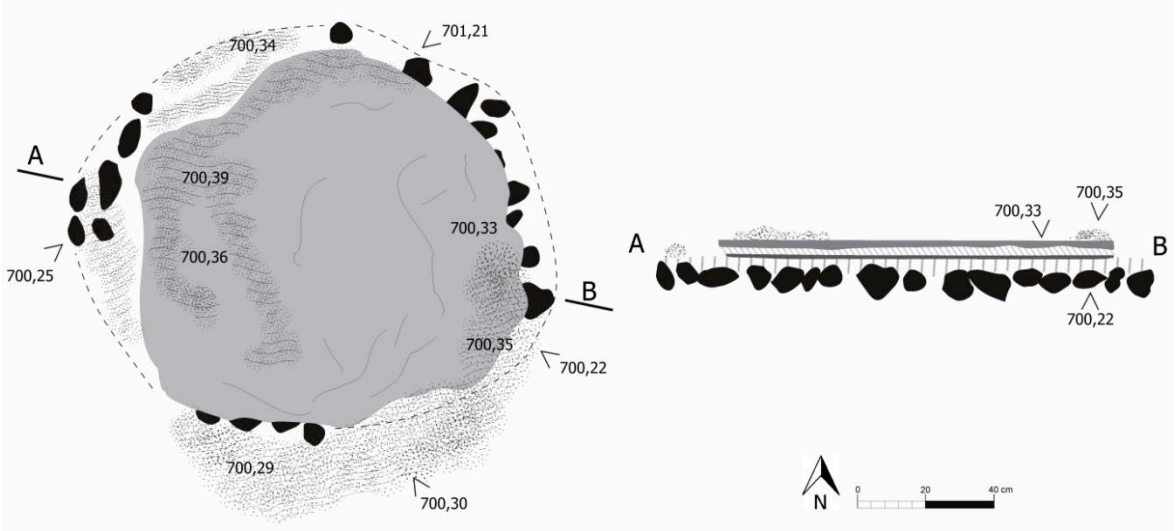


Figure 4.42: Hearth N5O7 and its cross-section

4.4.3.2.8. Hearth N5O8

This was located in an open space in the northern part of trench 14H in Area B. The hearth was on the eastern wall and just above the cell 4 of the Cell Building N6B11 of Phase N6. It covers an area of approximately 1 m^2 between the elevations of 701.85 to 701.96. It had a single, dark grey-coloured plastered floor with a stone pavement. Based on the floor remains, the hearth inclined to the south. (Figure 4.228)

The dimension of the oval/rounded-shaped hearth was 116 cm in the north-south direction and 109 cm in the east-west direction. The pavement was made of basalt and pebbles of different sizes between 4x6x7 - 5x8x15 cm. Between the stone pavement and the plastered floor was a layer of homogeneous sandy yellowish buff-coloured 2-3 cm-thick fill. The hard-plastered floor, which has been partially destroyed, was 1 cm in thickness. Its surface was densely cracked and rippled. Three ash pits having a diameter between 80 cm and 100 cm, and with a depth of 5-11 cm are just to the west of this hearth. Locally ash traces on its east side may be waste ashes from the hearth.

4.4.3.2.9. Hearth N5O9

This was located in an open space in the northern part of trench 15H, 20 cm north of the Hearth N5O10 in Area B. The hearth covers an area of approximately 1.7 m^2 between the elevations of 701.41 to 701.52 and it was built on a grey densely ashy and slightly limey

fill. It had a single bluish dark grey coloured plastered floor without a stone pavement. Based on the floor remains, the hearth inclined to the east.

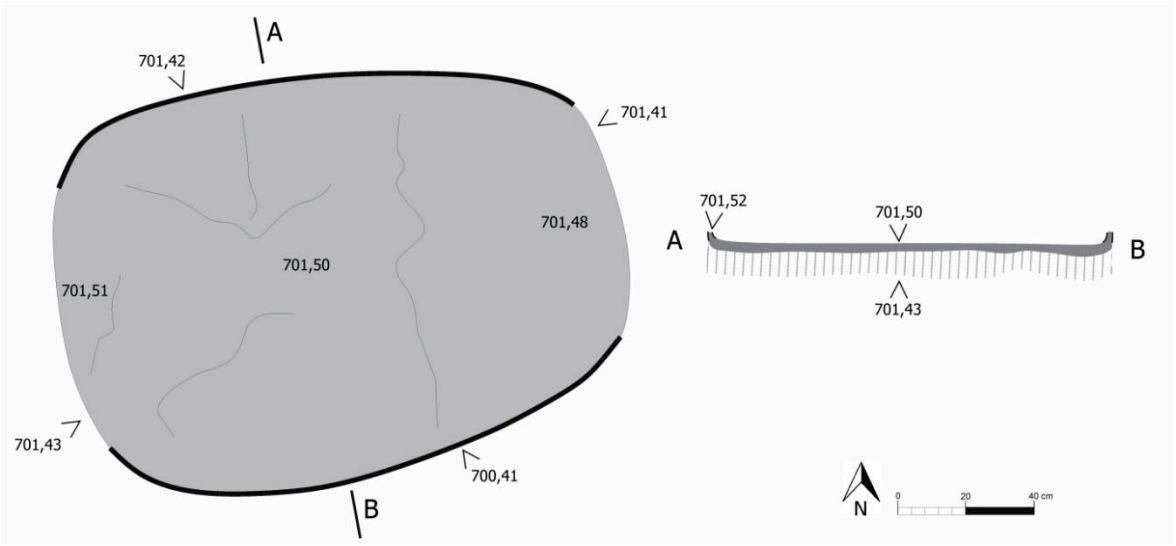


Figure 4.43: Hearth N5O9 and its cross-section

The oval /"U"-shaped hearth was 118 cm wide in the north-south direction and 169 cm long in the east-west direction. (Figure 4.43, 4.229, 4.230) Contrary to the other hearths, the hearth N5O9 was positioned in the east-west direction. The plastered floor with a thickness of 3 cm was built on a yellowish grey-coloured sandy nearly 6-7 cm-thick filling. The surface of the hard floor was rippled and slightly cracked. There are curved edges on the northern and southern sides of the floor with a height of 1-3 cm.

Examining the soil samples taken from the top of the hearth by floatation many different plant species were detected such as *Triticum/Hordeum*, *Fabaceae*, *Lens culinaris*, *Triticum turgidum ssp*, *Linum*, *Euphorbia falcate*, and *Vicia ervilia*.

4.4.3.2.10. Hearth N5O10

This was located in an open space in the northern part of trench 15H, 20 cm south of the Hearth N5O9 in Area B. It covers an area of approximately 2 m^2 between the elevations of 701.35 to 701.53. On its plastered floor was the Fire Pit N4A2 of Phase N4, which disturbed the plastered floor and caused traces of local burns on its surface. Based on the floor remains, the hearth slightly inclined to the southeast. The oval-shaped hearth was 164 cm long in the north-south direction and 145 cm wide in the east-west direction. (Figure 4.229) It had a single plastered floor without a stone pavement. The floor was plastered on a layer of greyish buff-coloured sandy and stony 4-5 cm-thick filling. The dark grey-

coloured plastered floor, which has been partially disturbed, was 2 cm in thickness. The surface of the medium hard plastered floor was rippled and cracked.

4.4.3.3. Fire Pits

Fire pits, which were not used in Phase N6, reappeared. Five fire pits were identified in Phase N5, four of them were in trench 15H and the other in trench 14H in Area B. (Diagram 3.16, Table 4.6) Three of them are very close to each other in trench 15H, and fire pits N5A2 and N5A3 were constructed on top of each other.

4.4.3.3.1. Fire Pit N5A1

It was located in an open space in the southeastern part of trench 14H in Area B. The oval-shaped fire pit was between the elevations of 702.00 to 702.06. Dug in a grey homogeneous soil, the fire pit was 53x72 cm in size and 6 cm deep. (Figure 4.44) On its edge, there is an orangish buff line due to burning with 2-3 cm thickness. There were no signs of plastering on its sides or its bottom. Its inner deposit was grey and yellowish buff with little ash.

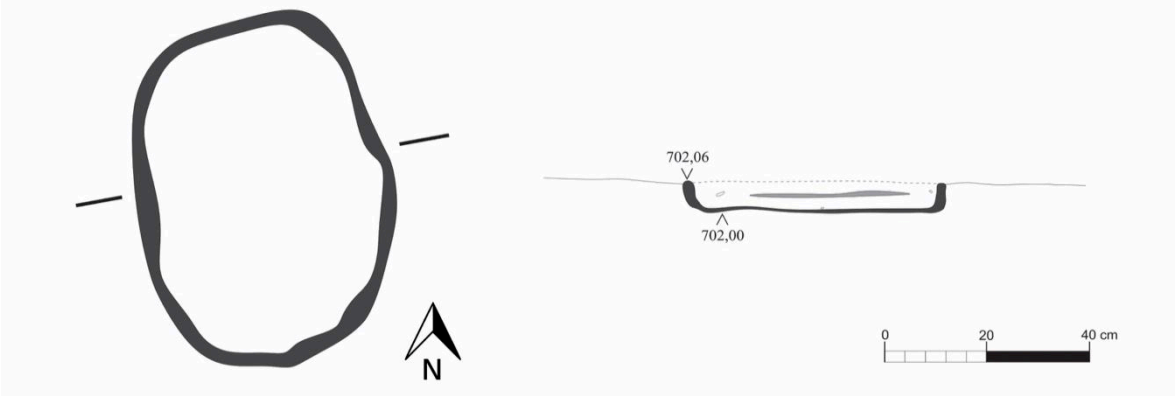


Figure 4.44: Fire Pit N5A1 and its cross-section

4.4.3.3.2. Fire Pit N5A2

This was located in an open space in the northeastern part of trench 15H in Area, in the northern part of Fire pit N5A3. The north part of the Fire Pit N5A3 was partly destroyed when this fire pit was dug. The waterdrop-shaped fire pit was between the elevations of 700.18 to 700.34. Dug in a grey homogeneous soil, the fire pit was 39x64 cm in size and 16

cm deep. On its edge, there is a dark, dull grey line due to burning with 2-3 cm thickness and and 16 cm deep. (Figure 4.45, 4.279 – 4.281) There were no signs of plastering on its sides or its bottom. Its inner deposits were grey, little stony and ashy soil. Different plant remains detected from its inner deposit by flotation were *Triticum/Hordeum*, *Triticum turgidum ssp*, *Lathyrus/Vicia*, and *Linum.*

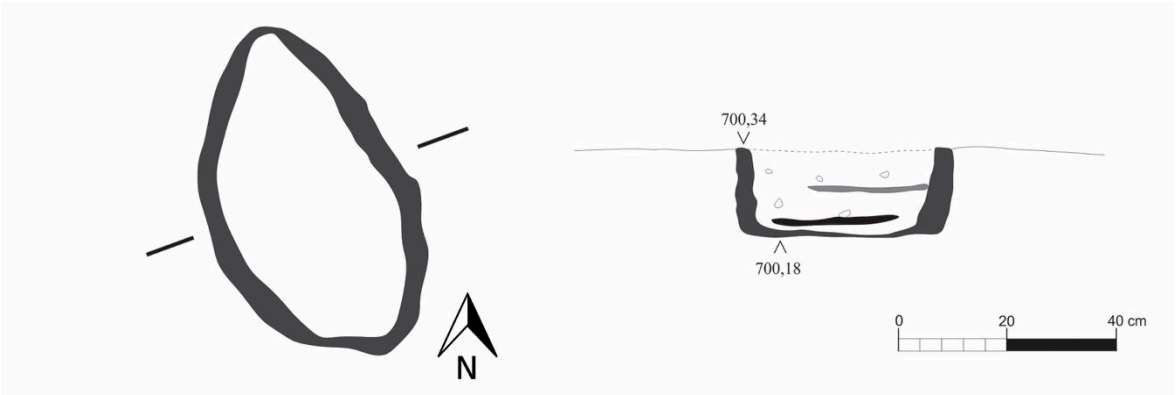


Figure 4.45: Fire Pit N5A2 and its cross-section

4.4.3.3.3. Fire Pit N5A3

This was located in an open space in the northeastern part of trench 15H in Area B, just below the Fire Pit N5A2, due to it was partially destroyed. The waterdrop-shaped fire pit was between the elevations of 700.15 to 700.32. Dug in a grey homogeneous soil, the fire pit was 41x67 cm in size and 17 cm deep. (Figure 4.46, 4.279 – 4.281) On its edge, there is a buff line due to burning with 1-2 cm thickness. There were no signs of plastering on its sides or its bottom. Its inner deposits were dull grey little stony and densely ashy soil. Different plant remains detected from its inner deposit by flotation were *Triticum/Hordeum*, *Fabaceae* family, *Lens culinaris*, and *Chrozophora tinchoria.* (Table 3.2)

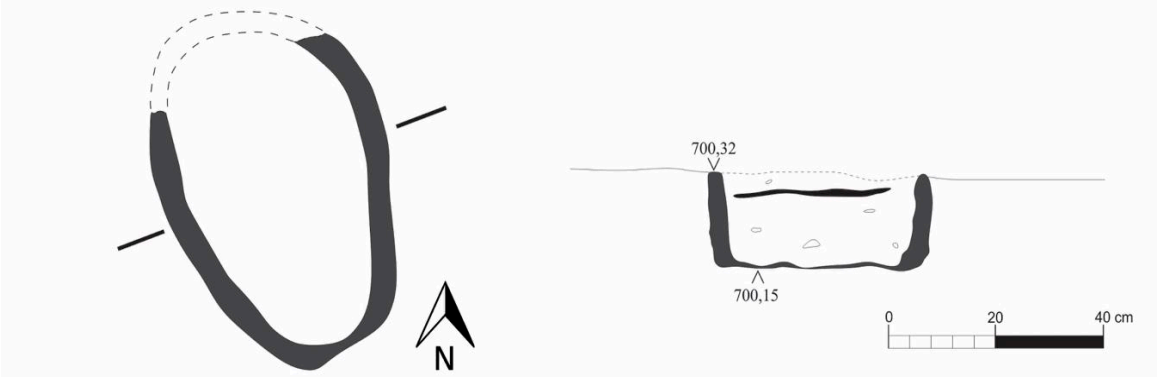


Figure 4.46: Fire Pit N5A3 and its cross-section

4.4.3.3.4. Fire Pit N5A4

This was located in an open space in the northeastern part of trench 15H and south of the Fire Pit N5A4 in Area B. The oval-shaped fire pit was between the elevations of 700.42 to 700.50. Dug in a dark grey homogeneous soil, the fire pit was 41x63 cm in size and 8 cm deep. (Figure 4.47) On its edge, there is a dark brown line due to burning with 2-3 cm thickness. There were no signs of plastering on its sides or its bottom. Its inner deposits were dull grey densely ashy soil.

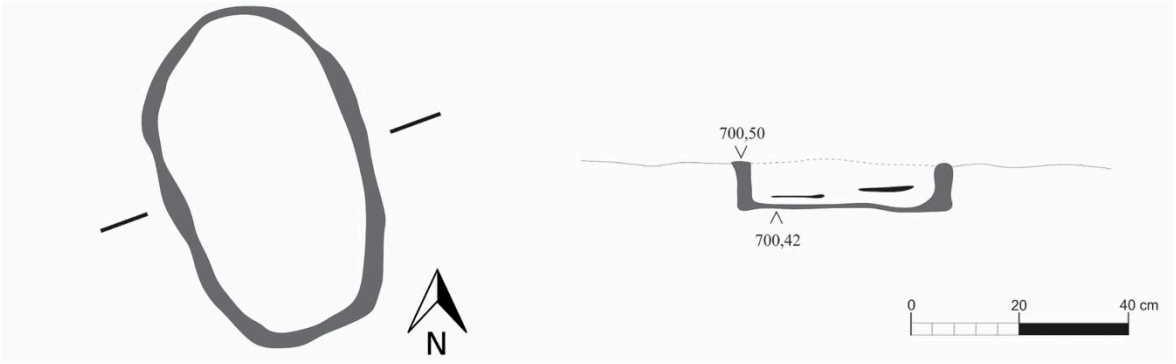


Figure 4.47: Fire Pit N5A4 and its cross-section

Abundant amounts of different plant remain were found in its inner deposit by flotation. *Fabaceae* family (*Lens culinaris, Vicia ervilia, Medicago, Medicago radiate*); *Poaceae* family (*Triticum/Hordeum, Hordeum vulgare*), and wild grassland species like *Linum, Cyperaceae* and *Centaurea* seeds were identified. (Table 3.2)

4.4.3.3.5. Fire Pit N5A5

This was located in the centre of trench 15H in Area B. Also, the fire pit was dug in the deposits of the room 4 of the Structure N5B12. The oval-shaped fire pit was between the elevations of 700.37 to 700.45. The fire pit was approximately 39x57 cm in size and 7 cm deep. On its edge, there is a dark, dull grey line due to burning with 2-5 cm thickness. There were no signs of plastering on its sides or its bottom. Its inner deposits were yellowish buff ashy soil. Nearby the fire pit, yellowish buff-coloured soil traces were also detected. This yellowish buff coloured soil with similar features to the inner deposit was probably waste ash deposited near the pit after the fire was extinguished. As mentioned above, this fire pit was located in the northwest corner of Room 4 of the Structure N5B12. Since the plaster floor of the structure N5B12 was disturbed by this fire pit, it should either belong to the

upper phase, or it was dug in the later stages of the Phase N5 when the building was out of use.

4.4.4. Phase N4 architecture

Phase N4 was identified in a total area of 840 m² covering 440 m² in Area B, 350 m² in Area A and 50 m² in Area C. In areas A and B, similarities were identified both in architectural distribution and use of the open areas. In both areas the structures encircled a common space. According to C_{14} dating, Phase N4 is dated to 8461±49 - 8436±52 CalBP. (Table 3.3)

In this phase, the architectural tradition partly changes. First of all, the Cell Building tradition was not used; however, the two-roomed- and multi-roomed structures of the previous phase continued along with an increase in the number of single-roomed structures. (Table 4.2 - 4.4, 4.7) Some differences are also observed in wall construction techniques. For example, no walls using kerpiç blocks with the piled earth technique of the previous phase were identified.

Hearths and fire pits are encountered in areas B and A. Seven hearths, with three in Area A and four in Area B, and six fire pits only identified in Area B, were found. (Table 4.5) The hearths and fire pits in Area B were gathered in a particular area. In this common area, one of the hearths was renovated at least three times. Apart from two hearths from this phase, the other five were identified to have stone pavements constructed of basalt, ground stone fragments and pebble fragments beneath their plastered floors. The plastered floor varied in thickness from 2-3 cm.

4.4.4.1. Structures

In Phase N4, six two-roomed Structures, two multi-roomed structures, and a single-roomed structure were identified. The plan of five of these structures could not be clarified. Seven of the structures were located in Area A, six in Area B, and one in Area C. (Table 4.2 - 4.4, 4.7)

4.3.4.1.1. Structure N4B1

Structure N4B1 is located in Area A southeast of trench 20L and northeast of trench 20M between the elevations of 699.80 – 700.30 meter. The structure sits on a grey and ashy fill. Based on the wall remains and general appearance, this structure is classified as a two-roomed structure. (Figure 4.48, 4.168 – 4.170) It was constructed with a southwest-northeast orientation nearby other structures in the same area, and following the slope of the natural surface without a stone foundation. Its wall height is 42 cm.

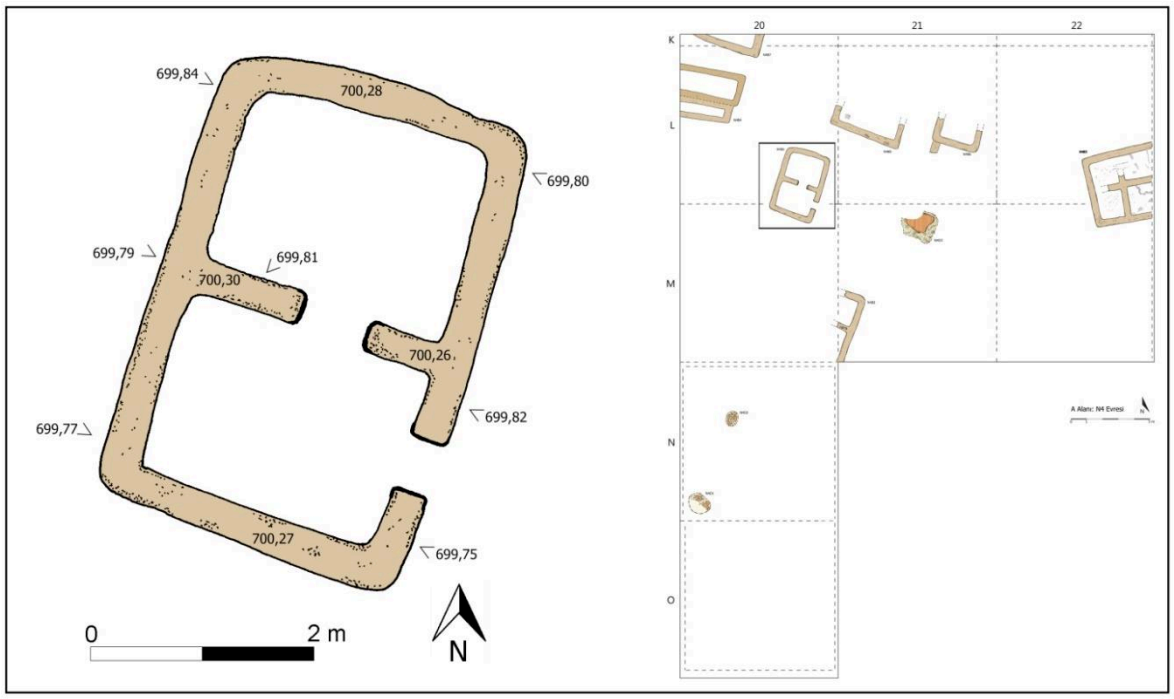


Figure 4.48: Location and plan of Structure N4B1

The rectangular structure is 426 cm in a southwest-northeast direction and 291 cm wide in a southeast-northwest direction. The bearing walls are 30-34 cm wide, and the partition walls are 26-28 cm wide. There are two rooms with very similar measurements, namely, 165x224 cm for the north room and 164x230 cm for the south one. Nearly 3.8 m^2 in size, these two rooms are linked by a 67 cm-wide doorway. (Figure 4.339) Its main entrance was narrower than the passage door between the rooms and measured nearly 50 cm. The internal fill of the rooms is grey and ashy with few stones and areas where plentiful lime fragments were observed. Plaster traces were not encountered on the lime surfaces. These very scattered lime fragments are probably the remains of collapsed wall or the upper cover of the structure. There are no plastered floors in either room. Animal bones and minimal amounts of pottery sherds exposed at elevations of 699.92 - 699.94 in the south

room define the living surfaces of the structure. Both finds within the structure and the lower level of the doorways and walls comply with each other. As there are no traces of a foundation pit, it is understood that this structure was built without a foundation.

Apparent lime fragment lines are observed on both sides and in the interior of the walls. At 5-7 cm intervals in the wall section, thin lime lines were also identified. These lines continue irregularly between the bedding. There was no plaster surface at the bottom or top of the reddish-brown bedding. The earth fill within the walls is only distinguished from the external area by its colour and the clear lime lines. The homogeneous reddish-brown filling of the walls is very loose. Considering the architectural tradition and construction technology of Sumaki Höyük, both bearing and partition walls were constructed by the piled earth method.

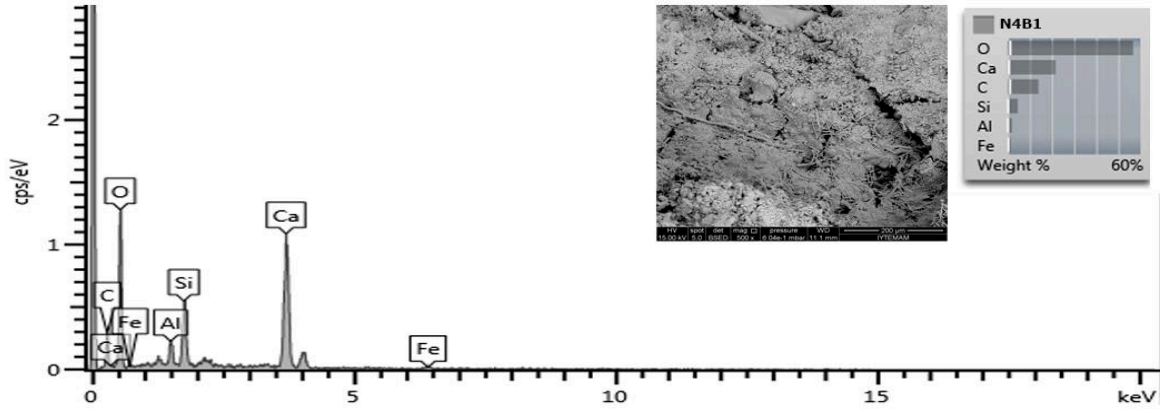


Diagram 4.53: EDX analysis of lime samples taken from Structure N4B1

SEM investigation of lime samples observed very clear calcium carbonate minerals surrounding tubes formed by organic remains. (Figure 4.308) EDX analysis identified O (56.66%), Ca (21.68%), C (13.94%), Si (4.55%), Al (1.83%), and Fe (1.34%). (Diagram 4.53)

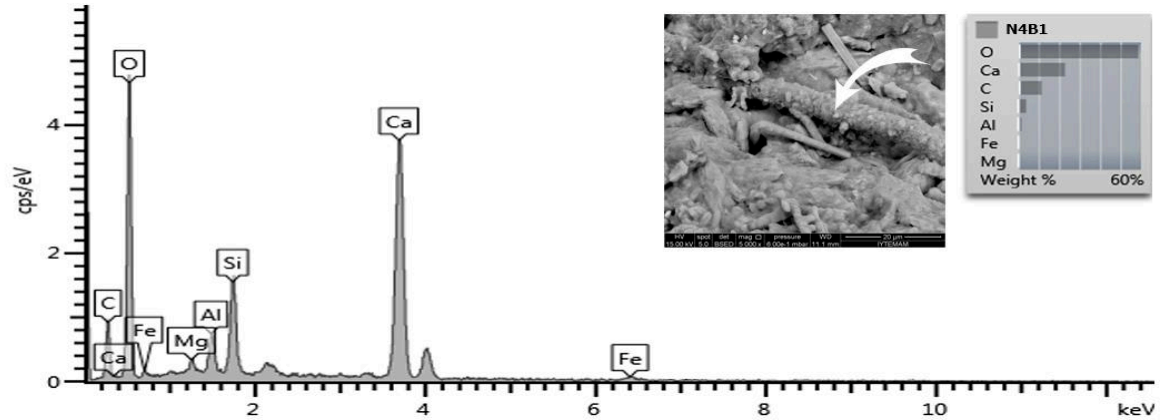


Diagram 4.54: EDX analysis results of tubes found in lime samples from Structure N4B1

Analysis of minerals surrounding the tubes by the EDX method identified O (58.74%), Ca (22.87%), C (11.53%), Si (3.89%), Al (1.53%), Mg (0.53%), and Fe (0.91%). (Diagram 4.54) Analysis of acicular crystals with EDX found O (56.89%), Ca (15.79%), C (19.35%), Si (4.26%), Al (1.73%), Mg (0.70%), and Fe (0.99%) elements. (Diagram 4.55)

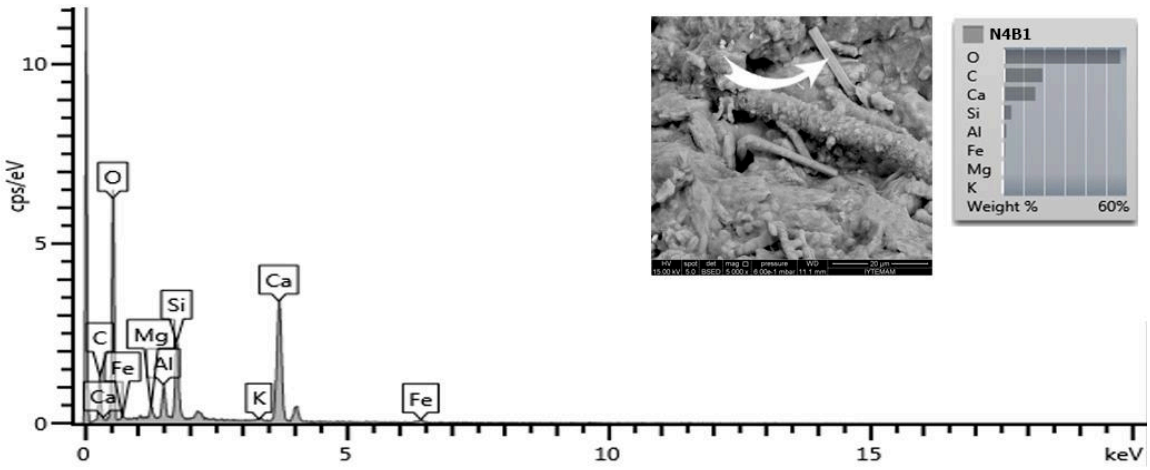


Diagram 4.55: EDX analysis results of acicular crystals found in lime samples from Structure N4B1

On SEM images of reddish-brown earth samples, micritic envelopes on sand and stone grains and acicular-shaped calcium carbonate crystals are observed. (Figure 4.309) According to EDX analysis, these soil samples contain O (34.08%), Ca (11.52%), C (9.34%), Si (17.99%), Fe (8.44%), and Al (6.62%). N, Na, Mg, P, S, Cl, and K elements were also identified at rates from 5% to 0.21%. (Diagram 4.56)

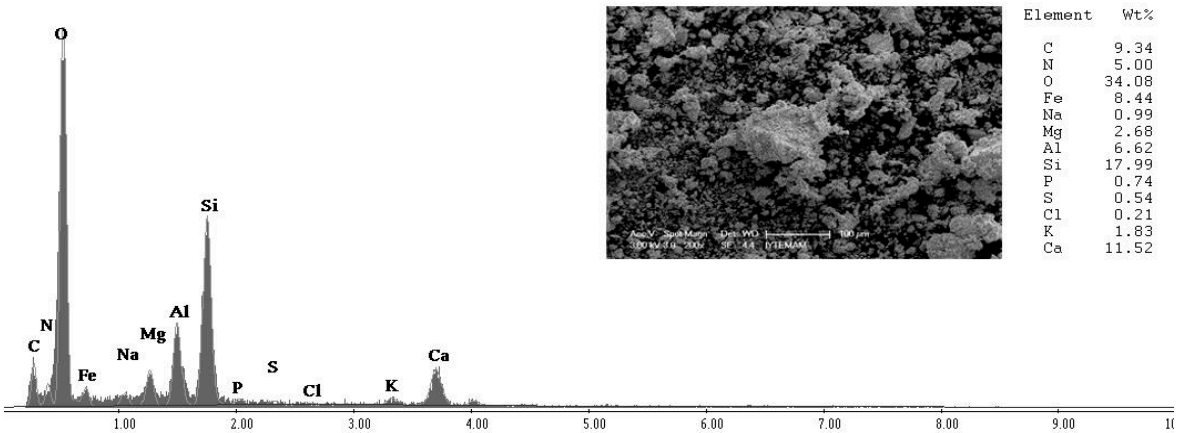
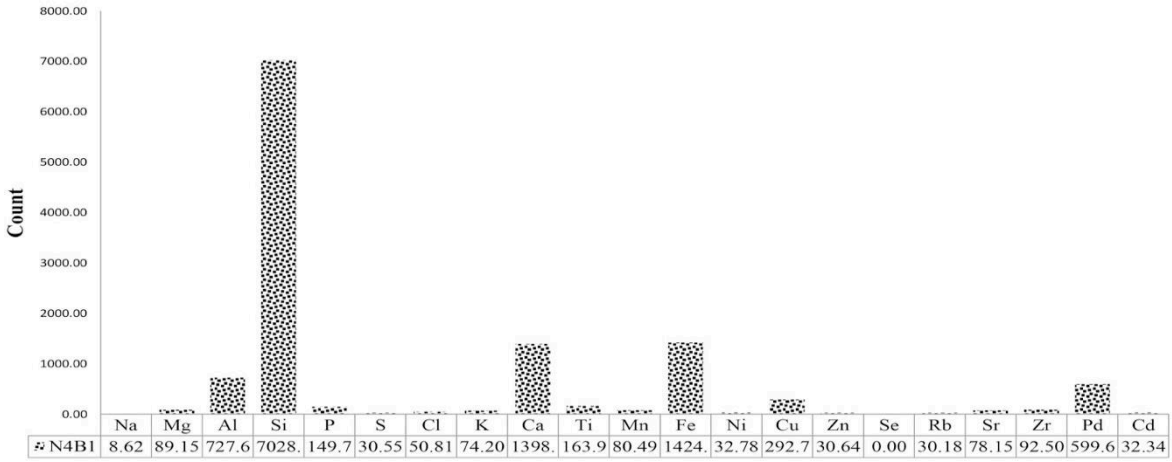


Diagram 4.56: EDX analysis results of soil samples taken from Structure N4B1

Investigation of XRD analysis of the lime samples only identified calcium carbonate. (Diagram 4.113) Earth samples with XRD analysis identified calcite, silica, quartz and kyanite minerals. Their chemical composition is calcium carbonate, silicon dioxide, and aluminium silicate compounds. (Diagram 4.114) The earth sample was also investigated by the XRF method found Si (57%), Ca (11%), Fe (11%), Al (6%), and Pd (5%) with trace amounts of Ni, Zn, Sr, Rb, Na, K, S, P, Cl, Cu, and Ze. (Diagram 4.57)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N4B1	8.62	89.15	727.6	7028.	149.7	30.55	50.81	74.20	1398.	163.9	80.49	1424.	32.78	292.7	30.64	0.00	30.18	78.15	92.50	599.6	32.34

Diagram 4.57: XRF analysis of the lime samples taken from Structure N4B1

Morphologic data very clearly show the presence of organic material in the structural fill and the internal texture of lime fragments. Both ethno-archaeological observations and archaeological data reveal the existence of such a construction technology. In this context, it is proposed that both surfaces of the earth walls were bounded by organic construction material like reeds or branches. This organic material partly bounding the earth walls combined at a certain level and was connected to the upper cover of the structure. The element keeping the top cover in place was probably a tension system. These ties give a meaning to the presence of stones scattered around the structure. A similar stabilization technique was also identified during our ethno-archaeological field studies in the Lower Garzan Basin.

4.4.4.1.2. Structure N4B2

This was built between the elevations of 700.05 to 700.18 meter following the slope of the natural surface at the southwest part of trench 21M in Area A. Its western half has been destroyed similar to the Cell Building N5B10, and its southern section remains outside the exposed area. (Figure 4.49, 4.171, 4.172) Accordingly, the limits of the structure could

not be detected. Based on the wall remains and general appearance, the structure is classified as a double-roomed structure. The building was constructed on a grey ash-poor fill following the slope of the natural topography without a stone foundation. The width of the bearing walls is 41-43 cm, and the partition walls are 30-31 cm wide. The walls have been preserved to a height of 13 cm.

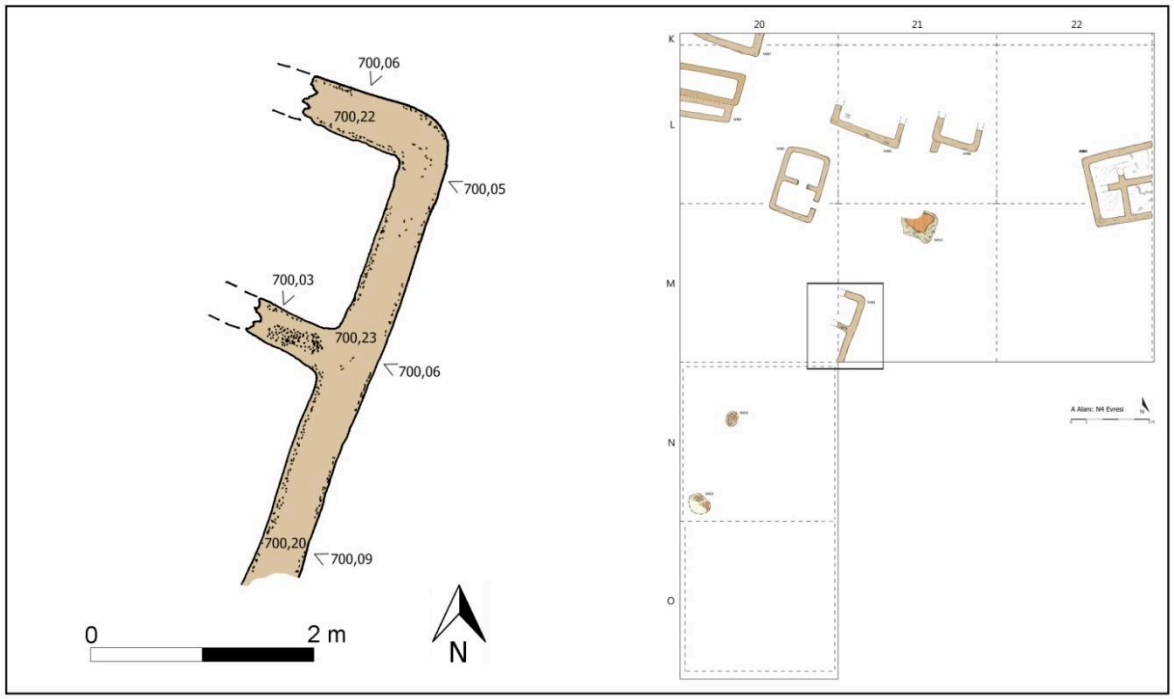


Figure 4.49: Location and plan of Structure N4B2

The structure has two rooms. The southern room is larger than the northern one. The north room is 160 cm long, and the south room is longer than 212 cm. Their internal fill is grey ash-poor with occasional lime fragments. As the structure was badly preserved, door openings cannot be detected.

Occasional lime fragments appear to have bound the walls. Continuing as weak and uncertain lines, their thickness varies from 1 to 3 cm. The earth fill within the walls is only distinguished from the external area by its colour and the clear lime lines. The homogeneous reddish-brown filling of the walls is very loose. Considering the architectural tradition and construction technology of Sumaki Höyük, the walls of the structure N4B2 were constructed by the piled earth technique. The scattered lime remains identified within the building may be related to the calcified remains of organic upper covering, which fell into the structure.

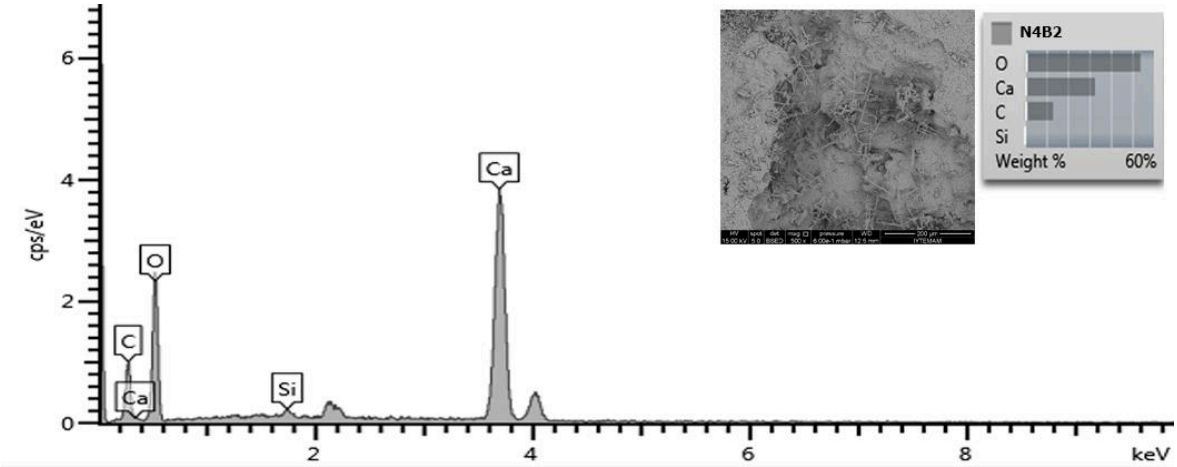


Diagram 4.58: EDX analysis of lime samples taken from Structure N4B2

Investigation of lime fragments from the faces of the walls and within the structure determined very dense organic material. (Figure 4.310) Investigation of lime samples with EDX method identified the elements O (53.75%), Ca (32.64%), C (13.17%), and Si (0.44%). (Diagram 4.58) EDX analysis of acicular crystals observed the elements O (55.19%), Ca (29.53%), C (14.95%), and Si (0.34%). (Diagram 4.59) Investigation of the same lime samples with XRD method identified as containing calcite, nitratine, berlinite, and moissanite minerals. (Diagram 4.115) Their chemical composition is calcium carbonate, aluminum phosphorus oxide, silicon carbide with silicon-carbon content, and sodium nitrate compound. Sodium nitrate compound indicates the presence of aridity.

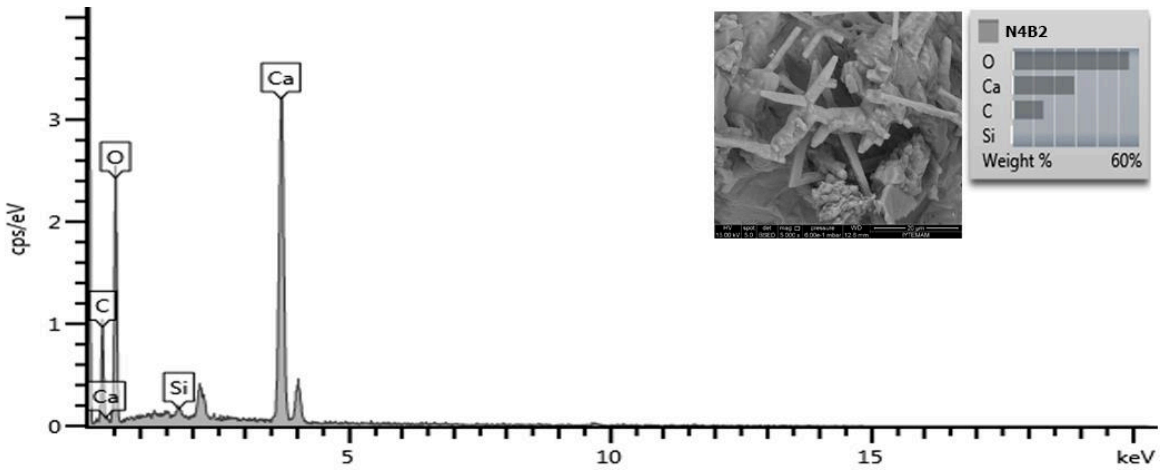


Diagram 4.59: EDX analysis results of acicular crystals found in lime samples from Structure N4B2

4.4.4.1.3. Structure N4B3

This is located in Area A, in the southeast of trench 22L and northeast of trench 22M between the elevations of 699.26 to 699.49 meter. Based on the wall remains and general appearance, this structure is classified as a multi-roomed structure. Its eastern section is outside the exposed area. (Figure 4.50, 4.173) Contrary to other structures in the area, Structure N4B3 was constructed on a grey ash-rich fill with east-west orientation following to the slope of the natural surface without a stone foundation. The walls have been preserved to a height of 23 cm.

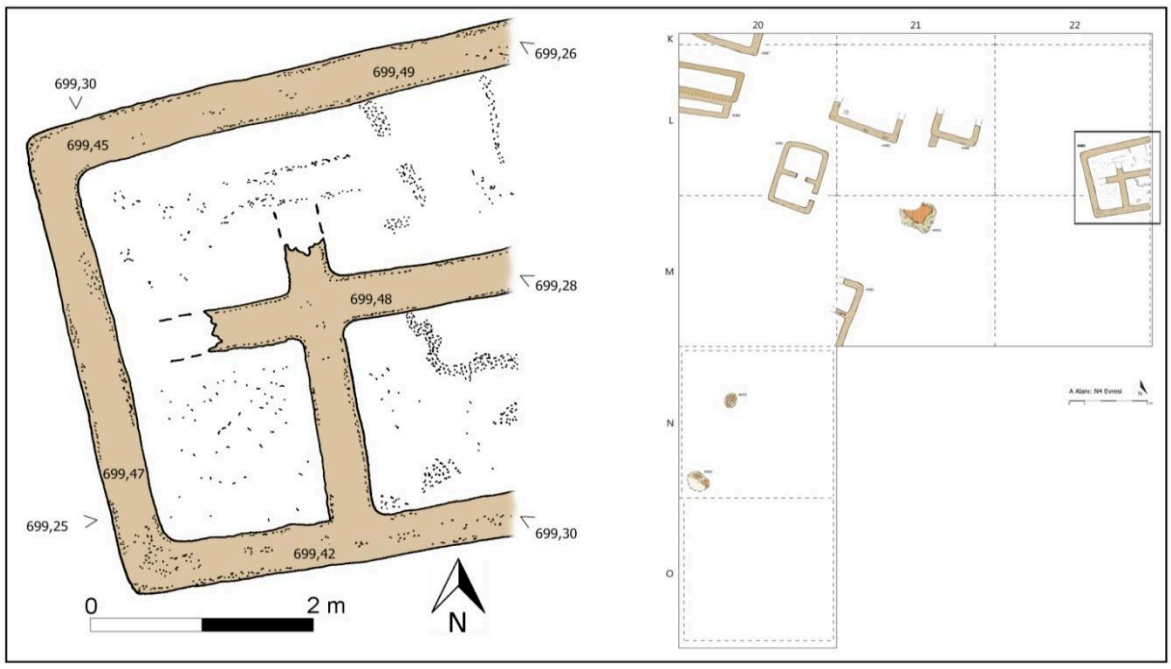


Figure 4.50: Location and plan of Structure N4B3

The exposed portion of the structure is more than 440 cm long in the east-west direction and is 462 cm wide in the north-south direction. The bearing and the partition walls have nearly the same widths, 37-43 cm.

The structure has four rooms. The west rooms are smaller than the east ones. The widths of the room's number 1 and 2 were determined; however, their long axis remains outside the exposed area. Room number 1 in the east is 157 cm wide and is longer than 188 cm. The room number 2 is 178 cm wide and is longer than 159 cm. The rooms in the west have similar measurements, namely, 157x169 cm in size. Since the partition walls between the rooms number 3 and 4, and those between the rooms number 1 and 4 were partly destroyed, no doorway was detected. The internal fill of the rooms is grey ash-poor with occasionally intensify limey areas. Though lime lines covering nearly the whole interior of

the rooms, there is no trace of plaster. These scattered calcified limes remains probably the remains of the upper cover of the structure. There was no plaster floor remains identified in the rooms. The homogeneous reddish-brown filling of the walls is very loose. Occasional lime fragments appear to have bound the walls. Continuing as weak and uncertain lines, their thickness varies from 1 to 2 cm. Considering the architectural tradition and construction technology of Sumaki Höyük, the walls of the structure were constructed by the piled earth technique. SEM investigation of lime samples taken from the structural fill and the wall surfaces observed dense organic material. SEM images of lime samples observed very clear calcium carbonate minerals surrounding tubes left by organic remains. (Figure 4.311)

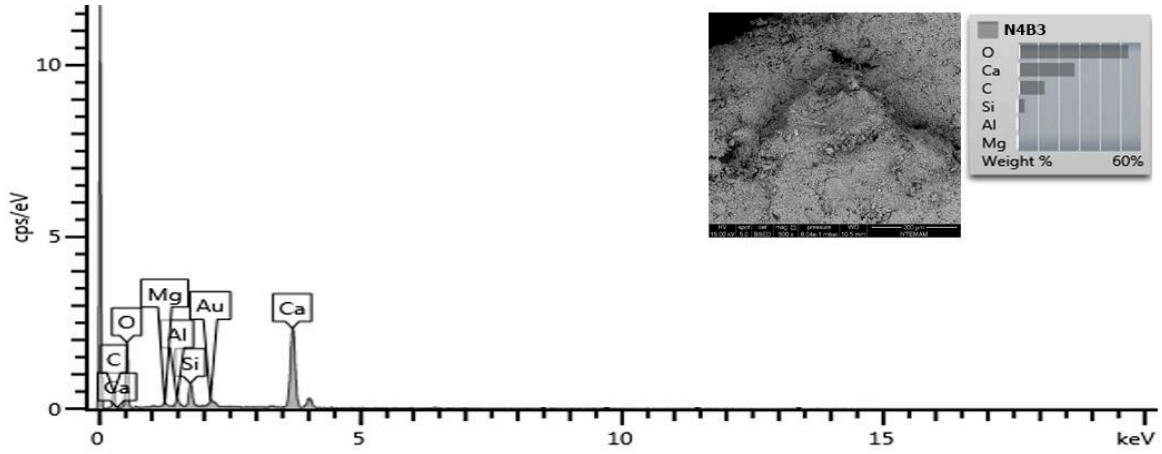


Diagram 4.60: EDX analysis of the lime samples taken from Structure N4B3

Investigation of lime samples with the EDX method identified the elements O (53.85%), Ca (27.80%), C (13.23%), Si (3.60%), Al (1.04%), and Mg (0.49%). (Diagram 4.60) Analysis of scalenohedral-shaped minerals surrounding the tubes with the EDX method identified the crystals containing O (53.36%), Ca (26.72%), C (12.25%), Si (3.50%), Al (1.20%), and Fe (2.98%) elements. (Diagram 4.61)

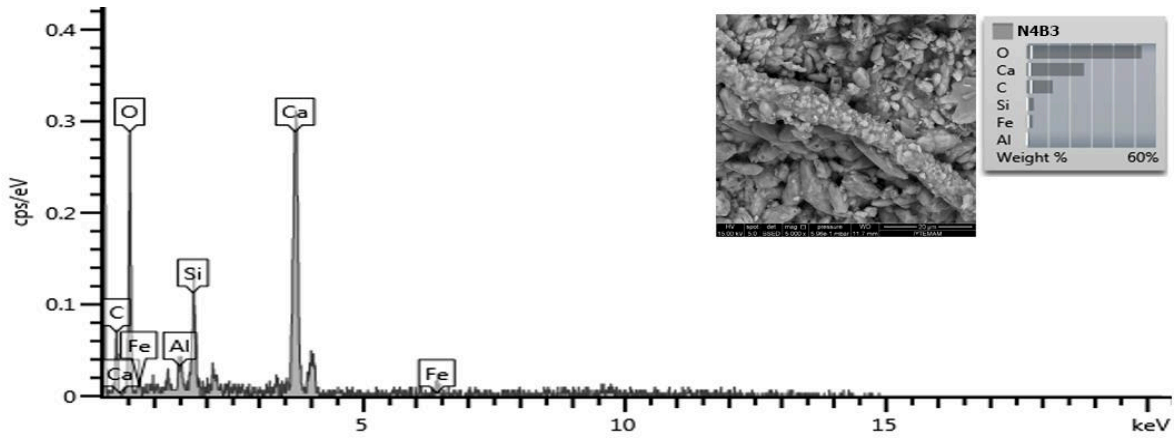
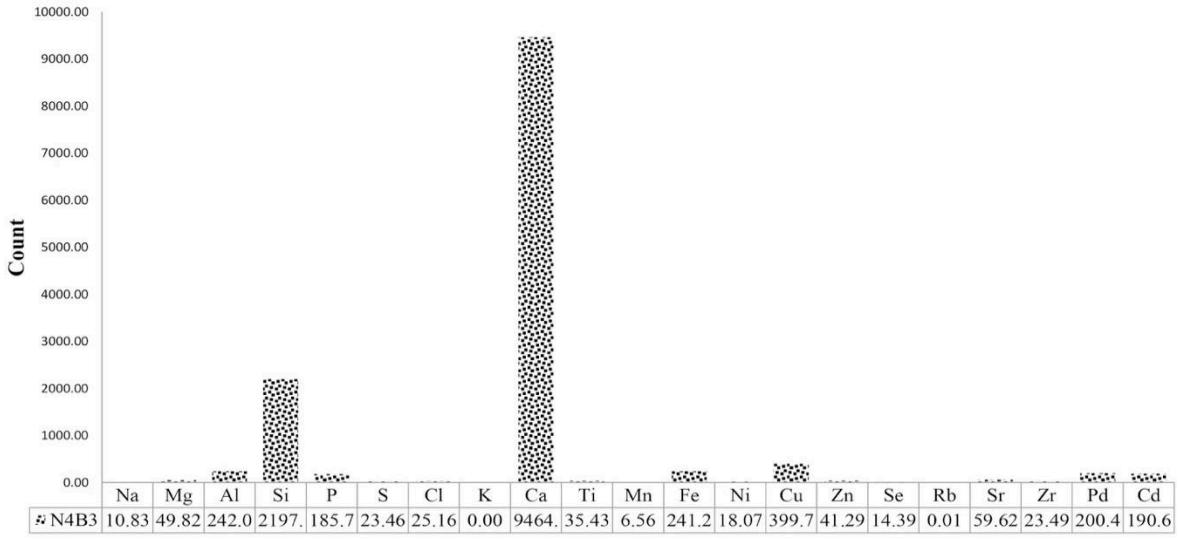


Diagram 4.61: EDX analysis of tubes identified in the lime samples from Structure N4B3

Investigation of lime samples by XRD method only found calcium carbonate mineral. (Diagram 4.116) Examination of the same samples with the XRF method observed the following elements dominating; Ca (70%), Si (16%), Cu (3%), Fe (2%), Al (2%), and Pd (1%), together with trace amounts of Ni, Zn, Sr, Rb, Na, S, P, Cl, Cu, and Ze. (Diagram 4.62)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N4B3	10.83	49.82	242.0	2197.	185.7	23.46	25.16	0.00	9464.	35.43	6.56	241.2	18.07	399.7	41.29	14.39	0.01	59.62	23.49	200.4	190.6

Diagram 4.62: XRF analysis of the lime samples taken from Structure N4B3

Morphologic data very clearly show the presence of organic material in the structural fill and the internal texture of lime fragments. In this context, it is proposed that both surfaces of the earth walls were bounded by organic construction material like reeds or branches, and the lime surfaces are directly related to the evaporation and calcification process of organic structural material.

4.4.4.1.4. Structure N4B4

This is located in Area A, in the southeast of trench 20L between the elevations of 700.20 to 700.80 meter. According to the wall remains and general appearance, the structure is classified as a double-roomed structure. (Figure 4.51, 4.174, 4.175) Its west section remains outside the exposed area. The structure was constructed with southwest-northeast orientation following the slope of the natural topography on a grey stone-poor fill with occasional ashy area without a stone foundation. The walls have been preserved to a height of 37-48 cm.

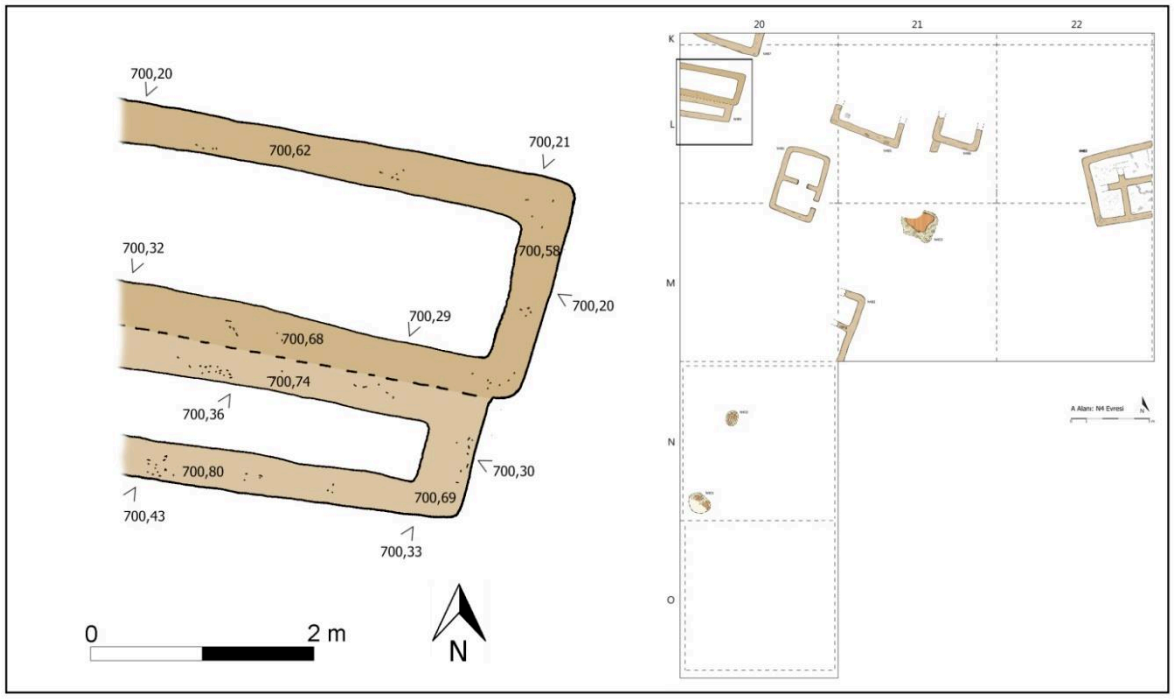


Figure 4.51: Location and plan of Structure N4B4

Its exposed section is 385 cm long in the southeast-northwest direction, and is 318 cm wide in the southwest-northeast direction. Consisting of two rooms added to each other, the walls are nearly in the same width: 35-38 cm. However, due to the addition of the wall, the wall between the rooms becomes wider. Based on the wall traces in the trench section, the limit of the auxiliary walls was clearly defined.

The structure appears to have two rooms. The south room was built after the first one. There is a 12-13 cm elevation difference between the bottom levels of the walls of the two rooms. The widths of both rooms were determined; however, their lengths were not. The width of the north room is 124 cm. The south room is 60 cm wide. There was no doorway identified between the rooms. There were no traces of plaster floor in either room. Some material such as an obsidian core and a few blade fragments found at an elevation of 700.30 within the rooms is defined the living surfaces of the structure.

The earth fill within the walls is only distinguished from the external area by its colour. The homogeneous reddish-brown filling of the walls is very loose. Apparent lime fragment lines are observed in the interior of the walls. At 3-6 cm intervals in the wall cross-section, these lime lines continue irregularly between the bedding. There was no plastered surface at the bottom or top of the reddish-brown bedding. Considering the architectural tradition and construction technology of Sumaki Höyük, Structure N4B4 was constructed by the piled earth technique.

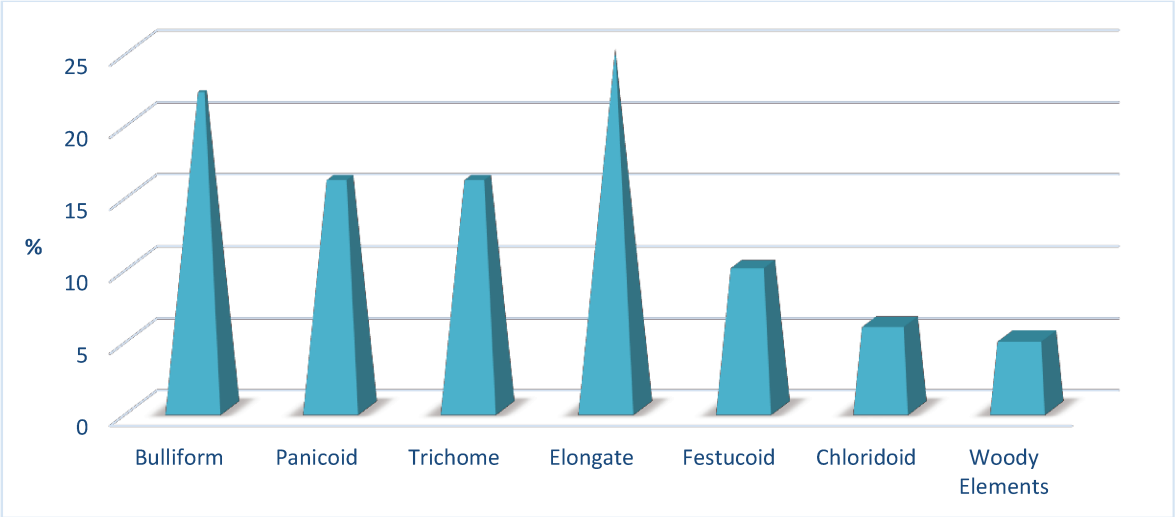


Diagram 4.63: Distribution of phytoliths in the lime samples taken from Structure N4B4

Phytolith analysis of lime samples identified reeds or herbaceous plant remains with high frequencies of *Bulliform* and *Elongate* forms. *Trichome*, *Festucoid*, *Panicoid, Chloridoid* and *Silicified Woody Forms* were also identified. (Diagram 4.63; Figure 4.325 - 4.330) Though there are very small amounts of silicified woody structures, the size of the phytoliths is noteworthy. The phytoliths are generally larger than 150 microns.

4.4.4.1.5. Structure N4B5

This is located in Area A in the central section of trench 21L. Structure N4B5 is partially underneath the structure N2B5 of Phase N2 between the elevations of 699.80 to 700.07 meter. Although the southern part of the structure was revealed, data allowing determination of its plan were insufficient in the exposed area. (Figure 4.52) The structure was constructed following the slope of the natural topography on a grey ash-poor fill without a stone foundation. Structure N4B5 appears to have southwest-northeast orientation. Based on the wall remains, the structure was 455 cm wide in the east-west direction. The uncovered section is 134 cm in the north-south direction. The walls have been preserved to a height of 27 cm and are 34-43 cm thick. The homogeneous reddish-brown loose fill of walls is only distinguished from the external area by its colour. Considering the architectural tradition and construction technology of Sumaki Höyük, the walls of the structure were built by the piled earth technique.

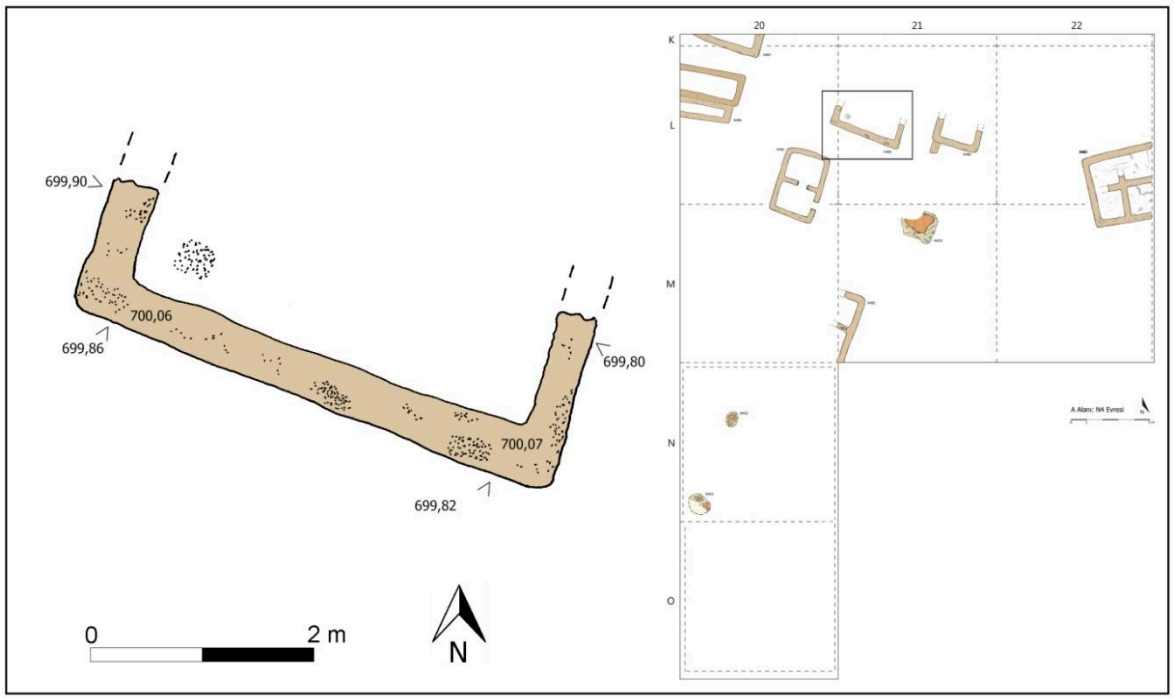


Figure 4.52: Location and plan of Structure N4B5

4.4.4.1.6. Structure N4B6

This is located in Area A, in the centre of trench 21L; this structure is partly underneath the Structure N2B6 between the elevations of 699.70 to 699.96 meter. Although the southern part of the structure was revealed, data allowing determination of its plan were insufficient in the exposed area. (Figure 4.53) Therefore, N4B6 is classified as an indeterminate-planned structure. The structure was constructed on a grey ash-poor fill following the slope of the natural topography without a stone foundation. The walls have been preserved to a height of 26 cm and are 36-44 cm thick. Structure N4B6 appears to have a southwest-northeast orientation. According to the wall remains, it was 302 cm wide in the east-west direction and the exposed section was 158 cm wide in the north-south direction. A partially preserved wall with the dimensions of 43x72 cm appeared to be an extension in the southwest corner of the structure. The homogeneous reddish-brown loose earth fill within the walls is only distinguished from the external area by its colour. Considering the architectural tradition and construction technology of Sumaki Höyük, the remaining walls of the Structure N4B6 were constructed by the piled earth technique.

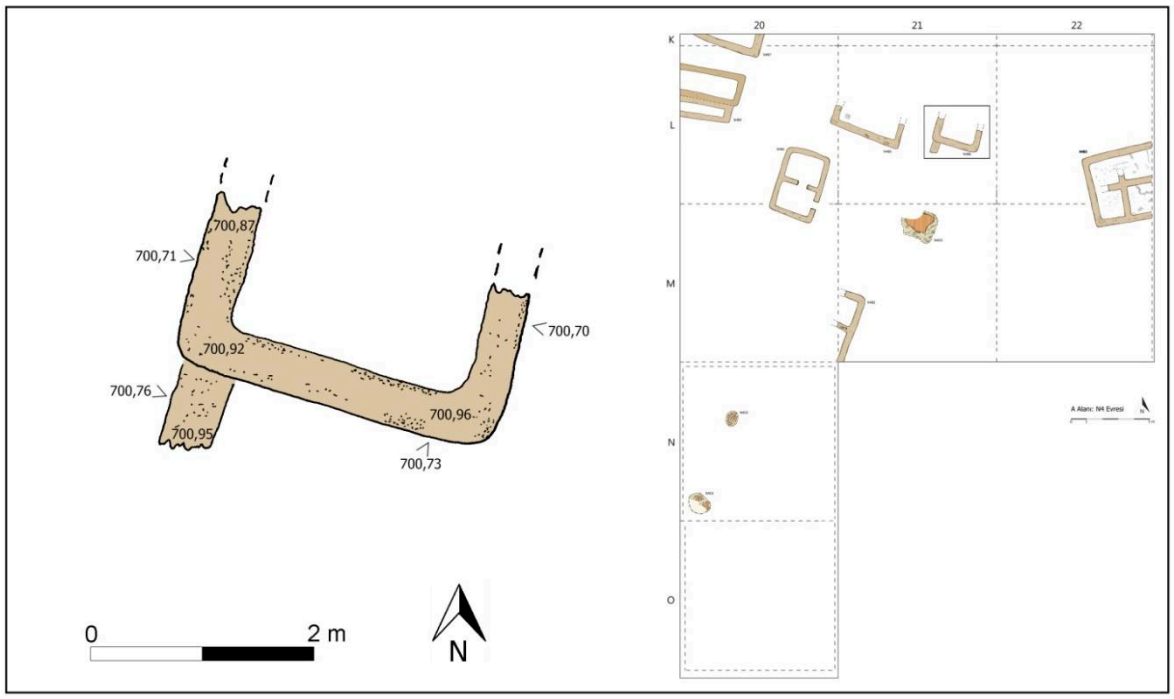


Figure 4.53: Location and plan of Structure N4B6

4.4.4.1.7. Structure N4B7

This is located in Area A in the northwest of trench 20L between the elevations of 700.10 to 700.48 meter on a grey ash-poor occasionally stony fill. Although the southern part of the structure was revealed, data allowing determination of its plan were insufficient in the exposed area. Accordingly, N4B7 is defined as an indeterminate-planned structure. (Figure 4.54, 4.176) The structure was constructed following the slope of the natural topography without a stone foundation. The walls have been preserved to a height of 38 cm, and are 38-46 cm thick. Its exposed section is 437 cm in the southeast-northwest direction and 1.4 m in the southwest-northeast direction. The internal fill of walls is homogeneous reddish-brown loose earth. There was no plaster floor remains in the single room. Considering the architectural tradition and construction technology of Sumaki Höyük, the walls were constructed by the piled earth technique.

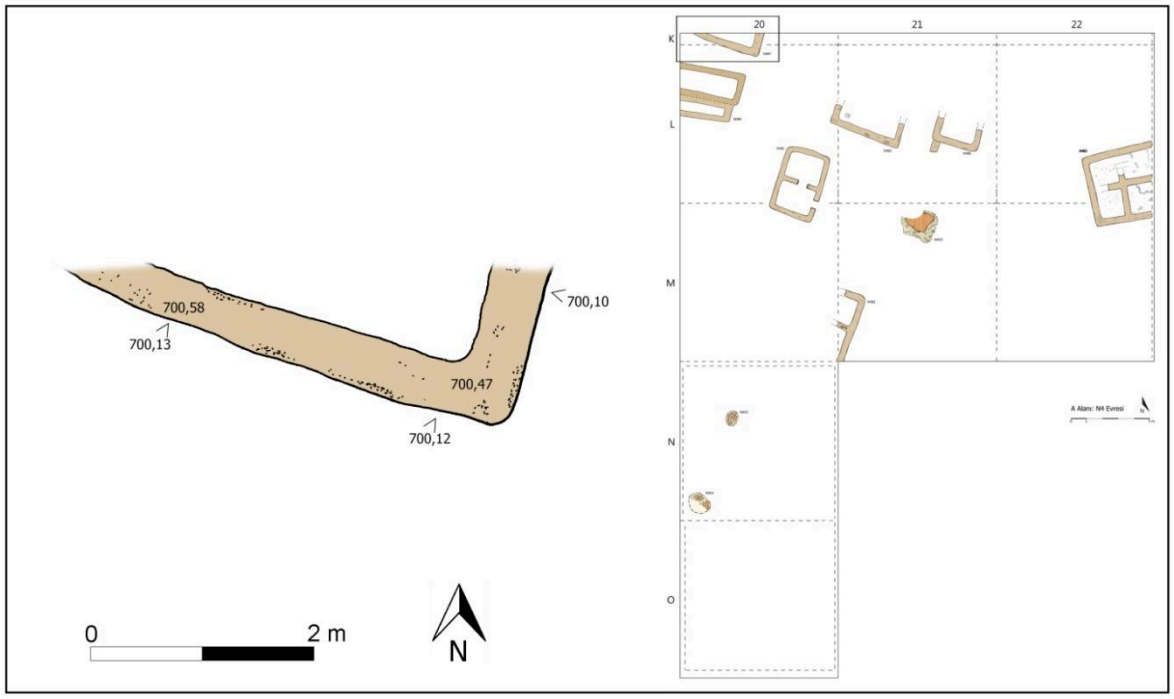


Figure 4.54: Location and plan of Structure N4B7

4.4.4.1.8. Structure N4B8

This is located in Area B in the southeast of trench 15G between the elevations of 701.02 to 701.35 meter. Its southwest corner turn and south limit are observed in the cross-section of the baulk between the trenches 15G and 15H. The north wall was partially disturbed by a deep Middle Age pit. (Figure 4.55, 4.177)

Based on the wall remains and general appearance, the structure is classified as a double-roomed structure. The walls on the west side and the partition wall have been preserved to a height of 30 cm. The north bearing walls have only been preserved to a height of 12-17 cm. (Figure 4.178, 4.179) The wall on the east side was not detected. The eastern limits of the structure are only distinguished from the external area by its colour and the clear reddish-brown traces in the trench section. The rectangular structure was built with southwest-northeast orientation on a light-grey fill occasionally dense carbon fragments and ashy areas following the slope of the natural topography without a stone foundation. The bottom surfaces of the walls slope slightly toward the east. There are no traces of plastered flooring identified. Some artefacts such as grinding stone fragments define the living surface of the structure.

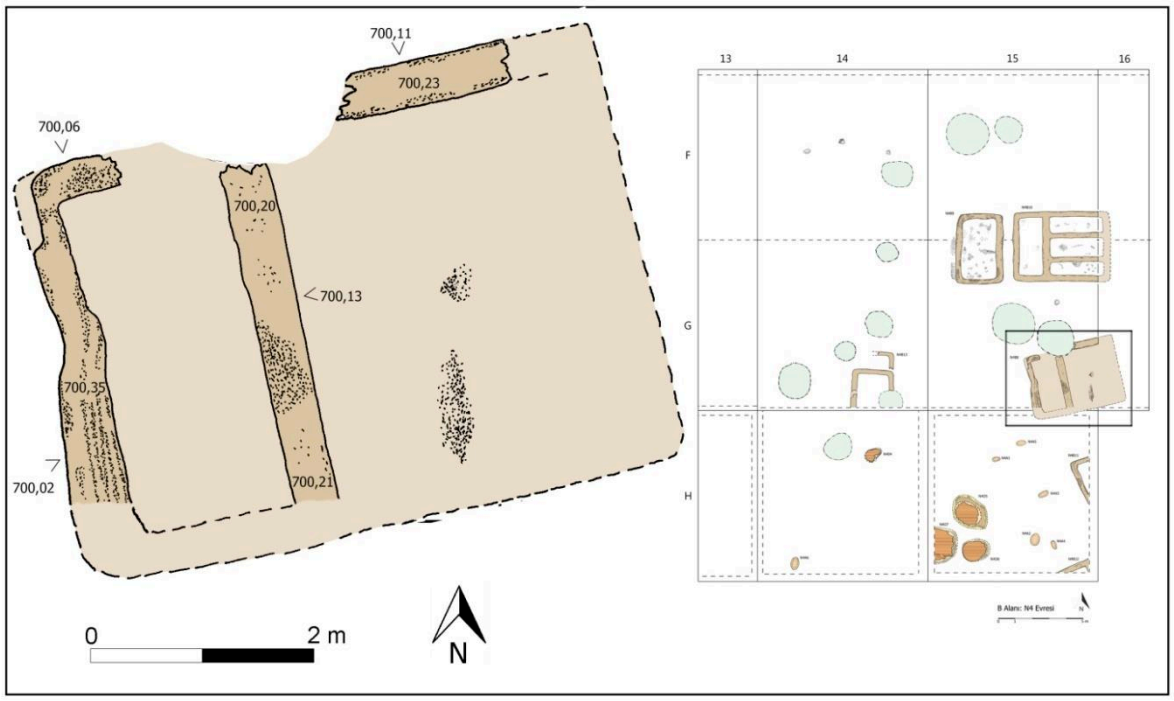


Figure 4.55: Location and plan of Structure N4B8

The structure was 543 cm long in the southwest-northeast direction and was 394 cm wide in the southeast-northwest direction. The walls are 31-45 cm thick. The western wall leans toward the west. Occasional thin lime fragments are clearly observed on the faces of the walls made of homogeneous light brown loose earth. A different ramming technique was used in this wall; here the 1-2 cm-thick lime fragment traces between reddish-brown bedding, as it was documented in the other structures constructed by piled earth wall technique, are not identified. Instead, based on the wall sections, this wall has a 12-13 cm-thick lime line on its external surface, and in the interior 1-2 cm-thick reddish-brown lines between the light brown bedding. Neither the lime lines nor thin reddish-brown lines, which continue irregularly between the bedding, had mortar characteristics. Plaster traces were not encountered at the bottom or the top of the reddish-brown and light brown bedding. Considering the architectural tradition and construction technology of Sumaki Höyük, the walls of the structure N4B8 were constructed by the piled earth technique.

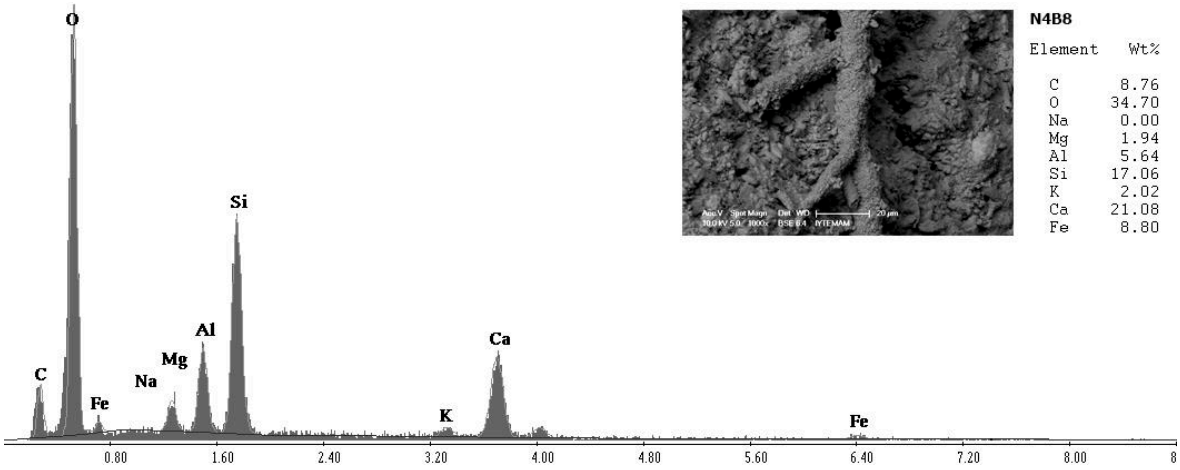
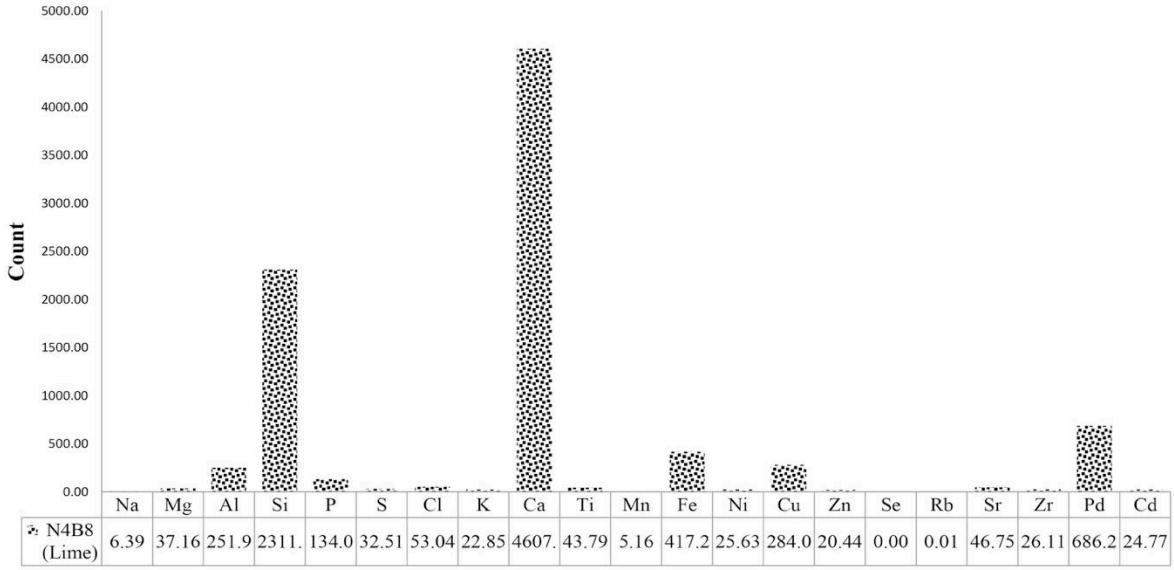


Diagram 4.64: EDX analysis of lime samples taken from Structure N4B8

SEM images of lime samples very clearly showed organic remains with calcium carbonate minerals surrounding tubes. (Figure 4.312c-d) Investigation of lime samples with EDX analysis found O (34.70%), Ca (21.08%), C (8.76%), Si (17.06%), Fe (8.80%), Al (5.64%), Mg (1.94%), and K (2.02%) elements. (Diagram 4.64)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N4B8 (Lime)	6.39	37.16	251.9	2311.	134.0	32.51	53.04	22.85	4607.	43.79	5.16	417.2	25.63	284.0	20.44	0.00	0.01	46.75	26.11	686.2	24.77

Diagram 4.65: XRF analysis of the lime samples taken from Structure N4B8

XRD analysis of lime samples were identified as containing calcite, silicon, quartz, magnesite, periclase, and nitratine minerals. Their chemical composition is calcium carbonate, silicon dioxide, magnesium carbonate, magnesium oxide, and sodium nitrate compounds indicating the presence of aridity. (Diagram 4.117) The oxygen and carbon isotope values of Phase N4 also support the presence of aridity. Investigation of the same

samples with the XRF analysis observed the following elements dominating; Si (26%), Ca (51%), Fe (5%), Al (3%), and Pd (8%).(Diagram 4.65)

On SEM images of reddish-brown earth samples, micritic envelopes on sand and stone grains and acicular-shaped calcium carbonate crystals are observed. (Figure 4.313) According to EDX analysis, they comprise the elements O (33.52%), Ca (10.20%), C (7.64%), Si (25.66%), Fe (10.99%), Al (7.07%), Mg (1.90%), K (2.55%), and Na (0.47%). (Diagram 4.66)

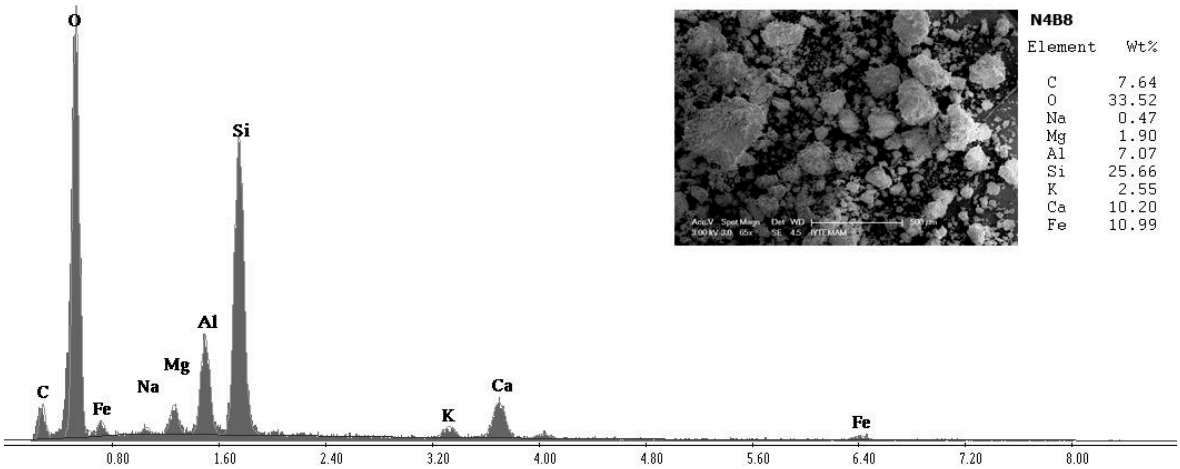
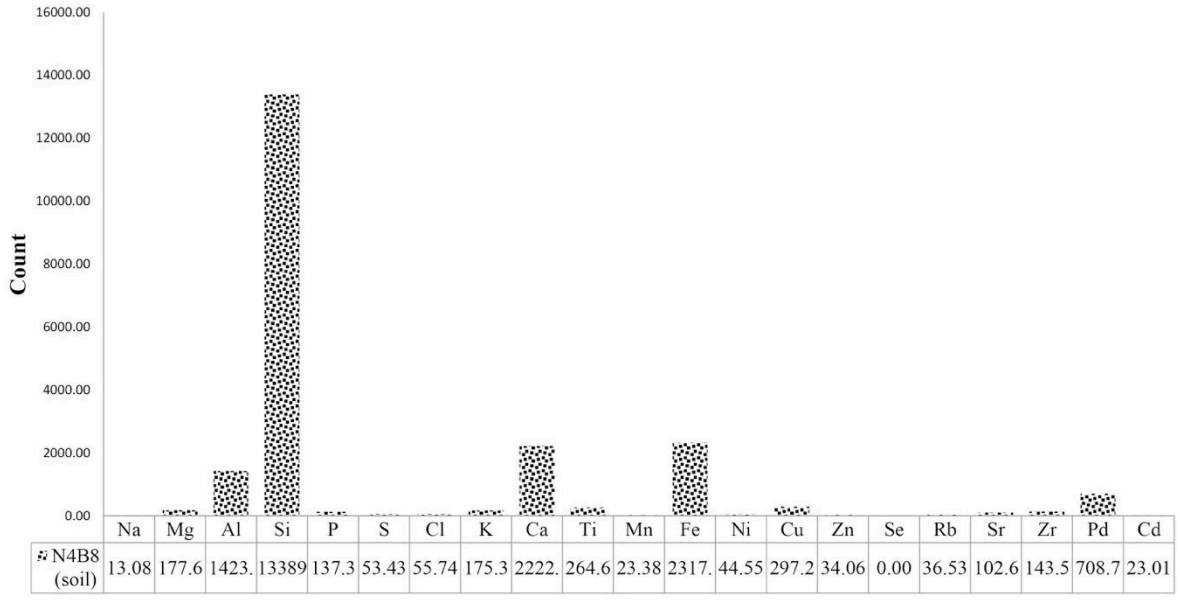


Diagram 4.66: EDX analysis results of soil samples taken from Structure N4B8

XRD analysis of the reddish-brown earth samples identified calcite, silica, quartz, and almandine minerals. Their chemical composition is calcium carbonate, silicon dioxide, and iron-magnesium manganese-calcium aluminum silicate compounds. (Diagram 4.118)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N4B8 (soil)	13.08	177.6	1423.	13389	137.3	53.43	55.74	175.3	2222.	264.6	23.38	2317.	44.55	297.2	34.06	0.00	36.53	102.6	143.5	708.7	23.01

Diagram 4.67: XRF analysis results of soil samples taken from Structure N4B8

Investigation of the same samples with the XRF analysis observed the following elements dominating; Si (62%), Ca (10%), Fe (11%), Al (7%), and Pd (3%), together with very small amounts of Ni, Zn, Sr, Rb, Na, K, S, P, Cl, Cu, and Ze. (Diagram 4.67) A high silicon proportion in samples taken from the reddish-brown soil is associated with the sand content in these fills. The reason for higher calcium and lower silicon in the lime samples is related to the presence of organic material within these lime fragments.

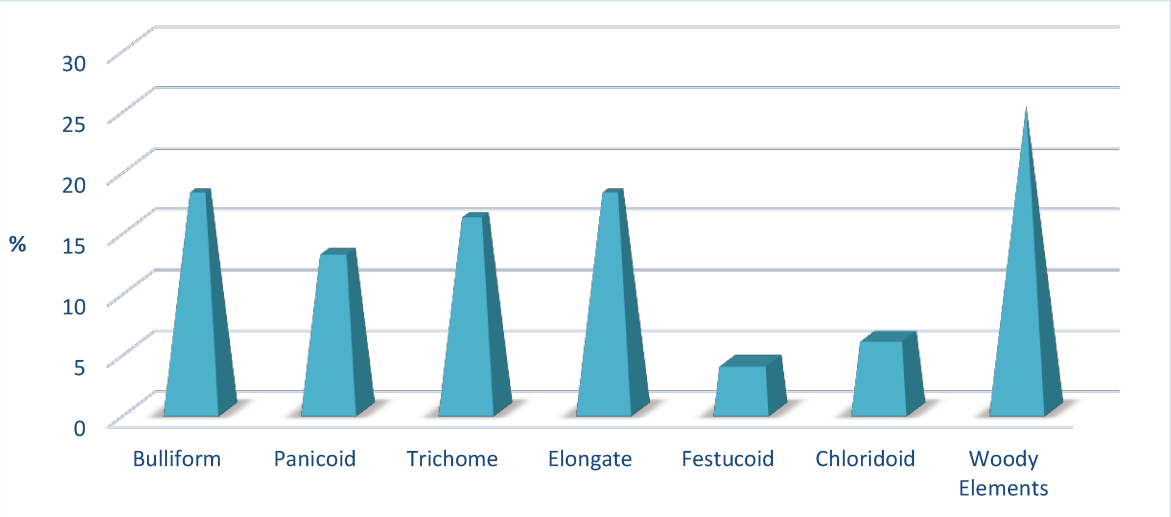


Diagram 4.68: Distribution of phytoliths in the lime samples taken from Structure N4B8

Phytolith analysis of lime samples identified reeds and/or woody plant remains were dominant. The natural structure of well-preserved phytoliths is clear. Among the phytoliths, high frequencies of *Trichome, Panicoid, Bulliform*, *Elongate*, and *Silicified Woody Forms* were observed. *Chloridoid* and *Fustucoid* forms were also identified. (Diagram 4.68; Figure 4.325 - 4.330) Pollen analysis of the same samples identified *Poaceae* pollen dominantly, together with *Calenduleae, Apocynaceae, Verbenaceae*, *Cesalpiniaceae, Liliaceae, Asparagaceae*, and *Malvaceae* pollens. (Figure 4.331, 4.332)

4.4.4.1.9. Structure N4B9

This is located in Area B in the northwest of trench 15G and southwest of trench 15F between the elevations of 701.18 to 701.59 meter. According to the wall remains and its layout this structure is classified as a single-roomed structure. N4B9 was constructed with north-south orientation on a grey occasionally stony and ashy fill following the slope of the natural topography without a stone foundation. (Figure 4.56, 4.180 – 4.182) The walls have been preserved to a height of 40 cm.

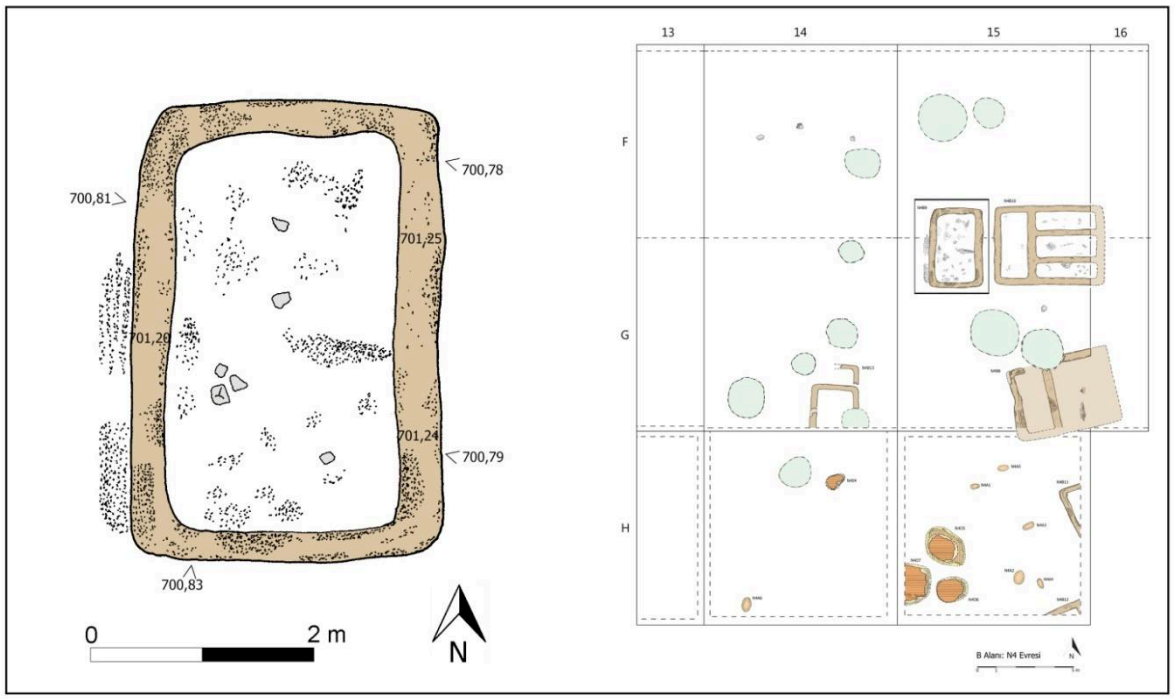


Figure 4.56: Location and plan of Structure N4B9

The rectangular structure is 283 cm wide in the east-west direction and 409 cm long in the north-south direction. (Figure 4.342) The internal area of the single-roomed structure was 8 m^2. Plaster floor remains were not identified. The walls are 28-43 cm in width. The faces of the walls are irregular and have undulating appearance. Occasional lime fragments appear to be bound the walls with a thickness of 6-9 cm. The internal fill of the walls is homogeneous reddish-brown loose earth. At 4-6 cm intervals in the wall section, calcified surfaces were also observed between bedding. These calcified surfaces, which continue irregularly between the layers, did not have mortar characteristics. On the outer faces of the walls, but notably those in the south section of the structure, there is parallel 9-12 cm-thick lime lines. These parallel lines might be the remains of woven reeds or woody material used during ramming, which fell outside. Plaster traces were not encountered on the rough lime surfaces.

SEM images of lime samples very clearly showed organic remains with calcium carbonate minerals surrounding tubes. SiO_2 gels filling the organic cavities are observed on SEM images of the same samples. The clearest is silicon dioxide gel filling a *Panicum* plant remnant. (Figure 4.314) EDX analysis of the lime samples observed the elements O (53.50%), Ca (20.50%), C (16.22%), Si (6.20%), Al (1.51%), Mg (0.82%), K (0.45%), and Fe (0.79%). (Diagram 4.69) XRD analysis of the lime samples only identified calcium carbonate minerals. (Diagram 4.119)

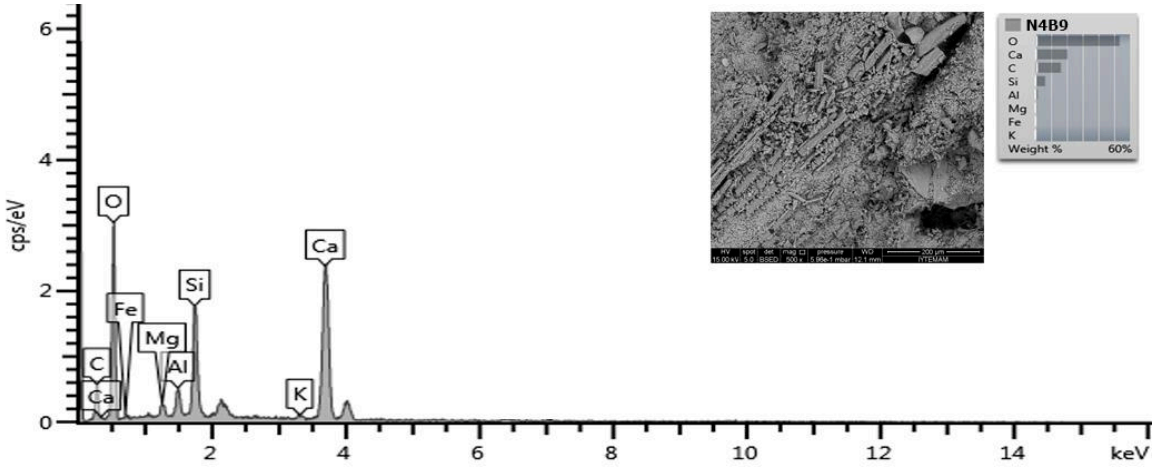


Diagram 4.69: EDX analysis of lime samples taken from Structure N4B9

Accordingly, the walls of structure N4B9 were constructed by the piled earth technique. The lime lines partially identified on the faces of the walls are the remains of woven reeds or woody material used during ramming. Due to this wall technology, it is unlikely that the roof was earthen. However, considering the density of lime fragments indicating organic material, it may be stated that the structure was covered with a light material such as reeds or branches.

4.4.4.1.10. Structure N4B10

This is located in Area B in the northeast of trench 15G and southeast of trench 15F between the elevations of 700.78 to 701.25 meter. Based on the wall remains and general layout, the structure is classified as a multi-roomed structure. (Figure 4.57, 4.183) The structure was constructed with east-west orientation on a light grey occasionally stony and ashy fill on the slope of the natural topography without a stone foundation. The structure was constructed on the lower terrace on the surface sloping slightly toward the west. The elevation difference between the east and west of the structure is 8-10 cm. The walls have been preserved to a height of 40 cm.

The rectangular structure is 575 cm long in the east-west direction and 413 cm wide in the north-south direction. Covering an area of nearly 24 m^2. (Figure 4.336) Thickness of the bearing walls and the partition walls are not significantly different, with bearing walls are 33-44 cm wide and partition walls are 28-42 cm wide. The earthen walls, partially bounded by lines of lime fragments have homogeneous reddish-brown very loose fill.

Apparent lime fragment lines are observed on both sides of the walls. The earth fill within the walls is only distinguished from the external area by its colour and the clear lime lines. Plaster traces were not encountered on the irregular lime lines.

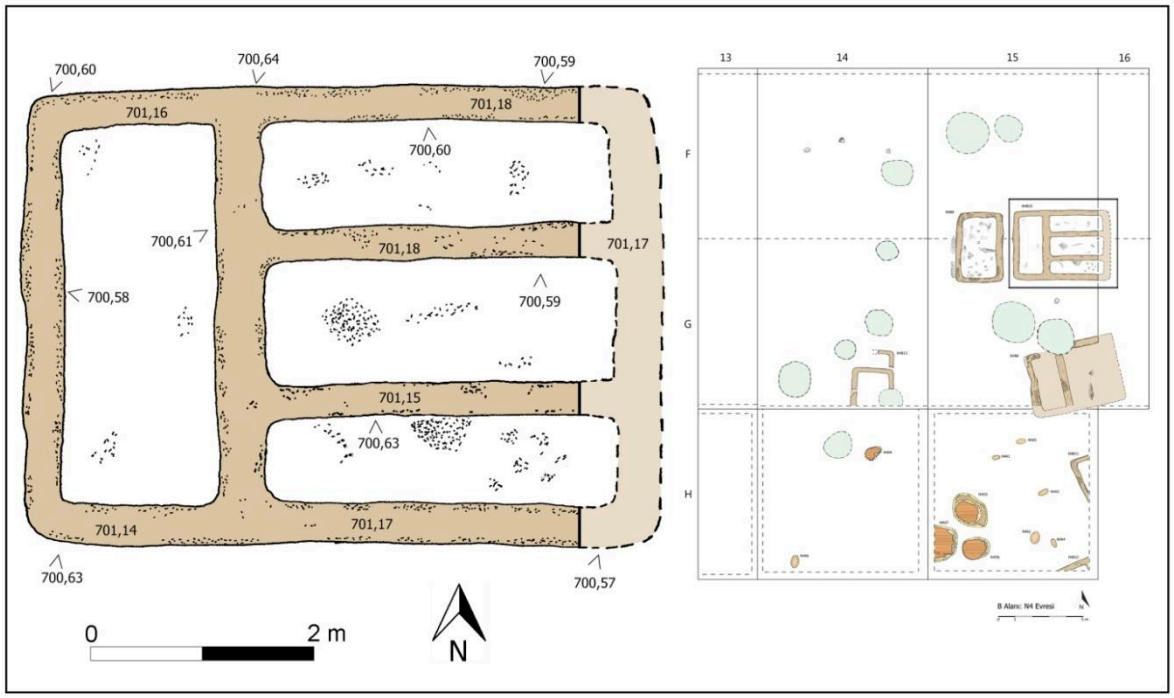


Figure 4.57: Location and plan of Structure N4B10

The structure has 4 rooms. On its western wing, the rectangular room number 4 is 140x358 cm in size with north-south orientation. Covering an area of nearly 5 m^2, this room is larger than those on the east side. Contrary to the room on the west side, the ones on the east side have east-west orientation. These rectangular rooms have very similar measurements. Covering an internal area of nearly 3 m^2 area, they are 84x330 cm and 99x322 cm in size. The rooms are not linked by doorways. The internal fill of the rooms is greyish-brown with low ash content. There was no plaster floor remains identified. It is stated that the dense lime fragments within the structure are the calcified remains of structural material made of woody plants which fell into the structure.

On SEM images of reddish-brown soil samples, micritic envelopes on sand and stone grains and acicular-shaped calcium carbonate crystals are observed. (Figure 4.315c-d) According to EDX analyses of the soil samples identified the elements O (32.43%), Ca (15.07%), C (8.92%), Si (20.73%), Fe (11.15%), Al (7.61%), Mg (2.05%), K (2.05%), and Na (0.38%). (Diagram 4.70)

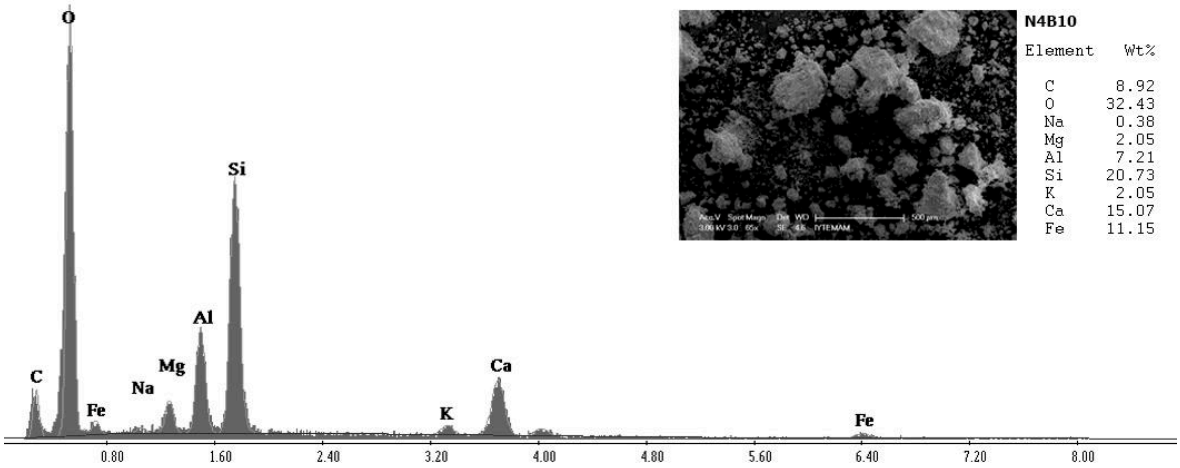
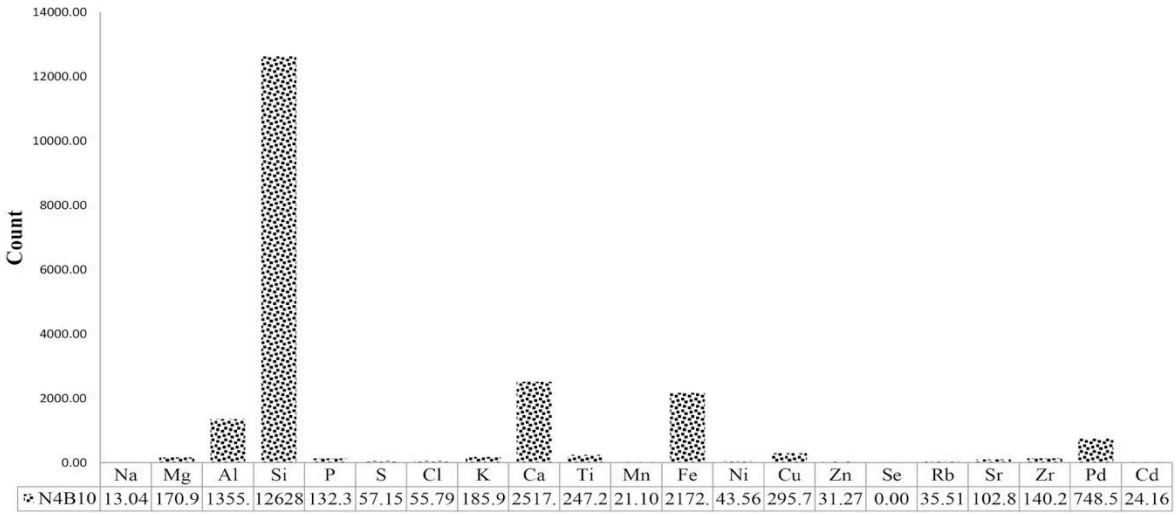


Diagram 4.70: EDX analysis results of soil samples taken from Structure N4B10

XRD analysis of the same samples were identified as containing calcite, cliftonite, graphite, silica, quartz, sakhaite, iron, and brucite minerals. (Diagram 4.120) Their chemical compositions comprise calcium carbonate, silicon dioxide, carbon, iron oxide, magnesium hydroxide, and calcium magnesium carbonate borate hydrate compounds. Investigation of the soil samples taken from the structure with the XRF method observed the following elements dominating; Si (60%), Ca (12%), Fe (10%), Al (6%), and Pd (4%). (Diagram 4.71)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N4B10	13.04	170.9	1355.	12628	132.3	57.15	55.79	185.9	2517.	247.2	21.10	2172.	43.56	295.7	31.27	0.00	35.51	102.8	140.2	748.5	24.16

Diagram 4.71: XRF analysis of the soil samples taken from Structure N4B10

4.4.4.1.11. Structure N4B11

This is located in Area B in the east profile edge of trench 15H between the elevations of 700.01 to 700.47 meter. Since the eastern portion of the structure remains outside the exposed area neither its dimensions nor its plan could clearly be identified. (Figure 4.58, 4.184) The structure sits on a light grey fill with random carbon fragments and stones without

a stone foundation. The walls have been preserved to a height of 46 cm, and their width is 29-32 cm. The internal fill of walls is homogeneous reddish-brown loose earth. At 8-12 cm intervals in the wall section, lime lines were identified between bedding. These lime lines, which continue irregularly between the layers, did not have mortar characteristics. Besides, plaster traces were not encountered on the surfaces of reddish-brown earth bedding. There are no plaster floor remains identified. Considering the architectural tradition and construction technology of Sumaki Höyük, the walls were constructed by the piled earth technique.

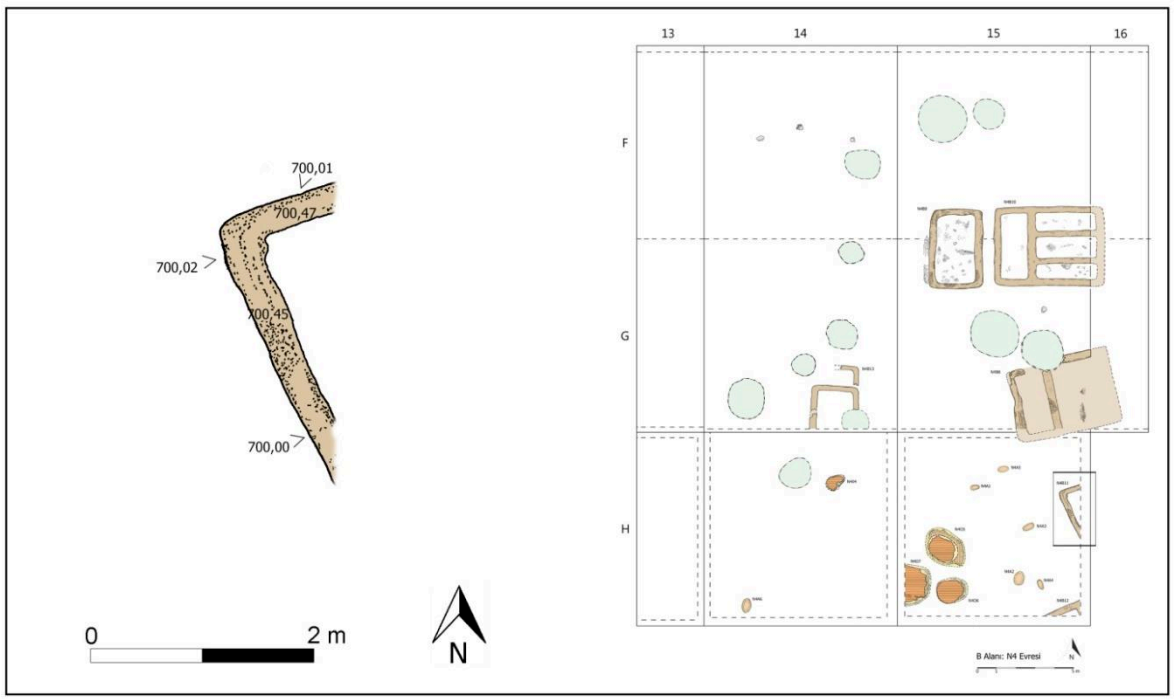


Figure 4.58: Location and plan of Structure N4B11

4.4.4.1.12. Structure N4B12

This is located in Area B in the southeast corner of trench 15H between the elevations of 700.00 to 700.50 meter. Although the northern and western parts of the structure were revealed, data allowing determination of its plan were insufficient in the exposed area. The structure was constructed on a light-grey fill occasionally dense carbon fragments and stones without a stone foundation. The walls have been preserved to a height of 50 cm, and their width is 32 cm. The earth fill within the walls is only distinguished from the external area by its colour. The internal fill of walls is homogeneous reddish-brown loose earth. At 4-10 cm intervals in the wall section, lime lines were identified. These lime lines, which continue

irregularly between the layers, did not have mortar characteristics. Considering the architectural tradition and construction technology of Sumaki Höyük, the walls of structure N4B12 were constructed by the piled earth wall technique.

4.4.4.1.13. Structure N4B13

This is located in Area B in the southeast of trench 14G between the elevations of 701.53 to 701.82 meter. The southern section and the northwest corner of the structure were disturbed by Middle Age pits. (Figure 4.59, 4.185) Based on the wall remains and general appearance, this structure is classified as a double-roomed structure. The rectangular structure has north-south orientation sits on a light grey stony fill occasionally with dense carbon fragments without a stone foundation. The walls have been preserved to a height of 29 cm.

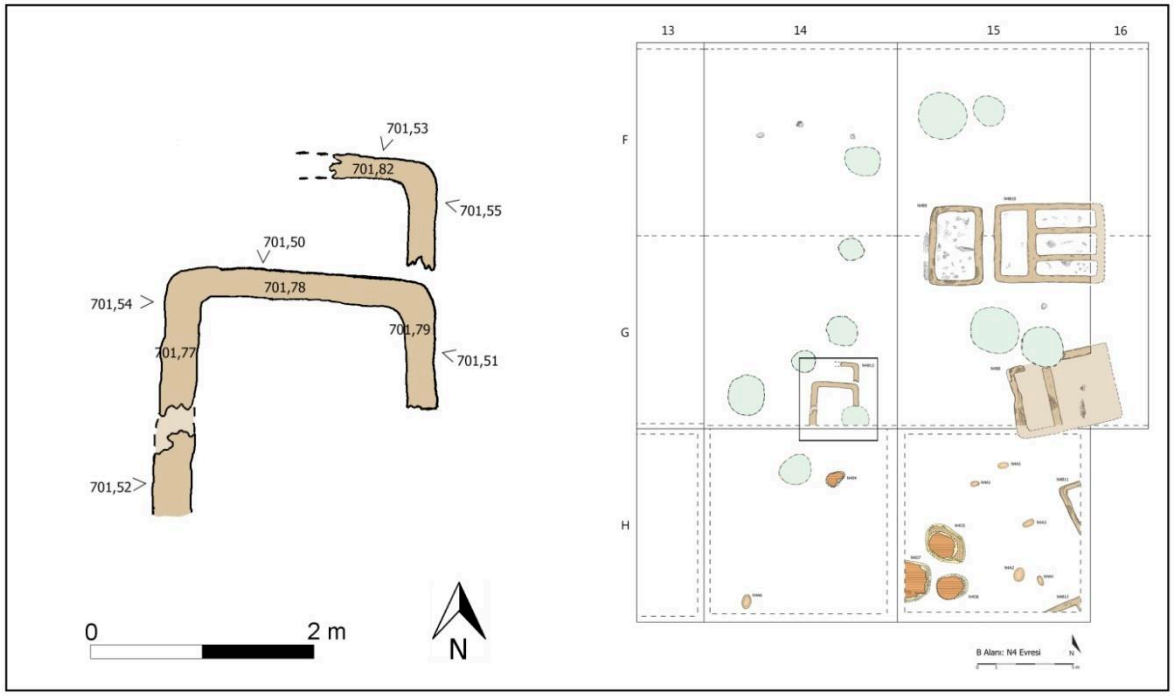


Figure 4.59: Location and plan of Structure N4B13

The structure is 227 cm wide in the east-west direction, and at least 332 cm in the north-south direction. The walls are 20-29 cm thick. The earth fill within the walls is only distinguished from the external area by its colour. At 3-6 cm intervals in the wall section, thin lime lines were identified. These lime lines, which continue irregularly between the layers, did not have mortar characteristics. Besides, there is no plaster surface at the top or

the bottom of the homogeneous reddish-brown loose bedding. Considering the architectural tradition and construction technology of Sumaki Höyük, the walls of the structure were constructed by the piled earth technique.

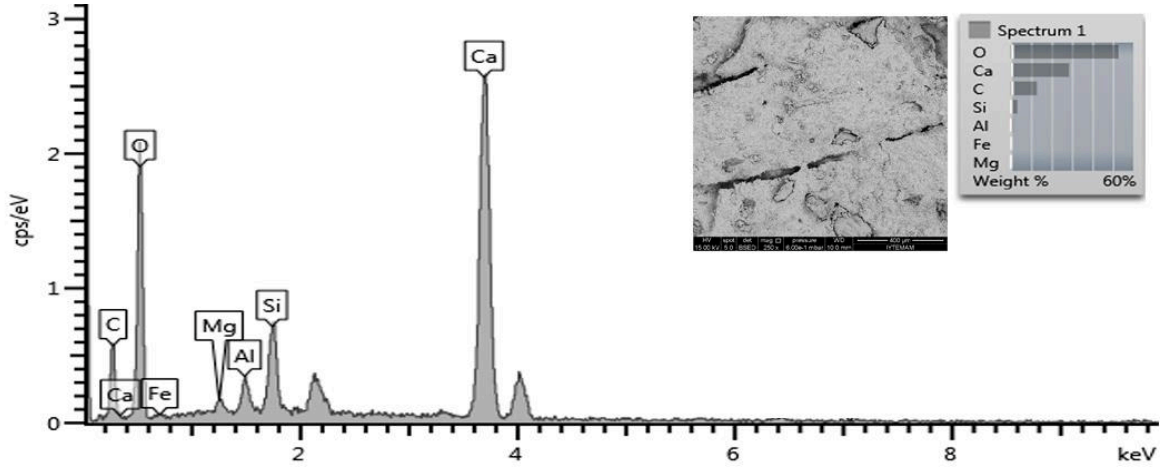


Diagram 4.72: EDX analysis of lime samples taken from Structure N4B13

SEM images of lime samples clearly show cavities formed by organic remains. Calcium carbonate minerals filled the edges of these cavities. (Figure 4.316) These calcium carbonate minerals with scalenohedral and granular crystal structure are probably aragonite crystals. Investigation of the lime samples with the EDX method identified the elements O (52.77%), Ca (28.59%), C (12.73%), Si (3.18%), Al (1.15%), Mg (0.49%), and Fe (1.09%). (Diagram 4.72)

4.4.4.1.14. Structure N4B14

This is located in Area C in the southwest of trench 18G along the profile edge between the elevations of 699.52 to 699.63 meter. Since the western half and southern section of the structure remains outside the exposed area, its dimensions could not clearly be detected. The walls have been preserved to a height of 11 cm, and their width is 40-42 cm. Based on the wall remains and general appearance, the structure is classified as a double-roomed structure. (Figure 3.71) The south room is larger than the north one; the north room is 192 cm long, while the south one is more than 205 cm long. Their internal fill is grey buff-colour ash-and stone-poor content. The internal fill of the walls is homogeneous reddish-brown with a very soft structure. Considering the architectural tradition and construction

technology of Sumaki Höyük, the walls of the structure N4B14 were constructed by the piled earth technique.

4.4.4.2. Hearths

In Phase N4, seven hearths were identified with three in Area A and four in Area B. (Diagram 3.16, Table 4.5)

4.4.4.2.1. Hearth N4O1

This was located in an open space in the southwestern part of trench 20N in Area A on a greyish buff-coloured soil mixed with random calcareous pieces. It covers an area of approximately 1.5 m^2 between the elevations of 700.52 to 700.63. The hearth had a single plastered floor with a stone pavement. The oval/rounded-shaped hearth was 147 cm long in the southeast-northwest direction and 68 cm wide in the northeast-southwest direction. Its southwestern part was disturbed. The pavement was made of basalt and groundstone fragments of different sizes between 4x5x7 - 5x8x12 cm. Between the stone pavement and the plastered floor was a layer of buff-coloured sand-and stone-tempered 3 cm-thick filling. The surface of the grey-coloured medium hard 2 cm-thick floor was rippled and densely cracked.

4.4.4.2.2. Hearth N4O2

This was located in an open space in the northwestern part of trench 20N in Area A on a greyish buff soil mixed with random calcareous pieces and little ash. It covers an area of approximately 1 m^2 between the elevations of 700.54 to 700.67. It had a single dark grey-coloured plastered floor with a stone pavement. Based on the floor remains, the hearth inclined to the south. The oval-shaped hearth was 98 cm long in the east-west direction and 76 cm wide in the north-south direction. The pavement was made of basalt of different sizes between 4x6x8 - 5x7x13 cm. Between the stone pavement and the plastered floor was a layer of yellowish buff-coloured stone-and sand-tempered 4 cm-thick filling. The surface of the hard 3 cm-thick plastered floor was rippled and densely cracked with different coloured traces of burning due to intensive usage.

4.4.4.2.3. Hearth N4O3

This was located in an open space in the north part of trench 21M in Area A on the grey-coloured ashy and stony earth. The hearth covers an area of approximately 2 m^2 between the elevations of 699.80 to 700.04. Although there was a very loose debris-like lime filling around the very hard plastered floor of the hearth, plaster or burning traces were not detected. The hearth had a single plastered bluish-grey-coloured floor with a stone pavement. Based on the floor remains, the hearth inclined slightly to the northwest. (Figure 4.231, 4.232) The oval-shaped hearth was 181 cm long in the east-west direction and 144 cm wide in the north-south direction. However, its northwestern part partially remains underneath the Hearth N3O1. The pavement was made of basalt and pebbles of different sizes between 3x5x8 - 6x8x11 cm. Between the stone pavement and the plastered floor was a layer of yellowish buff pebble-and sand-tempered 5-6 cm-thick filling. The surface of the very hard 2 cm-thick floor was smoothed and slightly cracked with different coloured traces of burning due to intensive usage.

4.4.4.2.4. Hearth N4O4

This was located in an open space in the northeastern part of trench 14H in Area B on the grey-coloured slightly ashy and limey earth. The hearth covers an area of approximately 1 m^2 between the elevations of 702.15 to 702.24. It had a single grey-coloured plastered floor with a stone pavement. (Figure 4.233) The size of the oval-shaped hearth was 95 cm in the southeast-northwest direction and 64 cm in the northeast-southwest direction. However, the northwestern and southeastern parts of its plastered floor have been badly disturbed. The pavement was made of basalt of different sizes between 3x6x8 - 5x7x12 cm. Between the stone pavement and the plastered floor was a layer of greyish buff-coloured stone-tempered 4 cm-thick filling. The surface of the hard 2 cm-thick plastered floor was densely cracked and smooth. Different coloured traces were observed due to intensive usage.

4.4.4.2.5. Hearth N4O5

This was one of the triple hearth groups located in the southwestern part of trench 15H in Area A. Hearths N4O6 and N4O7 were in its south. (Figure 4.237) The hearth, which covers an area of approximately 2 m^2 between the elevations of 700.65 to 700.97, was built

on a light grey homogeneous fill. (Figure 4.234 – 4.236) It had three superimposed plastered floors on a single stone pavement. Based on the floor remains, the hearth inclined to the southeast.

The size of the oval-shaped hearth was 229 cm in the southeast-northwest direction and 162 cm in the southwest-northeast direction. There were scattered lime fragments identified around the hearth. The stone pavement, which was made of basalt and pebbles of different sizes between 4x5x8 - 5x8x14 cm was under the first plastered floor. Between the stone pavement and the first plastered floor was a yellowish buff-coloured heterogeneous layer of sandy and stony 3 cm thick filling. Moreover, grey ashy 1-2 cm-thick homogeneous soil was spread on this layer. The 2 cm-thick first floor was plastered on this filling. This plastered floor was a light grey colour with traces of burning; and its surface was densely cracked. Thereafter, a grey-coloured stony and sandy heterogeneous filling was laid on the first floor; and the renewal floor one with a thickness of nearly 3 cm was plastered on this heterogeneous filling. After the use of this grey-coloured plastered floor, a layer of dark grey-coloured stone-tempered 2 cm-thick filling was laid. The last floor of the hearth was built on this filling about 2 cm in thickness. The surfaces of all the plastered floors were smoothed and slightly cracked.

In the examination of earth samples taken from the fill above the hearth by flotation plant remains, such as *Lens culinaris*, *Triticum/Hordeum*, and *Triticum turgidum* ssp. were identified. (Table 3.2)

4.4.4.2.6. Hearth N4O6

This was the other hearth from the triple hearth group located in the southwestern part of trench 15H in Area B. It lies to the east of Hearth N4O7 and to the south of Hearth N4O5. (Figure 4.237 – 4.239) The hearth covers an area of approximately 1.5 m^2 between the elevations of 700.62 to 700.69. The hearth, which was constructed on a grey-coloured soil with low ash content and scattered lime fragments, had a single bluish-grey-coloured plastered floor without a stone pavement. Based on the floor remains, the hearth inclined to the southwest.

The size of the oval/U-shaped hearth was 162 cm in the east-west direction and 125 cm in the north-south direction. Its western and northwestern parts have been disturbed.

Between the 2 cm-thick plastered floor and grey-coloured soil with low ash and lime contents, was a layer of yellowish buff-coloured heterogeneous stone-tempered 4 cm-thick filling. The surface of the very hard plastered floor was slightly cracked and smoothed. Calcareous lines that were particularly concentrated in the northern part of the floor have no traces of plastering or burning.

In the examination of earth samples taken from above the floor and the surroundings of the hearth by flotation different plant species, predominantly *Triticum turgidum* ssp, *Triticum/Hordeum*, and *Fabaceae* seeds were identified together with *Lens culinaris*, *Lathyrus sativus*, *Lathyrus/Vicia, Poaceae, Euphorbiaceae*, and *Brassicaceae* seeds. (Table 3.2)

4.4.4.2.7. Hearth N4O7

This was the other hearth from the triple hearth group located in the southwestern part of trench 15H. The hearth lies to the southeast of Hearth N4O5 and to the west of Hearth N4O6 in Area B. Its western part remains in the unexcavated area. The hearth, which was constructed on the grey-coloured ashy earth, covers an area of approximately 3 m^2 between the elevations of 700.69 to 700.78. The hearth inclined to the north. It had a single dark grey-coloured plastered floor without a stone pavement. (Figure 4.237, 4.238) The size of the rounded-shaped hearth was 189 cm in the north-south direction and 117 cm in the east-west direction. Between the grey-coloured ashy earth and the plastered floor was a layer of yellowish white -coloured stone-and sand-tempered 5 cm- thick filling. The surface of the 2 cm-thick disturbed plastered floor was cracked and rippled.

4.4.4.3. Fire Pits

Six fire pits were identified in Phase N4 with five in trench 15H and the other in trench 14H. (Diagram 3.16; Table 4.6) In trench 15H, the fire pits and hearths were gathered in a particular area. Accordingly, this area appears to have been reserved for common cooking place by the community.

4.4.4.3.1. Fire Pit N4A1

It was located in an open space in the northwestern part of trench 15H in Area B. The oval-shaped fire pit was between the elevations of 700.63 to 700.72. Dug in a grey ashy and limey soil, the fire pit was 30x62 cm in size and 9 cm deep. (Figure 4.60, 4.282, 4.283) On its edge, there is a dark grey line due to burning with 2-3 cm thickness. There were no signs of plastering on its sides or its bottom. It was filled with yellowish grey-coloured ash comprising a few stones.

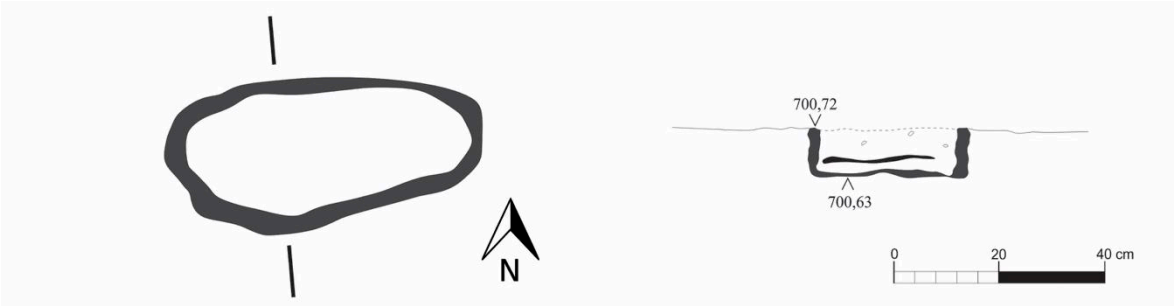


Figure 4.60: Fire Pit N4A1 and its cross-section

Different plant remains were detected from inner deposits and its close surroundings by floatation. The plants identified inside the fire pit were *Poaceae* family (*Triticum/Hordeum, Triticum turgidum ssp*), *Fabaceae* family (*Lens culinaris, Lathyrus sativus*), wild grassland species (*Chrozophora tinctoria* and *Boraginaceae*), and *Ficus carica*. In examination of the soil samples taken from its close surrounding identified *Poaceae* family (*Triticum/Hordeum, Triticum turgidum ssp*), *Fabaceae* family (*Lens culinaris* and *Cicer arietinum*), and *Linum*. (Table 3.2)

4.4.4.3.2. Fire Pit N4A2

This was located in an open space in the south part of trench 15H in Area B. The oval-shaped fire pit was between the elevations of 700.67 to 700.74. Dug in a grey-coloured little ashy and limey soil, the fire pit was 48x72 cm in size and 7 cm deep. (Figure 4.61) On its edge, there is a dark grey line due to burning with 1-2 cm thickness. There were no signs of plastering on its sides or its bottom.



Figure 4.61: Fire Pit N4A2 and its cross-section

It was filled with grey-coloured ash. Plant remains were detected in earth samples taken from its fill and its close surroundings by floatation. The plants from its inner deposit detected *Triticum/Hordeum*, *Fabaceae* family (*Lens culinaris*), and *Linum* seeds. The ones from its surroundings were *Poaceae* family (*Triticum turgidum ssp. and Triticum/Hordeum*), and *Fabaceae* family. (Table 3.2)

4.4.4.3.3. Fire Pit N4A3

It was located in an open space in the western-central part of trench 15H in Area B. The oval-shaped fire pit was between the elevations of 700.63 to 700.72. Dug in a yellowish grey densely limey soil, the fire pit was 31x60 cm in size and 9 cm deep. (Figure 4.62, 4.284) On its edge, there is a dark, dull grey line due to burning with 2-3 cm thickness. There were no signs of plastering on its sides or its bottom. It was filled with dull grey- and yellowish buff-coloured ash comprising a few stones.

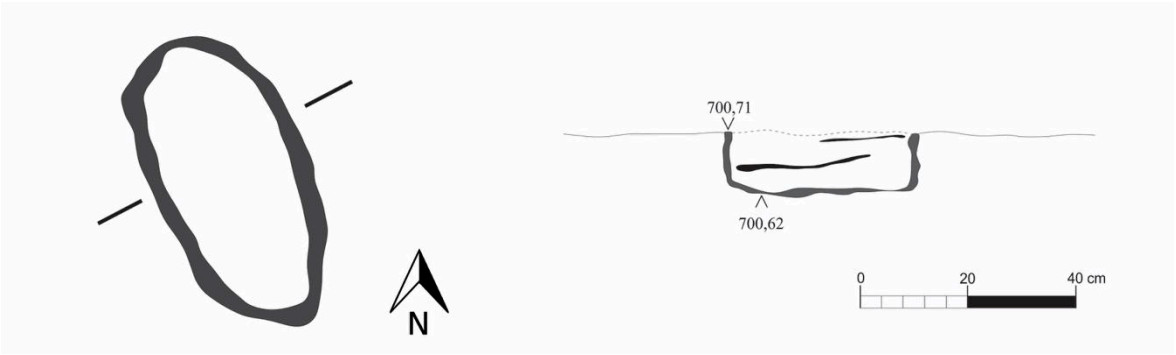


Figure 4.62: Fire Pit N4A3 and its cross-section

4.4.4.3.4. Fire Pit N4A4

This was located in an open space in the southwestern part of trench 15H in Area B. The oval-shaped fire pit was between the elevations of 700.53 to 700.64. Dug in a light grey

densely limey soil, the fire pit was 36x57 cm in size and 11 cm deep. (Figure 4.63) On its edge, there is a light brown line formed due to burning with 1-2 cm thickness. There were no signs of plastering on its sides or its bottom. It was filled with dull grey- and yellowish buff-coloured ash comprising a few stones.

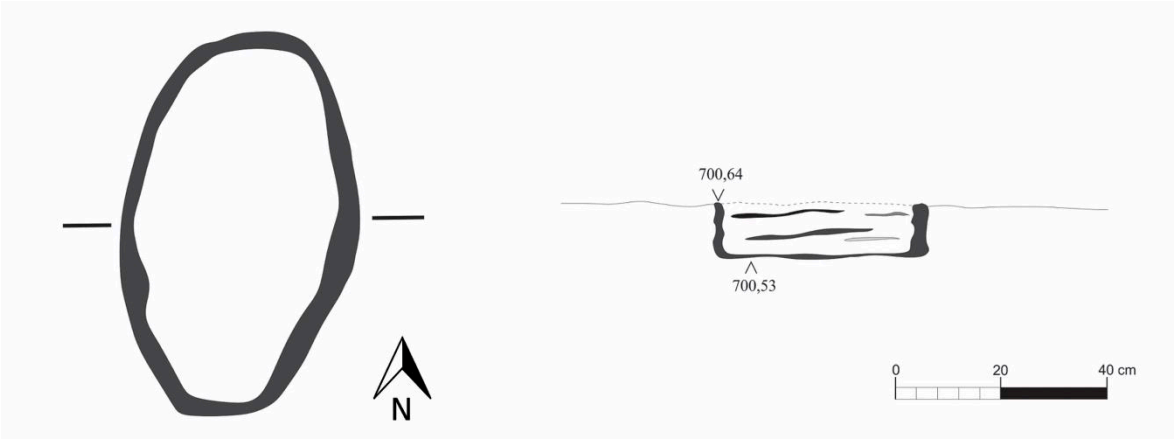


Figure 4.63: Fire Pit N4A4 and its cross-section

Different plant remains were identified from its inner deposit by floatation: *Fabaceae* family (*Lens culinaris, Medicago radiata, Vicia ervilia*), *Poaceae* family (*Triticum/Hordeum and Triticum turgidum* ssp), and wild grassland species such as *Rumex* and *Linum*. (Table 3.2)

4.4.4.3.5. Fire Pit N4A5

It was located in an open space in the northern part of 15H trench and north of the Fire Pit N4A1 in Area B. The waterdrop-shaped fire pit was between the elevations of 700.53 to 700.62. Dug in a grey-coloured lime-poor earth, the fire pit was 46x74 cm in size and 10 cm deep. On its edge, there is a dark grey line formed due to burning with 2-3 cm thickness. There were no signs of plastering on its sides or its bottom. It was filled with grey-coloured ash.

4.4.4.3.6. Fire Pit N4A6

This was located in an open space in the southern part of trench 14H in Area B. The oval-shaped fire pit was between the elevations of 702.08 to 700.19. Dug in a grey- coloured randomly limey soil, the fire pit was 42x73 cm in size and 11 cm deep. On its edge, there is a dark, dull grey/black line due to burning with 3-4 cm thickness. There were no signs of

plastering on its sides or its bottom. It was filled with yellowish buff-coloured ash comprising some stones and carbon particles. (Figure 4.285 – 4.287)

4.4.5. Phase N3 architecture

Phase N3 is dated to 8395±28 CalBP (Table 3.3) and it covers a total area of 693 m² scattered through 421 m² in Area B, 242 m² in Area A, and 30 m² in Area C.

Thin lines similar to these traces were also observed in trench sections in Area A. These traces are identified at intervals in the western parts of trenches 20L and 20M. In this context, it may be proposed that for a short time before Phase N3, Sumaki Höyük settlement was not inhabited. Later, a newly-arrived group had a very different lifestyle compared to the previous inhabitants. In other words, after nearly 250 years the permanent settlement appears to transform into a temporary "campsite" with partly similar features to Phase N7. (Tabo 5) The Phase N3 filling is very shallow compared to the other phase fills, but it is incredibly varied. The fill generally has the appearance of thin consecutive beds with a light grey and occasionally lead-grey, colour. Dense lime fragments and stony mixed fill were also identified. Scattered ash-rich fill was determined in different areas around hearths and fire pits.

Scattered stones in open areas represent Phase N3 and post-holes without a defined architectural plan along with post-holes surrounding a circular area. The hearths and fire pits of this phase are very similar to the ones of the previous phase. Circular areas in Areas A and B with posts surrounded by stones are the remains of temporary structures. The post-hole locations in these two areas were assessed within a structural classification. In Phase N3 there were four hearths, with one in Area A and three in Area B, and three fire pits all identified in Area B. (Table 4.5, 4.6) The hearths in Area B from Phase N3 were gathered in particular areas in a similar fashion to Phase N4. It seems that contrary to the structures in this phase, the hearths were used for more extended periods. The most apparent evidence is that three of the four hearths were renovated at least twice. Two of the fire pits are very close to each other. After this phase, the fire pit tradition ended. (Diagram 3.16)

4.4.5.1. Structures

Considering the post-holes identified in Phase N3 fill and intensifying in specific areas, two temporary structures were defined. One of them is in Area A, and the other is located in Area B. Single post-hole traces were also identified in Area A, with one in trench 20M and the other in trench 22M. Fist-sized stones encircle the post-hole in trench 22M while the one in trench 20M is a calcified round one nearly 32 cm in diameter and 2-3 cm thick. There is no trace of plaster. It appears to be the trace of a thick post on the ground. The two post traces found in trench 13G in Area B are probably associated with structure N3B2. (Table 4.2 - 4.4, 4.7)

4.4.5.1.1. Structure N3B1

Structure N3B1 is located in Area A in the eastern section of trench 20L and northeast of trench 20M between the elevations of 700.33 – 700.54. Covering an area of nearly 30 m^2, there are seven post-hole traces identified around the area, with five clear and two partly disrupted. (Figure 4.64, 4.186)

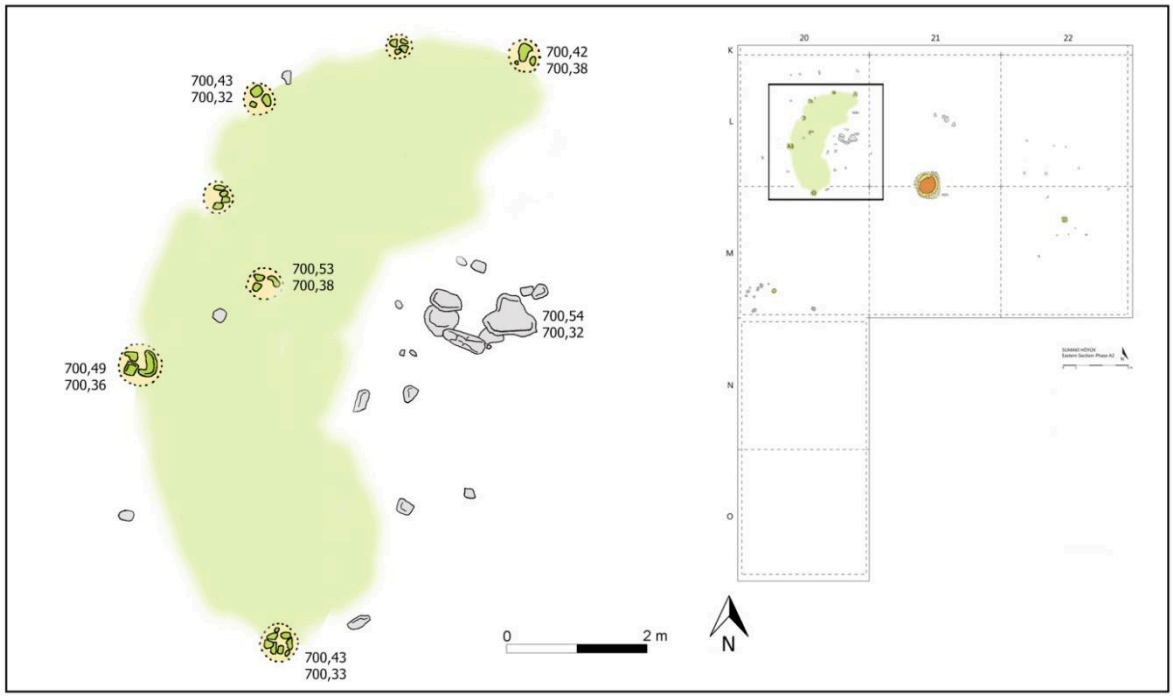


Figure 4.64: Location and plan of Structure N3B1

The post-holes were surrounded by basalt and ground stone fragments measuring from 7x10x11 to 10x14x23 cm in size. There are some scattered stones to the east of these post-holes. Since no clear post-hole trace was identified in this area, these stones may be

disrupted post-holes. (Figure 4.187) The general appearance of the post-holes indicates the presence of at least one circular temporary structure.

There is no trace of wall or surroundings between the post-holes as well as no evidence of a plastered floor surrounding these posts. The level determined as the existing surface was the surface where finds such as bone tools like awls and borers were found. There are occasional lime traces observed within the area surrounded by posts and at the edges of the posts.

These posts surrounding a circular area are probably the traces of a temporary structure with top tent cover. Similar marks were identified during ethno-archaeological field studies in the Lower Garzan Basin. A similar structure with tent upper covers is used for short periods in semi-nomadic societies and then the posts and the tent are removed, leaving similar traces on the ground when they leave. However, no stones were surrounding the posts identified in modern semi-nomadic groups, as there are in the Sumaki Höyük Phase N3 architecture. Posts are either driven into the soil or sit on the ground. The ones sitting on the ground are usually moveable.

4.4.5.1.2. Structure N3B2

Structure N3B2 is located in Area B southwest of trench 15H between the elevations of 702.19 - 702.44. This structure is defined by a circular area surrounded by post-holes. Its southern section is in the unexcavated area. Post-holes, which were identified in the southeast part of trench 13H, are possibly associated with this structure.

The area surrounded by posts in the exposed area is nearly 8 m^2. (Figure 4.65, 4.188) Five post-holes were surrounded by stones with sizes of 6x7x11 - 10x17x22 cm. Their general appearance shows the presence of at least one circular temporary structure with tent covering on top.

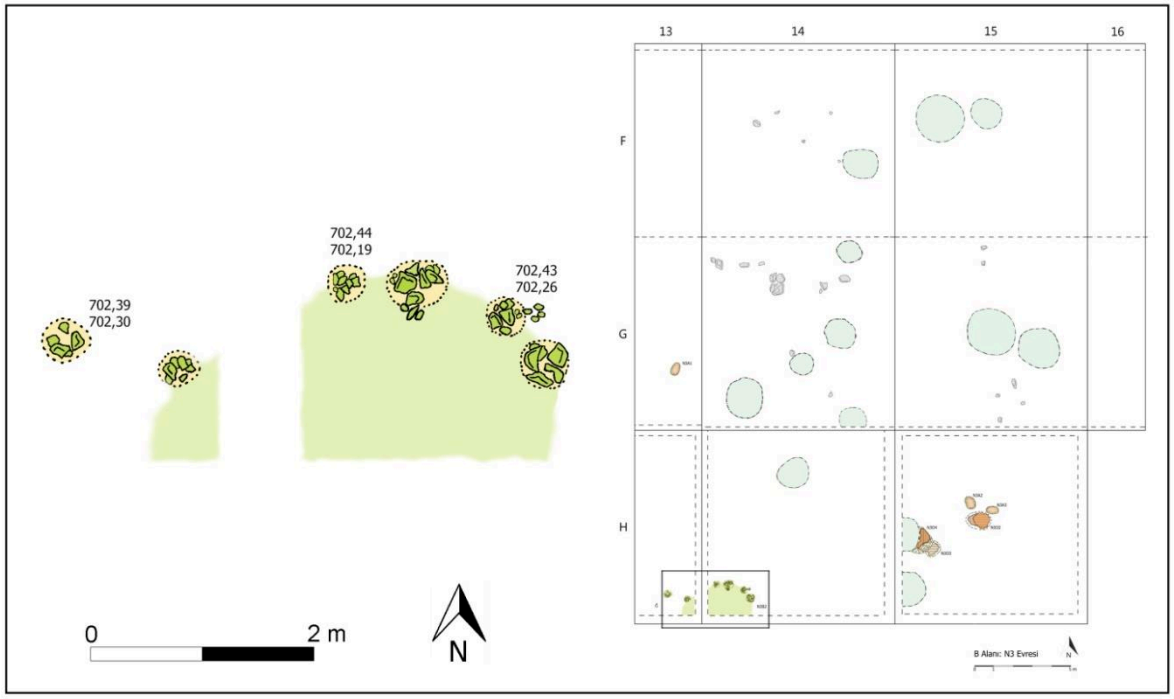


Figure 4.65: Location and plan of Structure N3B2

There are no traces showing walls or surroundings between the post-holes as well as no marks of plastered floors in the area surrounded by the holes within the excavation or sections. However, there are thick ash-rich lines and fill within the area enclosed by the posts and around it.

4.4.5.2. Hearths

In Phase N3, four hearths were identified with three in Area B and one in Area A. (Table 4.5)

4.4.5.2.1. Hearth N3O1

This was located in an open space in the northern part of trench 21M and the southern part of trench 21L, under the Structure N2B4 of the Phase N2, in Area A. In other words, Structure N2B4 was built slightly sloping to the south on this hearth. The hearth covers an area of approximately 2 m^2 between the elevations of 699.96 to 700.12 and it was constructed on the grey-coloured densely ashy earth. It had two superimposed plastered floors with a stone pavement under the earliest plastered floor. Based on the floor remains, the hearth slightly inclined to the south. (Figure 4.240 – 4.242)

The size of the rounded-shaped hearth was 199 cm in the east-west direction and 207 cm in the north-south direction. It had lime and burnt kerpiç edges. The pavement was made of basalt and pebbles of different sizes between 3x5x6 - 5x7x11 cm. Between the stone pavement and the first plastered floor was a layer of stone-tempered yellowish buff-coloured about 3-4 cm-thick filling. The first yellowish buff-coloured plastered floor was 2 cm thick. After its usage, a grey-coloured 2-3 cm-thick homogeneous filling was laid and the new floor was plastered. This had a grey-coloured rippled and slightly cracked surface about 1 cm in thickness.

The hearth was surrounded by an earth wall with a width of 13-21 cm, and it had a very slight inclination to the south of the plastered floor with a diameter of 110 cm. Traces of plaster was visible on this enclose items. On the outer face of this encloser, lime lines without plaster traces were observed in the form of two parallel 12-18 cm-thick lines. These lines are probably the remains of reed or brushwood encircled the earth wall.

4.4.5.2.2. Hearth N3O2

This was located in an open space in the middle of trench 15H in Area B on the greyish buff soil mixed with random calcareous pieces. The hearth covers an area of approximately 1 m^2 between the elevations of 701.20 to 701.37. Two plastered floors were laid on top of each other with a stone pavement under the first one. (Figure 4.243 – 4.245) The hearth slightly inclined to the west.

The oval-shaped hearth was 135 cm long in the east-west direction and 92 cm wide in the north-south direction. The pavement was made of basalt and pebbles of different sizes between 4x5x7 - 5x6x13 cm. Between the stone pavement and the first plastered floor was a layer of yellowish grey-coloured stone- and sand-tempered 2-3 cm-thick filling. The first dark grey-coloured plastered floor was 2 cm thick. After that, a orangish buff-coloured, dense stone-tempered 5-6 cm-thick heterogeneous filling was laid on the first plastered floor, and the upper floor was plastered. The new very hard floor was a grey colour about 1.5 cm in thickness with a rippled and cracked surface.

4.4.5.2.3. Hearth N3O3

This was located in an open space in the southwestern part of trench 15H in Area B between the elevations of 701.30 to 701.43 on the dark grey soil. It had two superimposed plastered floors with a stone pavement under the first plastered floor. (Figure 4.246)

The dimensions of the rounded-shaped hearth were 78 cm in the east-west direction and 89 cm in the north-south direction. The pavement was made of basalt and pebbles of different sizes between 2x5x8 - 5x7x11 cm. Between the stone pavement and the first plastered floor was a heterogeneous layer of orangish buff-coloured densely stone-and sand-tempered 2-3 cm-thick filling. The first plastered floor was light grey-coloured with a thickness of 3 cm. After the use of this floor, a reddish-brown coloured 1-2 cm-thick homogeneous filling was laid on it, and then, the second floor was plastered. This floor was a grey colour about 2 cm in thickness.

4.4.5.2.4. Hearth N3O4

This was located in an open space in the middle of trench 15H in Area B on the reddish-brown soil with random grey ash lines. It covers an area of approximately 1 m^2 between the elevations of 701.54 to 701.67. It had a single light grey-coloured plastered floor with a stone pavement. (Figure 4.246 – 4.248) Based on the floor remains, the hearth inclined to the south.

The oval/rounded-shaped hearth was 102 cm in the southwest-northeast direction and 67 cm in the northwest-southeast direction. Its northwestern section was disturbed by a Middle Age pit, and its southern part was also partially destroyed. The pavement was made of basalt and pebbles of different sizes between 2x4x5 - 6x8x14 cm. Between the stone pavement and the plastered floor was a layer of yellowish buff-coloured stone-tempered 3-4 cm-thick filling. The surface of the plastered floor with 3 cm thickness was densely cracked and slightly rippled.

4.4.5.3. Fire Pits

In Phase N3, three fire pits were identified with two in trench 15H and the other in trench 14H. After this phase, fire pit tradition ended at Sumaki Höyük. (Table 4.6)

4.4.5.3.1. Fire Pit N3A1

This was located in an open space in the southern part of trench 13G in Area B. The oval-shaped fire pit was between the elevations of 701.90 to 702.00. Dug in a light grey-coloured little stony soil, the fire pit was 42x66 cm in size and 10 cm deep. On its edge, there is an orangish buff line due to burning with 2-3 cm thickness. There were no signs of plastering on its sides or its bottom. (Figure 4.288) Its inner deposit was grey and yellowish buff. Immediately above the fire pit, there was a layer of dense stone-tempered heterogeneous fill mixed with animal bones and pottery sherds of the torrent of Phase N2. Therefore, the fire pit was partly destroyed.

4.4.5.3.2. Fire Pit N3A2

This was located in an open space in the mid-side of trench 15H, and northwestern of Hearth N3O2 in Area B. The waterdrop-shaped fire pit was between the elevations of 701.47 to 701.56. Dug in a grey densely limey soil, the fire pit was 35x60 cm in size and 9 cm deep. (Figure 4.289) On its edge, there is a dark grey line due to burning with 1-2 cm thickness. There were no signs of plastering on its sides or its bottom. Its inner deposit was light grey-coloured ash.

4.4.5.3.3. Fire Pit N3A3

This was located in an open space at the mid-side of trench 15H, and northeast of Hearth N3O2 in Area B. The oval-shaped fire pit was between the elevations of 701.45 to 701.57. Dug in a grey densely limey soil, the fire pit was 52x71 cm in size and 12 cm deep. On its edge, there is a dark, dull grey/black line due to burning with 2-3 cm thickness. (Figure 4.290) There were no signs of plastering on its sides or its bottom. Its inner deposit was dark grey-coloured ash.

4.4.6. Phase N2 architecture

Phase N2 was revealed in a total area of 1204 m², with 495 m² in Area B, 669 m² in Area C, and 40 m² in Area C. Since there is no C_{14} dating, this phase is relatively dated to about 8250 - 8200 CalBP. (Table 3.3)

The architectural concept and settlement strategy changes in Phase N2 compared to Phase N3. The settlement pattern and spatial distribution density interrupted in Phase N3 were recreated in this phase similar to phases N6 and N4. The structures followed a particular model, being located beside each other and built following the topography of the period. In this phase, the Circular Temporary Structures from Phase N3 are replaced by rectangular temporary structures. (Table 4.7) Cell Building N2B9, located in trench 14H with a very similar plan to the Cell Buildings, which dominated the architecture in Sumaki Höyük Phase N6, reoccurred in this phase. (Diagram 3.16)Apart from this structure, it is clear that nearly all structures except for two Single-roomed Structures (N2B1 and N2B7) had a temporary character based on both fill characteristics and construction techniques. Six hearths were identified with four in Area B and two in Area C. The hearths were generally renovated more than once. One of them (N2H2) was renewed at least four times. There are stone pavements under their plastered floors. The thickness of their plaster base varies from 1-2 cm. (Table 4.5)

4.4.6.1. Structures

There were twelve structures identified in Phase N2. One of them (N2B9) belongs to the Cell Building group. The others are classified as Single-roomed Structures. Piled earth walls surround two of them (N2B1 and N2B7). The others are rectangular "temporary" structures defined by soil colour and 1-2 cm-thick lime lines. Of the structural remains and traces, seven were revealed in Area A, and five were in Area B. (Table 4.2 - 4.4, 4.7)

4.4.6.1.1. Structure N2B1

Structure N2B1 is located in Area A south of trench 20N and the northern section of trench 20/O between the elevations of 700.77 – 700.89 meter. According to its wall remains and general appearance, the structure is classified as a Single-roomed Structure. (Figure 4.66, 4.189) It was constructed with a southwest-northeast orientation following other structures in the same area on the slope of the natural surface without a stone foundation. The height of the walls is 7 cm.

This rectangular structure is 398 cm wide in a southeast-northwest direction, and the preserved section is 592 cm long in a northeast-southwest direction. The walls are 32 -43 cm in width with irregular and undulating surfaces. There is no plaster floor in the structure.

The wall faces are identified from differences in soil colour. The walls in its southern half could not be determined since this area appears to have been disturbed by structure N1B4 of Phase N1. The wall fill, which is of a homogeneous brown and loose character, is only distinguished from the external area soil by its colour. Considering the architectural tradition and construction technology of Sumaki Höyük, the structure was built using the piled earth technique.

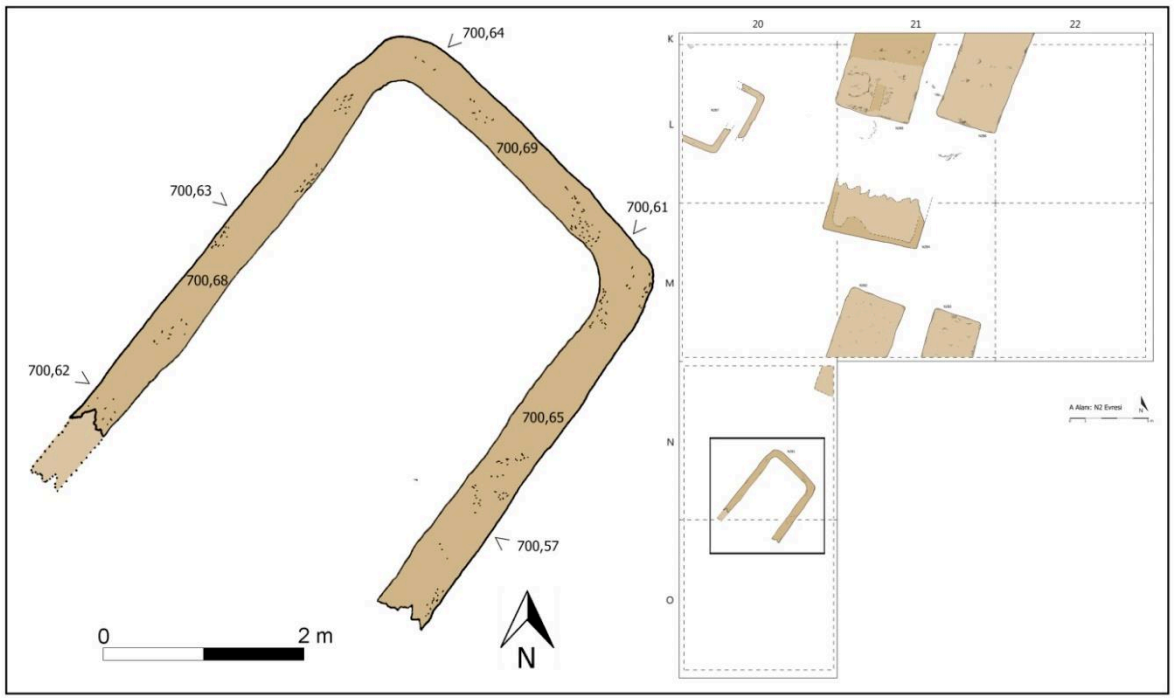


Figure 4.66: Location and plan of Structure N2B1

4.4.6.1.2. Structure N2B2

Structure N2B2 is located in Area A southwest of trench 21M, with its southern section outside the trench between the elevations of 700.30 – 700.54 meter. It was partly identified southwest of trench 20N, but the southeast corner remains outside the exposed area. Based on the traces and general appearance, it is classified as a Single-roomed Structure. (Figure 4.67, 4.190, 4.192) As per this type, it was a temporary structure without walls, probably surrounded by reeds with flimsy upper cover.

Constructed on the northern slope of a slight rise with southwest-northeast orientation, N2B2 is 372 cm wide in an east-west direction, and along with the area within trench 20N, it is 671 cm long in a north-south direction. Covering an area of nearly 25 m^2. This structure with a rectangular plan and single large room did not have any plaster floor remains or hardened floor surface or partition walls.

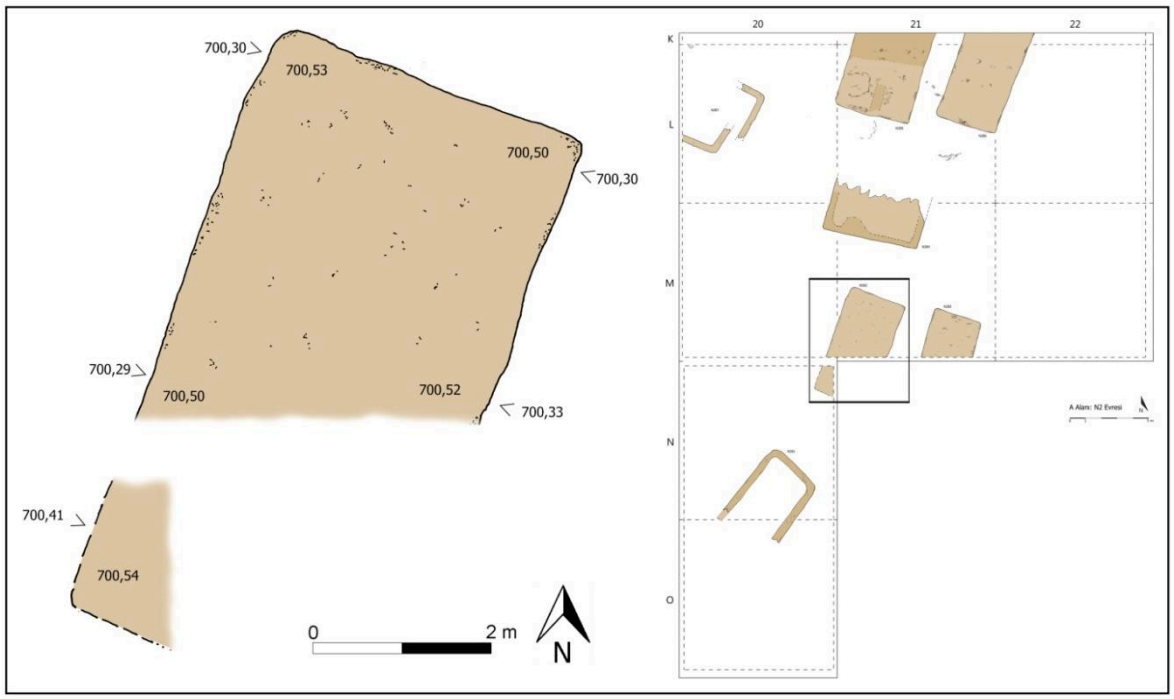


Figure 4.67: Location and plan of Structure N2B2

The limits of the structure were determined by lime fragment lines 2-3 cm thick and reddish-brown soil traces. The observed reddish-brown colour and lime traces in trench sections were used to define the structure. These traces most likely belong to a temporary structure with probably reed surroundings and flimsy upper cover. Similar examples were commonly observed in our ethno-archaeological field studies in the Lower Garzan Basin. Similar structures with an upper tent cover used for brief durations by semi-nomadic societies leave identical traces on the ground after removing the posts and tent after a certain period of use. However, there were no post traces encountered inside or outside this structure.

SEM images of lime samples taken from N2B2 fill observed scalenohedral and granular crystal structures. (Figure 4.318) Their EDX analysis identified O (54.60%), Ca (25.98%), C (11.30%), Si (4.73%), Al (1.49%), Fe (1.03%), and Mg (0.86%). EDX analysis in areas with clear scalenohedral and granular crystal structures determined element ratios very consistent with the general surface. (Diagram 4.73) Investigation of lime sample with

XRD analysis only identified calcite. Its chemical composition is calcium carbonate. (Diagram 4.123)

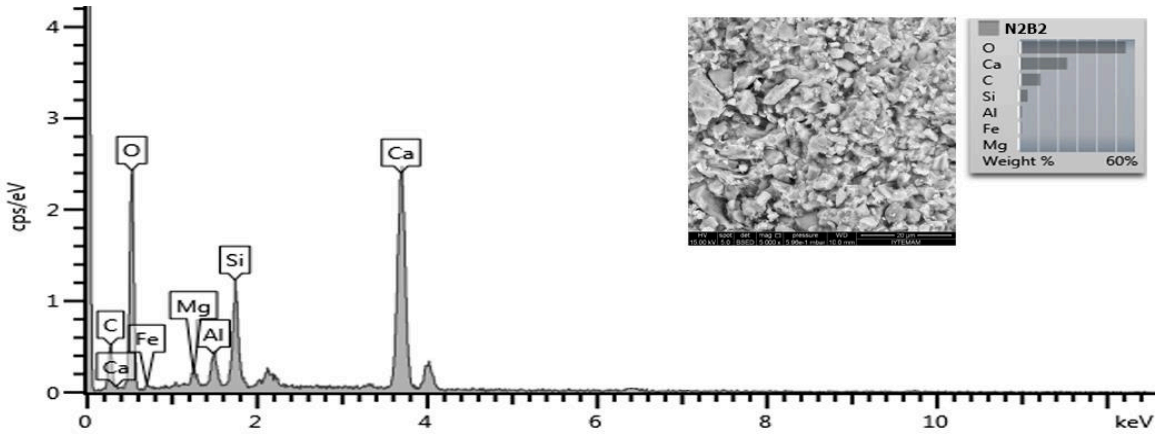


Diagram 4.73: EDX analysis of lime samples taken from Structure N2B2

4.4.6.1.3. Structure N2B3

This is located in Area A in the southeast of trench 21M; its southern part is outside the exposed area between the elevations of 700.38 to 700.74 meter. Based on the traces and general appearance, the structure is classified as a single-roomed structure. (Figure 4.68, 4.191, 4.192) As per this type it was a temporary structure without walls, probably surrounded by reeds with flimsy upper cover.

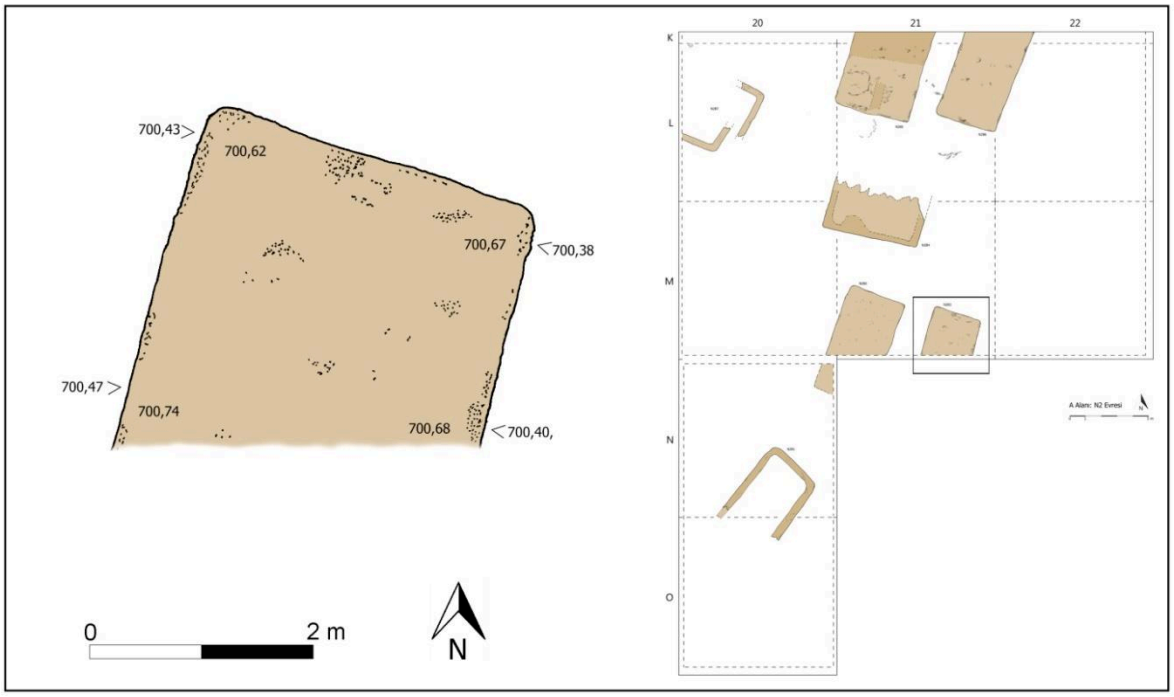


Figure 4.68: Location and plan of Structure N2B3

Constructed on a slight rise with southwest-northeast orientation, the structure is 315 cm wide in the east-west direction and is 315 cm long in the north-south direction. The limits of the structure were determined by 1-2 cm-thick lime fragment lines and reddish-brown soil traces. This structure with rectangular-plan and a single large room did not have any plaster floor remains or hardened floor surface or partition walls.

SEM images of lime samples taken from its fill observed scalenohedral, prism-shaped crystal structures along with acicular crystals. (Figure 4.319) EDX analysis of the lime samples found the elements O (35.00%), Ca (31.85%), C (21.18%), Si (3.34%), and Fe (1.28%) with trace amounts of Na, Mg, Al, K, and Ti. (Diagram 4.74)

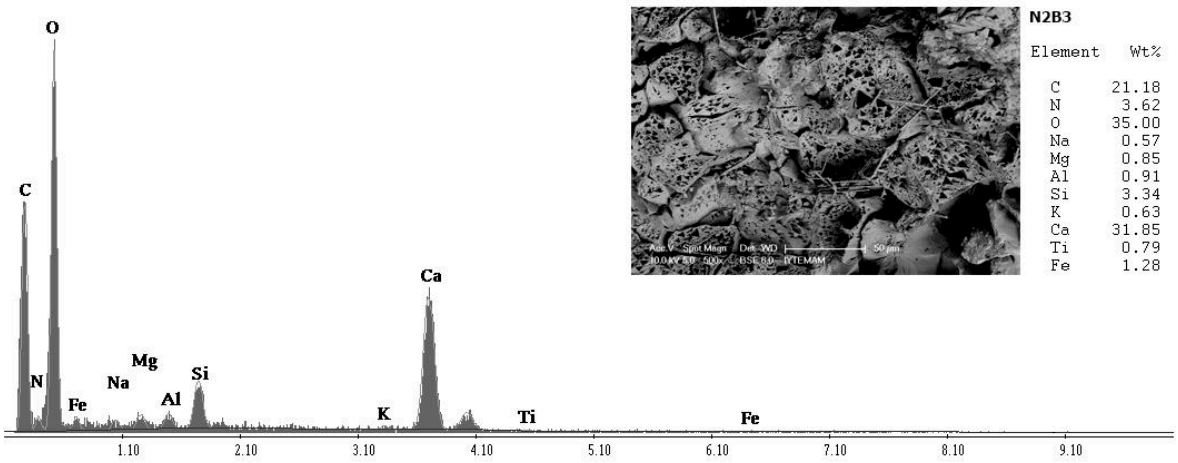
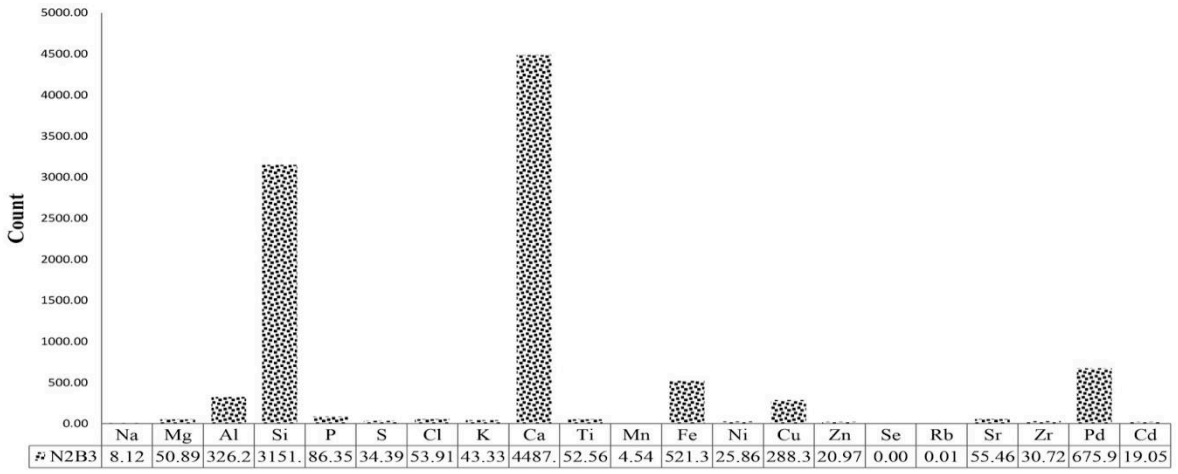


Diagram 4.74: EDX analysis of lime samples taken from Structure N2B3

XRF analysis of the lime samples complied with the EDX analysis, accordingly, it was observed that the following elements dominating; Si (32%), Ca (45%), Fe (5%), Al (3%), and Pd (7%), together with very small amounts of Ni, Zn, Sr, Rb, Na, K, S, P, Cl, Cu, and Ze. (Diagram 4.75)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N2B3	8.12	50.89	326.2	3151.	86.35	34.39	53.91	43.33	4487.	52.56	4.54	521.3	25.86	288.3	20.97	0.00	0.01	55.46	30.72	675.9	19.05

Diagram 4.75: XRF analysis of the lime samples taken from Structure N2B3

4.4.6.1.4. Structure N2B4

It is located in Area A in the north of trench 21M between the elevations of 700.30 to 700.53 meter; its northern limits could not be detected. Based on the traces and general appearance, the structure is classified as a single-roomed structure. (Figure 4.69, 4.192 – 4.194) As per this type, it was a temporary structure without walls, probably surrounded by reeds with flimsy upper cover.

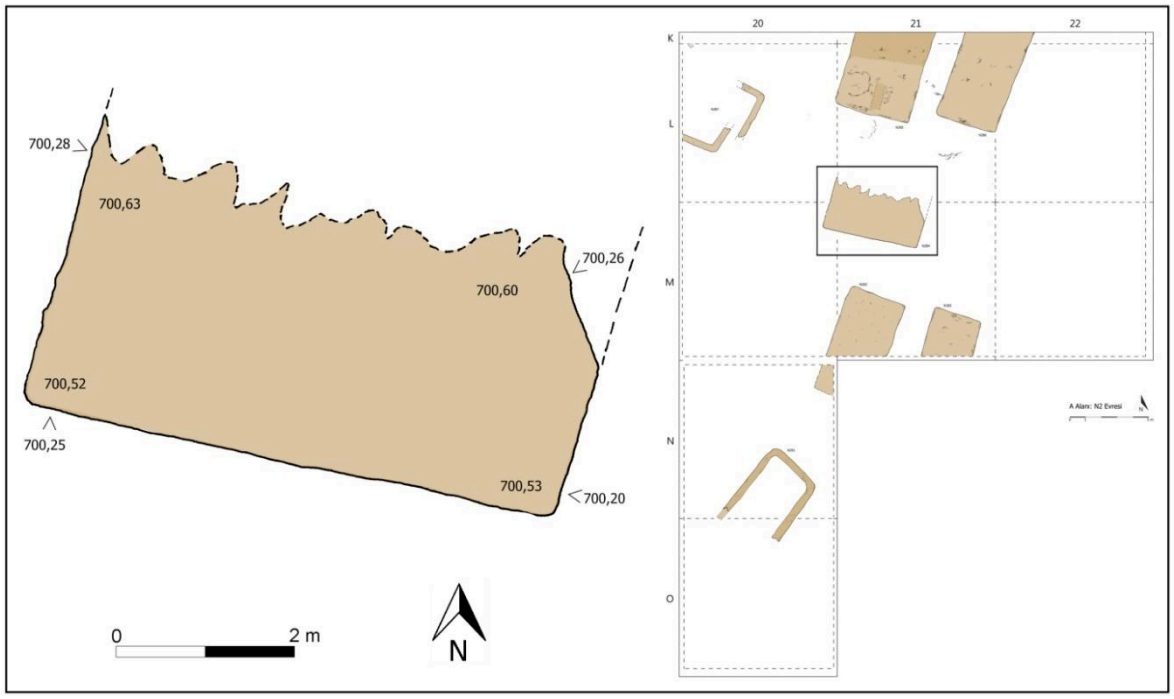


Figure 4.69: Location and plan of Structure N2B4

Constructed on the northern slope of a slight rise with southwest-northeast orientation, the exposed section of the structure is 610 cm long in the east-west direction and is 317 cm wide in the north-south direction. The limits of the structure were determined by very thin occasionally traceable lime lines and light reddish-brown soil. This structure with a rectangular plan and single large room did not have any plaster floor remains or hardened floor surface or partition walls.

SEM images of lime samples show granular crystal structures. (Figure 4.320) Investigation of the same samples with EDX observed the following elements dominating; O (38.15%), Ca (23.92%), C (16.79%), Si (8.36%), and Fe (4.23%), together with trace amount of Na, Mg, Al, K, and Ti. (Diagram 4.76)

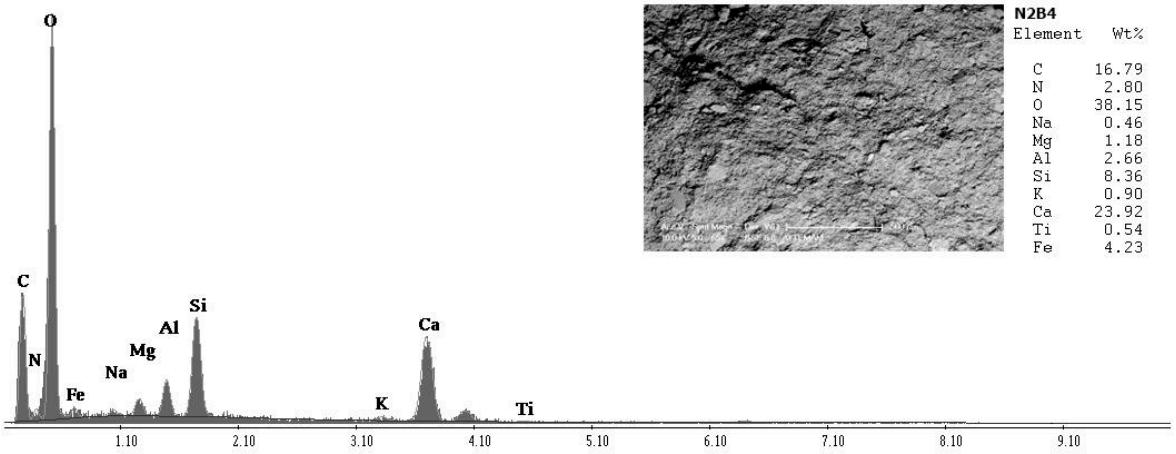
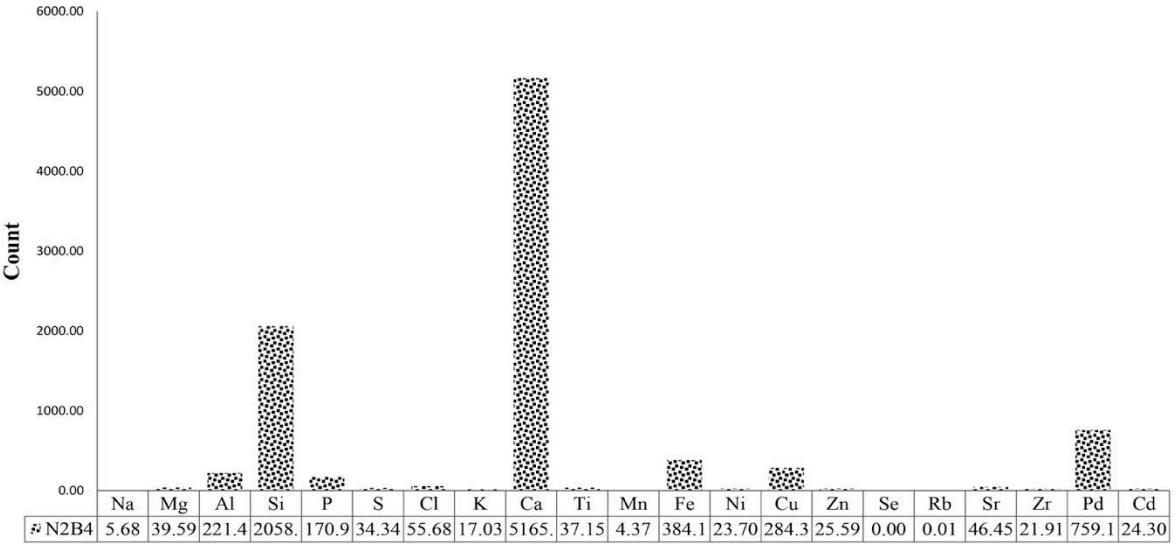


Diagram 4.76: EDX analysis of lime samples taken from Structure N2B4

Investigation of the same samples with XRF analysis observed the elements Si (22%), Ca (55%), Fe (4%), Al (2%), and Pd (8%), complying with the EDX data. Trace amounts of Ni, Zn, Sr, Rb, Na, K, S, P, Cl, Cu, and Ze elements were also identified. (Diagram 4.77)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N2B4	5.68	39.59	221.4	2058.	170.9	34.34	55.68	17.03	5165.	37.15	4.37	384.1	23.70	284.3	25.59	0.00	0.01	46.45	21.91	759.1	24.30

Diagram 4.77: XRF analysis of the lime samples taken from Structure N2B4

4.4.6.1.5. Structure N2B5

This is located in Area A in the north of trench 21L, with its northern section outside the exposed area between the elevations of 700.80 to 700.02 meter. Based on the traces and general appearance, this structure is classified as a single-roomed structure. (Figure 4.70, 4.195 – 4.197) As per this type, it was a temporary structure without walls, probably surrounded by reeds with flimsy upper cover.

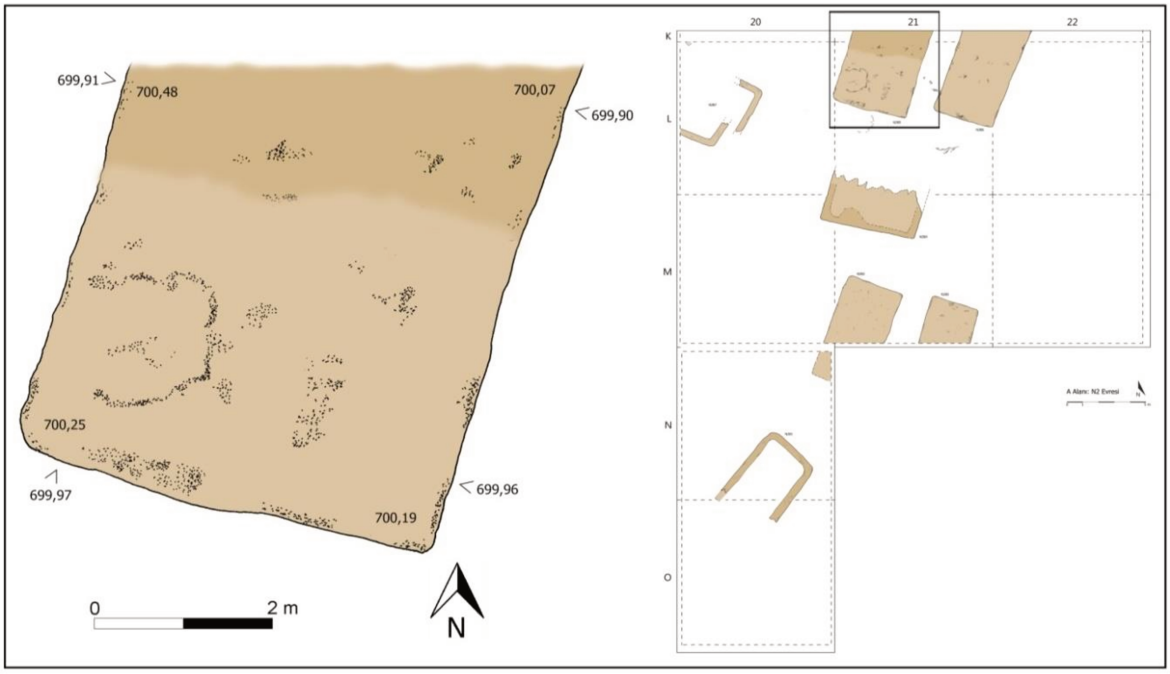


Figure 4.70: Location and plan of Structure N2B5

Constructed on the northern slope of a slight rise with southwest-northeast orientation, the structure is 470 cm wide in the east-west direction, and its exposed section is 523 cm long in the north-south direction. The limits of the structure were determined by 1-3 cm-thick lime lines and reddish-brown soil traces. This structure with a rectangular plan and single large room did not have any plaster floor remains or hardened floor surface or partition walls.

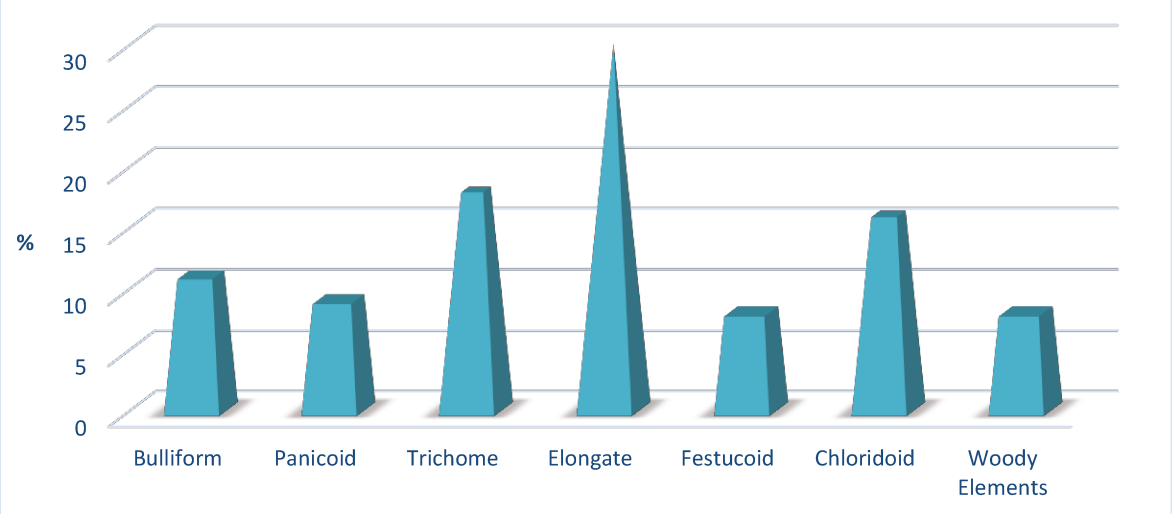


Diagram 4.78: Distribution of phytoliths in the lime samples taken from Structure N2B5

Phytolith analysis of lime samples identified reed or woody plant remains particularly with high frequencies of *Trichome* and *Elongate* forms. *Bulliform, Panicoid,*

Chloridoid, Festucoid, and *Silicified Woody Forms* were also identified. The *Bulliform* phytoliths are fan-shaped. The natural structure of well-preserved phytoliths was clear. (Diagram 4.78; Figure 4.325 - 4.330)

4.4.6.1.6. Structure N2B6

This is located in Area A in the northeast of trench 21L. The northern section of the structure is outside the exposed area between the elevations of 700.63 to 700.87 meter. According to the traces and general appearance, the structure is classified as a single-roomed structure. (Figure 4.71, 4.195 – 4.197) As per this type, it was a temporary structure without walls, probably surrounded by reeds with flimsy upper cover.

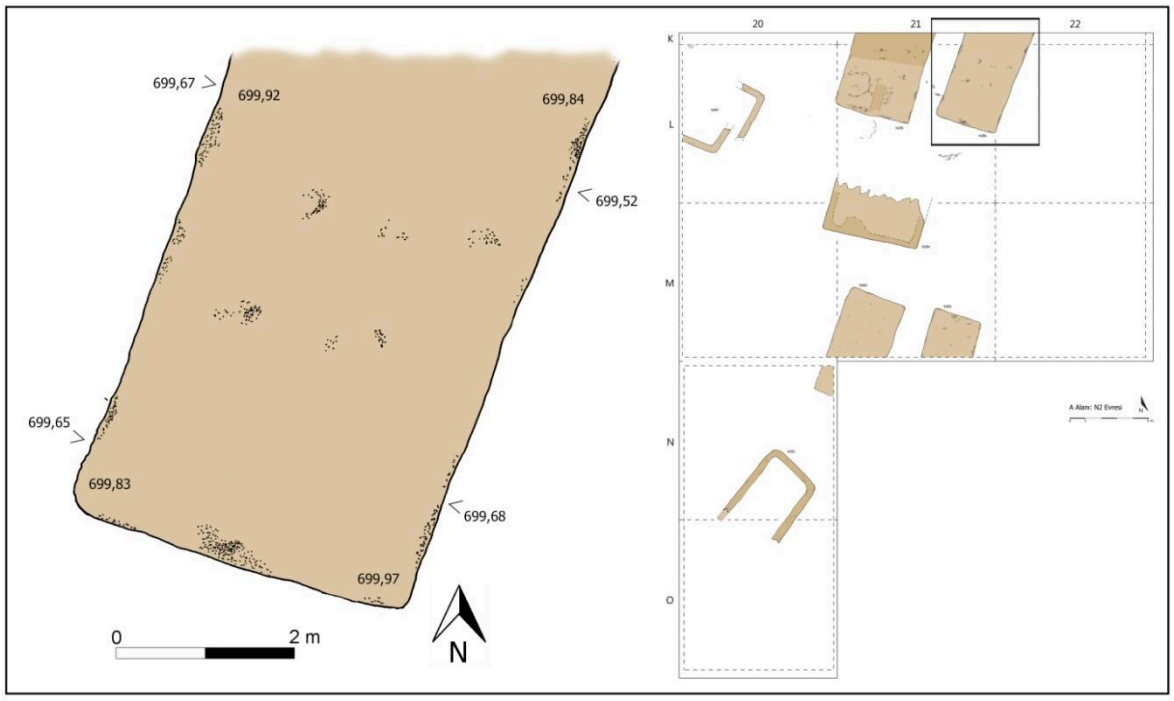


Figure 4.71: Location and plan of Structure N2B6

Constructed on the northerneastern slope of a slight rise with southwest-northeast orientation, the structure is 402 cm wide in the east-west direction, and the exposed part is 611 cm long in the north-south direction. The limits of the structure were determined by very thin, occasionally traceable lime lines and light reddish-brown earth fill. Similar examples have been commonly observed in our ethno-archaeological field studies in the Lower Garzan Basin. This structure with a rectangular plan and single large room did not have any plaster floor remains or hardened floor surface or partition walls.

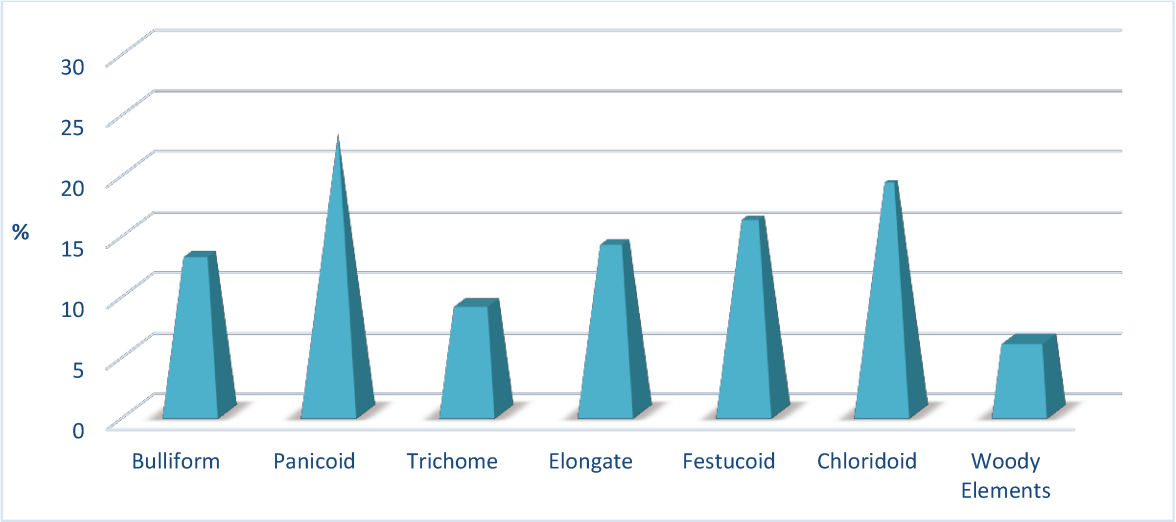


Diagram 4.79: Distribution of phytoliths in the lime samples taken from Structure N2B6

Phytolith analysis of lime samples identified reed, and herbaceous plant remains. The phytoliths contained high frequencies of *Panicoid, Chloridoid*, *Elongate* and *Festucoid* forms along with *Trichome, Bulliform* and silicified forms. *Trichome* phytoliths have multiple forms. (Diagram 4.79; Figure 4.325 - 4.330)

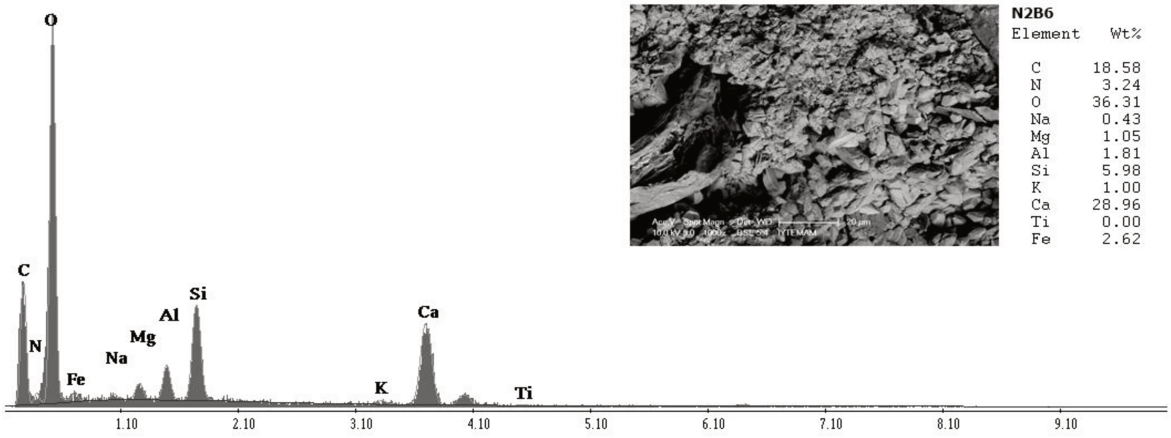
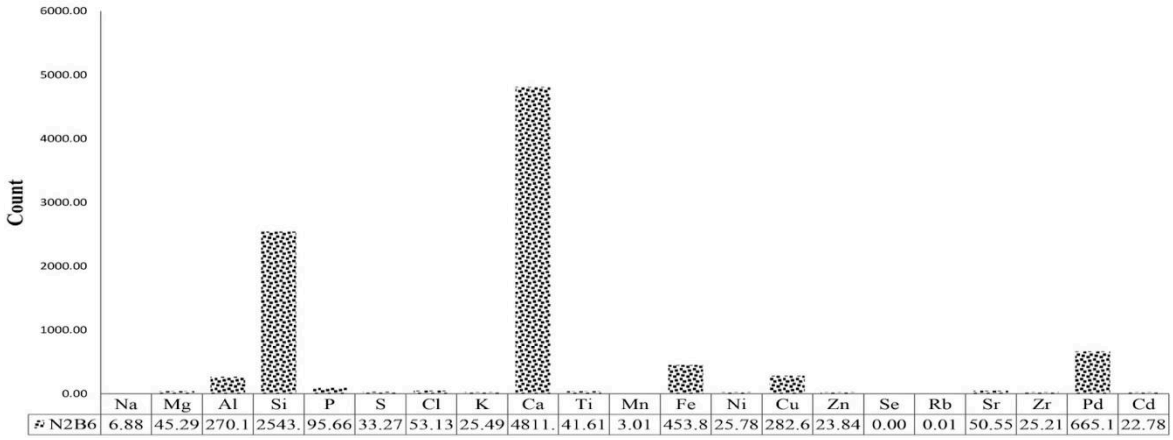


Diagram 4.80: EDX analysis of lime samples taken from Structure N2B6

SEM images of lime samples show scalenohedral, prismatic, and granular crystals. Rod-like shaped cavities were also identified. The crystals surrounding these cavities were generally scalenohedral. (Figure 4.321c-d) Investigation of the lime samples with EDX method identified the elements O (36.31%), Ca (28.96%), C (18.58%), Si (5.98%), and Fe (2.62%). Na, Mg, Al, and K were also identified at rates from 2% to 0.43%. (Diagram 4.80)

Investigation of the lime samples with XRF analysis observed the elements Si (27%), Ca (51%), Fe (5%), Al (3%), and Pd (7%), complying with the EDX analysis. Very small amounts of Ni, Zn, Sr, Rb, Na, K, S, P, Cl, Cu, and Ze were also detected. (Diagram 4.81)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
# N2B6	6.88	45.29	270.1	2543.	95.66	33.27	53.13	25.49	4811.	41.61	3.01	453.8	25.78	282.6	23.84	0.00	0.01	50.55	25.21	665.1	22.78

Diagram 4.81: XRF analysis of the lime samples taken from Structure N2B6

4.4.6.1.7. Structure N2B7

This is located in Area A in the northeast section of trench 20M between the elevations of 700.50 to 700.74 meter. Architectural elements identified in this area are poorly-preserved walls with a height of 10 to 14 cm. According to the wall remains and general appearance the structure can be classified as a single-roomed structure, however, data allowing determination of its plan were insufficient in the exposed area. Therefore, the structure is classified as an indeterminate-planned structure. (Figure 4.72, 4.198 – 4.200)

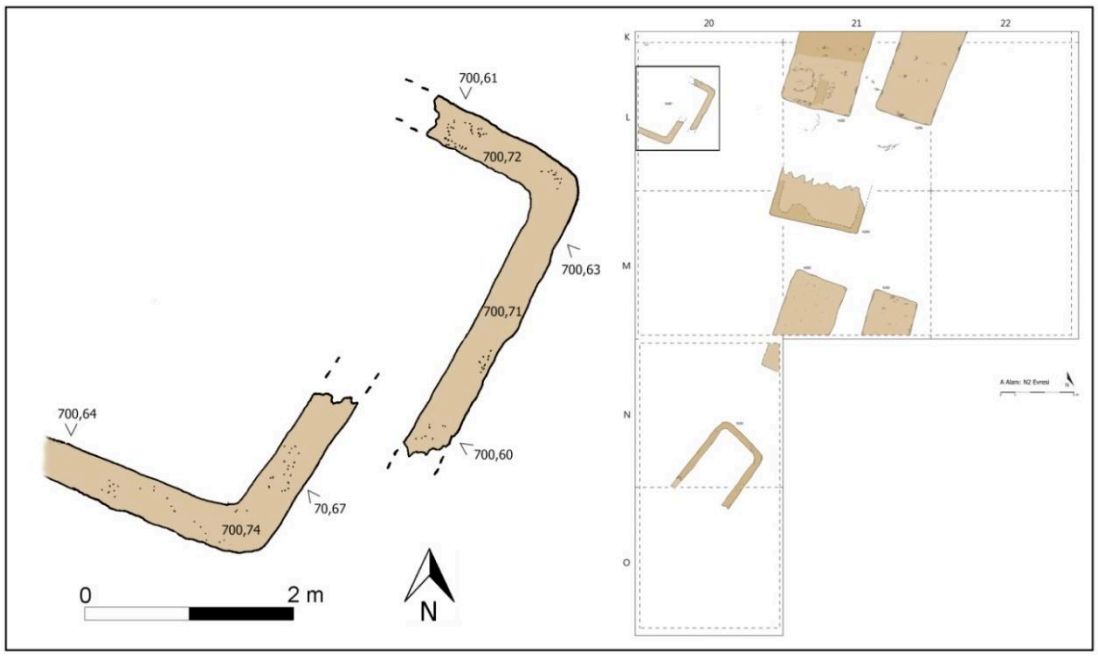


Figure 4.72: Location and plan of Structure N2B7

Walls were directly erected on the ground without a stone foundation. The walls with curved corners are 32-35 cm wide. The limits of the walls were determined by light reddish-

brown fillings. The internal fill of walls is homogeneous light reddish-brown very loose earth. Considering the architectural tradition and construction technology of Sumaki Höyük, Structure N2B7 was constructed by the piled earth wall technique.

4.4.6.1.8. Structure N2B8

This is located in Area B in the northeast of trench 15F and northwest of trench 16F between the elevations of 701.00 to 701.10 meter. Based on the traces and general appearance, this structure is classified as a single-roomed structure. As per this type, it was a temporary structure without walls, probably surrounded by reeds with flimsy upper cover. (Figure 4.73, 4.201 – 4.203)

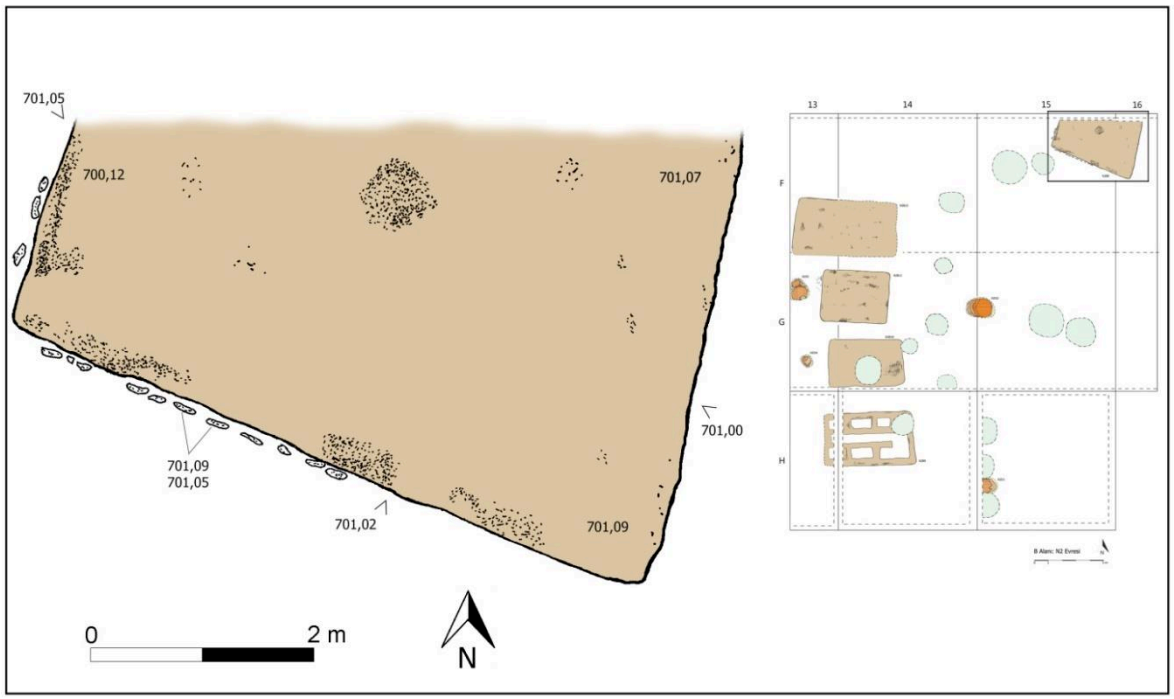


Figure 4.73: Location and plan of Structure N2B8

Constructed on the northern slope of a slight rise with southwest-northeast orientation, the structure is 614 cm long in the east-west direction, and its exposed section is 337 cm wide in the north-south direction. The limits of the structure were determined by very thin, occasionally traceable lime and light reddish-brown earth fill. This structure with a rectangular plan and single large room did not have any plaster floor remains or hardened floor surface or partition walls. Its south and west external sides were surrounded by walnut-sized stones with calcified surfaces in a line.

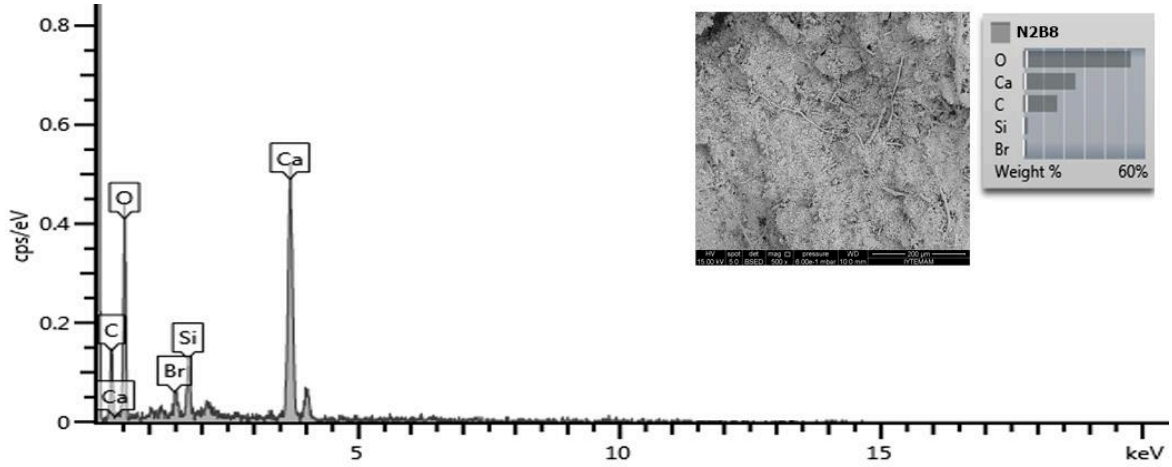


Diagram 4.82: EDX analysis of lime samples taken from Structure N2B8

SEM images of lime samples show scalenohedral, prismatic, granular and acicular crystals. The minerals surrounding these tubes are generally sharp-tipped and needle-shaped crystal structures of aragonite. (Figure 4.322) Scalenohedral-shaped calcium carbonate minerals clearly observed surrounding the tubes left by organic remains. Their EDX analysis identified O (52.81%), Ca (25.76%), C (16.89%), Si (2.47%), and Br (2.06%) elements. (Diagram 4.82)

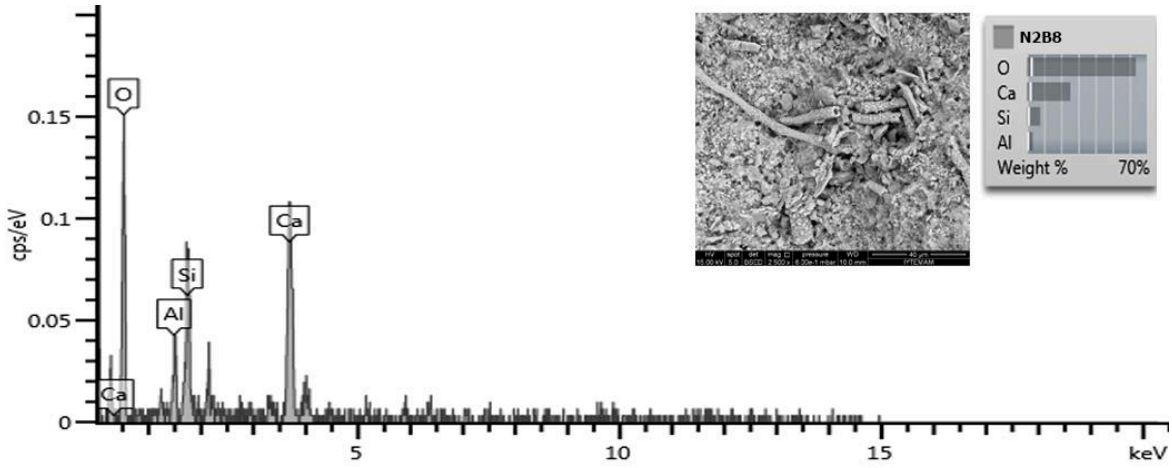
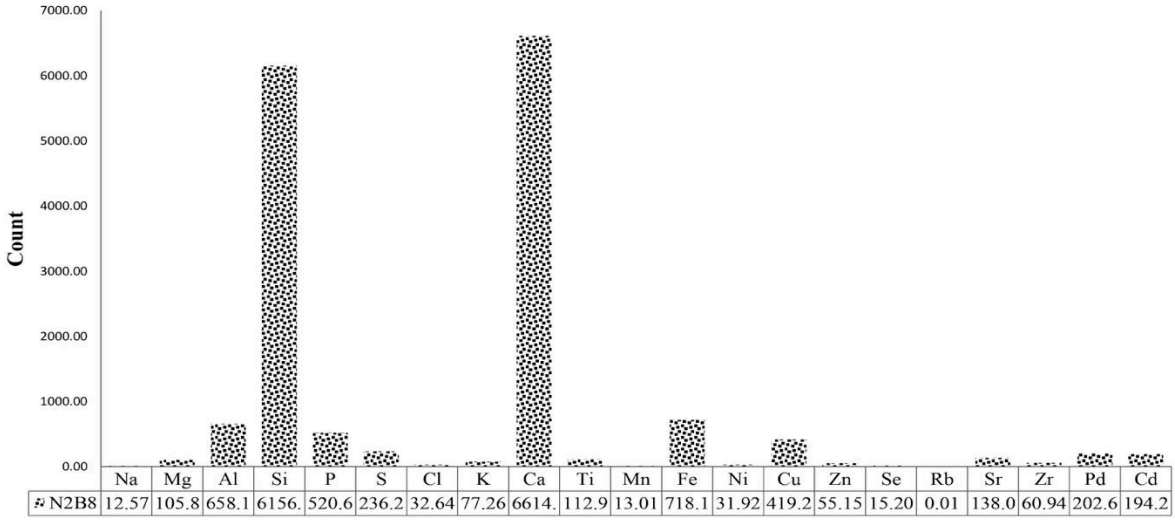


Diagram 4.83: EDX analysis results of tubes found in lime samples from Structure N2B8

Analysis of minerals surrounding the tubes by the EDX method comply with each other. EDX analysis identified O (%63,52), Ca (%25,31), Si (%7,74) and Al (%3,43) elements of this sample. (Diagram 4.83; Figure 4.322c-d)

Investigation of the same samples with XRF analysis found the elements Si (38%), Ca (40%), Fe (4%), Al (4%), and P (3%), per the EDX analysis. Trace amounts of Ni, Zn, Sr, Rb, Na, K, S, Pd, Cl, Cu, and Ze elements were also identified. (Diagram 4.84) The lime

sample XRD analysis identified calcite, silicon and quartz minerals having calcium carbonate and silicon dioxide compositions. (Diagram 4.124)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N2B8	12.57	105.8	658.1	6156.	520.6	236.2	32.64	77.26	6614.	112.9	13.01	718.1	31.92	419.2	55.15	15.20	0.01	138.0	60.94	202.6	194.2

Diagram 4.84: XRF analysis of the lime samples taken from Structure N2B8

4.4.6.1.9. Structure N2B9

This is located in Area B in the northwest of trench 14H and northeast of trench 13H between the elevations of 702.28 to 702.80 meter. Northeastern part of the structure was disturbed by a Middle Age pit. The walls have been preserved to a height of 37 cm, and the fill is nearly 62 cm in height, while some walls (notably those in the east section) are lower: 29-30 cm. The structure was constructed on a natural terrace in east-west orientation without a stone foundation.

The structure is 610 cm long in the east-west direction, and is 337 cm wide in the north-south direction. Covering an area of nearly 21 m^2, the cells of the structure are 65x98 cm and 76x163 cm in size and have mean area of 1 m^2. However, the cells on the north side are smaller. There is no very significant difference in the thickness of the bearing and partition walls, the bearing walls are 42-45 cm and the partition walls are 29-46 cm.

The Cell Building has three cells along the north wing and two cells on the south side with an L-shaped corridor in between having the dimensions of 564 cm long and 62 cm wide. (Figure 4.74, 4.204) It appears the south end of the L-shaped corridor was partly divided. There might be a cell in this area but, the data allowing determination of a cell were insufficient.

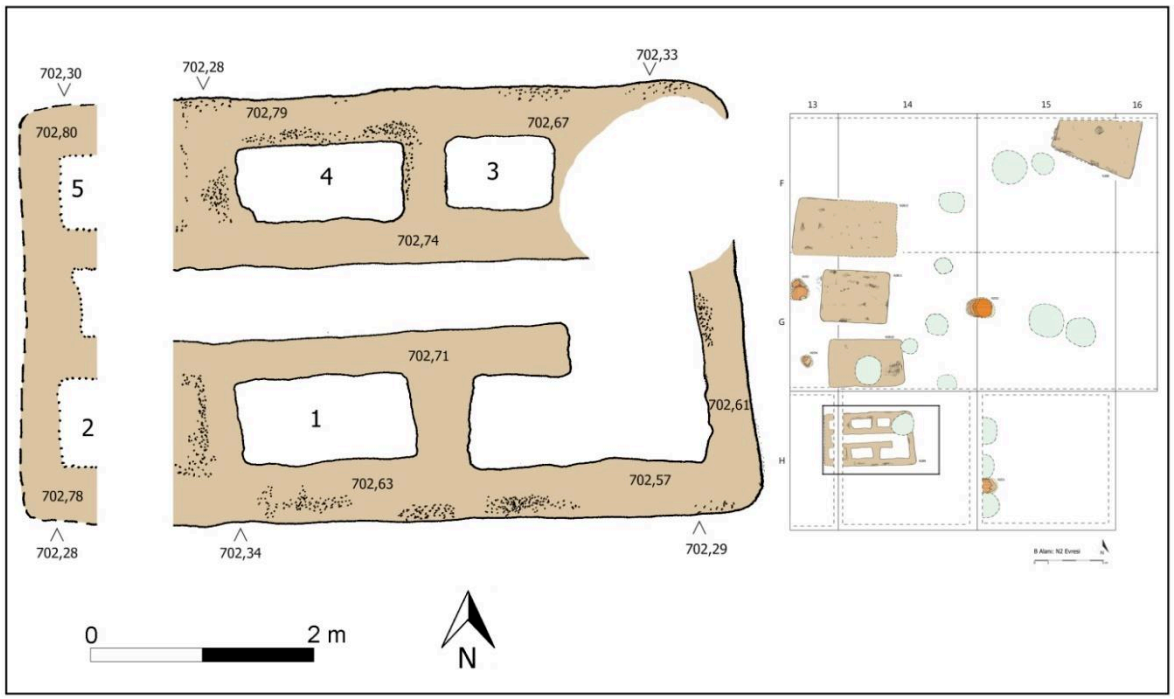


Figure 4.74: Location and plan of Structure N2B9

The structure has 3 small cells in different sizes. Especially, cell number 3 is much smaller than the others. There are no doorways identified between the cells. The cells and the corridor did not have any plaster floor remains or hardened floor levels.

Occasional lime fragments appear to have bound the walls. Continuing as weak and uncertain lines, their thickness varies from 1 to 2 cm. The internal fill of the walls is homogeneous reddish-brown with a very soft structure. Considering the architectural tradition and construction technology of Sumaki Höyük, both bearing walls and partition walls were constructed by the piled earth wall technique. However, considering the distribution of lime fragments found within the structure, it may be stated that the structure was covered with a light material.

4.4.6.1.10. Structure N2B10

This is located in Area B in the south of trench 14G between the elevations of 702.02 to 702.13 meter. The structure was disturbed by a large and deep Middle Age pit. Based on the traces and general appearance, this building is classified as a single-roomed structure. (Figure 4.75, 4.205) As per this type, it was a temporary structure without walls, probably surrounded by reeds with flimsy upper cover.

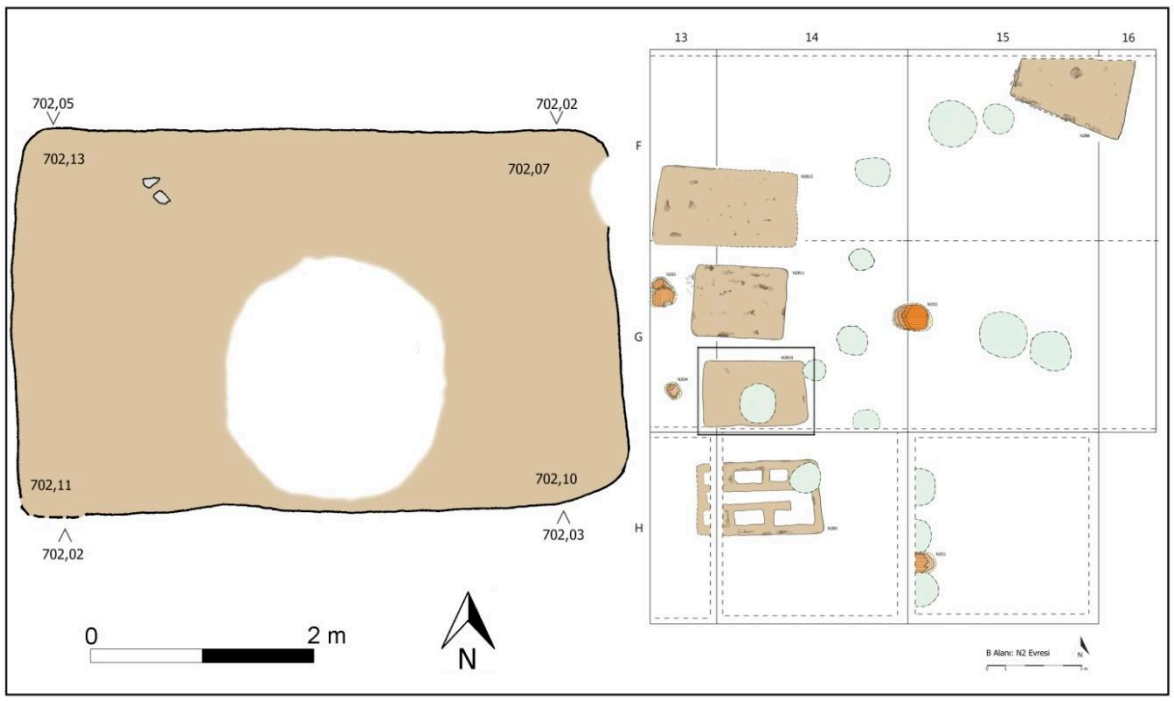


Figure 4.75: Location and plan of Structure N2B10

The structure was constructed on the north slope of a natural terrace with east-west orientation. The structure is 532 cm long in the east-west direction and is 319 cm wide in the north-south direction. (Figure 4.345) Covering an area of nearly 17 m^2.The limits of the structure were determined by traces of light reddish-brown soil. This structure with a rectangular plan and single large room did not have any plaster floor remains or hardened floor surface or partition walls.

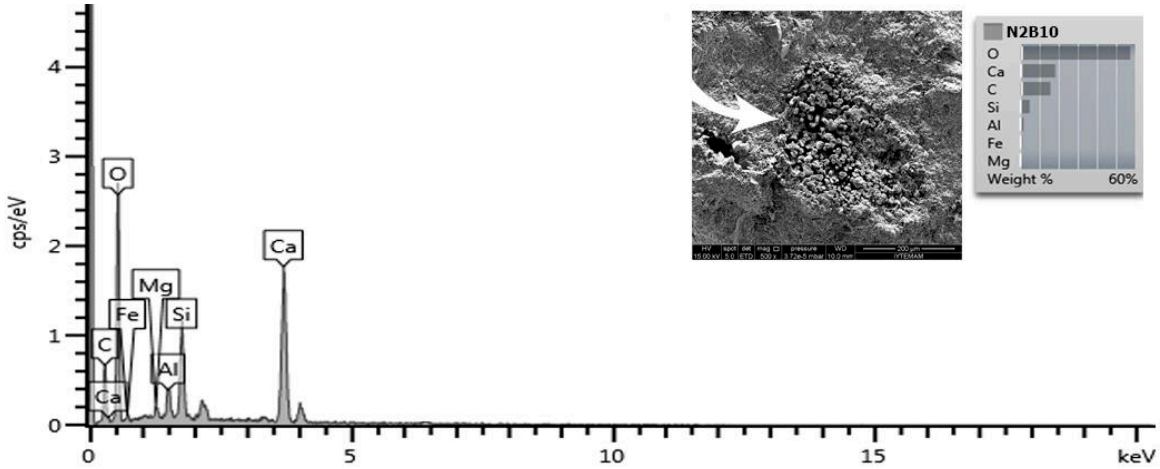


Diagram 4.85: EDX analysis of lime samples taken from Structure N2B10

SEM images of the lime sample taken from the fills observed scalenohedral and granular crystals. Investigation of the same lime samples with EDX analysis identified the elements O (57.47%), Ca (18.28%), C (15.71%), Si (4.93%), Al (1.61%), Mg (0.66%), and

Fe (1.34%). (Diagram 4.85) According to the XRD analysis of the same samples only identified calcite mineral with a calcium carbonate composition. (Diagram 4.125)

4.4.6.1.11. Structure N2B11

This is located in Area B in the south of trench 14G between the elevations of 702.00 to 702.35 meter. Based on the traces and general appearance, the structure is classified as a single-roomed structure. (Figure 4.76) As per this type, it was a temporary structure without walls, probably surrounded by reeds with flimsy upper cover.

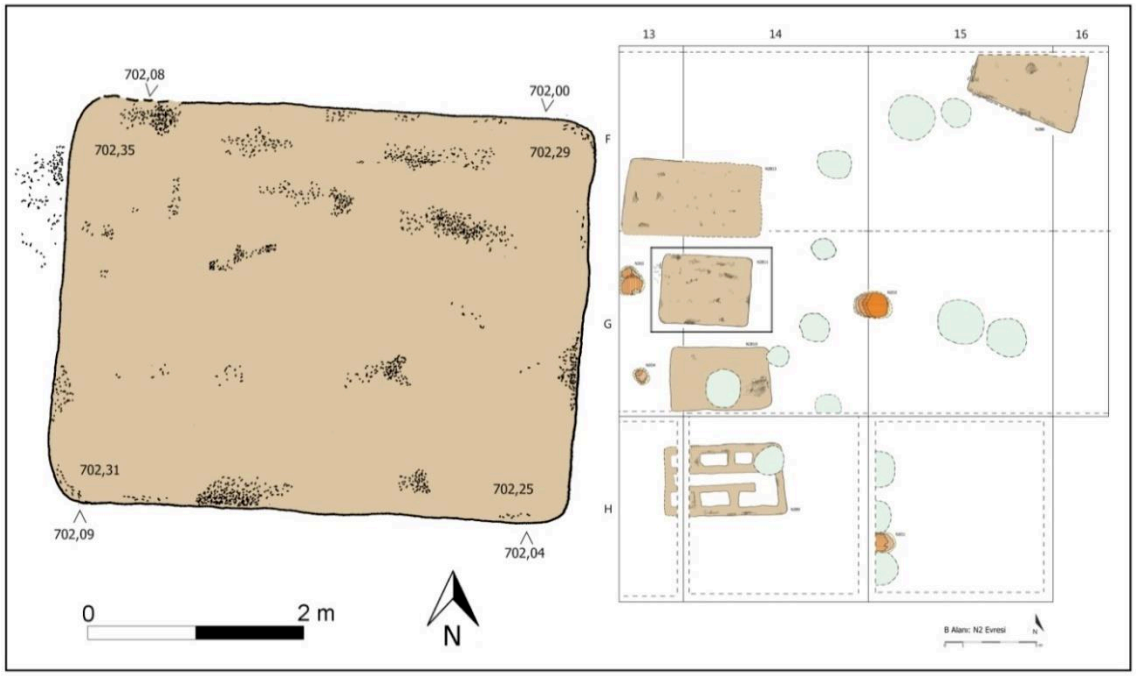


Figure 4.76: Location and plan of Structure N2B11

The structure was constructed on a natural terrace with east-west orientation. It is 490 cm long in the east-west direction and is 374 cm wide in the north-south direction. Covering an area of nearly 18 m^2. (Figure 4.346) The limits of the structure were determined by very thin, traceable lime lines and light reddish-brown fill. This structure with a rectangular plan and single large room did not have any plaster floor remains or hardened floor surface or partition walls.

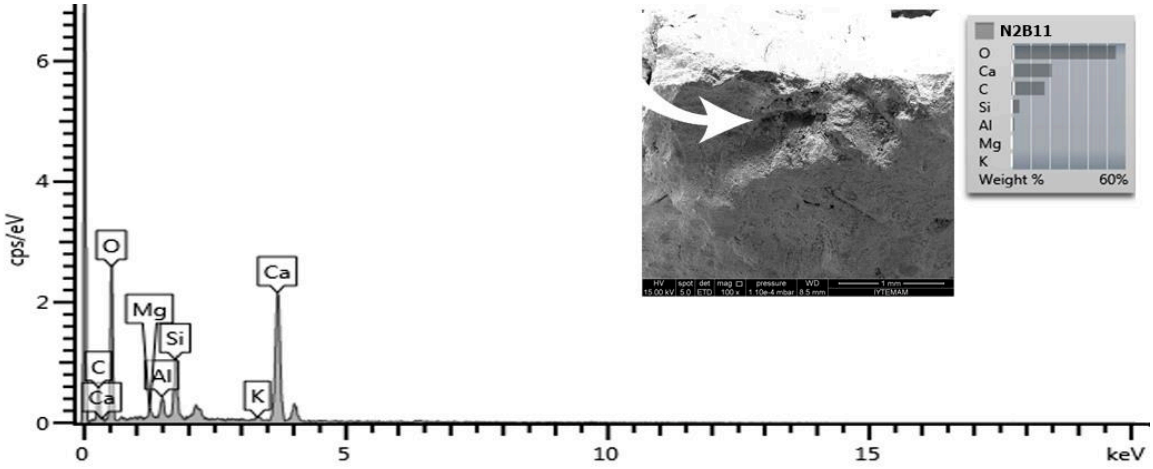
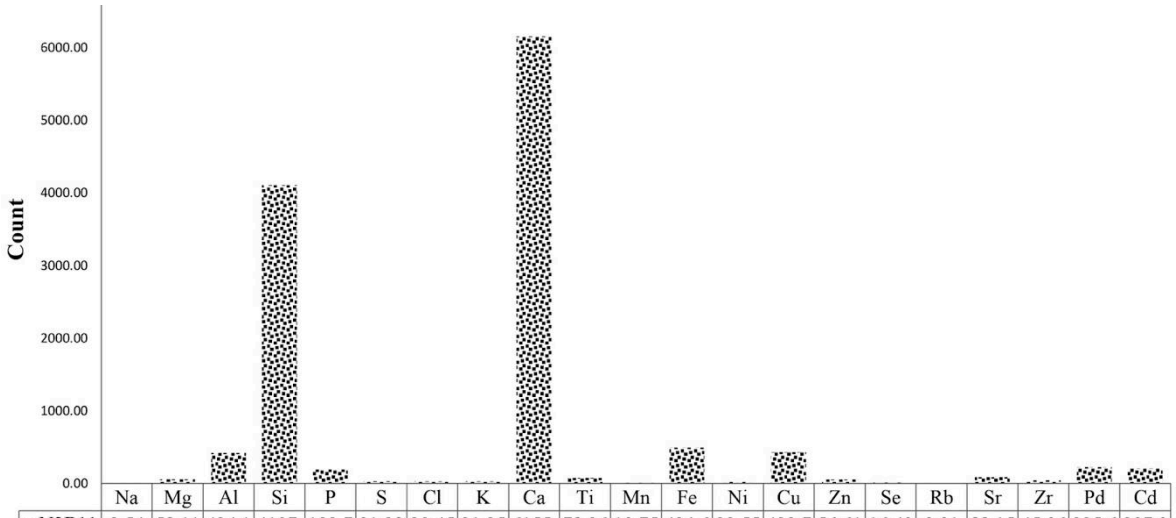


Diagram 4.86: EDX analysis of lime samples taken from Structure N2B11

SiO_2 gels filling the organic cavities are observed on their SEM images. (Figure 4.323d) The clearest is silicon dioxide gel filling a *Panicum* plant remnant. EDX analysis of these lime samples identified O (54.89%), Ca (21.12%), C (17.43%), Si (4.13%), Al (1.38%), Mg (0.64%), and K (0.40%) elements. (Diagram 4.86)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N2B11	9.54	58.11	424.1	4107.	193.7	31.39	30.45	31.25	6155.	78.36	10.75	494.6	22.55	432.7	56.61	16.40	0.01	88.15	45.06	225.6	207.0

Diagram 4.87: XRF analysis of the lime samples taken from Structure N2B11

XRF analysis of lime samples observed the following elements dominating; Si (32%), Ca (48%), Fe (4%), Al (3%), Pd (2%), and Cd (2%), together with very small amounts of Ni, Zn, Sr, Rb, Na, K, S, Pd, Cl, Cu, and Ze. (Diagram 4.87)

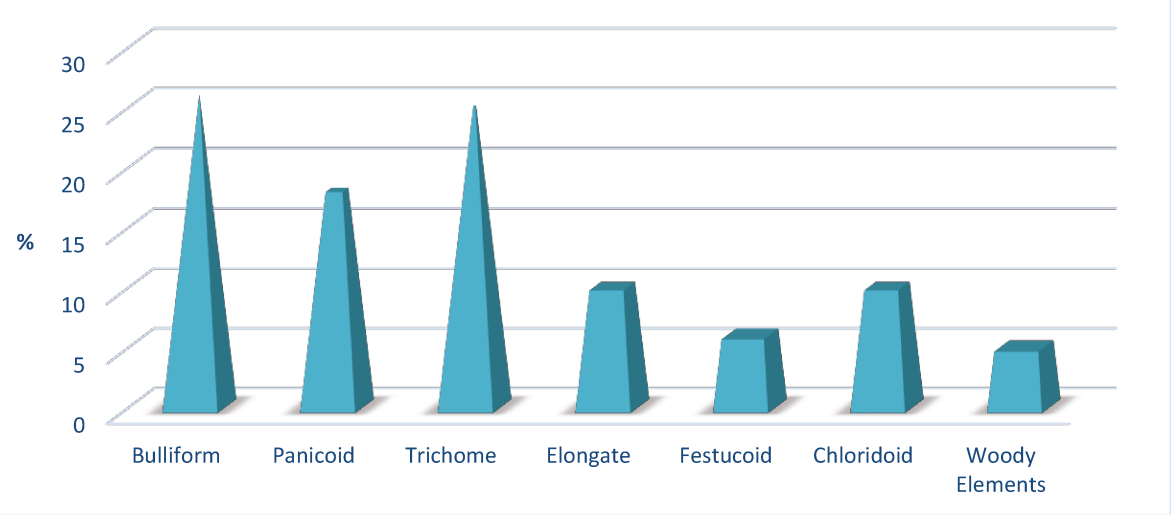


Diagram 4.88: Distribution of phytoliths in the lime samples taken from Structure N2B11

Phytolith analysis of lime samples identified reed or woody plant remains. The phytoliths contained high frequencies of *Trichome, Bulliform*, and *Panicoid* forms. *Chloridoid, Elongate, Festucoid*, and *Silicified Woody Forms* were also identified. *Chloridoid* phytoliths have a subtype form, and *Panicoid* phytoliths have short-shafted forms. *Trichome* phytoliths have long pointed tips. (Diagram 4.88; Figure 4.325 - 4.330)

4.4.6.1.12. Structure N2B12

This is located in Area B in the south sections of trenches 14F and 13F between the elevations of 701.78 to 701.94 meter. Based on the traces and general appearance, the structure is classified as a single-roomed structure. (Figure 4.77, 4.206) As per this type, it was a temporary structure without walls, probably surrounded by reeds with flimsy upper cover.

N2B12 was constructed on a natural terrace sloping slightly to the south with east-west orientation. The structure is 745 cm long in the east-west direction and is 403 cm wide in the north-south direction. (Figure 4.347) Covering an area of nearly 30 m^2. The limits of the structure were determined by very thin occasionally traceable lime lines and light reddish-brown fill. This structure with a rectangular plan and single large room did not have any plaster floor remains or hardened floor surface or partition walls.

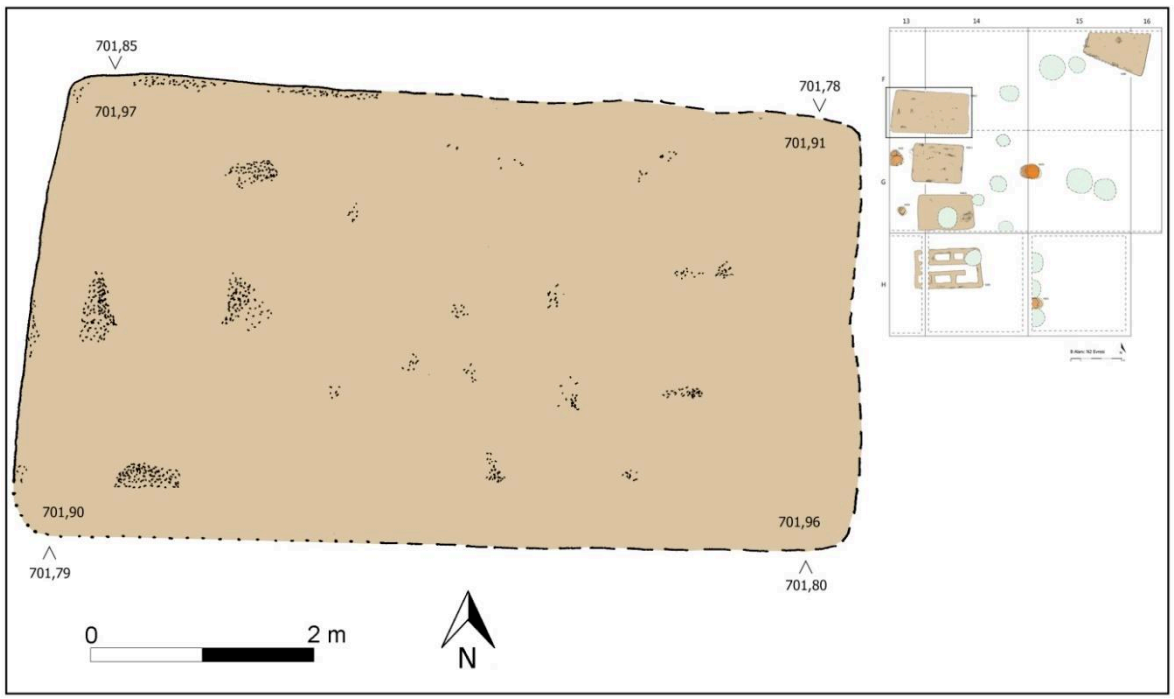


Figure 4.77: Location and plan of Structure N2B12

SEM images of lime samples taken from structures revealed granular and laminar crystal structures along with acicular-shaped crystals. Sharp-tipped or needle-shaped crystals are generally aragonite. (Figure 4.324) Besides SiO_2 gels filling the rod-like organic remains are observed on SEM images of the lime samples. The clearest is silicon dioxide gel filling a *Panicum* plant remnant. (Figure 4.324c) EDX analysis of these lime samples identified the elements O (33.86%), Ca (17.98%), C (11.75%), Si (17.59%), Al (4.31%), and Fe (4.87%). N, Na, Mg, P, S, Cl, and K were also identified at rates from 4% to 0.31%. (Diagram 4.89)

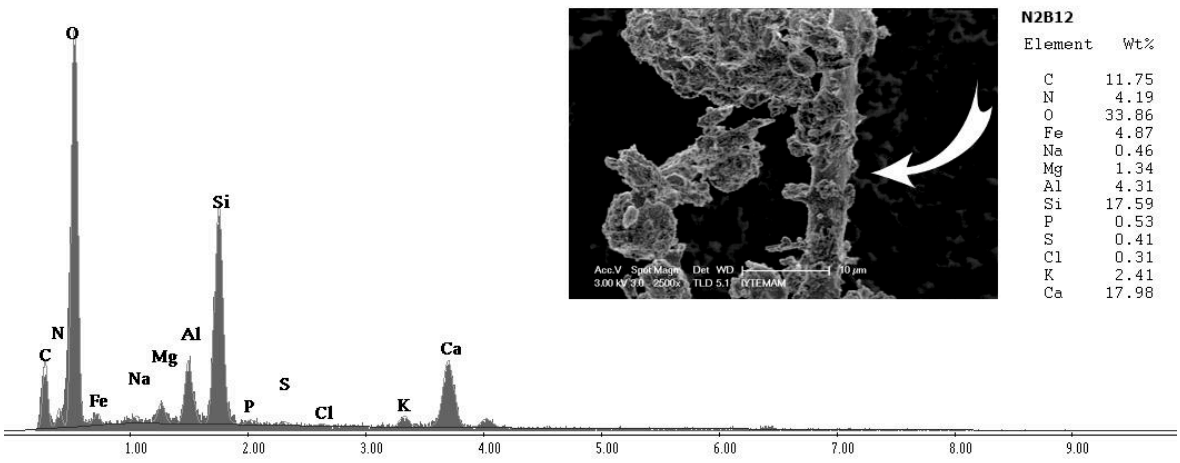
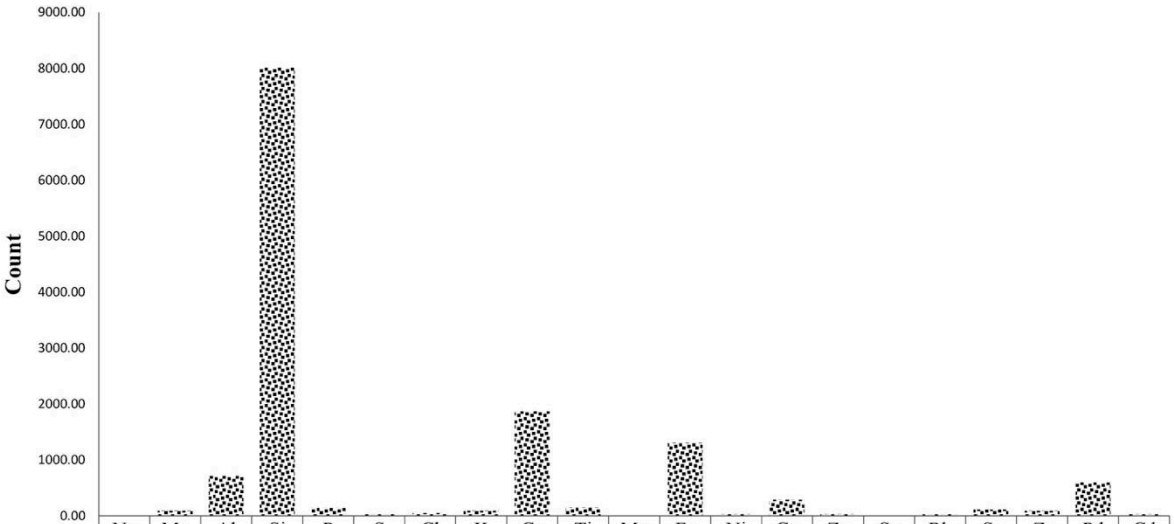


Diagram 4.89: EDX analysis results of calcareous soil samples taken from Structure N2B12

Investigation of lime samples with the XRF method observed the elements Si (58%), Ca (14%), Fe (10%), Al (5%), Pd (4%), and Cu (2%), together with very small amounts of Ni, Zn, Sr, Rb, Na, K, S, P, Cl, and Ze. (Diagram 4.90) Their XRD analysis identified calcite minerals and organic carbon minerals such as graphite, sphalerite, and dolomite. Their chemical composition is calcium carbonate, zinc sulphide, carbon, and calcium magnesium carbonate compounds. (Diagram 4.126)



	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Ni	Cu	Zn	Se	Rb	Sr	Zr	Pd	Cd
N2B12	8.31	93.34	716.0	8014.	142.6	30.53	51.16	94.97	1871.	148.3	6.53	1308.	32.33	290.8	33.84	0.00	29.18	116.5	90.97	600.0	32.88

Diagram 4.90: XRF analysis of the soil samples taken from Structure N2B12

4.4.6.2. Hearths

In Phase N2, six hearths were identified with four in Area B and two were in Area C. There was no hearth in Area A. (Table 4.5, Diagram 3.16)

4.4.6.2.1. Hearth N2O1

This was located in an open space in the southwestern part of trench 15H in Area B. The hearth was constructed on a dark grey ashy soil. It covers an area of approximately 1.5 m^2 between the elevations of 700.30 to 700.44. Two superimposed plastered floors with a stone pavement were excavated. (Figure 4.249 – 4.251) The hearth inclined to the west. The oval-shaped hearth was 102 cm in the north-south direction. However, the east-west direction could not be clarified because the western part remained in the unexcavated area. The remaining portion is 109 cm in the east-west direction. The pavement, which was made

of basalt and pebbles of different sizes between 4x6x8 - 9x11x18 cm was under the first plastered floor. Between the stone pavement and the first plastered floor was a layer of yellowish buff-coloured stone- and sand-tempered 3-5 cm-thick filling. The first plastered floor was a grey colour about 2 cm in thickness. After its usage, a heterogeneous buff-coloured stone-tempered 1-2 cm-thick filling was laid on it, and a new floor was plastered. This floor was a light grey colour about 1.5 cm in thickness with a smooth and densely cracked surface.

4.4.6.2.2. Hearth N2O2

The hearth was located in an open space at the edge of the eastern profile of trench 14G in Area B. The hearth was constructed on the dark grey ashy soil containing scattered lime particles. It covers an area of approximately 2.2 m^2 between the elevations of 701.76 to 701.92. It had four superimposed plastered floors with a single stone pavement. The hearth slightly inclined to the west. (Figure 4.78, 4.252 – 4.254)

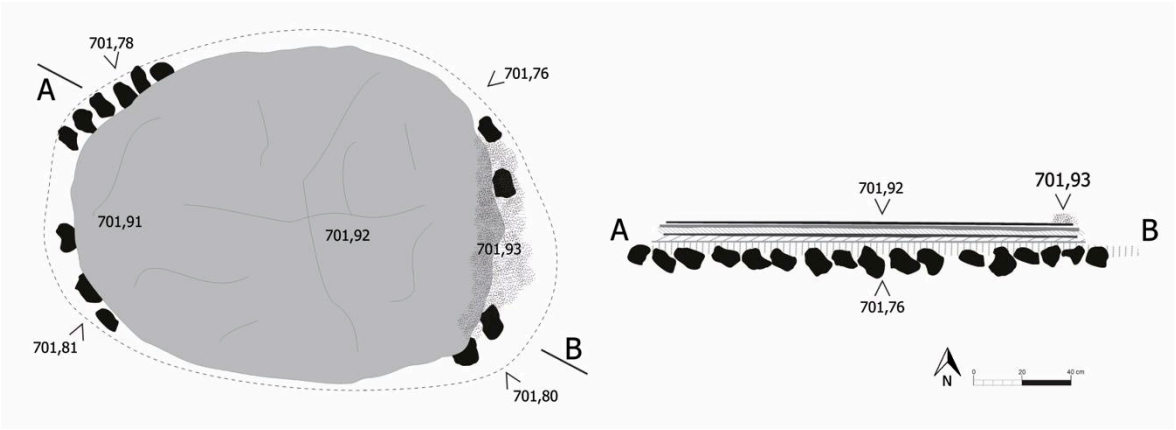


Figure 4.78: Hearth N2O2 and its cross-section

The oval-shaped hearth was 190 cm long in the east-west direction and was 134 cm wide in the south-north direction. The pavement, which was made of basalt and pebbles of different sizes between 3x5x8 - 5x7x15 cm was under the first plastered floor. Between the stone pavement and the first plastered floor was a layer of orangish buff-coloured filling with low stone content about 5-6 cm in thickness. The first plastered floor was a yellowish grey colour with locally dully grey-coloured traces due to burning in 1 cm thickness. After its usage, buff-coloured a stone-tempered 2 cm-thick filling was laid on the first floor, then the 2nd floor was plastered. This one was a grey colour 1.5 cm in thickness. On the second floor, a heterogeneous yellowish buff-coloured sandy 1-1.5 cm-thick filling was laid, and the 3rd

floor was plastered. This floor was a yellowish grey colour about 2 cm in thickness. Hereafter, the last renewal floor of the hearth was made directly on the 3rd floor without any filling. The last floor was a light grey colour. Except for the first floor with medium-hard and densely cracked appearance, all the surfaces of the plastered floors were very hard with local cracks.

4.4.6.2.3. Hearth N2O3

This was located in an open space at the edge of the western profile of trench 13G in Area B. The hearth was constructed on the dark grey soil with stone-poor contents. It covers an area of approximately 1.6 m^2 between the elevations of 702.30 to 702.48. It had three superimposed plastered floors with a stone pavement. (Figure 4.255, 4.256) The hearth very slightly inclined to the north. The dimensions of the oval-shaped hearth were 121 cm in the east-west direction and 159 cm in the south-north direction. The pavement, which was made of basalt of different sizes between 4x5x7 - 5x8x11 cm was under the first plastered floor. Between the stone pavement and the first plastered floor was a layer of orangish buff-coloured scattered stone-tempered 4-5 cm-thick filling. The first grey-coloured plastered floor was 2 cm thick. A layer of buff-coloured tiny stone-tempered 2 cm-thick filling was laid on the first floor before plastering the 2nd floor. The second floor was a light grey colour with locally faint dull grey traces due to burning. However, the third plastered floor was directly plastered on the second floor without a layer of any filling. The surfaces of all the plastered floors were cracked. The second floor was harder than the others.

4.4.6.2.4. Hearth N2O4

This was located in an open space in the south part of trench 13G in Area B. The hearth was constructed on a very hard grey-coloured stone-poor soil. It covers an area of approximately 1 m^2 between the elevations of 702.30 to 702.43. It had two superimposed plastered floors with a stone pavement. (Figure 4.257) The hearth inclined to the northwest. The rounded-shaped hearth was badly disturbed. Its preserved remains were 95 cm in the north-south direction and 72 cm in the east-west direction. The pavement was made of basalt and pebbles of different sizes between 4x6x7 - 5x7x12 cm. Between the stone pavement and the plastered floor was a layer of buff-coloured stone-tempered 4 cm-thick filling. The first

plastered floor was a grey colour 1 cm in thickness. Hereafter, a renewal base was constructed directly without any padding. The new floor was a light grey colour 1.5 cm in thickness. Both of the very hard plastered floors were cracked.

4.4.6.2.5. Hearth N2O5

This was located in an open space at the edge of the eastern profile of trench 20G in Area C. The hearth was constructed on a grey stone-poor soil. It covers an area of approximately 1.2 m^2 between the elevations of 698.01 to 698.17. It had a single plastered floor with a stone pavement. The dimensions of the oval/ "U"-shaped hearth were 92 cm in the east-west direction and 120 cm in the north-south direction. (Figure 4.258 – 4.260) Its plastered floor was bluish-grey colour and 2 cm in thickness. The pavement was made of stones of different sizes. Between the stone pavement and the plastered floor was a layer of buff-coloured scattered stone-tempered 2-4 cm-thick filling. The surface of the plastered floor was densely cracked and rippled.

4.4.6.2.6. Stone Pavement / Hearth N2O6

This was located in an open space at the edge of the eastern profile of trench 20G and also partially underneath the Hearth N2O5 in Area C. This stone pavement (hearth) covers an area of approximately 1.1 m^2 between the elevations of 697.95 to 698.02 and it was on the grey stone-poor soil. (Figure 4.258, 4.259) Its plastered floor was not detected and its southeast part was not well-preserved. The dimensions of the oval / rounded-shaped feature were 102 cm in the east-west direction and 73 cm in the north-south direction. Since it had a similar type of stone pavement of the hearth' bases this feature was defined as hearth. It is likely that the plastered floor was left unfinished. The stone pavement was constructed of basalt and pebbles of different sizes between 4x6x9 - 5x8x14 cm.

4.4.7. Phase N1 architecture

As explained above, Sumaki Höyük Neolithic period fill experienced a short cessation after Phase N2. The final habitation of the Neolithic settlement represented by

Phase N1 was dated to nearly 8150 - 8100 CalBP according to comparative chronological data. (Table 3.3)

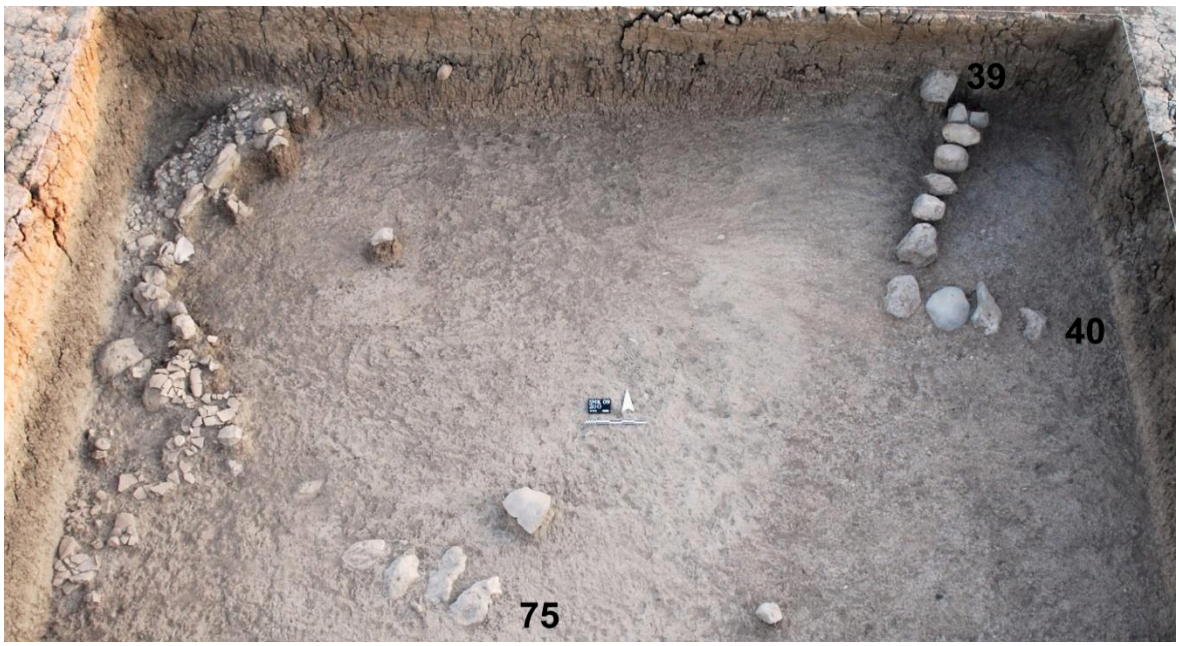


Figure 4.79: Stone rows from Phase N1

The architectural tradition in this phase is different to nearly all of the previous phases. In this phase, stone walls and rows are dominant in almost all exposed areas. Together with walls/rows belonging to more than one structure, the structural plans and measurements are uncertain. In some areas at least, the rows/walls with corners may be determined as belonging to rectilinear structures. (Figure 4.79) Apart from these, stone rows are observed in different areas. Broken grinding stones from previous phases were reused in stone walls or rows. (Figure 4.80) In the area inside the stone rows, uncertain reddish-brown traces and occasional lime fragments were identified. Since the edges of these traces are not precise, as in the Single-roomed Structures identified in previous phases, these stone rows were not included in the structural classification. Additionally, as some of these stone rows are at the edge of and above the fill from Phase N2 structures, it may be considered that these structures were repaired and reused in this phase. Possibly, these stone rows and walls are the remains of temporary shelters covered with a tent, or tent-like material as upper cover, having surroundings made of thin reeds/branches, and the rows of stones.



Figure 4.80: Stone rows from Phase N1

Seven hearths were revealed in open areas, as in previous phases. There is no trace of hearths or fire pits in the interior of the stone rows. Four of the hearths are in Area A, two are in Area B, and one is in Area C. (Table 4.5; Diagram 3.16) Three of them had no plastered floor on stone pavements. Either the stone paving was left incomplete during construction, or the plastered floor was disturbed on different occasions. The other hearths have stone pavements. Except for one hearth, the others have only a single plastered floor. The thickness of the plaster base varies from 1.5 to 2.5 cm.

Ethno-archaeological field studies in the Lower Garzan Basin identified structural remains partly surrounded by stone rows or walls. (Figure 5.48 – 5.50) In this type of rectangular structure, three sides were surrounded by temporary material such as soil in sacks, reeds, and branches while stone rows surrounded its other side. These rows are generally located on the narrow side on the slope section. (Figure 5.76, 5.77) The best example is encountered in Sulan Kom winter quarters. These temporary structures have a single inner space. In this context, the stone rows or walls found in Sumaki Höyük are considered to be the remains of rectangular Single-roomed Structures. Additionally, in some winter quarters, it was observed that old structures had a plan or measurements that had been altered on one side, primarily by adding a stone wall to the narrow side. The best examples are in winter quarters of Memikan Kom and Çemisitrin Kom.

4.4.7.1. Architectural Elements

In Phase N1, stone rows or wall lines were identified in several areas. Some of them bounded the edge of structures, while some extended to open areas outside the structures. The function of the rows independent of structures could not be clarified. Additionally, single large stones were identified which were probably used as supports along the edges of the earth walls of structures. Two stone pavements were uncovered in areas B and C. (Figure 3.71) The rocks used in these stone pavements are more extensive than the stones used for pavements of the hearths and have a different pattern; therefore, it was not assessed in the group with a stone pavement beneath the hearth.

4.4.7.1.1. Number 6 Stone Row / Wall in Area A

Located in Area A in the central part of trenches 20M and 21M, this extends in an east-west direction and makes a slight curve toward the southeast in trench 20M then continues. (Figure 4.81, 4.192) Its western part is between the elevations of 700.80 – 701.18, while its eastern section is between the elevations of 700.54 – 700.87. Built according to the slope of the natural surface, and inclined slightly to the east, it has a length of nearly 14 m in an east-west direction and 28-47 cm width. Extending as a single row and at single stone height, this row/wall occasionally reached 3 or 4 stone height.

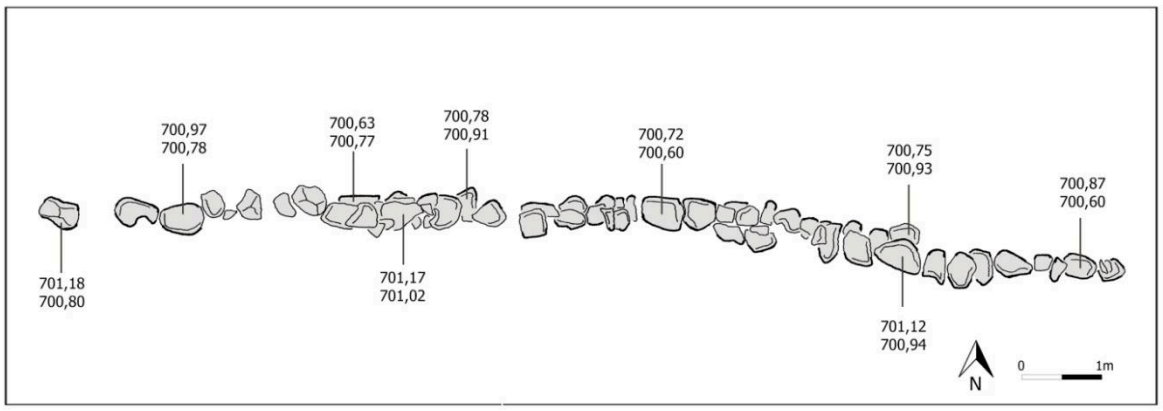


Figure 4.81: Number 6 Stone Row / Wall

There is no corner turn identified to its west or east. No association with any structure was determined. In its construction, natural basalt along with whole and broken ground stones were used. Grinding stones belonging to previous phases found a secondary use. There are no *in situ* grinding stones in this phase. The robust and scattered stony fill under the row/wall was spread over nearly all areas of the Neolithic settlement. It was

heterogeneously deposited after the torrent determined to have occurred in the later stages of Phase N2. This stone-rich fill is mixed with animal bones, pottery sherds, obsidian and flint artefacts and blades. (Figure 3.42, 3.43)

4.4.7.1.2. Number 7 Stone Row / Wall in Area A

Located in Area A in the centre of trenches 20M and 21M, and 20-35 cm north of Number 6 Stone Row/Wall, this wall extends in an east-west direction. In trench 20M, a nearly 4 m section appears to have been destroyed. (Figure 4.82, 4.192)

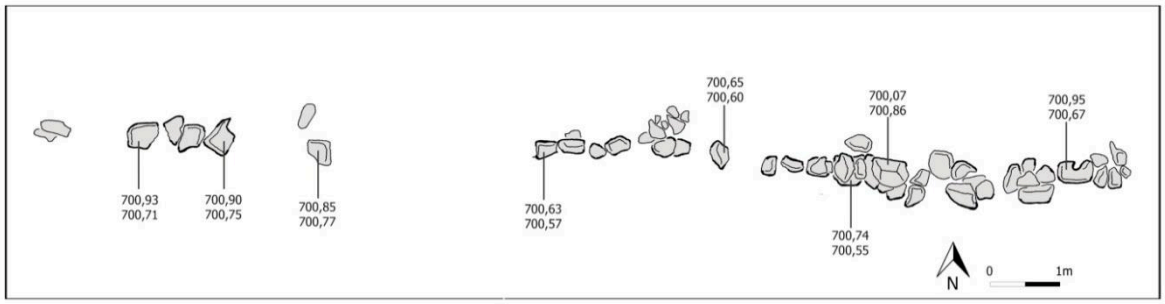


Figure 4.82: Number 7 Stone Row / Wall

Its western part is 700.74 – 700.95 in elevation while its eastern part was identified to be at 700.55 to 700.97. Constructed on a stone-rich heterogeneous surface sloping slightly to the east, it is 16 m long in an east-west direction and 32-43 cm wide. Generally extending as a single row and at single stone height, it was identified to have some sections preserved to 3-4 stone heights, especially in the eastern part. No corner turn was identified at either end and it does not relate to any structure. Whole natural basalt and broken grinding stones were used in its construction.

4.4.7.1.3. Number 12 Stone Row in Area A

Located in Area A in the centre of trench 21M, and 22-34 cm south of stone wall Number 6, this row extends in a southeast-northwest direction. (Figure 4.83, 4.192) Its western section is between the elevations of 700.51 to 700.77 while its eastern part is between the elevations of 700.48 to 700.75. This stone row was constructed on a compact heterogeneous fill on a depression area in the central section of Area A. It has a length of 447 cm in southeast-northwest direction and a width of 25-34 cm. Extending as a single row and at single stone height, no corner turn was identified. No association with any structure

was determined. In its construction, natural basalt along with whole and broken ground stones were used.

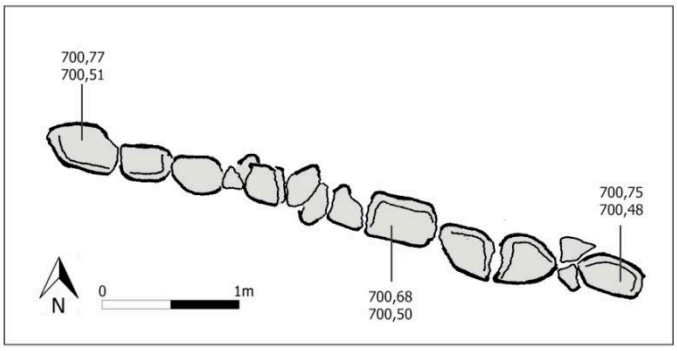


Figure 4.83: Number 12 Stone Row

4.4.7.1.4. Number 38 Stone Row in Area A

Located in Area A in the northeast of trench 20M and southeast of trench 20L, this row extends in a southeast-northwest direction between the elevations of 700.58 to 700.80. It was constructed on a compact heterogeneous fill, similar to the other rows in the same area. In its construction, natural basalt along with whole and broken ground stones were used. The row is 319 cm long in southeast-northwest direction and is 21-48 cm in width. (Figure 4.84)

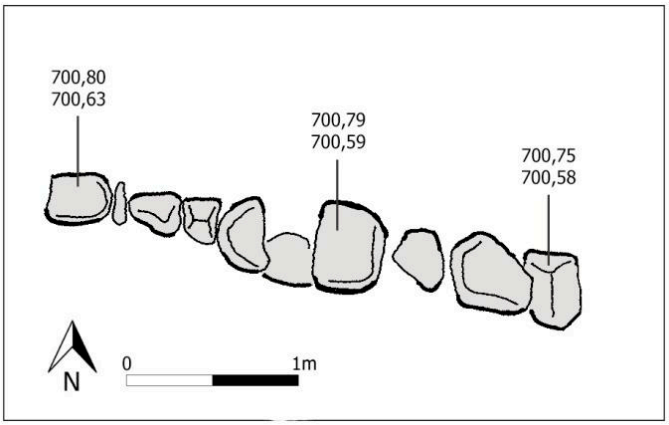


Figure 4.84: Number 38 Stone Row

Extending as a single row and at single stone height, no corner turn was identified. No association with any structure was determined. However, there are occasional reddish-brown traces and scattered lime fragments determined in the northern section. This row might form the north boundary of a structure, but the reddish-brown soil traces do not represent a fill of a structure.

4.4.7.1.5. Number 39-40 Stone Rows in Area A

This is located in Area A in the northeast section of trench 20/O between the elevations of 700.75 to 701.03. This row with corner turns slopes slightly to the east. Probably surrounding the south and west of a structure, its west section is Stone Row Number 39, and its southern part is Stone Row Number 40. (Figure 4.79, 4.85)

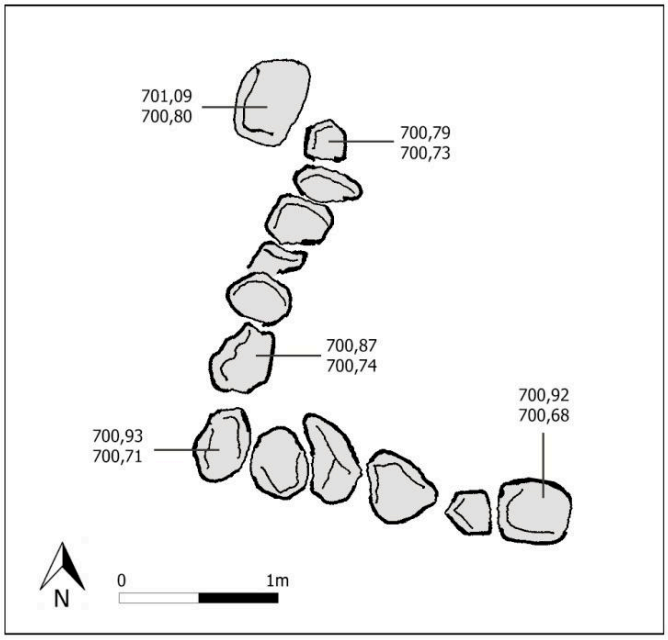


Figure 4.85: Number 39-40 Stone Rows

The first one is 232 cm long in the southwest-northeast direction and is 21-37 cm in width. Stone row Number 40 is 242 cm long in the exposed area in a northwest-southeast direction and is 25-44 cm in width. Constructed on a grey ash-poor and occasionally more or less stony fill both rows have wall pattern with a single row and at single stone height. Whole natural basalt and broken grinding stones were used in their construction. These stone rows surrounded the reddish-brown soil traces from south and west side. Since the limits of these traces were not precisely determined, the dimensions of the structure could not be clarified. These stone rows probably bounded only the southwest edge of a rectangular temporary structure while the rest is completed with perishable surroundings.

4.4.7.1.6. Number 75 Stone Row in Area A

This is located in Area A in the northwest section of trench 20/O between the elevations of 700.88 to 701.09. Constructed on a grey ash-poor and occasionally stone-poor

fill the row is 434 cm long in the southeast-northwest direction and 32-35 cm wide. (Figure 4.86) There is a stone concentration in the northwest section of the row.

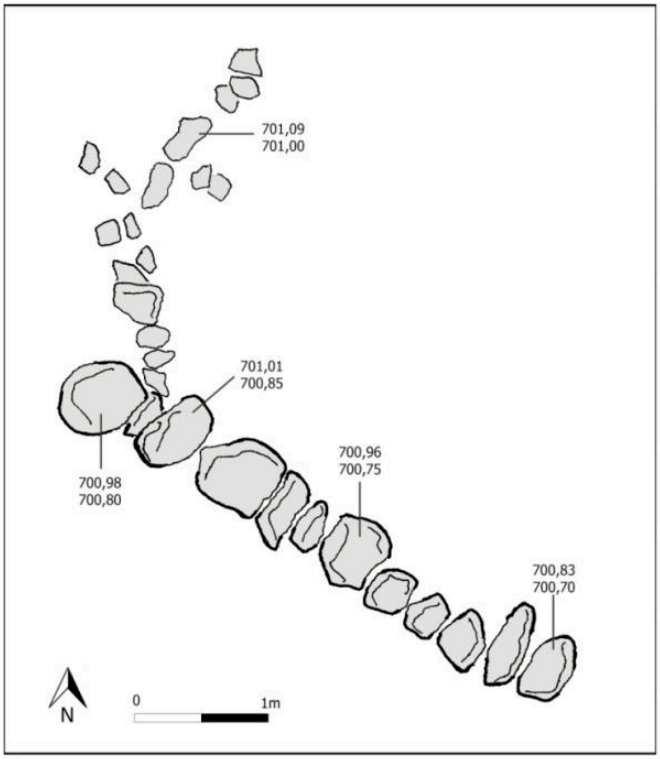


Figure 4.86: Number 75 Stone Row

This stone-poor homogenous fill is directly related to the torrent that occurred after Phase N1. The stone has a single row and at single stone height. In its construction, natural basalt along with whole and broken ground stones were used. The stone row probably limits only the southern edge of a temporary structure while the rest is completed with perishable material. Our ethno-archaeological observations reveal the existence of temporary structures constructed of different material predominantly in the winter quarters such as Sulan Kom, Bazivan Kom, and Sulane Girgiz Kom.

4.4.7.1.7. Number 28 Stone Row in Area B

Located in Area B in the southeast of trench 15H, this row extends in a southwest-northeast direction. Its northwest portion is between the elevations of 702.18 to 702.35 while the southeast part is between the elevations of 702.00 to 702.24. Constructed on a surface sloping slightly to the east, the row is 292 cm long and 24-53 cm wide. (Figure 4.87) Extending as a single row and at single stone height, this row was not identified to have

corner turns. In its construction, natural basalt along with whole and broken ground stones were used.

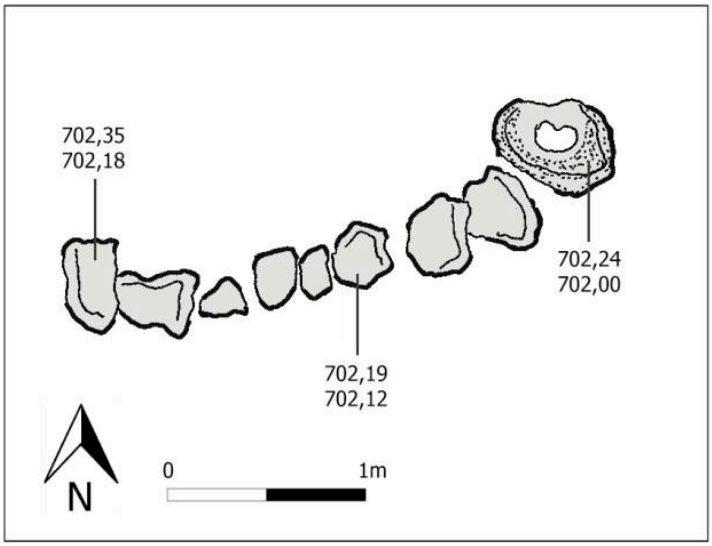


Figure 4.87: Number 28 Stone Row

4.4.7.1.8. Number 32 Stone Row in Area B

This is located in Area B in the southern section of trench 13G between the elevations of 702.21 to 702.44. This stone row, which is extending in a north-south direction, was constructed on a surface sloping slightly to the south. Extending as a single row and at single stone height, it is 291 cm long in the north-south direction and is 25-51 cm wide. (Figure 4.88) There are very few stones identified in its northern part. In its construction, natural basalt along with broken ground stones, and large cobbles were used.

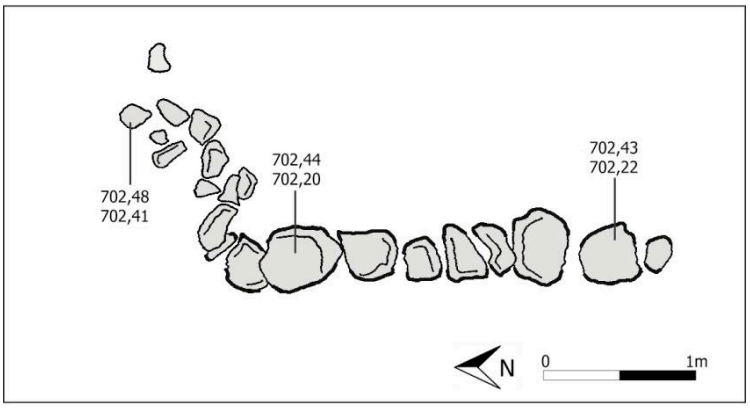


Figure 4.88: Number 32 Stone Row

The stone row sits on a buff occasional grey ashy and stony heterogeneous fill. Immediately east of this row, light reddish-brown colour earth traces were identified,

however, their limits could not be determined. Probably, only the west edge of a rectangular temporary structure was bounded by the stone row, while the rest is completed with perishable material such as reeds or branches. Similar temporary structures were commonly observed in our ethno-archaeological field studies in the Lower Garzan Basin. The best examples were in the winter quarters Sulan Kom, Bazivan Kom, and Sulane Girgiz Kom. Stone rows identified in these winter quarters appear to be on the slope-side of the structures are similar to the stone rows of Sumaki Höyük. Probably more extensive material was preferred against slope flow.

4.4.7.1.9. Number 33 Stone Row in Area B

This is located in Area B in the south section of trench 13F between the elevations of 701.94 to 702.14. The row was constructed on a surface sloping slightly to the north in a north-south direction. Extending as a single row and at single stone height it is 397 cm long in the north-south direction and is 18-37 cm wide. (Figure 4.89) In its construction, natural basalt along with broken ground stones, large cobbles, and limestone were used.

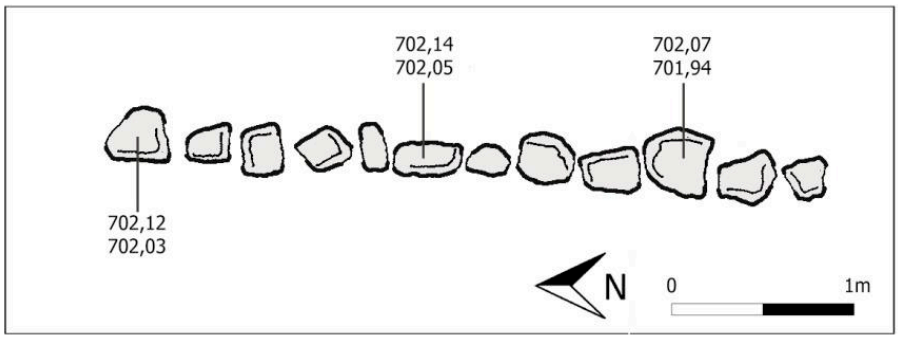


Figure 4.89: Number 33 Stone Row

The row was laid on a buff colour occasionally grey ashy and stony heterogeneous fill in the north, and on reddish-brown occasionally limey homogeneous fill in the south. Immediately east of the row, light reddish-brown soil traces were identified. Since their definite boundaries could not be determined the dimensions of the structure could not be clarified. Probably, the west edge of a rectangular temporary structure was bounded by the stone row while the rest is completed with perishable material such as reeds or branches. Temporary structures made of different materials were commonly observed in our ethno-archaeological field studies in the Lower Garzan Basin.

4.4.7.1.10. Number 34Stone Row in Area B

This stone row is located in Area B in the north section of trench 13F between the elevations of 701.87 to 702.02. Its western part slightly sloping toward the east is 34a Stone Row, and the south section is Stone Row 34b. (Figure 4.90) Stone Row 34a is 171 cm long in a north-south direction and is 22-34 cm in width.

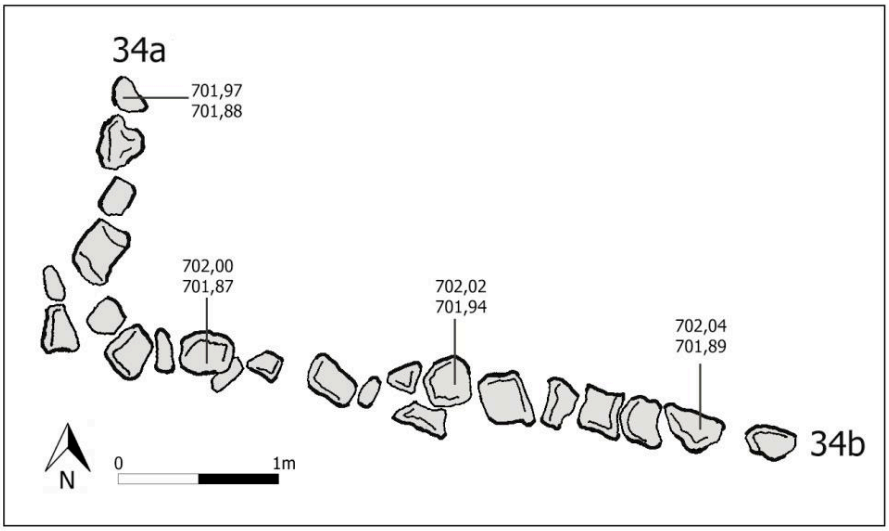


Figure 4.90: Number 34 Stone Row

Stone Row 34b is 482 cm long in the east-west direction and is 19-35 cm in width. Both extend as a single row and at single stone height. In their construction, natural basalt was used. The rows sit on a heterogeneous buff-coloured, occasionally grey ashy and stony surface. Immediately east of it within the corner, reddish-brown colour soil traces were identified. Since their definite boundaries could not be determined the measurements of the structure could not be clarified. Probably, only southwest edge of a rectangular temporary structure was bounded by the stone row, while the rest is completed with perishable material such reeds or branches.

4.4.7.1.11. Number 4 Stone Pavement in Area B

This is located in Area B in the northwest of trench 13G immediately above the hearth N2O3 in an open area between the elevations of 702.52 to 702.80. It sits on a grey buff-coloured ash-poor stony fill. Its exposed eastern section is 140x55 cm in size while its western part remains outside the exposed area. (Figure 4.91, 4.258) The pavement is made of basalt and broken groundstone with a small amount of limestone with sizes from 8x10x15 to 14x20x25 cm. This stone pavement is partially different than the stone pavements of the

hearths. The rocks used in these stone pavements are more extensive than the stones used for pavements of the hearths. Besides, there were found no plaster traces. Therefore, its function was not defined.

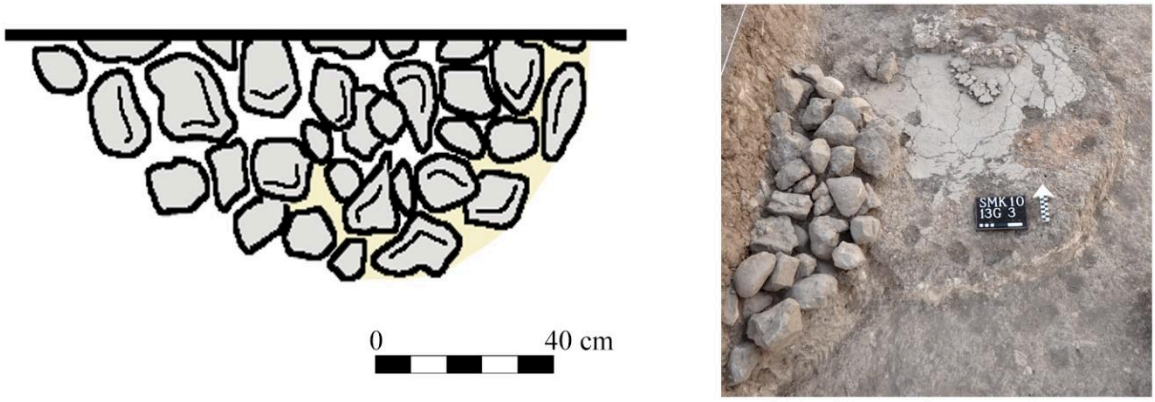


Figure 4.91: Number 4 Stone Pavement

4.4.7.1.12. Number 5 Stone Pavement in Area C

This is located in Area C in the northwest of trench 20G, immediately above the hearths N2O4 and N2O5, in an open area between the elevations of 698.20 to 698.37. It was built on grey buff stone-poor fill. Its exposed eastern section is 188x134 cm in size while its western part remains outside the exposed area. The pavement was made of basalt and large pebbles with 6x7x12 - 15x21x29 cm in size. This stone pavement is partially different than the stone pavements of the hearths. (Figure 4.92, 4.258, 4.259) The stones used in these pavements are more extensive than the stones used for pavements of the hearths and have a different pattern; besides, there were found no plaster traces. Therefore, its function was not defined.

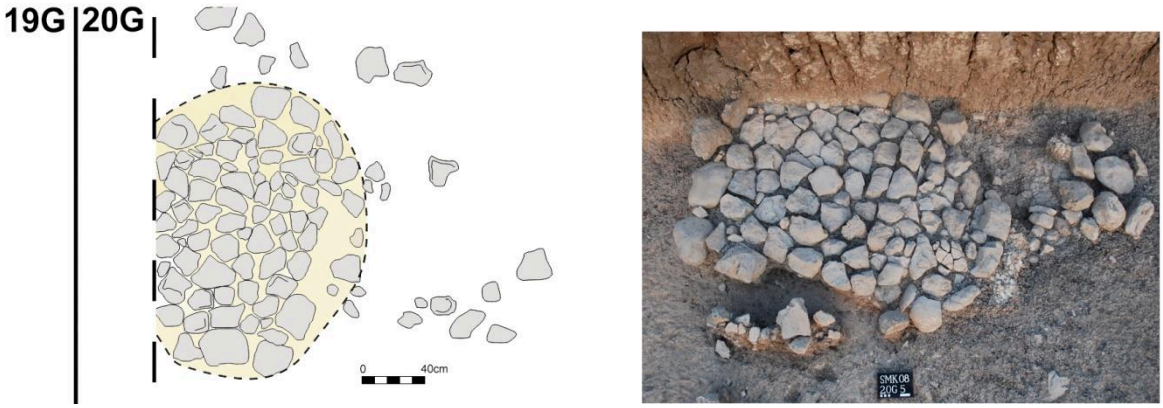


Figure 4.92: Number 5 Stone Pavement

4.4.7.2. Hearths

In Phase N1, seven hearths were identified with four in Area A, two in Area B, and the other two in Area C. (Diagram 3.16; Table 4.5)

4.4.7.2.1. Hearth N1O1

It was located in an open space in the southwestern part of trench 20M in Area A. The hearth covers an area of approximately 1 m^2 between the elevations of 700.95 to 701.14 and it was built on the grey ashy, stony and sandy soil. It had a single yellowish grey-coloured plastered floor with a stone pavement. (Figure 4.261 – 4.263) The hearth inclined to the north.

Oval/"U"-shaped hearth was measured at 128 cm in the north-south direction and 102 cm in the east-west direction. The pavement was made of basalt, pebbles and groundstone fragments of different sizes between 4x5x8 - 6x8x13 cm. Between the stone pavement and the plastered floor was a layer of a heterogeneous orangish buff-coloured sand- and stone-tempered 3-4 cm-thick filling. The surface of the very hard plastered floor, which was 2 cm in thickness, was smoothed and cracked. The plastered floor was encircled by natural basalt. The basalt row was arranged in a single row on the plastered floor. Since there were not found any rocks in the southern part of the floor, as a similarly inclined surface, the mouth of the hearth might be at that part.

4.4.7.2.2. Stone Pavement / Hearth N1O2

It was located in an open space in the middle of trench 20N in Area A. The stone pavement (hearth) covers an area of approximately 1 m^2 between the elevations of 701.34 to 701.56 and it was on greyish buff earth. Its plastered floor was not detected. The size of the oval/rounded pavement was 115 cm in the southeast-northwest direction and 84 cm in the north-south direction. Since it had a similar type of stone pavement of the hearth' bases this feature was defined as hearth. (Figure 4.264) It is likely that the plastered floor was left unfinished. The stone pavement was made of basalt and pebbles of varying sizes between 4x6x8 - 5x7x13 cm.

4.4.7.2.3. Hearth N1O3

This was located in an open space in the southeastern part of trench 22M in Area A. The hearth was constructed on a greyish buff sandy locally stony fill. It covers an area of approximately 1 m^2 between the elevations of 700.24 to 700.33. The oval-shaped hearth was 84 cm in the east-west direction; however, the north-south direction could not be clarified because the southern part remained in the unexcavated area. The remaining portion was 52 cm in the north-south direction. The pavement was made of basalt and pebbles of different sizes between 3x5x6 - 4x6x10 cm. Between the stone pavement and the plastered floor was a layer of light grey-coloured scattered lime-and stone-tempered 4-5 cm-thick filling. (Rsim 4.265) However, traces of plastered floor were not identified on this filling. Probably the floor was not plastered or disturbed, therefore, the hearth might not be used.

4.4.7.2.4. Hearth N1O4

This was located in the southwestern part of the trench 22M in Area A. The hearth was constructed on a greyish buff sandy soil with locally concentrated stones. It covers an area of approximately 1 m^2 between the elevations of 700.45 to 700.58. It had a single dark grey-coloured plastered floor with a stone pavement. The dimensions of the preserved portion of the oval-shaped hearth were 75 cm in the northeast-southwest direction and 43 cm in the east-west direction. The pavement was made of basalt, pebbles and groundstone fragments of different sizes between 4x5x7 - 5x7x13 cm. (Figure 4.266) Between the stone pavement and the plastered floor was a layer of buff-coloured sand- and stone-tempered 3 cm-thick filling. The plastered floor, which was badly destroyed, was 1.5 cm thick. The surface of the hard floor was smoothed and cracked.

4.4.7.2.5. Hearth N1O5

This was located in an open space in the southern part of trench 15F in Area B. It covers an area of approximately 1 m^2 between the elevations of 701.32 to 701.45. It had two superimposed plastered floors with a stone pavement under the first plastered floor. The dimensions of its preserved portion were 67 cm in the south-north direction and 79 cm in the east-west direction. (Figure 4.267 – 4.269) The pavement was made of basalt and pebbles of different sizes between 3x5x6 - 5x7x16 cm. Between the stone pavement and the first grey

coloured plastered floor was a layer of sand-and stone-tempered buff-coloured 2 cm-thick filling. The first plastered floor was 2 cm thick. After its usage, a layer of scattered stone-tempered yellowish grey-coloured 3-4 cm-thick filling was laid on it, and the new floor was plastered. This one was a dull grey colour about 1 cm in thickness. The surfaces of the plastered floors were rippled and cracked.

4.4.7.2.6. Stone Pavement / Hearth N1O6

This was located in an open space in the northern part of trench 13G in Area B. The stone pavement was constructed on the greyish buff soil. It covers an area of approximately 1.2 m^2 between the elevations of 702.54 to 702.66. Its plastered floor was not preserved. (Figure 4.270) The diameters of this oval / rounded feature were 118 cm in the north-south direction and 102 cm in the east-west direction. The main reason for defining this feature as the hearth since it had a similar type of stone pavement of the hearth bases. It is likely that the plastered floor was left unfinished. The stone pavement was made of basalt and pebbles of different sizes between 4x7x8 cm and 5x7x15 cm similar to the pavements of other hearths.

4.4.7.2.6. Hearth N1O7

This was located in an open space in the south-central part of trench 17M in Area C. The hearth was constructed on the sandy and densely localised stony greyish buff-coloured soil. It covers an area of approximately 2 m^2 between the elevations of 701.82 to 702.04. It had three superimposed plastered floors with two stone pavements under the first and the second floors. Based on the floor remains, the hearth slightly inclined to the east. The dimension of the oval/rounded shaped hearth was 130 cm in the east-west direction; since its southern part remained in the unexcavated area its north-south direction could not be clarified. (Figure 4.271, 4.272) The exposed portion was 70 cm. The pavement was made of basalt and pebbles of different sizes between 4x5x9 - 5x7x15 cm. Between the stone pavement and the plastered floor was a layer of orangish buff-coloured tiny stone filling about 2-3 cm in thickness. The first plastered floor was a yellowish grey about 2 cm in thickness.

A layer of stone-and sand-tempered buff-coloured 7-8 cm-thick filling was laid on the first floor, -possibly due to the need of enlarging the hearth-, before the construction of the second floor. The second floor was a grey colour about 1 cm in thickness. After the usage of this floor, a layer of orangish buff-coloured scattered stone-tempered filling was laid on it, and then the third floor built. The third floor was also a grey colour about 2 cm thick. All the hard-plastered floors of the hearth have cracked and smooth surfaces.

4.5. Discussion

In all period of history, architectural structures and related elements reflect the lifestyle and socio-economic organization of communities. With the emergence of settled life in the Neolithic Period, and later permanent architectural structures became widespread, various studies indicate that campsites or seasonal settlements are continuing. Both archaeological and ethnological data clearly show that this process continues throughout history with different qualities in different geographies.

In the archaeological sense, the remains of any architectural structure, depending on the information requested from it is evaluated in various ways. (De Domenico et al., 2008; Ertürk et al., 2011, Fang and Jiao, 2013; Haklay and Gopher, 2019; Haklay and Gopher, 2015; Say-Özer and Özer, 2017) Among the highlights of these assessments are architectural techniques, the purpose or function of the building, or the construction of a semantic bridge between the present and the past in an ethnoarchaeological context. Nevertheless, *Architectural formal analysis*, which examines the geometric forms of architectural structures in the context of plan and layout, is used to reveal the characteristics of building design, which defines one aspect of architectural tradition. (Haklay and Gopher, 2019: 8) Archaeological architectural history is like a catalogue of changing architectural traditions, designs and forms. Traditional or local designs undoubtedly vary depending on the regional, cultural, technological and socio-economic structure. (Arslan & Ertürk, 2005:329) As a way of connecting two areas such as construction techniques or architectural semantic evaluations, it is obvious that the evaluation of the building form will be more qualified in terms of the course of the works. Although this thesis has chosen an ethnoarchaeological study as a methodological method to place the construction techniques and semantic context in place, it proposes a model about the architectural tradition of Sumaki Höyük and as a designed indicator of the conditions under which the architectural structure was built. The

architectural structures were examined in terms of their morphological aspects and both periodic and spatial relationships were evaluated mutually with their different features. In this thesis, construction techniques have been evaluated in terms of both micro-archaeological and different chemical and physical analyses, and by examining building forms, the architectural design process of the period has been tried to be understood.

As mentioned earlier, one of the aims of this study is to make a connection between architectural design and chemical and physical analysis. The structures examined by architectural formal analysis will provide information that can be applied directly to both architectural traditions and architectural design problems. In this context, out of 60 architectural structures unearthed in the Neolithic settlement of Sumaki Höyük, the ones whose borders and therefore their net dimensions could be determined were selected. 17 architectural structures with different plans from different phases were examined by architectural formal analysis method.

Three *Single-roomed (without walls)* structures studied were built on an area of 17-30 m2 and have single spaces. The ratio of X-Y axes of these structures to each other varies between 1.3-1.8. *Single-roomed (with walls)* structures have some more standard features, but it is difficult to argue that they are pre-designed and constructed entirely in standard dimensions. These types of buildings are smaller than all other building types unearthed in the Neolithic Settlement of Sumaki Höyük. They are probably an additional space used in conjunction with other structures. However, apart from architectural form, size and space feature, no definite data to prove this could not be reached. Apart from one of the four *single-roomed (with walls)* structures examined, the others were built on an area of 6-8m2. The other one covers an area of 12m2. The X-Y ratio of these structures ranges from 1.3 to 1.6. Wall thicknesses are different.

Double-roomed structures are divided into two long axes. They reflect a distinctive design partnership and, in part, a marked standard. The buildings consist of two rooms built on an area of 8 and 13 m2. The ratio of these structures to X-Y axes is 1.5. There is also a marked standard in wall thicknesses. The outer wall widths are between 30-32 cm, but the inner walls of both structures are slightly narrower than the outer walls.

The remains of *Multi-roomed* structures represent the most complex group of architectural examples in the context of architectural measurements and plan among the Neolithic building examples. This type of structure is rectangular or square in Sumaki Höyük. There is no specific common design and the construction process related to this

design. There is no common design in the interior. In the two square plan examples, both the long axis and the short axis are divided into different plans and sizes. The rectangular structure also does not have equal partitioning and a distinct design. In short, all three structures seem to be random and divided according to the needs of individuals who will use this structure. This complexity could not be connected in phase. For example, the two structures in the N5 phase are very close to each other, but their design does not resemble. This type of building is built on an area of 12-24 m2 and consists of multiple rooms or cells. The ratio of X-Y axes to each other is between 1.0-1.4. Although the outer and inner wall widths are very different, both the outer and inner walls of each of the structures are also different from each other.

It is possible to talk about design in Cell Building. Except for the 3 buildings that were unearthed, common design and partitioning seem to have been taken into account in almost all buildings. There is a similar partitioning in all 5 structures examined. Such structures are divided into 3 sections on both long and short axis. There is a corridor on the short axis. On the right and left sides of this corridor are the cells. However, it should be noted that the cells do not have a standardized design and standard dimensions. In some structures (N6B1 and N6B3), partitioning lines and wall lines do not fit together.

The Cell Building tradition, which is the dominant building plan of the period, is also seen in Sumaki Höyük, but it is not a standardized design product, as claimed in a publication published on Çayönü Hill architecture. (Haklay and Gopher, 2019) Incidentally, I find it useful to mention. The hypothesis put forward in this publication is unfortunately not even valid for the Çayönü Hill Neolithic Settlement. In this article, this hypothesis is based on only 2 Cell Building data. Other structures of the same plan have never been mentioned. Even for 36 Cell Buildings unearthed on the Çayönü Hill, this standard does not apply. If we go back to Sumaki Höyük Cell Building structures; X-Y axis ratio of Cell Building structures whose boundaries are determined varies between 1.1-1.4, which ratio is very close to each other. The wall thickness of the buildings is between 30-43 cm. The cells are usually 1m2, but their width or length is slightly different. When all the buildings are evaluated together, it is very difficult to claim an architectural construction process designed for Sumaki Höyük Neolithic Buildings.

In the morphological examination of sediments and soils in archaeological settlements, there is a natural effect as well as a human effect on a regional scale. (Courty, 1992:39) Calcium carbonate (CaCO3) is one of the most abundant and common minerals in

the soil (Oral et al., 2019:129) and is also a mobile mineral. Easily soluble depending on environmental conditions. The CaCO3 mineral dissolved in water changes depending on the atmospheric conditions and then recrystallizes according to the chemical conditions of the medium in which it is transported. This mineral is generally seen as a fine-grained crystal or granule aggregation. (Freitas & Martins, 2000:981) Many publications show that this mobile mineral, which crystallizes due to the chemical conditions of the environment it is transported, is formed as a result of diffusion movement especially in the pores and pores formed by organic material. (Günal et al., 2011; Freitas & Martins, 2000; Amrhein & Suares, 1987)

CaCO3 mineral was found in all of the lime and soil samples taken from the architectural structures and cultural fillings of the Sumaki Höyük Neolithic Period. These minerals were determined in XRD analysis in detail in SEM images. Especially in the analysis of lime pieces by XRF method, 9464 ppm Ca element is seen. However, in samples taken from lime pieces, the element Ca is generally 4000-6000 ppm. In particular, SEM images of lime samples taken from N5B9, N5B14, N4B2 and N2B8 Structures showed very sharp pointed CaCO3 minarets. The concentration of the bicarbonate solution and the evaporation effect caused by evaporation may result in calcium migration in the soil. Sumaki Höyük seems to have increased the concentration of CaCO3 in the soil as a result of the sudden-high evaporation effect with the presence of reeds or herbaceous plants in the Neolithic Period architectural structures. In the same examples, SEM images, which we observe that silicon gels fill plant cavities, support this argument.

SEM/EDX analysis is a method commonly used in conjunction with other microscopic and analytical instruments and is used to identify the formation and degradation processes of the materials under investigation. (Mereuta, 2019: 1; Erginal & Ertek, 2009:3; Quaranta & Sandu, 2008:3) In almost all of the lime samples taken from the Neolithic Period architectural structures, phytoliths filled with *SiO2* gels were found. It is important to identify phytoliths to determine regional flora distribution and diversity due to spatial variability of soils. It is important to identify phytoliths to determine regional flora distribution and diversity due to spatial variability of soils. (McClung de Tapia et al., 2008:68) Sumaki Höyük the architectural structures unearthed during the Neolithic phases and the phytoliths found in the open area cultural fill are predominantly belonging to herbaceous plants. Phytoliths are non-crystalline minerals that accumulate in cells and cell walls in various parts of plants. In the following, Sumali Höyük Phytolite analysis results

are presented and discussed in detail. Phytolites consisting of plant fossils clogged with silica gels (SiO2) can be protected for a long time due to their high resistance to decomposition in the process. (Zuo et al., 2016:1)

Lime and soil samples were also investigated by the XRD method. *Graphite* mineral was found in three architectural building walls (N2B12, N5B8, N5B11) except for the presence of phytoliths in lime fragments taken from architectural structures. However, in one of the soil samples taken from the building walls (N4B10), plumbago was also found as a carbon mineral. Both minerals are the same. However, according to XRD analysis, carbon deposition was determined as graphite mineral in lime samples and plumbago mineral in soil samples. Besides, some differences in the mineral composition of the lime fragments taken from the building walls and mineral composition of the soil samples were determined. *Graphite*, *Covellite*, *Villiumite*, *Dolomite*, *Magnesit*e, *Methoxyphenyl* and *Dimagnesium* minerals were not detected in building soils, flood-flood fillings, open area culture fillings and caliche layer except calcite, *SiO2* and *Nitratine* minerals found in lime fragments. In this context, it is as proof of a different factor that is not found in the soil during the formation and accumulation process of lime pieces. It can be asserted that herbaceous plants, which are identified in SEM images and Phytolite analyzes, are highly effective in diversifying this composition. Also, some minerals (*Anorthite*, *Sakhaite*, *Berzelianite*, *Monticellite*, *Moissanite* and *Berlinite*) found in soil samples were not detected in lime fragments, flood fillings and caliche layers.

The diversity revealed in XRD analysis is significant in this context. For example; Moissanite and berlinite mineral were determined in Structure N4B2 sample, whereas berzelianite and monticellite mineral were determined in Structure N6B2 sample. Apart from the calcite and SiO2 predominant minerals, this type of rare minerals also supports the soil diversification used in different areas determined in XRF soil classification. Lime samples were divided into four groups according to all data obtained in XRF analysis. The first group is the largest group with 13 samples. The second group was represented by 1 sample, the third group by 2 samples and the fourth group by 1 sample. In addition to that, instead of all the data of the same samples, the data were divided into three groups by using only aluminium and silicon values used in the source analysis of silicon-based materials. The first group is again the largest and is represented by fifteen examples. The second group is a sample (N5B1); the third group is represented by an example (N5B11). When we consider all these together, a significant uniformity is observed in the formation process of lime

samples. While there is variation in soil samples on the same walls, it can be argued that at least the lime formation accumulates in situ based on the presence of a dominant uniformity in the lime samples. Besides, the accumulation of Nitrate, especially in lime fragments from the architectural walls of Sumaki Höyük, was also observed. This mineral owes its existence to a favourable environment for the deposition and conservation of this mineral rather than the presence of the caliche zone, which had previously accumulated under the cultural fill of the settlement and on the Miocene dunes. The presence of this mineral found in architectural structures that have no systematic relationship with the topography or rock type can only be explained by atmospheric transport and deposition. (Böhlke et al, 1997: 147; Ericksen,1981:1, Holloway & Dahlgren, 2002:65.1; Stadler et al., 2008:5)

Sumaki Höyük cultural fillings and caliche layer have no physical touchpoints with each other. As it can be seen clearly in the settlement sections, the dense calcareous red-coloured soil extends between the caliche layer and the earliest cultural deposit. In this context, it is not possible for the nitratine minaret to physically interfere with the formation of lime deposited on the building walls. On the contrary, the samples taken from the walls constructed with Duripan (Brique taillée or Raw soil cut) technique found in N5B11-N5B13 structures did not encounter the nitrate mineral. On the other hand, nitratine mineral was identified on the walls where organic material was detected in EDX / SEM and phytolith analysis. The most important reason for the deposition of this mineral can be explained by the use of the structure or the presence of an extremely arid climate in a period thereafter. Likewise, excessive drought and slow accumulation are among the most important causes of nitrate accumulation. (Ericksen,1981:1; Jackson et al., 2015 :510; Tecimen et al., 2012:27) Sumaki Höyük carbon and oxygen isotope data support this argument. Nitrate minerals were detected in lime samples taken from building walls in N4 - N6 phases and isotope data proved that significant droughts occurred after these phases. It was formed as a result of rainwater draining in the culture fill and re-accumulating around organic material during rainy periods. Or a reflection of the calcification process (Langer & Benner, 2009:77) as a result of accumulated in lime formation.

Phytoliths obtained from archaeological strata are a powerful tool for reconstructing the paleoenvironment conditions with past cultures and also human behaviour. (Tsartsidou et al., 2007:1263; McClung de Tapia, 2012:162) Lime samples were processed for silica phytoliths; they have contained phytoliths and also most of them had preservation of silica particles. Most general types were observed scattered in the samples, including grass silica-

cells as well as *Trichomes*, *Bulliform* cells. *Bulliform* cells are found in grasses and some other types of herbaceous plants such as sedges. The presence of grass silica-cells in all samples indicates the contribution of grasses to the sediments represented by these lime samples. However, the abundances are low for counting so no more detailed information on types of herbaceous plants. Extended counting techniques might be useful on samples with higher amounts, but were not employed in this study. It is observed that the preservation of phytoliths from all the 22 samples is average. Irrespective of the context of the sample it is noted that there are multiform Trichome phytoliths. Poor preservation of Panicoid Phytoliths in most samples should be noted. The presence of Fan-shaped Bulliform phytoliths in all the samples suggest the presence/dominance of paleoblastic vegetation as compared to other panicoid *Bulliform* morphotypes. *Chloridoid* and *Festucoid* phytoliths (short cell grass phytoliths) although with variable frequency are dominated in the Sumaki Neolithic Phase. Multiform Trichome and elongates phytoliths were observed. The taphonomy of phytoliths indicates rounding of surface and degenerated edges. This probably indicates that vegetation was exploited at a large scale and the conditions were suitable for the grown of flora. Based on anatomic origin and structural characteristics, the dominant plant cover of Phases N6 - N4 at Sumaki Höyük is, in general, the andropogonea / reed species. In later phases such as N3 - N1, plant cover is represented by *Chloridoid* and *Festucoid* pasture. This probably indicates that there was a wet-dry–wet phase within the region.

Pollens are relatively durable in many sediments, arboreal pollen, which is released several feet to several dozen feet above the ground, usually travels well on the wind, providing a record of trees growing in the region. Shrubs, which are not as tall as trees, release their pollen at a lower level. Although pollen from some shrubs. Grasses that grow even lower to the ground, release their pollen relatively close to the ground. Usually, this pollen is not available for wind transport over long. Use of pollen as a proxy for past vegetation often provides valuable information concerning the paleoenvironment. A stratigraphic pollen record provides information concerning both local and regional vegetation. The pollen analysis shows the presence of arboreal and non-arboreal species. *Poaceae* type (grasses) pollens are found consistently within the profile followed by *Malvaceae* types indicating grassland vegetation. The pollens were well preserved. Arboreal species of *Apocynaceae* and *Cesalpiniaceae* types are indicative. *Asparagaceae*, *Calenduleae*, *Liliaceae* and *Verbenaceae* type pollens are spread irregularly throughout the

profile indicating ephemeral flora. As of now, it will be too early to create any distinct pollen zone within the profile.

All these are evaluated together, it has been the necessity to conduct a more detailed study on plant diversity and morphology has become clear. I hope that this study will lead to detailed studies on the possible plant morphology and the distribution of Sumaki Höyük in the following years.



Figure 4.93: Structure N6B1 from south



Figure 4.94: Lime traces on the cell base of Structure N6B1



Figure 4.95: Cross-section view of massive piled earth (Structure N6B1)



Figure 4.96: Structure N6B2 from south



Figure 4.97: Lime traces and piled earth / duripan (?) wall of Structure N6B2



Figure 4.98: Structure N6B1 from north



Figure 4.99: Structure N6B3 from southeast



Figure 4.100: Structure N6B3 from northeast



Figure 4.101: Bird's-eye view of Structure N6B3 and its piled earth walls



Figure 4.102: Structure N6B4



Figure 4.103: Lime traces on the cell base of Structure N6B4



Figure 4.104: Cross-section of massive piled earth (Structure N6B4)



Figure 4.105: Trace of Structure N6B5



Figure 4.106: Structure N6B5 from east



Figure 4.107: Bird's-eye view of Structure N6B5



Figure 4.108: Structure N6B6 from east



Figure 4.109: Massive piled earth walls and cells of Structure N6B6



Figure 4.110: Some stone tools and bones on the corridor base of Structure N6B6



Figure 4.111: Trace of Structure N6B7



Figure 4.112: Massive piled earth walls Structure N6B7



Figure 4.113: Structure N6B8 from south



Figure 4.114: Trace of Structure N6B9



Figure 4.115: Trace of massive piled earth walls from Structure N6B9



Figure 4.116: Structure N6B9 from west



Figure 4.117: Lime traces on the cells and corridor base of Structure N6B9



Figure 4.118: Cross-section view of massive piled earth (Structure N6B9)



Figure 4.119: Lime traces on the cell base and earth wall edge of Structure N6B9



Figure 4.120: Structure N6B10 from southwest



Figure 4.121: Structure N6B10 from west



Figure 4.122: Lime traces on the cells and corridor base and also earth walls edge of Structure N6B10



Figure 4.123: Massive piled earth walls layers from Structure N6B10



Figure 4.124: Massive piled earth walls and lime traces on the cell base of Structure N6B10



Figure 4.125: Thin lime traces from massive piled earth walls edge of Structure N6B10



Figure 4.126: Structure N6B11 from south



Figure 4.127: Structure N6B12



Figure 4.128: Thin lime traces from piled earth walls edge of Structure N6B12



Figure 4.129: Structure N6B13



Figure 4.130: Massive piled earth walls layers from Structure N6B13



Figure 4.131: Structure N6B14 from southwest



Figure 4.132: Structure N5B1 from north



Figure 4.133: Structure N5B1 from south



Figure 4.134: Lime traces of wickerwork and duripan wall from Structure N5B1



Figure 4.135: Structure N5B2 from southeast



Figure 4.136: Structure N5B2 from south and its piled earth walls



Figure 4.137: Cross-section of piled earth walls from Structure N5B2



Figure 4.138: Bird's-eye view of Structure N3B3



Figure 4.139: Limy wall trace and plastered floor residues in room number 2 from Structure N5B3

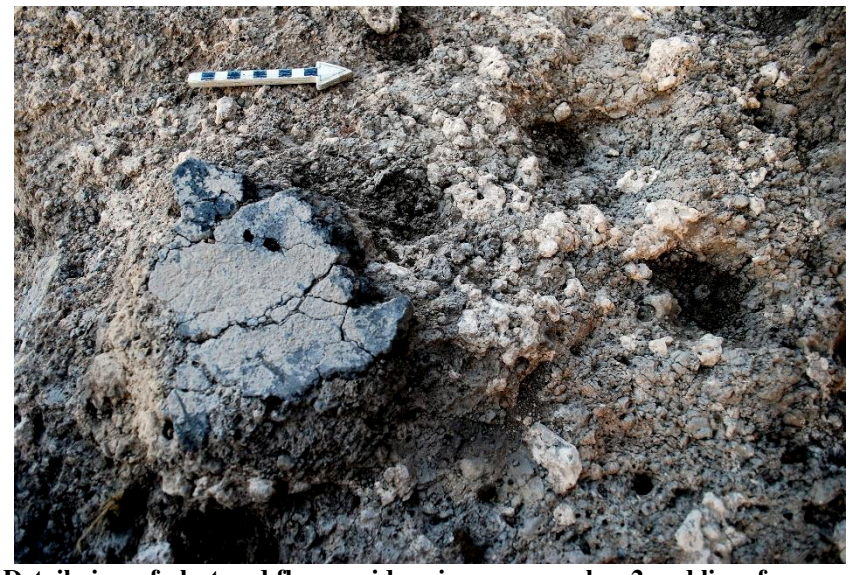


Figure 4.140: Detail view of plastered floor residues in room number 2 and lime fragments from Structure N5B3



Figure 4.141: Structure N5B4 from east



Figure 4.142: Massive piled earth walls layers from Structure N5B4



Figure 4.143: Detail view of massive piled earth walls layers from Structure N5B4



Figure 4.144: Structure N5B5 from north



Figure 4.145: Piled earth wall trace and lime fragment of Structure N5B5



Figure 4.146: Piled earth wall trace of Structure N5B5 from west



Figure 4.147: Massive piled earth wall trace of Structure N5B6 from north



Figure 4.148: Cells and corridor of Structure N5B6



Figure 4.149: Structure N5B6 and Structure N5B7



Figure 4.150: Bird's-eye view of Structure N5B8



Figure 4.151: Piled earth / duripan wall of Structure N5B8



Figure 4.152: Duripan wall of Structure N5B8



Figure 4.153: Structure N5B9 from southwest



Figure 4.154: Structure N5B9 from west



Figure 4.155: Cells of Structure N5B10 from west



Figure 4.156: Bird's-eye view of Structure N5B11



Figure 4.157: Duripan wall from Structure N5B11



Figure 4.158: Example of duripan wall from Structure N5B11



Figure 4.159: Structure N5B12 from north



Figure 4.160: Plastered floor residues in room number 3 from Structure N5B12



Figure 4.161: Cross-section of the wall from Structure N5B12



Figure 4.162: Some mud bricks example from Structure N5B12



Figure 4.163: Detail view of mud bricks and mortar from Structure N5B12

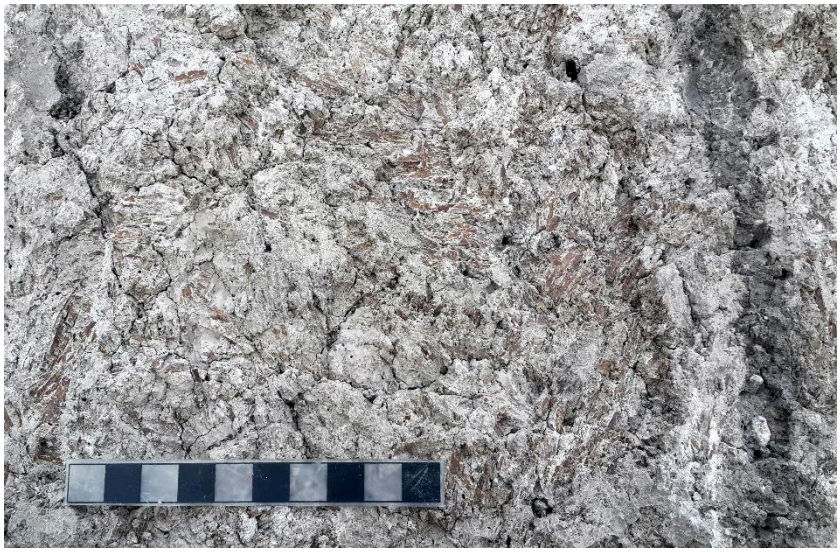


Figure 4.164: Traces of plants in mud brick mud and also mortar



Figure 4.165: Structure N5B13 from south



Figure 4.166: Structure N5B14 from southwest



Figure 4.167: Structure N5B15 from south



Figure 4.168: Massive piled earth walls traces of Structure N4B1 from west



Figure 4.169: Thin lime traces from massive piled earth walls edge of Structure N4B1



Figure 4.170: Rooms and door openings of Structure N4B1 from north



Figure 4.171: Structure N4B2 from south



Figure 4.172: Thin lime traces from piled earth walls edge of Structure N4B2



Figure 4.173: Structure N4B3 from east and thin lime traces from its piled earth walls edge



Figure 4.174: Massive piled earth walls traces of Structure N4B4 from north



Figure 4.175: Detail view of massive piled earth walls layers from Structure N4B4



Figure 4.176: Structure N4B7 from southeast and cross-section of earth wall



Figure 4.177: Structure N4B8 from south



Figure 4.178: Detail view of wattle frame of massive piled wall from Structure N4B8



Figure 4.179: Thin lime traces from massive piled earth walls edge of Structure N4B8



Figure 4.180: Bird's-eye view of Structure N4B9 and lime fragment in its piled earth walls



Figure 4.181: Massive piled earth walls layers from Structure N4B9



Figure 4.182: Detail view of massive piled earth walls layers from Structure N4B9



Figure 4.183: Structure N4B4



Figure 4.184: Structure N4B11



Figure 4.185: Structure N4B13



Figure 4.186: Structure N3B1 from north



Figure 4.187: Example a post-hole from Structure N3B1



Figure 4.188: Structure N3B1 from north



Figure 4.189: Structure N2B1 from northeast

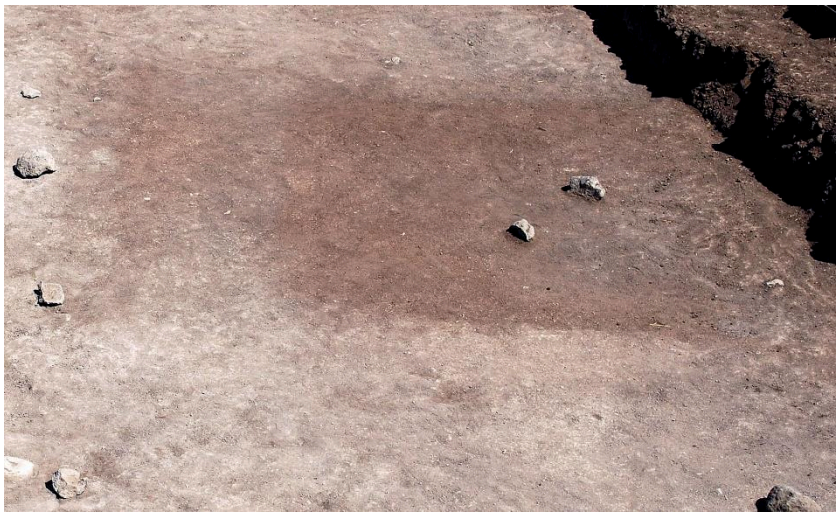


Figure 4.190: Structure N2B2 from west

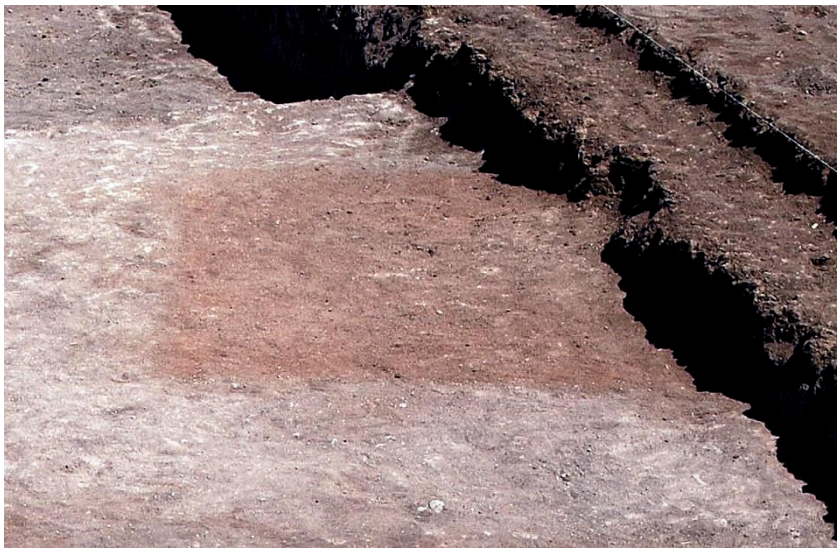


Figure 4.191: Structure N2B3 from west



Figure 4.192: Location of the Structures N2B2-N2B3- N2B4



Figure 4.193: Structure N2B4 from west



Figure 4.194: Structure N2B4 from north

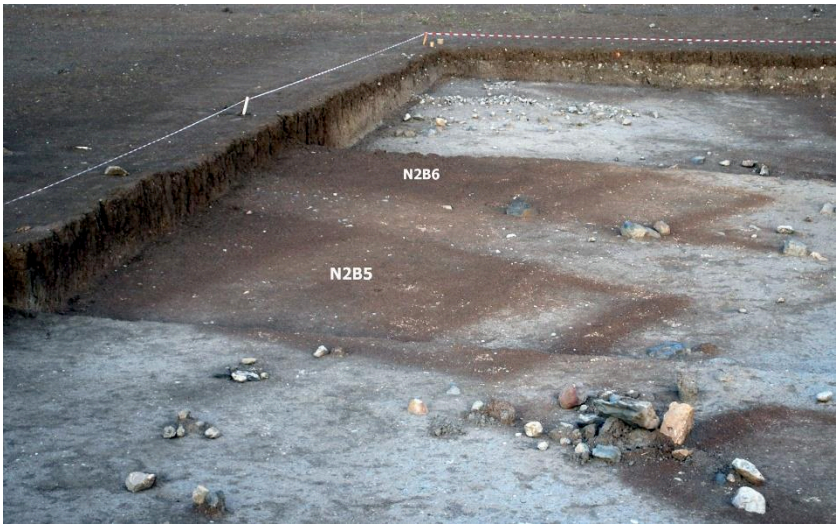


Figure 4.195: Location of the Structures N2B5 and N2B6

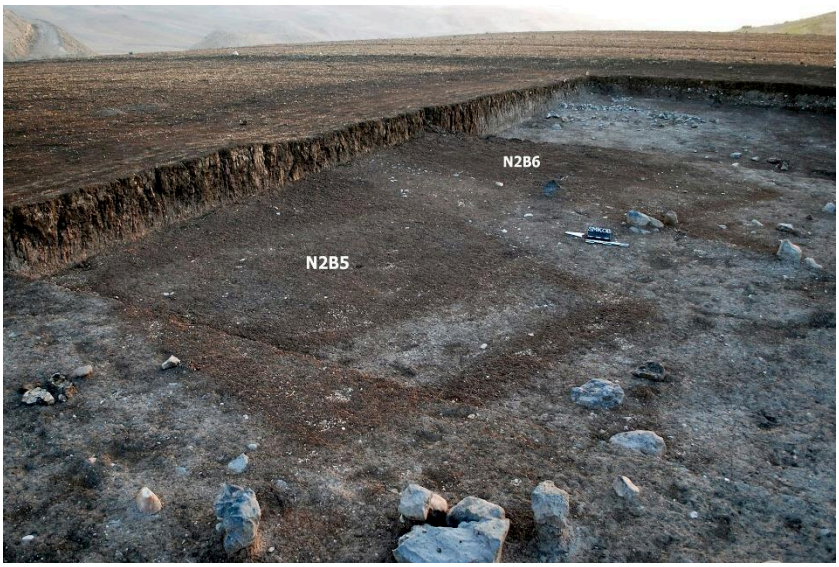


Figure 4.196: Structures N2B5 and N2B6 from southwest

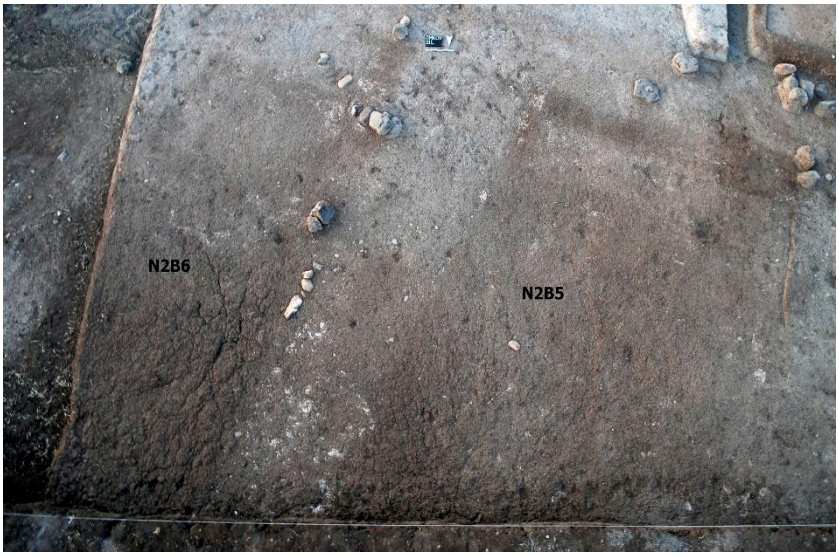


Figure 4.197: Bird's-eye view of Structures N2B5 and N2B6



Figure 4.198: Piled earth wall traces of Structure N2B7

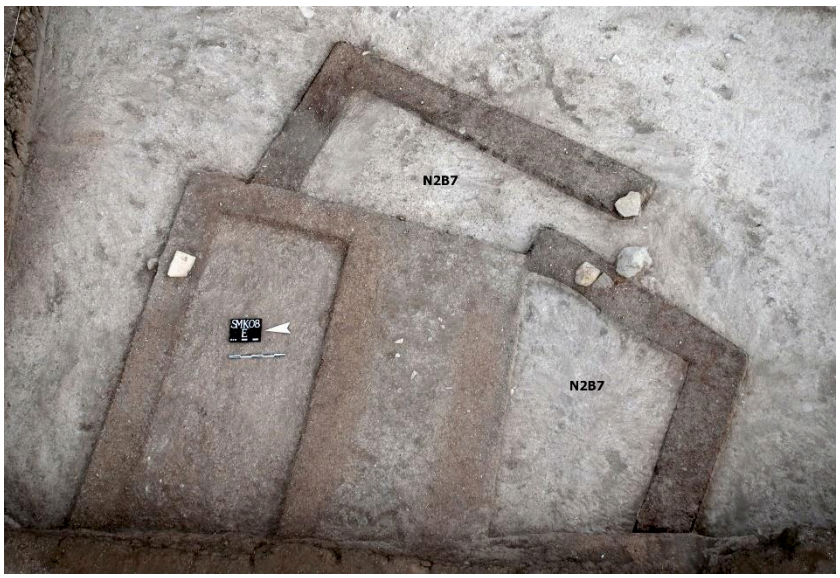


Figure 4.199: Bird's-eye view of Structures N2B7

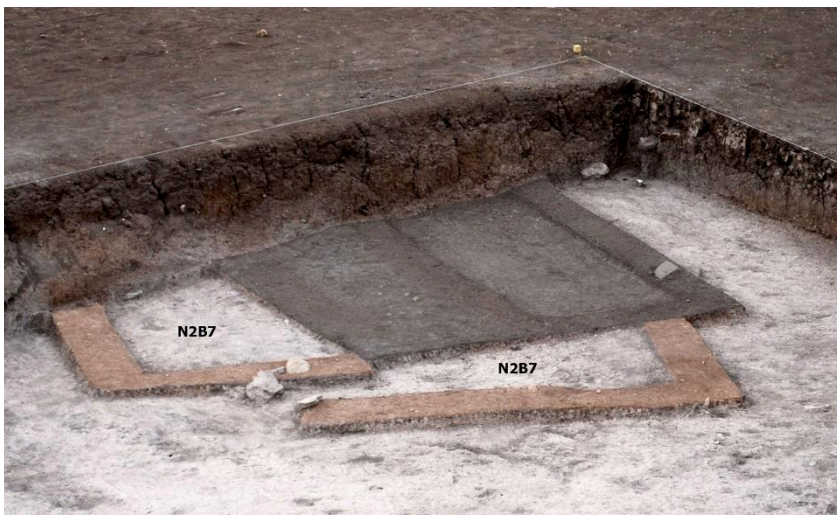


Figure 4.200: Location of the Structure N2B7



Figure 4.201: Structure N2B8 from south



Figure 4.202: Structure N2B8 from west



Figure 4.203: Structure N2B8 and 1st stage torrent/flood fillings accumulated on its edge



Figure 4.204: Structure N2B9 and its cells from west



Figure 4.205: Structure N2B10 from north



Figure 4.206: Structure N2B13 from north and upper phases stone row on its filling



Figure 4.207: Hearth N7O1



Figure 4.208: Detail view of Hearth N7O1



Figure 4.209: Hearth N7O2



Figure 4.210: Hearth N6O1



Figure 4.211: Bird's-eye view of Hearth N6O2



Figure 4.212: Hearth N6O2 from southwest and two ground stone artefacts near it

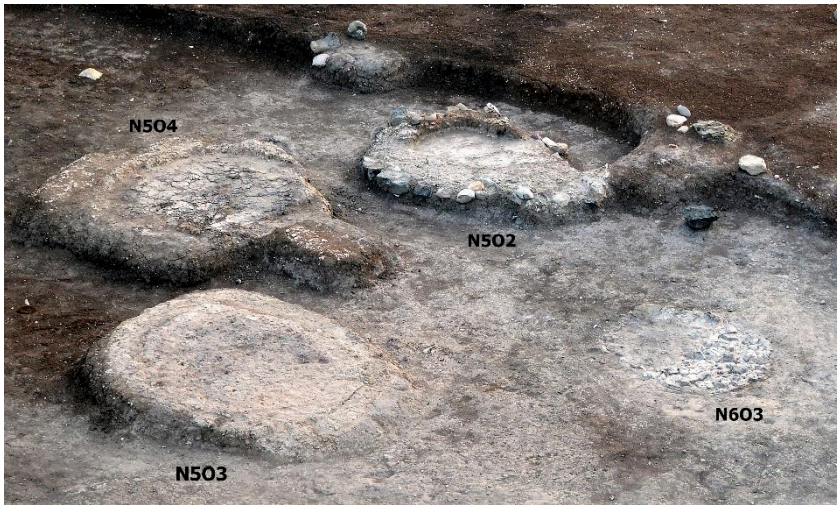


Figure 4.213: Overview of Phase N6 and N5 hearths together.



Figure 4.214: Hearth N6O3 from southwest



Figure 4.215: Stone Pavement / Hearth N6O5 from east



Figure 4.216: Hearth N5O1from west

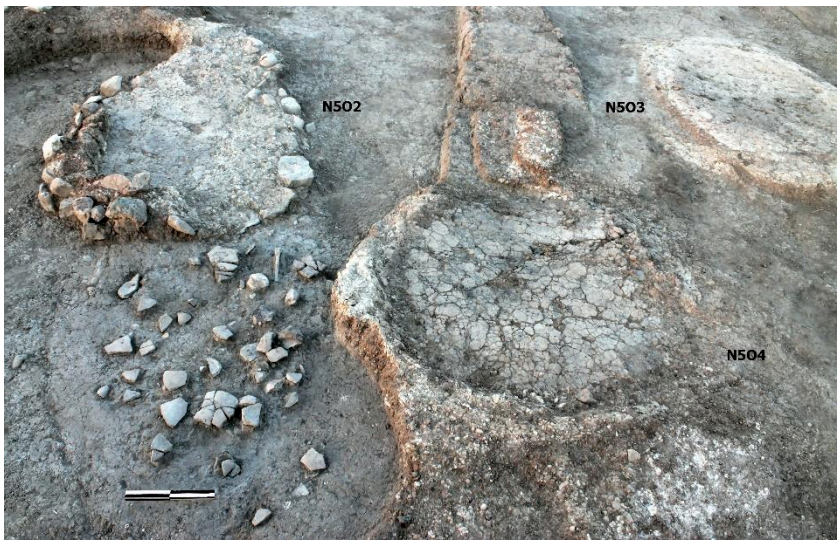


Figure 4.217: Overview of Phase N5 hearths together at the Area A



Figure 4.218: Hearth N5O2 from west



Figure 4.219: Hearth N5O3 base under the plastered floor from east



Figure 4.220: Hearth N5O3 from southwest



Figure 4.221: Hearth N5O3 from west



Figure 4.222: Hearth N5O5 from south



Figure 4.223: Hearth N5O5 from east



Figure 4.224: Bird's-eye view of Hearth N5O6 and lime fragments around it



Figure 4.225: Hearth N5O7 and lime fragments around it and also on its plastered floor

t 

Figure 4.226: Cross-sectional view of stone pavement and plastered floors from Hearth N5O7



Figure 4.227: Stone pavement from Hearth N5O7



Figure 4.228: Hearth N5O8 from east

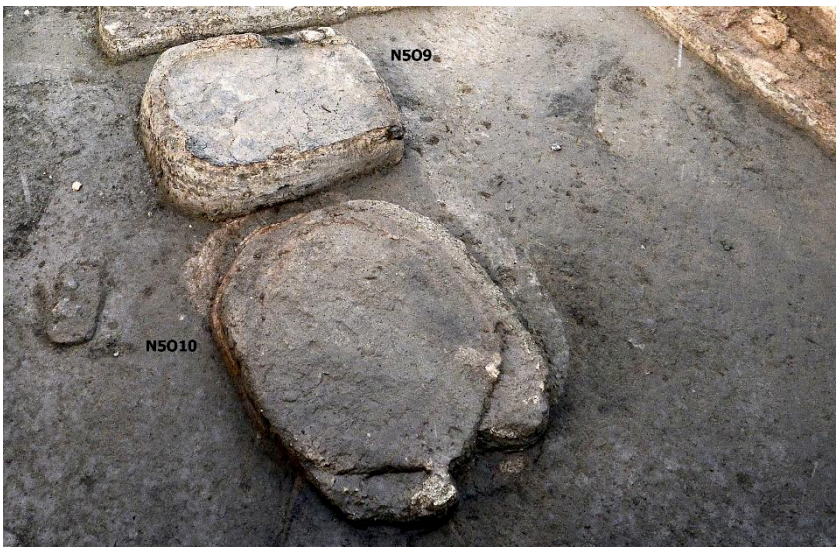


Figure 4.229: Overview of Hearth N5O9 and Hearth N5O10 together at the Area B



Figure 4.230: Hearth N5O9 from east



Figure 4.231: Location of Hearth N4O4 from south

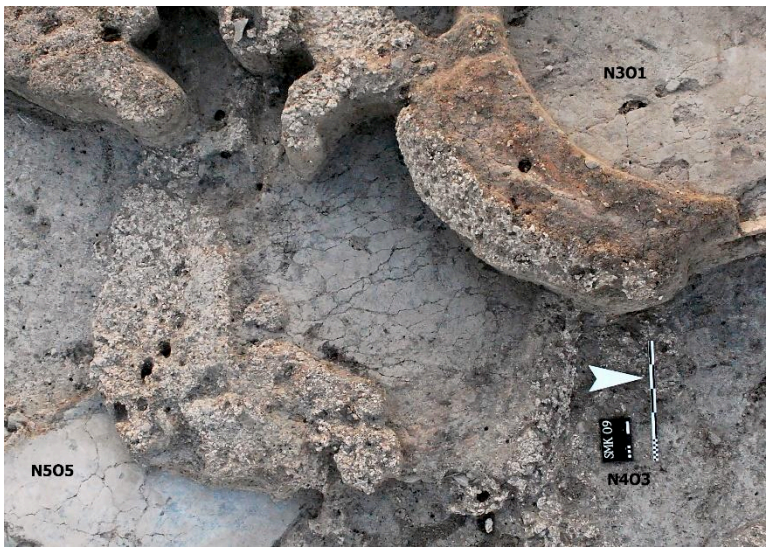


Figure 4.232: Bird's-eye view of Hearth N4O3 and lime fragments around it



Figure 4.233: Hearth N4O4



Figure 4.234:Hearth N4O5 from east (1st stage)

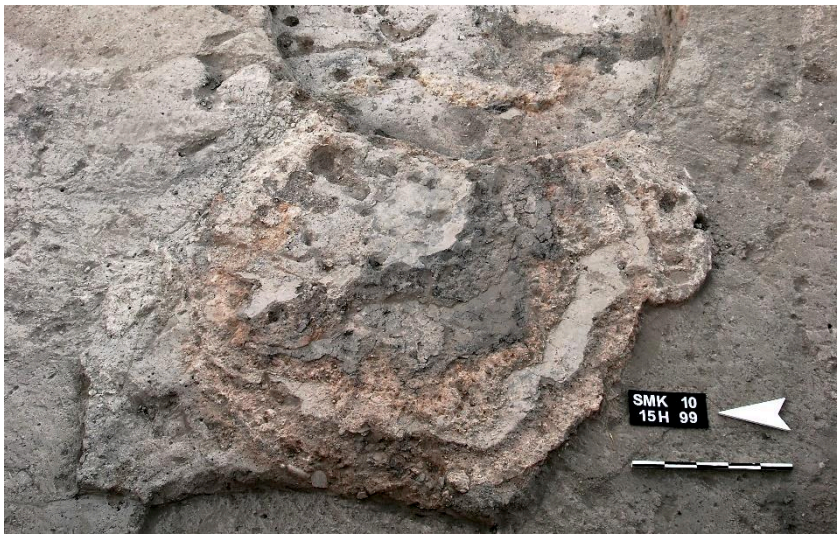


Figure 4.235: Hearth N4O5 from west (1st stage)



Figure 4.236: Cross-sectional view of stone pavement and plastered floors from Hearth N4O5



Figure 4.237: Overview of Phase N4 hearths together at the Area B



Figure 4.238: Hearth N4O6 and Hearth N4O7 together at the Area B



Figure 4.239: Hearth N4O6 from south



Figure 4.240: Hearth N3O1 from southwest and densely lime fragments around it



Figure 4.241: Hearth N3O1 from north



Figure 4.242: Cross-sectional view of stone pavement and plastered floors from Hearth N3O1



Figure 4.243: Hearth N3O2



Figure 4.244: Cross-sectional view of stone pavement and plastered floors from Hearth N3O2



Figure 4.245: Stone pavement from Hearth N3O2

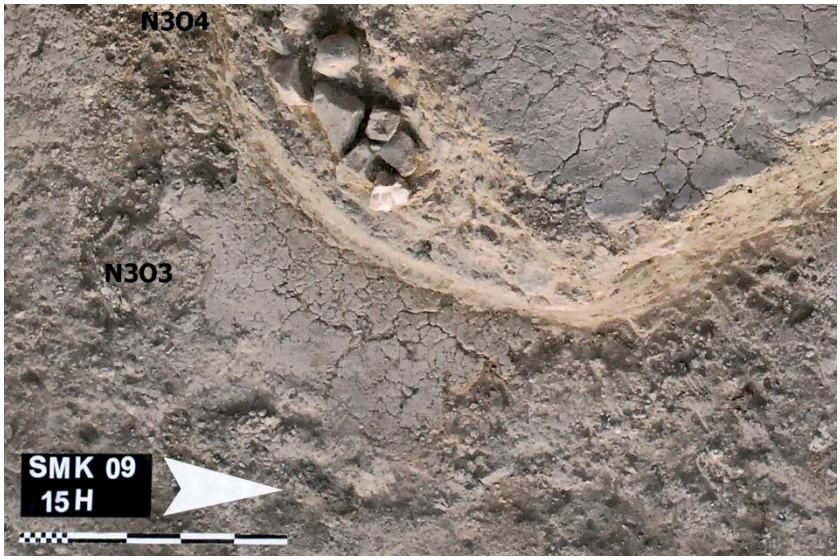


Figure 4.246: Hearth N3O3



Figure 4.247: Hearth N3O4



Figure 4.248: General view of the superimposed position of Hearth N3O3 and Hearth N3O4

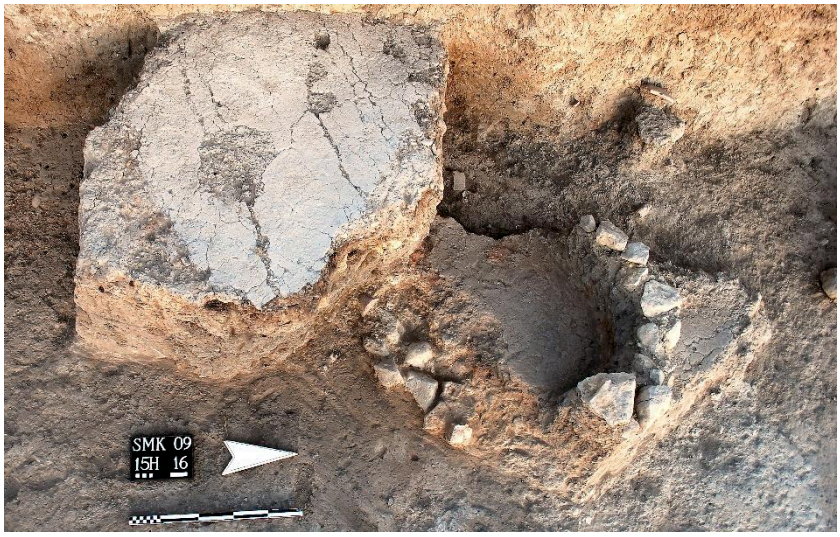


Figure 4.249: Hearth N2O1



Figure 4.250: Bird's-eye view of Hearth N2O1



Figure 4.251: Plastered floor and stone pavement together from Hearth N2O1



Figure 4.252: Hearth N2O2 from south (1st floor stage)



Figure 4.253: Hearth N2O2 from south (3th floor stage)



Figure 4.254: Stone pavement from Hearth N2O2



Figure 4.255: Hearth N2O3 from west

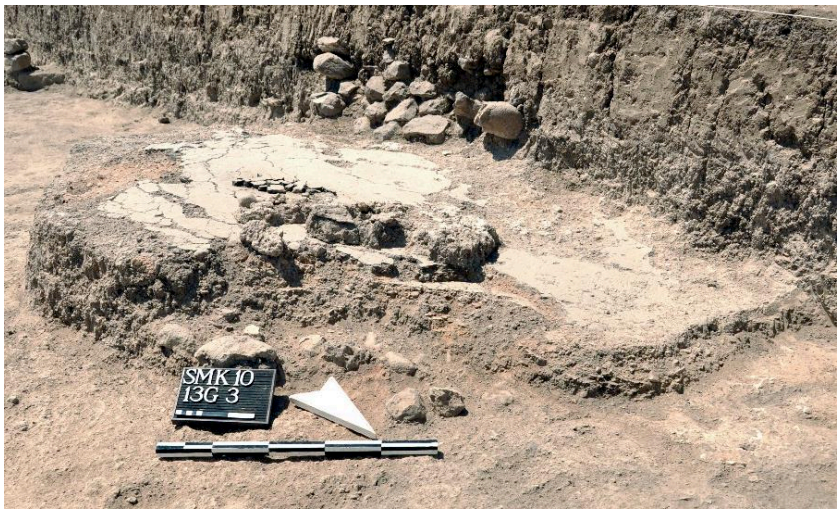


Figure 4.256: Cross-sectional view of stone pavement and plastered floors from Hearth N2O3



Figure 4.257: Hearth N2O4 from west



Figure 4.258: Overview of Hearth N2O5 and Stone Pavement / Hearth N2O6 together at the Area C

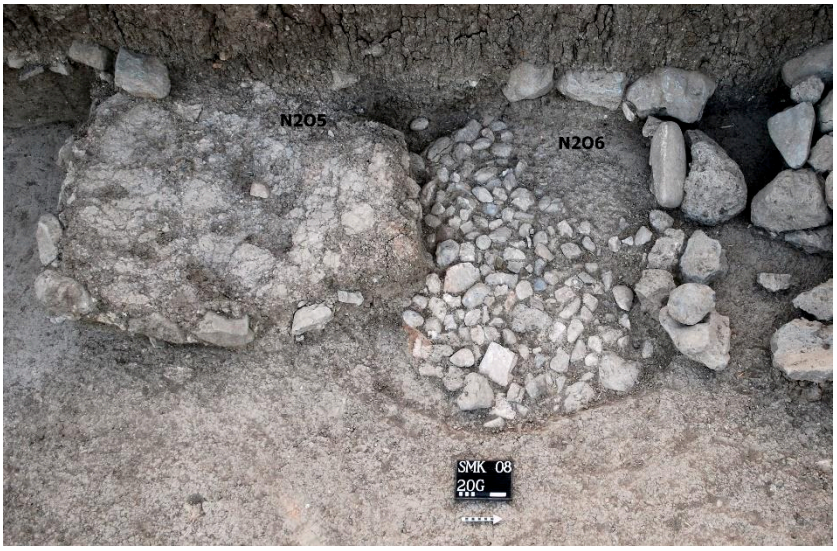


Figure 4.259: General view of the superimposed position of Hearth N2O5 and Stone Pavement / Hearth N2O6



Figure 4.260: Detail view of plastered floor from Hearth N2O5



Figure 4.261: Hearth N1O1 from north



Figure 4.262: Cross-sectional view of stone pavement and plastered floors from Hearth N1O1



Figure 4.263: Detail view of cross-sectional view of Hearth N1O1



Figure 4.264: Stone Pavement / Hearth N1O1



Figure 4.265: Hearth N1O3 from north



Figure 4.266: Cross-sectional view of stone pavement and plastered floors from Hearth N1O4



Figure 4.267: Hearth N1O5 from north



Figure 4.268: Detail view of plastered floors from Hearth N1O5



Figure 4.269: Stone pavement from Hearth N1O5



Figure 4.270: Stone Pavement / Hearth N1O6



Figure 4.271: Bird's-eye view of Hearth N1O7



Figure 4.272: Cross-sectional view of stone pavement and plastered floors from Hearth N1O7



Figure 4.273: Fire Pit N7A1 and its burnt filling



Figure 4.274: Fire Pit N7A2 and limy plant remains around the fire pit



Figure 4.275: Cross-section of its burnt filling of Fire Pit N7A2



Figure 4.276: Fire Pit N7A3 (unexcavated)



Figure 4.277: Fire Pit N7A3 (excavated)



Figure 4.278: Traces of Fire Pit N7A5 (unexcavated)

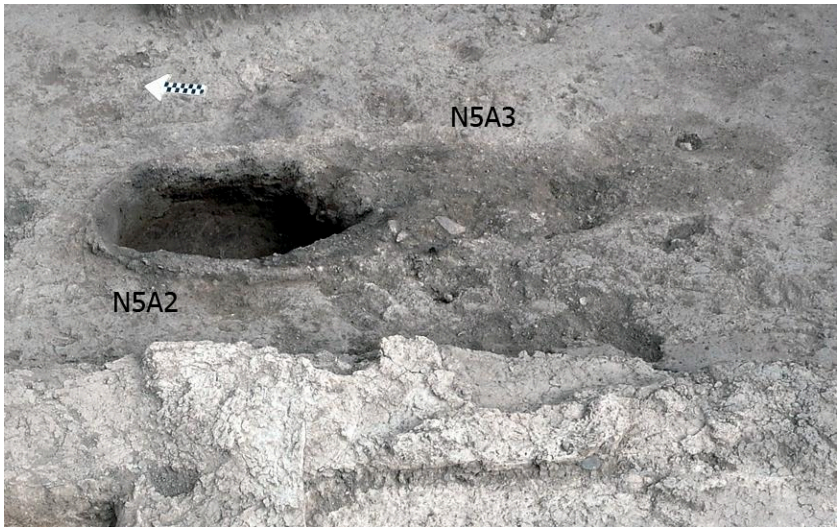


Figure 4.279: Fire Pits N5A2 and N5A3 from west

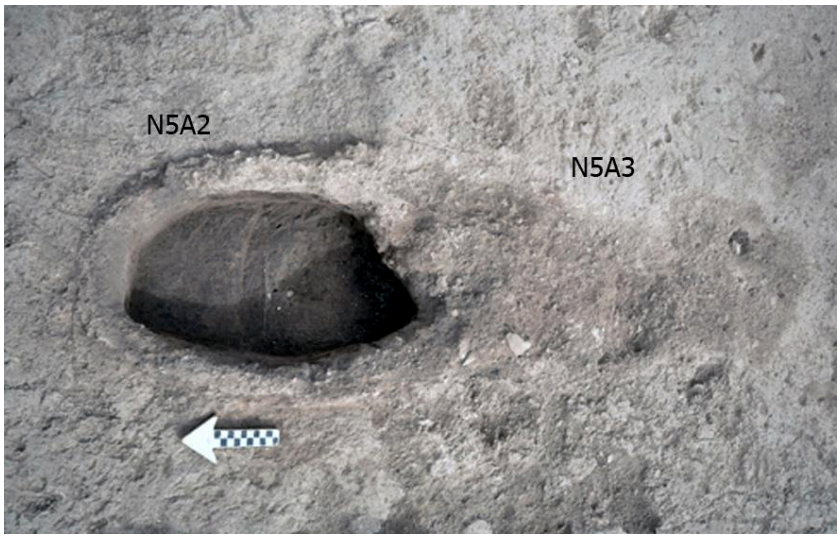


Figure 4.280: Bird's-eye view of Fire Pits N5A2 and N5A3



Figure 4.281: Fire Pits N5A2 and N5A3 from east

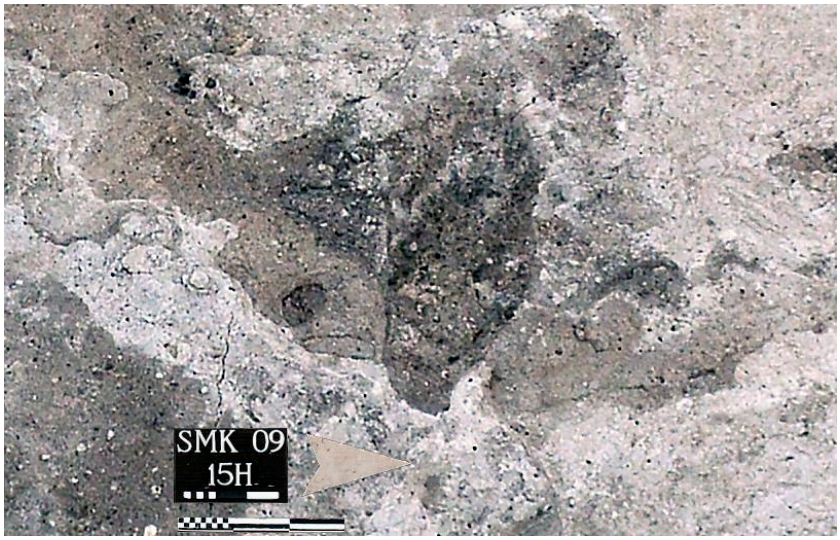


Figure 4.282: Traces of Fire Pit N4A1



Figure 4.283: Cross-section of Fire Pit N4A1

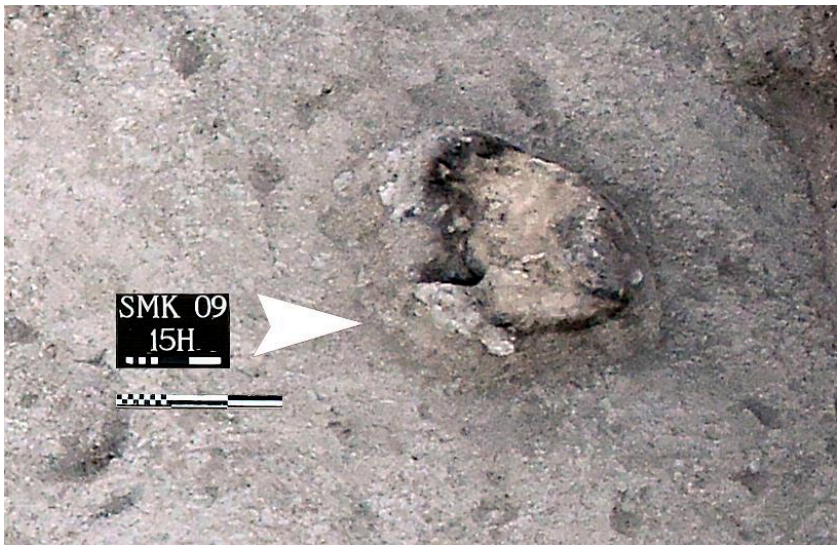


Figure 4.284: Fire Pit N4A3 from east

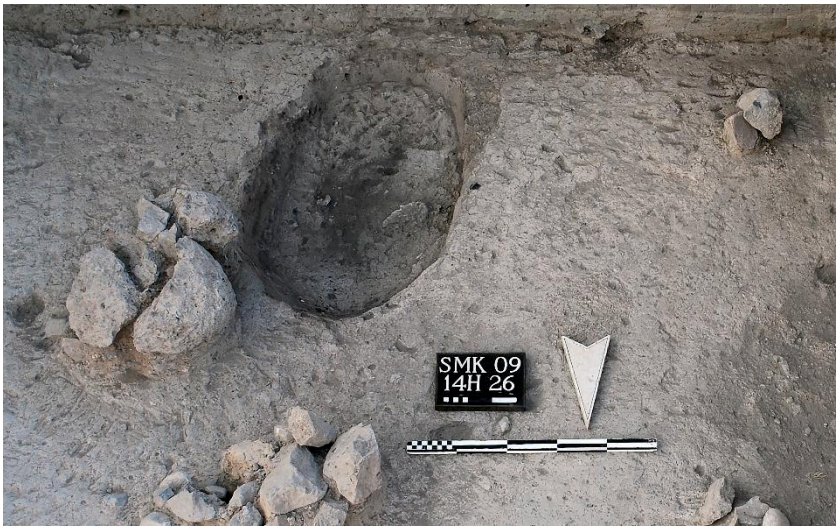


Figure 4.285: Fire Pit N4A6



Figure 4.286: Cross-section of Fire Pit N4A6 from northwest



Figure 4.287: *Bird's-eye view* of Fire Pit N4A6

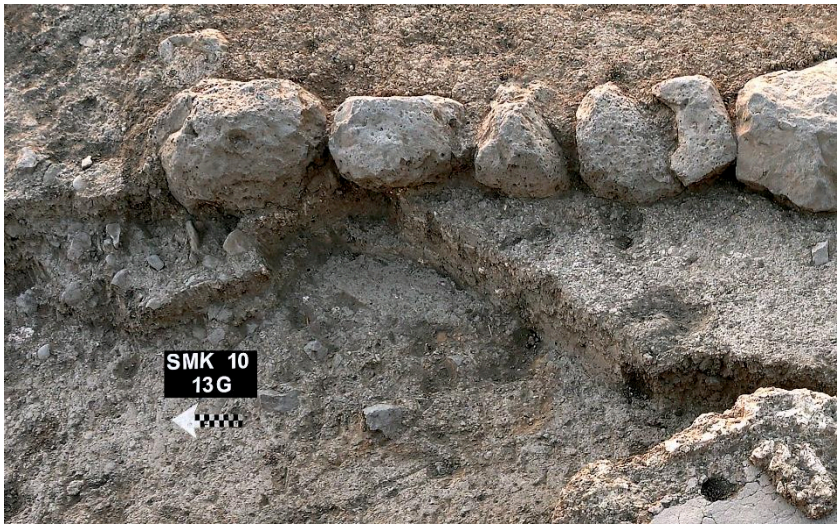


Figure 4.288: Fire Pit N3A1

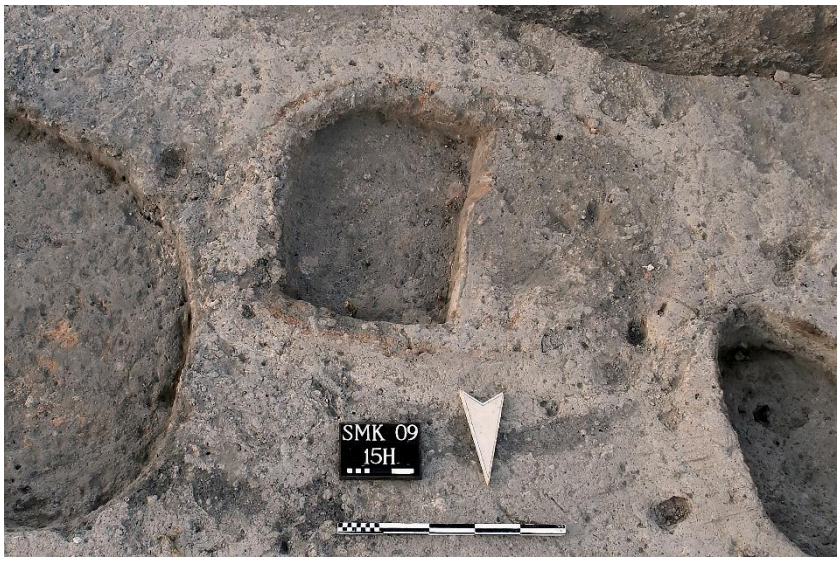


Figure 4.289: Fire Pit N2A2

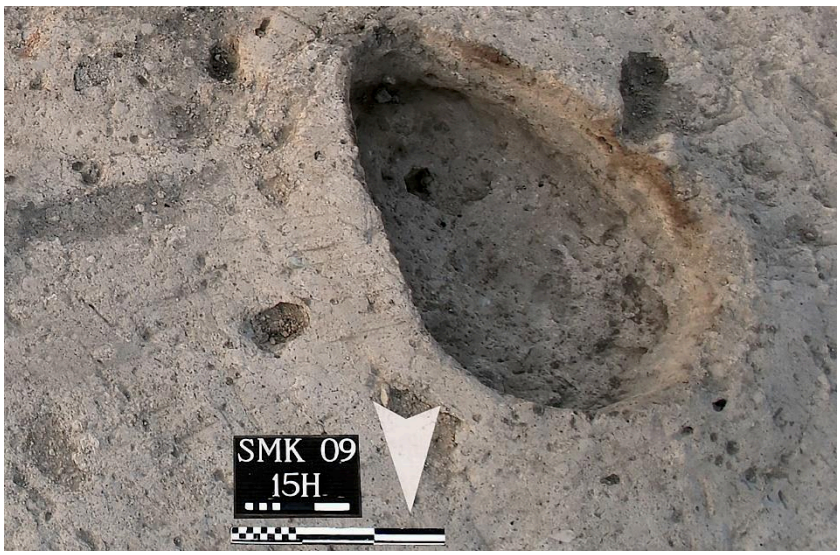


Figure 4.290: Fire Pit N3A3

Sample Name	Phase	Area	Unit Name	O	Ca	C	Si	Fe	Al	Mg	K	N	Na	Ti
IYTE_13E.18a	N2	A	N2B2	54,60	25,98	11,30	4,73	1,03	1,49	0,87				
IYTE_SMK-eO9			N2B3	35,00	31,85	21,18	3,34	1,28	0,91	0,85	0,63	3,62	0,55	0,79
IYTE_SMK-eO11			N2B4	38,15	23,92	16,79	8,36	4,23	2,66	1,18	0,90	2,81	0,46	0,54
IYTE_SMK-eO8			N2B6	36,31	28,96	18,58	5,98	2,62	1,85	1,05	1,00	3,24	0,41	
IYTE_13E.15a		B	N2B8_1	52,81	25,76	16,89	2,47	2,07						
IYTE_13E.15f1			N2B8_2	63,52	25,31		7,74		3,43					
IYTE_13E.24a			N2B10	57,47	18,28	15,71	4,93		1,61	0,66	1,34			
IYTE_13E.23b			N2B11	54,89	21,12	17,43	4,13		1,38	0,64	0,41			
IYTE_SMK-e8			N2B12	33,86	17,98	11,75	17,59	4,87	4,31	1,34	2,41	4,19	0,46	
IYTE_13E.20a	N4	A	N4B1_1	56,66	21,68	13,94	4,55	1,34	1,83					
IYTE_13E.20f3			N4B1_2	58,74	22,87	11,53	3,89	0,91	1,53	0,53				
IYTE_13E.20f2			N4B1_3	56,89	15,79	19,35	4,26	0,99	1,73	0,70	0,29			
IYTE_SMK-e3			N4B1_4	34,08	11,52	9,34	17,99	8,44	6,62	2,68	1,83	5,00	0,99	
IYTE_13E.9d			N4B2_1	53,75	32,64	13,17	0,44							
IYTE_13E.9e			N4B2_2	55,19	29,53	14,95	0,33							
IYTE_13E.21a			N4B3_1	53,85	27,80	13,23	3,60		1,04	0,48				
IYTE_13E.21f1			N4B3_2	53,36	26,72	12,25	3,50	2,98	1,20					
IYTE_SMK-e13		B	N4B8_1	34,70	21,08	8,76	17,06	8,80	5,64	1,94	2,02			
IYTE_SMK-e12			N4B8_2	33,52	10,20	7,64	25,66	10,99	7,07	1,90	2,55		0,47	
IYTE_13E.12a			N4B9	53,50	20,50	16,22	6,20	0,79	1,51	0,82	0,46			
IYTE_SMK-e11			N4B10	32,43	15,07	8,92	20,73	11,15	7,21	2,05	2,05		0,39	
IYTE_13E.13e			N4B13	52,77	28,59	12,73	3,18	1,09	1,15	0,49				
IYTE_13E.1a	N5	A	N5B1_1	54,55	13,17	16,06	8,60	2,53	3,33	1,17	0,59			
IYTE_13E.1e			N5B1_2	54,01	29,68	12,49	1,79	0,89	0,70	0,44				
IYTE_SMK-eO2d		B	N5B3_1	37,01	26,93	17,00	8,05	3,99	2,08	0,78	0,86	2,97	0,33	
IYTE_SMK-eO2a			N5B3_2	55,39	0,51	4,50	32,43	0,00	0,71	0,88	0,39	3,37	1,27	0,55
IYTE_SMK-eO2c			N5B3_3	36,32	31,90	17,82	4,27	2,48	0,99	0,56	0,82	3,41	0,53	0,90
IYTE_SMK-eO18			N5B4	40,18	25,57	13,10	12,49	1,68	1,39	0,71	0,61	3,51	0,48	0,28
IYTE_SMK-eO14			N5B6	39,32	25,90	14,90	6,53	2,61	2,88	1,49	0,86	3,80	1,11	0,60
IYTE_SMK-eO15			N5B7	38,51	29,17	15,87	5,44	2,48	2,10	1,08	0,84	3,67	0,46	0,38
IYTE_SMK-e7			N5B8	37,60	10,59	12,72	16,68	6,02	6,15	2,11	2,39	4,05	0,54	
IYTE_13E.12k			N5B9	57,70	22,68	15,58	2,51	0,57	0,63	0,33				
IYTE_13E.25a3			N5B10_1	58,28	16,41	14,47	6,14	1,64	2,13	0,93				
IYTE_13E.25d1			N5B10_2	67,01	14,15		14,46	0,85	0,44	1,34				
IYTE_13E.2a			N5B11_1	56,27	5,64	12,85	19,58	1,59	1,99	0,50	0,56			
IYTE_13E.2c3			N5B11_2	58,57	1,96	11,79	25,63	0,62	0,78	0,30	0,35			
IYTE_13E.14b			N5B12_1	57,65	19,56	14,71	6,77		0,59	0,72				
IYTE_13E.14f1			N5B12_2	62,06	4,37	5,70	27,87							
IYTE_13E.14f2			N5B12_3	55,52	27,54	12,83	4,11							
IYTE_13E.4a			N5B14_1	53,33	21,33	16,98	4,58	1,30	1,42	0,70	0,36			
IYTE_13E.4c			N5B14_2	58,14	23,33	15,71	1,60		0,68	0,54				
IYTE_SMK-eO17	N6	A	N6B1	37,27	28,61	16,53	5,49	3,36	2,46	0,85	1,00	3,23	0,38	0,82
IYTE_13E.6f			N6B2	55,63	27,70	14,74	1,23		0,48	0,22				
IYTE_SMK-e6			N6B2	30,80	12,56	9,76	20,97	6,96	7,61	2,51	2,41	4,65	0,82	
IYTE_13E.7f		B	N6B9	58,44	25,30	15,28	0,64		0,34					
IYTE_13E.10b			N6B10_1	55,05	24,50	11,29	7,03		2,13					
IYTE_13E.10e2			N6B10_2	47,06	25,46	12,87	6,57	6,90	1,14					
IYTE_13E.10e1			N6B10_3	41,42	5,29	12,38	40,91							
IYTE_SMK-eO10			N6B13	33,38	35,14	14,04	6,45	3,40	2,23	0,86	1,24	2,28	0,32	0,66

Table 4.8: Quantitative results of EDX analysis of lime samples from Sumaki Höyük architectural structures

structures

Sample Name	Phase	Area	Unit Name	O	Ca	C	Si	Fe	Al	Mg	K	N	Na	Ti
IYTE_SMK-e1	N1	A	Open Space	31,12	12,30	7,82	23,12	7,01	6,90	2,34	1,95	5,11	1,23	
IYTE_SMK-e5		B	Open Space	35,17	11,78	8,01	20,06	8,96	6,66	2,53	2,03	2,24	0,85	
IYTE_13E.19a	N2	A	Open Space	57,43	24,62	13,85	3,33		0,77					
IYTE_13E.18b		B	Open Space	55,21	25,01	11,27	4,65	1,44	1,63	0,80				
IYTE_SMK-e2	N3	A	Open Space	31,55	11,42	8,58	21,98	7,45	6,43	2,58	2,34	4,59	0,81	
IYTE_SMK-e14		B	Open Space	33,83	14,06	8,59	24,13	8,57	6,16	2,15	2,17		0,33	
IYTE_SMK-e9	N4	A	Open Space	30,49	15,92	7,57	23,76	12,11	5,26	2,05	2,42		0,41	
IYTE_SMK-e10		B	Open Space	35,58	27,68	12,11	17,58		3,44	1,46	1,94		0,22	
IYTE_SMK-eO12	N5	A	Open Space	33,87	26,68	18,15	8,62	4,03	2,76	1,09	0,87	3,10	0,44	0,39
IYTE_SMK-eO20		B	Open Space	40,16	23,50	13,99	8,56	2,95	3,67	1,50	0,96	3,47	0,82	0,42
IYTE_13E.19e1	N6	A	Open Space	56,70	14,30	16,87	6,60	1,65	2,78	0,70	0,40			
IYTE_13E.19e2		B	Open Space	59,10	21,60	12,97	3,10	1,01	1,83	0,39				
IYTE_13E.21f2	N7	B	Open Space	59,20	25,70	9,73	3,75		1,62					

Table 4.9: Quantitative results of EDX analysis of soil samples from Sumaki Höyük

Sample Name	Phase	Area	Unit Name	O	Ca	C	Si	Fe	Al	Mg	K	N	Na	Ti
IYTE_SMK-e13	N1	A	Torrent ??	39,10	30,64	18,66	2,35	1,15	1,05	1,17	0,64	4,01	0,53	0,71
IYTE_SMK-e11	N2-N1		Torrent 1	32,43	15,07	8,92	20,73	11,15	7,21	2,05	2,05		0,38	
IYTE_SMK-e12	N2-N1			33,52	10,20	7,64	25,66	10,99	7,07	1,90	2,55		0,47	
IYTE_13E.8a1	N2-N1	B	Torrent 1	52,36	23,26	16,67	4,53	0,98	1,33	0,43	0,45			
IYTE_13E.8a2	N2-N1			55,03	22,81	12,65	5,54	1,61	1,69	0,68				
IYTE_13E.2c1	N5-N4		Torrent 2	60,02	1,75	8,66	23,94	0,67	4,61		0,35			
IYTE_13E.2c2	N5-N4			58,28	4,53	11,80	18,30	2,09	3,14	1,20	0,66			

Table 4.10: Quantitative results of EDX analysis of torrent sediment samples from Sumaki Höyük

Sample Name	Phase	Area	Unit Name	Si	Ca	Fe	Al	Mg	Pd	Cu	P	S	Cl	K	Ti	Na	Cr	Mn	Ni	Zn	Br	Sr	Zr	Cd	Au	Ag	Mo	Ba	La	Ir	Pt	Tl	Bi	Ga	Se	Rb	Co	U	Sum (%)
IYTE-SMK-fO9	N2	A	N2B3	3151,95	4487,41	521,34	326,25	50,89	675,98	288,39	86,35	34,39	53,91	43,33	52,56	8,12	12,07	4,54	25,86	20,97	6,68	55,46	30,72	19,05	7,06	0,39	0,33	4,70	1,23	20,20	2,79	1,03	1,00				0,42		63,39
IYTE-SMK-fO11		A	N2B4	2058,18	5165,34	384,15	221,47	36,59	759,13	284,38	170,91	34,30	55,68	17,03	37,15	5,68	12,81	4,37	23,70	25,59	9,59	46,45	21,91	24,30	7,16	0,64	0,29	4,29	1,29	22,16	2,84	1,42	0,09	0,89			0,10		65,82
IYTE-SMK-fO3		A	N2B5	2854,74	5000,66	539,46	307,19	47,58	661,21	287,71	146,69	33,44	52,63	33,91	60,11	7,78	8,77	42,10	28,01	27,16	6,99	78,16	50,37	39,53	7,94	0,29	0,25	3,37	1,69	13,16	2,18	1,10	0,49			19,92		13,35	64,43
IYTE-SMK-fO8		A	N2B6	2543,58	4811,41	453,82	270,10	45,29	665,17	282,66	95,66	33,27	53,13	25,49	41,61	6,88	11,58	3,01	25,78	23,84	7,04	50,55	25,21	22,78	8,68	0,42	0,66	4,89	1,30	13,51	2,12	1,22	0,82	0,03				0,68	64,67
IYTE-13F-3		B	N2B8	6156,04	6614,47	718,15	658,12	105,80	202,68	419,21	520,69	236,26	32,64	77,26	112,99	12,57	0,00	13,01	31,92	55,15	4,70	138,00	60,94	194,26	1,45	0,45									15,20				67,26
IYTE-13F-5		B	N2B11	4107,89	6155,95	494,64	424,16	58,11	225,65	432,75	193,70	31,39	30,45	31,25	78,94	9,54	0,00	10,75	22,55	56,61	10,30	88,15	45,06	207,08	2,00	0,21									16,40				65,22
IYTE-13F-4	N4	A	N4B3	2197,02	9464,30	241,29	242,02	49,82	200,44	399,73	185,72	23,46	25,16	0,00	35,43	10,83	0,00	6,56	18,07	41,29	2,33	59,62	23,49	190,70	1,71	0,05									14,39				58,33
IYTE-SMK-fO5		B	N4B8	2311,31	4607,41	417,27	251,93	37,16	686,28	284,06	134,06	32,51	53,04	22,85	43,79	6,39	12,04	5,16	25,63	20,44	7,17	46,75	26,11	24,77	7,45	0,89	1,04	4,32	1,22	19,53	4,53	2,17	1,86	0,31					64,88
IYTE-13F-1	N5	A	N5B1	8933,72	4977,08	979,61	898,75	138,23	186,15	495,13	104,07	48,79	30,92	108,29	142,14	9,56	5,29	12,12	33,70	58,03	6,82	332,49	76,20	197,19	1,79	0,59									12,75				72,73
IYTE-SMK-fO2		B	N5B3	2719,79	4400,96	531,16	292,59	49,51	661,89	294,19	141,63	35,11	53,88	33,52	51,71	7,25	10,70	4,60	27,42	30,09	5,60	77,22	37,49	28,49	7,98	0,54	0,30	3,90	1,24	33,85	4,66	1,26	0,97			15,87		12,41	63,90
IYTE-SMK-fO18		B	N5B4	3594,51	6357,77	548,30	375,54	61,70	757,27	281,67	134,24	32,59	53,28	41,96	55,76	7,31	18,45	0,74	29,01	20,46	6,57	72,60	35,71	15,68	6,09	0,43	0,91	4,47	1,91	20,64	2,08	0,96					0,02		64,55
IYTE-SMK-fO14		B	N5B6	4045,85	5529,87	692,56	416,24	64,97	741,92	279,70	156,41	32,59	51,35	49,56	88,23	7,48	8,03	9,41	26,76	26,27	5,79	100,20	43,74	23,26	5,79	0,14	1,03	5,62	1,05	20,70	4,71	1,24	0,67	0,47					63,28
IYTE-SMK-fO15		B	N5B7	3211,84	6249,50	479,10	321,70	53,89	771,87	289,24	167,64	31,27	53,21	36,91	50,39	7,54	10,88	2,28	27,77	24,11	7,69	90,49	30,58	20,06	6,48	0,55	1,14	5,03	1,17	21,30	2,82	2,06	1,43						64,97
IYTE-SMK-fO7		B	N5B8	2543,49	5131,93	439,29	270,97	44,24	690,08	280,93	112,14	32,65	54,68	26,05	46,20	7,23	11,17	0,39	25,24	20,41	7,38	68,14	32,06	15,89	7,64	0,15	0,89	4,53	0,98	20,97	2,94	2,83	1,37						64,97
IYTE-13F-2		B	N5B11	13186,83	2526,08	1412,73	1143,89	122,23	221,75	610,05	66,57	43,95	34,45	163,95	243,96	10,66	0,20	22,16	53,83	75,90	6,78	146,22	119,32	202,84	2,12	0,08								19,63	6,78		1,93		81,82
IYTE-SMK-fO17	N6	A	N6B1	2224,92	7372,59	344,85	238,76	40,24	814,29	274,73	117,48	34,10	53,02	19,64	35,19	6,11	9,09	5,73	28,60	20,26	5,12	42,06	22,90	25,36	6,20	0,40	0,35	0,94	0,94	19,39	2,90		0,94				1,79		67,09
IYTE-SMK-fO10		A	N6B2	2843,95	4720,20	473,91	295,00	45,04	747,57	271,03	145,99	47,96	63,12	41,26	50,59	7,75	8,86	3,63	24,95	23,91	6,40	66,51	26,99	18,77	7,82	0,45	0,42	4,39	1,34	35,45	1,45	1,04	1,32						64,10
IYTE-SMK-fO4		A	N6B7	2207,43	4836,01	402,28	236,00	38,93	719,23	285,35	99,70	31,21	53,65	24,46	38,90	7,06	12,01	3,03	25,66	23,18	7,88	65,27	22,51	16,07	7,84	0,92	0,87	4,05	1,19	13,26	3,34	2,21	0,89					0,67	65,31

Table 4.11: Quantitative results of XRF analysis of lime samples from Sumaki Höyük architectural structures

Sample Name	Phase	Area	Unit Name	Si	Ca	Fe	Al	Mg	Pd	Cu	P	S	Cl	K	Ti	Na	Cr	Mn	Ni	Zn	Br	Sr	Zr	Cd	Au	Ag	Mo	Ba	La	Ir	Pt	Tl	Bi	Ga	Se	Rb	Co	U	Sum (%)
IYTE-SMK-f8	N2	B	N2B12	8014,19	1871,72	1308,89	716,00	93,34	600,05	290,88	142,68	30,53	51,16	94,97	148,36	8,31	12,89	6,53	32,33	33,84	2,19	116,56	90,97	32,88	6,77	0,42	0,73	9,28	1,31	15,57	2,33	1,22		1,01		29,18		8,17	55,20
IYTE-SMK-f3	N4	A	N4B1	7028,50	1398,80	1424,06	727,65	89,15	599,62	292,73	149,75	30,55	50,81	74,20	163,91	8,62	12,10	8,49	32,78	30,64	8,08	78,15	92,50	32,34	7,51	0,89	0,76	7,68	1,19	17,15	2,47	1,56	0,78			30,18		11,69	55,32
IYTE-SMK-fO12		A	N4B2	3635,91	4584,66	553,83	346,44	51,39	704,57	277,20	173,76	33,19	53,87	33,60	62,69	8,35	10,57	6,47	25,53	18,91	8,12	55,06	35,84	21,19	8,39	0,86	0,85	4,64	1,11	19,94	2,57	1,23	0,66						62,73
IYTE-SMK-f12		B	N4B8	13389,93	2222,66	2317,79	1423,34	177,67	708,69	297,28	137,30	53,43	55,74	175,35	264,63	13,08	14,00	23,38	44,56	34,07	3,72	102,63	143,57	23,01	0,84	0,72	0,45	15,18	1,85	12,50	1,37	0,04	0,31			36,53		0,04	54,74
IYTE-SMK-f11		B	N4B10	12628,59	2517,92	2172,99	1355,03	170,99	748,57	295,78	132,30	57,15	55,79	185,92	247,20	13,04	12,74	21,10	43,56	31,27	5,34	102,83	140,21	24,16	1,97	0,34	0,40	12,66	3,24	11,91	1,97	0,89				35,51	0,54		55,31
IYTE-SMK-f7	N5	B	N5B3	7895,97	1651,41	1568,70	828,19	103,13	581,50	289,92	93,41	30,41	52,40	97,50	176,79	9,16	13,21	10,15	33,40	28,13	8,04	88,83	104,61	14,79	6,76	0,38	1,15	12,05	0,95	16,25	1,48	0,48	0,36			29,78	0,62	7,49	55,12
IYTE-SMK-f6	N6	A	N6B2	6563,04	1406,65	1360,06	693,53	85,87	640,09	290,42	75,56	29,34	50,34	70,17	155,34	8,50	10,87	8,95	32,61	28,61	6,91	74,75	102,42	35,28	7,84	0,55	1,16	8,91	1,60	17,28	3,74	2,46	1,10			26,80	0,67	9,38	55,66
IYTE-SMK-fO6		B	N6B9	3744,46	3742,59	674,14	386,96	58,26	613,47	293,81	120,65	32,06	52,88	47,99	73,98	7,46	9,73	26,67	28,37	27,72	5,26	87,97	50,38	31,18	8,24	0,41	0,75	5,98	1,25	33,09	2,34	0,98	1,69			21,54		11,62	61,57

Table 4.12: Quantitative results of XRF analysis of earth samples from Sumaki Höyük architectural structures

Sample No	Phases	Area	Unit Name	Material	Calcite	SiO2, Quartz	Nitratine	Iron oxide	Sphalerite	Graphite	Covellite	Periclase	Albite	Villiaumite	Dolomite	Magnesite	Methoxyphenyl	Dimagnesium
IYTE-13D_14	N2	A	N2B2	Lime fragment														
IYTE-13D_12		B	N2B8	Lime fragment														
IYTE-13D_20			N2B10	Lime fragment														
IYTE_SMK_r08			N2B12	Lime fragment														
IYTE-13D_16	N4	A	N4B1	Lime fragment														
IYTE-13D_17			N4B3	Lime fragment														
IYTE-SMK_rO5		B	N4B8	Lime fragment														
IYTE-13D_18			N4B9	Lime fragment														
IYTE-13D_1	N5	A	N5B1	Lime fragment														
IYTE-SMK_rO18		B	N5B4	Lime fragment														
IYTE-SMK_rO14			N5B6	Lime fragment														
IYTE-SMK_rO15			N5B7	Lime fragment														
IYTE-SMK_r07.1			N5B8	Lime fragment														
IYTE-13D_7			N5B9	Lime fragment														
IYTE-13D_2			N5B11	Lime fragment														
IYTE-13D_11			N5B12	Lime fragment														
IYTE-13D_4			N5B14	Lime fragment														
IYTE-SMK_rO17	N6	A	N6B1	Lime fragment														
IYTE-13D_8			N6B2	Lime fragment														
IYTE-13D_9		B	N6B10	Lime fragment														

Table 4.13: Quantitative results of XRD analysis of lime samples from Sumaki Höyük architectural structures

Sample No	Phases	Area	Unit Name	Material	Calcite	SiO2, Quartz	Nitratine	Iron oxide	Cliftonite	Plumbago	Brucite	Kyanite	Almandine	Albite	Anorthite	Sakhaite	Berzelianite	Monticellite	Moissanite	Berlinite
IYTE-SMK_rO20	N2	A	N2B2	Homogeneous Soil																
IYTE-SMK_r02	N3	A	Open Sapce	Homogeneous Sediment																
IYTE-SMK_r14			Open Sapce	Homogeneous Sediment																
IYTE-SMK_r03	N4	A	N4B1	Homogeneous Soil																
IYTE-13D_13			N4B2	Homogeneous Soil																
IYTE-SMK_r12		B	N4B8	Homogeneous Soil																
IYTE-SMK_r11			N4B10	Homogeneous Soil																
IYTE-SMK_r06	N6	A	N6B2	Homogeneous Soil																

Table 4.14: Quantitative results of XRD analysis of earth samples from Sumaki Höyük architectural structures

Sample No	Phases	Area	Unit Name	Material	Calcite	SiO2, Quartz	Nitratine	Sphalerite	Cliftonite	Plumbago	Brucite	Periclase	Kyanite	Almandine	Altaite	Chalcopyrite	Magnesium
IYTE-SMK_r1	N1	A	Torrent (?)	Heterogeneous Sediment													
IYTE-SMK_r5	N1-N2	A	Torrent 1	Heterogeneous Sediment													
IYTE-SMK_r13		B	Torrent 1	Heterogeneous Sediment													
IYTE-13D_22	N4-N5	B	Torrent 2	Heterogeneous Sediment													

Table 4.15: Quantitative results of EDX analysis of torrent sediment samples from Sumaki Höyük

Sample No	Location	Thrench	Unit Name	Material	Calcite	SiO2, Quartz	Iron oxide	Sphalerite	Periclase	Manganocalcite
IYTE-SMK_rO4	Area A	20/O	Caliche layer	Virgin Soil						

Table 4.16: Quantitative results of XRD analysis of caliche samples under the Sumaki Höyük

Sample name	Phase	Area	δ13C VPDB ± 0.08	δ18O VPDB ± 0.10	C measurement (standard deviation)	O measurement (standard deviation)	Voltage
SIGL_13Z.7	N1	A	-6,19	-6,12	0,016	0,037	2,53
SIGL_13Z.13		B	-9,60	-6,19	0,038	0,036	1,75
SIGL_13Z.15		A	-5,08	-7,15	0,044	0,010	1,79
SIGL_13Z.21		B	-7,72	-5,91	0,012	0,033	1,89
SIGL_13Z.24	N2	B	-10,64	-5,71	0,005	0,030	1,70
SIGL_13Z.5		B	-7,77	-5,94	0,022	0,092	1,67
SIGL_13Z.6		B	-8,53	-6,01	0,051	0,025	2,04
SIGL_13Z.25		B	-8,37	-6,63	0,069	0,056	1,47
SIGL_13Z.9		A	-7,71	-5,86	0,007	0,038	2,26
SIGL_13Z.3		B	-9,07	-6,16	0,022	0,033	1,89
SIGL_13Z.16	N3	A	-6,35	-6,31	0,022	0,041	1,74
SIGL_13Z.20		B	-8,23	-6,02	0,051	0,067	1,51
SIGL_14Z.1		A	-7,83	-6,75	0,023	0,030	2,18
SIGL_13Z.17		A	-6,06	-6,53	0,024	0,051	2,98
SIGL_13Z.12		B	-9,11	-6,08	0,017	0,043	2,37
SIGL_13Z.8	N4	B	-7,24	-5,93	0,015	0,027	2,59
SIGL_13Z.10		B	-7,61	-5,84	0,051	0,097	1,79
SIGL_13Z.22		B	-7,40	-6,42	0,012	0,041	2,47
SIGL_13Z.14		A	-8,08	-5,92	0,015	0,018	1,72
SIGL_13Z.19		B	-7,60	-6,24	0,017	0,035	2,52
SIGL_13Z.2		A	-7,19	-5,75	0,010	0,005	2,83
SIGL_13Z.23	N5	A	-10,57	-5,64	0,015	0,058	2,12
SIGL_14Z.3		B	-8,43	-6,00	0,012	0,023	1,71
SIGL_13Z.18		B	-5,45	-6,30	0,027	0,076	2,07
SIGL_13Z.1		A	-7,54	-6,72	0,004	0,011	2,18
SIGL_13Z.4		B	-8,49	-5,81	0,035	0,044	2,66
SIGL_14Z.2	N6	B	-7,75	-6,34	0,004	0,093	2,25
SIGL_13Z.11		B	-7,66	-5,83	0,011	0,045	1,80
SIGL_14Z.4		A	-8,05	-6,04	0,008	0,010	1,95
SIGL_14Z.5		B	-8,15	-6,10	0,049	0,008	1,61

Table 4.17: Quantitative results of Isotope analysis of lime samples from Sumaki Höyük

Sample name	Phase	Area	Unite name	Panicoid	Chloridoid	Festucoid	Elongate	Trichome	Bulliform	Woddy Element	Total
PRI_14FT.02	N2	A	**N2B5**	27	48	23	89	55	33	25	300
PRI_14FT.21			**N2B6**	69	58	46	42	27	39	19	300
PRI_14FT.19		B	**N2B11**	53	32	19	31	74	77	14	300
PRI_14FT.09	N4	A	**N4B3**	32	18	34	77	67	48	24	300
PRI_14FT.17			**N4B4**	47	19	28	76	48	66	16	300
PRI_14FT.06			**N4B5**	43	31	38	69	54	33	32	300
PRI_14FT.12		B	**N4B8**	41	18	12	53	48	54	74	300
PRI_14FT.15			**N4B9**	68	39	24	36	54	41	38	300
PRI_14FT.07	N5	A	**N5B1**	12	43	49	31	81	59	25	300
PRI_14FT.14		B	**N5B3**	87	41	18	48	45	37	24	300
PRI_14FT.04			**N5B12**	15	12	18	58	73	98	26	300
PRI_14FT.11			**N5B13**	18	34	73	39	64	32	40	300
PRI_14FT.20	N6	A	**N6B2**	44	15	21	66	56	59	39	300
PRI_14FT.18			**N6B4**	38	22	31	79	46	74	10	300
PRI_14FT.08			**N6B5**	17	34	72	81	23	39	34	300
PRI_14FT.13			**N6B6**	37	16	23	49	51	53	71	300
PRI_14FT.22		B	**N6B9**	52	34	64	81	23	30	16	300
PRI_14FT.16			**N6B10**	54	33	28	59	57	25	44	300
PRI_14FT.10			**N6B13**	11	31	46	23	73	84	32	300
PRI_14FT.01			**N6B15**	22	50	41	52	81	28	26	300
PRI_14FT.03	N7	B	**131**	12	33	18	52	73	68	44	300
PRI_14FT.05			**262**	58	23	33	53	57	55	21	300

Table 4.18: Quantitative results of Phytolite analysis of lime samples from Sumaki Höyük

Sample name	Phase	Area	Unite name	Poaceae	Malvaceae	Asparagaceae	Calenduleae	Luliaceae	Verbenaceae	Apocynaceae	Cesalpiniaceae	Total
PRI_14P.1	N2	A	78	16	9	4	8	3	6	4	8	58
PRI_14P.7	N4	B	N4B8	12	0	7	3	7	6	5	8	48
PRI_14P.5	N5	B	N5B12	18	8	5	3	0	6	1	4	45
PRI_14P.10			N5B13	22	14	2	4	1	10	6	8	67
PRI_14P.9	N6	A	92	13	10	0	8	0	7	6	3	47
PRI_14P.6		B	N6B9	14	4	8	6	3	4	3	5	47
PRI_14P.8			N6B10	15	6	8	12	8	9	3	7	68
PRI_14P.2	N7	B	131	19	5	8	6	3	0	5	5	51
PRI_14P.3			262	14	5	9	7	1	8	6	6	56
PRI_14P.4			14G	21	6	9	3	4	1	7	2	53

Table 4.19: Quantitative results of Pollen analysis of lime samples from Sumaki Höyük

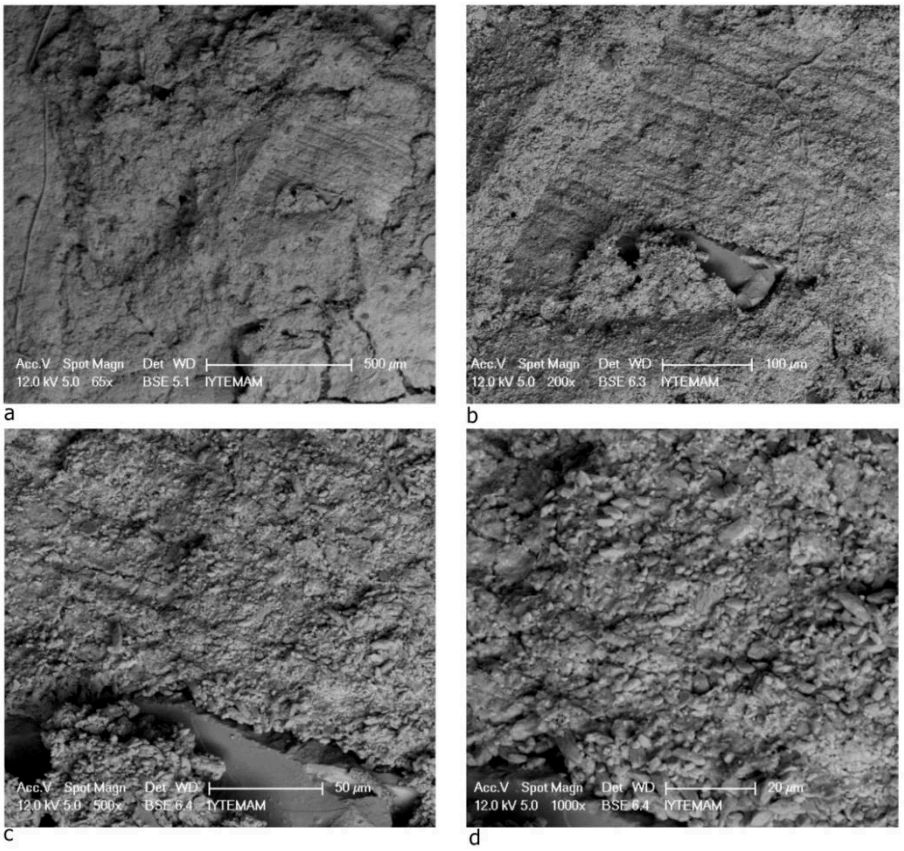


Figure 4.291: SEM images of lime samples taken from Structure N6B1

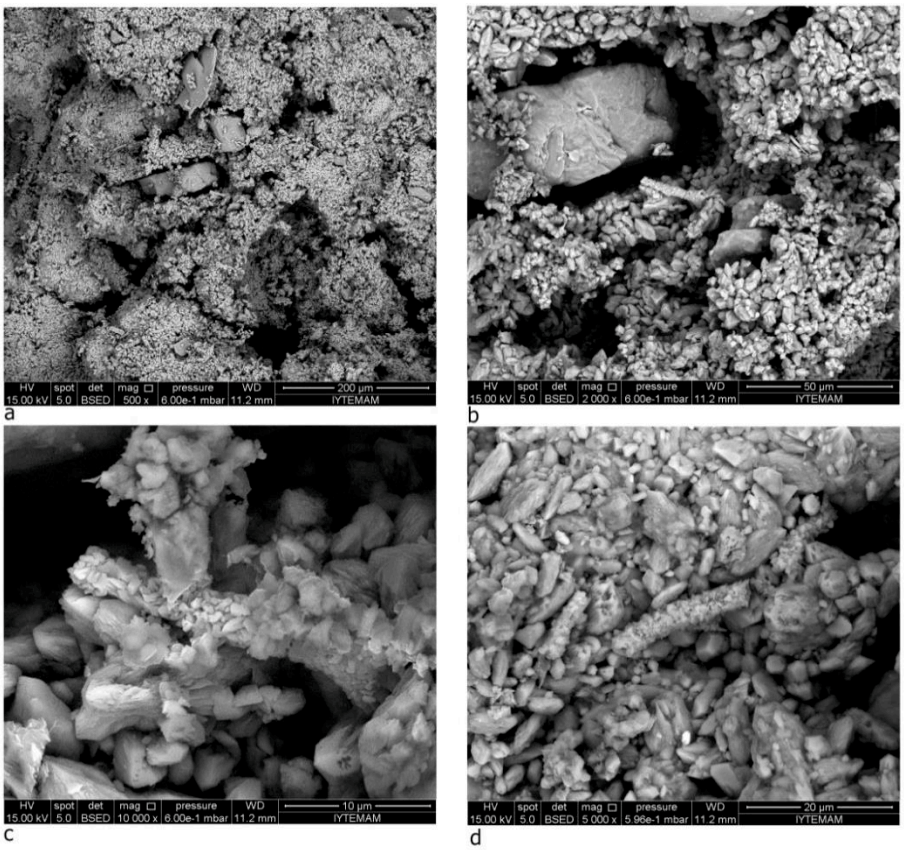


Figure 4.292: SEM images of lime samples taken from Structure N6B2

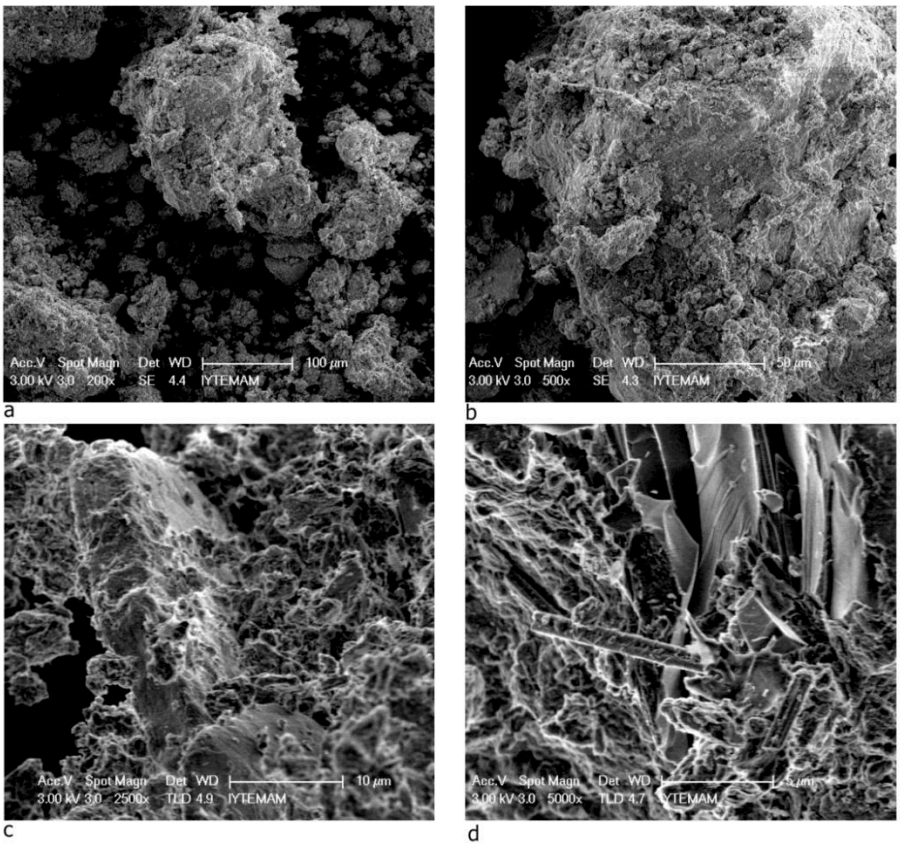


Figure 4.293: SEM images of soil samples taken from Structure N6B2

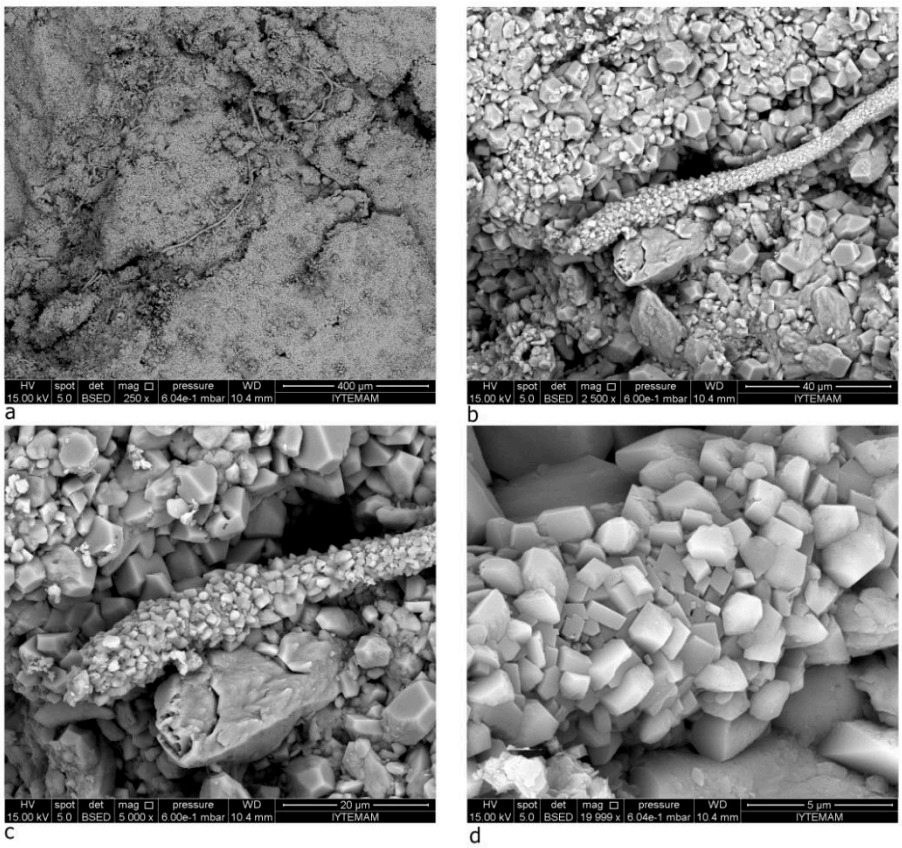


Figure 4.294: SEM images of lime samples taken from Structure N6B9

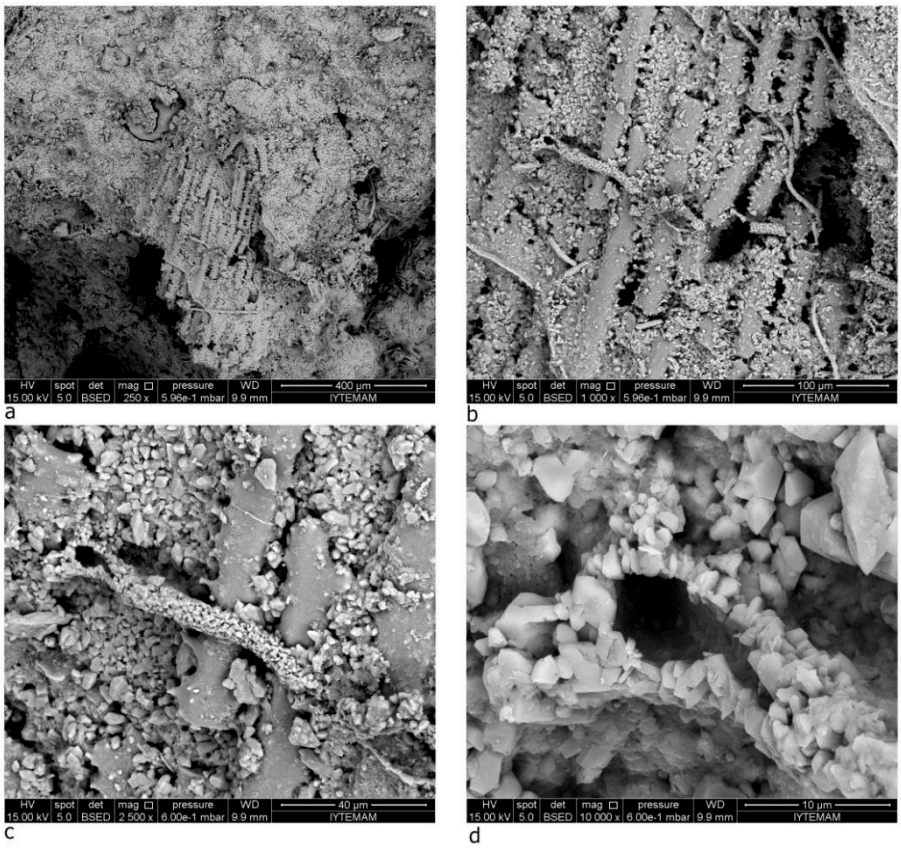


Figure 4.295: SEM images of lime samples taken from Structure N6B10

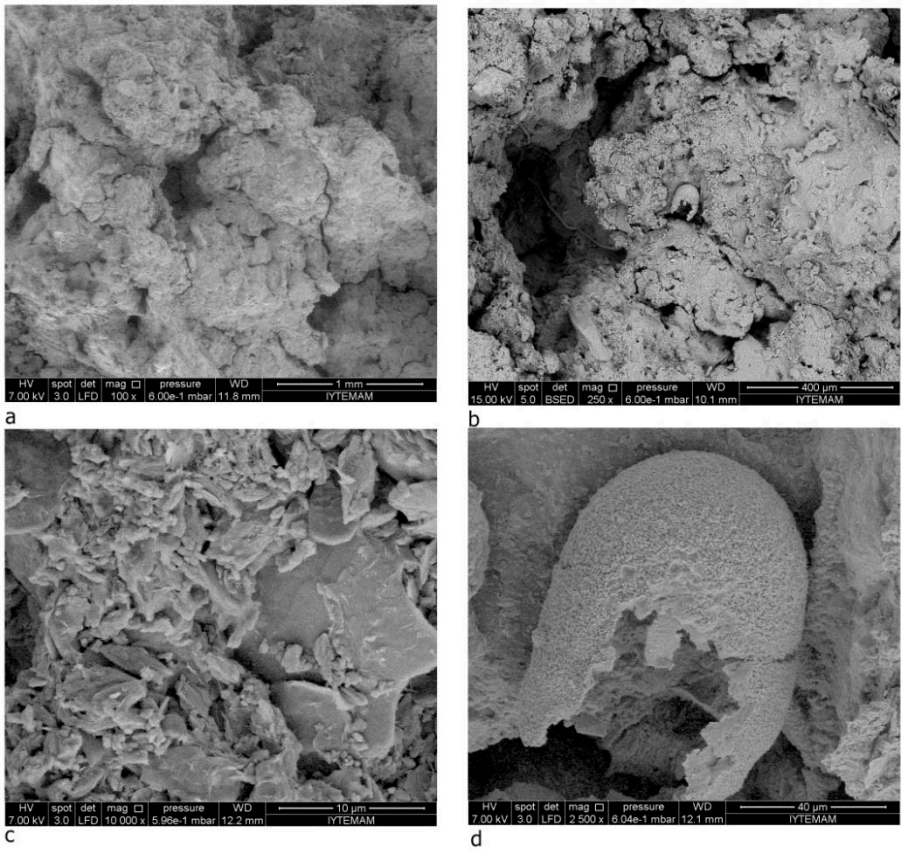


Figure 4.296: SEM images of lime samples taken from Structure N5B1

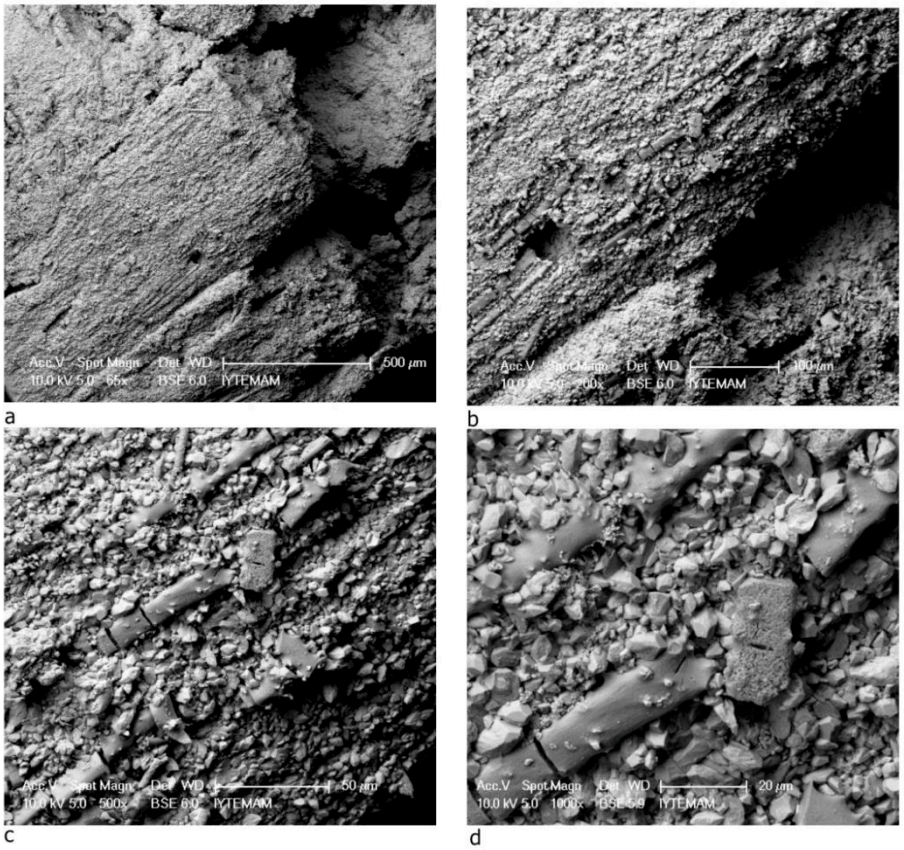


Figure 4.297: SEM images of lime samples taken from Structure N5B3

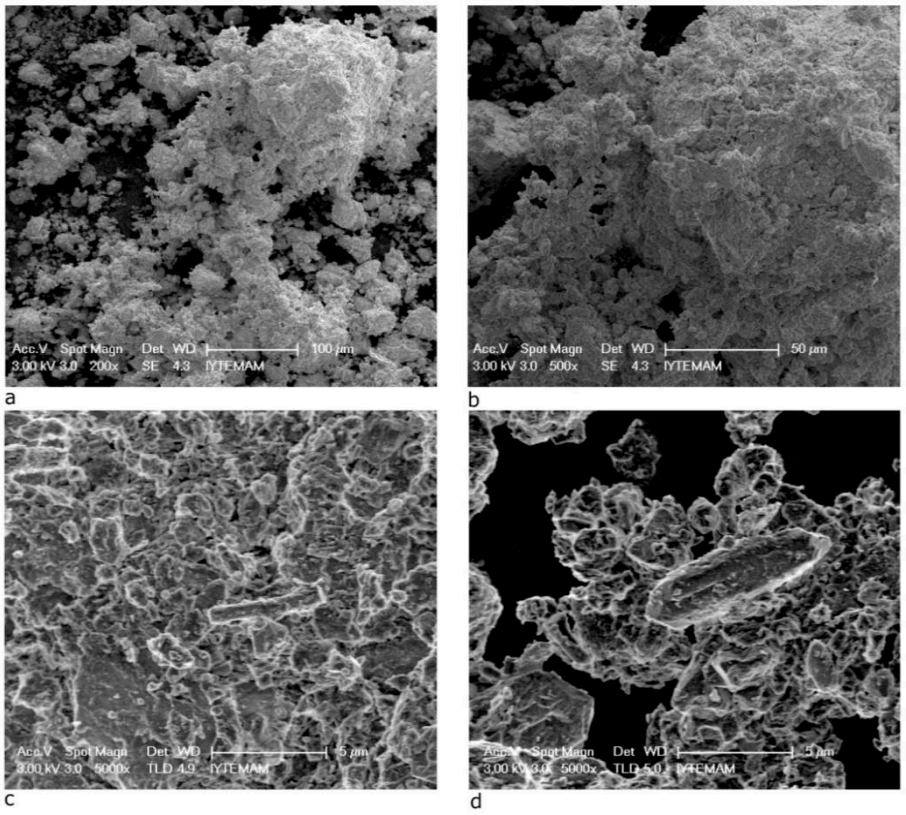


Figure 4.298: SEM images of soil samples taken from Structure N5B3

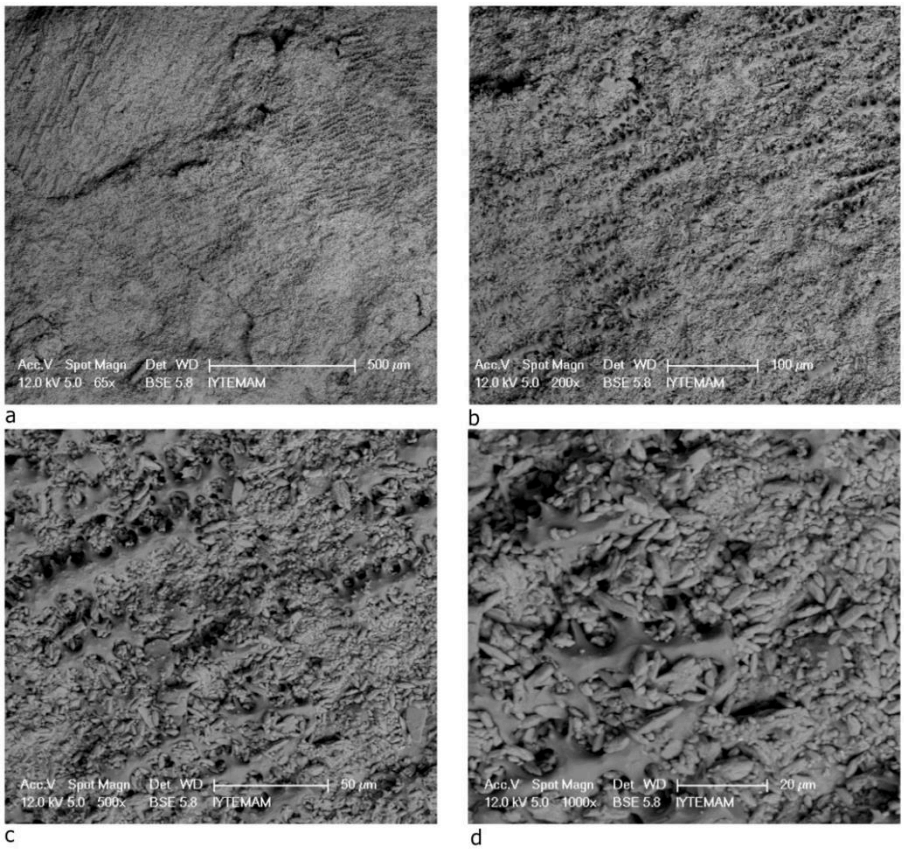


Figure 4.299: SEM images of lime samples taken from Structure N5B4

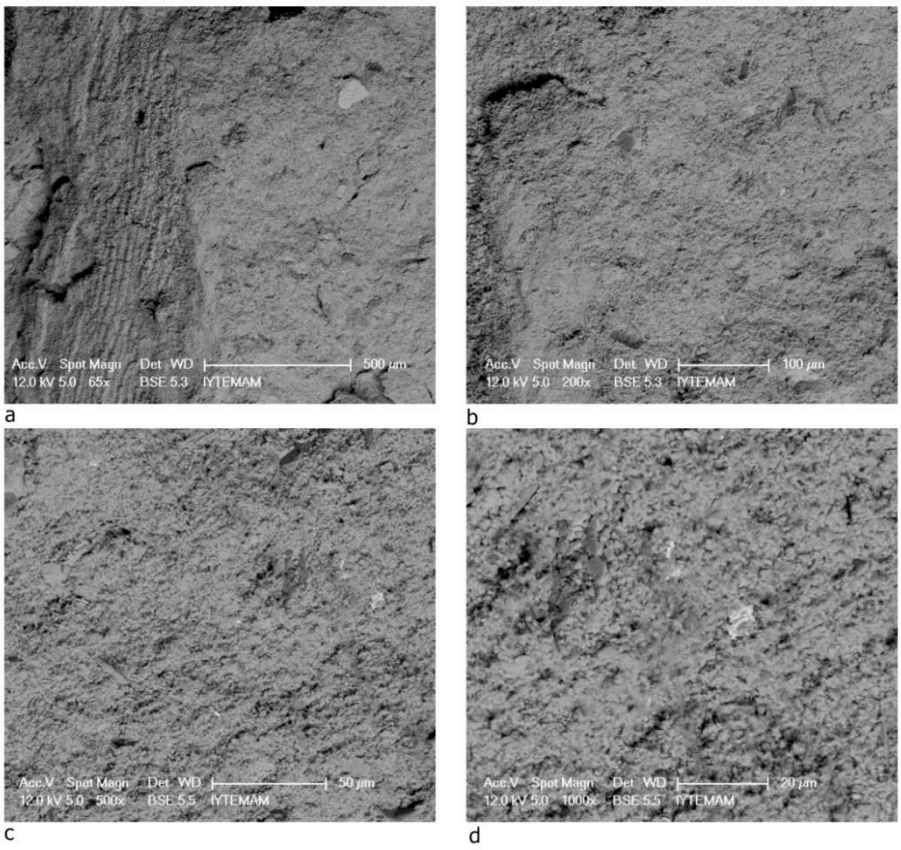


Figure 4.300: SEM images of lime samples taken from Structure N5B6

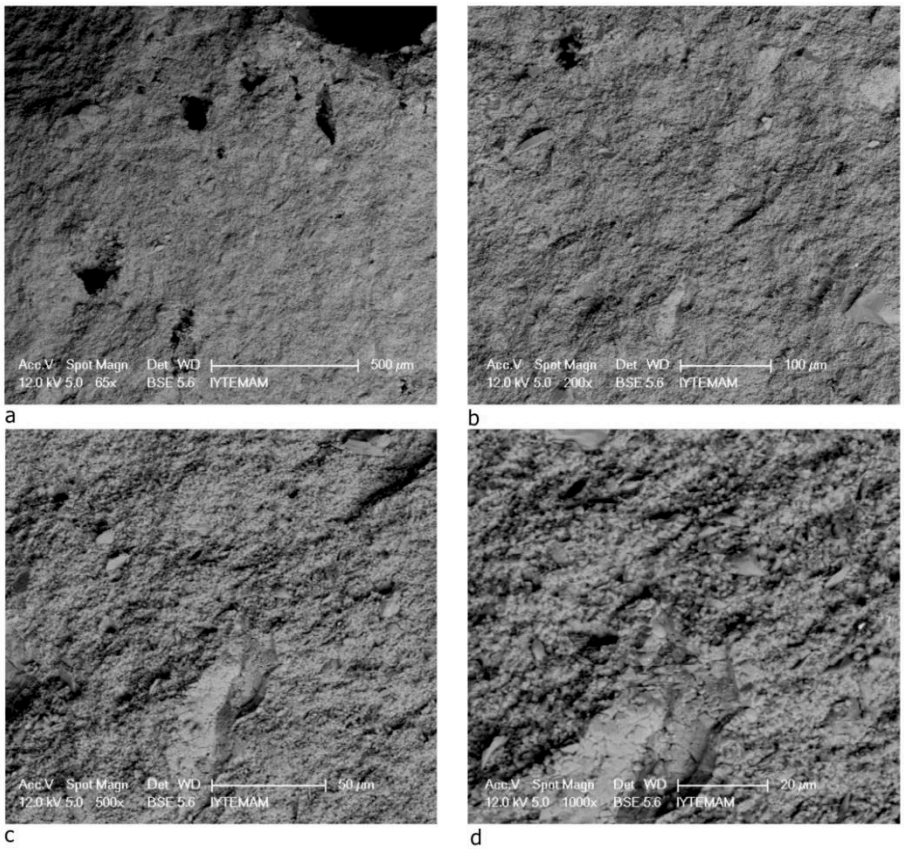


Figure 4.301: SEM images of lime samples taken from Structure N5B7

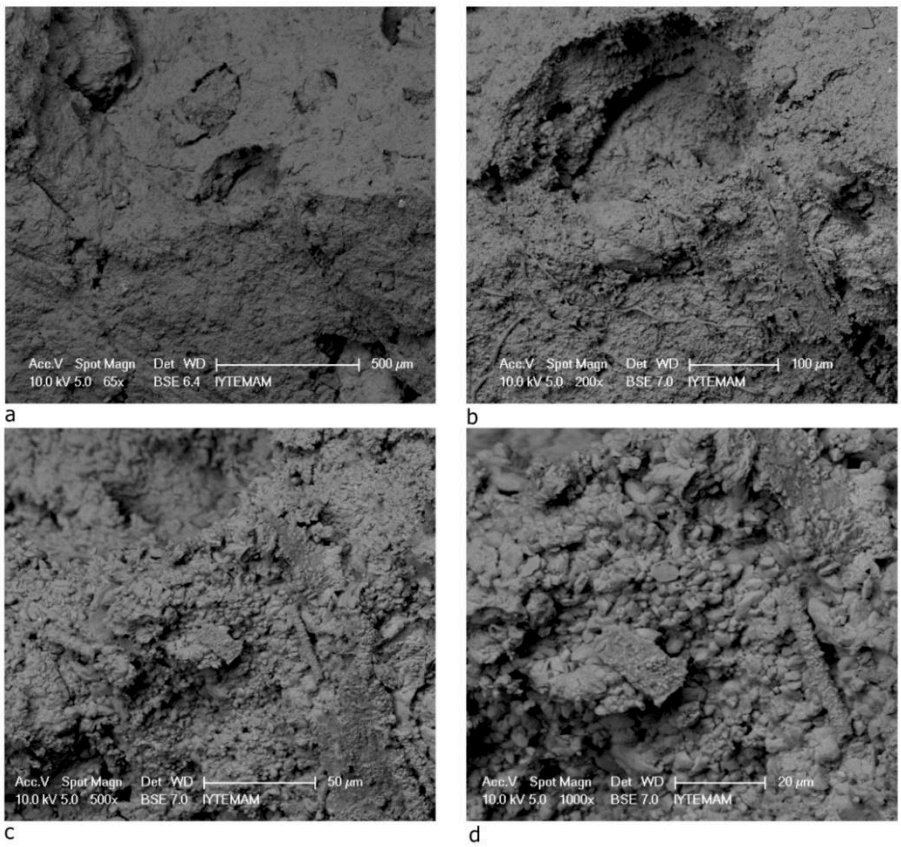


Figure 4.302: SEM images of lime samples taken from Structure N5B8

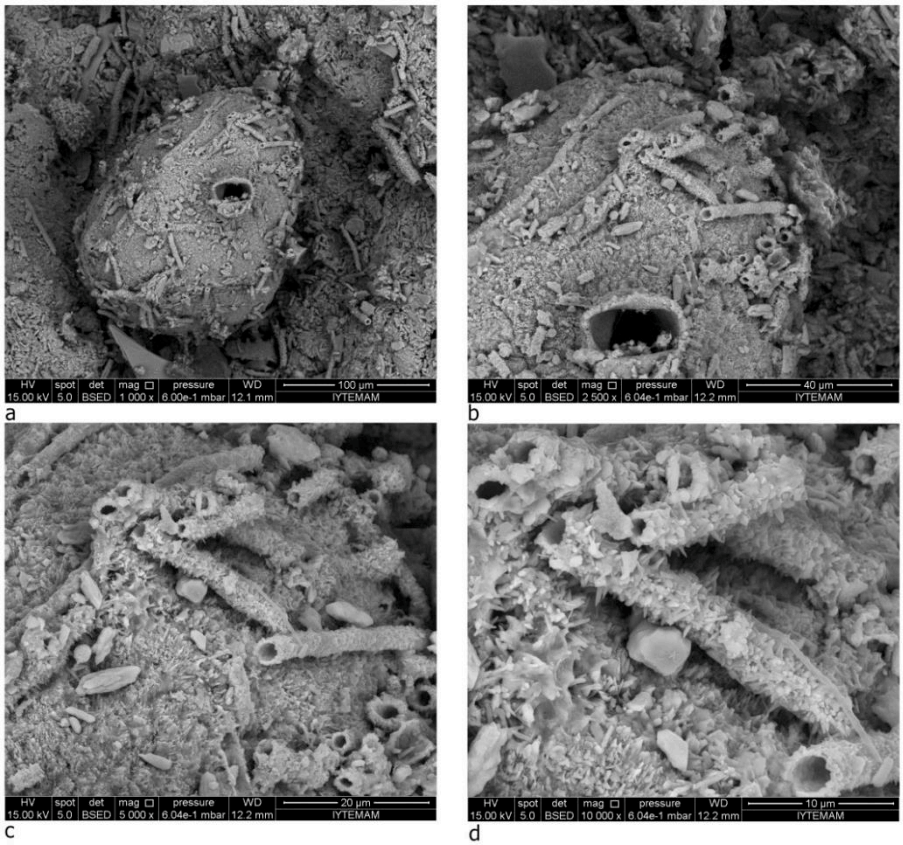


Figure 4.303: SEM images of lime samples taken from Structure N5B9

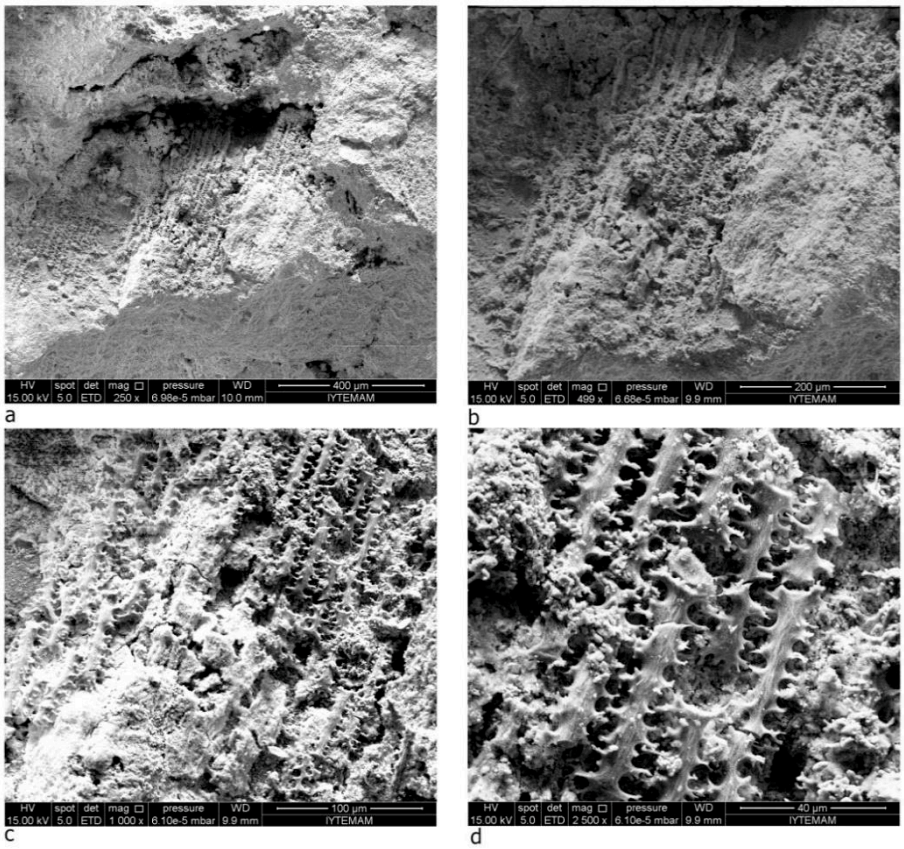


Figure 4.304: SEM images of lime samples taken from Structure N5B10

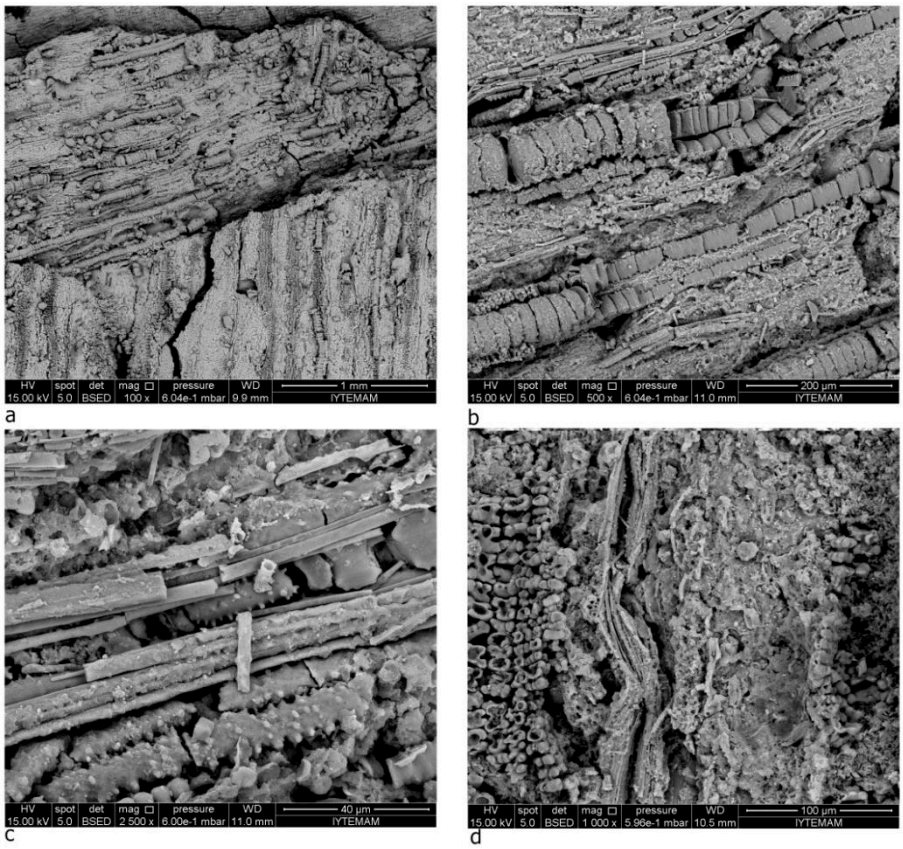


Figure 4.305: SEM images of lime samples taken from Structure N5B11

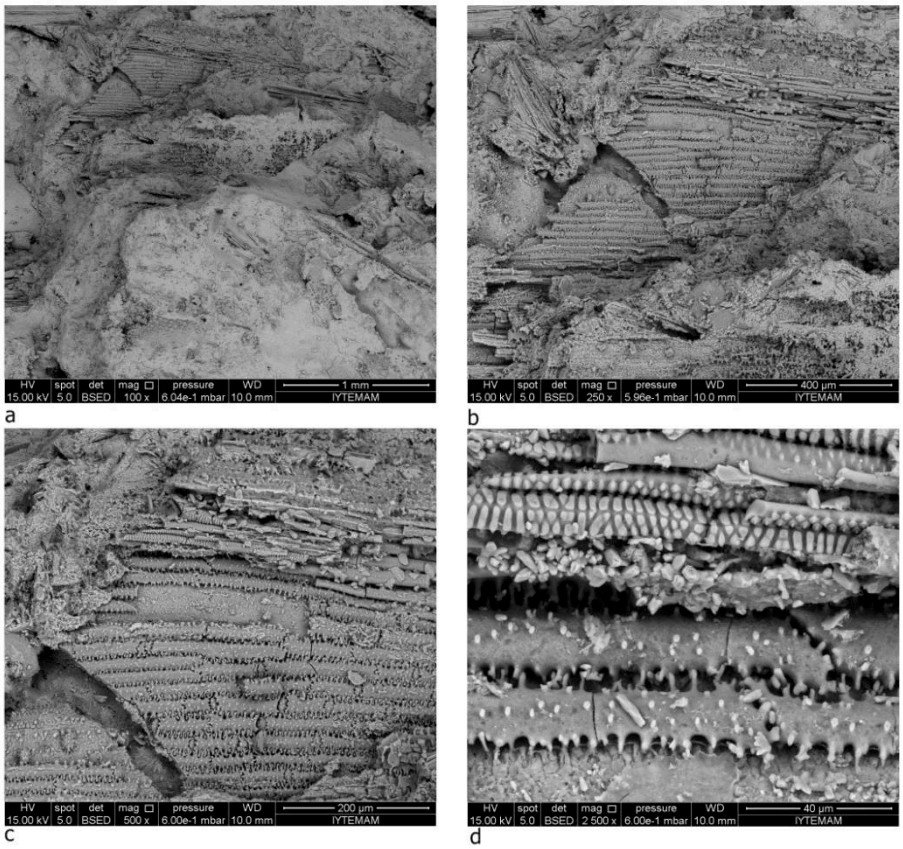


Figure 4.306: SEM images of lime samples taken from Structure N5B12

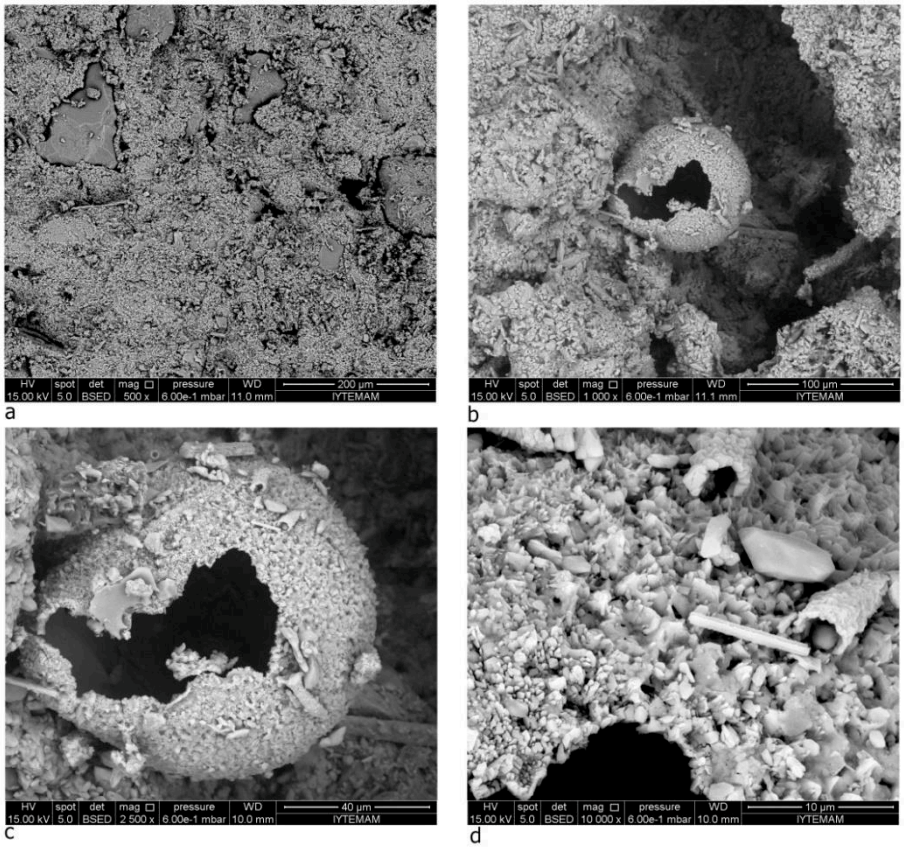


Figure 4.307: SEM images of lime samples taken from Structure N5B14

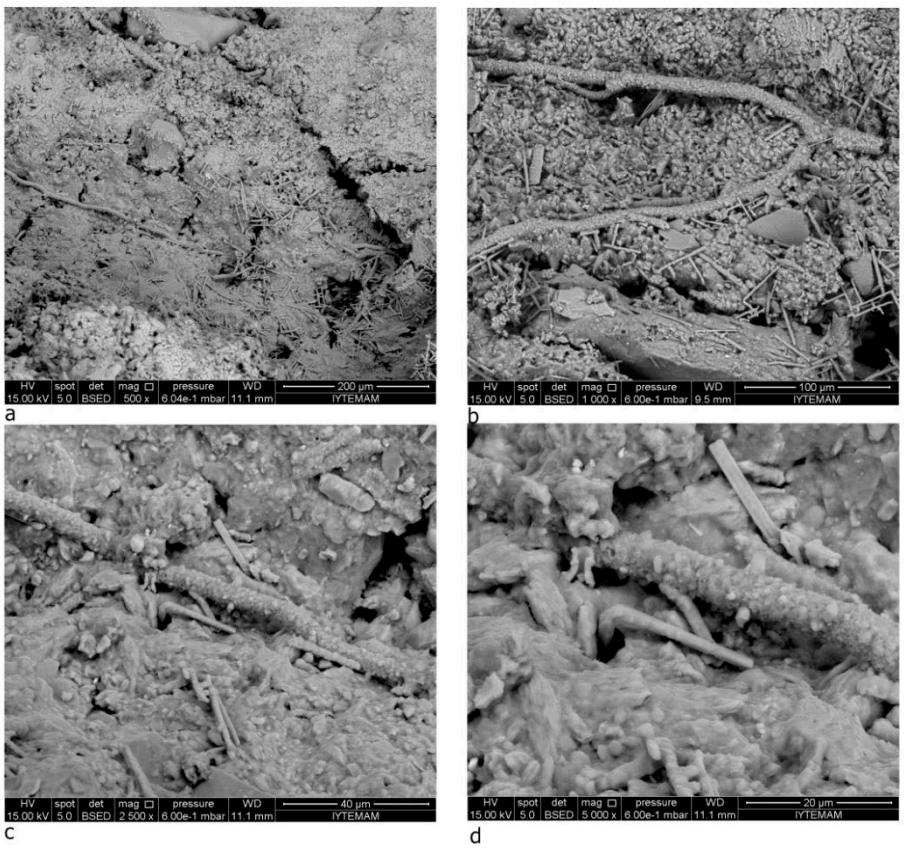


Figure 4.308: SEM images of lime samples taken from Structure N4B1

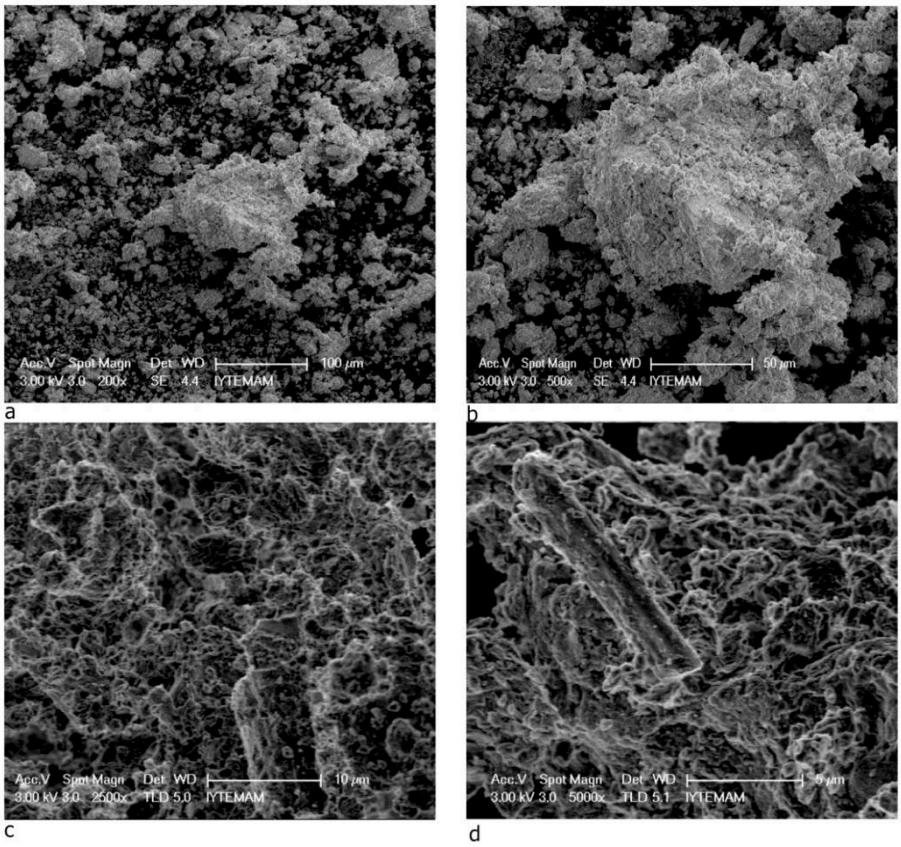


Figure 4.309: SEM images of soil samples taken from Structure N4B1

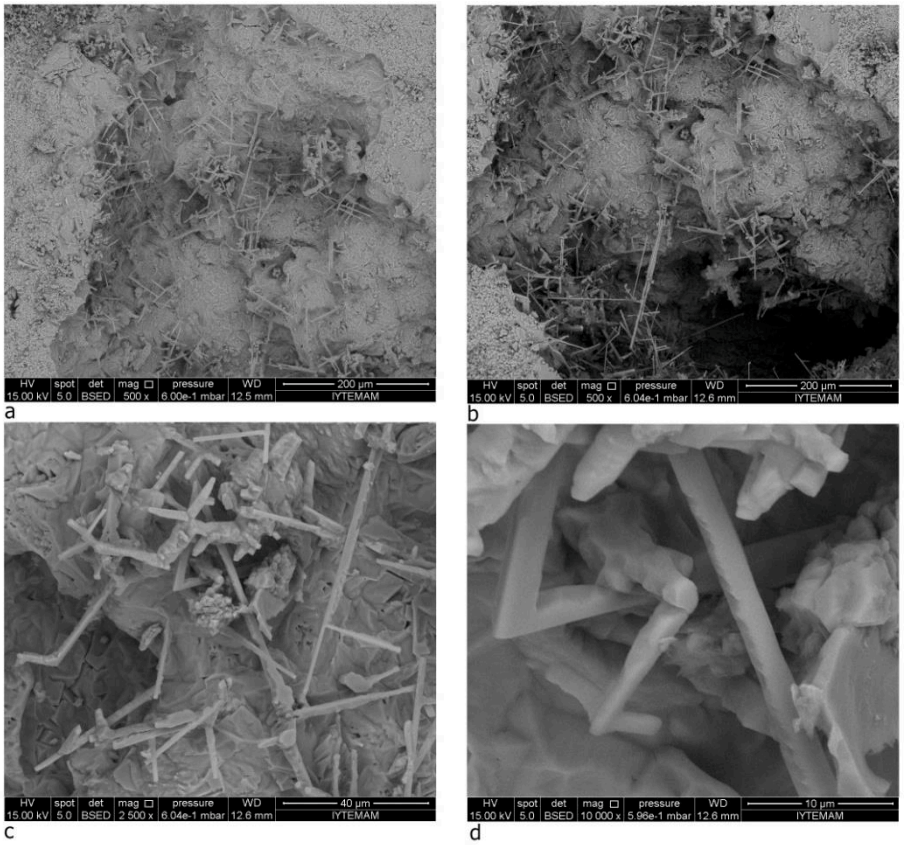


Figure 4.310: SEM images of lime samples taken from Structure N4B2

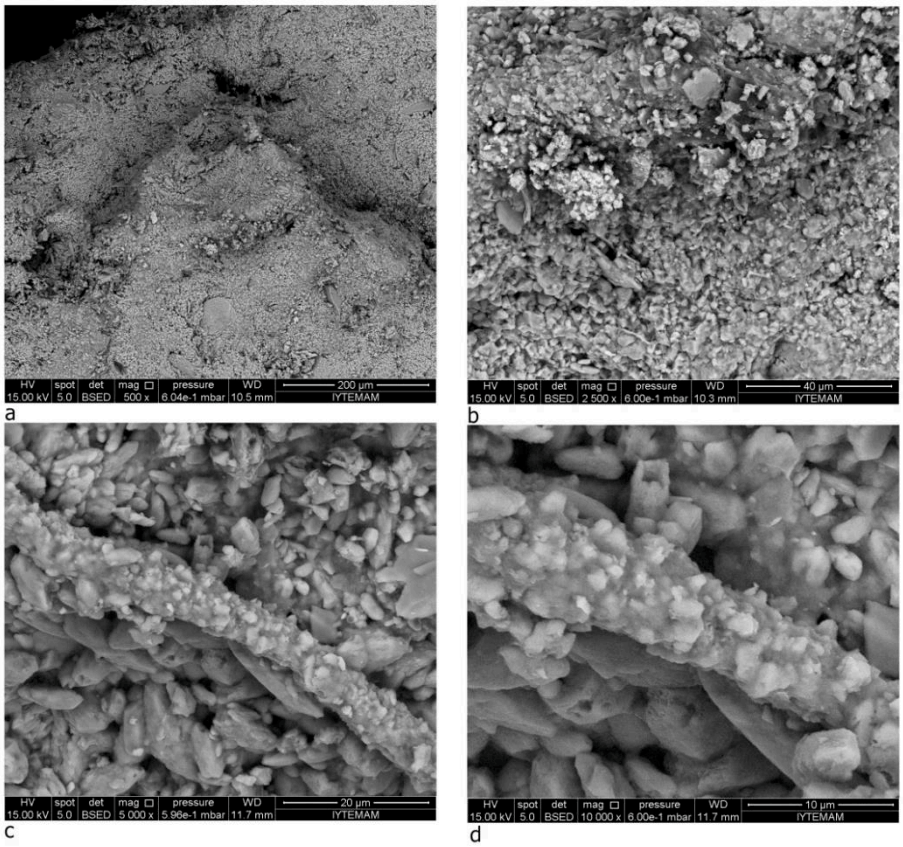


Figure 4.311: SEM images of lime samples taken from Structure N4B3

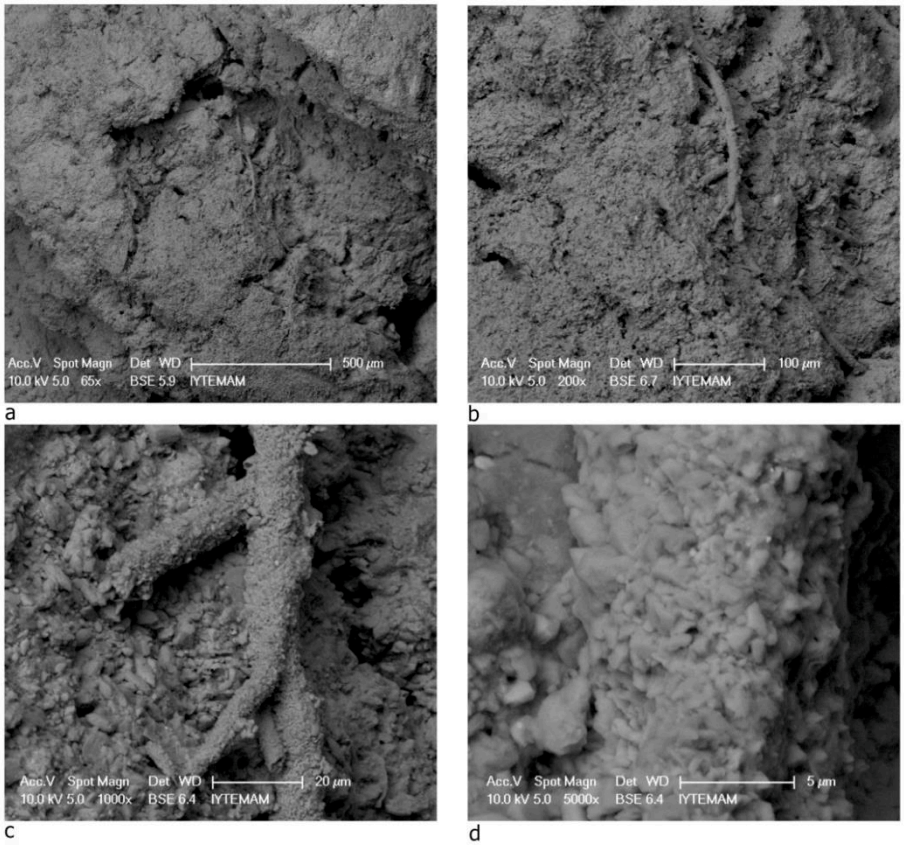


Figure 4.312: SEM images of lime samples taken from Structure N4B8

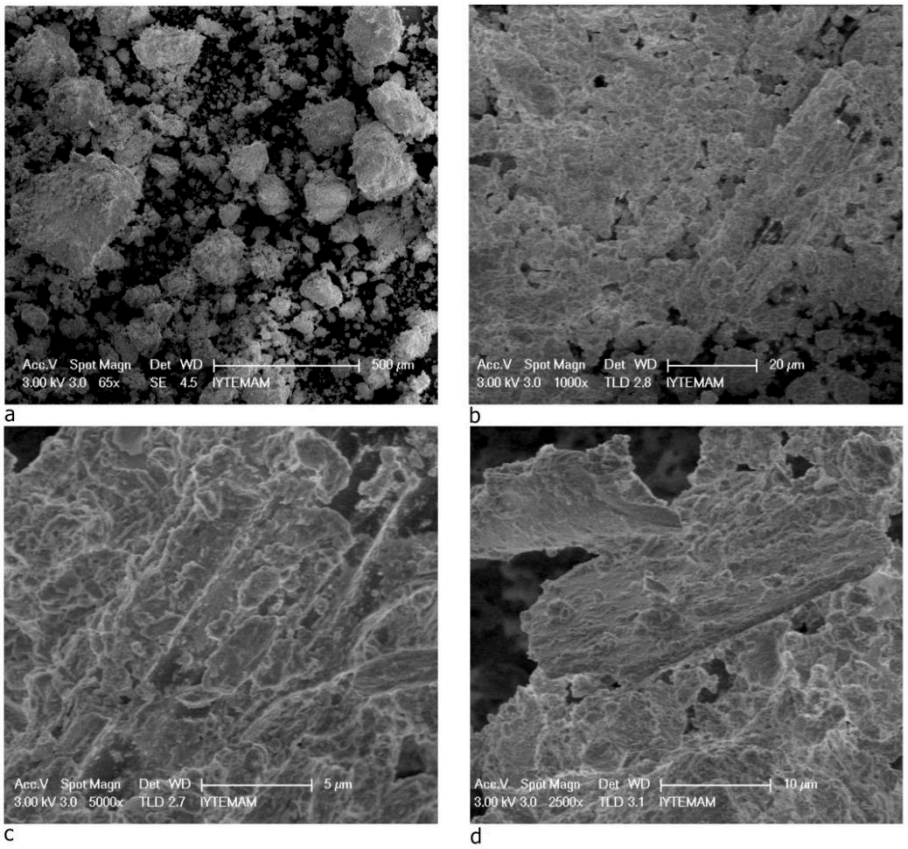


Figure 4.313: SEM images of soil samples taken from Structure N4B8

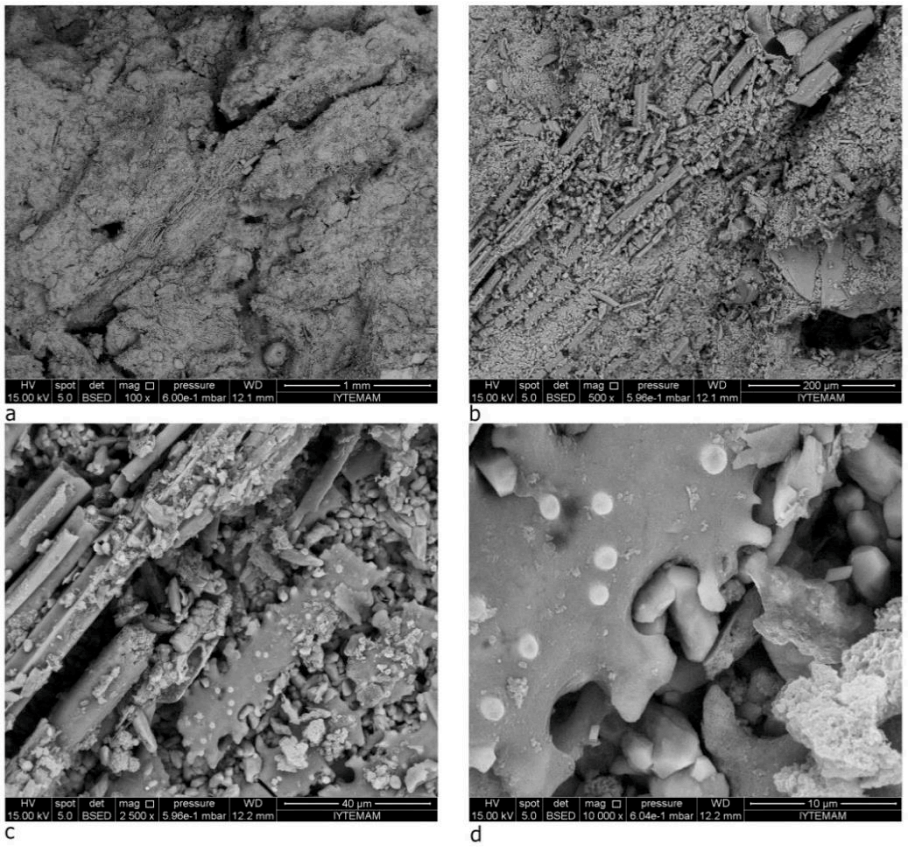


Figure 4.314: SEM images of lime samples taken from Structure N4B9

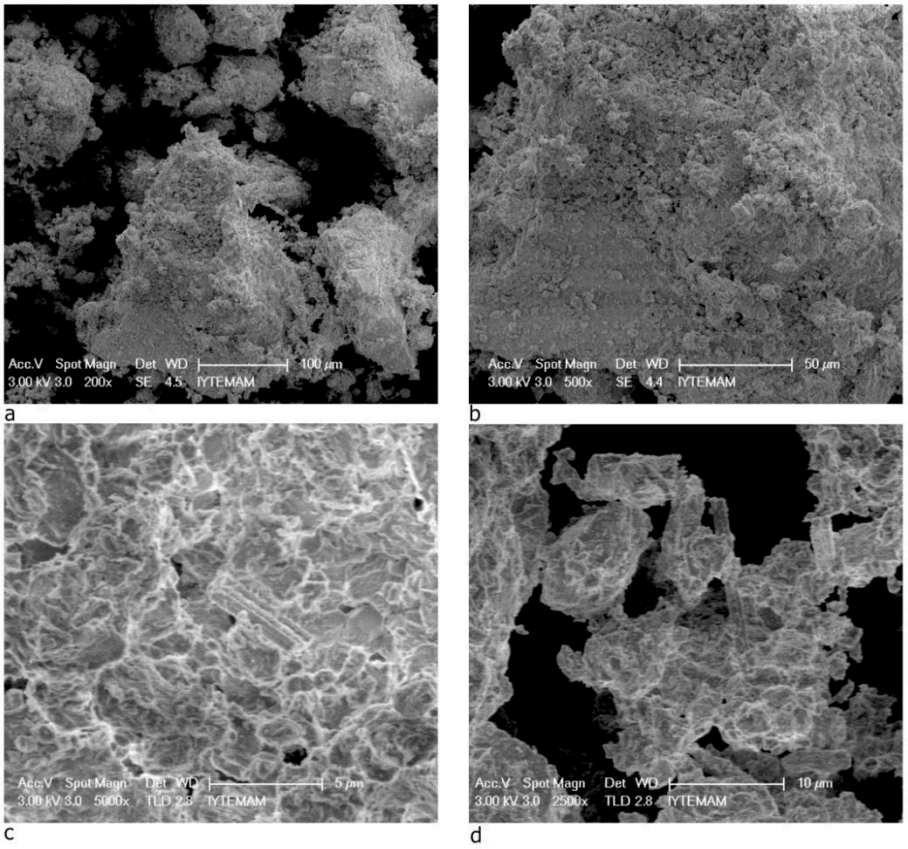


Figure 4.315: SEM images of soil samples taken from Structure N4B10

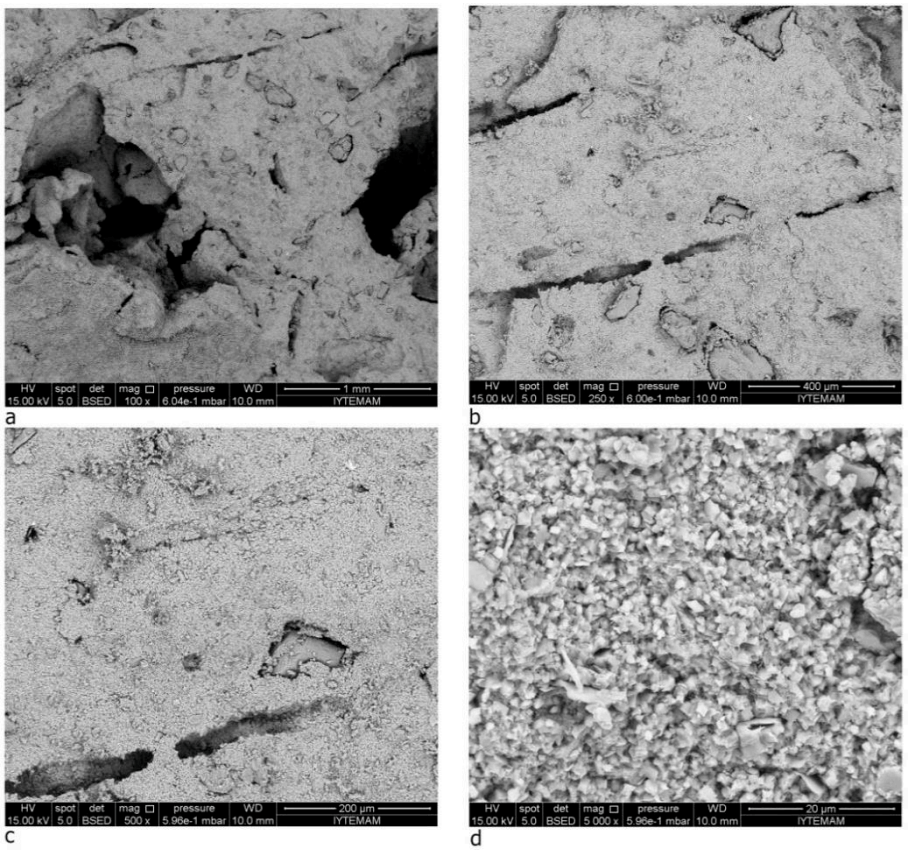


Figure 4.316: SEM images of lime samples taken from Structure N4B13

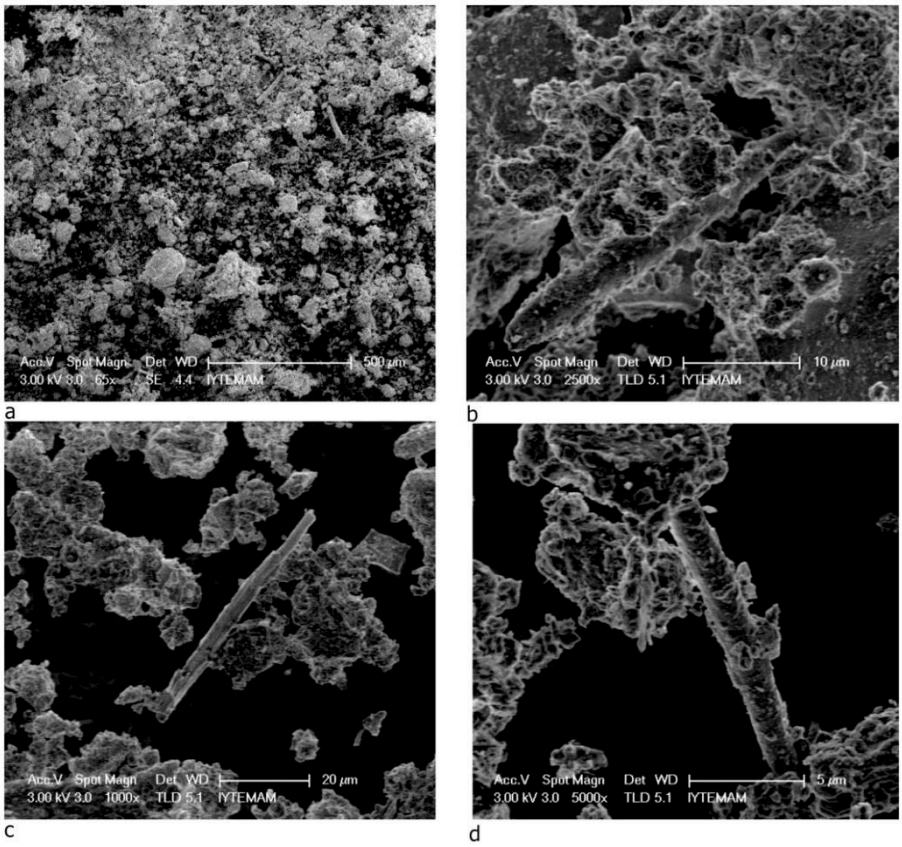


Figure 4.317: SEM images of soil samples taken from Phase N3 filling

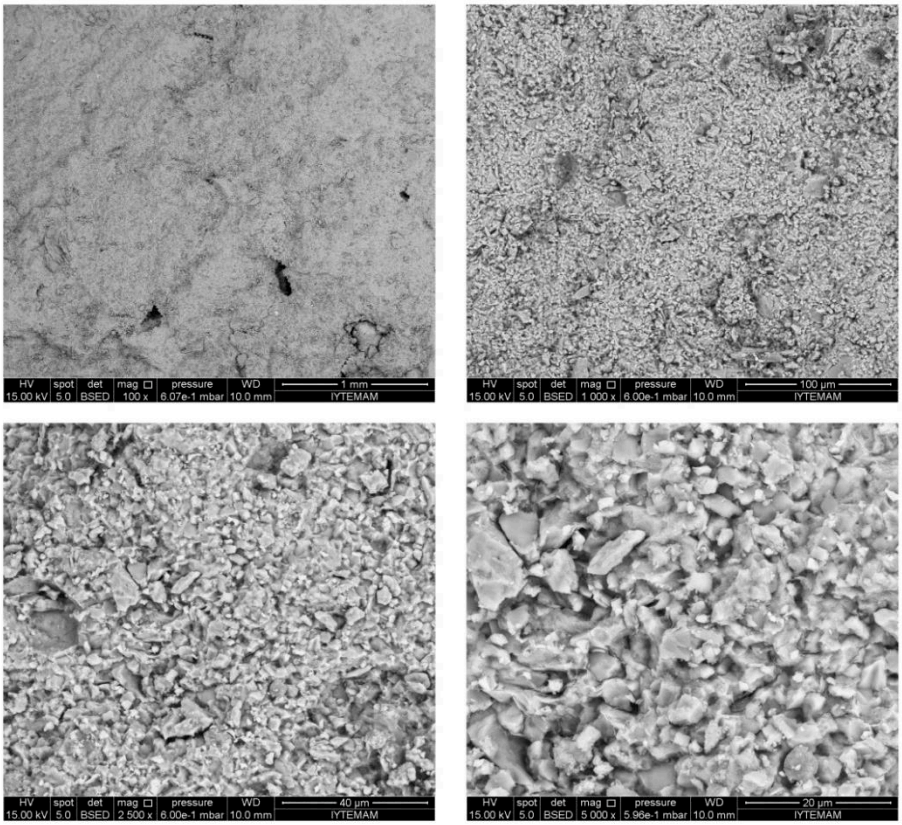


Figure 4.318: SEM images of lime samples taken from Structure N2B2

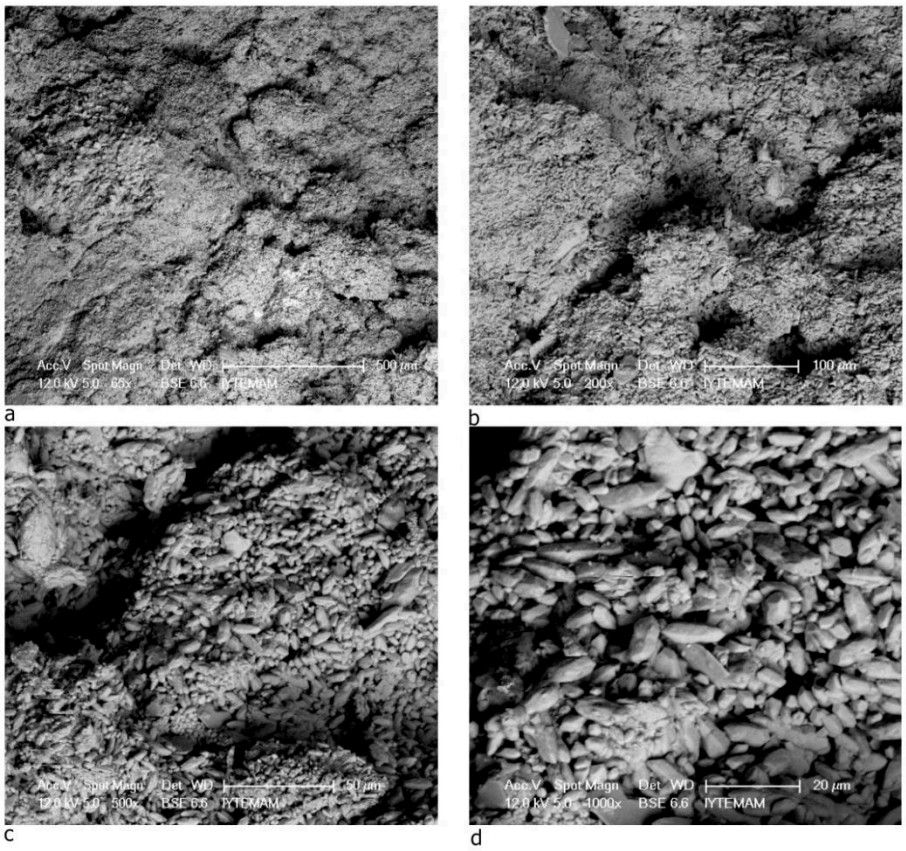


Figure 4.319: SEM images of lime samples taken from Structure N2B3

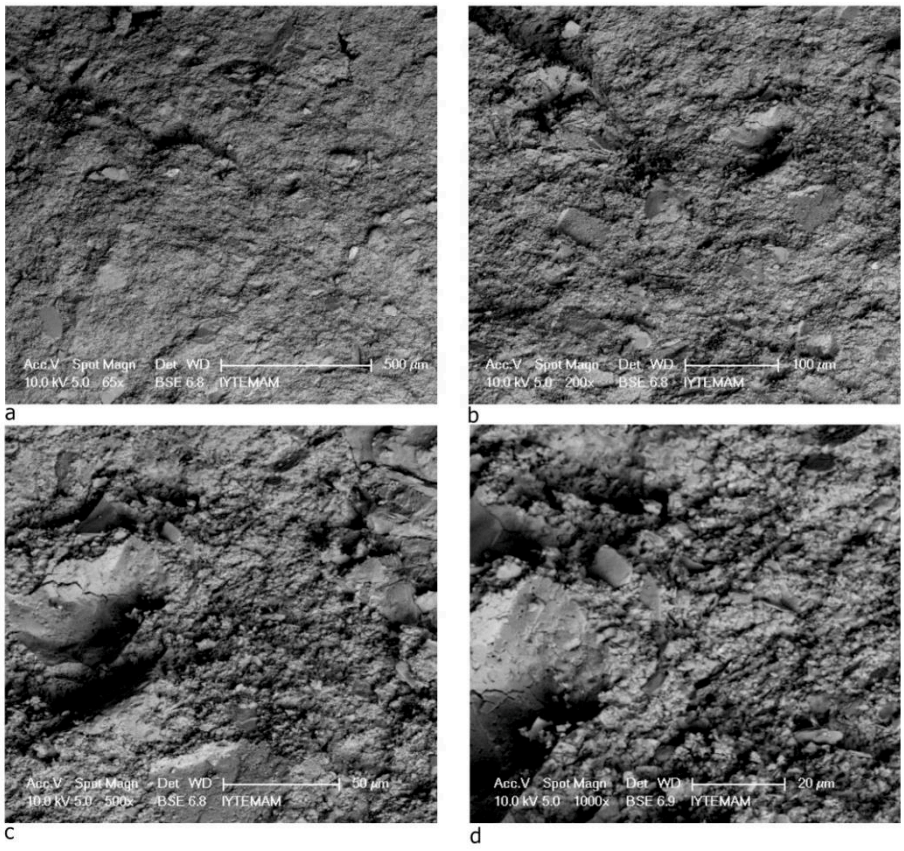


Figure 4.320: SEM images of lime samples taken from Structure N2B4

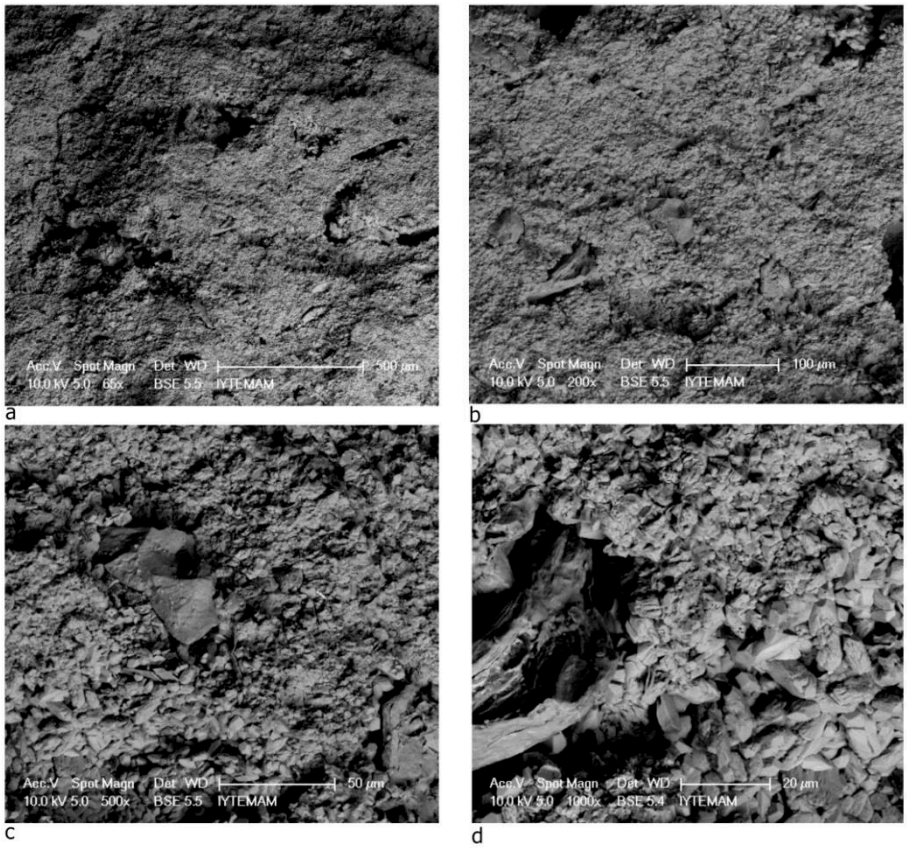


Figure 4.321: SEM images of lime samples taken from Structure N2B6

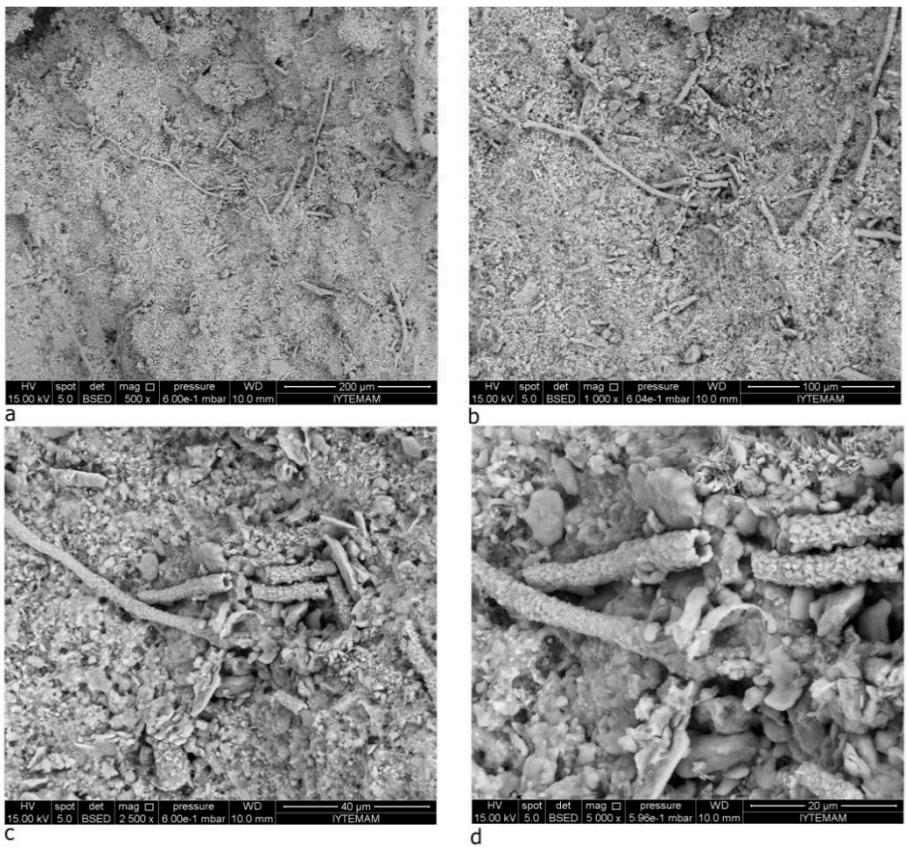


Figure 4.322: SEM images of lime samples taken from Structure N2B8

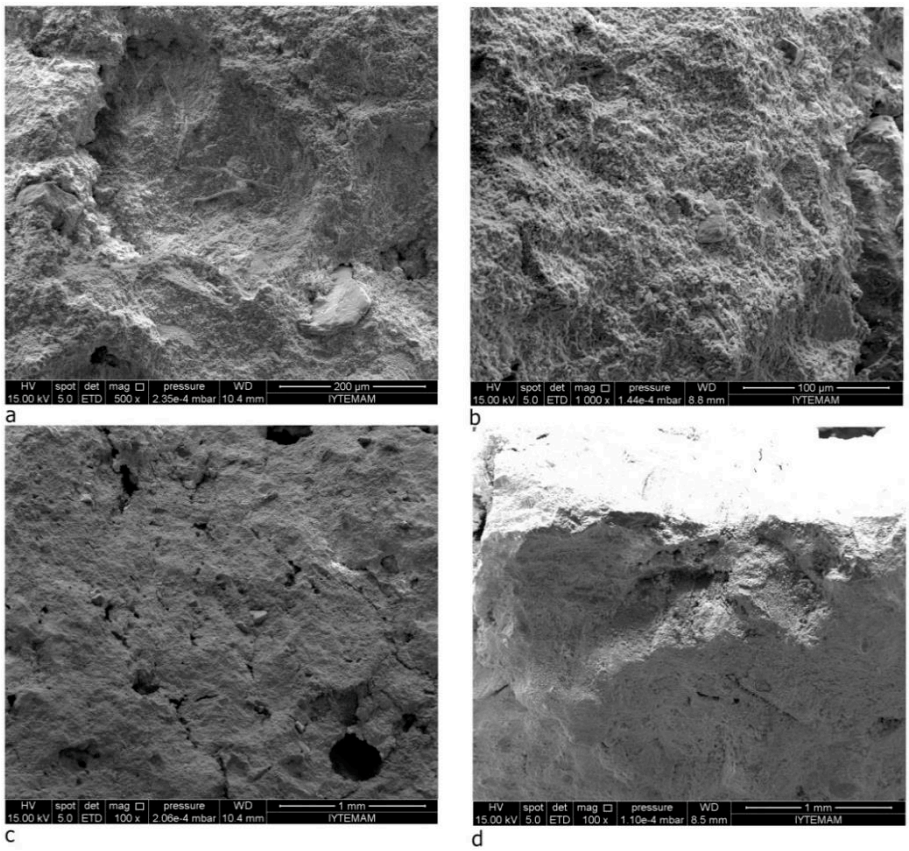


Figure 4.323: SEM images of lime samples taken from Structure N2B11

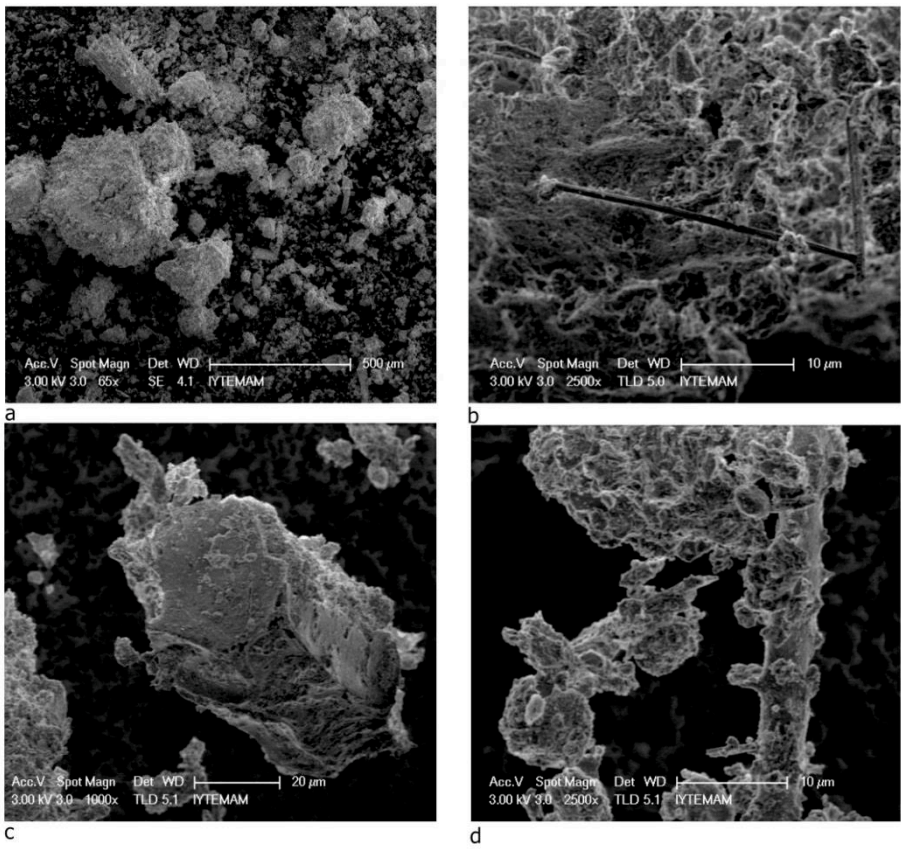
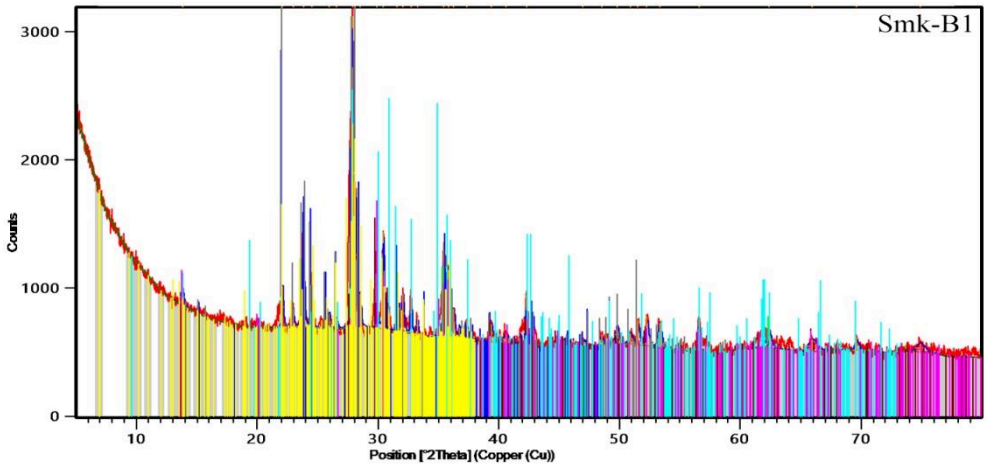
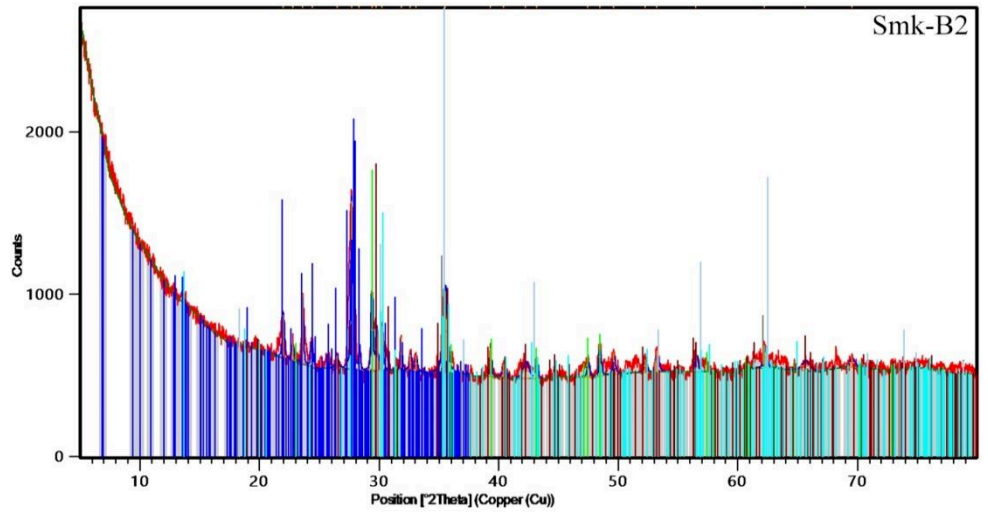


Figure 4.324SEM images of soil samples taken from Structure N2B12



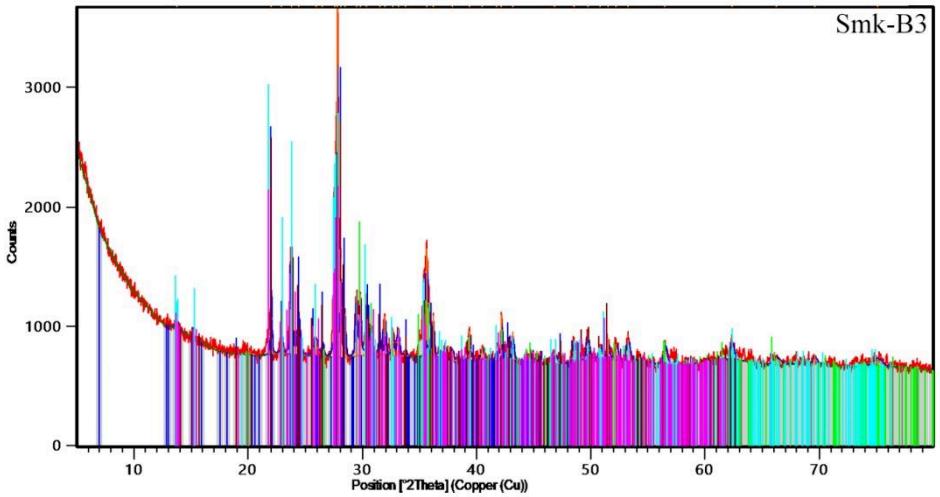
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
	96-100-8758	48	Anorhtite sodian	0.000	0.861	Na1.92 Ca2.08 Si10.00 Al6.00 O32.00
*	96-900-3590	31	Magnesioferrite	0.000	0.168	Fe16.00 Mg8.00 O32.00
*	96-901-1424	47	Oligoclase	0.000	0.873	Na1.45 Ca0.55 Al2.55 Si5.45 O16.00
	96-900-0792	22	Diopside	0.000	0.269	Mg3.76 Mn0.76 Ca3.48 Si8.00 O24.00
*	96-900-0354	15	Ferrosilite	0.000	0.581	Si16.00 Mg5.09 Fe10.65 Ca0.26 O48.00
*	96-901-0086	26	Hedenbergite	0.000	0.311	Ca2.00 Na2.00 Fe4.00 Si8.00 O24.00
*	96-100-0035	28	Anorthite	0.000	0.499	O64.00 Ca8.00 Si16.00 Al16.00

Diagram 4.91: XRD analysis pattern and detected minerals of basalt samples taken from Sumaki Höyük



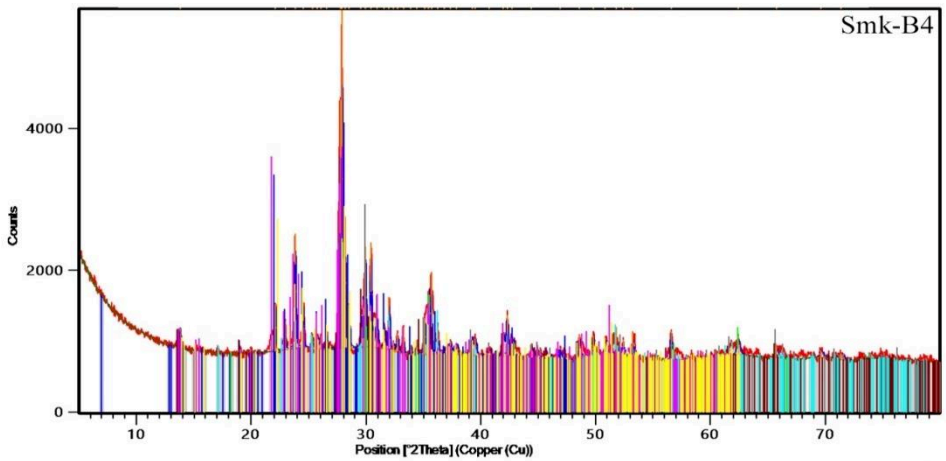
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
	96-900-0363	26	Anorthite	0.000	0.558	Ca8.00 Si16.00 Al16.00 O64.00
*	96-901-5391	26	Calcite	0.000	0.447	Ca6.00 C6.00 O18.00
*	96-900-3614	17	Magnesioferrite	0.000	0.258	Fe16.00 Mg8.00 O32.00
	96-900-5682	17	Diopside	0.000	0.460	Ca3.34 Na0.56 Mg3.57 Ti0.82 Si7.55 B0.10 O24.00
*	96-900-1812	13	Hedenbergite	0.000	0.351	Ca4.00 Fe4.00 Si8.00 O24.00

Diagram 4.92: XRD analysis pattern and detected minerals of basalt samples taken from Sumaki Höyük



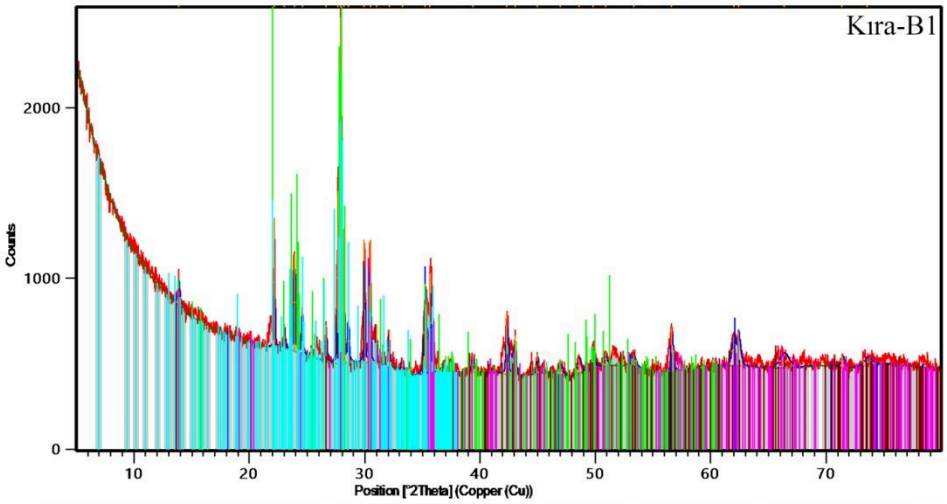
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
	96-100-8758	43	Anorhtite sodian	0.000	0.659	Na1.92 Ca2.08 Si10.00 Al6.00 O32.00
*	96-900-0792	27	Diopside	0.000	0.306	Mg3.76 Mn0.76 Ca3.48 Si8.00 O24.00
*	96-901-6707	24	Calcite	0.000	0.146	Ca6.00 C6.00 O18.00
	96-901-1424	44	Oligoclase	0.000	0.537	Na1.45 Ca0.55 Al2.55 Si5.45 O16.00
*	96-900-0708	28	Albite	0.000	0.615	Na4.00 Si12.00 Al4.00 O32.00
*	96-900-0858	26	Anorthoclase	0.000	0.388	Al2.00 Si6.00 Na1.50 K0.50 O16.00

Diagram 4.93: XRD analysis pattern and detected minerals of basalt samples taken from Sumaki Höyük



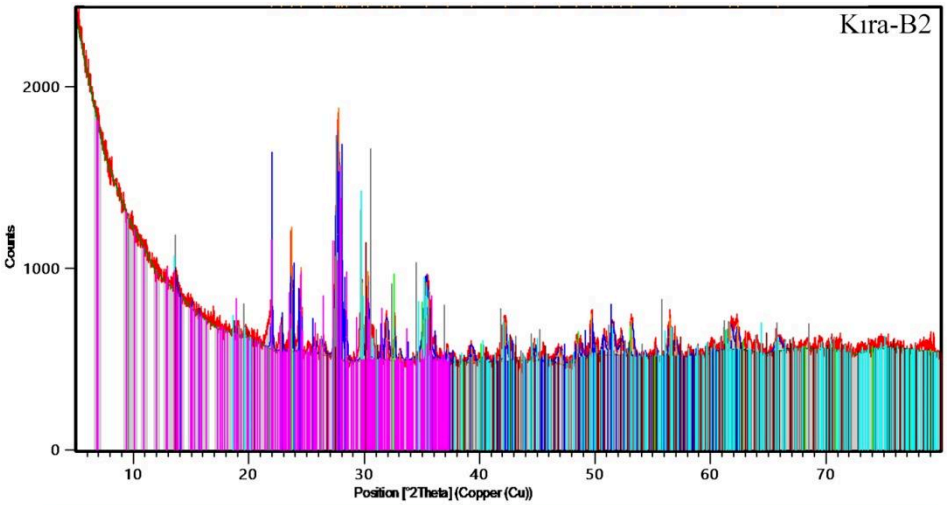
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
	96-100-8758	40	Anorhtite sodian	0.000	0.557	Na1.92 Ca2.08 Si10.00 Al6.00 O32.00
*	96-900-3588	27	Magnesioferrite	0.000	0.147	Fe16.00 Mg8.00 O32.00
*	96-900-4315	30	Diopside	0.000	0.354	Mg3.88 Fe0.12 Ca4.00 Si7.69 Al0.31 O24.00
	96-900-0448	15	Ferrosilite	0.000	0.143	Fe6.00 Ca2.00 Si8.00 O24.00
*	96-901-0755	19	Forsterite	0.000	0.108	Fe3.74 Mg4.26 Si4.00 O16.00
*	96-900-0858	26	Anorthoclase	0.000	0.499	Al2.00 Si6.00 Na1.50 K0.50 O16.00
*	96-900-1634	20	Albite	0.000	0.352	Na2.00 Al2.00 Si6.00 O16.00

Diagram 4.94: XRD analysis pattern and detected minerals of basalt samples taken from Sumaki Höyük



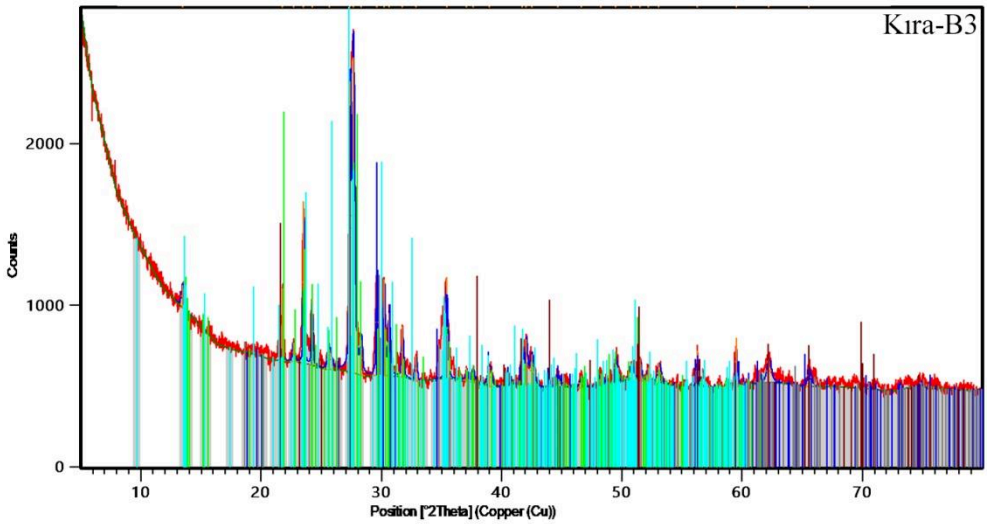
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
	96-900-3614	48	Magnesioferrite	0.000	0.242	Fe16.00 Mg8.00 O32.00
*	96-901-1423	31	Oligoclase	0.000	0.940	Na1.64 Ca0.36 Al2.36 Si5.64 O16.00
*	96-901-3533	26	Magnetite	0.000	0.188	Fe22.51 Ti1.49 O32.00
	96-900-4320	31	Diopside	0.000	0.228	Mg3.97 Fe0.03 Ca4.00 Si7.69 Al0.31 O24.00
*	96-100-0035	26	Anorthite	0.000	0.545	O64.00 Ca8.00 Si16.00 Al16.00
*	96-901-0475	22	Hedenbergite	0.000	0.235	Na0.96 Ca3.04 Al0.96 Fe3.04 Si8.00 O24.00

Diagram 4.95: XRD analysis pattern and detected minerals of basalt samples taken from Kıradağı



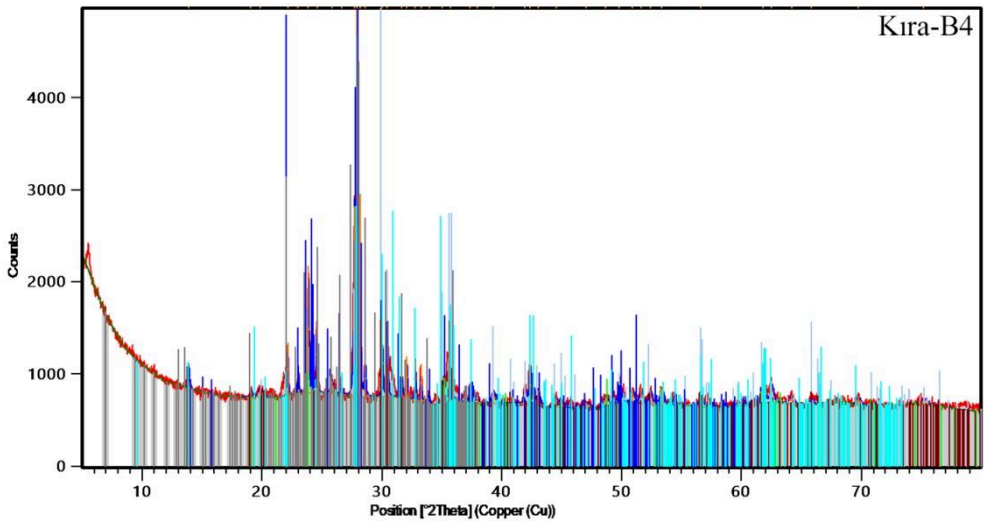
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
	96-901-1424	29	Oligoclase	0.000	0.485	Na1.45 Ca0.55 Al2.55 Si5.45 O16.00
*	96-900-6988	17	Ilmenite	0.000	0.194	Fe8.40 Ti3.60 O18.00
*	96-900-0359	15	Ferrosilite	0.000	0.502	Mg10.54 Fe5.20 Ca0.26 Si16.00 O48.00
	96-901-0470	9	Jadeite	0.000	0.265	Ca4.00 Fe4.00 Si8.00 O24.00
*	96-901-0330	15	Hedenbergite	0.000	0.383	Ca3.96 Fe4.04 Si8.00 O24.00
*	96-900-0362	25	Anorthite	0.000	0.437	Ca8.00 Si16.00 Al16.00 O64.00

Diagram 4.96: XRD analysis pattern and detected minerals of basalt samples taken from Kıradağı



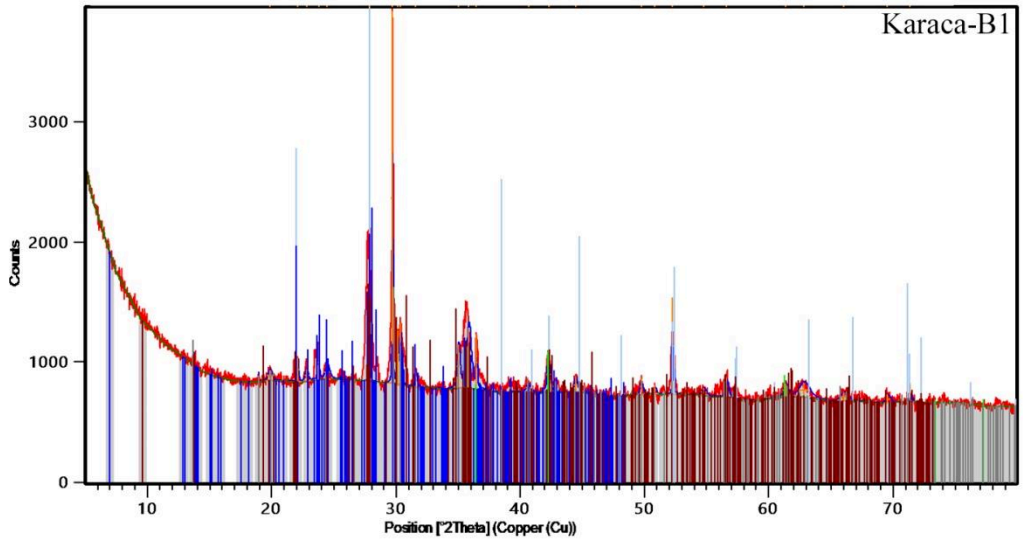
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
	96-900-0334	34	Diopside	0.000	0.462	Si8.00 Mg4.00 Ca4.00 O24.00
*	96-900-0860	29	Anorthoclase	0.000	0.564	Al2.00 Si6.00 Na1.70 K0.30 O16.00
*	96-901-0075	9	Hedenbergite	0.000	0.217	Ca4.00 Fe4.00 Si8.00 O24.00
	96-900-6553	20	Berlinite	0.000	0.579	Al6.00 P6.00 O12.00
*	96-900-3093	18	Feldspar	0.000	0.838	Ca1.60 Sr6.40 Si16.00 Al16.00 O64.00

Diagram 4.97: XRD analysis pattern and detected minerals of basalt samples taken from Kıradağı



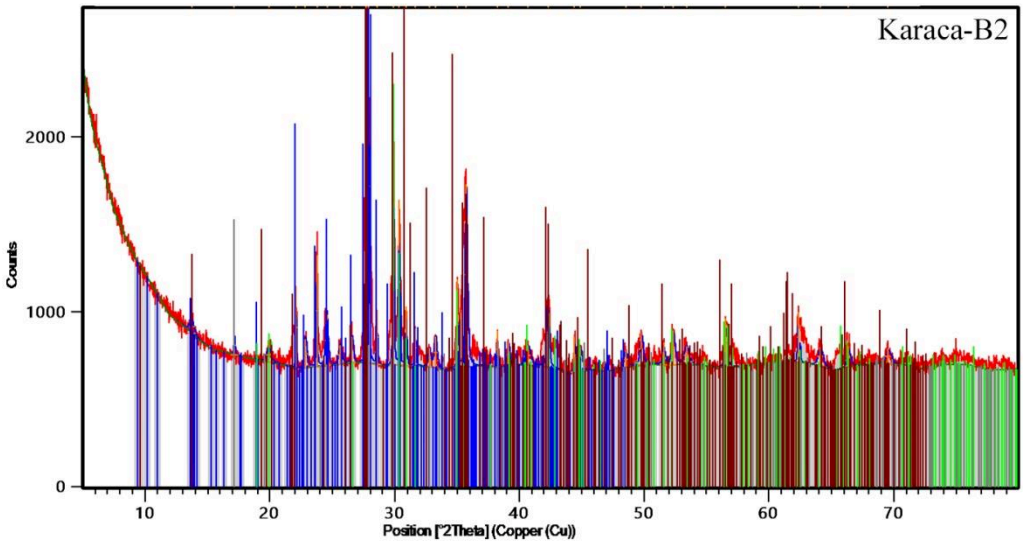
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
	96-901-1423	30	Oligoclase	0.000	0.888	Na1.64 Ca0.36 Al2.36 Si5.64 O16.00
*	96-900-6977	22	Ilmenite	0.000	0.161	Fe8.40 Ti3.60 O18.00
*	96-100-0035	27	Anorthite	0.000	0.788	O64.00 Ca8.00 Si16.00 Al16.00
	96-901-0086	25	Hedenbergite	0.000	0.168	Ca2.00 Na2.00 Fe4.00 Si8.00 O24.00
*	96-900-0354	19	Ferrosilite	0.000	0.416	Si16.00 Mg5.09 Fe10.65 Ca0.26 O48.00

Diagram 4.98: XRD analysis pattern and detected minerals of basalt samples taken from Kıradağı



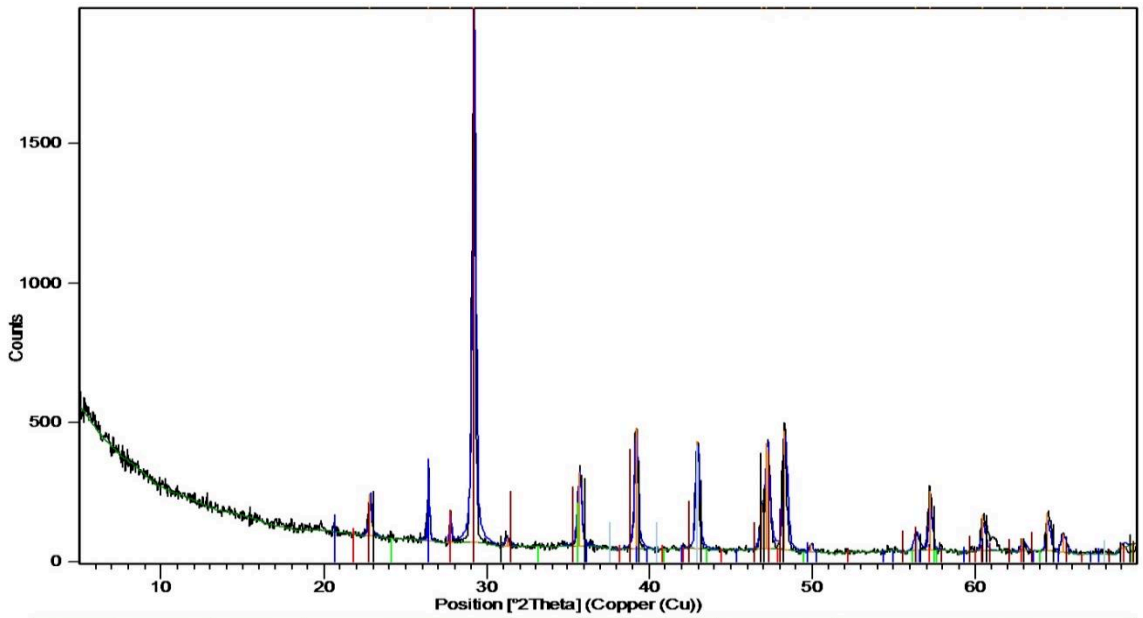
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
	96-100-8758	38	Anorhtite sodian	0.000	0.364	Na1.92 Ca2.08 Si10.00 Al6.00 O32.00
*	96-900-6464	28	Periclase	0.000	0.084	Mg4.00 O4.00
*	96-901-0082	25	Hedenbergite	0.000	0.202	Ca2.20 Na1.80 Fe4.00 Si8.00 O24.00
	96-900-0355	15	Ferrosilite	0.000	0.203	Mg5.08 Fe10.66 Ca0.26 Si16.00 O48.00

Diagram 4.99: XRD analysis pattern and detected minerals of basalt samples taken from Karacadağ



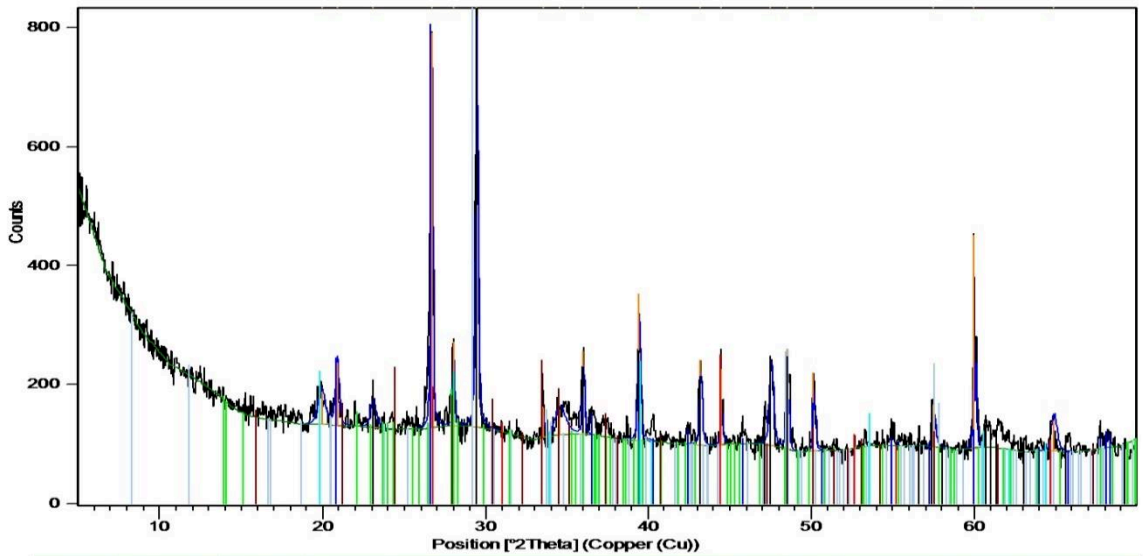
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
	96-901-1201	52	Bytownite	0.018	0.804	Ca3.44 Na0.56 Al7.36 Si8.64 O32.00
*	96-901-0082	44	Hedenbergite	0.011	0.586	Ca2.20 Na1.80 Fe4.00 Si8.00 O24.00
*	96-101-1150	14	Witherite	0.002	0.281	Ba4.00 C4.00 O12.00
	96-900-0358	23	Ferrosilite	0.074	0.904	Si16.00 Mg5.09 Fe10.66 Ca0.26 O48.00

Diagram 4.100: XRD analysis pattern and detected minerals of basalt samples taken from Karacadağ



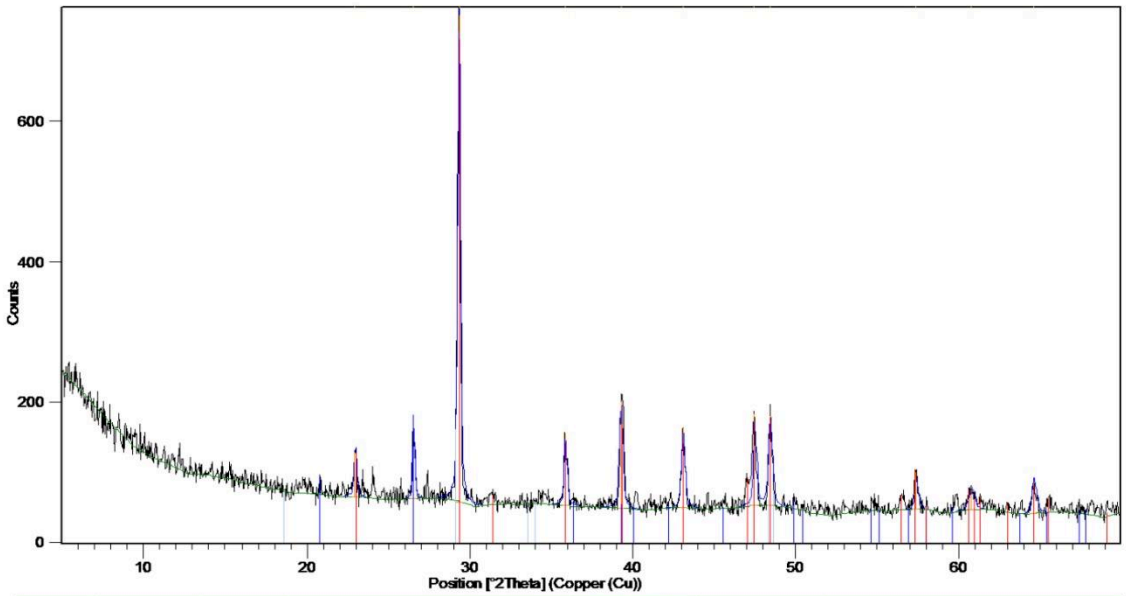
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-086-2341	44	calcite high	0,000	0,925	Ca (C O3)
*	01-089-8939	22	á-Si O2, Quartz á	0,000	0,148	Si O2
*	01-073-0603	33	iron(III) oxide	0,000	0,077	Fe2 O3
*	01-079-1912	15	á-Si O2, quartz HP	0,000	0,058	Si O2
*	01-072-0027	37	Nitratine, syn	0,000	1,000	Na N O3

Diagram 4.101: XRD analysis pattern and detected minerals of lime samples taken from Structure N6B1



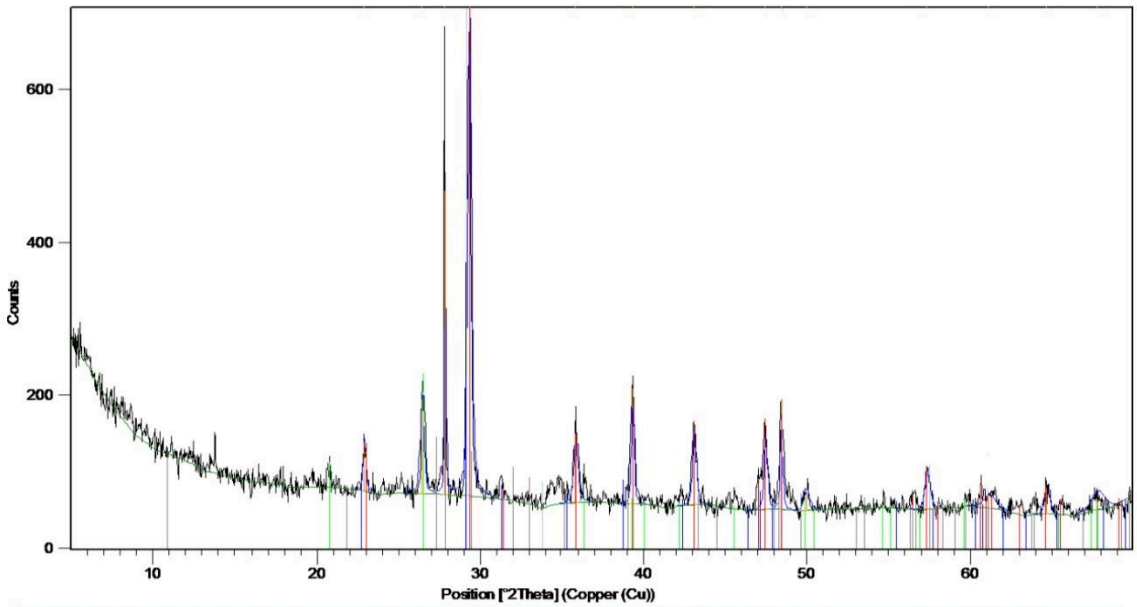
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-086-2334	67	Calcite	0,000	0,990	Ca (C O3)
*	03-065-0466	46	Quartz low, syn	0,000	0,812	O2 Si
*	00-041-1480	10	Albite, calcian, ordered	0,000	0,109	(Na , Ca) Al (Si , Al)3 O8
*	03-065-2982	27	Berzelianite, syn	0,000	0,180	Cu2 Se
*	00-011-0129	13	Monticellite	0,000	0,157	Ca Mg Si O4
*	01-074-2582	16	Brucite - synthetic	0,000	0,161	Mg (O H)2

Diagram 4.102: XRD analysis pattern and detected minerals of lime samples taken from Structure N6B2



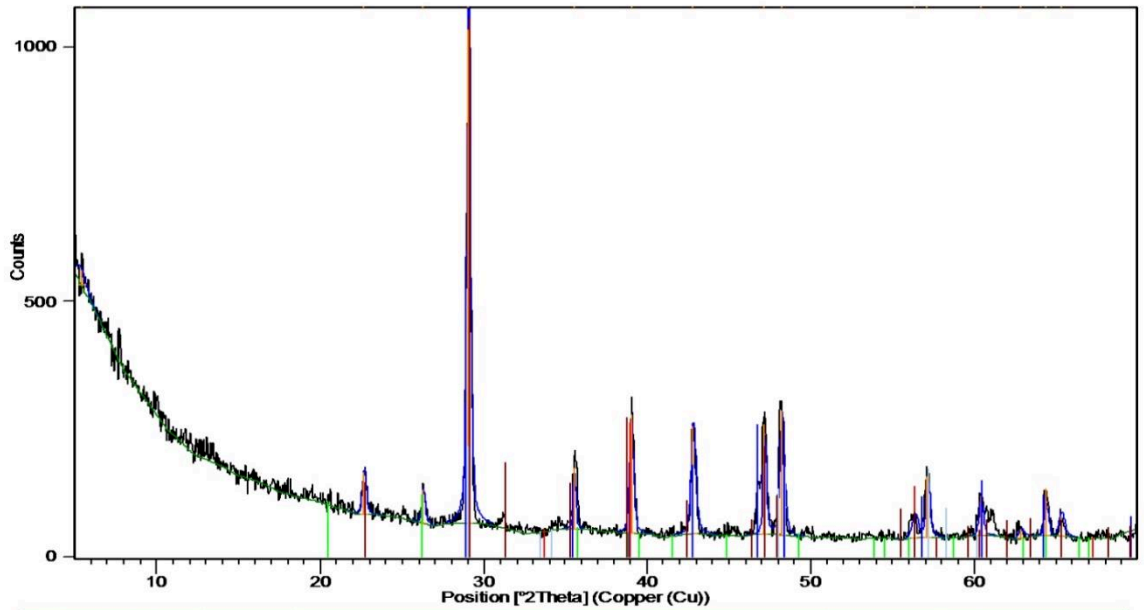
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-072-1937	74	Calcite	0,000	0,863	Ca C O3
*	01-089-8937	22	á-Si O2, Quartz á	0,000	0,156	Si O2

Diagram 4.103: XRD analysis pattern and detected minerals of lime samples taken from Structure N6B10



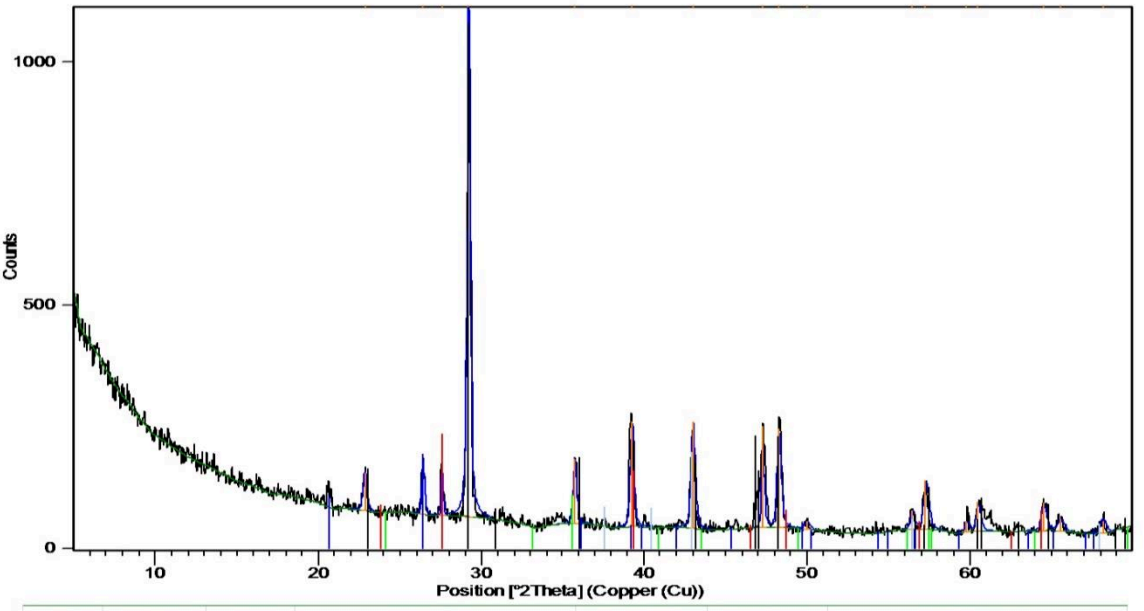
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-072-1937	74	Calcite	0,000	0,931	Ca C O3
*	01-085-1462	11	nitratine, high, sodium nitrate(V)	0,000	0,199	Na (N O3)
*	01-089-8937	29	á-Si O2, Quartz á	0,000	0,222	Si O2
*	03-065-3928	20	Covellite	0,000	0,597	Cu S

Diagram 4.104: XRD analysis pattern and detected minerals of lime samples taken from Structure N5B1



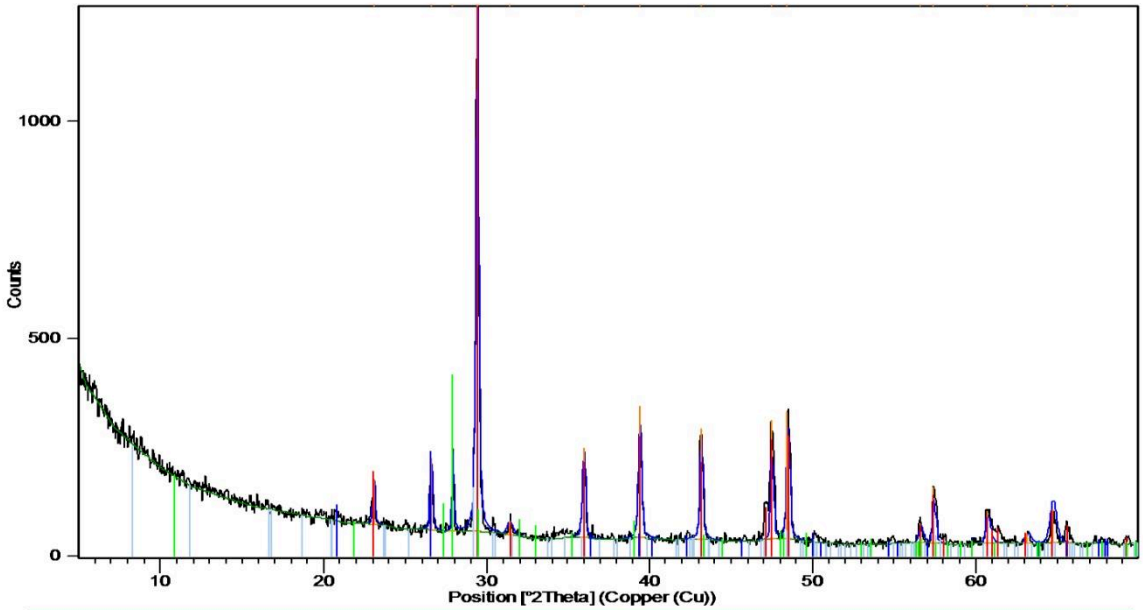
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	00-003-0569	42	Calcite	0,000	0,251	Ca C O3
*	01-075-1555	17	á-Si O2, Quartz	0,000	0,052	Si O2
*	01-088-2299	51	Villiaumite, syn	0,000	0,200	Na F
*	01-085-1462	39	nitratine, high, sodium nitrate(V)	0,000	0,918	Na (N O3)

Diagram 4.105: XRD analysis pattern and detected minerals of lime samples taken from Structure N5B4



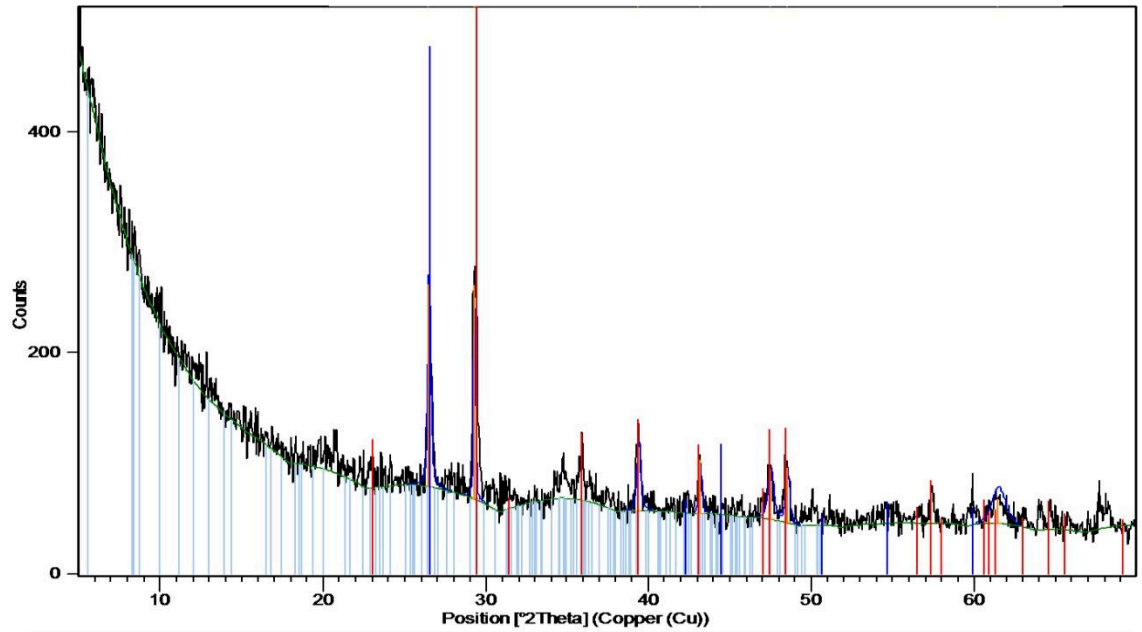
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-086-2341	41	calcite high	0,000	0,910	Ca (C O3)
*	01-089-8939	22	á-Si O2, Quartz á	0,000	0,111	Si O2
*	01-073-0603	26	iron(III) oxide	0,000	0,052	Fe2 O3
*	03-065-0324	37	Altaite, syn	0,000	0,150	Pb Te

Diagram 4.106: XRD analysis pattern and detected minerals of lime samples taken from Structure N5B6



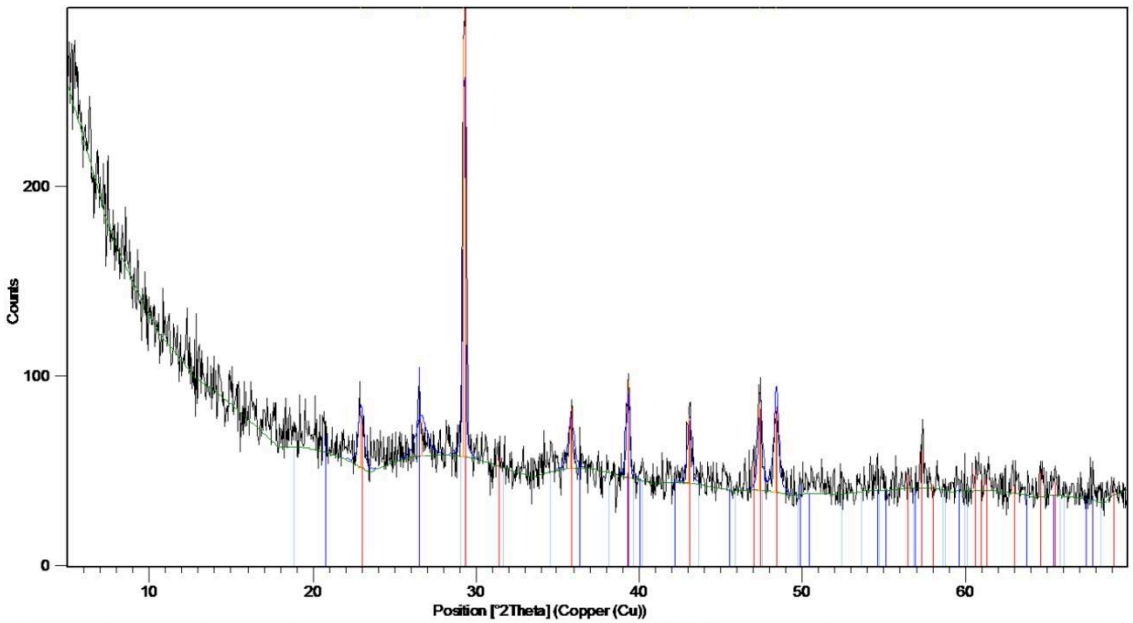
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-083-1762	86	Calcite	0,000	1,018	Ca (C O3)
*	01-089-8936	20	á-Si O2, Quartz á	0,000	0,142	Si O2
*	03-065-3928	16	Covellite	0,000	0,283	Cu S

Diagram 4.107: XRD analysis pattern and detected minerals of lime samples taken from Structure N5B7



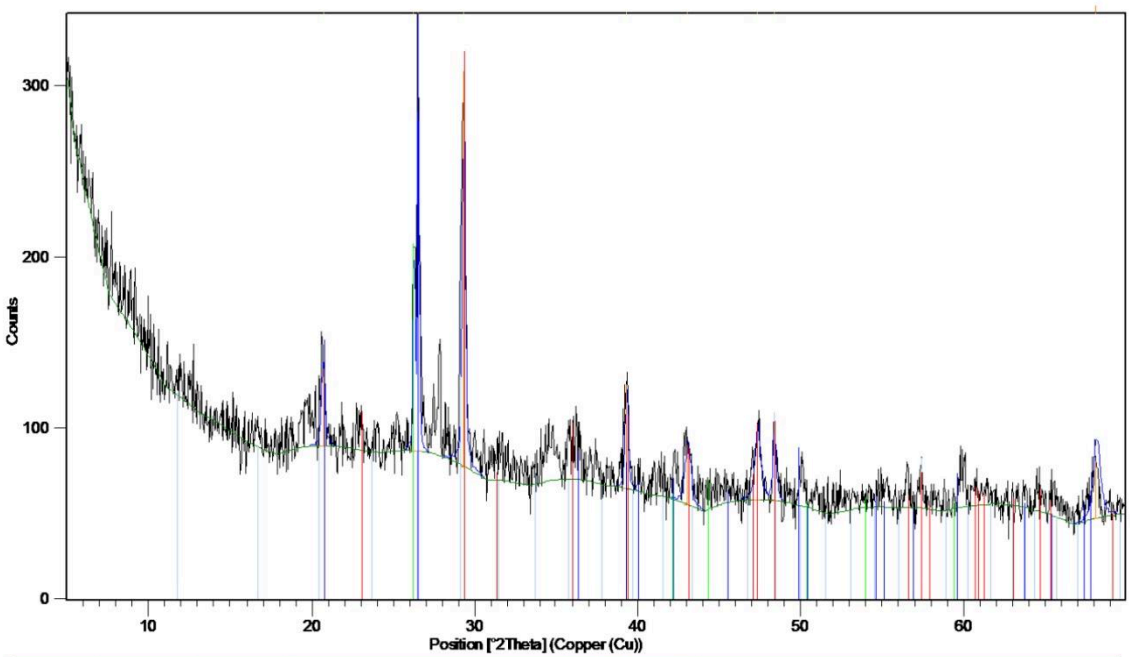
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-072-1937	47	Calcite	0,000	0,877	Ca C O3
*	01-089-7213	41	Graphite-2H	0,000	0,775	C

Diagram 4.108: XRD analysis pattern and detected minerals of lime samples taken from Structure N5B8



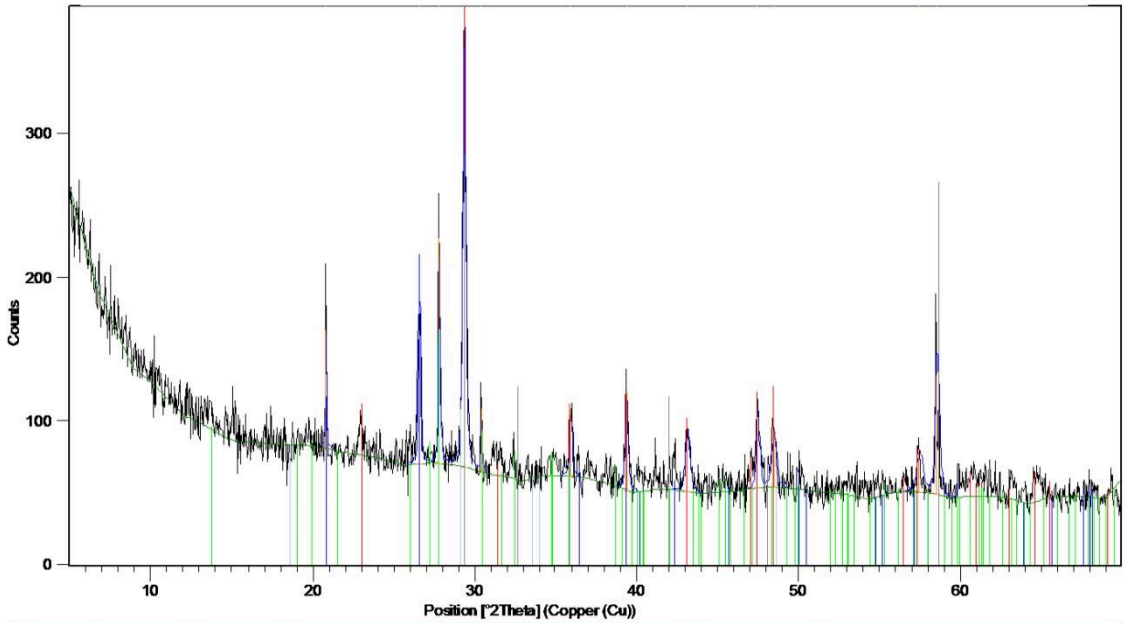
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-072-1937	49	Calcite	0,000	0,808	Ca C O3
*	01-089-8937	10	á-Si O2, Quartz á	0,000	0,160	Si O2

Diagram 4.109: XRD analysis pattern and detected minerals of lime samples taken from Structure N5B9



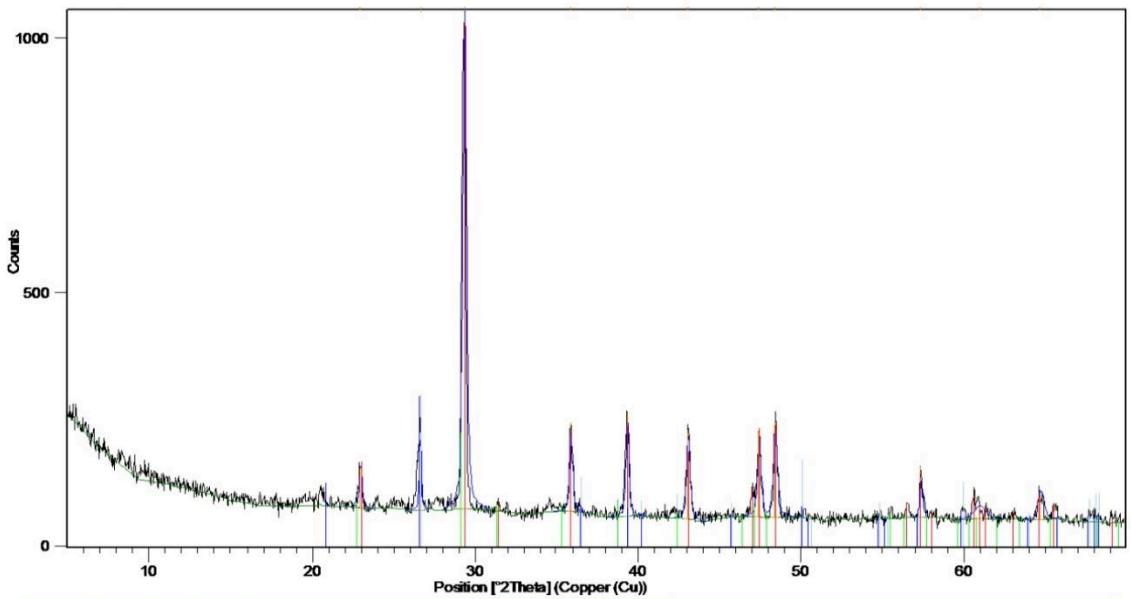
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-086-2339	36	calcite high, syn	0,000	0,710	Ca (C O3)
*	01-089-8937	34	á-Si O2, Quartz á	0,000	0,861	Si O2
*	01-075-1621	33	Graphite-2H	0,000	0,354	C

Diagram 4.110: XRD analysis pattern and detected minerals of lime samples taken from Structure N5B11



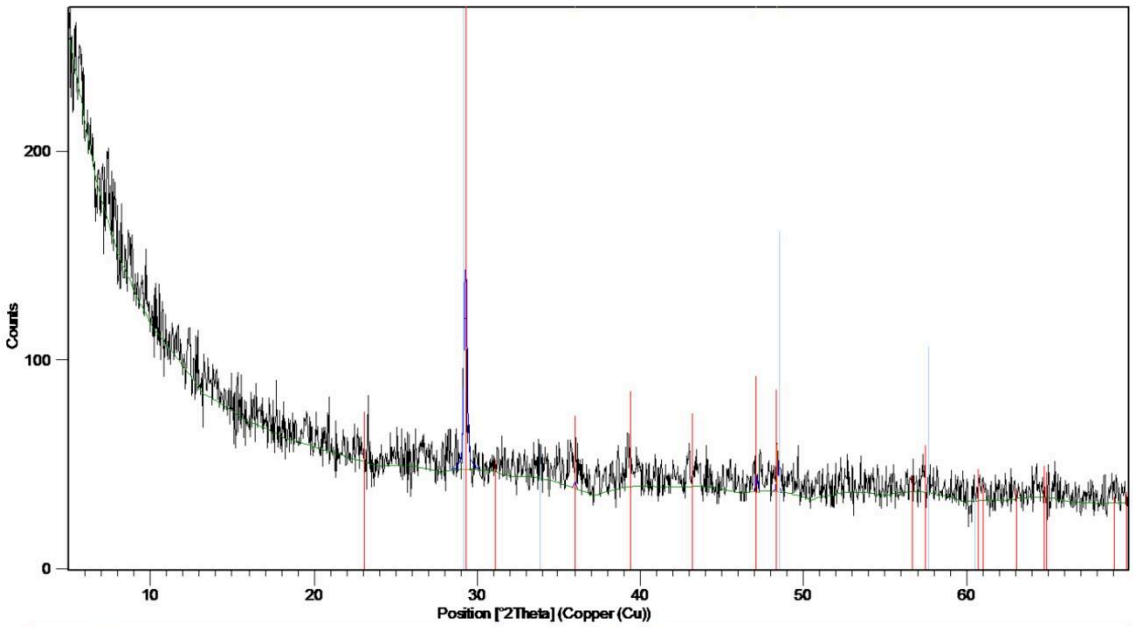
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-072-1937	53	Calcite	0,000	0,953	Ca C O3
*	01-089-1961	27	Quartz low, syn	0,000	0,375	Si O2
*	01-086-0435	9	dimagnesium catena-disilicate, enstatite high	0,000	0,235	Mg2 (Si2 O6)
*	00-057-0910	21	Unnamed mineral (NR)	0,000	0,560	Cu8 (O H)12 (Si O4) ·8 H2 O

Diagram 4.111: XRD analysis pattern and detected minerals of lime samples taken from Structure N5B12



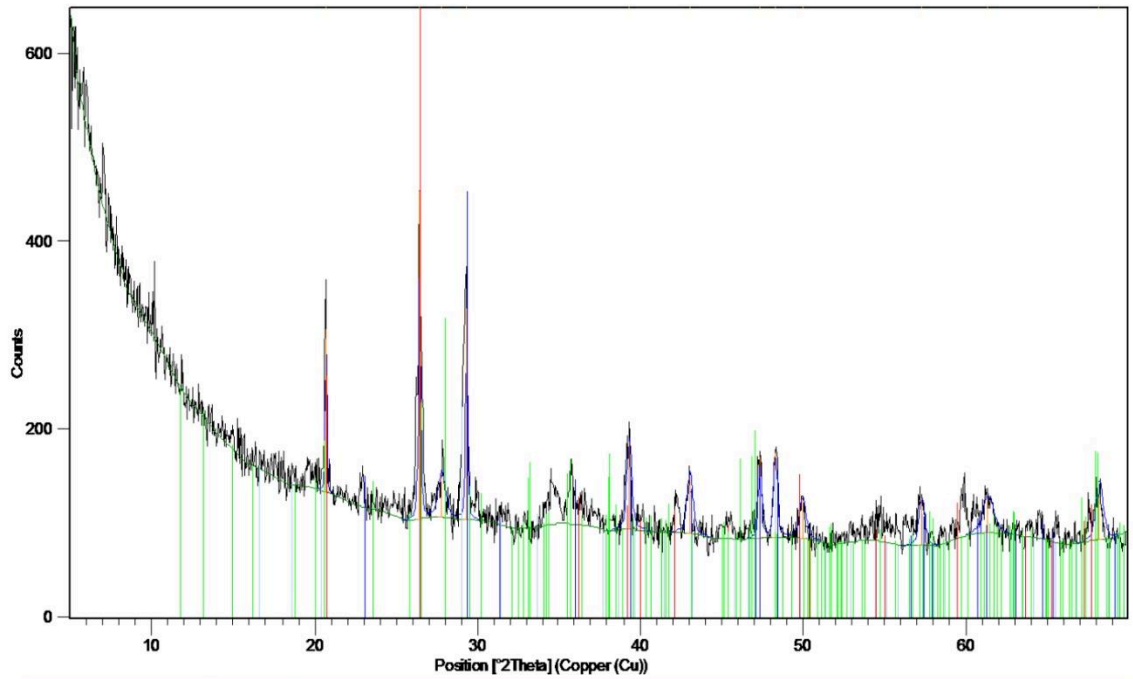
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-072-1937	78	Calcite	0,000	0,907	Ca C O3
*	01-070-2517	22	Quartz low - theoretical	0,000	0,211	Si O2
*	01-085-1462	10	nitratine, high, sodium nitrate(V)	0,000	0,142	Na (N O3)

Diagram 4.112: XRD analysis pattern and detected minerals of lime samples taken from Structure N5B14



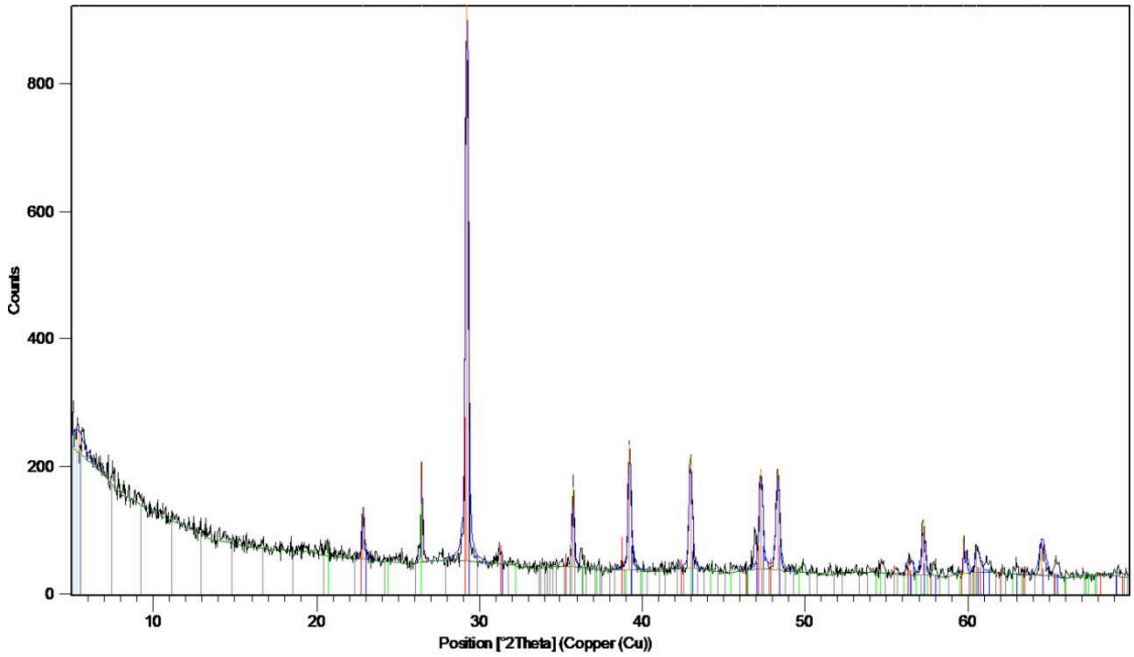
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-086-2340	23	calcite high	0,000	0,967	Ca (C O3)

Diagram 4.113: XRD analysis pattern and detected minerals of lime samples taken from Structure N4B1



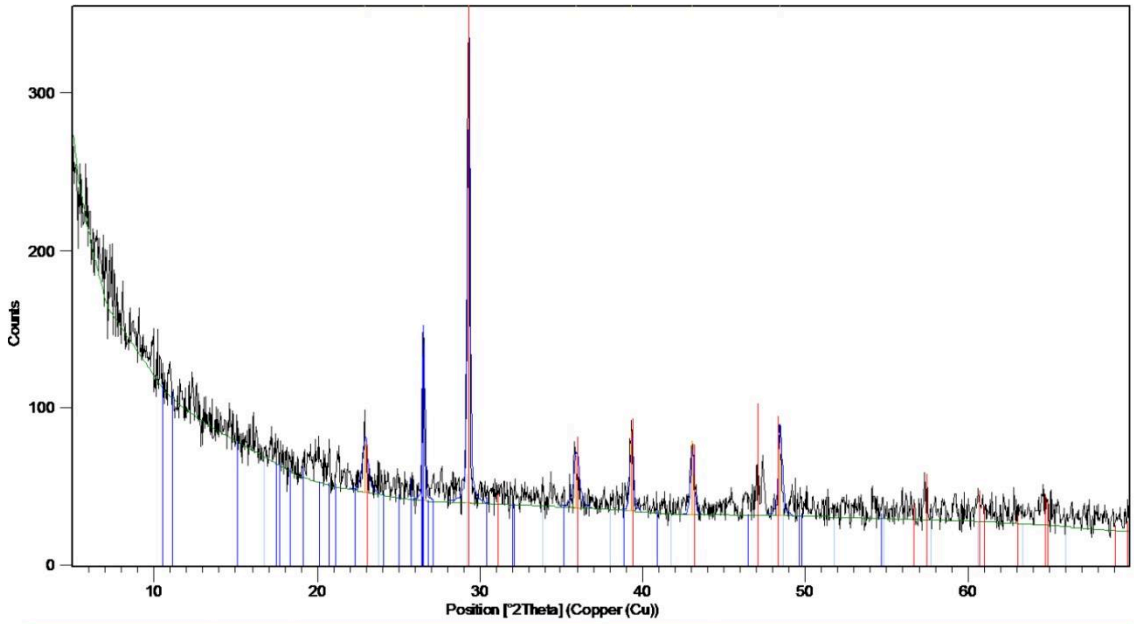
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-089-8938	37	á-Si O2, Quartz á	0,000	0,911	Si O2
*	01-086-2339	37	calcite high, syn	0,000	0,538	Ca (C O3)
*	01-083-1567	6	Kyanite	0,000	0,329	Al2 Si O5

Diagram 4.114: XRD analysis pattern and detected minerals of soil samples taken from Structure N4B1



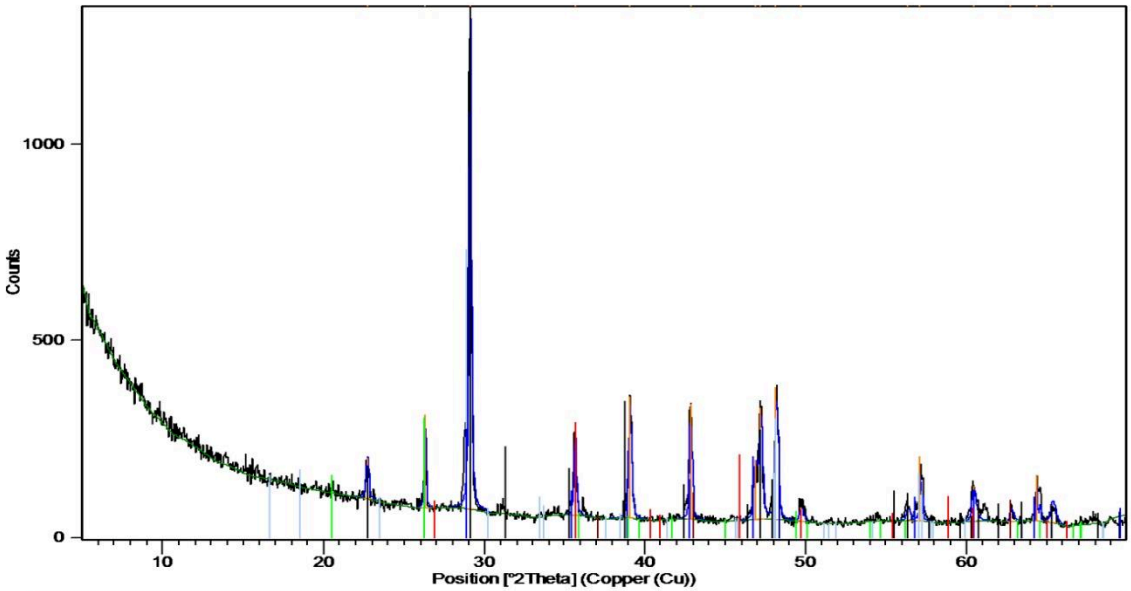
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-085-1462	20	nitratine, high, sodium nitrate(V)	0,000	0,243	Na (N O3)
*	01-072-1937	26	Calcite	0,000	0,222	Ca C O3
*	01-075-6871	19	Berlinite	0,000	0,100	Al P O4
*	01-073-1407	7	moissanite-57R, syn	0,000	0,043	Si C

Diagram 4.115: XRD analysis pattern and detected minerals of soil samples taken from Structure N4B2



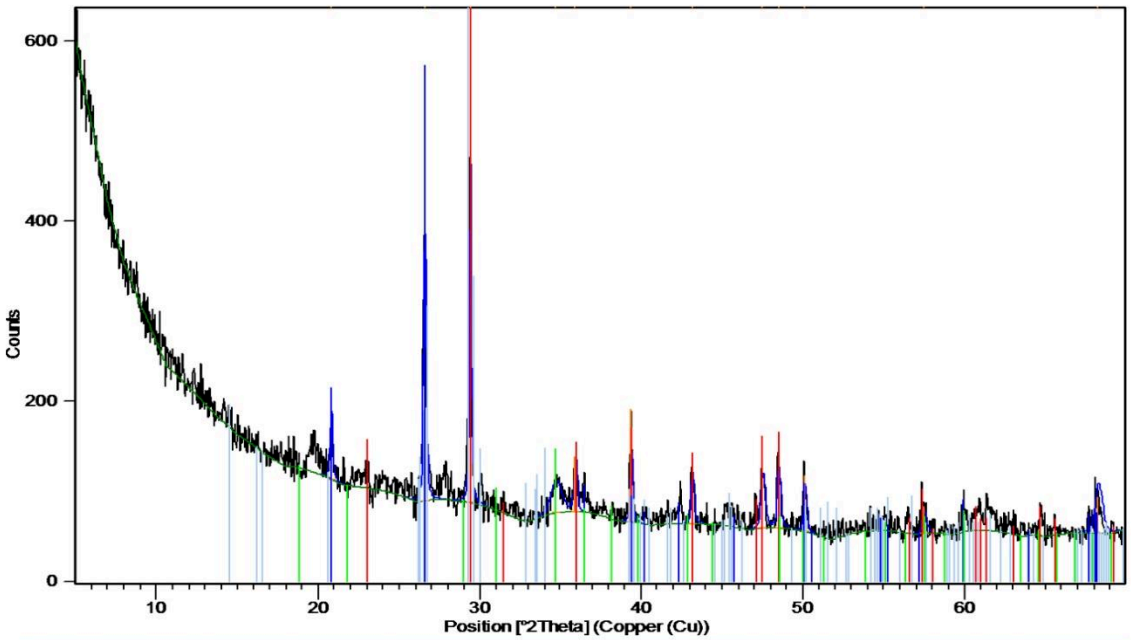
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-086-2340	31	calcite high	0,000	0,943	Ca (C O3)
*	00-054-2179	22	5-(4-Methoxyphenyl)tetrazole	0,000	0,315	C8 H8 N4 O

Diagram 4.116: XRD analysis pattern and detected minerals of lime samples taken from Structure N4B3



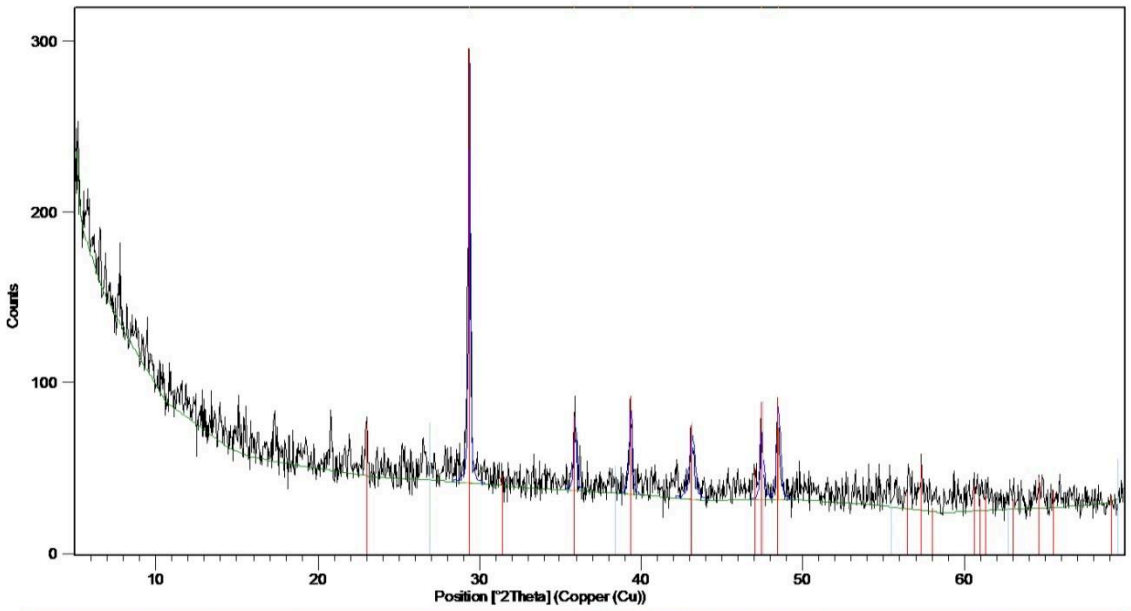
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-085-1462	45	nitratine, high, sodium nitrate(V)	0,000	0,965	Na (N O3)
*	00-003-0569	40	Calcite	0,000	0,149	Ca C O3
*	01-089-8951	21	á-Si O2, Quartz	0,000	0,169	Si O2
*	01-070-8515	19	magnesite HP	0,000	0,174	Mg (C O3)
*	00-003-0998	25	Periclase	0,000	0,051	Mg O

Diagram 4.117: XRD analysis pattern and detected minerals of lime samples taken from Structure N4B8



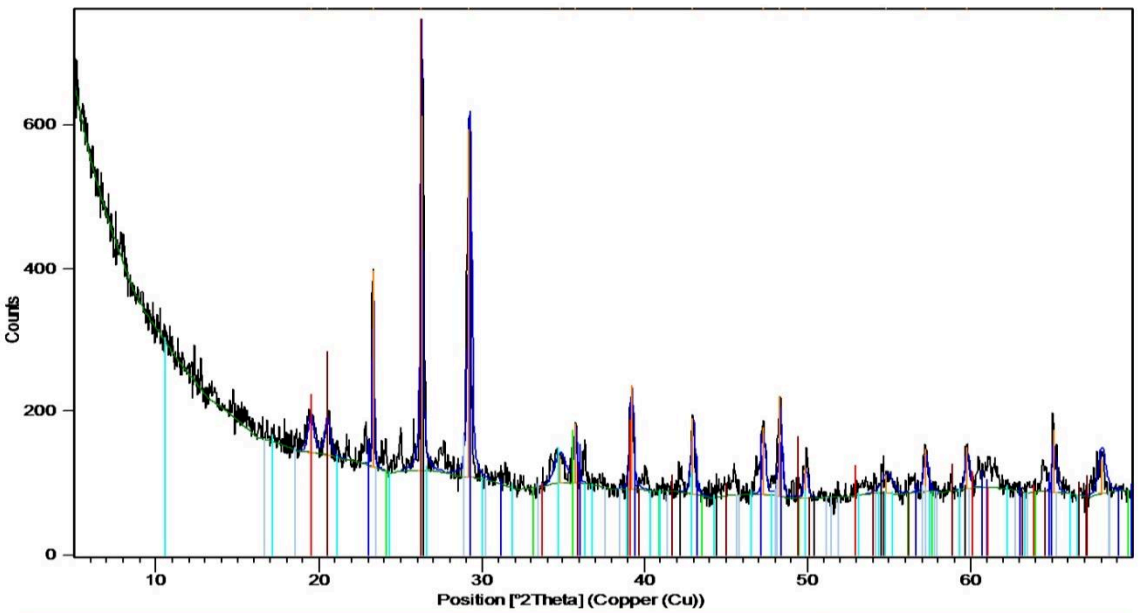
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-083-1762	60	Calcite	0,000	0,888	Ca (C O3)
*	01-089-8935	50	á-Si O2, Quartz á	0,000	0,757	Si O2
*	01-089-4372	8	Almandine	0,000	0,110	(Fe2.25 Mg0.42 Mn0.26 Ca0.08) (Al1.96 Fe0.04) (Si O4)3

Diagram 4.118: XRD analysis pattern and detected minerals of soil samples taken from Structure N4B8



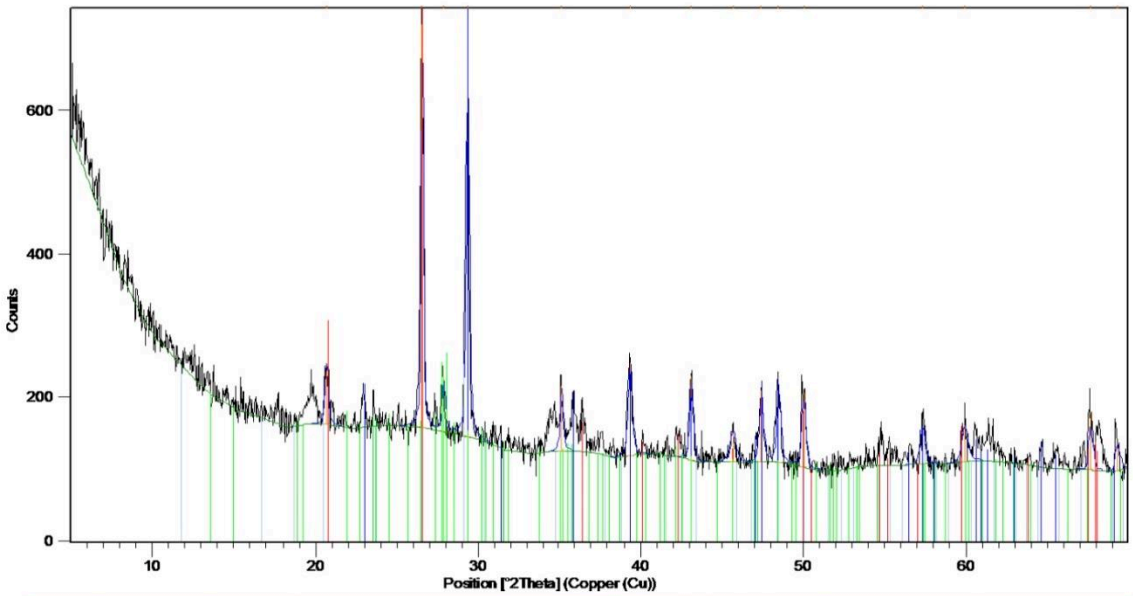
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-072-1937	58	Calcite	0,000	0,988	Ca C O3

Diagram 4.119: XRD analysis pattern and detected minerals of lime samples taken from Structure N4B9



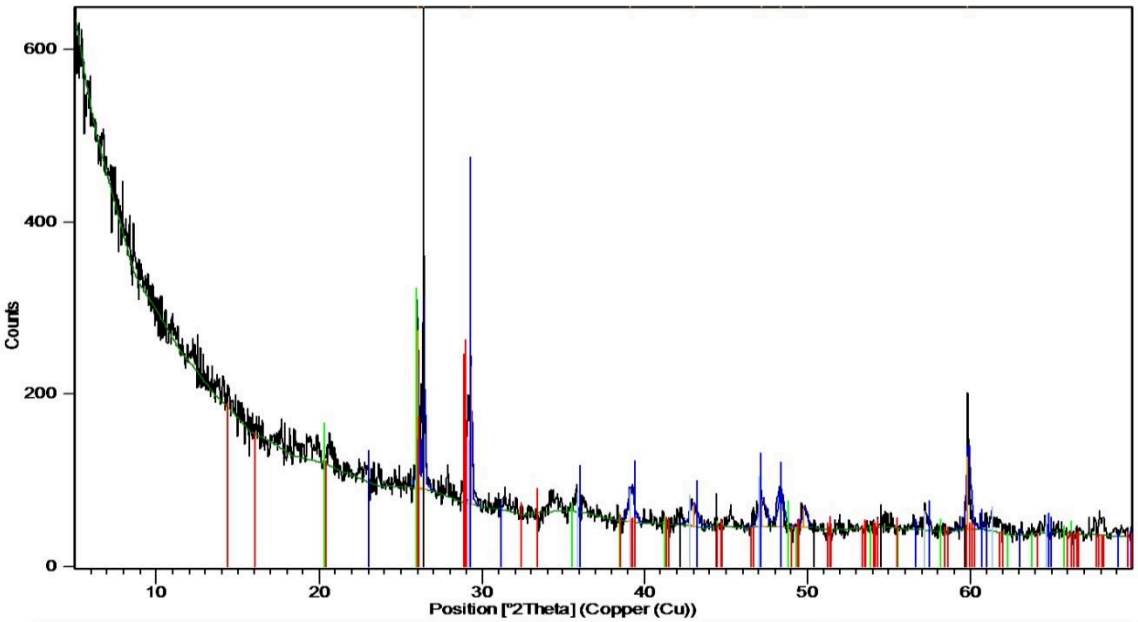
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	00-041-1487	36	C.I. Pigment Black 10, cliftonite, plumbago	0,000	0,716	C
*	01-086-2340	31	calcite high	0,000	0,524	Ca (C O3)
*	01-073-0603	30	iron(III) oxide	0,000	0,097	Fe2 O3
*	01-074-2581	23	Brucite - synthetic	0,000	0,127	Mg (O H)2
*	01-089-8951	36	â-Si O2, Quartz	0,000	0,935	Si O2
*	00-019-1112	11	Sakhaite	0,000	0,067	Ca3 Mg (B O3)2 (C O3) ·x H2 O

Diagram 4.120: XRD analysis pattern and detected minerals of lime samples taken from Structure N4B10



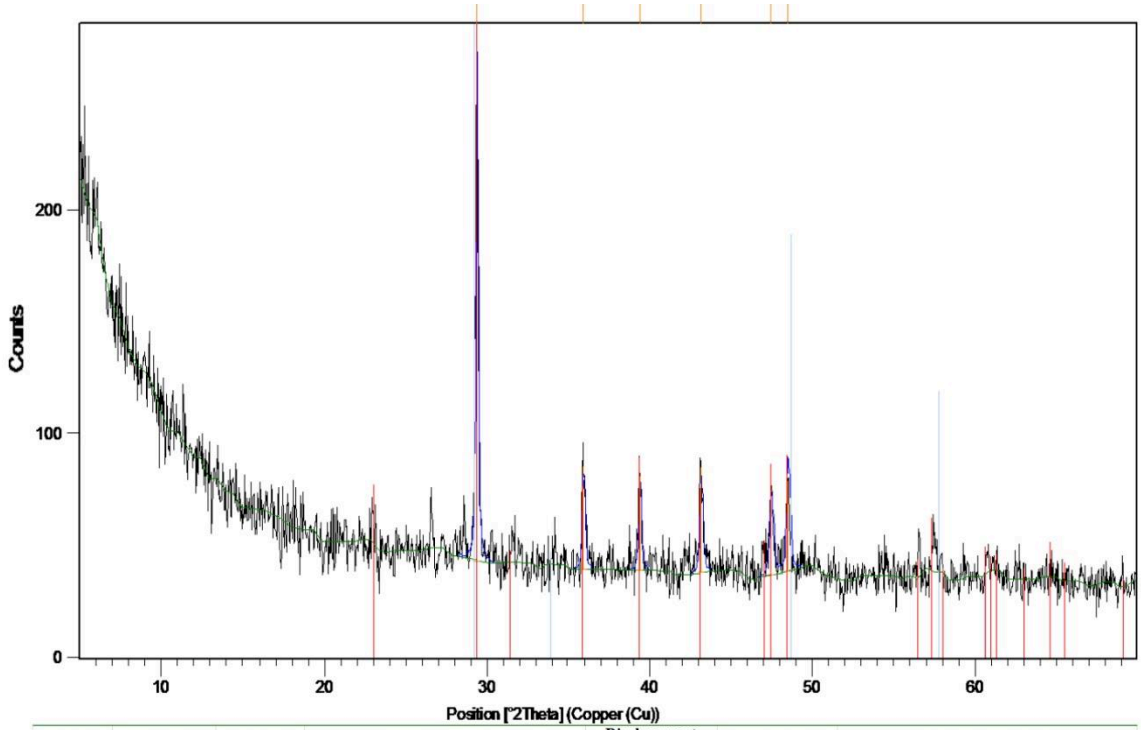
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-089-8936	56	á-Si O2, Quartz á	0,000	0,940	Si O2
*	01-072-1937	56	Calcite	0,000	0,836	Ca C O3
*	00-041-1486	10	Anorthite, ordered	0,000	0,149	Ca Al2 Si2 O8

Diagram 4.121: XRD analysis pattern and detected minerals of lime samples taken from Phase N3 at Area A



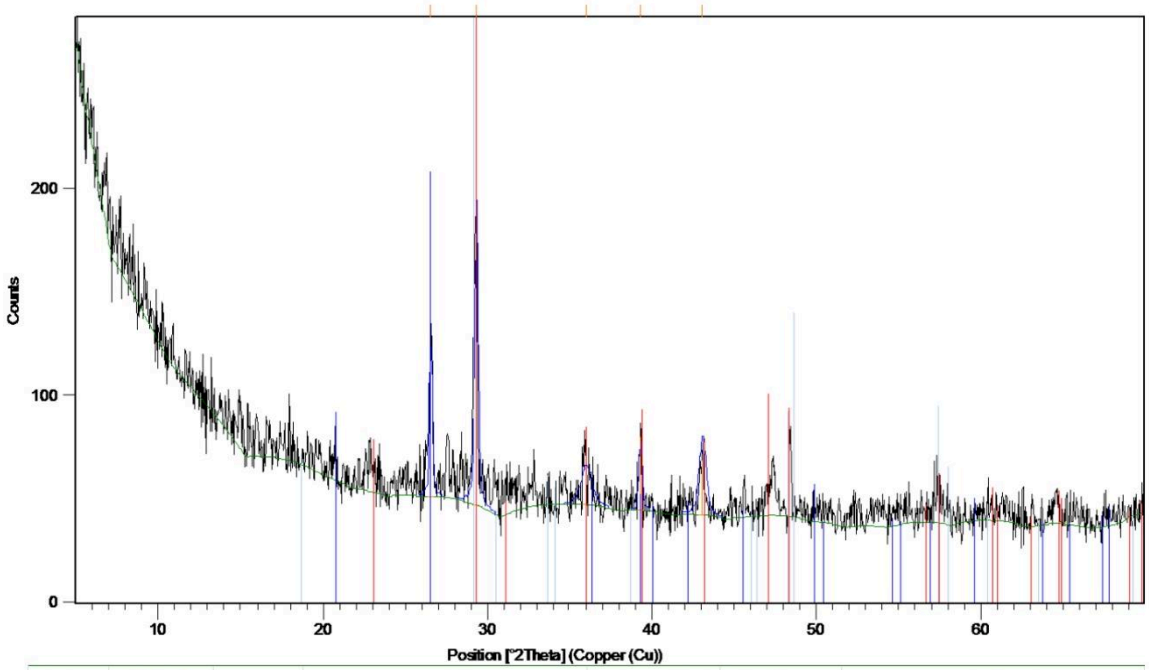
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	00-041-1487	46	C.I. Pigment Black 10, cliftonite, plumbago	0,000	1,000	C
*	01-086-2340	35	calcite high	0,000	0,619	Ca (C O3)
*	01-074-3486	19	Quartz low	0,000	0,359	Si O2
*	01-075-1381	15	Coesite	0,000	0,291	Si O2

Diagram 4.122: XRD analysis pattern and detected minerals of lime samples taken from Phase N3 at Area B



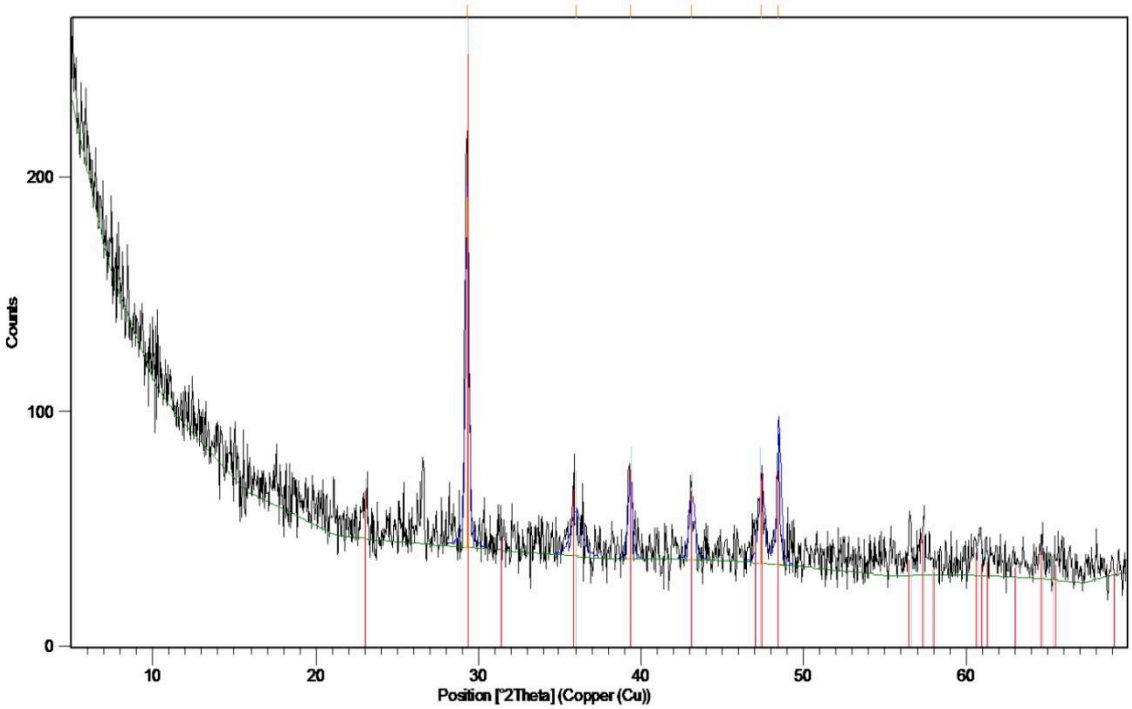
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-072-1937	60	Calcite	0,000	0,966	Ca C O3

Diagram 4.123: XRD analysis pattern and detected minerals of lime samples taken from Structure N2B2



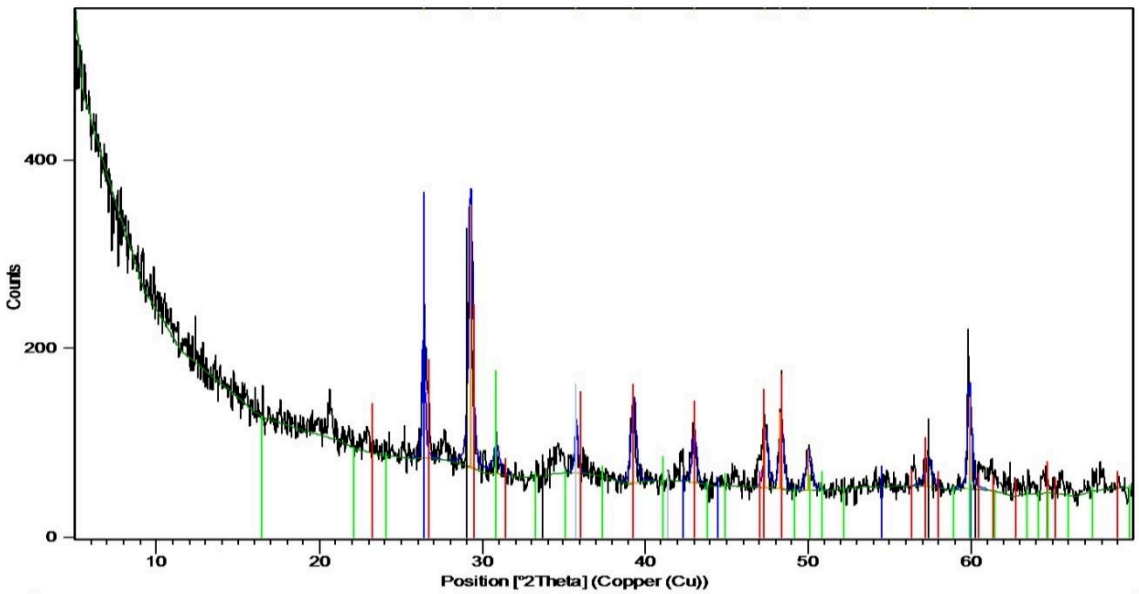
Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-086-2340	38	calcite high	0,000	0,981	Ca (C O3)
*	01-089-8937	27	á-Si O2, Quartz á	0,000	0,554	Si O2

Diagram 4.124: XRD analysis pattern and detected minerals of lime samples taken from Structure N2B8



Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-072-1937	53	Calcite	0,000	0,784	Ca C O3

Diagram 4.125: XRD analysis pattern and detected minerals of lime samples taken from Structure N2B10



Visible	Ref. Code	Score	Compound Name	Displacement [°2Th.]	Scale Factor	Chemical Formula
*	01-079-0043	38	Sphalerite, syn	0,000	0,450	Zn S
*	00-008-0415	36	Graphite	0,000	0,502	C
*	00-003-0596	32	â-Ca C O3	0,000	0,310	Ca C O3
*	01-075-3702	11	Dolomite	0,000	0,196	Ca Mg (C O3)2

Diagram 4.126: XRD analysis pattern and detected minerals of lime samples taken from Structure N2B12

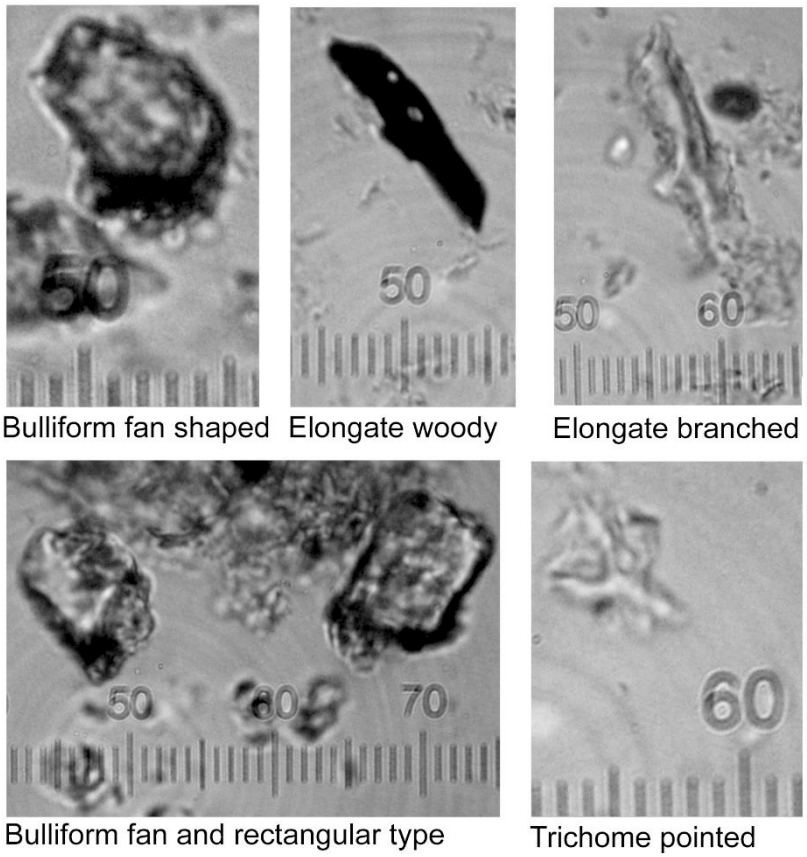


Figure 4.325: Bulliform shape, Elongate, and Trichome phytoliths determined of lime samples taken from architectural remains

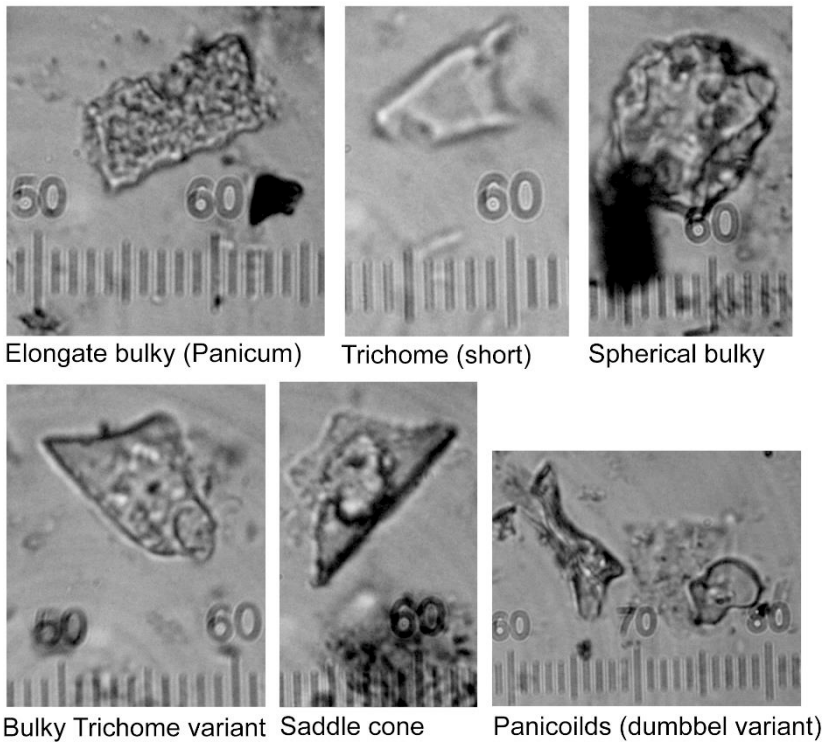


Figure 4.326: Elongate, Trichome and Panicoid phytoliths determined of lime samples taken from architectural remains

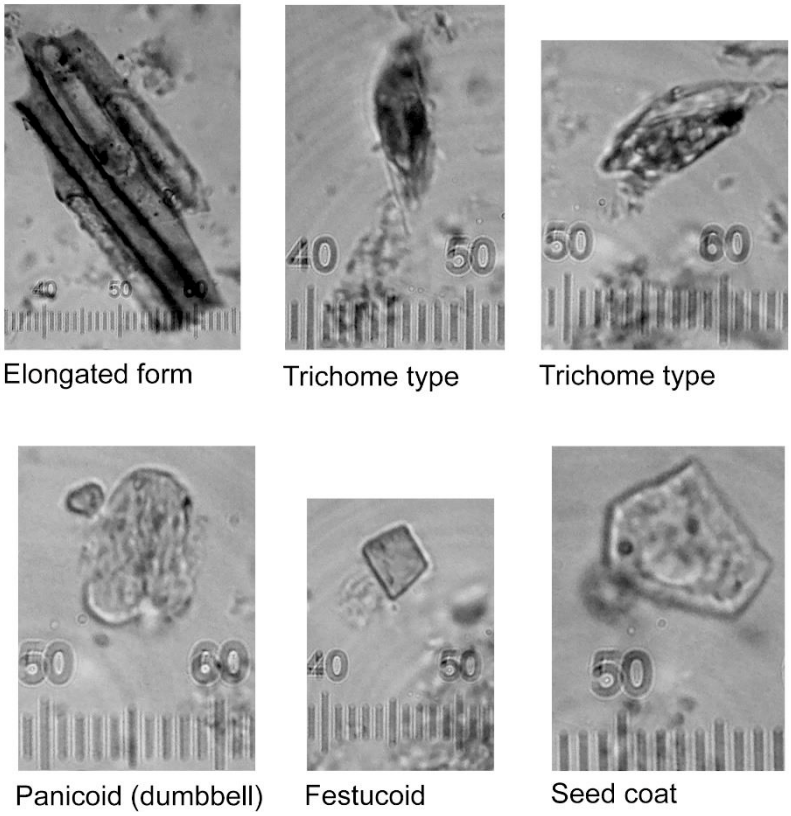


Figure 4.327: Trichome, Panicoid and Festucoid phytoliths determined of lime samples taken from architectural remains

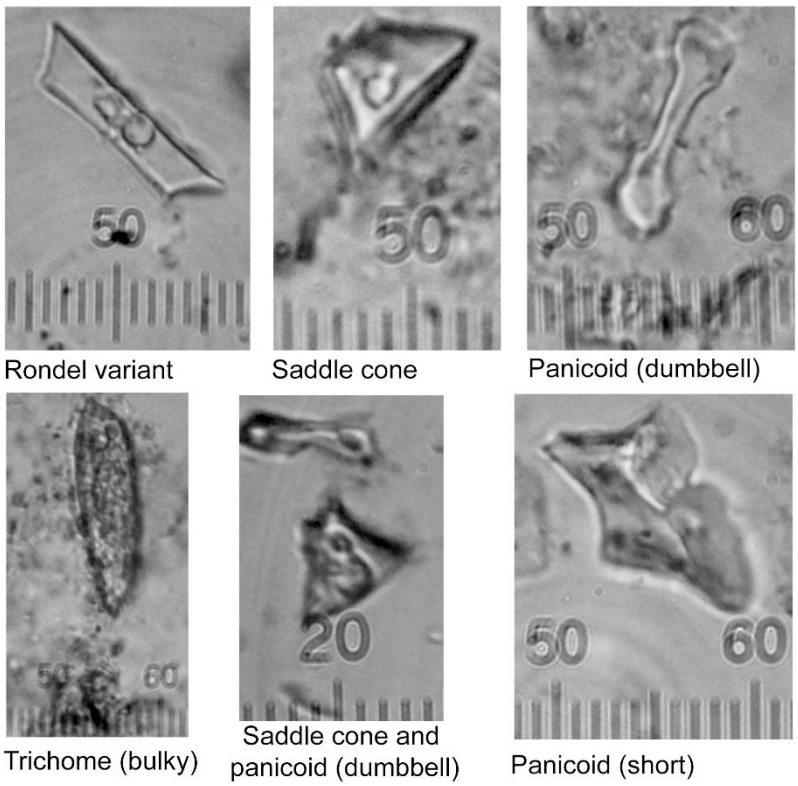


Figure 4.328: Trichome and Panicoid phytoliths determined of lime samples taken from architectural remains

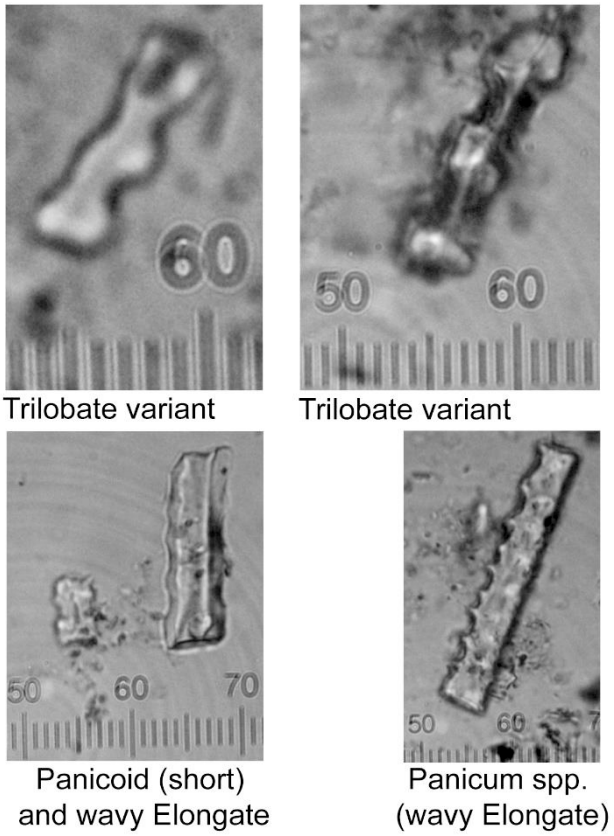


Figure 4.329: Trilobate and Panicoid phytoliths determined of lime samples taken from architectural remains

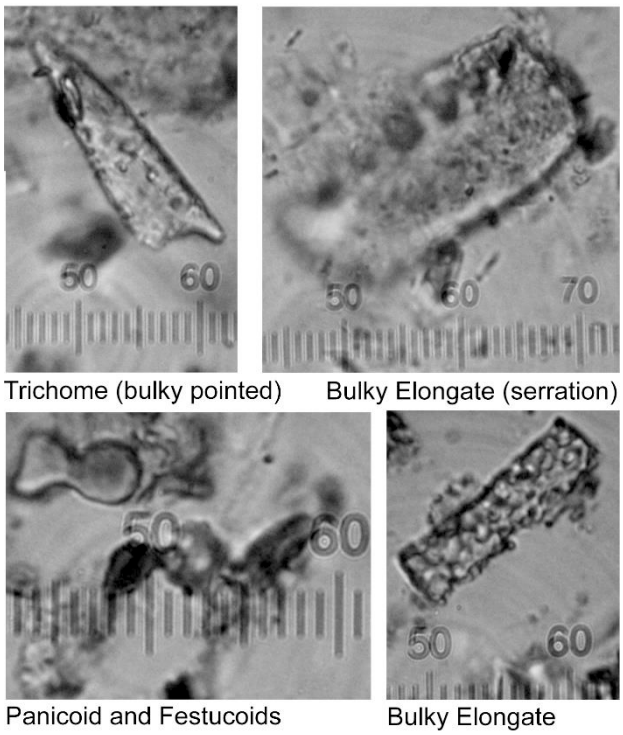


Figure 4.330: Trichome, Panicoid and bulky Elongate phytoliths determined of lime samples taken from architectural remains

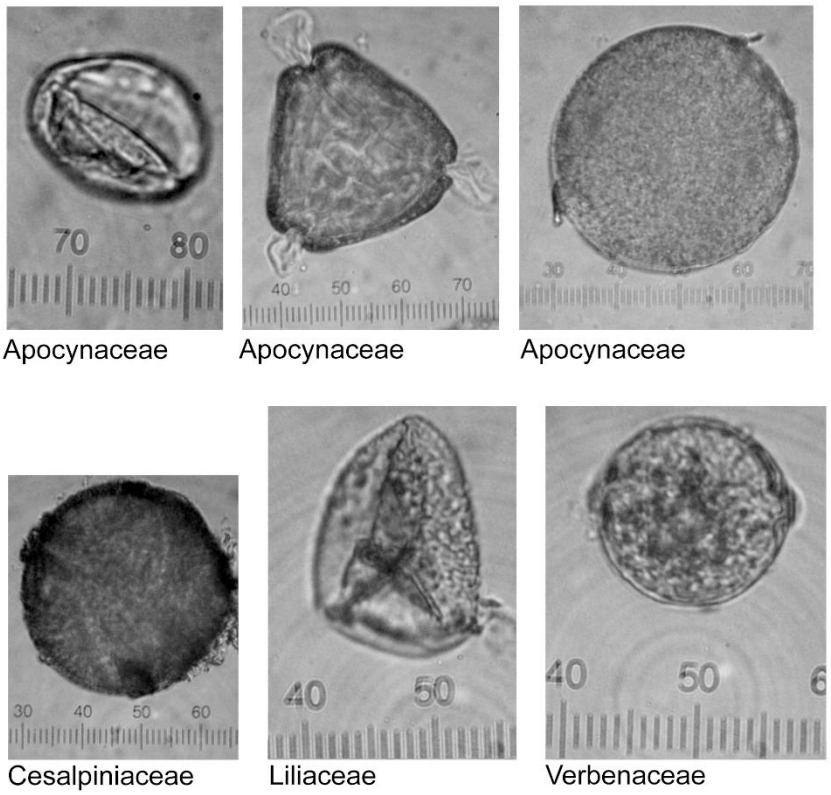


Figure 4.331: Apocynaceae, Cesalpiniaceae, Liliaceae and Verbenaceae pollens determined of lime samples taken from architectural remains

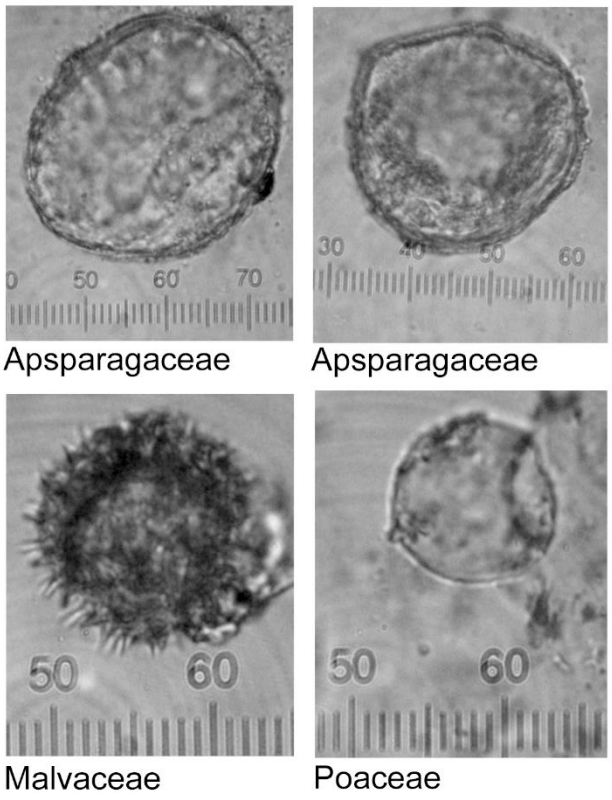


Figure 4.332: Apsparagaceae, Malvaceae and Poaceae pollens determined of lime samples taken from architectural remains

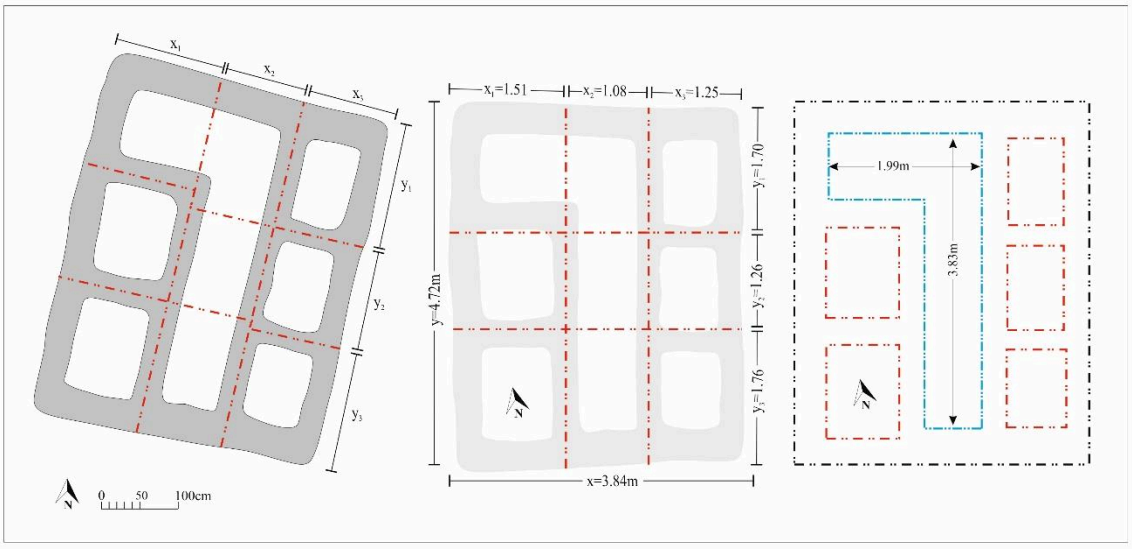


Figure 4.333: ***Geometric layout of Structure N6B1***

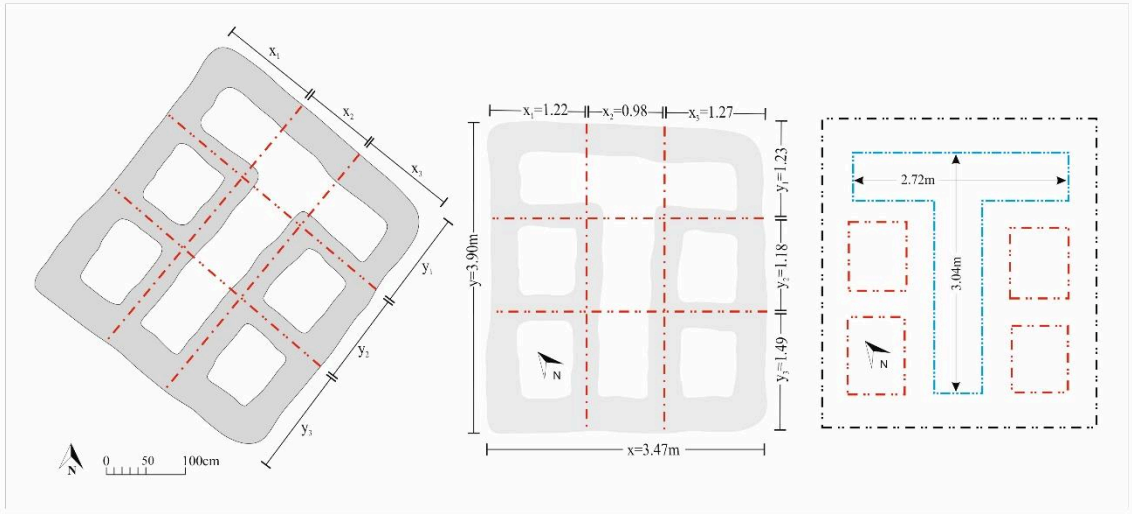


Figure 4.334: ***Geometric layout of Structure N6B6***

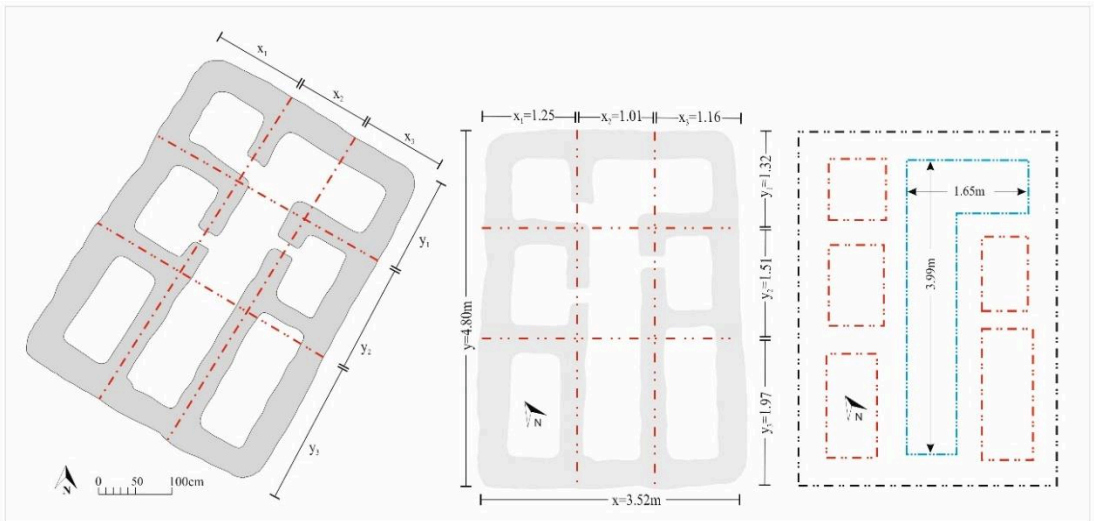


Figure 4.335: ***Geometric layout of Structure N6B5***

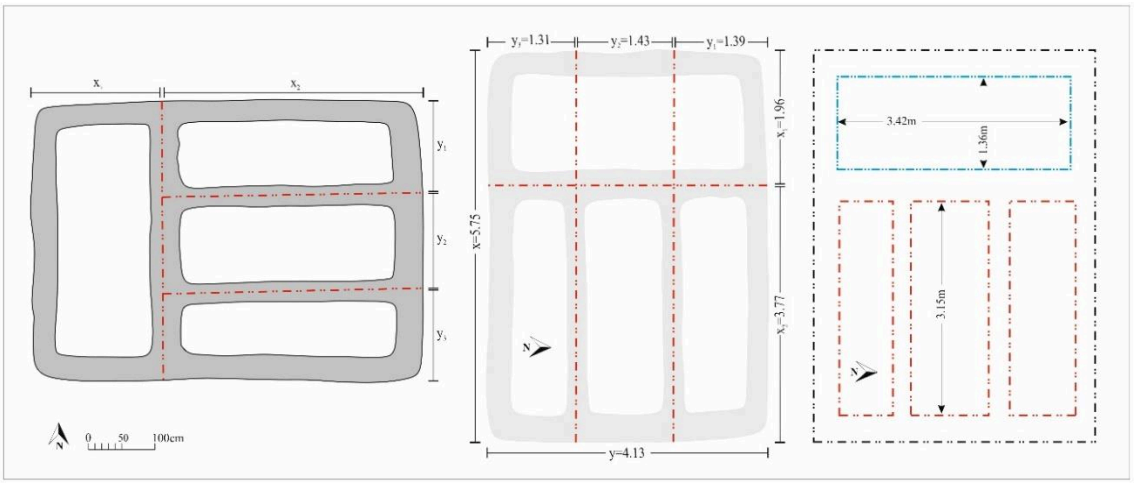


Figure 4.336: ***Geometric layout of Structure N4B10***

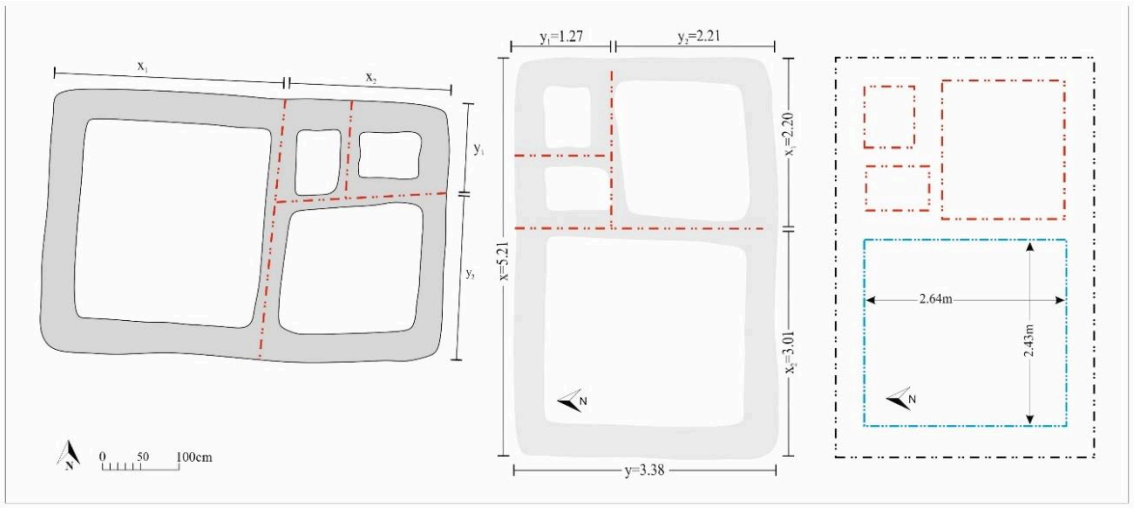


Figure 4.337: ***Geometric layout of Structure N5B3***

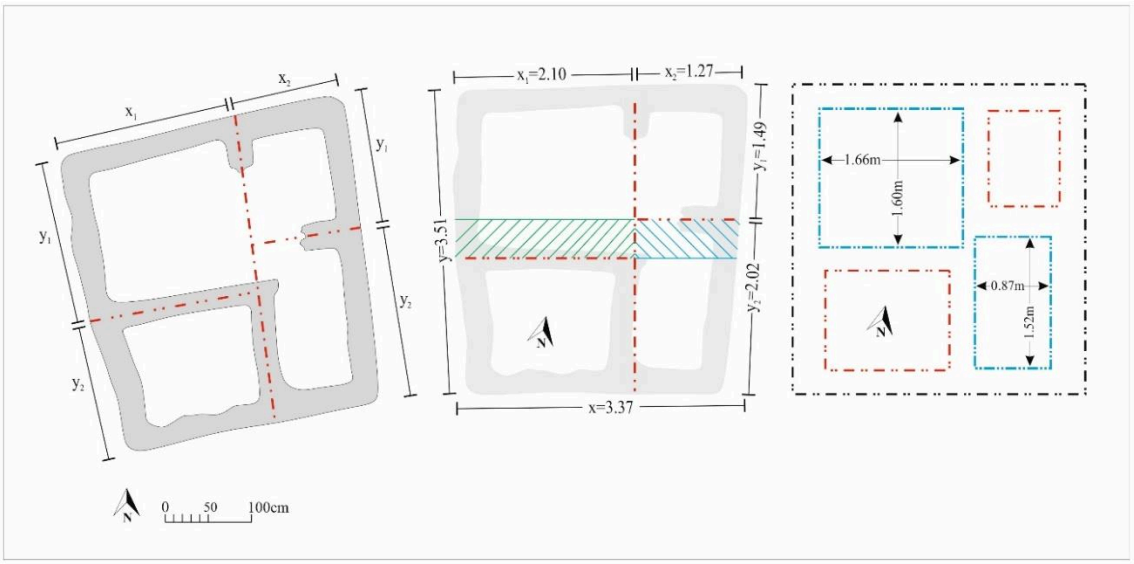


Figure 4.338: ***Geometric layout of Structure N5B12***

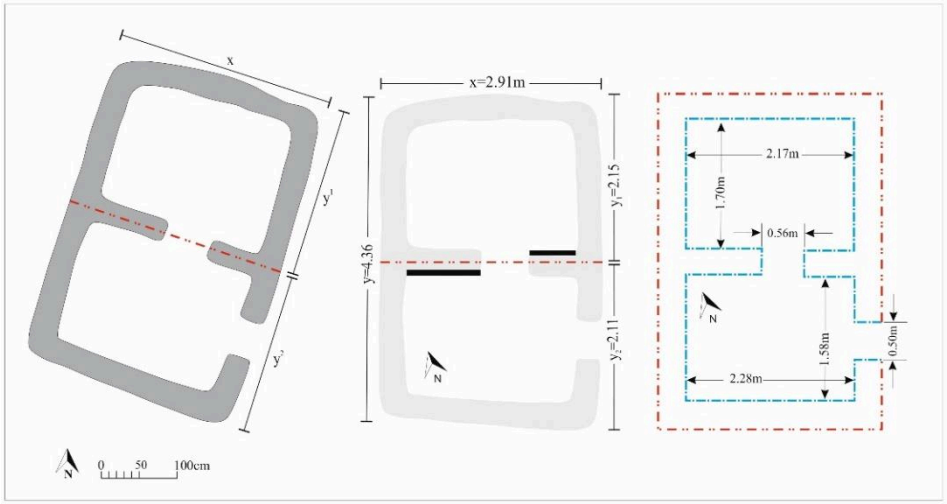


Figure 4.339: ***Geometric layout of Structure N4B1***

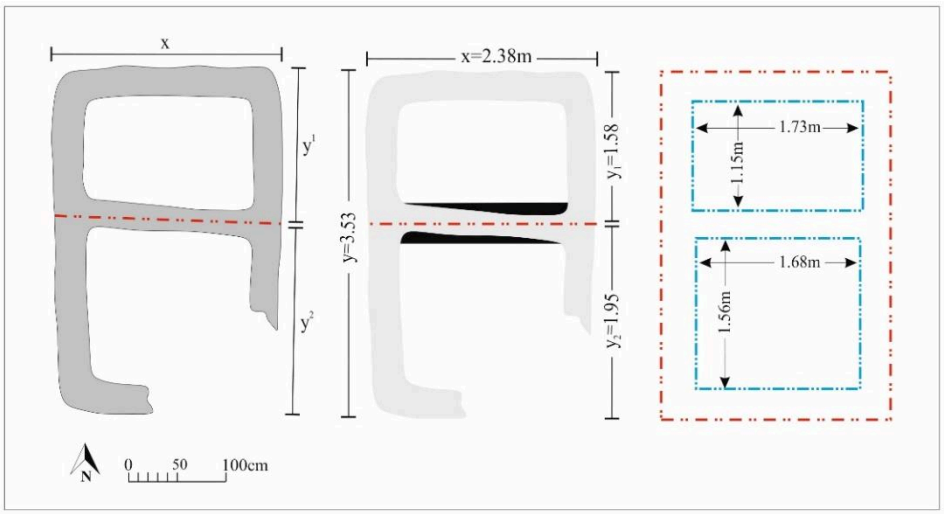


Figure 4.340: ***Geometric layout of Structure N5B4***

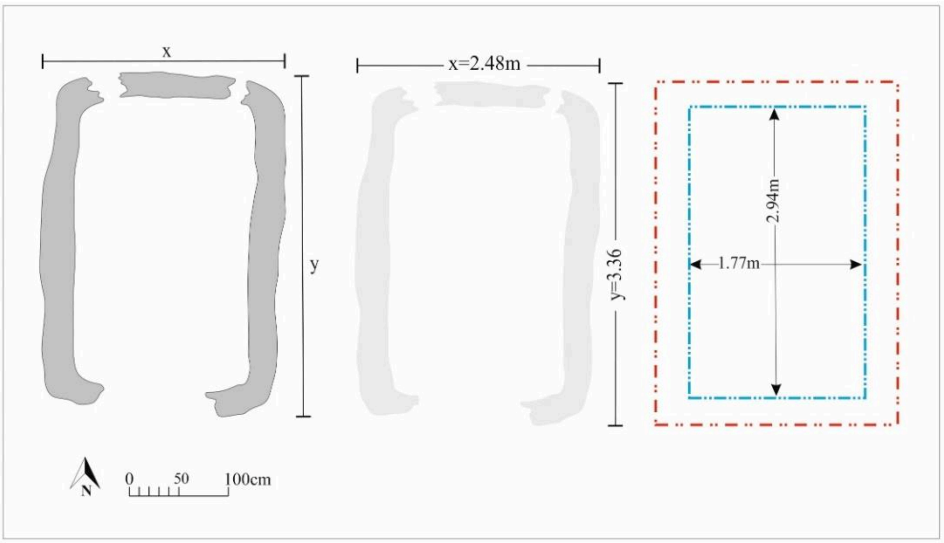


Figure 4.341: ***Geometric layout of Structure N5B5***

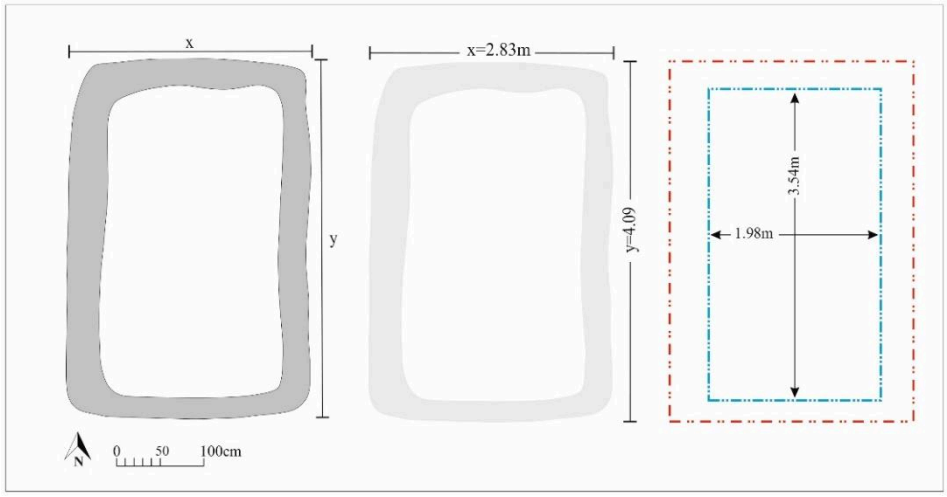


Figure 4.342: ***Geometric layout of Structure N4B9***

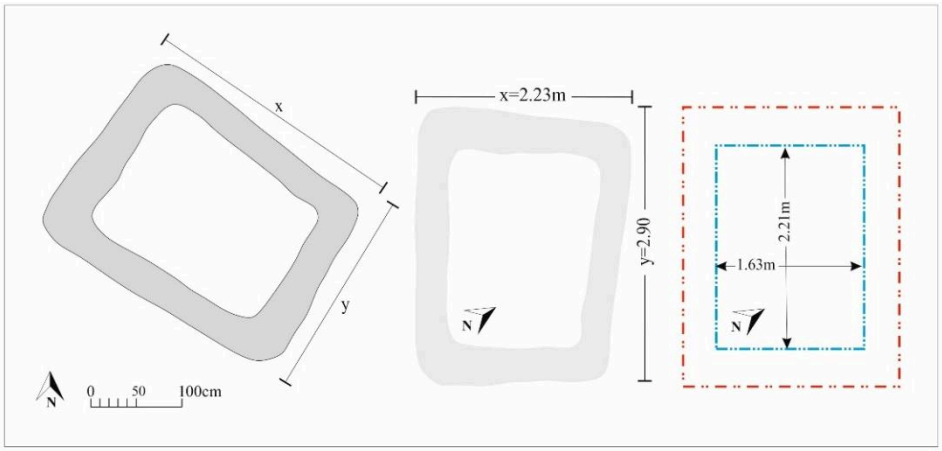


Figure 4.343: ***Geometric layout of Structure N6B7***

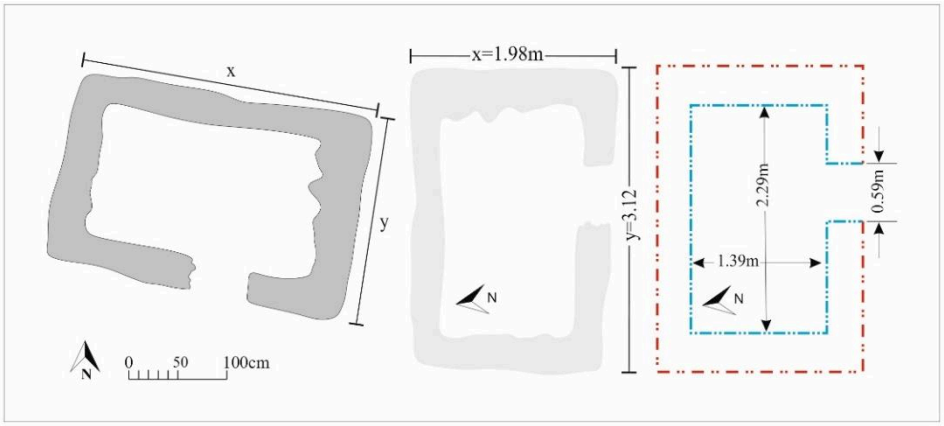


Figure 4.344: ***Geometric layout of Structure N6B15***

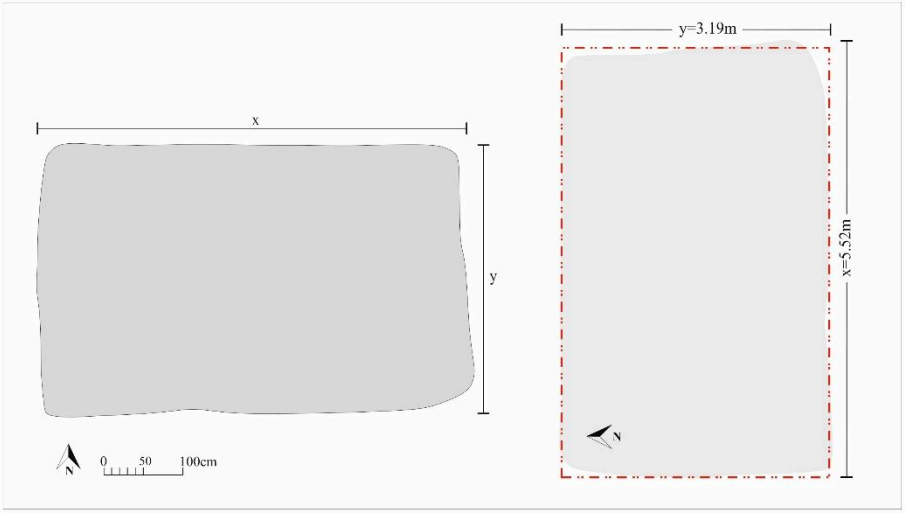


Figure 4.345: ***Geometric layout of Structure N2B10***

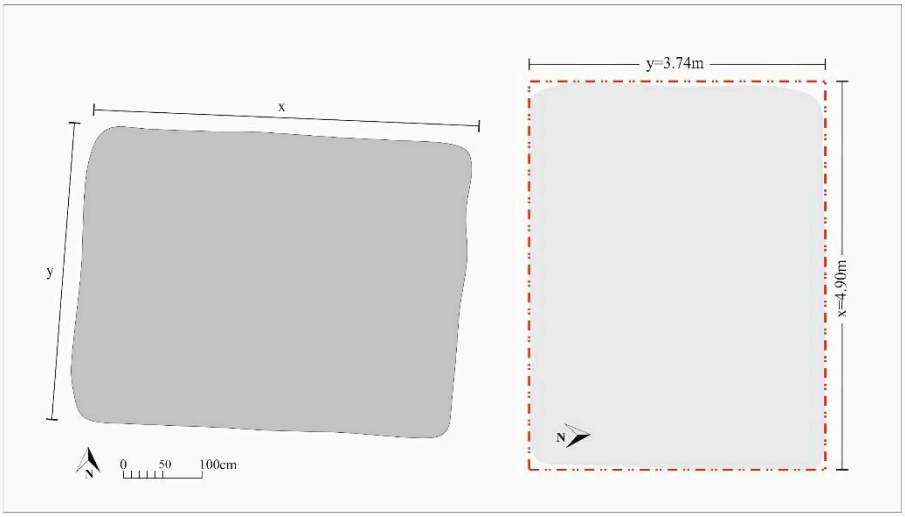


Figure 4.346: ***Geometric layout of Structure N2B11***

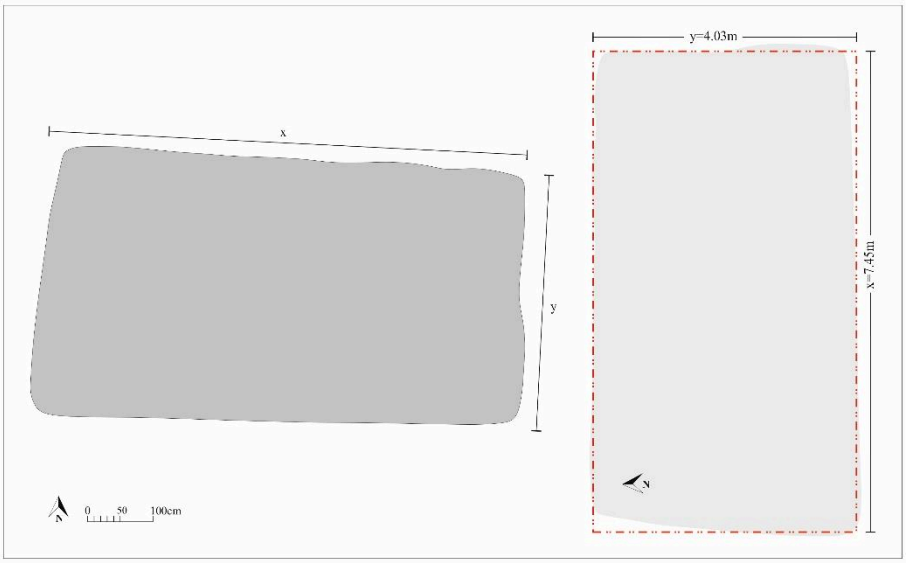


Figure 4.347: ***Geometric layout of Structure N2B12***

CHAPTER V
SEMI-NOMADIC PASTORALISTS IN THE LOWER GARZAN BASIN: ARCHITECTURE AND SETTLEMENT PATTERN

> *"Today it is more evident that human communities do not show a single cultural association in chronological order nor lived at certain levels in the same order. Depending especially on geographical and regional differences, the life style of communities, as well as the stages that they pass though, differs accordingly. In certain situations of social development, behaviours are no longer a necessity - they are "preferred" as a life style. Therefore, culture that is emerging from the harmony of geography and living, reflecting historical progress, transforms into a structure that is adopted and preferred."* (Büyükcan Sayılır, 2012: 565)

Ethnographic methods and observation have a long history of use by researchers concerned with the reconstruction of prehistoric human behaviour and cultural patterns based on archaeological data. Ethno-archaeological methodology is one option for comparing ethnographic and archaeological data. (Stiles, 1977: 87) It is also from this perspective that the archaeologist hopes to identify archaeologically a certain observable pattern in a living site. (Binford, 1983: 23)

The aims and needs of the field of ethno-archaeology, along with a presentation of the methods of obtaining data needed by archaeologists in explanation and interpretation, are worth discussing. Ethno-archaeology has been accused of limiting archaeological interpretation of past modes of behaviour to known modern analogues. (Stiles, 1977: 87) Archaeologists have always studied societies through archaeological, historical and ethnographical evidence. (Patterson, 2008: 66) The complexity of social structures and the presence of multiple variables make multi-disciplinary work a necessity. It is necessary to look at different perspectives in order to understand social structures and to formulate generalisations. This plays an important role in understanding pastoral nomadic communities and the way they lived in the past. (Beardsley, 1953: 24; Cribb, 1991: 52; Rosen, 2003: 751; Watson, 1980: 56-57) The relationship between the past and today is studied with regard to cultural materials such as architecture, weaving, tool variety, tool making techniques, and the social structure of past societies is interpreted in terms of the archaeological point of view.

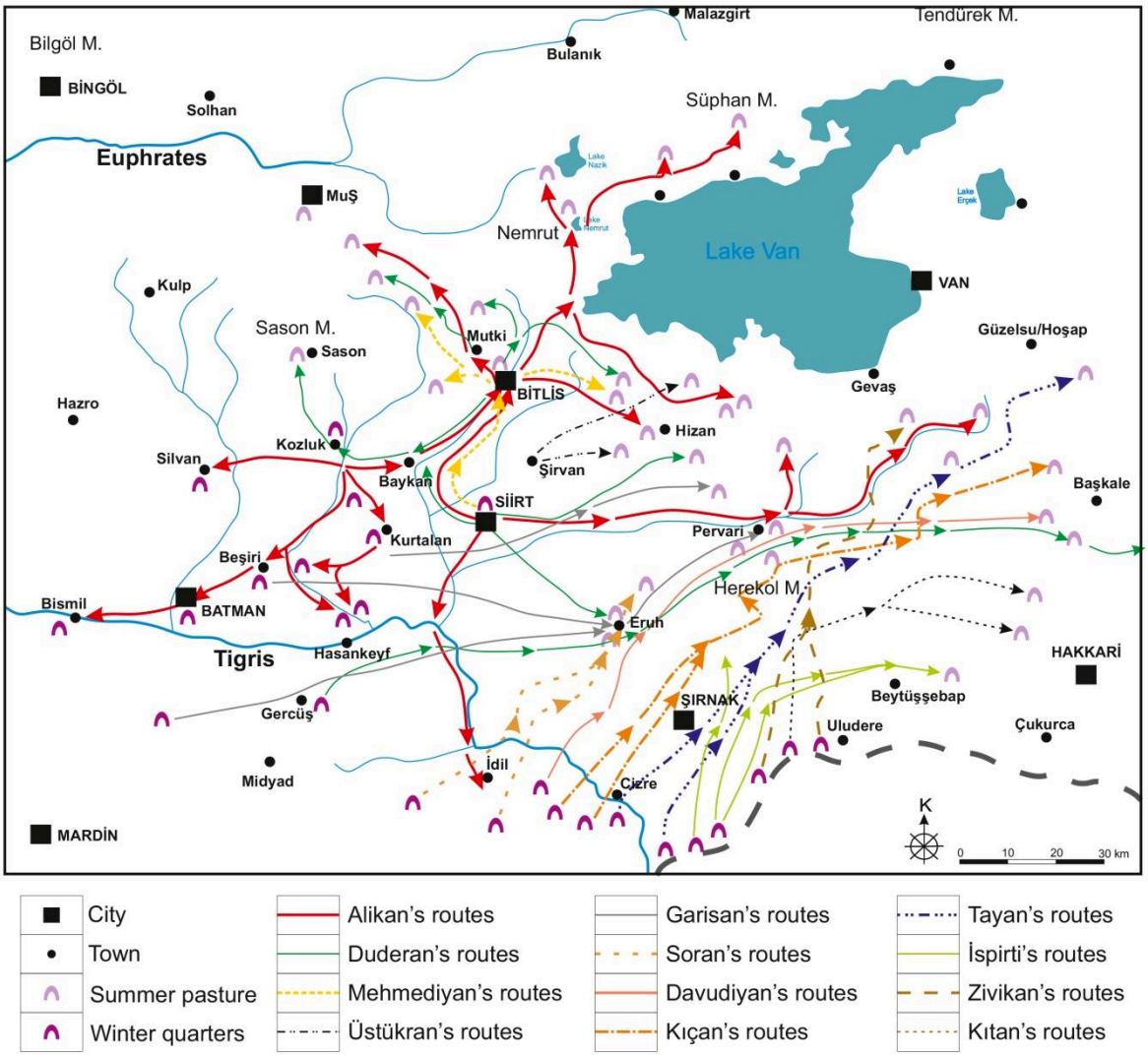


Figure 5.1: Migration routes of semi-nomadic tribes in Northern Mesopotamia and Southeast Anatolia (Adapted from Beşikçi, 1969: Map 2)

Pastoralism has played an important social and economic role in the Near East for thousands of years. (Ur & Hammer, 2009: 54; Akkermans & Duistermaat, 1996: 28; Khazanov, 2009: 122-124; Cribb, 1991: 10) In other words, the semi-nomadic lifestyle is key to historical developments in Upper Mesopotamia. (Figure 5.1) The pastoral nomads or herding nomads' fieldworks affect interpretations of past Near Eastern nomadism. This focus on pastoral economies has brought to light the fact that there are actually many different types of pastoral nomadism in the Near East, especially from the Syrian steppe zones to the Taurus mountain range. (Szuchman, 2009: 2) It seems that alterations in terms of household mobility were/are contingent upon group decisions affected by various cultural, economic and political considerations or other events. In some periods or locations, the dominant economic pursuits exert a less significant influence on the nomads' subsistence economic

system. Pastoralism has nonetheless always been an integral part of Near Eastern society and its economy. Especially in the mountainous regions of the Near East, such as Upper Mesopotamia, pastoralism was the dominant economic pursuit until less than a century ago. (Abdi, 2003: 395-396)

The study of architectural structures in relation to semi-nomadic pastoralism can help us to understand their lifestyle. However, material culture is not just a tool that is passively used by people as they follow strategies dictated by environmental and social adaptation or social behaviour. (Hodder, 2008: 28) Most of the ethno-archaeological studies in Anatolia have focused on the production processes of 'similar objects' found in archaeological contexts such as pottery (Yalman, 2005: 23) or different artefacts (Whittaker, et al., 2009: 94; Bordaz, 1969: 75). In this chapter, I should emphasise that I did not focus particularly on the artefacts in daily use by the semi-nomads; instead, their social structure and settlement pattern shall be highlighted rather than their material goods. Within this context, the distinguishing feature of this study is that the nomadic lifestyle is observed in terms of their architectures and campsites.

5.1. A semi-nomadic pastoralists group: Alikan Tribe

In the nomadic system, as well as its social infrastructure, the concept of the group is linked to line of descent, which forms the basis of social structure in the east, especially the southeast of Anatolia. (Beşikçi, 1969: 7) Within the scope of field work, the nomadic groups representing semi-nomadism sociologically have been identified as the *koçer*, and they are also divided into multiple groups and branches. Nomadic communities not only own identification but also use the tribal or group family names that they belong to. For instance, ex-semi-nomadic families connected to the Alikan Aşireti (tribe) in Yazıhan village and Gedikli hamlet and its vicinity introduce themselves as *Dibo*. Even when they become sedentary, they still identify themselves as Dibo, Koçer as well as Alikan. A similar nomenclature has also been observed among the semi-nomadic communities of the Lower Garzan Basin.

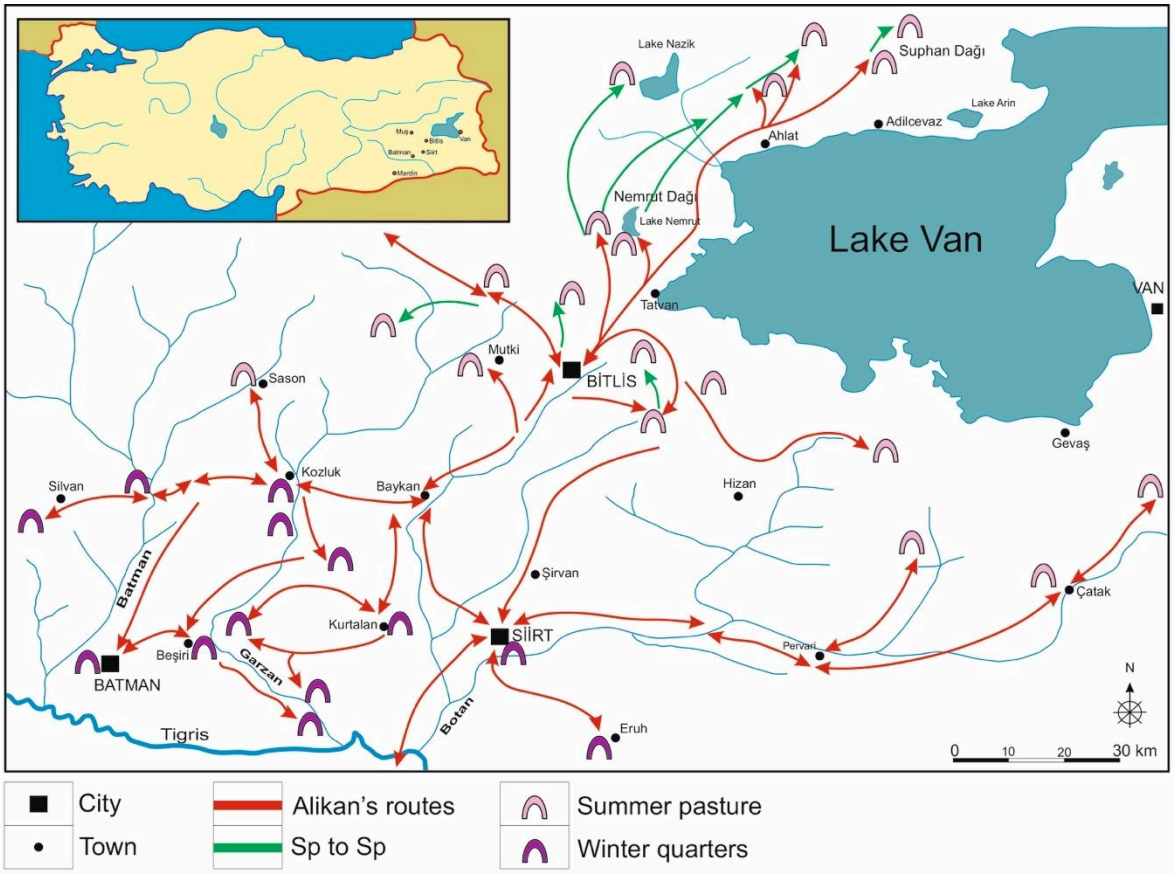


Figure 5.2: Migration routes of Alikan Tribes (Adapted from Beşikçi, 1969: Map 3)

The Alikan tribe selects its winter quarters particularly in the steppes of the Garzan Valley, Beşiri, Kurtalan, Kozluk, Silvan, İdil, Cizre districts, and their surrounding areas. High altitude summer pastures are mainly located around Aveberdan, Kariz, Nemrut Dağ, Süphan Dağ, Düav, Çatak, Zövaser, and Lake Van. (Figure 5.2) (Beşikçi, 1969: 94, 95) The Alikan tribe is more-or-less the largest of the semi-nomadic tribes in Batman, Siirt and Bitlis districts and their vicinity. Within the scope of this thesis, there are two reasons for studying this tribe. The first is their active use of the Lower Garzan Basin for temporary settlements as the Sumaki Höyük Neolithic settlement, the second, perhaps the most important reason, is that their structures are comparable to the Sumaki Höyük Neolithic Period architectural structures. In his doctoral dissertation and other publications, İsmail Beşikçi has described the Alikan tribe, according to its social structure and mobility pattern, as "Factual Nomadism". (Beşikçi, 1969: 13) Rather than enjoying free movement, the mobility pattern of the Alikan tribe can be described as a movement in spring and autumn between two geographically different regions used as winter quarters and summer pastures. (Figure 5.3, 5.23 – 5.25)

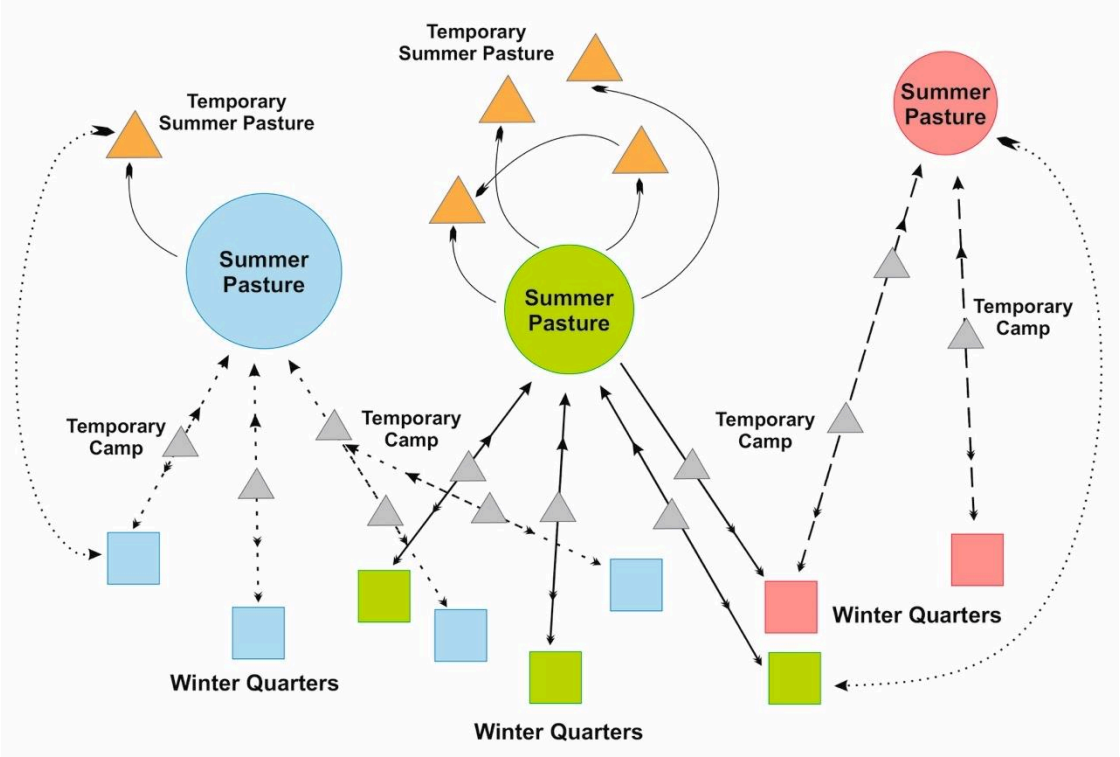


Figure 5.3: Mobility of semi-nomadic groups between winter quarters to summer pasture

Within this context, it would be more accurate to define the migration movement as *semi-nomadism*, which has been staying at certain times in certain areas such as winter quarters and summer pastures, and following a predetermined route between these two areas. Therefore, the so-called nomadic movement will be defined as semi-nomadic within the scope of this thesis. The most basic reason not to define them as "Semi-Settled" is that the concept of property based on land has been totally out of question in the so-called groups, neither in their winter quarters nor in their summer pastures. Although it resembles a semi-settled model from the seasonal campsite point of view, the instability of these campsites and their changeable characteristics mean that these groups should be defined as "Semi-Nomadic".

The pastoral ecosystem has three main elements: people, herds and environment. Seasonal campsite selection in nomadic communities is directly related to the topographical conditions, climate, and vegetation. Seasonal selection and the density of campsites may vary according to the environment. (Beşikçi, 1969: 43) The Alikan tribe migrates rather slowly. Gradual migration or movement comprises periodic short breaks at areas that were previously determined to cover their basic needs on the migration route. The duration of this gradual migration from winter quarters to summer pastures and vice-versa on foot differs from 30 to 50 days, depending on the distance to the occupation area. Preparations for

migration start 10-15 days before the movement of the first group. During migration, tents and all requisite materials are carried by the leading group, the camp preparation group.



Figure 5.4: A semi-nomadic group passing down the Garzan Basin

Migration to the winter quarters and the summer pastures on foot is not done directly. The group stays for one to four days in Temporary Camp areas. (Figure 5.26 – 5.28) Women move ahead on the pre-defined route, which has been used for centuries. The precursor group, which predominately consists of females, travels with structural materials such as poles, tents and basic kitchen equipment carried by draught/pack animals, donkeys and mules. (Figure 5.4) The main duties of the precursor group are to prepare the Temporary Camp areas (Figure 5.29 – 5.31) to meet the needs of the group and to milk the animals. During the migration from winter quarters to summer pastures at the beginning of spring, the distance between the precursor group and the males herding animals is always close. The reason for this is the increase in the amount of milk taken from sheep, which have given birth in winter, and the necessity of these sheep to be milked almost every day. The distance between these two groups is shorter and stopovers are more frequent during the spring; resting periods are also shorter. Migration in the spring is a little longer than the duration of migration in the autumn. One of the reasons for this is milking, while the other reason is to take advantage of newly-sprouting fresh pasture. (Beşikçi, 1969: 52)

The distance of the migration both ways is almost 200 km in total; but the distance may be shorter depending on the location of the winter quarters or summer pastures. On the other hand, insufficiencies of pastoral or fertile areas along with domestic hostilities may also cause migration from one highland to another. While migration is southwards to warmer areas and winter quarters in November (Cribb, 1991: 185-211), migration is towards high mountain areas to the north or northeast with summer pastures in April. Due to differences and variations in climate, the migration may take from 1 to 15 days. The Alikan tribe spends 4-5 months of the year in the Lower Garzan Basin as their winter quarters. They spend 4-5 months of the remaining period in bi-directional migration to the highlands in north or eastern Anatolia.

Written records, oral and field data show that the mobility of the Alikan tribe is between two areas, the Garzan basin as winter quarters, and Nemrut and Süphan mountains in the summer as well as other mountainous areas in the same region. However, it was determined that some groups preferred northeast of the Garzan Basin - especially Çatak and its surroundings - for summer pastures before the 1970s. (Beşikçi, 1969: Harita 2) Records from 1882 also support this case. Here it is stated that some groups related to the Alikan tribe, which use the environs of Rıdvan (Redwan) as winter quarters, have around 400-500 tents and some groups use Çatak and its surroundings as summer pastures. (BNA, FO 424/132)

Climatic, topographic and floral variations in the seasonal campsites -northern summer pastures and southern winter quarters- of the semi-nomadic Alikan tribe display different features. While summer months are rather dry and hot in the southern lowlands, the highlands in the north are quite cool. It follows that winter is quite cold in northern areas while the low plains in the south are rather milder. Therefore, the existence of fresh and green pastures in the chilled northern areas provides favourable conditions for livestock. (Beşikçi, 1969: 49) Finding pastures for livestock on steppes not covered with snow is favourable when compared to the northern areas. Plateaus in the south are not higher than 750 meters and are fragmented by the Tigris River and its tributaries, as well as by seasonal streams. Semi-nomadic groups move between the two regions in a north-south direction, parallel to Garzan and Bitlis streams.

Whether individual or social, ownership is a fact. Involvement in ownership can be explained in individual or communal terms, or a social connection between the two. Semi-nomadic communities analysed within the context of this study are not able to develop a

commitment to the land - especially where the settlement area exists - due to their temporary, irregular bond with a specific area. They cannot form a possession-focused relationship with their living space, and thus to their individual place. (Beşikçi, 1969: 105) The most apparent case illustrating the possession concept in nomadic communities is livestock. The concept of individual possession is rarely observed. The dominant and determining possession is the communal one. Animals owned by the community form a communal concept of possession rather than individual. The livestock we are talking about here is sheep-goat breeding. (Figure 5.23 – 5.25) Cattle-breeding requires special care and is not suitable for nomadic life. For pack animals, horses, mules, and donkeys are preferred.

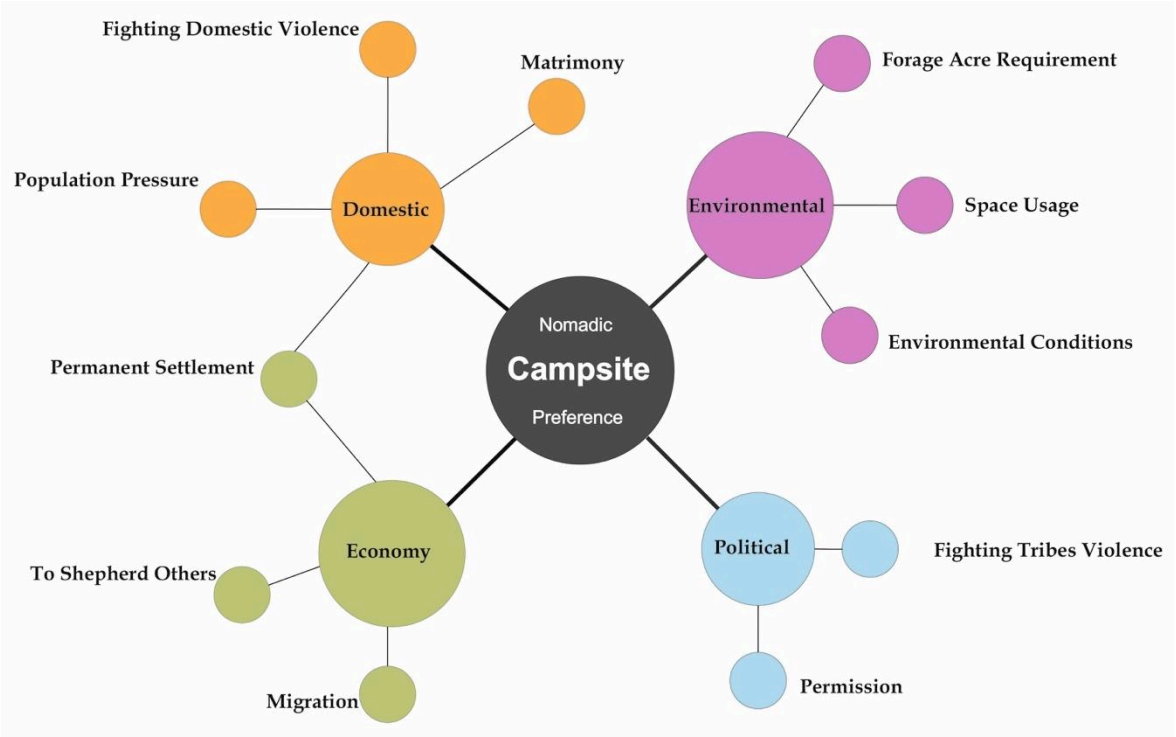


Figure 5.5: Reasons for accommodation and migration of semi-nomadic groups

Since campsites or pastures for occupation are spaces identified and appropriated by permanent villages, the residents of the village make agreements solely with a number of specific nomadic groups. This agreement may be based on a monetary arrangement, as well as taking care of the animals in the village or supplying animal products such as cheese, milk, or wool. Agreements are generally based on verbal agreements or, in some cases, written contracts; which may vary according to each village or group. (Figure 5.5) Agreements are generally made for a year as well as seasonally (Ur & Hammer, 2009: 40) but according to our ethno-archaeological studies, sometimes agreements are made for 3 to

5 years, such as at Bazivan Kom, Memikan Kom and Mezrik Kom. Any kind of hostility that may occur between the two parties is resolved to the benefit of the settled group. This forces the semi-nomadic pastoralists, who are not legally bound to a particular piece of land, to search for a new place the following year. As well as the above arrangements or agreements of cooperation, the farmers in villages allow the *Koçer* to use their grain as fodder (wheat, rye and barley) by leaving it in the field after harvesting. In recent years, with the increased planting of corn in the Garzan Basin, the remainder of corn stems and harvest residuals after the corn cobs are cleared during the harvest is reserved for the herds of the *Koçer*.

The basic element in the choice of location for winter quarters is the existence of broad, fertile areas with a water supply where the nomads can feed their livestock. Another determining factor is the availability of raw materials for dwellings such as stone, brushwood, reeds, etc. It is important for the settlement area to be naturally sheltered and offer safety, with proximity to nearby settlements such as villages or towns to provide the necessary forage for periods when the flora decreases or its fertility is lower. Marketing opportunities, especially for products such as cheese, milk, and wool supplied through exchange or sale, is also important for settlements. Within this context, three types of campsite model have been identified, based on ten winter quarters that were observed and followed up in the field work.

5.2. Arhitecture of semi-nomadic groups in the Lower Garzan Basin

Besides variations in the organization models of winter quarters, there is also diversity in structure types. In the Lower Garzan Basin, dwellings constructed and used by semi-nomads either for residence or as pens have been classified into seven types according to their construction technique and building material as well as different combinations, as below.

- Type 1 (T1) > Wattle Structures
- Type 2 (T2) > Stone-Walled Wattle Structures
- Type 3 (T3) > Stone-Walled Tentsites
- Type 4 (T4) > Wattle-Walled Tentsites
- Type 5 (T5) > Brushwood-Walled Tentsites
- Type 6 (T6) > Mixed-Walled Tentsites
- Type 7 (T7) > Tents

5.2.1. Wattle Structures (Type 1)

A rectilinear structure with "walls" made of a series of reed bundles carried by a wooden frame and posts is the basic description of these dwellings. In simple terms, these dwellings look like "huge upside-down baskets". They are represented by 16 examples in the Garzan Basin, constructed at Memika Kom, Mezrik Kom, and Bazivan Kom. Ten or twelve wattle reeds with their leaves attached are made into a bundle; then these bundles are placed next to one another and woven tightly with fresh leaves. The bottom parts of the wattle bundles are buried 5-6 cm in the ground and then covered with earth and securely pressed. This wattle screen, wrapping the whole structure like a curtain, is 12-15 cm thick and 220 cm high on average. (Figure 5.6, 5.32 – 5.47) The top fringes of the wattle screen are intertwined with a platform made out of reeds, like a bouquet or garland, which form the upper top. Branches surrounding the screen bundles integrated with the structure's upper woven joints in an oval shape make the structure into a whole.

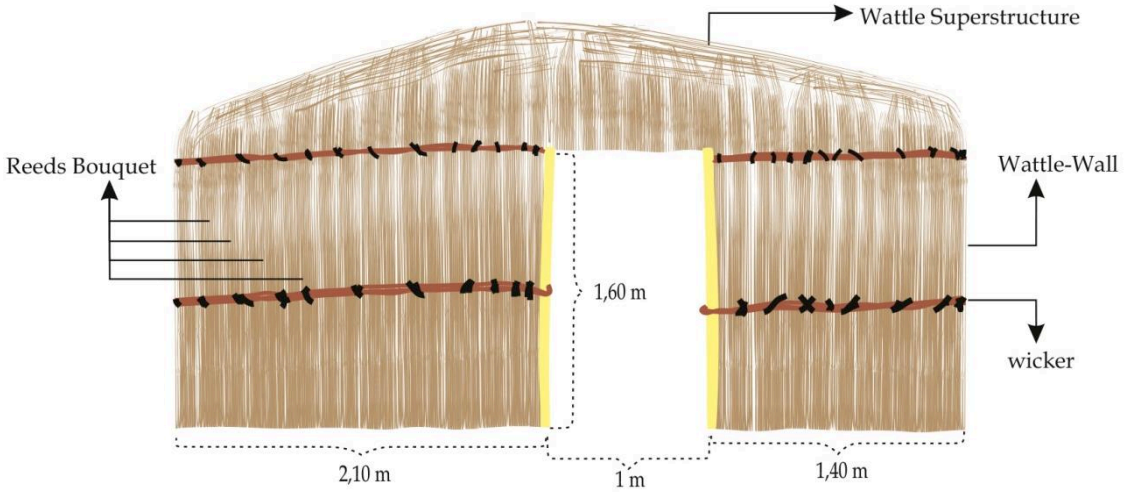


Figure 5.6: Architectural elements of a Wattle Structures

Nowadays, frames and posts are made of the poplar tree. In former times, the thick wattle reed called *Zirc* by the locals was used. *Zirc* ripens only at the end of March until mid-April and is collected in that period. [15] This type of example was not encountered in the field studies, and generally, poplar branches were used as structural bearing components. (Figure 5.30, 5.31, 5.43) The stretch and therefore the strength of the structure, which is constructed

[15] Oral interview with Abdullah Zilan (Uzunçayır village / Batman), November 2012

solidly both with tight weaving and ridgepole parts, is increased by ropes tied to large rocks. (Figure 5.32, 5.33) This *Wattle Structure* is covered by a tent in very cold and rainy seasons.

According to oral interviews with *Koçer* members, to build a wattle structure takes about a month. Usually the men are responsible for cutting and collecting the reeds while women deal with the weaving process, but most of the time they share the work. This type of structure was encountered at Memika Kom, Mezrik Kom and Bazivan Kom in the Lower Garzan Basin. According to Koçer Ömer, from the Memika Kom, the wattle structures can last 7-8 years with partial repair.

5.2.2. Stone-Walled Wattle Structures (Type 2)

Rectangular *Wattle Structures* are encircled by stone surroundings. Construction of the Wattle Structure part of the dwellings is similar to the ones of the *Wattle Structures with stone surroundings*. Stone surroundings are constructed of middle-sized (20x30 cm) and relatively large cobbles (30x40 cm on average) without mortar. They are generally 40-50 cm thick, and 50-70 cm high (in 4-5 rows). The approximately 1 m-wide openings are sometimes on the long axis and sometimes on the short axis. (Figure 5.7, 5.48 – 5.57) Although I did not have a chance to see the process during construction, it seems that the stone walls are built just after erecting the wattle structure. There is no standard in the dimensions of the structures; they differ between 18.5x7.2 m and 14.5x6.9 meters. There is no actual flooring; the ground inside hardens with constant usage.

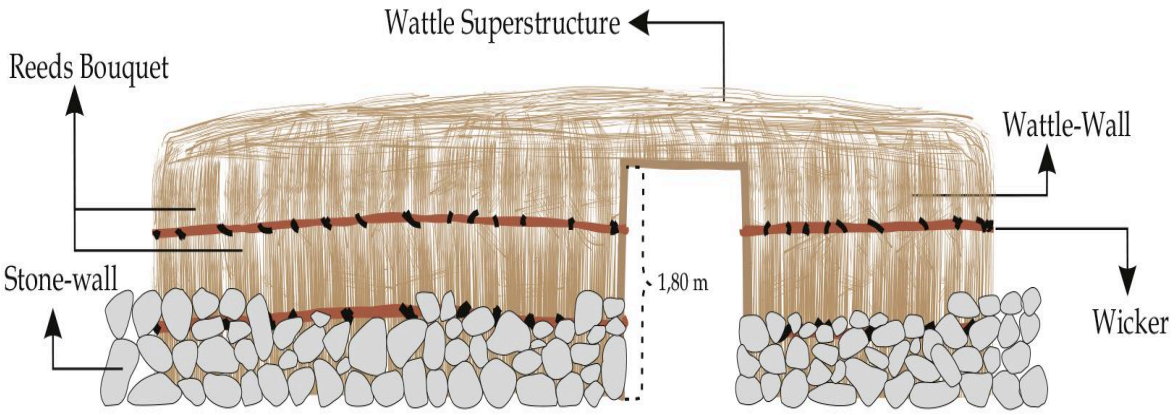


Figure 5.7: Architectural elements of a Stone-Walled Wattle Structure

This type of dwelling is represented by 12 examples in the Garzan Basin, at Sulan Kom, Çemisitrin Kom and Işıkveren Kom II. The best examples are at Işıkveren Kom II. Since I did not have the opportunity to meet anyone from the Işıkveren Kom II winter quarter, I have no information on how long construction takes for this type of structure.

5.2.3. Stone-Walled Tentsites (Type 3)

The general definition of this type is that rectilinear stone surroundings serve as "walls" for the mobile tents. Erected with non-stable poles, the tent is stretched by sacks filled with stones that are either tied or sewn around the tent. Poles are not embedded in the ground, but stand with the stretched forms within themselves. (Figure 5.8, 5.58 – 5.63)

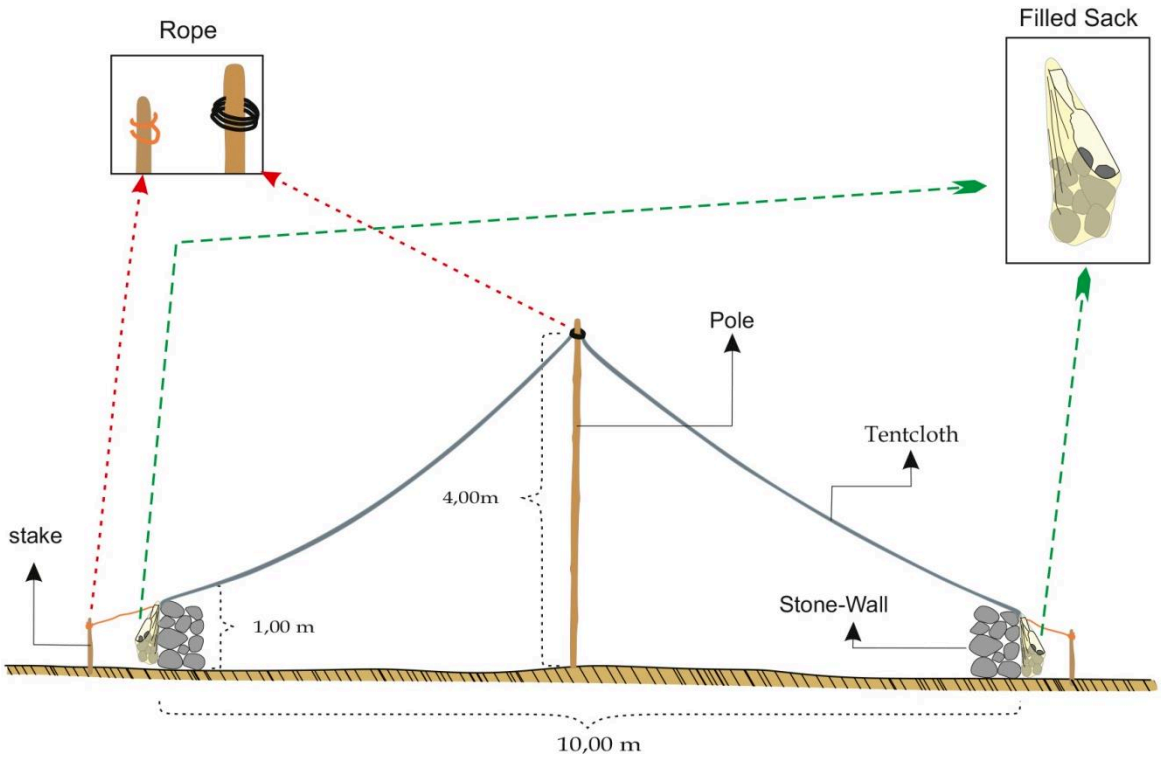


Figure 5.8: Architectural elements of a Stone-Walled Tentsites

This stretching enables the tent not only to be erected tightly but also to be unaffected by precipitation. Stone surroundings are constructed of middle-sized (20x30 cm) and relatively large stones (30x40 cm on average) without mortar. They are generally 25x60 cm wide, and their height ranges from 40 to 80 cm (3 to 6 rows). Examples such as the 125 cm-

high stone surroundings at Işıkveren Kom I winter quarters also exist. Earth-filled sacks as at Sulan Kom or kerpiç blocks taken from ruined village buildings such as at Şeyhosel Kom winter quarters lie on the upper rows of some of the surroundings. Stone surroundings have a maximum of two openings, either on the long or short sides. There is no standard in the dimensions of the structures, which vary between 21.9x11.5 and 6.2x5 meters.

Construction of the stone surroundings, which requires some hard labour, takes about 10 days and they can remain standing for a long period of time with minor alterations. Every mature person of either sex has responsibility for helping to construct the surroundings. From my observations, I can say that *Koçer* women are extremely skilful in this kind of construction. Examples existing for more than 10 years have been identified at Sulan Kom, Sulane Girgiz Kom, Işıkveren Kom I, and Işıkveren Kom II winter quarters. This is the most common type (188 examples) used by the semi-nomads. They function either as a sheep-fold or as residences for humans. They have been identified at all winter quarters in the Lower Garzan Basin, except for Memika Kom.

5.2.4. Wattle-Walled Tentsites (Type 4)

This concept is similar to the *Stone-Walled Tentsites*. Here, wattle surroundings displace the stone surroundings and serve as "walls" for mobile tents. Except for minor details, the construction technique of the wattle part is basically similar to the wattle structures, but they are lower. A rather tight and enduring surrounding is woven with bundles of wattle placed vertically next to each other; and horizontally-laid reeds are passed through the bundles. Wattle bundles woven by being intertwined with each other are bound tightly with wicker. These surroundings, which are tighter and thicker than the walls of *Wattle Structures*, are approximately 15-20 cm. This wattle sheet covering the whole structure like a curtain is generally 120 cm high. Wattle bundles are buried 5-6 cm in the ground and tightly covered with earth to fix them. By twisting the upper fringes of the wattle sheet inwards, the upper parts of the surrounding gain a round shape. Erected with non-stable poles, the tent is stretched by sacks filled with stones that are either tied or sewn around the tent. (Figure 5.9, 5.64 – 5.69) Mobile poles are not embedded in the ground, but stand with the stretched entity formed within themselves. There is no standard in the dimensions of the structures, which range between 15.6x7.5 m and 7.4x5.6 meters.

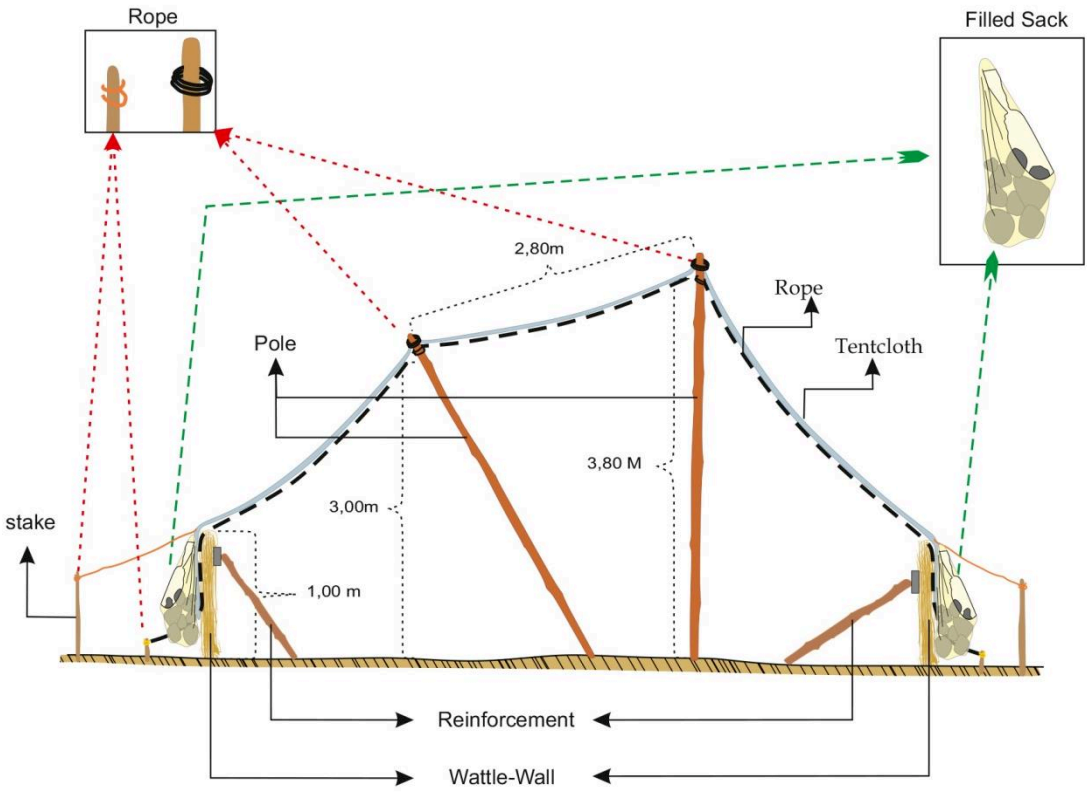


Figure 5.9: Architectural elements of a Wattle-Walled Tentsites

Even though this type of structure generally functions as pens, there are samples of them serving as homes in the Lower Garzan Basin in the region between Gercüş and Hasankeyf, and in the southern part of Derik district. Similar records have also been published in various books and articles. (Beşikçi, 1969; Cribb, 1993; Izady, 1992; Stark, 1959; Thevenin, 2011) Such structures are generally used in summer pastures or in temporary camps on the migration route but also exist at winter quarters such as Memika Kom, Çemisitrin Kom and Bazivan Kom, where they are represented by 11 samples.

5.2.5. Brushwood-Walled Tentsites (Type 5)

This model is similar to the Wattle-Walled Structures, but instead, brushwood or branches are used in these structures to imprecisely construct the wattle surroundings. (Figure 5.70, 5.71) There is no standard in this type either in the plan or in craftsmanship. All of them have openings on the short side. The technical and structural details of the tents are similar to those of other tent types. This type of dwelling is represented by 9 samples in the Garzan Basin. The best examples are at Sulan Kom and Sulane Girgiz Kom. The brushwood surrounding at Bazivan Kom is not covered by a tent.

5.2.6. Mixed-Walled Tentsites (Type 6)

The surroundings of this type are partly made of stone and partly of wattle or brushwood. These combinations are generally defined as re-used partly-ruined stone structures. The ruined area is usually repaired with wattle and/or brushwood. Sometimes, to save time and labour, the critical sections of the surroundings are constructed with stones while the rest is completed with a wattle structure. At Sulan Kom the sides facing the slope are encircled with stone, while the rest is completed with perishable material. At Bazivan Kom, on the other hand, the front short side of the structure where the entrance is has stone surroundings and the other parts are made of wattle or brushwood. (Figure 5.72) Due to variations in local practices, there is no standard either in thickness or height. The highest example is not more than 65 cm. The technical and structural details of the tents and their surroundings are similar to those of other tents. This kind of structure is found at Mezrik Kom, Sulan Kom, Bazivan Kom and Çemisitrin Kom winter quarters.

5.2.7. Tents (Type 7)

Tents, known as Black Tent (Jafar, 1976: 109) or *Kıl Çadır,* are typical structures of nomads (*Koçer*) used in pastures, winter quarters and temporary camps. (Figure 5.10, 5.73 - 5.75) Black Tents were made out of goat's hair up until 10 years ago; however, today's nomads, under the influence of modern “trends”, prefer ready-made tarpaulin or canvas instead of goat hair, which is very hard to weave.

Black Tents are made of covers woven with hair from the "Black Goat", also named *Kilis goat*. It is a very large (approximately 6 by 8 meters) single-piece cover erected in 4-6 stacks, and stretched over 10-12 stakes. The cover is made of eight strips one meter wide that are joined together. According to Beşikçi’s records, (Beşikçi, 1969: 73) each strip woven of goat hair is trimmed in the pastures and it is only possible to weave one 100 cm line per year. Therefore, the strips of the tents need to be renewed constantly. Renewal of the whole tent cover takes about 7 to 8 years. Nomads recycle the discarded pieces as floor mats, sacks or feeding trough covers. In the pastures, Black Tents are sometimes surrounded by other sheets or reed mats made of goat hair. This practice is not observed in the temporary camps.

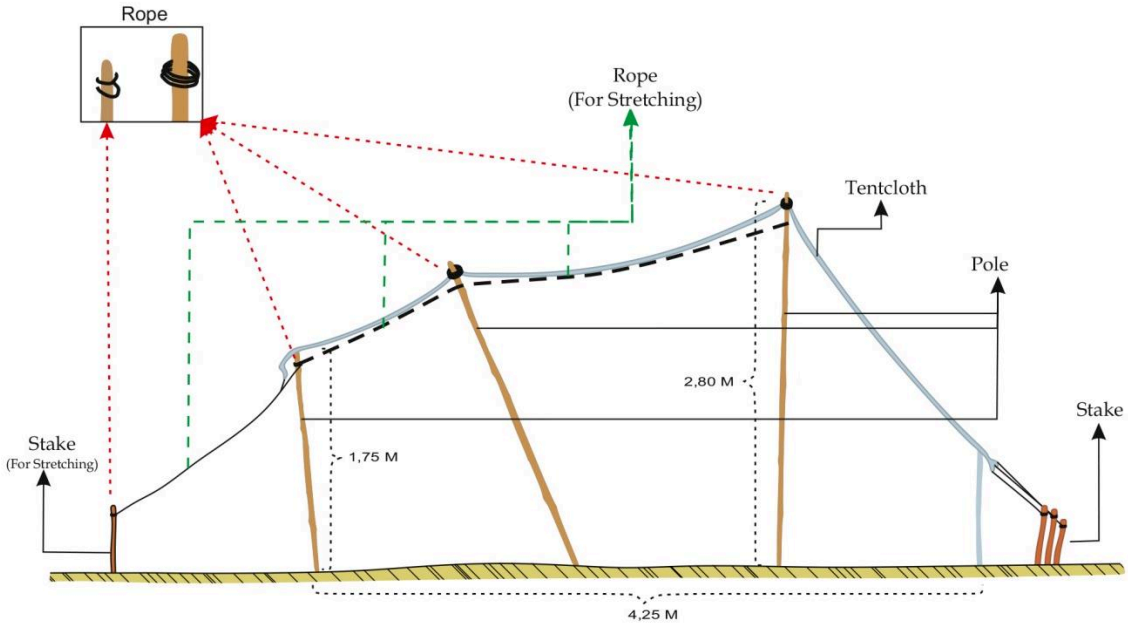


Figure 5.10: Architectural elements of a Tent

5.3. Setlement models of winter quarters in the Lower Garzan Basin

Based on 10 followed-up winter quarters (Figure 5.11) in the Lower Garzan Basin between 2002 and 2014, they can be classified into three types according to their relationship with settled populations. (Table 5.1; Figure 5.78 – 5.80)

No	Winter quarters	Independent (M1)	Nearby-village (M2)	Intra-village (M3)
1	Şeyhosel Kom			■
2	Çemisitrin Kom	■		
3	Sulan Kom			■
4	Sulane Girgiz Kom	■		
5	Bazivan Kom		■	
6	Memika Kom			■
7	Mezrik Kom		■	
8	Işıkveren Kom 1	■		
9	Işıkveren Kom 2		■	
10	Boğaz Kom	■		

Table 5.1: Winter quarters relationship with villages in Lower Garzan Basin

Model 1 (M-1) is self-sufficient winter quarters which are relatively distant from villages and display a totally independent character. Six of the ten winter quarters in the

Lower Garzan Basin fall into this category: such as Çemisitrin Kom, Sulane Girgiz Kom, Işıkveren Kom I and Boğaz Kom.

Model 2 (M-2) is winter quarters close to villages, having a daily interaction with villagers but not integrated into their life style. Two of the ten winter quarters in the Lower Garzan Basin fall into this category, Bazivan Kom, Mezrik and Işıkveren Kom II.

Model 3 (M-3) winter quarters is integrated with villages and some members usually remain in the villages all year round. Usually small *Koçer* groups, who are members of an extended family such as a father and his married sons, prefer this model. They construct their dwellings in an empty area of the village under an agreement. Aged and disabled individuals who have difficulty making the annual migrations remain in the village all year. *Koçer* individuals keep continuing the lifestyle characteristics of a semi-nomadic culture in socio-economic terms. Şeyhosel Kom, Sulan Kom and Memika Kom are good examples of this practice.

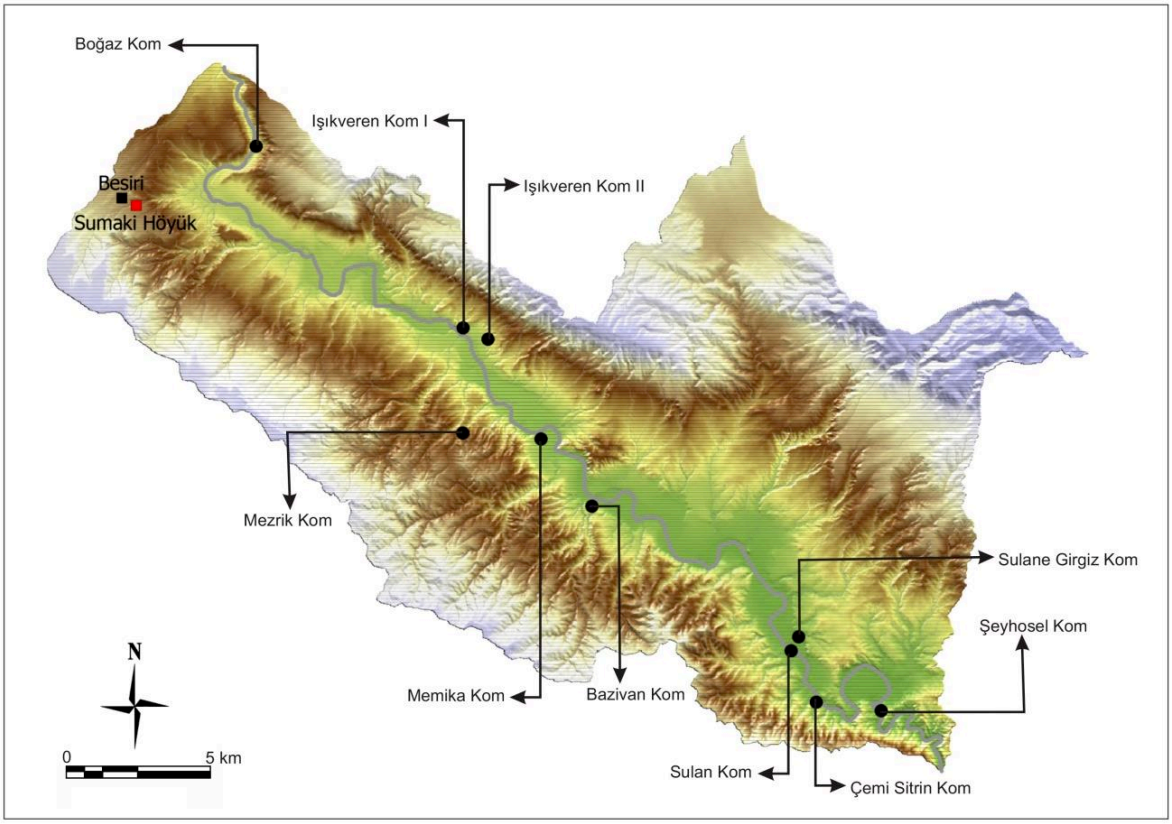


Figure 5.11: Location of the winter quarters in the Lower Garzan Basin

5.4. Winter quarters in the Lower Garzan Basin

Semi-nomadic life is seasonal. Their areas are generally divided into two main groups, winter quarters and summer pasture. The winter quarters are set up in a steppe zone where the winters are milder by a lakeside or on plains and in valleys, which are close to wetlands. With the warming up in spring, the winter quarters are abandoned and the migration towards higher and cooler areas begins. As the temperature climbs, there is a decrease in the extent of lower pastures and partial wetlands. The summer pastures are used to benefit from the grazing land in the mountainous region. The period spent in the summer pasture and winter quarters varies depending on the environment, climate and regional conditions. They usually live in these seasonal host sites for 4-5 months. (Table 12) The remaining 2-3 months of the year are times of migration between these two sites. Some nomadic groups migrate from one summer pasture to another temporal summer pasture or from winter quarters to temporal winter quarters. This is for two important reasons. One is the inadequacy of fertile fields for animals and the other is a deterioration of the social network between nomadic groups connected by kinship.

No	Winter quarters	2002	2002-2009	2009	2010	2012	2013
1	Şeyhosel Kom			7	5	7	7
2	Çemisitrin Kom		2	18	14		
3	Sulan	2	5	14	16	23	23
4	Sulane Girgiz Kom	10	2	?	12		
5	Bazivan Kom		2	14	18	21	16
6	Memika Kom		6	10	10	7	7
7	Mezrik Kom		1	7	4		
8	Işıkveren Kom 1		8	9	11		
9	Işıkveren Kom 2		2	13	12	12	12
10	Boğaz Kom		27	14	14	?	13

Table 5.2: Numerical density of temporary structures at winter quarters in Lower Garzan Basin

Within the scope of our study, the most important factor in studying the winter quarters is that they are located in the same region so that ethno-archaeological studies can be carried out in coordination with the excavated Sumaki Höyük settlement study. The winter quarters were also visited during the winter months and analysis of living area usage and observations were conducted. A detailed examination was made of the architectural

details of structures in the period during which there are no nomads in the summer months. Observation of deformations in structures and drawing up building plans can be carried out more comfortably and practically in this period.

5.4.1. Şeyhosel Kom

Şeyhosel Kom is located at the north end of a deep recessed valley before the junction of the Garzan and the Tigris rivers. (Figure 5.81 – 5.83) The winter quarters are geographically situated on a moderately sloping terrace on the east bank of the Garzan River at elevations of 470-475 meters. Within the scope of this study, Şeyhosel Kom was evaluated in the M3 group of winter quarters. (Table 5.1) A direct relationship has not been established in the sense of villages being around this winter quarters. During the survey carried out in 2002, there was no nomad occupation. The first documentation of these winter quarters was in 2009 but we were informed that its first establishment was in 2007.

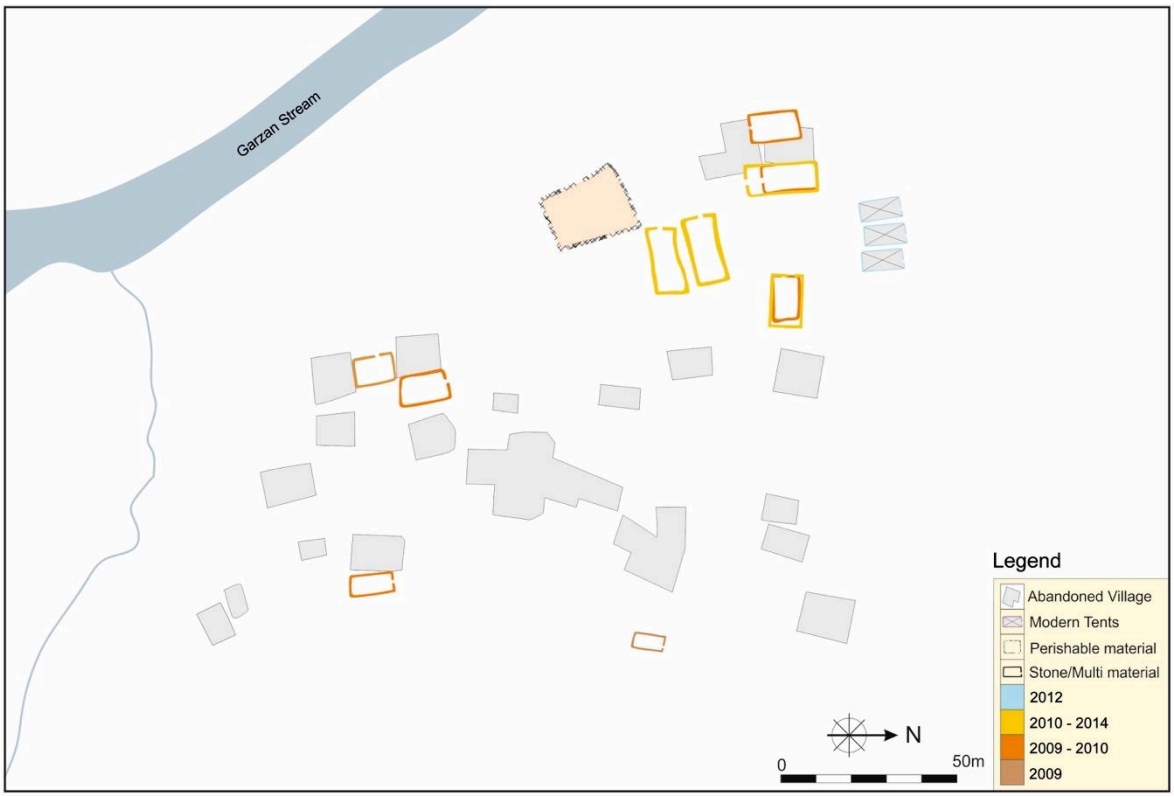


Figure 5.12: Settlement pattern and architecture of the Şeyhosel Kom

Ten nomadic structures have been identified between 2007 and 2013. (Figure 5.12; Table 5.2) In 2009 there were five Stone-Walled Structures. They were six in 2010. Three of the five structures were built next to or on top of the ruins of Şeyhosel village by using

the partially-preserved walls. The dimensions of the rectilinear Stone-Walled Structures, which were built in 2009 and 2010 changed between 4.1x8.7 m and 7.3x12.75 meters. The widths of the stone surroundings alter between 40 and 50 cm, and their height is between 40-65 cm (3-5 rows). Stone surroundings are constructed of middle-sized (20x30 cm) and relatively large limestone (≥40x50 cm) mostly removed from the foundations of abandoned buildings in the village. Three of the rectilinear structures have openings facing north, while two of them face west and one faces south. The direction of the openings might have been associated with family relations.

Architectural Structures	Long axis	Short axis	Square meter	Ratio	Construction Material	Function
1	12,82	6,34	81	2,0	Stone and Earth	
2	9,25	4,91	45	1,9	Stone and Earth	
3	12,16	8,57	104	1,4	Stone and Earth	
4	14,40	9,13	131	1,6	Stone and Earth	
5	19,54	8,32	163	2,3	Stone and Earth	
6	19,81	9,48	188	2,1	Stone and Earth	
7	21,24	8,83	188	2,4	Stone and Earth	
8	14,65	8,62	126	1,7	Stone and Earth	
9	16,17	8,59	139	1,9	Stone and Earth	
10	12,81	8,16	105	1,6	Stone and Earth	Dwelling
11	15,32	9,57	147	1,6	Stone and Earth	
12	12,18	6,03	73	2,0	Tent	Dwelling
13	12,05	6,28	76	1,9	Tent	Dwelling
14	12,26	6,13	75	2,0	Tent	Dwelling

Table 5.3: Dimensions of architectural structures at Şeyhosel Kom

In 2012, the general layout of the winter quarters significantly changed. The previously-built six Stone-Walled *Structures* were out-of-use, and insead, four new sites were constructed to the west and north of the Şeyhosel village. The winter quarters is separated into two areas: "Modern tents", which are used by humans, are set parallel to each other at the northern limit of the village. The area on the west side of the village is reserved for livestock. The structures that function as pens are Stone-Walled Structures with openings facing north or west. The rectilinear structures are approximately 9 meters wide and 16 meters long. (Table 5.3; Figure 5.138) The stone surroundings are 50-55 cm wide and 60-70 cm high. The upper rows of some of the surroundings are made of kerpiç blocks, which were removed from the abandoned village houses. The general appearance of the surroundings points to rapid construction for short-term usage. This situation may imply that the Şeyhosel winter quarter were not planned for long-term occupation.

According to the spatial distribution of the structures, the Şeyhosel winter quarter seem to have been occupied by at least two different groups between 2009 and 2013. Only the Stone-Walled Structures are used.

5.4.2. Çemisitrin Kom

Çemisitrin Kom is far from any sedentary villages. The winter quarter is geographically situated on a moderately-sloping terrace on the south bank of the Garzan Stream at elevations of 470-480 m. Two intermittent streams bordered the winter quarter. Floods have partly fragmented the site. Çemisitrin is among the M1 type of winter quarters. (Table 5.1, 5.85) A direct relationship has not been established in the vital sense of villages situated around this type of winter quarters. Although it has been stated that Çemisitrin had been the winter quarters of semi-nomads for a long period of time, it was documented in 2002 for the first time. (Erim-Özdoğan & Sarıaltun, 2011: 991) (Figure 5.13, 5.84, 5.89)

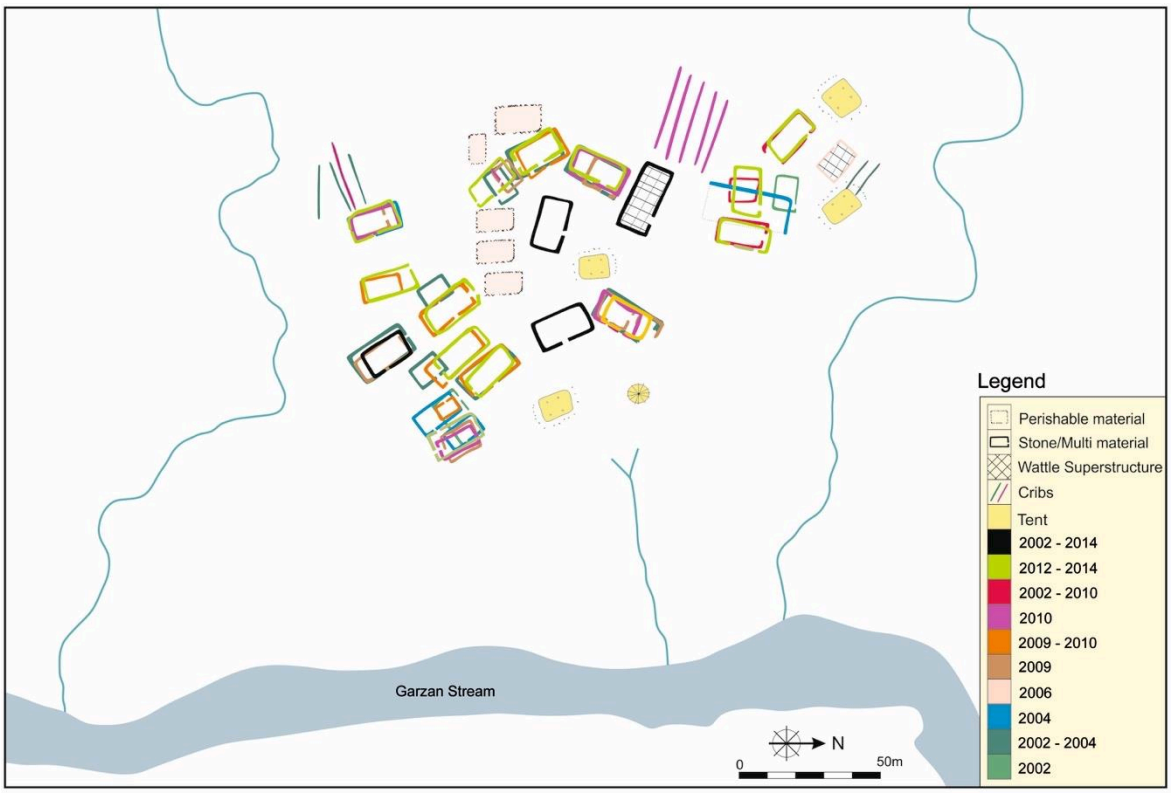


Figure 5.13: Settlement pattern and architecture of the Çemisitrin Kom

In the years between 2002 and 2004, there were 21 rectilinear (Table 5.2) Stone-Walled Structures with dimensions between 5.2x3.9 m and 16.4x8.35 m. (Table 5.4; Figure 5.139) The stone surroundings are approximately 60-80 cm high and their thickness varies

between 30-55 cm. Some were constructed with large cobblestones (4 rows) while some were constructed with relatively small pebbles (5-6 rows).

Some of the structures existed in 2002 and continued to be used in 2004 but some were demolished. Empty spaces next to these and the areas where the destroyed 2002 structures stood became new construction areas in 2003 and 2004. The structures of 2003 and 2004 have different orientations and sizes. One of the new construction areas is to the southeast of the winter quarter. Two Stone-Walled structures running east-west with dimensions of 17x8.6 m and 13.6x7 m supersede the former north-south orientated structure of 18.4x9.5 m in size. The other one is to the northwest, and similar activity also took place here.

In 2006, while carrying out fieldwork and in oral communication with a *Koçer* named Çemisitrin, it became clear that he belongs to a different group than the preceding ones. Newcomers use only three of the former structures with stone surroundings and have constructed five Wattle-Walled Structures in the empty spaces among the existing ones. Their tents are covered by plastic. Wattle-Walled Structures are for humans. The former structures with surroundings covered by wattle on a wooden frame identified as Stone-Walled Wattle Structures are for animals. The interior spaces of the Wattle-Walled Structures are divided into segments by sacks. (Figure 5.86, 5.87) In other words, sacks serve as “interior partition walls”. According to *Koçer* women (nomadic women), such division is basically for three reasons. The initial reason is to allocate extra space for storage of the large supply sacks. The second reason is to organize separate sleeping areas for adults and children. The third one is to divide the large area functionally as a kitchen or workshop, and as guest rooms and sleeping quarters. There are no open fireplaces inside. During my field survey in 2006, interior spaces were heated by modern stoves. Cooking activities and/or bread making take place in the "*Tandır*" constructed in the open air. (Figure 5.88) It is said that through time-sharing among the Koçer women, cooking and bread making for each household is arranged separately. (Oral interview with a semi-nomad woman, 2006, Çemisitrin Kom / Batman)

In 2009, there was a significant change in the layout of Çemisitrin once again. Stone-Walled Structures, which were used in the years between 2002 and 2004, were repaired for re-utilisation. Besides this, new constructions were observed to the southeast of the winter quarter, which was previously occupied in 2003 and 2004. Some of the structures that were disused in 2004 in the northeast section of the quarter were also repaired.

Architectural Structures	Long axis	Short axis	Square meter	Ratio	Construction Material	Function
1	13,81	7,95	110	1,7	Stone	
2	13,04	10,92	142	1,2	Stone	
3	14,86	7,30	108	2,0	Stone	
4	18,72	10,12	189	1,8	Stone	Sheep pen
5	8,43	5,94	50	1,4	Stone	
6	18,89	10,15	192	1,9	Stone	
7	21,64	10,74	232	2,0	Stone	Sheep pen
8	20,23	7,83	158	2,6	Stone	Sheep pen
9	19,31	8,94	173	2,2	Stone	
10	11,92	9,05	108	1,3	Stone	
11	22,48	9,96	224	2,3	Stone	Sheep pen
12	20,00	9,57	191	2,1	Stone	Sheep pen
13	22,52	12,08	272	1,9	Stone	Sheep pen
14	19,40	9,46	184	2,1	Stone	
15	17,24	10,31	178	1,7	Stone	
16	11,43	8,35	95	1,4	Stone	
17	20,21	10,24	207	2,0	Stone	Sheep pen
18	20,54	11,25	231	1,8	Stone	Sheep pen
19	14,69	8,05	118	1,8	Stone	
20	15,52	10,29	160	1,5	Stone	
21	19,23	9,82	189	2,0	Stone	
22	13,47	8,33	112	1,6	Stone	
23	17,36	8,79	153	2,0	Stone	Sheep pen
24	17,82	10,11	180	1,8	Stone	
25	9,51	6,82	65	1,4	Stone	
26	23,25	11,14	259	2,1	Stone	Sheep pen
27	12,92	9,92	128	1,3	Stone	
28	16,87	10,74	181	1,6	Stone	
29	16,92	10,21	173	1,7	Stone	
30	20,43	11,48	235	1,8	Stone	Sheep pen
31	18,03	9,52	172	1,9	Stone	
32	19,35	9,71	188	2,0	Stone	
33	17,65	11,28	199	1,6	Stone	
34	10,31	8,89	92	1,2	Stone	
35	12,83	8,32	107	1,5	Stone	
36	19,84	10,05	199	2,0	Stone	
37	17,22	9,95	171	1,7	Stone	
38	19,36	11,42	221	1,7	Stone	Sheep pen
39	21,18	11,38	241	1,9	Stone	Sheep pen
40	20,41	11,43	233	1,8	Stone	Sheep pen
41	14,12	10,42	147	1,4	Stone	
42	19,93	9,81	196	2,0	Stone	
43	19,84	11,83	235	1,7	Stone	Sheep pen
44	17,10	11,40	195	1,5	Stone	
45	17,75	10,15	180	1,7	Stone	
46	16,92	9,78	165	1,7	Stone	
47	12,80	7,82	100	1,6	Stone	
48	9,92	8,10	80	1,2	Stone	
49	9,30	5,90	55	1,6	Stone	
50	24,95	11,32	282	2,2	Stone and Reed	Sheep pen
51	13,30	9,15	122	1,5	Stone and Reed	Dwelling
52	10,64	6,32	67	1,7	Reed	Dwelling
53	16,73	9,90	166	1,7	Reed	Dwelling
54	13,51	7,80	105	1,7	Reed	Dwelling
55	13,05	8,02	105	1,6	Reed	Dwelling
56	13,64	7,59	104	1,8	Reed	Dwelling
57	11,45	10,37	119	1,1	Tent	Dwelling
58	12,32	8,20	101	1,5	Tent	Dwelling
59	11,31	8,34	94	1,4	Tent	Dwelling
60	10,65	8,30	88	1,3	Tent	Dwelling

Table 5.4: Dimensions of architectural structures at Çemisitrin Kom

In general, it appears that there is a tendency to return to not only the layout but also the construction habits of 2002-2004. The average dimensions of the structures inhabited in 2009 are 15.8 by 7.3 meters. In 2010 there is no change either in layout or in the construction technique at Çemisitrin. One or two smaller feeding troughs were generally placed next to buildings in previous years, but in 2010 the northeast outer area was totally reserved for feeding troughs, which are very long, from 11 to 25 meters. They are 30 cm wide and 40 cm high.

In 2012, although some of the former structures were still in use, there were some new constructions with a different plan. Between the years 2012 and 2014, no significant change in the winter quarters occurred. Wattle-Walled Structures were not constructed in those years. In 2013 and 2014 it was observed that when nomads migrated to their winter quarters, they stayed in tents for a while as they used to be temporary camps. They moved to Stone-Walled Structures after repair and maintenance.

Periodical fieldwork at Çemisitrin winter quarter showed us that it is intensively occupied. But the permanency of the quarters is contrary to the stability of the nomadic groups. From our observations, we identified four different arrangements of the quarters between the years 2002 and 2014: these are 2002-2004, 2006, 2009-2010 and 2012-2014. Accordingly, four different nomadic groups have occupied Çemisitrin since 2002, and changes in layout or construction technique reflect their style of living models.

5.4.3. Sulan Kom

This is located on one of the earlier terraces on the southeast bank of the Garzan River. Two intermittent streams border the winter quarters; Şeyh Cemaleddin to the southeast and Dezirane to the northwest. The winter quarters occupy the ruins of İkiyaka village, which was deserted in the years 1992-1994 due to political events in the region and never resettled. The abandoned village has been transformed into partly-empty spaces and / or the immediate margins of the ruined houses, where the temporary structures of the nomads are located. Sulan Kom was evaluated as being the M3 type of winter quarters. (Table 5.1) A direct relationship has not been established with villages around this winter quarters. Sulan Kom is first recorded in 2002. Earlier occupation of the winter quarters is limited to the western part of the village; nomad dwellings were constructed in empty spaces between the

village houses in 2002. In following years, the winter quarters expanded to cover almost the entire village area.

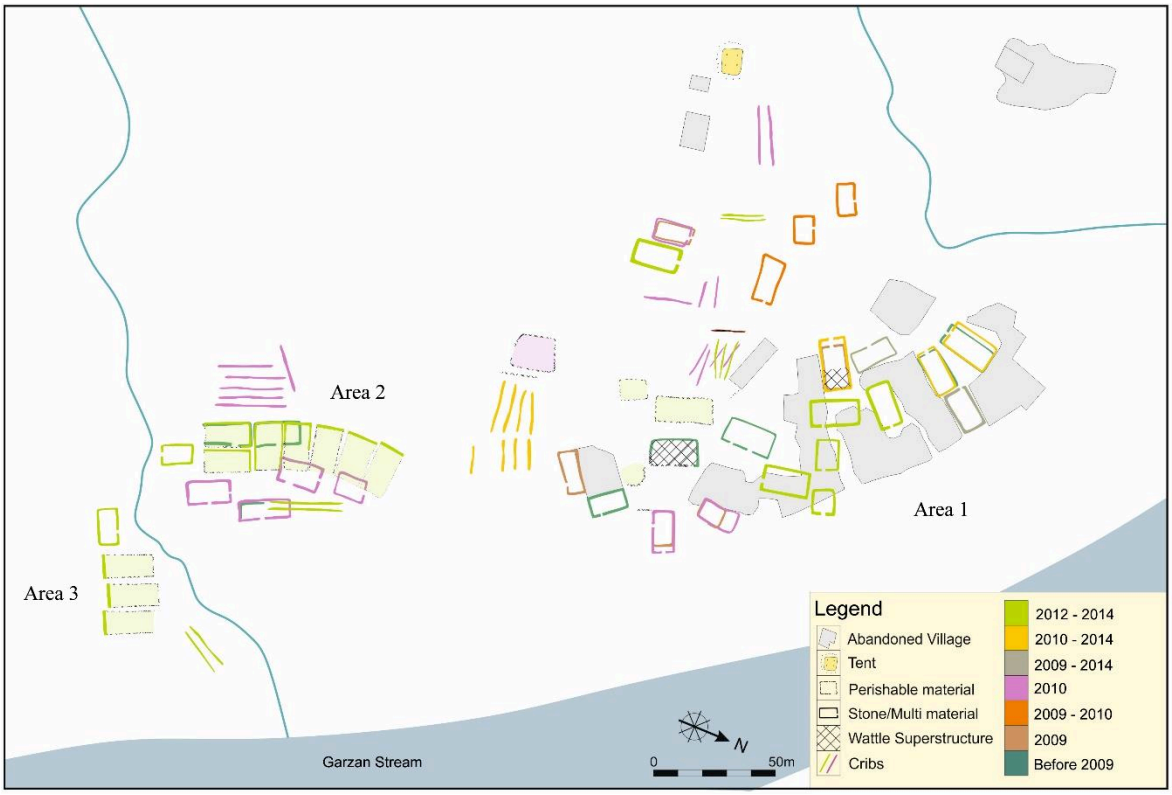


Figure 5.14: Settlement pattern and architecture of the Sulan Kom

This winter quarters can be divided into three areas. Area 1 is located; between the ruins of the village house and partly on it. Area 2 is located southeast of the village. (Figure 5.90 – 5.96) The campsite in this area consists of adjacent buildings with a specific plan. Area 3 is located just south of Seyh Cemaleddin River. This area can be specified as being used by a relatively small group. The construction material of the buildings in this area resembles the structures in the 2nd Area. (Figure 5.14)

In 2002, there were nine structures with average dimensions of 15.5x6.2 meters. Eight structures have stone surroundings while one is a Mixed-Walled Structure. Their sides facing the slope are encircled with stone, while the rest is completed with perishable material. (Figure 5.92) Besides these structures, the nomads also occupied some of the abandoned village houses. Some of the structures are reserved for animals. In 2009, it is seen that some of the village houses were totally destroyed by nomads to open spaces for their structures. All obtainable materials supplied by demolishing the buildings were reused in the nomadic structures. The Stone-Walled Structures, which expanded to cover a vast area in 2009, have dimensions of 12.3x6.8 m and 19.2x8.5 m. (Table 5.5; Figure 5.140) The width of the stone

surroundings is 50-55 cm and their height is 70-75 cm. Structures used in 2002 were also occupied by repair work and partially enlargement. The southern outer area of the former village was reserved for livestock by placing feeding and watering troughs. In 2010, the nomads also occupied the southern outer part of the former village. This expansion is due not only to an increase in population but also the arrival of a new nomadic group. Since we were not able to make contact with the nomads either in 2009 or 2010, the kinship between the preceding group and the newcomers has not yet been clarified. However, according to both mine and Beşikçi's observations, there should be a close family relationship.

In November 2012, it was realised that a different group had started to occupy the area since 2011. A member of the new group, who introduced himself as Koçer Kasım, told us that they migrated from the pastures to the north of Bitlis and their previous winter quarters were somewhere south of Kurtalan district. In 2012, all the structures used in 2010 were completely demolished and new ones were constructed. Radical changes in settlement pattern and the arrangement of structures of the winter quarters demonstrate different traditions. From now on, the winter quarters occupy two separate districts. In 2013, winter quarters were composed of two separate districts (Area 1 and Area 2) according to the distribution of the structures and/or open air arrangements. The first and earlier one lies between and partly on top of ruined village houses. The second one that was primarily occupied in 2010 and reorganised in 2012 is located to the southeast approximately 80 meters from the former village as well as the earlier winter quarters, on either side of the Şeyh Cemaleddin stream not far from Garzan River (about 50-60 meters). This district was tidily arranged, composed of two groups of flush-seamed structures with approximately 50-60 cm of space in between. The group on the west bank of the stream comprises five flush-seamed structures running in a north-south direction with their short sides leaning towards a naturally curved low ridge. To the east of these structures, two flush-seamed structures oriented in an east-west direction are situated adjacent to the orderly ones with short sides. While the eastern side of structures on the west bank of the Şeyh Cemaleddin stream resting against the slope have stone surroundings, the rest of their sides are made of flimsy material such as brushwood. Sometimes the side facing the Garzan River is completely open. The limits of tents and/or interior spaces can only be identified by some traces on the ground.

The structures on the eastern bank of the Şeyh Cemaleddin stream also display similar features: three flush-seamed structures oriented in an east-west direction and a structure perpendicular to that order to the south. The last one is surrounded by a heap of

earth. Three flush-seamed structures have stone surroundings on their south side but the flimsy construction on the other sides and openings face the Şeyh Cemaleddin stream. Their inner space ranges between 105-180 m^2.

Architectural Structures	Long axis	Short axis	Square meter	Ratio	Construction Material	Function
1	29,30	9,35	274	3,1	Stone and Earth	Sheep pen
2	21,03	9,46	199	2,2	Stone and Earth	Sheep pen
3	20,92	9,59	201	2,2	Stone and Earth	Sheep pen
4	15,46	8,82	136	1,8	Stone	Dwelling
5	21,63	8,44	183	2,6	Stone	
6	18,65	10,13	189	1,8	Stone	
7	13,30	8,77	117	1,5	Stone	Dwelling
8	17,85	10,82	193	1,6	Stone	
9	12,43	9,64	120	1,3	Stone	
10	19,96	8,51	170	2,3	Stone	
11	19,43	10,22	199	1,9	Stone	
12	18,99	10,26	195	1,9	Stone and Earth	Sheep pen
13	19,39	9,76	189	2,0	Stone and Earth	Sheep pen
14	19,82	11,94	237	1,7	Stone and Earth	Sheep pen
15	19,94	11,07	221	1,8	Stone and Earth	Sheep pen
16	19,28	11,11	214	1,7	Stone and Earth	Sheep pen
17	19,40	11,95	232	1,6	Stone and Earth	Sheep pen
18	20,64	10,52	217	2,0	Stone and Earth	Sheep pen
19	16,90	14,57	246	1,2	Brushwood and Reed	Sheep pen
20	11,14	8,81	98	1,3	Brushwood and Reed	Dwelling
21	23,96	10,47	251	2,3	Brushwood and Reed	Sheep pen
22	18,39	7,96	146	2,3	Stone	
23	15,94	8,90	142	1,8	Stone	
24	20,52	11,40	234	1,8	Stone and Reed	Sheep pen
25	17,60	9,40	165	1,9	Stone	
26	15,07	9,46	143	1,6	Stone	Sheep pen
27	10,70	9,17	98	1,2	Stone	
28	16,31	9,66	158	1,7	Stone	
29	20,73	11,07	229	1,9	Stone	Sheep pen
30	19,99	11,30	226	1,8	Stone	
31	10,19	10,03	102	1,0	Stone	
32	13,38	9,95	133	1,3	Stone	Dwelling
33	21,05	11,79	248	1,8	Stone	Sheep pen
34	18,29	10,42	191	1,8	Stone and Reed	
35	21,91	11,38	249	1,9	Stone	
36	17,82	8,39	150	2,1	Stone	Dwelling
37	19,20	10,44	200	1,8	Stone	
38	18,40	8,84	163	2,1	Stone	Sheep pen
39	19,57	9,67	189	2,0	Stone	Sheep pen
40	21,95	9,78	215	2,2	Stone	Sheep pen
41	20,43	11,97	245	1,7	Stone	Sheep pen
42	18,19	10,19	185	1,8	Stone	
43	20,00	10,93	219	1,8	Stone	Sheep pen
44	19,90	7,49	149	2,7	Stone	Sheep pen
45	15,48	9,28	144	1,7	Stone	Dwelling
46	19,10	9,85	188	1,9	Stone	
47	12,11	9,07	110	1,3	Stone	Dwelling
48	13,97	7,93	111	1,8	Stone	Dwelling
49	10,62	8,21	87	1,3	Tent	Dwelling

Table 5.5: Dimensions of architectural structures at Sulan Kom

Feeding troughs are usually placed totally apart from the “residential area” but sporadic examples have been seen in different places over the years depending on temporal usage of the area. Every district has its own feeding troughs. In the first area, the feeding troughs are mainly placed in the southeast. The quantity changes every year; for example, in the southwest section of the quarter there are feeding trough remains next to structures for humans. In the “new” district, the main feeding trough area is at the back of the structures but there are also some in front. On the east bank of the Şeyh Cemaleddin stream, the feeding troughs are relatively close to the Garzan River.

Generally, large structures with stone surroundings and structures with brushwood surroundings contain a thick layer (30-35 cm) of animal waste on their ground floor, reserved for animal shelters, while those with a size of 100 m^2 and relatively-small structures are used as dwellings. The inner part of the dwellings is partly smoothed over but they have never been paved or plastered. Constant usage hardens the floor. Remains of reeds are only observed in five structures which are not erected any more. Types T3, T4, T5 and T6 structures have all been used at Sulan Kom.

5.4.4. Sulane Girgiz Kom

Sulane Girgiz Kom, which is situated approximately 400 meters southeast of Rıdvan village and Başarı hamlet on the east bank of the Garzan River, lies on the gentle eastern-sloping bank of Sinder intermittent stream at elevations of 485-495 m. (Figure 5.15, 5.96 - 98) A village road divides the winter quarters into two sections. Structures on the east side are on more sloping land compared to those on the west. Sulane Girgiz Kom was evaluated as being the M1 type of winter quarters. (Table 5.1) However, the village, which was abandoned in the distant past, may be partially related as it is very close to the others.

Twenty-three structures were identified. (Table 5.2) Twenty-one of them are Stone-Walled Structures, the other two Brushwood-Walled Structures. The dimensions of the structures are not standard. The largest is 9.8x21.1 m and the smallest one is 3.2x5.3 meters. (Table 5.6; Figure 5.141) The average height of the stone surroundings is 60 cm and their width ranges between 30-50 cm. Rectilinear structures do have a single opening in general - except one of them - and the openings are usually on the long axis. In 2002, there were 10 structures. In 2009, six of them with dimensions of 9.4x4.7 m and 4.5x4.1 m was reused without repair. Since there are no wattle remains inside or outside the structures, only mobile

tents are used for coverage. Lack of remnants of earth- or stone-filled sacks points to the stretching of tents by means of wooden poles. Except for secondary utilisation, all the structures built in 2009 occupy 40 m^2 or less space. Taking these data into consideration, Sulane Girgiz Kom has not been intensively used and it can be proposed that it was occupied by a small group for 1 or 2 months as a temporary camp in the winter of 2009.

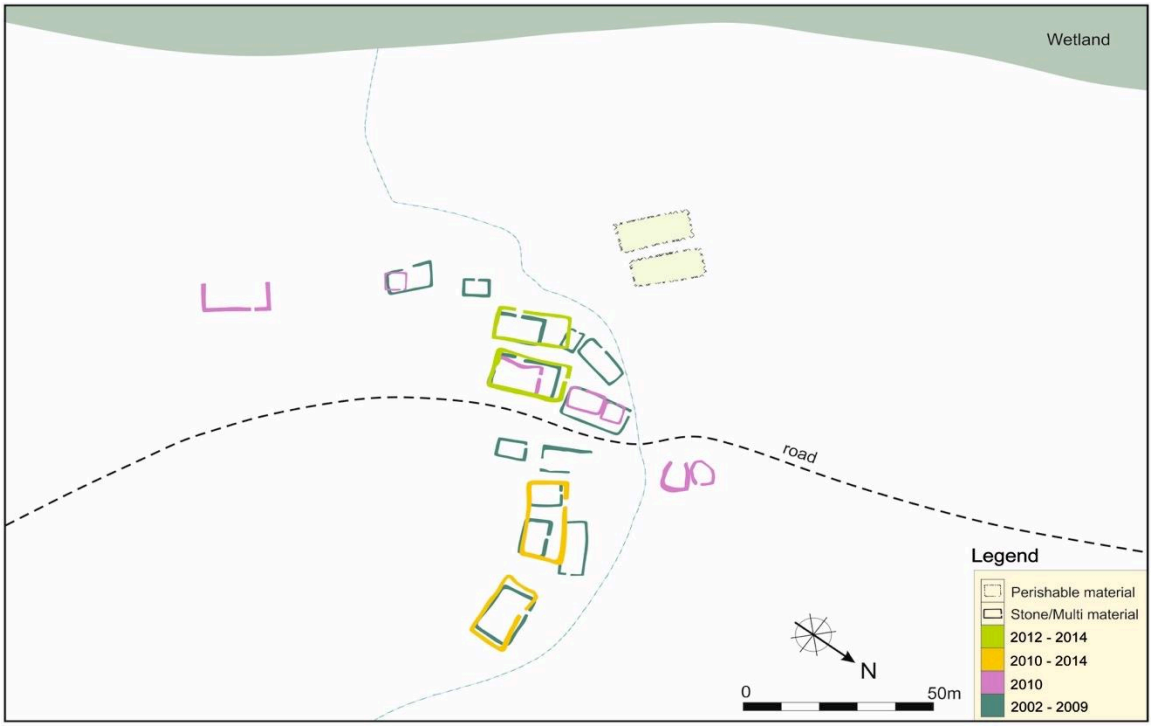


Figure 5.15: Settlement pattern and architecture of the Sulane Girgiz Kom

In 2010 there is an increase in the number of structures. Not only the former Stone-Walled Structures have been reused by partial repair, but also new ones have been erected. This shows that the nomadic group in 2010 was more populous than that of the previous year and the quarters were occupied all through the winter.

After being deserted in 2011 and 2012, the winter quarters were reoccupied in 2013. Four Stone-Walled Structures on either side of the road were repaired and used as pens. In addition to these, two Brushwood-Walled structures were constructed on the western side of the road. Absence of animal waste and traces of daily tools and implements are evidence that the newly built structures are intended for humans.

Stone pavements, which are unique at winter quarters, were identified in two of the structures during the 2002 research. (Erim-Özdoğan & Sarıaltun, 2011: 988) The surface of the pavements is uneven and not convenient for use without plastering. Since there are no remnants of earth or plaster on them, it is suggested that brushwood and then mattresses

would have covered the pavements. Two or three alternatives may be proposed. It is conceivable that the nomads who used Sulane Girgiz Kom before 2002 had different traditions or else the pavements were laid down for yearlong utilisation. A semi-nomadic group, which has chosen to devolve to a partly sedentary life, has started to use this type of construction. During field research in 2009 and afterwards, it was identified that a relatively vast area of approximately 250x800 m between the Garzan River and the winter quarters has the characteristics of a "Wetland". Under this circumstance, in order to be isolated from dangerously high levels of ground water, some sections of the winter quarters need to be paved with stones. This can be a third alternative. Unfortunately, we have little chance of obtaining better information since Başarı hamlet was emptied out between 1992-94. According to our field research and oral interviews, it is understood that the winter quarters are occasionally occupied.

Architectural Structures	Long axis	Short axis	Square meter	Ratio	Construction Material	Function
1	15,11	10,71	162	1,4	Stone	
2	18,82	10,46	197	1,8	Stone	Sheep pen
3	22,94	11,52	264	2,0	Stone	Sheep pen
4	10,61	7,39	78	1,4	Stone	
5	9,56	7,45	71	1,3	Stone	
6	15,48	7,31	113	2,1	Stone	
7	13,29	7,38	98	1,8	Stone	
8	8,35	5,54	46	1,5	Stone	Dwelling
9	18,08	9,06	164	2,0	Stone	
10	5,84	5,09	30	1,1	Stone	Dwelling
11	12,62	7,24	91	1,7	Stone	
12	7,46	5,21	39	1,4	Stone	
13	13,60	7,92	108	1,7	Stone	
14	20,19	9,68	195	2,1	Stone	Sheep pen
15	6,25	4,64	29	1,3	Stone	Dwelling
16	13,75	6,15	85	2,2	Stone	Dwelling
17	9,85	5,69	56	1,7	Stone	Dwelling
18	6,22	5,74	36	1,1	Stone	Dwelling
19	17,51	8,71	153	2,0	Stone	
20	13,61	8,06	110	1,7	Stone	
21	17,95	10,12	182	1,8	Stone	
22	20,77	11,53	239	1,8	Stone ane Reed	Sheep pen
23	19,69	8,04	158	2,4	Brushwood	Sheep pen
24	19,32	8,25	159	2,3	Brushwood	Sheep pen

Table 5.6: Dimensions of architectural structures at Sulane Girgiz Kom

5.4.5. Bazivan Kom

The winter quarters are located in the valley of the Variconi intermittent stream, a tributary of the Garzan River. The structures are distributed either in the streambed or on the slopes. (Figure 5.16, 5.99 – 5.113) It is only 200 m from Kumgeçit village and we were told that there is a close relationship between the two groups of ladies, who share daily activities. Bazivan Kom was evaluated as being the M2 type of winter quarters. (Table 5.1) The winter quarters are separated into three main areas according to structure distribution and utility of the open-air areas.

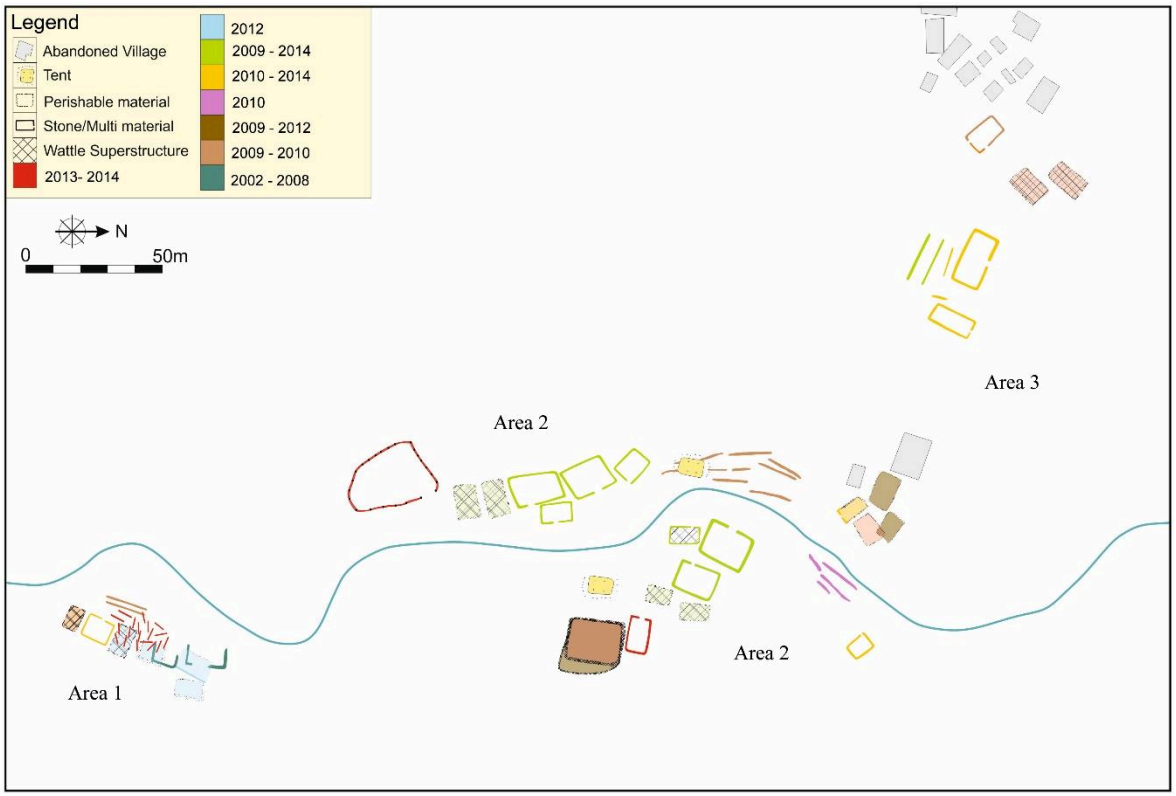


Figure 5.16: Settlement pattern and architecture of the Bazivan Kom

This winter quarters can be divided into three different areas according to the structure distribution and changing usage space. (Figure 5.99 – 5.101) Area 1: The southern area is a relatively sheltered area towards the inner valley of Variconi stream. It covers an area of 2000 m^2 on the gentle slope on the east bank of the stream. There are seven structures of which only one is a tent with stone surroundings; the rest are either Wattle Structures or Brushwood-Walled Structures. It occupies a space of 50m^2 and functions as a pen. There are two *Wattle Structures* on either side of the tent with stone surroundings, north and south. The northerly one is 9.7x5.5 m whereas the southerly one is 7.5 by 4.7 m. Both are 2.4 m high and are used by humans even though they lack regular flooring. (Table 5.7; Figure

5.142) In the fieldwork of 2012, the wattle structure in the south, which had been completely demolished, left little trace of its presence. (Figure 5.102 - 104) The off colouring on the ground is the only indicator of its existence. The one in the north had been accidentally burnt while it was in use (Oral interview with Sedat Taş, 2013, Kumgeçit Village / Batman). What is left from that structure is dark-coloured patches on the ground. To the north of the group of two Wattle Structures and tent with stone surroundings is a relatively steep slope where there are Brushwood-Walled Structures. One of them has a stone surrounding 90 cm in height and 30-40 cm in thickness on the side leaning towards the slope. The rest of the structures are made of brushwood. In 2013, Area 1 radically changed. All the structures were totally demolished except for the tent with stone surroundings. Feeding troughs were placed all around the structure and the area was reserved only for livestock.

Area 2: The area in the centre is dispersed on either bank of the Variconi stream. On the east bank there are seven structures. The Three of them are wattle structures, the other three are Stone-Walled, and the last structure is a surrounded by earth-filled sacks. interior area of the Wattle Structures is 40-60 m^2. Two of them are encircled by stone surroundings of 40-45 cm in height. The Wattle Structures are partly buried in the ground. The height of the structures is 210 cm and the thickness of their walls is 15-18 cm on average. These structures are not typical Stone-Walled Wattle Structures since the stone surroundings are later additions for stabilization of the structures. The smaller ones are used as dwellings while the larger ones are reserved for newly-born lambs. Single-roomed dwellings are functionally divided without separation elements. The arrangement is simply based on the distribution and concentration of artefacts. A detailed description of a wattle structure follows.

The area identified as a kitchen is right next to the door in the north corner of the structure. The area on the east side (north east of the structure) of the kitchen is kept for piling beds, blankets and pillows. Carpets and rugs are laid on the west, south and partially southeast ends of the structure and this area is reserved for guests and some daily activities. (Figure 5.111-113) On the west side of the wattle structure in the area up to the door is free from any ground cloth. According to the Koçer woman, the owner of the dwelling, this part is reserved for daily activities, children being washed in the cold seasons, and the structure is heated with a small stove in cold winters. Cooking usually takes place outside. *Tandır,* used for making bread, is in common usage among the villagers.

On the west bank there are six structures next to each other with a simple rectilinear stone surrounding. (Figure 5.109) Two of them are wattle structures, and the other four are Stone-Walled Structures. The Wattle Structures do not have stone surroundings. Their dimensions are quite similar to each other. The internal dimension of the one to the south is 11.9x7.6 m and the one to the north is 12.4x7.2 m. Their openings are on the narrow side facing east. Both of the Wattle Structures are used for sheltering animals. To the north of the wattle structures, there are four Stone-Walled Structures next to each other which have openings facing east. The tension of the tent, which is the top of these structures, is provided by pillars and filled sacks stones-filled sacks. The largest tent with stone surroundings has internal dimensions of 16.7x10.05 m and the smallest one is 10.5x6.2 m. Their floors are totally covered with a thick layer of animal waste. In November 2012, it was observed that animal waste was partly disposed of by burning. In the north and northeast of the Stone-Walled Structures, there are fifteen feeding troughs.

Area 3: This place is situated north-northeast of the winter quarters in an area between the village and the mouth of the Variconi stream. Here exist nine structures from different time periods. On the west bank of the stream where the feeding troughs are located are structures made of wattle and brushwood. One of them has a stone surrounding on its front side. The structures, which are 30-70 m^2, in size, are reserved for humans. Three Stone-Walled Structures used as pens as well as four feeding troughs were constructed right next to the permanent village houses. The area, which was only occupied between 2009 and 2010, remained inactive afterwards. In 2014, a group came here and built two wattle structures. (Figure 5.38 – 5.42) They told us that they had pastures on Süphan Mountain, and had not come to Bazivan before. (Oral interview with a semi-nomadic woman, 2014, Çemisitrin Kom / Batman. The new group has no kinship with the previous users of Bazivan Kom but they are also from the Alikan tribe. They also told us that it took a month to build the Wattle Structures and they occupied them for 6 or 7 months. The Wattle Structures of Bezivan Kom are similar to the ones at Memika and Mezrik winter quarters. Types T1, T3, T5 and T6 structures have all been used at Bazivan Kom.

Architectural Structures	Long axis	Short axis	Square meter	Ratio	Construction Material	Function
1	8,73	5,83	51	1,5	Reed	Dwelling
2	10,38	8,79	91	1,2	Stone	Sheep pen
3	11,00	6,95	76	1,6	Reed	Dwelling
4	8,70	6,83	59	1,3	Stone ane Reed	Dwelling
5	12,25	7,46	91	1,6	Stone ane Reed	Sheep pen
6	10,13	6,34	64	1,6	Stone ane Reed	Dwelling
7	14,69	7,34	108	2,0	Stone	
8	9,46	7,39	70	1,3	Stone	
9	12,72	8,50	108	1,5	Reed	Sheep pen
10	13,58	7,99	109	1,7	Reed	Sheep pen
11	18,88	11,83	223	1,6	Stone	Sheep pen
12	16,42	12,53	206	1,3	Stone	Sheep pen
13	11,29	9,00	102	1,3	Stone	Sheep pen
14	11,92	7,54	90	1,6	Stone	Sheep pen
15	8,99	6,22	56	1,4	Traditional Tent	Dwelling
16	21,19	16,51	350	1,3	Brushwood and Reed	Sheep pen
17	21,20	14,84	315	1,4	Brushwood and Reed	Sheep pen
18	13,24	8,27	109	1,6	Stone	Sheep pen
19	9,07	6,23	57	1,5	Tent	Dwelling
20	9,46	6,42	61	1,5	Reed	Dwelling
21	11,34	6,69	76	1,7	Reed	Dwelling
22	15,59	11,38	177	1,4	Stone	Sheep pen
23	17,99	14,03	252	1,3	Stone	Sheep pen
24	11,25	6,58	74	1,7	Reed and Stone	Dwelling
25	8,95	6,68	60	1,3	Stone	
26	10,05	5,78	58	1,7	Stone and Reed	Dwelling
27	10,83	7,68	83	1,4	Brushwood and Reed	Sheep pen
28	9,27	6,87	64	1,3	Brushwood and Reed	Sheep pen
29	12,65	8,78	111	1,4	Brushwood and Reed	Sheep pen
30	16,44	7,48	123	2,2	Stone	Sheep pen
31	20,77	11,05	230	1,9	Stone	Sheep pen
32	12,93	8,25	107	1,6	Reed	Dwelling
33	13,74	8,01	110	1,7	Reed	Dwelling
34	13,12	8,28	109	1,6	Stone	Sheep pen

Table 5.7: Dimensions of architectural structures at Bazivan Kom

5.4.6. Memika Kom

This is located on a gentle slope at an elevation of 440-460 meters south to southeast of a steep slope on the south bank of the Garzan River. Memika Kom is within the territory of Gedikli hamlet of Yazıhan village. It is a typical winter quarters that is integrated with the village and some members of the nomadic group remain all through the year. Memika Kom was evaluated as being the M3 type of winter quarters. (Table 5.1) The structures, to the south of the hamlet, are constructed in empty spaces free from modern dwellings. (Figure

5.17) The villagers allow this area to be occupied by the nomads. The other reason for choice of this area as winter quarters is the existence of some buildings, which were used for drying tobacco leaves about 20 years ago, and are rented to the nomads.

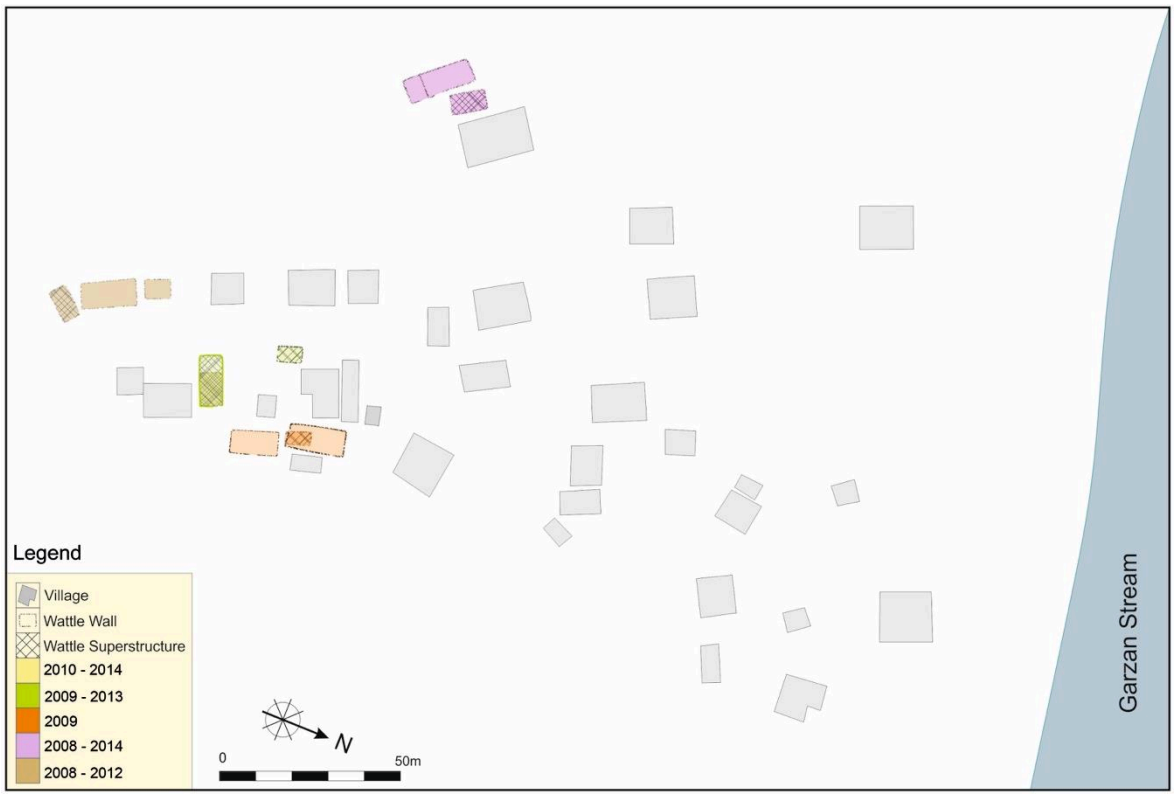


Figure 5.17: Settlement pattern and architecture of the Memika Kom

In this winter quarters, there are two types of buildings. One of these Wattle Structure (Figure 5.123 – 5.125) is usually used by human amd Stone-Walled Tentsites is used for an animal shelter. The walls of the structures are made by placing 10-12 cm-thick wattle bundles next to each other and tying them tightly together. According to Koçer Ömer, one of the residents, the structures can last 7-8 years with partial repair. We were informed that the Wattle Structure, which we detected in 2008, was 3 years old. The wattle structure, which I have termed the "Memika Saz Ev" (Figure 5.18) within the scope of this thesis, was followed consecutively since 2008. The aging, decomposition, and destruction process of this structure are documented here with all the stages. (Figure 5.120 – 5.122) In July 2008, it was observed that the “Memika Saz Ev” was still standing, yet partially ruined and some reeds bundle had broken off. Another rectangular wattle structure in the neighbourhood was partially damaged and needed serious repair. It was clearly seen in 2009 that the damaged parts in 2008 had been repaired. However, it was detected that the parts of wattle structures, which were not damaged in 2008 and therefore not repaired in 2009, had suffered the same

fate and were falling apart. The “Memika Saz Ev” leaned towards the north and if it was not seriously repaired, it was impossible for it to withstand the following winter. In November 2012, it was seen that the "Memika Saz Ev" had completely fallen apart and the remains were in a form of a low heap mixed with earth. Even the location of the poles could not be determined, neither by a colour change on the surface nor by shallow depressions in the ground. Under this circumstance, the layout of the structure can only be identified by hardly visible traces on the ground. The colour change of the soil is another indicator of decomposed structures.

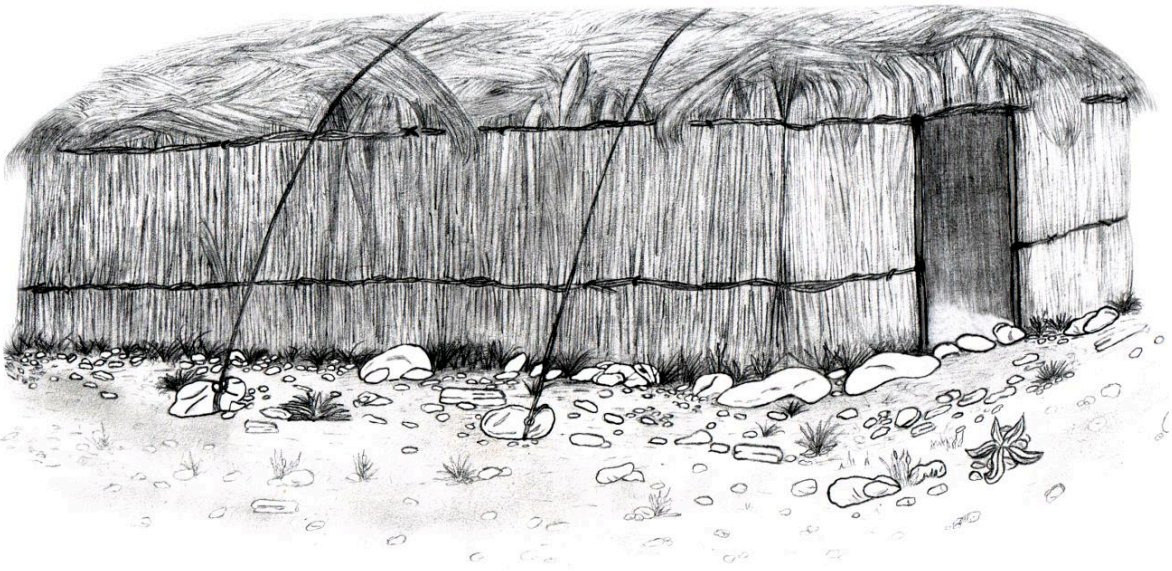


Figure 5.18: Pencil drawing of the Memika Saz Evi (by Nilüfer İdikut)

In May 2013 the remains of the "Memika Saz Ev" formed a rise on the ground where structure once was and was becoming intermingled with the earth. By October of the same year, data showed a structure remaining in the field that had almost disappeared. The area where the "Memika Saz Ev" and wattle surroundings were previously erected had been transformed into a rank (hayloft) and also used for feeding troughs in November 2013. It is almost impossible to identify the location of the former structures with the naked eye. If we accept the life cycle of a wattle structure is a minimum 3 years as we were informed by Koçer Ömer in 2008, then depending on environmental effects, periodical “restorations”, and the abandonment stage, the life cycle of a wattle structure is a maximum of 8 or 9 years. Repairs affect the life cycle of a structure while environmental effects increase the decomposition process. For example, another wattle structure that we detected in 2008 next to a village house is still standing and being used. In communications with villagers during

2012 fieldwork, we were told that the nomadic group to which Koçer Ömer belonged, had left these winter quarters[16]. The main reason behind the T1 type "Memika Saz Ev" becoming decayed is that the group using this structure migrated somewhere else.

Architectural Structures	Long axis	Short axis	Square meter	Ratio	Construction Material	Function
1	19,47	7,24	141	2,7	Reed	Sheep pen
2	14,35	6,96	100	2,1	Reed	Sheep pen
3	10,22	5,91	60	1,7	Reed and Brushwood	Dwelling
4	9,44	5,37	51	1,8	Reed	Dwelling
5	15,63	7,45	116	2,1	Reed	Sheep pen
6	7,41	5,50	41	1,3	Reed	Sheep pen
7	14,70	6,92	102	2,1	Stone and Reed	Sheep pen
8	9,50	6,22	59	1,5	Reed	Dwelling
9	13,31	6,62	88	2,0	Reed and Brushwood	Sheep pen
10	15,74	7,36	116	2,1	Reed and Brushwood	Dwelling
11	7,18	3,69	26	1,9	Reed	Dwelling
12	7,02	4,26	30	1,6	Reed	Dwelling

Table 5.8: Dimensions of architectural structures at Memika Kom

Besides the structures defined above, there are five more buildings at Memika Kom. Three of them are wattle structures, the rest are Wattle-Walled Structures. The structures serving as pens are 16x6.7 m and 12.9x6.55 m in size. (Table 5.8; Figure 5.143) The average height of the wattle surroundings is 120 cm and the average thickness is 15-20 cm. The tents' upper cover stands by means of movable poles. The upper woven stretch is maintained by stone-filled sacks, which are sewn by the women[17] in the outer section. The larger structure to the north has two openings whereas the small one has a single opening. The number of openings depends on the size of the structures, not their function.

Around the 50 meter-square Wattle Structure, which was constructed only of wattle in 2008 immediately south of the Wattle-Walled Structures with a size of 8.75x5.9 (51 m^2), stone surroundings were added in 2010 and the Wattle Structure has been reused by extending it approximately 5 meters on the narrow west side. With this extension, its dimensions are 13.55x5.9 m (80 m^2). Lack of animal waste on the interior ground points to it being used as a dwelling. In 2012, it is seen that the structure was turned into an animal

[16] Koçer Ömer settled in Batman with his father Osman. Whenever they were occupied in the Gedikli hamlet, Koçer Osman used to stay in the village all through the year due to his age. His sons, Ömer and Reşit, used the village as winter quarters and migrated to a pasture on Süphan Mountain. Koçer Reşit partly continues his semi-nomadic life. For their winter quarters, they reside in Bazivan Kom, which is within the territory of Kumgeçit village to the south of Gedikli hamlet. On occasions when Koçer Reşit agrees with the locals, he sometimes stays in the village all the year and herds the livestock of the villagers.

[17] Usually 50 kilogram white flour sacks are preferred.

shelter; the ground was completely covered by animal waste and the feeding troughs were left by the nomads.

Possibly, as a result of the other group leaving the village as of 2010, and the making of "*Modern Structures"* rented by the new group, there was no longer a need for a sheltered wattle structure and these structures were spare for animals to use, with partial changes. The stone surroundings of this wattle structure are rather low compared to the ones that we detected in other winter quarters. Stone surroundings are a later addition to reinforce the Wattle Structure, a similar process to that seen at Bazivan Kom. T1 and T4 Type structures have been used at Memika Kom.

5.4.7. Mezrik Kom

Mezrik Kom is located on the south bank of Kuşikapınar intermittent stream on a ridge to the north of Yazıhan village. (Figure 5.19, 5.126 – 5.128)

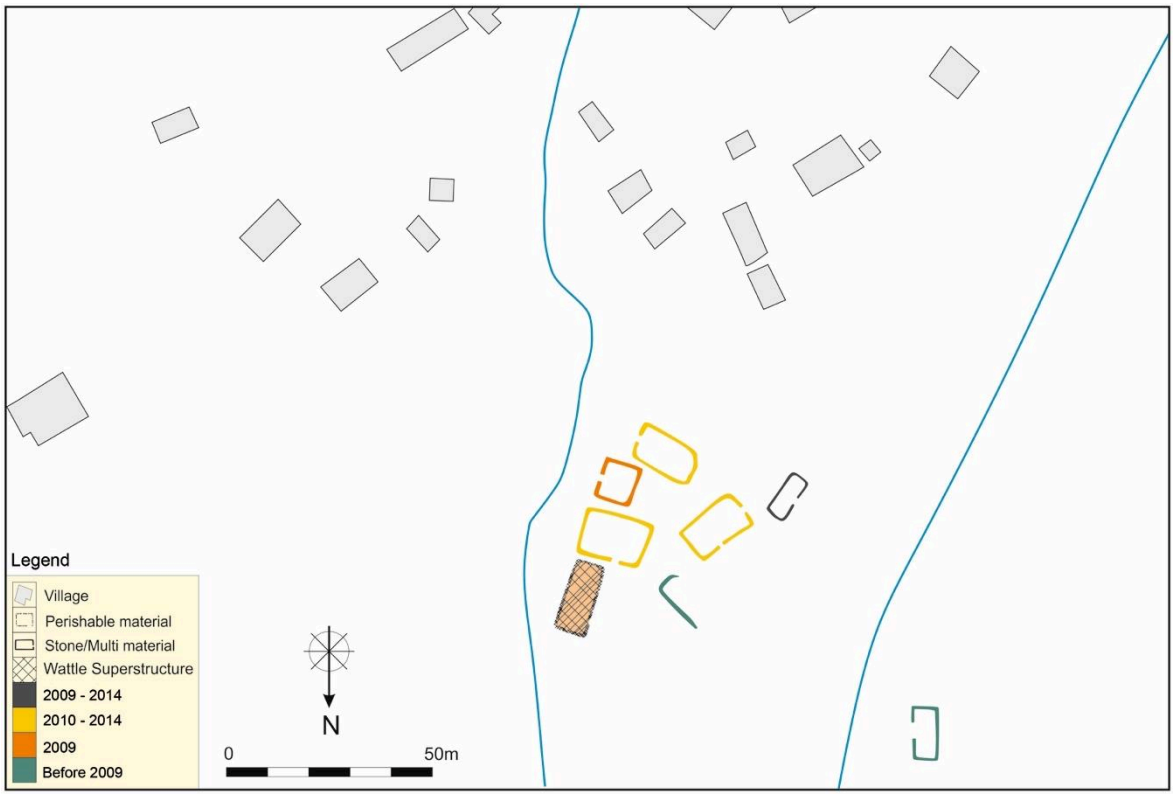


Figure 5.19: Settlement pattern and architecture of the Mezrik Kom

The winter quarters are used by a small group who are relatives of the ones who occupy Memika Kom[18]. It seems that the winter quarters are partly integrated with Yazıhan village, since the relationship between the nomads and villagers is close, as with those in M2 type of quarters. (Table 5.1)

The group using Mezrik Kom as winter quarters migrates in the spring to pastures on the flanks of Mount Süphan and stays there at least 4-5 months. (Oral interview with Sıdık Öztürk, 2013, Gedikli-Yazıhan village/ Batman) He was called "Zozan" and is members of that tribe.

In 2009, there were six structures with dimensions varying between 8.8x3.2 m and 14.3x9.6 m. The one to the north is a narrow long Wattle Structure, 5.4x16.3 meters in size. (Table 5.9; Figure 5.144) The other structures are Stone-Walled Structures without any remains of wattle being determined inside.

Based on interviews, spatial analysis and environmental usage analysis, it was revealed that the Wattle Structures and/or Tents with stone surroundings at Mezrik Kom are constructed for livestock and the houses for the semi-nomads are briquette or mud-brick structures which are rented from the villagers. The group, which comprises 26 people including a grandfather, his sons, and his unmarried daughters, have 600 sheep and goats. T1, T3 and T6 Type structures have been used at Mezrik Kom.

Architectural Structures	Long axis	Short axis	Square meter	Ratio	Construction Material	Function
1	16,35	8,71	142	1,9	Soil	Sheep pen
2	10,21	9,48	97	1,1	Stone and Soil	Sheep pen
3	16,78	11,85	199	1,4	Soil	Sheep pen
4	17,87	9,07	162	2,0	Reed and Brushwood	Sheep pen
5	16,24	9,69	157	1,7	Soil	Sheep pen
6	11,68	5,12	60	2,3	Soil	Sheep pen
7	13,11	6,70	88	2,0	Stone	Sheep pen

Table 5.9: Dimensions of architectural structures at Mezrik Kom

[18] Koçer Fahrettin, the brother of Koçer Osman, who lives in Gedikli hamlet all year long, has been using Mezrik Kom winter quarter for 6 years.

5.4.8. Işıkveren Kom I

Işıkveren Kom I was first recorded in 2002. (Erim-Özdoğan & Sarıaltun, 2011: 973) The stone surroundings of the structures demonstrate different features in comparison with the rest of the winter quarters in the south Garzan Basin in terms of construction technique. First of all, they are rather high, sometimes the height is 1.25 m. The bottom rows of the surroundings are composed of rather large, angular, gathered stones around 50x70 cm in size.

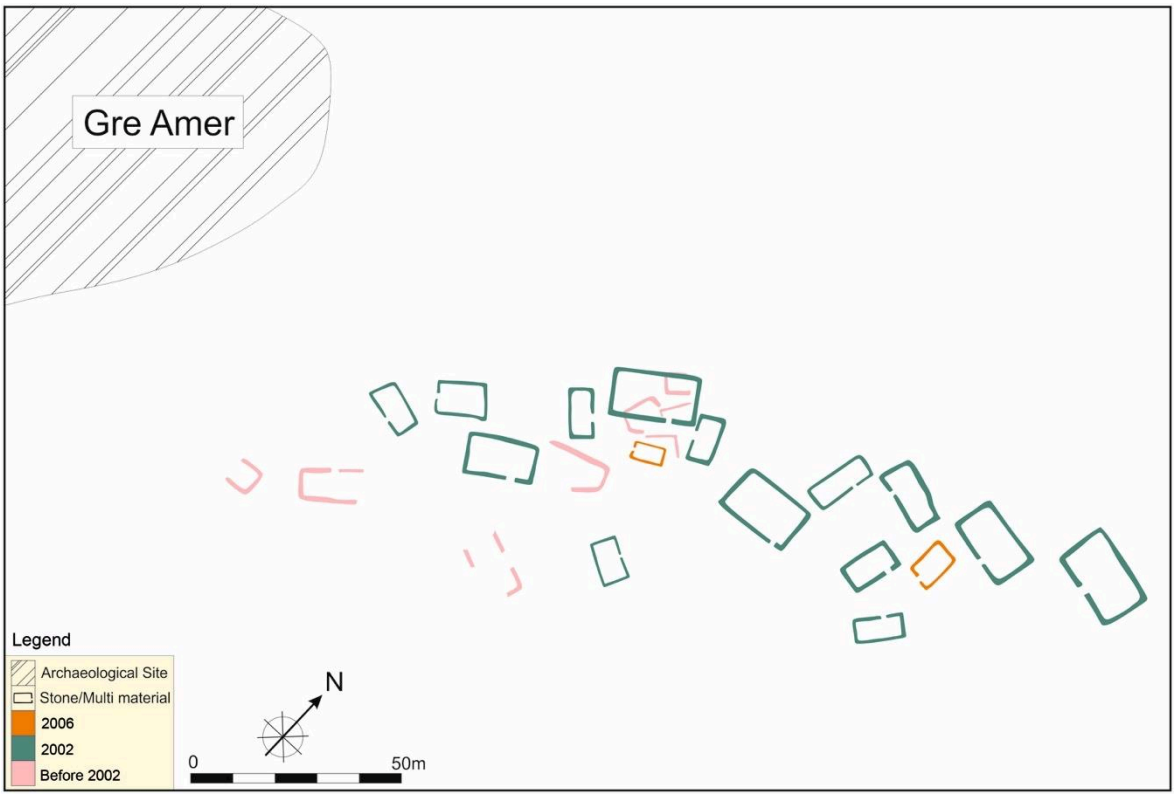


Figure 5.20: Settlement pattern and architecture of the Işıkveren Kom I

From the masonry point of view, it is observed that all the stones forming the surroundings are made to fit to each other. This type of construction technique is basically practiced in long-lasting structures with a stable roofing system rather than temporarily-occupied ones with tent coverage. There is also another aspect that we came across only at Işıkveren Kom I. This is the existence of two short "pillar"-like standing piles made by putting a couple of flat stones on top of each other in a regular way on the top rows of the short axis of rectangular Stone-Walled Structures. Based on our observations between the years 2002-2009, four of them have these standing elements. (Figure 5.20, 5.129 – 5.131) Since we were unable to document the manner of putting up tents, the function of this architectural feature is not clarified. Another interesting practice is that some of the stone

surroundings have dry earth particles grains, starting usually from the second layer of rows constructed of large stones. The reason behind this practice, as confirmed by the nomads, is that whenever the earth becomes wet by natural means, it fills the gaps between the stones and serves as mortar.

All the structures have single openings facing different directions. Either side of the openings is bordered by flat stones. This practice is also not known among the occupants of other winter quarters. The layout of the winter quarters is structures built relatively parallel in a northeast-southwest direction. In 2002, there were six structures 14x8 m in size, and 8 structures 9x5 m in size. (Table 5.10; Figure 5.145) In 2005 some of the Stone-Walled Structures were reused and two new ones were built. The new ones are rather small, and cover an area of not more than 24 m^2. The construction technique of their surroundings is completely different from that of the previous structures. The height of these elaborately-constructed structures is 55-60 cm and the width is 50 cm.

From our observations, it is understood that the winter quarters have not been occupied since 2005, and were in a semi-ruined state after 2009. Stones of the nomadic structures were then completely removed and piled up next to a field. Villagers have ploughed the land since 2010. Only Type T3 structures were used at Işıkveren Kom I.

Architectural Structures	Long axis	Short axis	Square meter	Ratio	Construction Material	Function
1	12,35	6,83	84	1,8	Stone	Sheep pen
2	11,94	8,49	101	1,4	Stone	
3	17,11	10,25	175	1,7	Stone	Sheep pen
4	12,29	6,16	76	2,0	Stone and reed	Dwelling
5	21,11	12,01	254	1,8	Stone	Sheep pen
6	7,95	4,52	36	1,8	Stone	
7	11,71	6,39	75	1,8	Stone	
8	10,86	6,58	71	1,7	Stone	
9	18,99	12,28	233	1,5	Stone	Sheep pen
10	15,86	6,32	100	2,5	Stone	
11	16,24	8,28	134	2,0	Stone and reed	Dwelling
12	13,00	7,22	94	1,8	Stone	
13	12,29	6,16	76	2,0	Stone	
14	10,25	6,89	71	1,5	Stone	
15	18,33	11,1	203	1,7	Stone	Sheep pen
16	20,71	12,68	263	1,6	Stone	Sheep pen

Table 5.10: Dimensions of architectural structures at Işıkveren Kom I

5.4.9. Işıkveren Kom II

Işıkveren Kom II is the second winter quarters area located on the same terrace (on Amer Plain) as Işıkveren Kom I. It is situated on the south bank of Kereken intermittent stream, approximately 500 meters northeast of the Garzan River and 750 meters southeast of Işıkveren Kom I. (Figure 5.21, 5.132 – 5.134) It lies both on a gentle slope and flat terrace. Işıkveren Kom II was evaluated as being the M2 type of winter quarters. (Table 5.1)

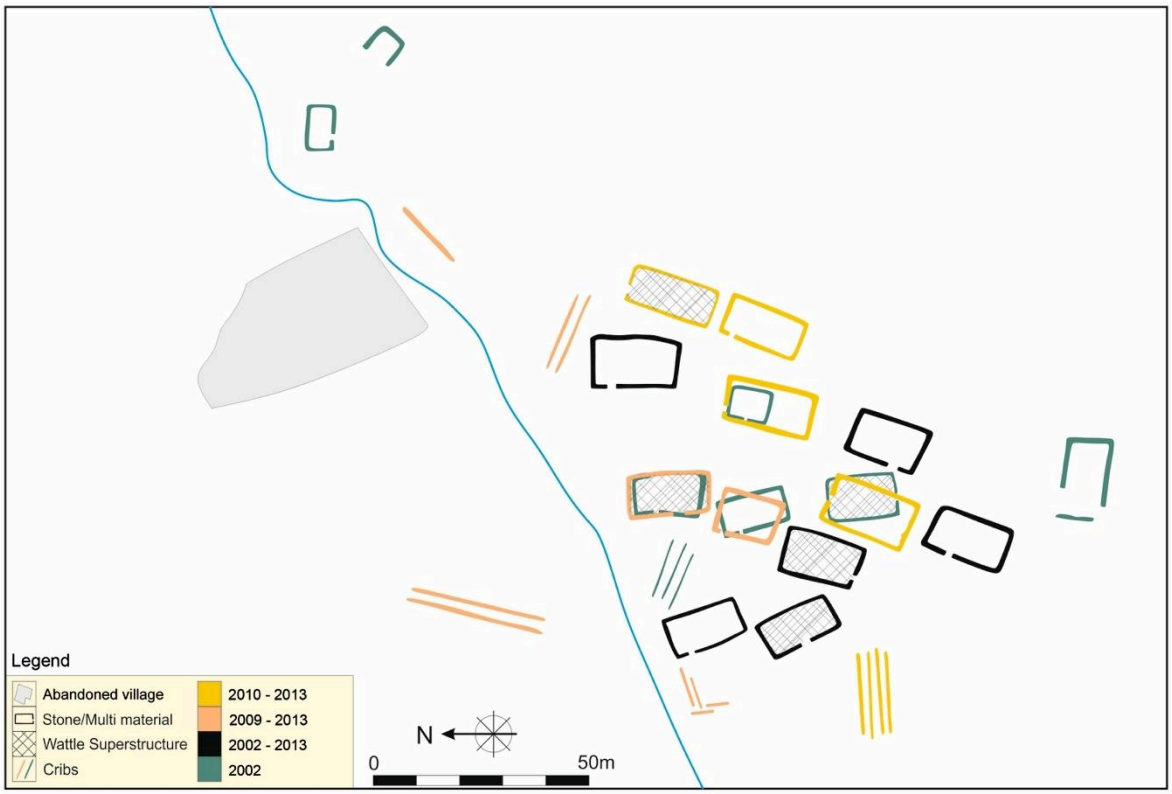


Figure 5.21: Settlement pattern and architecture of the Işıkveren Kom II

The winter quarters extend towards the slope area with structures positioned parallel to each other in a southwest-northeast direction. All of the structures have stone surroundings. Işıkveren Kom II was first recorded in 2002. (Erim-Özdoğan & Sarıaltun, 2011: 973) During our 12 years of research at regular intervals, it was seen that five structures are Stone-Walled Wattle Structures. The dimensions of these structures are not different from others, varying between 18.5x7.2 m and 14.5x6.9 meters. (Table 5.11; Figure 5.146) At Memika Kom and Bazivan Kom, the stone surroundings of the wattle structures, which are relatively low and imprecisely constructed, are basically for reinforcement of the *Wattle Structures* and usually they are later additions. However, at Işıkveren Kom II this practice is a conscious choice; in other words, a tradition.

The structures at Işıkveren Kom II are usually repaired and used numerous times; yet serious changes in the settlement pattern took place in the central area. In 2002 the Stone-Walled Structures were in a southeast-northwest direction and they were relatively small compared to the structures of the succeeding periods, which have a more elaborate masonry technique. In 2010 and after, it was observed that the orientation of the structures changed to southwest-northeast and their size was noticeably larger. The area of the tents with stone surroundings varies from 60 to 220 m^2. It was stated during interviews with settled villagers in the neighbourhood that this winter quarters was unoccupied between 2004-2007 and the current group is not the same group as in 2002. Yet the reason for the 2002 group migrating to a new campsite could not be specified by the villagers.

Feeding troughs at Işıkveren Kom II are clearly outside the residential area. Especially the western outer part, which is closer to water and meadows, is reserved for herds. Nonetheless, structures for animal sheltering are dispersed in the winter quarters without a regular plan. There is no clear distinction in construction technique or relationship between structures used by humans and shelters for animals. However, humans prefer to use the smaller ones. Tandırs and small fireplaces are placed between the structures. (Figure 5.134) There are no interior hearths; all the cooking of food takes place outside. T2 and T3 Type structures have been used at Işıkveren Kom II.

Architectural Structures	Long axis	Short axis	Square meter	Ratio	Construction Material	Function
1	10,84	7,00	76	1,5	Stone	
2	20,95	9,23	193	2,3	Stone and Reed	Sheep pen
3	19,23	10,25	197	1,9	Stone	Sheep pen
4	20,55	12,50	257	1,6	Stone	Sheep pen
5	9,89	7,96	79	1,2	Stone	Dwelling
6	21,32	11,48	245	1,9	Stone	Sheep pen
7	17,82	11,44	204	1,6	Stone	Sheep pen
8	19,20	11,28	217	1,7	Stone	
9	16,40	10,86	178	1,5	Reed and Stone	Dwelling
10	20,68	12,37	256	1,7	Stone	Sheep pen
11	16,25	8,76	142	1,9	Stone	Dwelling
12	14,73	10,75	158	1,4	Stone	Sheep pen
13	16,87	9,81	165	1,7	Stone	Sheep pen
14	19,70	10,67	210	1,8	Stone and Reed	Sheep pen
15	18,69	11,34	212	1,6	Reed and Stone	Sheep pen
16	18,06	9,99	180	1,8	Stone	Sheep pen
17	18,04	9,64	174	1,9	Stone and Reed	Sheep pen
18	19,21	10,98	211	1,7	Stone	

Table 5.11: Dimensions of architectural structures at Işıkveren Kom I

5.4.10. Boğaz Kom

Boğaz Kom is situated in the Lower Garzan Basin, which has an embedded valley character that separates the south and the north basins of the Garzan River. The general layout of the winter quarter is in a southeast to northwest direction, covering an area of 450 by 150 meters. The area is separated into four area according to the dwelling density and periodic utilisation of structures. (Figure 5.22, 5.135 – 5.137) Boğaz Kom was evaluated as being the M1 type of winter quarters. (Table 5.1)

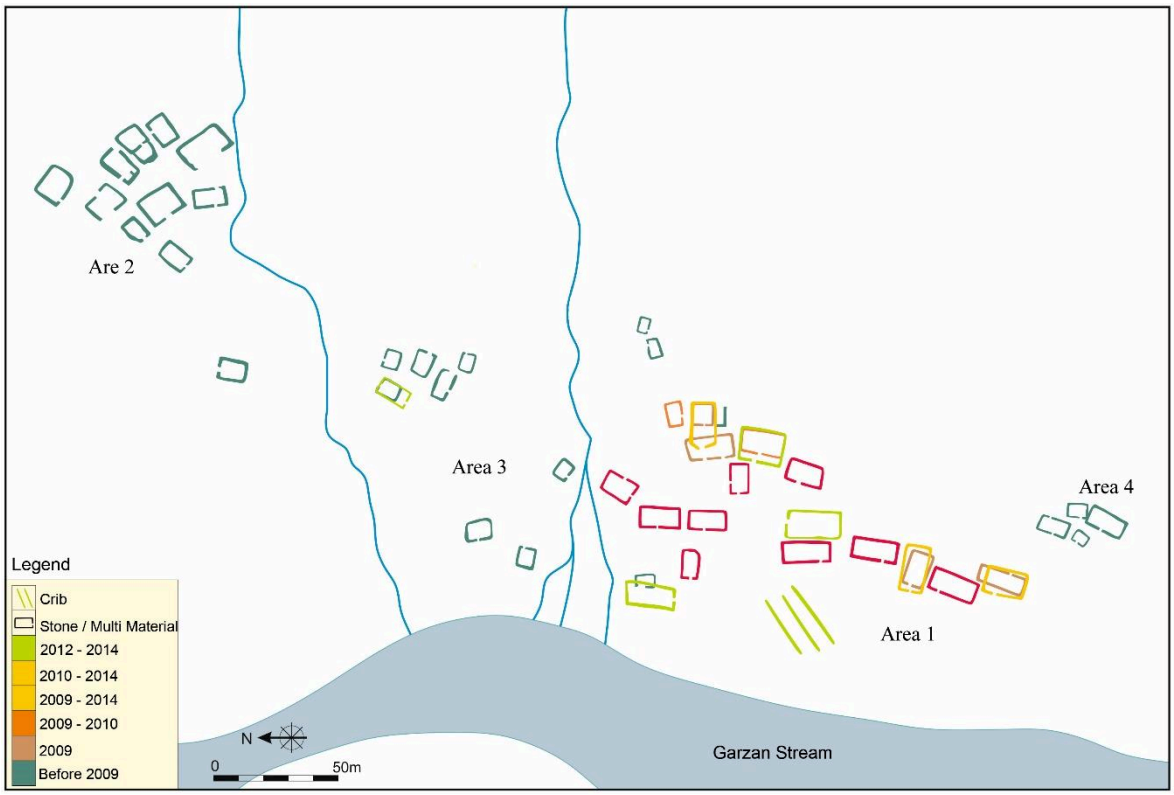


Figure 5.22: Settlement pattern and architecture of the Boğaz Kom

Area 1 is in the centre next to the Garzan River and is situated on the south bank of Ziyaret intermittent stream. It extends in a south-north direction in general terms, and rests on two terraces of the slope, where Cemal spring is located. Area 1 displays the most intensive and longest utilisation. Structures in this area are concentrated in two areas, the ones on the northwest side are more numerous compared to its southeast part. While the southeast is more organized and displays a contiguous plan, the northwest side is disorganized and has an architectural plan that has changed and been renewed constantly over time. Some severely damaged structural ruins without a regular plan, which belong to a previous utilisation, have also been detected. Taking into account all this data, the core of

Boğaz Kom can be stated as the northwest part of Area 1. Generally, the openings of the structures face south towards the Garzan River. There are three rows of feeding troughs parallel to each other in the south of Area 1. Just east of these 25-30 m feeding troughs, some run-down feeding trough ruins can also be seen. When field observations and satellite images were compared, it was detected that between 2010 and 2013, the feeding troughs were re-used after repair without changing their places. They display similar features to other winter quarters that are woven with wattle and brushwood together.

Area 2 is in the middle of the winter quarters and shows signs of expansion, especially on the terrace on the west slope of Ziyaret Hill, which reflects the earliest period of the seasonal campsite sequence. Stone-Walled Structures are rather small in size and their plan is rectangular or square. Their dimensions are 11x5.1 and 4x3.8 meters and their surroundings are 50 cm high and 25-40 cm thick. (Table 5.12; Figure 5.147)

Area 3 is the easternmost area of the winter quarter. Stone-Walled Structures are contiguous, having a rectilinear plan that is quite close to a square with dimensions of approximately 6.5x4.6 meters or are rectangular with dimensions of about 12.6x6.5 meters. The surroundings are 40-65 cm high and 35-40 cm thick. The openings face in different directions. There is a 200 m^2 area between the structures in the centre. Neither the remains of feeding troughs nor fireplaces have been determined in this area.

Area 4 is on the farthest eastern edge of the winter quarters. Cyclically, it has been used before Area 1, after Area 2, or together with Area 2 and 3. Stone-Walled Structures in this area are rectangular, sharing similar features with those of other areas. Their dimensions are 3.9x2.8 m and 10.8x4.6 meters. The upper rows of stone surroundings are sometimes finished with earth-filled sacks.

The tops of these enclosures are completely covered by a tent according to Google Earth satellite analysis and our field research. Only T3 Type structures have been used at Boğaz Kom.

Architectural Structures	Long axis	Short axis	Square meter	Ratio	Construction Material	Function
1	14,53	12,38	180	1,2	Stone	
2	16,05	9,68	155	1,7	Stone	
3	17,17	10,92	187	1,6	Stone	
4	12,77	8,97	115	1,4	Stone	
5	20,32	12,07	245	1,7	Stone	
6	15,91	12,49	199	1,3	Stone	
7	10,58	7,77	82	1,4	Stone	
8	12,64	8,50	107	1,5	Stone	
9	14,03	7,95	112	1,8	Stone	
10	12,12	9,15	111	1,3	Stone	
11	9,25	7,63	71	1,2	Stone	
12	13,37	6,63	89	2,0	Stone	
13	8,10	7,11	58	1,1	Stone	
14	10,59	7,94	84	1,3	Stone	
15	7,93	6,33	50	1,3	Stone	
16	12,60	7,72	97	1,6	Stone	
17	8,46	6,84	58	1,2	Stone	
18	11,18	8,58	96	1,3	Stone	
19	8,86	7,67	68	1,2	Stone	
20	8,36	5,57	47	1,5	Stone	
21	20,43	9,48	194	2,2	Stone	
22	12,35	7,76	96	1,6	Stone	Dwelling
23	17,11	9,13	156	1,9	Stone	Sheep pen
24	15,99	8,42	135	1,9	Stone	Dwelling
25	13,87	9,24	128	1,5	Stone	Sheep pen
26	12,71	8,03	102	1,6	Stone	Dwelling
27	15,36	9,54	147	1,6	Stone	Sheep pen
28	18,13	10,63	193	1,7	Stone	Sheep pen
29	18,65	14,30	267	1,3	Stone	Sheep pen
30	19,22	9,67	186	2,0	Stone	Sheep pen
31	10,25	6,45	66	1,6	Stone	
32	9,98	9,57	96	1,0	Stone	
33	18,65	10,56	197	1,8	Stone	Dwelling
34	8,38	5,78	48	1,4	Stone	
35	6,69	4,94	33	1,4	Stone	
36	22,65	11,56	262	2,0	Stone	Sheep pen
37	20,14	9,16	184	2,2	Stone	Sheep pen
38	19,15	9,17	176	2,1	Stone	Sheep pen
39	14,90	9,80	146	1,5	Stone	
40	19,36	10,71	207	1,8	Stone	Sheep pen
41	19,93	7,54	150	2,6	Stone	Sheep pen
42	17,49	11,04	193	1,6	Stone	Sheep pen
43	8,63	5,99	52	1,4	Stone	Sheep pen
44	12,78	6,91	88	1,8	Stone	
45	5,83	5,29	31	1,1	Stone	
46	16,23	8,47	137	1,9	Stone	

Table 5.12: Dimensions of architectural structures at Boğan Kom

5.5. Discussion

Ethnoarchaeology has become established subfields in archaeology so that ethno-archaeological studies are one of the important tools used to understand or re-question the ways of living, practices of daily life and also perhaps social organizations of past communities, and also it is possible to be interpreted of the materials from archaeological sites. However, one must be prudent about reconstructing prehistoric remains by direct analogy with modern semi-nomadic group especially pastoral semi-nomadic group.

In this section, it is tried to understand the settlement strategy of the semi-nomadic groups that established temporary campsites as winter quarters in the Lower Garzan Basin. Spatial analyses of the winter quarters enable us to make some analogies with the settlement pattern and architectural elements of the Sumaki Höyük. Based on this reason, ten of the nineteen winter quarters identified in the basin were periodically followed up from the beginning of our thesis research. Architectural structures of the winter quarters were drawn in detail and the changes within the years were also tried to be followed. Field work has also been supplemented by oral interviews with the semi-nomadic groups and sometimes the villagers have received assistance.

Basically, there is no standard criterion in choice of land for establishing winter quarters in the Lower Garzan Basin, generally close to water sources and protected areas are preferred. However, the areas should not always be geographically protected. For example, the location of winter quarters such as Boğaz Kom, Işıkveren Kom I-II and Sulane Girgiz Kom were geographically protected areas while Mezrik Kom, Gedikli Kom and Bazivan Kom are protected by villagers. Whereas the location of Çemisitrin Kom was completely different than the others. It is far from the villages and geographically open area. Almost all of winters quarters are close to the Garzan River, nevertheless, Mezrik Kom has been founded in an area far from the river, which is similar to the location of Sumaki Höyük. Although Mezrik Kom is far from the river; a drinkable water source is just nearby. Overall most of the winter quarters are located in the hilly areas not far from the cultivated fields. Perhaps the main reason for this is the richness of remaining material after the reaping of the fields.

There are two types of construction material used in the winter quarters: stone and reed. Stone is used in accordance with the topography of the region in almost all the winter quarters. However, reeds have been preferred in some winter quarters and also they have been used in different technique or fashion and/or in different periods. Reeds are favoured

as construction material at Memika Kom, Bazivan Kom, and Çemisitrin Kom. At Işıkveren Kom I-II, Mezrik Kom and Sulane Girgiz Kom the stone surroundings are covered with reeds, and reeds/twigs are used in fences around animal shelters. Although, Boğaz Kom is very close to the marshy areas, reeds or reeds traces were not identified. The semi-nomadic groups, who occasionally occupied this area, cover the stone surroundings by plastic or fabric tents.

All structures that are constructed with different materials such as stone, reeds, branches, or sacks filled with soil have exceptionally rectangular or rectilinear plans. The corner of the stone surroundings in Işıkveren Kom I - II, Çemisitrin Kom and Sulan Kom are perpendicular while in the other winter quarters, the corners of the structures are more curved. No traces of mortar were found in any of these stone surroundings. In the winter quarters of the semi-nomadic groups using the Lower Garzan Basin, no round or oval structures were encountered.

Inside these structures, posts are functioned as the architectural frame, to support the reed top cover as well as carry the reed surroundings. The reed bundles used in top cover are tightly bonded and then is covered with plastic or fabrics. In oral interviews, I was also told that there was no need to cover the first years of these reed structures. They were only put temporary clothes on heavy rainy days. In my field study, a plastered floor was encountered in structures used neither in animal shelters nor in residential areas. Generally, ready-made items such as mats, carpets or rugs are laid on the floor, and all the indoor activities took place on these covers. I was observed that after the removal of these covers, a partly hardened thin surface on earth can be seen.

The structures in the winter quarters are positioned in accordance with the environmental conditions and topography. And also there are no graveyards in any of the winters quarters. However, the Şeyh Cemalettin cemetery, which is far from any of the villages nowadays, is a very old graveyard. During the survey in 2002, we are told that it is not known which village this cemetery belongs to and modern settled people did not use it, rather since 50-60 years, semi-nomadic groups have been buried their dead.

The architectural construction material is compatible with the topography is chosen from the material easily found in the region. There is no plastered floor or hardened earth floor inside the structures. Generally, rectangular buildings with 40-60 m^2 of interior space were used by humans, while 100 m^2 and larger structures are reserved for herds. There is no significant difference in the stone walls of the buildings used by humans or animals. In both

types of construction, similar techniques and similar material were used. Although pastoral semi-nomadic groups in the study area display different attitudes in choice of habitation area, generally, they have preferred sheltered and fertile areas.



Figure 5.23*:Semi-nomadic group on the way back to winter quarters, near Hasankeyf*



Figure 5.24: Semi-nomadic group on the way to the summer pasture, near Kentalan Mountain



Figure 5.25: ***Semi-nomadic group on the way to the summer pasture, near Rıdvan village***

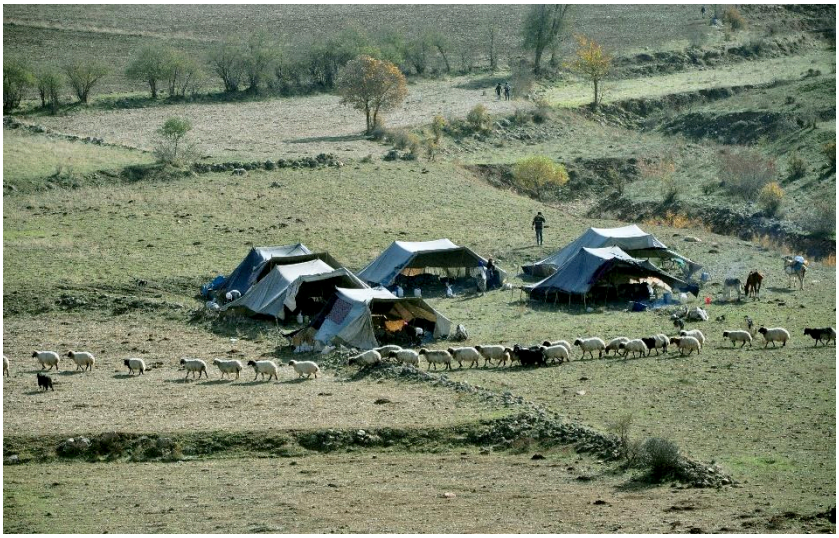


Figure 5.26: Temporary campsite was located in the south of Hasankeyf



Figure 5.27: Temporary camp site was located in front of Rıdvan village



Figure 5.28: ***A temporary campsite was located near Kumgeçit village***



Figure 5.29: Temporary campsite in the Lower Garzan Basin, near Beşpınar town



Figure 5.30: Establishment of a temporary campsite in the Lower Garzan Basin, near the town of Bespinar



Figure 5.31: ***Establishment of a temporary campsite in the Lower Garzan Basin, near the town of Bespinar***



Figure 5.32: External view of Memika Saz Evi and its tensioning system, near Gedikli village



Figure 5.33: External view of Memika Saz Evi , near Gedikli village



Figure 5.34: ***Wickerwork detail of the Wattle Structure, near Gedikli village***



Figure 5.35: Wattle Structure: its plan with dimensions

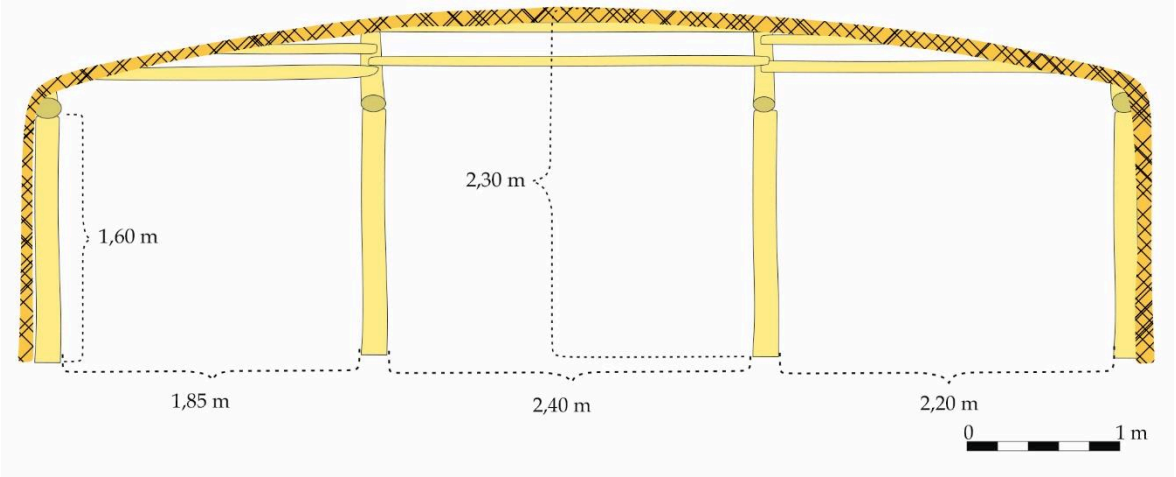


Figure 5.36: ***Architectural components and its dimensions of a Wattle Structure (long axle)***

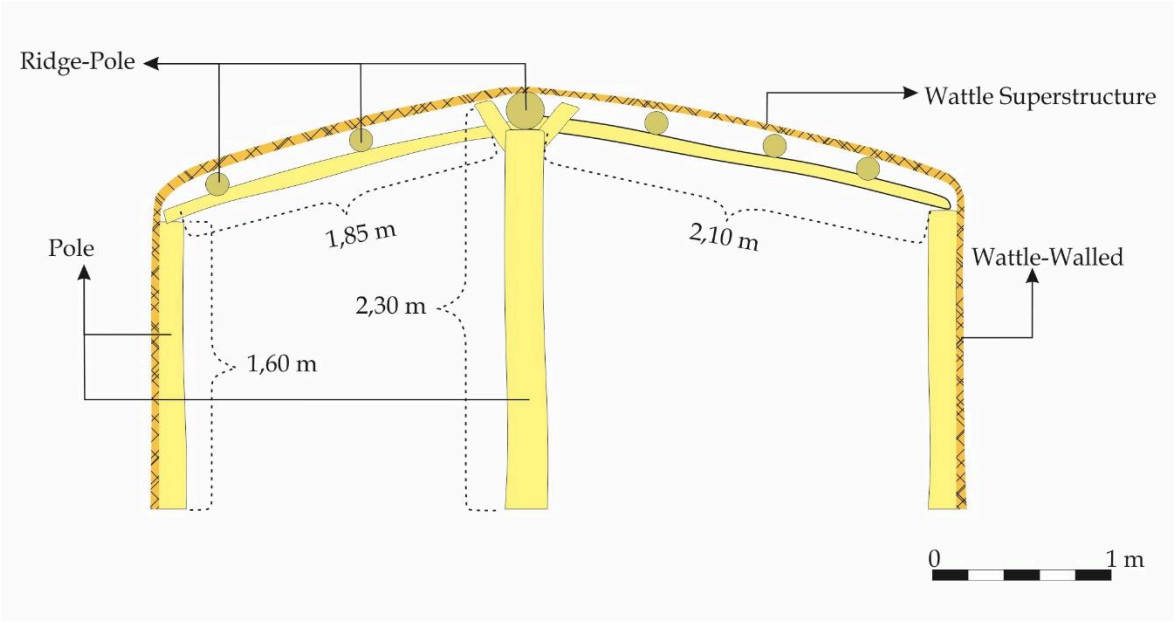


Figure 5.37: ***Architectural components and its dimensions of a Wattle Structure (short axle)***



Figure 5.38: ***External view of the Wattle Structures and its architectural construction process, near Kumgeçit***



Figure 5.39: ***External view of the Wattle Structures and its architectural construction process, near Kumgeçit***



Figure 5.40: ***Architectural construction process of a Wattle Structure, near Kumgeçit village***



Figure 5.41: ***Architectural construction process of a Wattle Structure, near Kumgeçit village***



Figure 5.42: ***Some wooden poles in a Wattle Structure, near Kumgeçit village***



Figure 5.43: ***Some wooden poles was used for Wattle Structures, near Kumgeçit village***

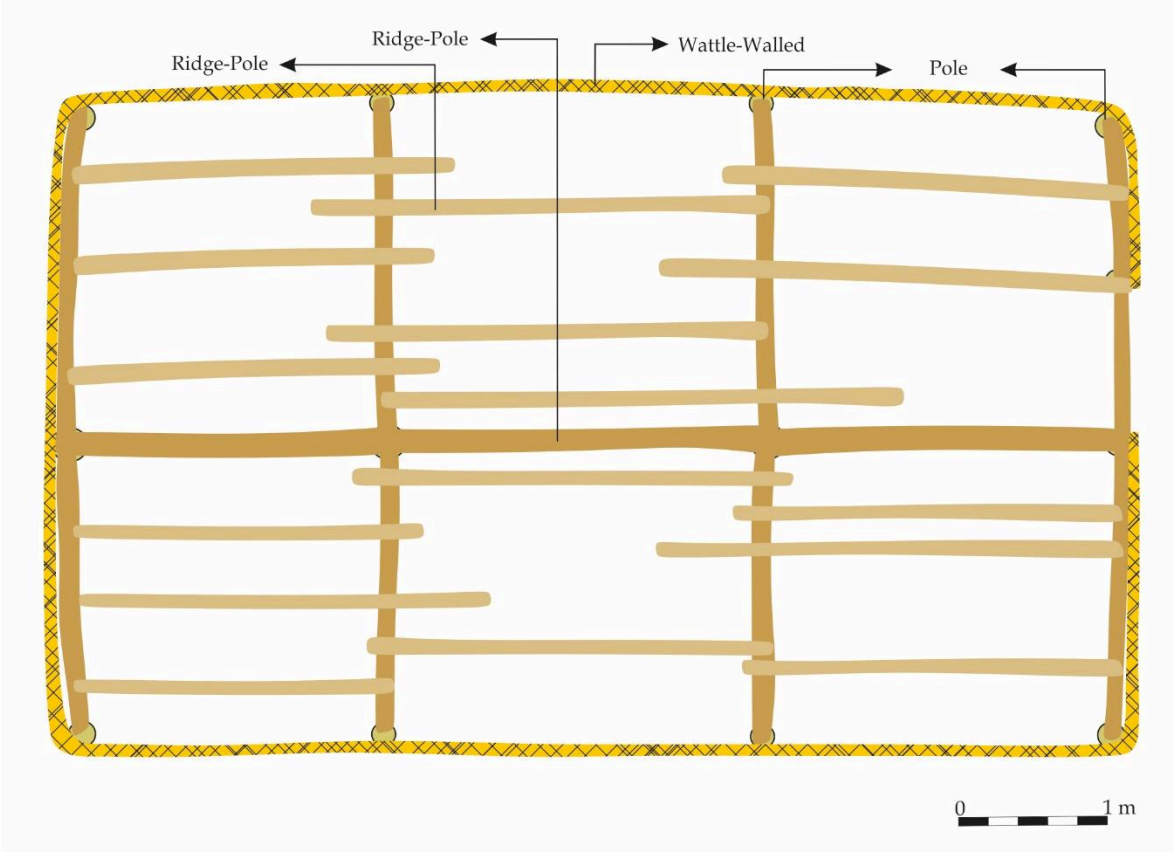


Figure 5.44: ***Architectural components of the superstructure of a Wattle Structure***

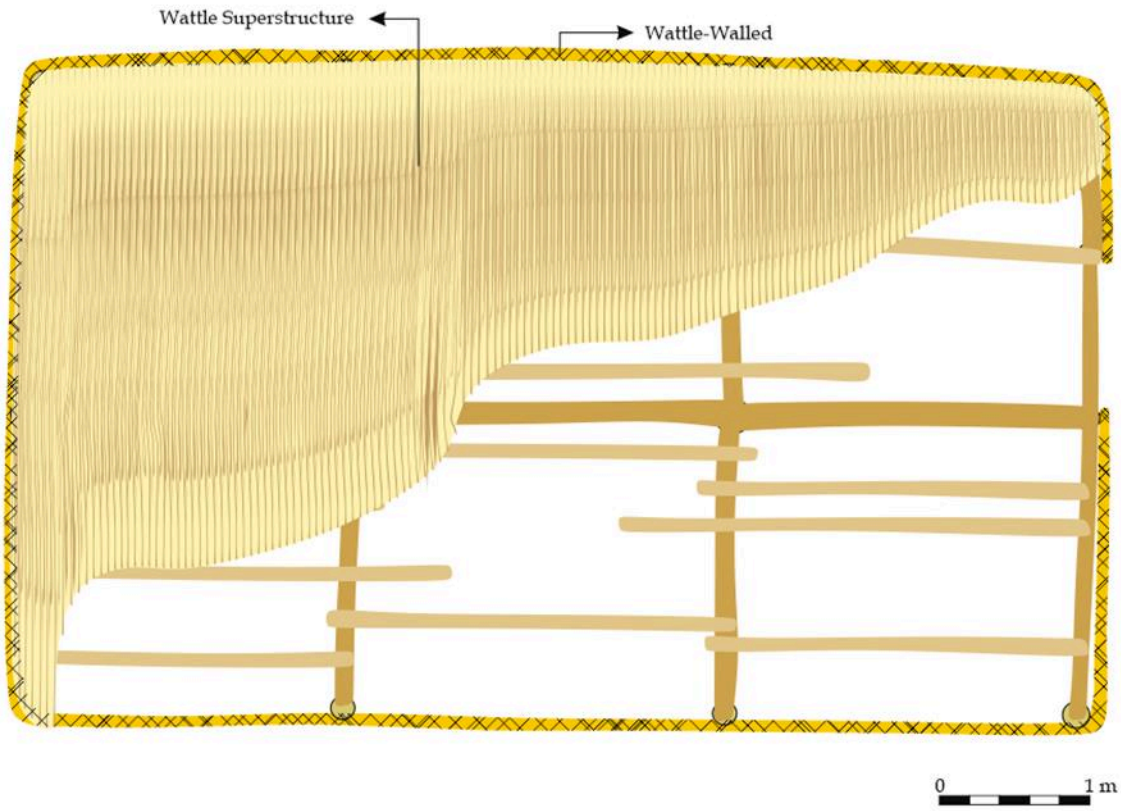


Figure 5.45: Reeds cover of the superstructure of a Wattle Structure



Figure 5.46: ***Exterior view of a Wattle Structure (long axle)***

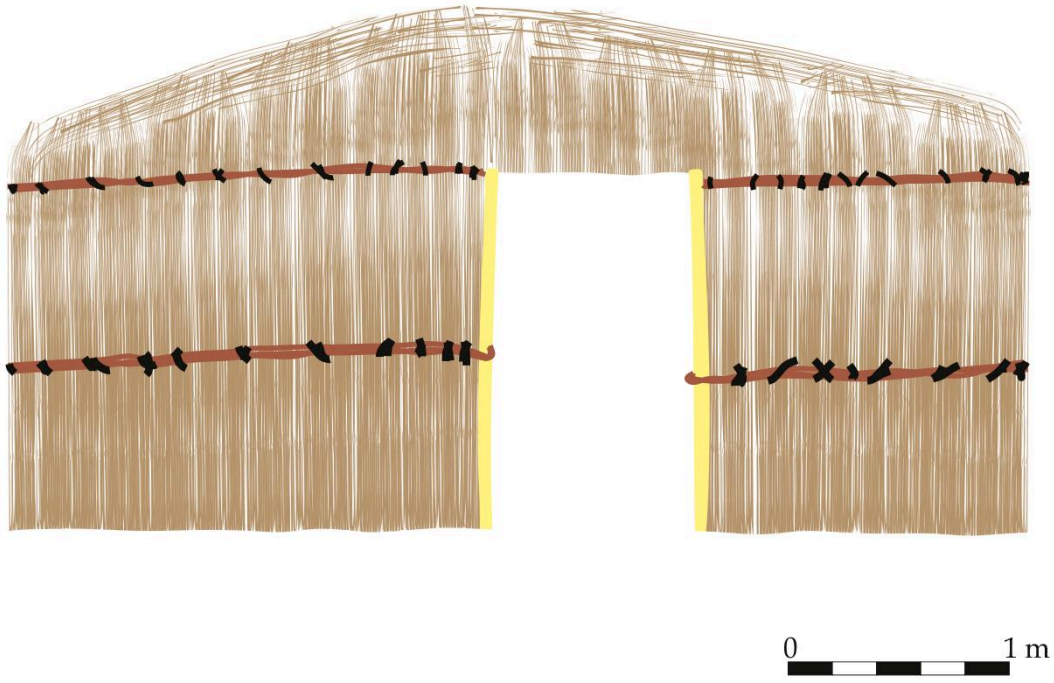


Figure 5.47: Exterior view of a Wattle Structure (short axle)



Figure 5.48: Stone-Walled Wattle Structure in Memika Kom, from Gedikli village



Figure 5.49: Stone-Walled Wattle Structure in Bazivan Kom, south of Kumgeçit village

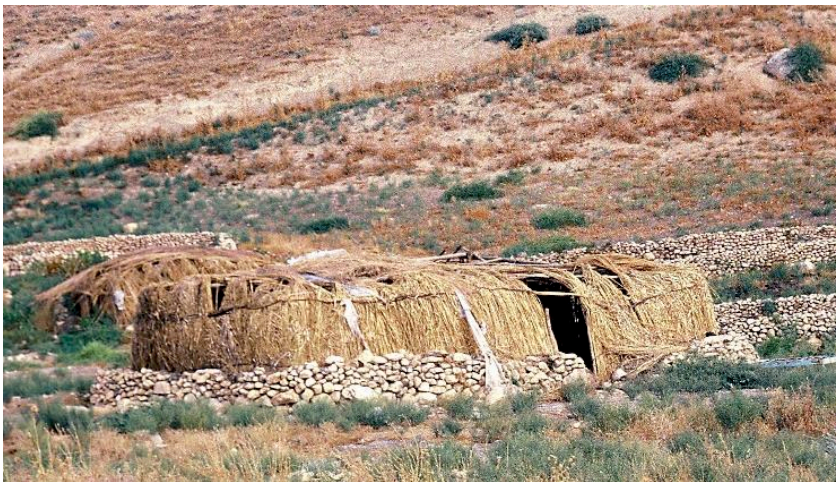


Figure 5.50: ***Stone-Walled Wattle Structure in Işıkveren Kom II, south of Işıkveren village***

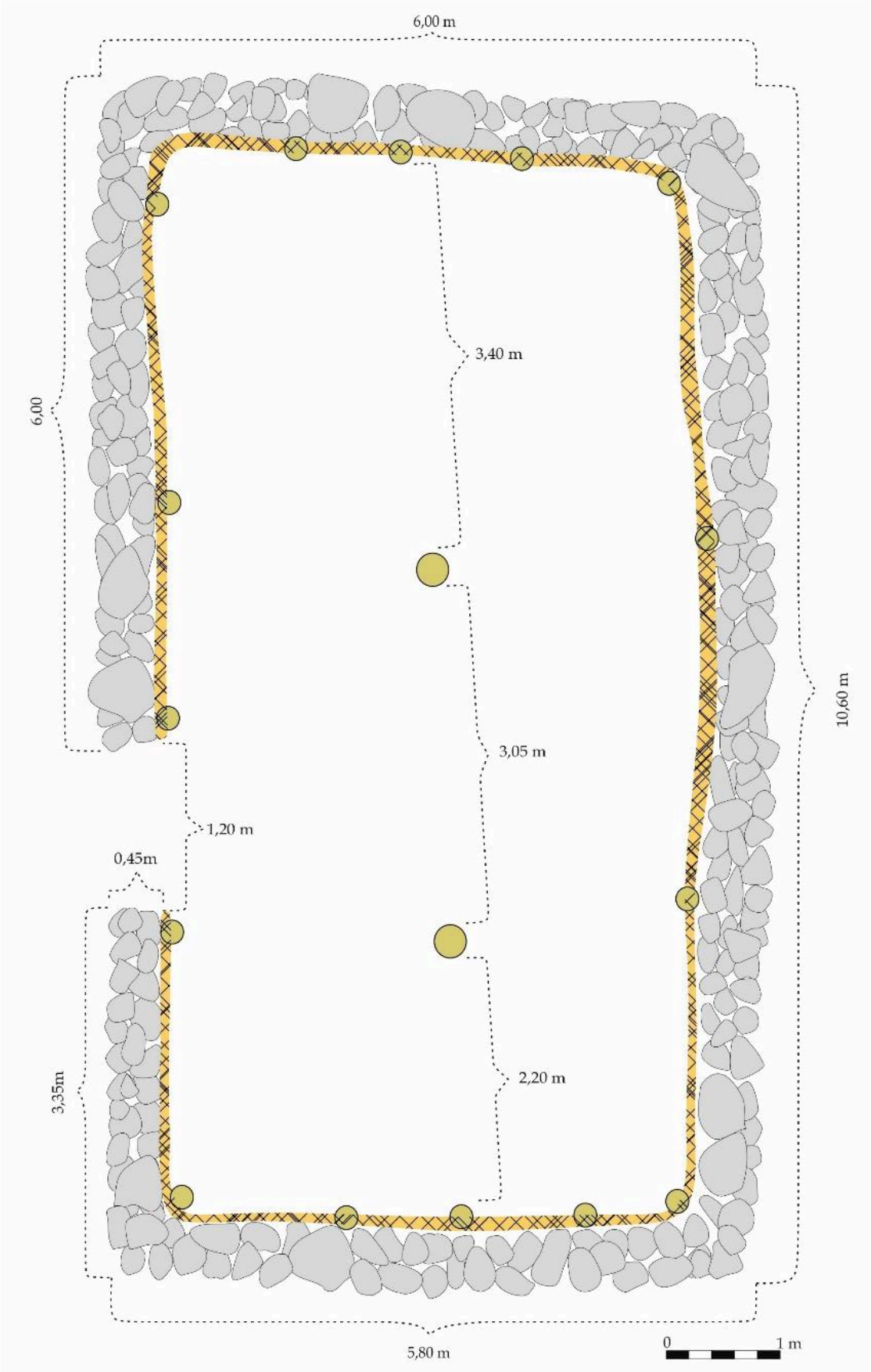


Figure 5.51: ***Stone-Walled Wattle Structure: plan with dimensions***

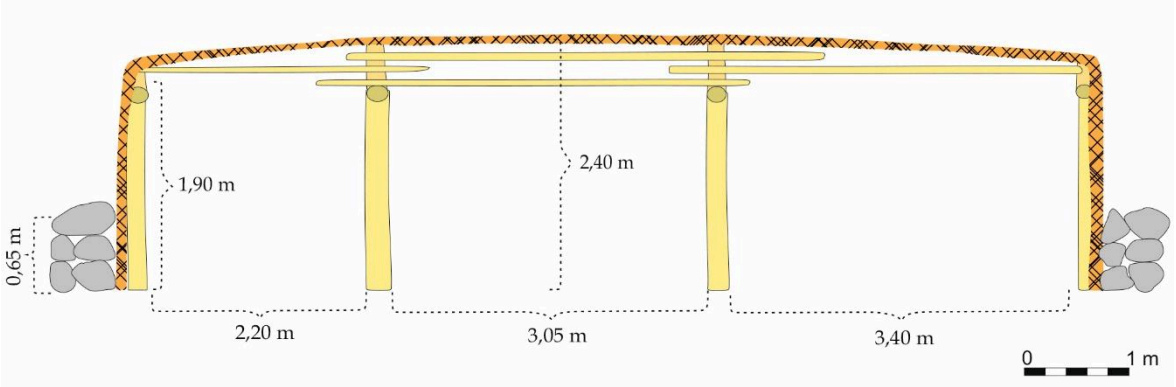


Figure 5.52: ***Architectural components and its dimensions of a Stone-Walled Wattle Structure (long axle)***

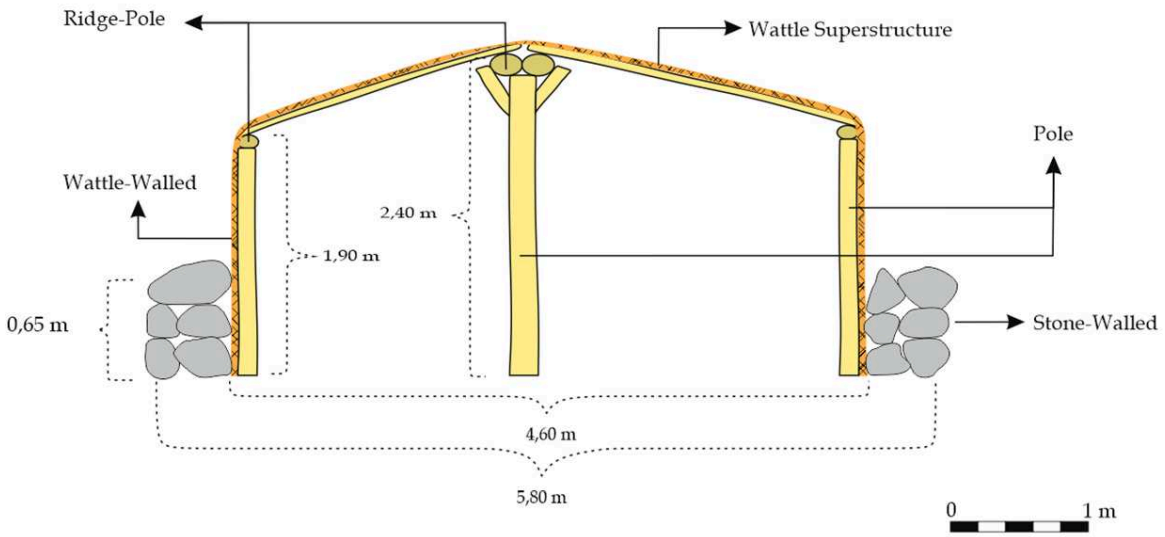


Figure 5.53: ***Architectural components and its dimensions of a Stone-Walled Wattle Structure (short axle)***

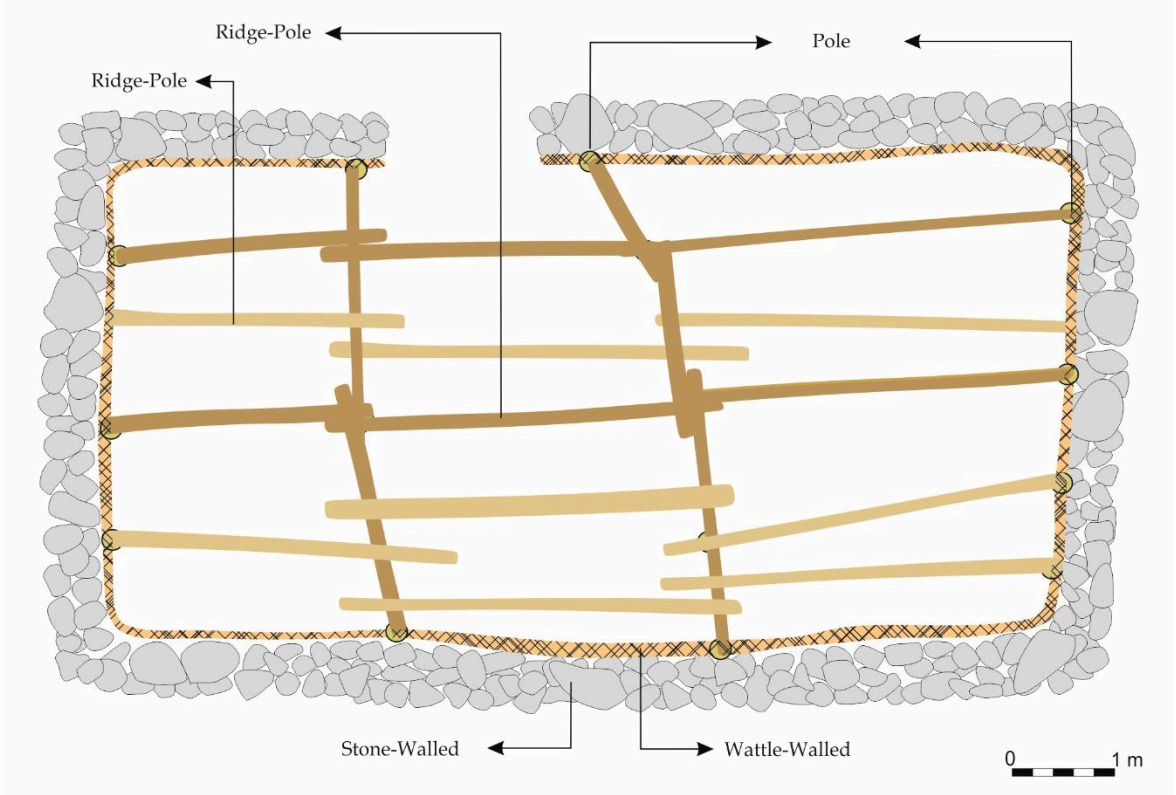


Figure 5.54: ***Architectural components of the superstructure of a Stone-Walled Wattle Structure***

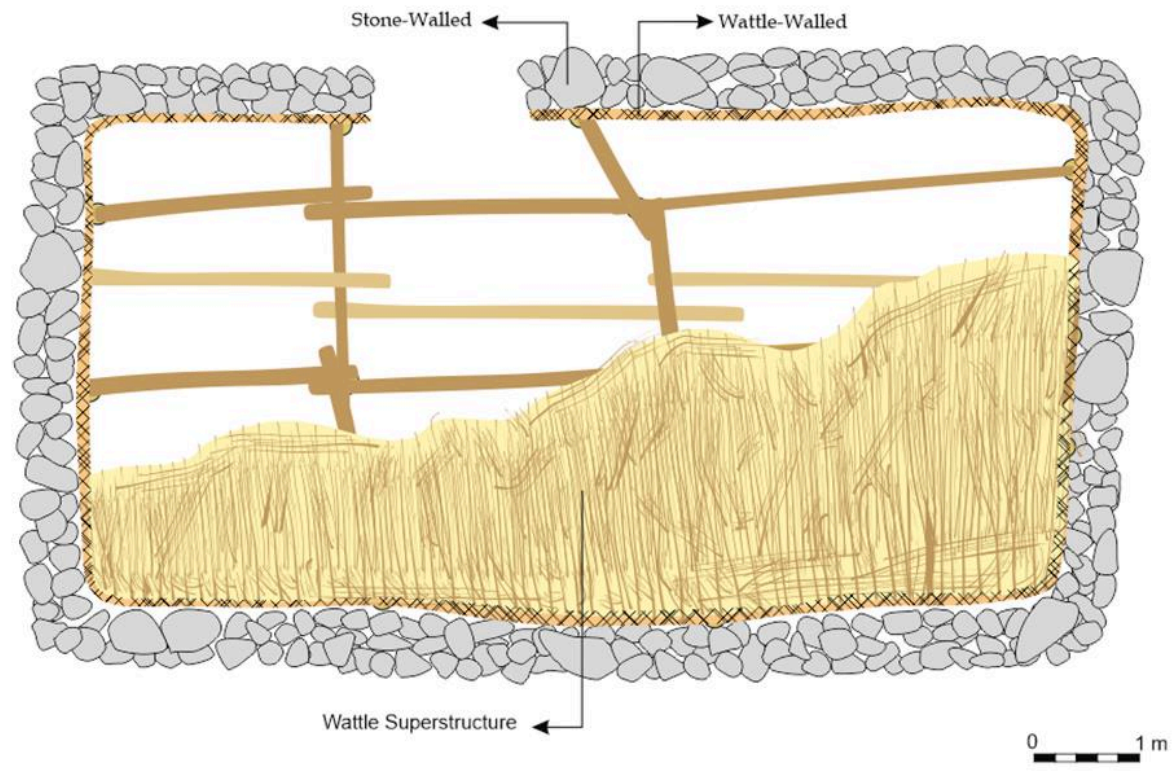


Figure 5.55: ***Reeds cover of the superstructure of a Stone-Walled Wattle Structure***

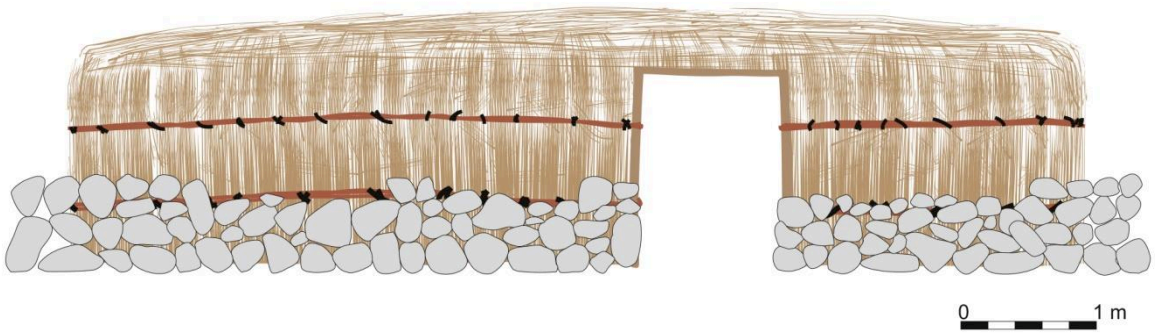


Figure 5.56: ***Exterior view of a Stone-Walled Wattle Structure (long axle)***

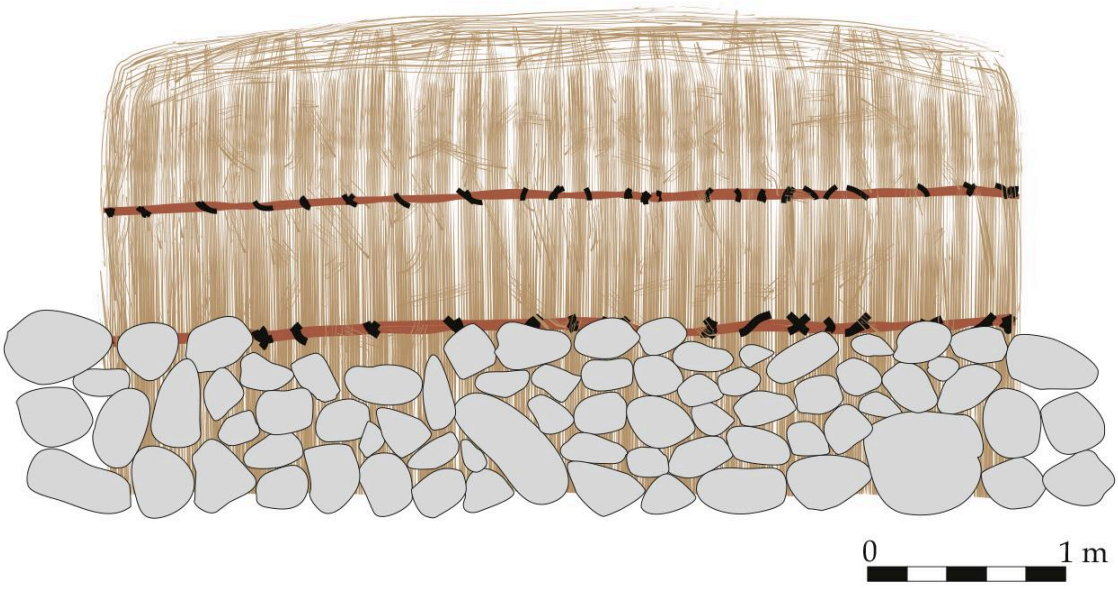


Figure 5.57: ***Exterior view of a Stone-Walled Wattle Structure (short axle)***



Figure 5.58: External view of a Stone-Walled Tentsites (in usage)



Figure 5.59: Overview of some Stone-Walled Tentsites (after usage)



Figure 5.60: ***External view of a destroyed Stone-Walled Tentsites and its architectural components***

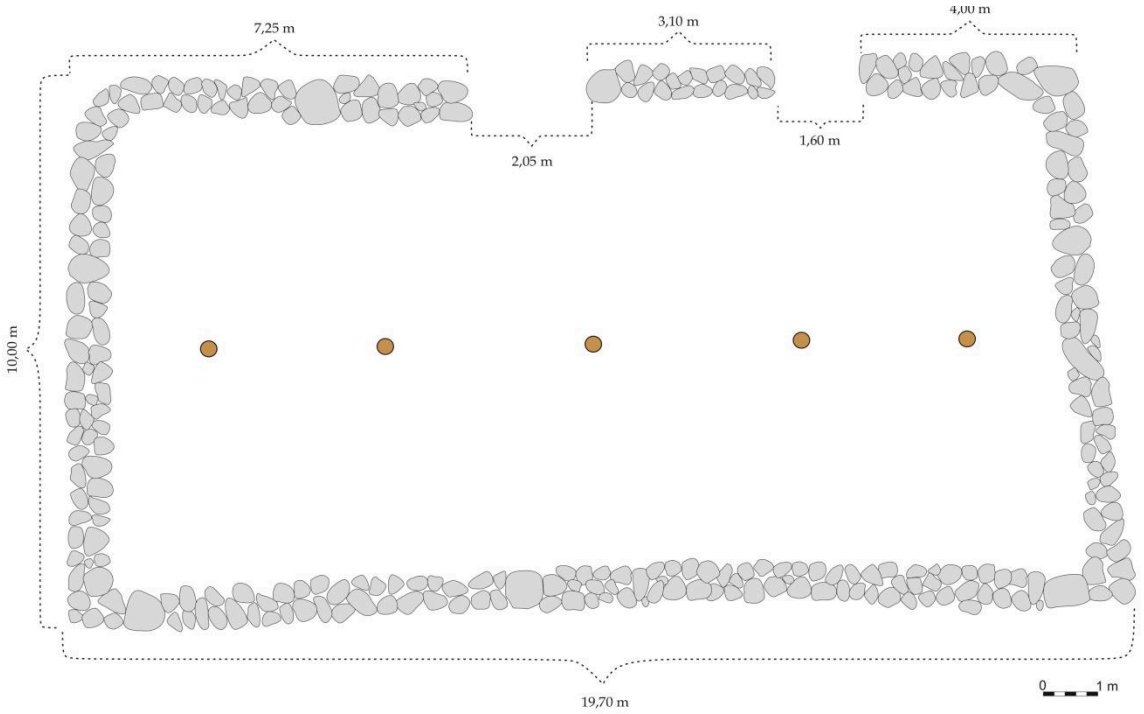


Figure 5.61: ***Stone-Walled Tentsite: plan and dimensions***

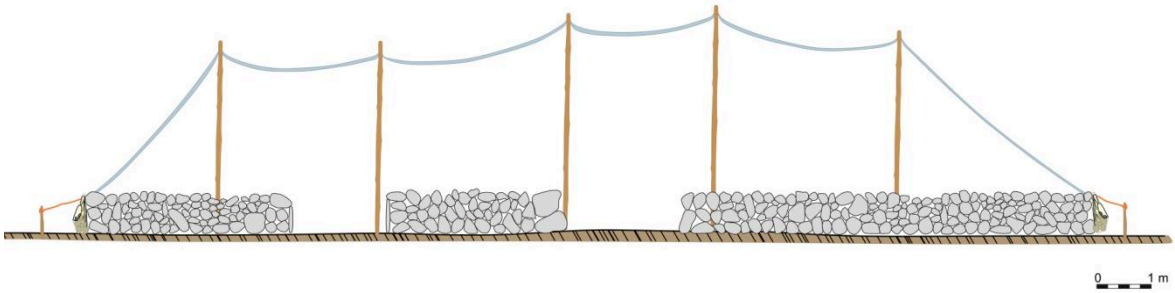


Figure 5.62: ***Architectural components and its dimensions of a Stone-Walled Tentsite (long axle)***

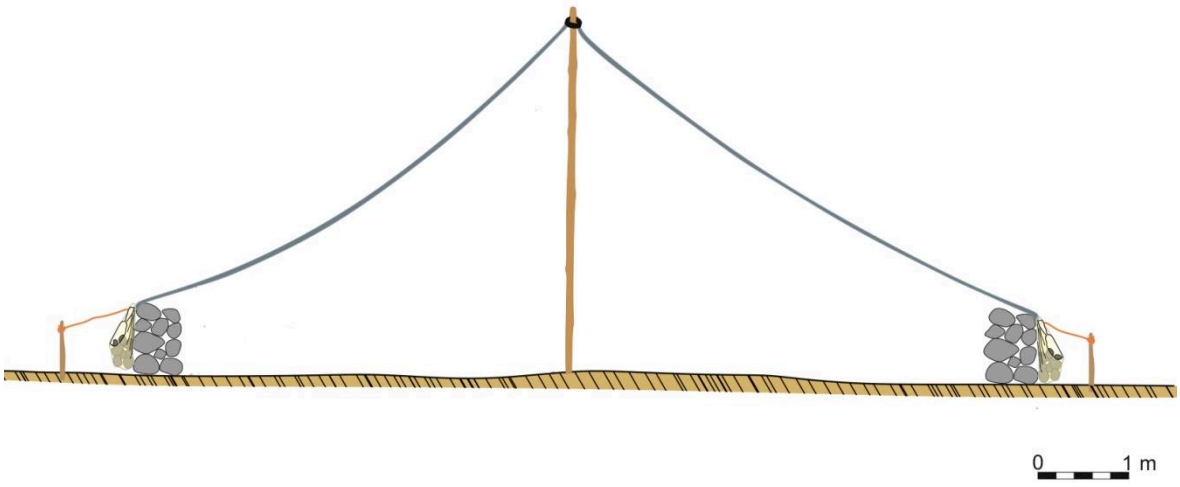


Figure 5.63. ***Architectural components and its dimensions of a Stone-Walled Tentsite (short axle)***



Figure 5.64: External view of some Wattle-Walled Tentsites (sheep pen)



Figure 5.65: Interior view of a Wattle-Walled Tentsite (sheep pen)



Figure 5.66: External view of a evacuated Wattle-Walled Tentsite (dwelling ?)

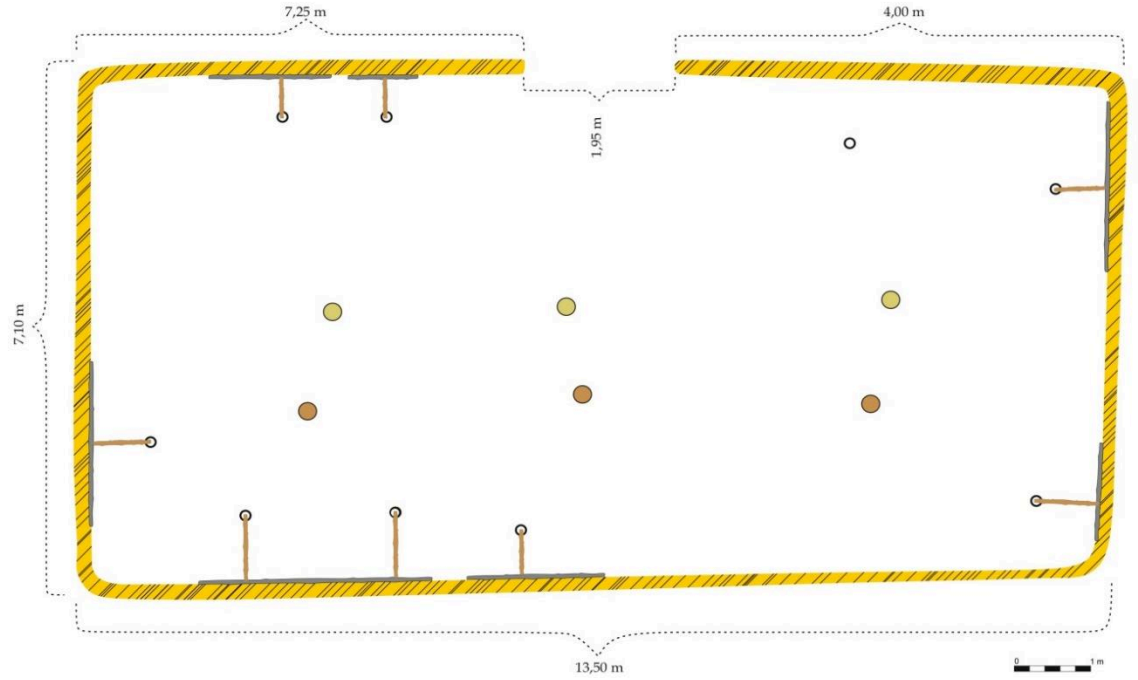


Figure 5.67: ***Wattle-Walled Tentsite: plan and dimensions***

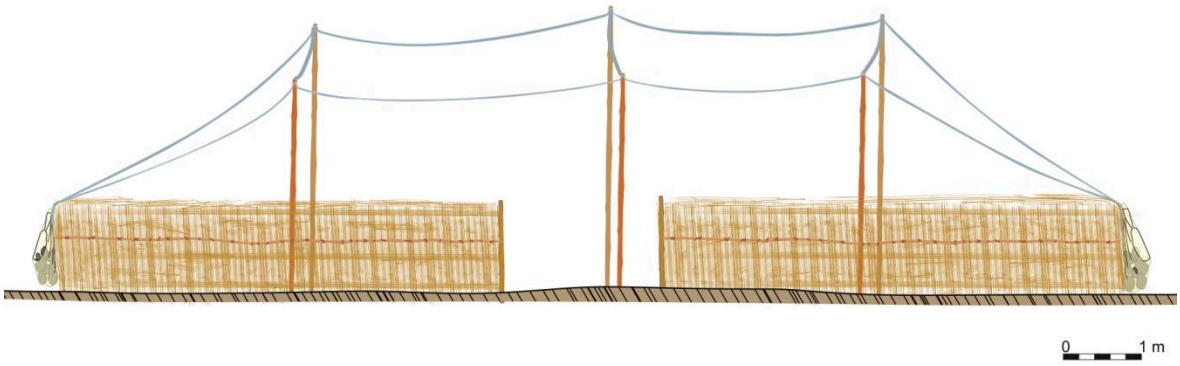


Figure 5.68: ***Architectural components and appearance of a Wattle-Walled Tentsite (long axle)***

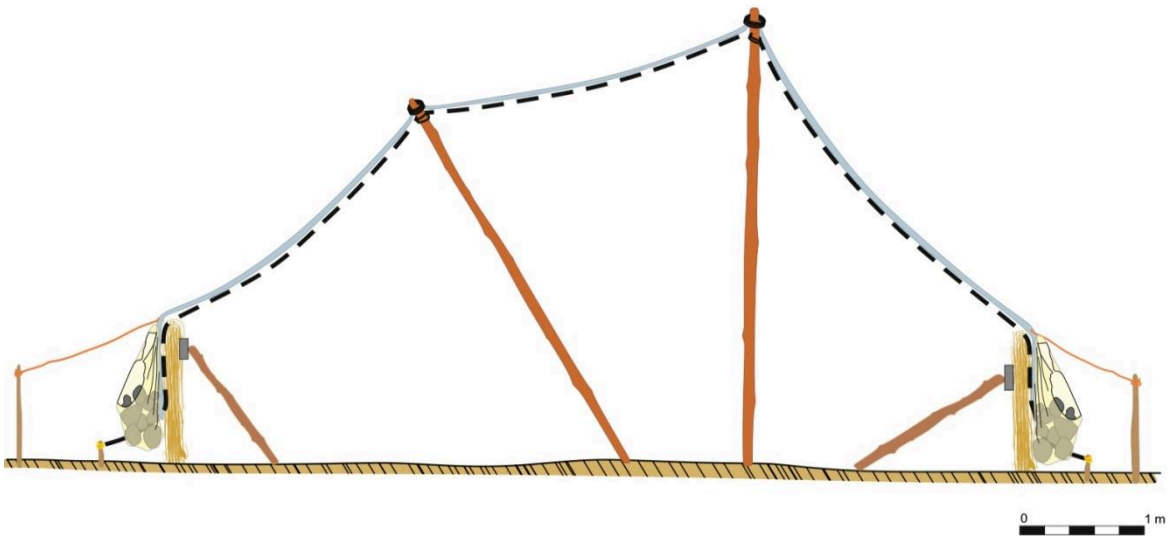


Figure 5.69: ***Architectural components and appearance of aWattle-Walled Tentsite (short axle)***



Figure 5.70: External view of a Brushwood-Walled Tentsite in Sulane Girgiz Kom (after usage)



Figure 5.71: Abandoned Brushwood-Walled Tentsite in Bazivan Kom, south of Kumgeçit village



Figure 5.72: ***Abandoned Mixed-Walled Tentsite in Bazivan Kom, south of Kumgeçit village***



Figure 5.73: Tent in Sulan Kom



Figure 5.74: Establish process a Tent in Bazivan Kom



Figure 5.75: ***Interior view of a Tent in Bazivan Kom***

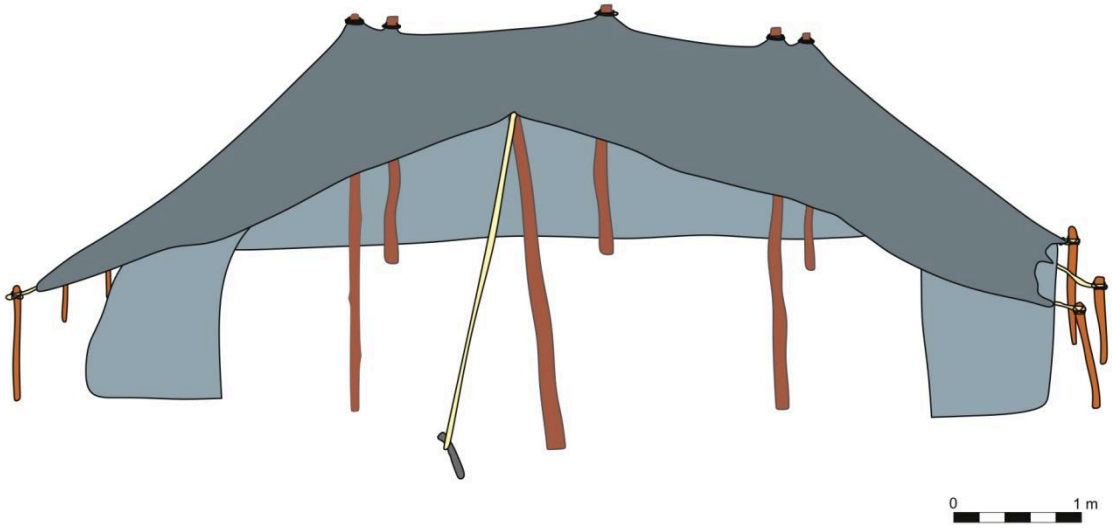


Figure 5.76: ***View from the front: a tent with architectural components***

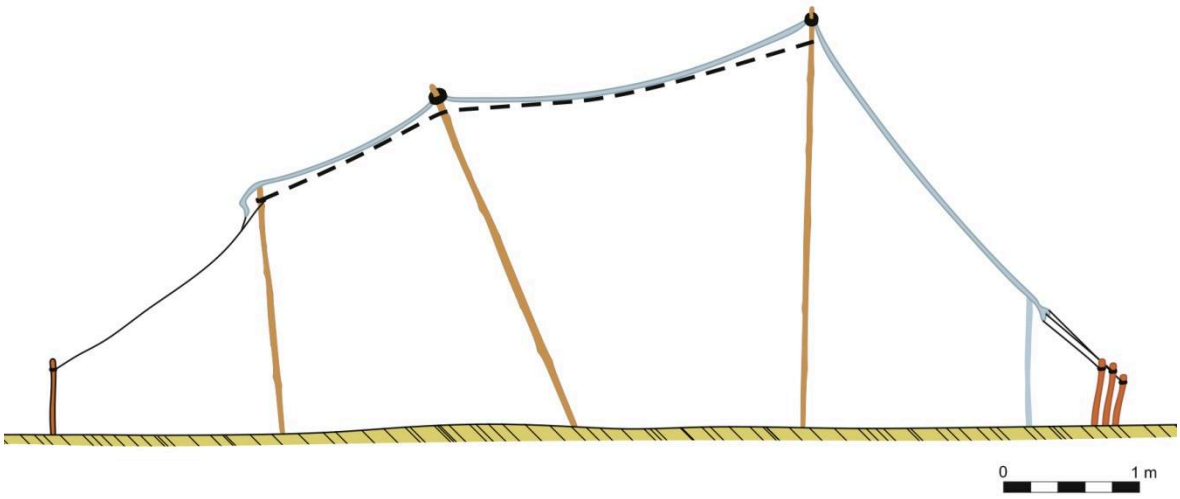


Figure 5.77: ***Side view of a tent with its architectural components***



Figure 5.78: Independent model of a winter quarters (M1), Çemistrin Kom



*Figure 5.79: N**earby-village** model of a **winter quarters (M2), Mezrik Kom***



*Figure 5.80: **Intra-village** model of a **winter quarters (M3), Memika Kom***



Figure 5.81: General view of Seyhosel Kom in 2002



Figure 5.82: Location of Seyhosel Kom



Figure 5.83: ***Some Stone-Walled Tentsites and Modern Tent in Seyhosel Kom***



Figure 5.84: General view of Çemi Sitrin Kom in 2002



Figure 5.85: Location of Çemi Sitrin Kom



Figure 5.86: ***Interior view of a Wattle-Walled Tentsites in*** *Çemi Sitrin* ***Kom***



Figure 5.87: ***Exterior view of a Wattle-Walled Tentsites in*** *Çemi Sitrin* ***Kom***



Figure 5.88: Hearth (tandır) in the open spaces from Çemi Sitrin Kom



Figure 5.89: Example of destroyed stone surrounding remains in Çemi Sitrin Kom (after usage)



Figure 5.90: Location of Area 1 between abandoned village architecture from Sulan Kom



Figure 5.91: Stone surroundings between abandoned village architecture from Sulan Kom



Figure 5.92: Stone surrounding and wattle remains in the in the Area 1 (Sulan Kom)



Figure 5.93: Location of Area 2 from Sulan Kom



Figure 5.94: ***Settlement patterns of the Area 2*** *from Sulan Kom*



Figure 5.95: ***Some architectural perishable structures of the Area 2*** *from Sulan Kom*



Figure 5.96: Location of Sulane Girgiz Kom



Figure 5.97: View of a destroyed stone surrounding remains in Sulane Girgiz Kom



Figure 5.98: ***Brushwood-Walled Tentsite in*** *Sulane Girgiz Kom* ***(after usage)***



Figure 5.99: Location of Area 1 and its architectural structure remains in Bazivan Kom (1st stage)



Figure 5.100: Field usage of Area 1 and its changing settlement pattern in Bazivan Kom (2nd stage)



Figure 5.101: ***Overview of Area 1 after abandonment*** *in Bazivan Kom (3rd stage)*



Figure 5.102: Front view of some Wattle Structures in the Area 2 from Bazivan Kom



Figure 5.103: Rear view of some Wattle Structures in the Area 2 from Bazivan Kom



Figure 5.104: ***View of some Wattle Structures in the Area 2*** *from Bazivan Kom* ***(after abandonment)***



Figure 5.105: General view of some Wattle Structures in the Area 1 from Bazivan Kom



Figure 5.106: View of some Wattle Structures in the Area 1 from Bazivan Kom



Figure 5.107: ***Brushwood-Walled Tentsite in*** *Bazivan Kom* ***(after usage)***



Figure 5.108: Location of Area 2 and its architectural structure during inhabiting



Figure 5.109: Overview during evacuation of Area 2 in Bazivan Kom



Figure 5.110: ***External view of a Stone-Walled Wattle Structure in Area 2*** *from Bazivan Kom*



Figure 5.111: Interior view of Stone-Walled Wattle Structure and arrangement of living space in Area 2



Figure 5.112: Interior view of Stone-Walled Wattle Structure and arrangement of living space in Area 2



Figure 5.113: Interior view of Stone-Walled Wattle Structure and arrangement of living space in Area 2



Figure 5.114: Some Architectural Structures in Memika Kom from southwest



Figure 5.115: Some Architectural Structures in Memika Kom from northwest



Figure 5.116: Some Wattle-Walled Tent in Memika Kom (in usage)



Figure 5.117: Some Wattle-Walled Tent in Memika Kom (after usage)



Figure 5.118: Fuction of a Wattle-Walled Tent in Memika Kom



Figure 5.119: View of a destroyed Wattle-Walled Tent in Memika Kom



Figure 5.120: Memika Saz Evi in 2008 (in usage)



Figure 5.121: After destroyed Memika Saz Evi in 2012



Figure 5.122: ***Last remaining trace of Memika Saz Evi in 2013***



Figure 5.123: Wattle Structures in Memika Kom



Figure 5.124: Architectural change of Wattle Structures to Stone-Walled Wattle Structures in Memika Kom



Figure 5.125: ***Destroyed a Stone-Walled Wattle Structures in Memika Kom***



Figure 5.126: Location of Mezrik Kom



Figure 5.127: Wattle Structure in Mezrik Kom



Figure 5.128: ***Example of Earth Wall (Piled Earth) in*** *Mezrik Kom*



Figure 5.129: Location of Işıkveren Kom I



Figure 5.130: External view of a Stone Walled Wattle Structure in Işıkveren Kom I



Figure 5.131: External view of a Stone Walled Wattle Structure in Işıkveren Kom I



Figure 5.132: Location of Işıkveren Kom II



Figure 5.133: Some architectural structures in Işıkveren Kom II



Figure 5.134: Hearth (tandır) in the open spaces from Işıkveren Kom II



Figure 5.135: Location of Boğaz Kom from east



Figure 5.136: Location of Boğaz Kom from southeast



Figure 5.137: Some architectural structures in Boğaz Kom

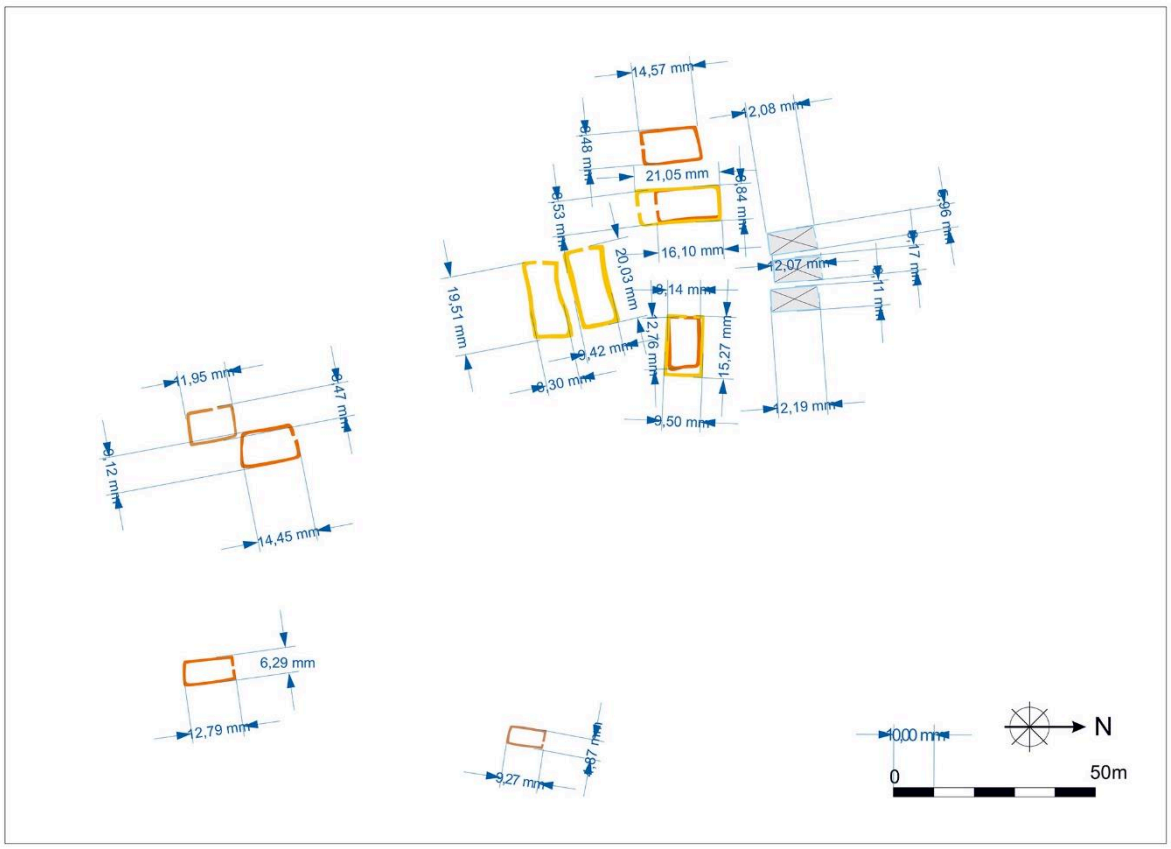


Figure 5.138: ***Parallel dimensions of architectural structures from Şeyhosel Kom***

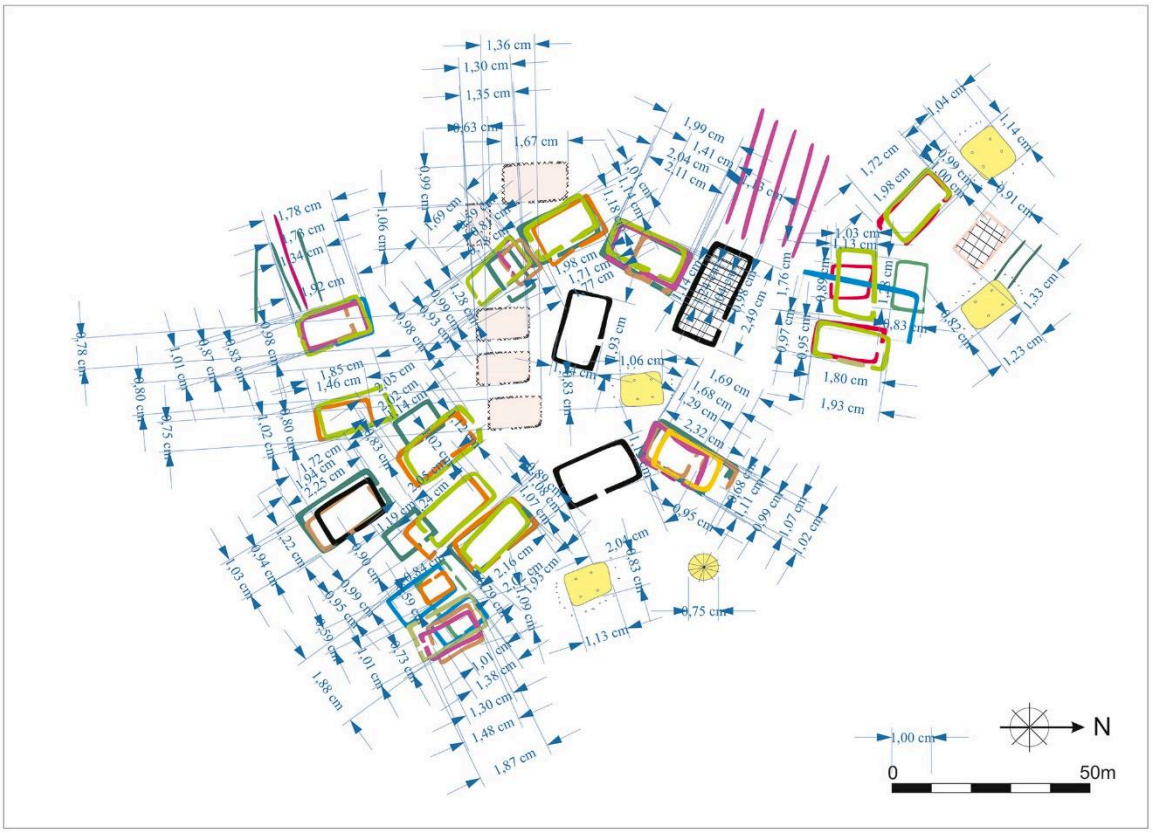


Figure 5.139: ***Parallel dimensions of architectural structures from Çemisitrin Kom***



Figure 5.140: ***Parallel dimensions of architectural structures from Sulan Kom***



Figure 5.141: ***Parallel dimensions of architectural structures from Sulane Girgiz Kom***

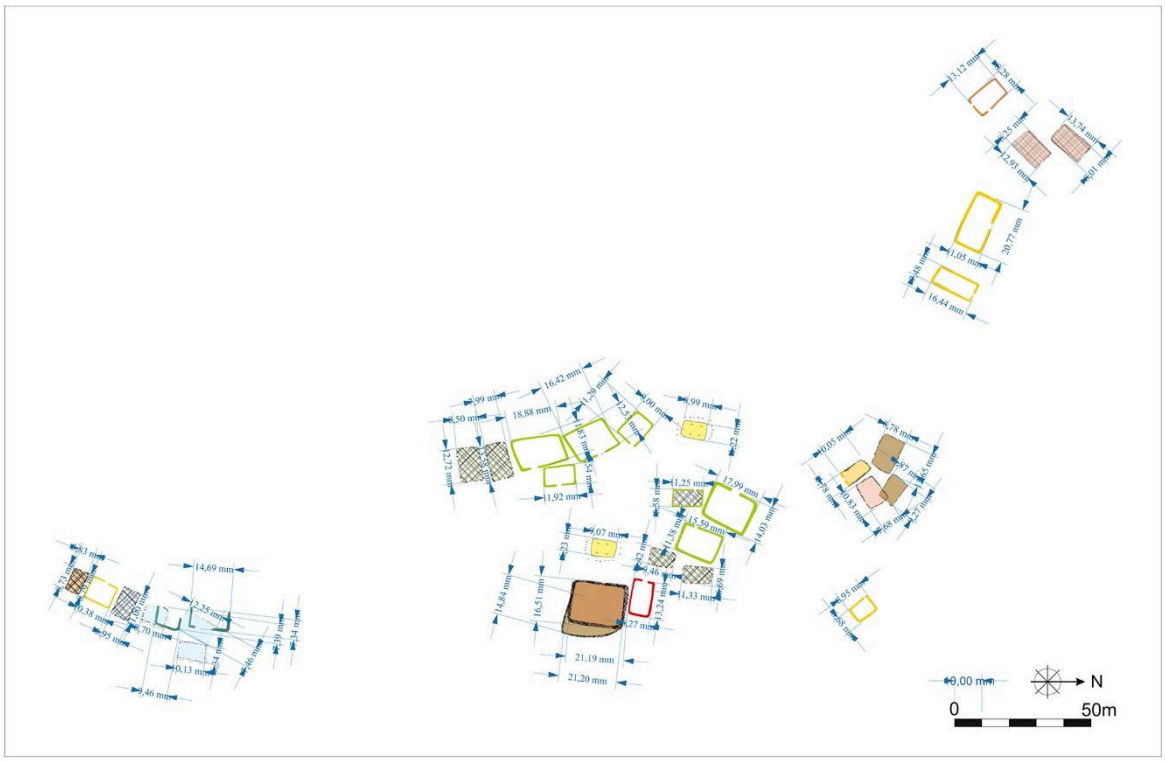


Figure 5.142: ***Parallel dimensions of architectural structures from Bazivan Kom***



Figure 5.143: ***Parallel dimensions of architectural structures from Memika Kom***

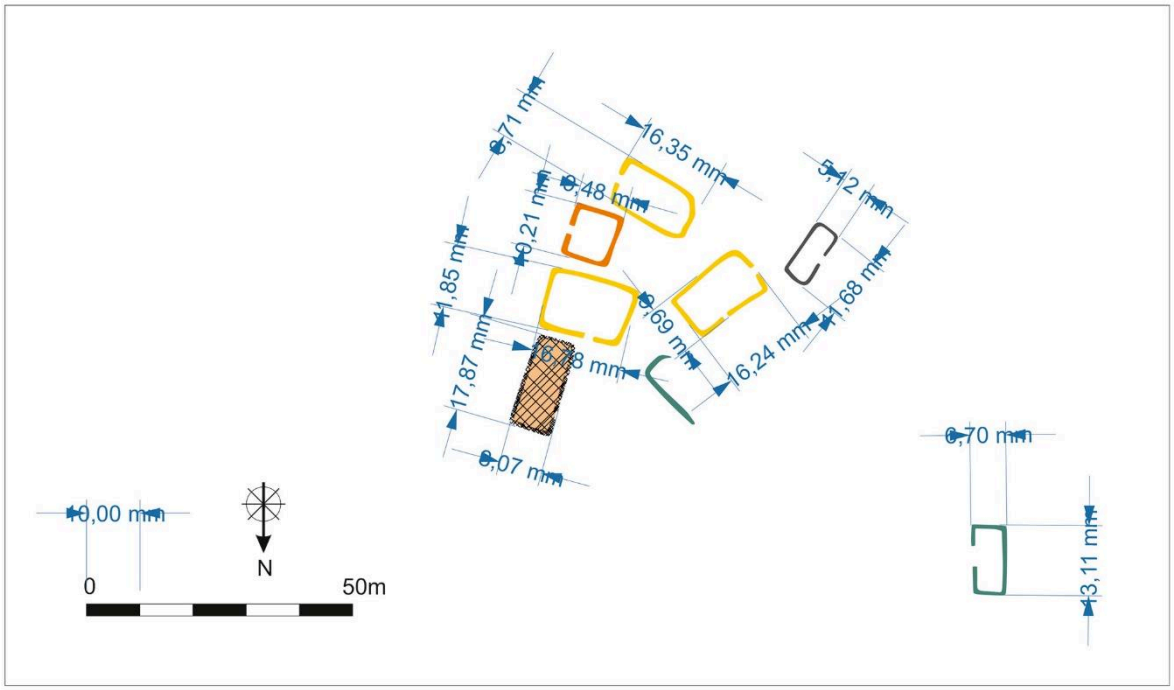


Figure 5.144: ***Parallel dimensions of architectural structures from Mezrik Kom***

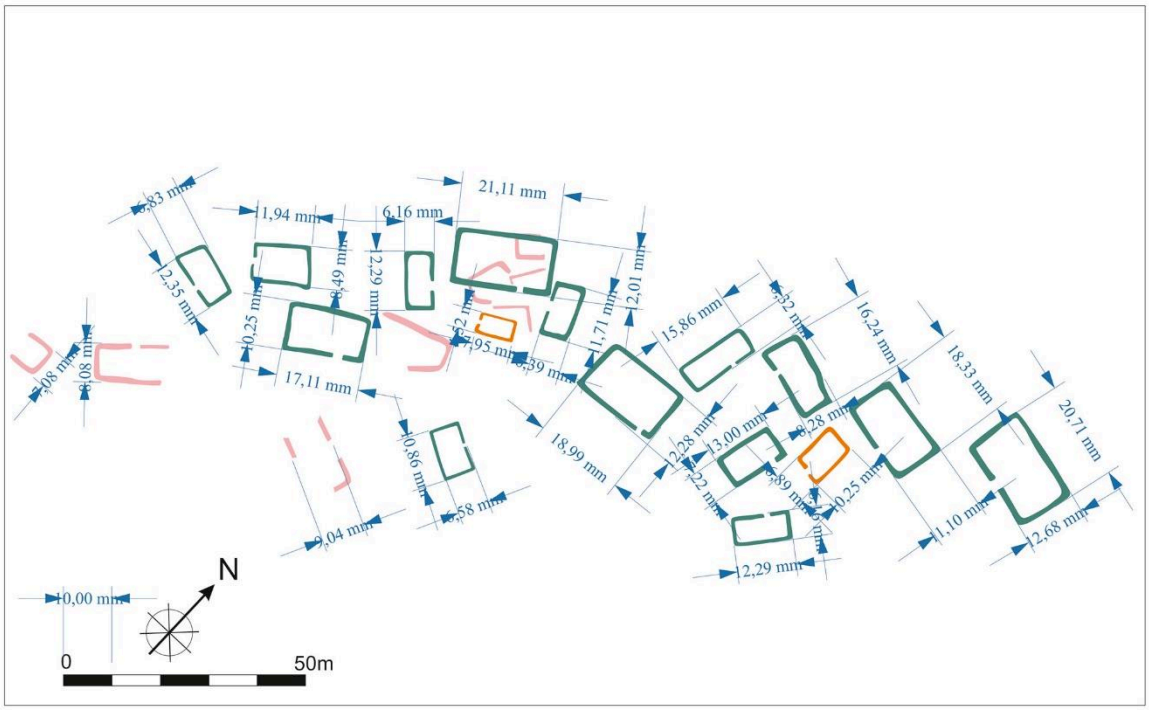


Figure 5.145: ***Parallel dimensions of architectural structures from Işıkveren Kom I***

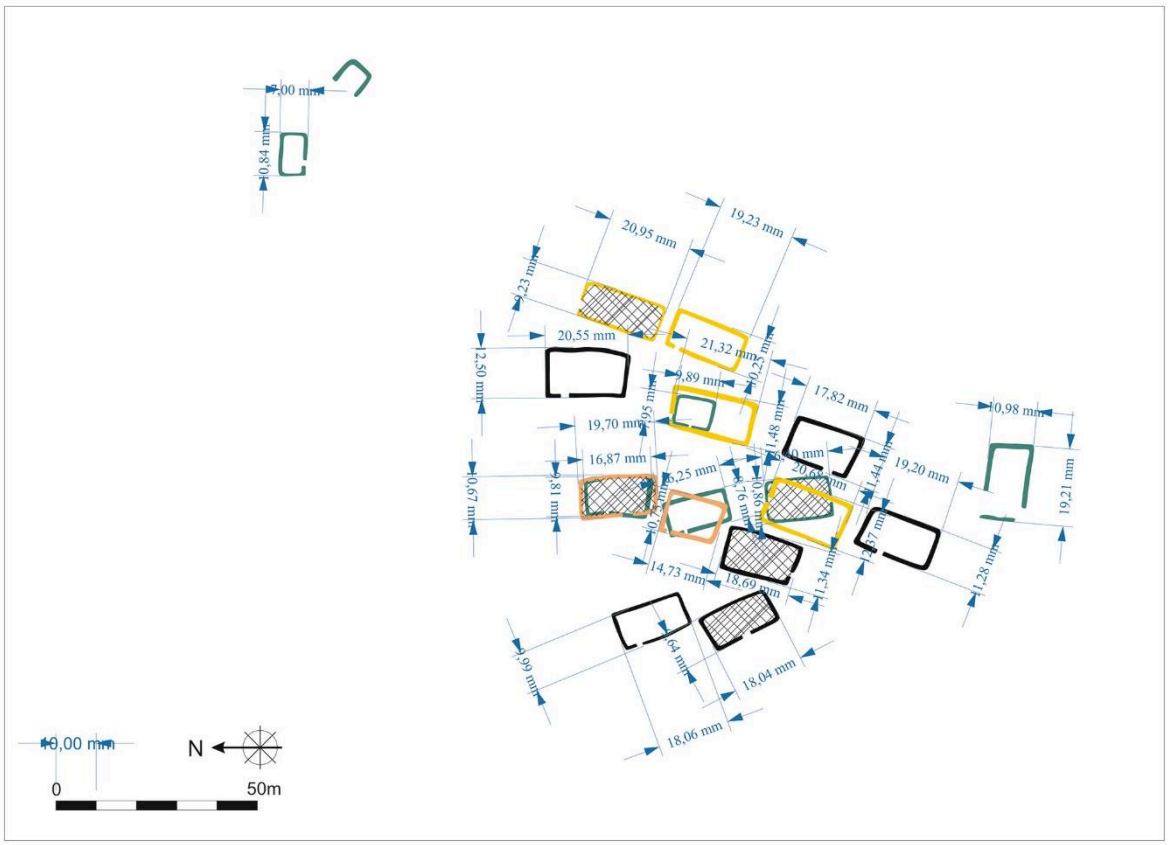


Figure 5.146: ***Parallel dimensions of architectural structures from Işıkveren Kom II***

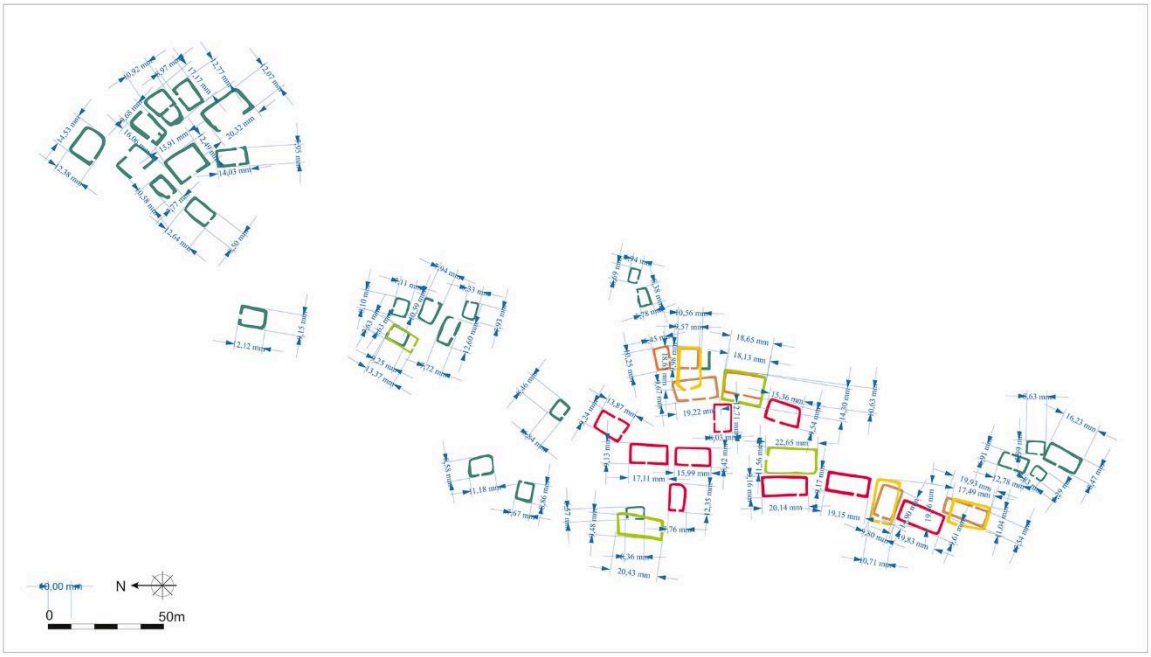


Figure 5.147: ***Parallel dimensions of architectural structures from Boğaz Kom***

CONCLUSION

The arrangement of a settlement is mainly related to its natural surroundings. The natural conditions of the existing outer space and the stability and variability of these conditions are the primary elements of the settlement and interior space. A secondary element is the culture of the community or communities that choose a certain area in this natural environment. In other words, the culture of the community comes into play in the arrangement of outdoor spaces under certain natural conditions; these having different functional structures (indoor) and open spaces (open or semi-open spaces associated with the interiors). Not only the layout, direction, and dimensions of structures but also the work places and daily production areas in line with activities carried out in open areas are reflections of the lifestyle of the community. In this context, space is more than just a physical area that is limited to a three-dimensional structure; it is a projection of historical accumulation and experience together with social preferences. In this context and within the scope of the thesis, the life model of the Neolithic community of Sumaki Höyük, the settlement's topography in the Neolithic period environment-human relationship, paleo-environmental conditions, climatic features, the use of raw material resources and the cultural effect of the preferences of the community were all considered.

With common elements developing in their own context, the way in which the Pre-Pottery Neolithic way of life suddenly turned upside down and the factors affecting abandonment of most of the settlements have been hotly debated over the last 20-25 years and numerous assumptions regarding the reasons (climate change, deterioration of the environment due to intensive use, a return from a sedentary lifestyle to a semi-nomadic lifestyle with the spread of domestic sheep and goats, social erosion, etc.) have been made. Additionally, uncertainty about the Pre-Pottery - Pottery Neolithic transition phase in some settlements, where and how the Pottery Neolithic Period started, its spread, and the fact that communities using pottery were different from those who did not, have also been extensively investigated in the literature. In studies conducted in recent years, it has been argued that the Pre-Pottery Neolithic (PPN) and Pottery Neolithic (PN) periods were artificially divided according to complex elements that are actually intertwined, and therefore, the correctness of this separation should be open to discussion.

In this context, after the 9.2 ka event the "*collapse*", "*degradation*" or "*degeneratio*n" of the Pre-Pottery Neolithic Period, was such a phenomenon actually experienced? Did the

mobile communities, whose existence has been determined and discussed not exist in the previous Pre-Pottery Neolithic period (PPN)? Does the increase in visibility of the mobile groups, which are of lesser importance than the permanent structures of Near-East Pre-Neolithic settlements, reflect a collapse or degeneration? Or is it that the community adapted rationally to conditions caused by physical events, such as climatic change, that are easily explained?

In order to reach answers to these questions in the context of this thesis, various data such as Sumaki Höyük architecture and area usage, which present important clues on this issue, have been evaluated. These evaluations are aimed at re-interrogating the Late Pre-Pottery Neolithic (LPPNB) or Final Pre-Pottery Neolithic (FPPNB) process, which is often described as the stage of "*collapse*" or "*degradation*" in the Near Eastern Neolithic period. In this context, Sumaki Höyük architectural data and various factors in the variability of the settlement, evaluated within the scope of space-time and the archaeological data gap related to the transition to the Pottery Neolithic period in the Upper Tigris Basin, have been presented within the "*space-environment-human*" framework. In terms of understanding, interpreting and reconstructing the Sumaki Höyük Neolithic period architecture and cultural background, paleo-climatic, paleo-environment and numerical modelling data have been used along with numerous mineralogical analyses following the methodological axis of the archaeological, geographical and ethno-archaeological sciences.

This thesis also discusses the development of geography related to Sumaki Höyük Neolithic Period architecture, the effect of paleo-environmental conditions on the settlement and changes occurring during this process; in other words, the change process of "natural outdoor space" other than the human factor. The Lower Garzan Basin, where the Sumaki Höyük settlement is situated, lies along the Anatolian mountain range or the Border Folds region between the Arabian Platform and Anatolian Continent. The impact of the compressional tectonics of the Alpine Orogenic belt on the Taurus Orogenic area has been observed in our study area and its environs; based on the compressional tectonic processes, autochthon and allochthon units that can be found within the study area and environs. The Lower Garzan Basin only comprises autochthonous units. In the geographic area where the basin in located, the Arabian and Eurasian plates collided during Middle Miocene thorough Early-Late Miocene in the Bitlis-Zagros suture zone. Therefore, there were transitions

between marine and terrestrial environments, together with both lithological and landform changes that occurred in the terrestrial areas.

The hydrography of the study area is defined by the Tigris River and its bayous. According to studies of the water quality and groundwater potential of the geological units of the Upper Tigris Basin, the basalt flows of the Karacadağ Volcanism and Şelmo Formation are weaker than the Eocene limestones in terms of water retention. In the Eocene limestones, while the annual groundwater feed is 238 m^3, the Kıradağı basalt flows, which are part of the Karacadağ Volcanism and Şelmo Formation, are at levels of 50 m^3. In terms of underground water discharge, 97.5% of the water accumulated in the Şelmo Formation and basalt units is discharged by natural processes. 99% of the underground water in the Eocene limestones is discharged due to feeding through the headwaters.

In the Şelmo Formation, which lies beneath the Kıradağ basalt W-NW of our study area, there are underground water sources. These can be seen by the Kani Huşur (Cadalı Stream) flowing in the deep valley of the Sumaki Höyük Neolithic site, and other related streams. The different lithological features of the basalt layers and the presence of clayey bands in the loosely-structured Şelmo Formation underneath this unit prevent the penetration of surface runoff to deeper levels in all underground areas. Therefore, the water accumulated due to units that prevent infiltration to different levels flows through fractures and cracks generated by the geological structures. The presence of many springs between Sumaki Höyük settlement and the eastern slope of Kıradağı results from this geological structure. Around Sumaki Höyük, it was determined that many pores had dried up or the waterway had changed its direction, according to both archaeological and historical data. An example of this is the Kani Şırık Mevkii, which is a partially-dry pore situated 200 m east of Sumaki Höyük. The best example of a spring or tectonic-related re-orientated waterway was found in the southern portion the study area according to topographical data. This was detected in the flood fill of trenches 20N and 20/O at Sumaki Höyük.

Mass movements around Sumaki Höyük are generally caused by three mechanisms, namely, collapse or slip, flow and fall. Collapse generally corresponds to large-scale landslides while slip affects relatively smaller areas. The collapse movements formed several steps with landslide heels, especially on the foothills of Kıradağı. The sliding surfaces are generally flat or curved. Clayey, sandy and clastic sedimentary mass movements are more effective on the western side of the Garzan Stream, where the Şelmo Formation is the

dominant geological unit. The fall mechanism occurs mainly in the form of rupture of hard rocks such as limestone or basalt, and consists of the falling and/or drifting of blocks detached from the Kıradağ basalt and Mare Hill conglomerates. Depending on the topographic structure and slope of the basin, when we consider the amount, shape and periods of precipitation, the rainfall in the winter and spring months in our study area acts as a trigger of mass movements by penetrating underground or acting as a surface flow. The clayey-sandy-silty geological units which are saturated with rainfall cause mass movements. In the periods when precipitation increases, groundwater accumulating under the Kıradağı basalt cover, which acts as a reservoir rock, either emerges to the surface in the form of springs or is manifested as surface flow and helps to generate landslides in places. Due to these structural features, mass movements affecting large areas on the eastern slopes of Kıradağı are quite common. Due to slope failure caused by the heavy basalt mass on the loose units, mass movements have occurred very frequently throughout history and the broken material has been transported to distant areas. The best examples of this extensive transportation can be found in the vicinity of Tepecik village and are represented by basalt blocks derived from Kıradağ and located on the slopes of the Garzan stream. Another area where landslide events occur in clayey units is Sumaki Höyük and its surroundings.

The data on landslides and earthflow at Sumaki Höyük and its surroundings were modelled by GIS techniques and linked with the geomorphological dynamics and processes effective on the area. The erosion-accumulation surface where the Sumaki Höyük settlement is located was generally formed in *Pliocene-Pleistocene* but especially in the Holocene period. Due to the sloping piedmont morphology and geological structure of this highly-siltated area, geological structures features, such as dense slip, subsidence and soil flow have been formed. The new landslide cracks found during our geomorphological observations that occurred in the vicinity of our archaeological excavations imply that the environment around the settlement is not purely shaped by paleo-landslides, and mass movements are ongoing, even today.

Flooding, overflow and earth flow traces, of which two are quite apparent, have been detected in the Neolithic layers of Sumaki Höyük. Due to these external factors, the settlement was abandoned at intervals. Confirmation of the abandonment of the settlement does not rely solely on archaeological evidence. For example, in the uppermost part of Phase N4 fillings, 2-3 cm-thick soil lines, possibly formed after floods or inundation, are observed.

XRD and XRF analyses show that different soils were transported to the settlement and different mineral compositions were formed in periods when habitation was partially interrupted. The detected minerals such as brucite and sphalerite are related to an aqueous environment. Kyanite and chalcopyrite originating in volcanic formations were probably carried by slope streams from the Kıradağı Volcanism.

An approximately 35 cm-thick swamp/wetland fill, clearly detected in squares 20/O and 20N, indicates that the site was also affected by external factors such as floods, landslides and overflows after the Neolithic Period. In addition, in trench 20G, it was determined that the steep slope (stream bed?) on the eastern edge of the settlement was filled with landslide/flood material. Especially in the phases N4 and N2, greenish oxidation is seen on the surface of pottery sherds from remaining under water for a long time. Also, lightweight objects transported by floods and overflows, such as sherds, clay objects, chipped stone tools, etc. were deposited in the collapsed areas of the settlement. The fact that heavy stones such as basalt grinding stones were not exposed to this drift clearly demonstrates that the Neolithic period floods/overflows or soil flows were slower in proportion to the carrying capacity of the drift. It can be stated that very strong floods, overflows or soil runoff which would dislodge or cover the structures did not take place, at least in the Neolithic period around Sumaki Höyük. All these points are valid for Sumaki Höyük and its vicinity, although making a generalisation for the entire Lower Garzan Basin is rather difficult and beyond the scope of this study. Based on these data, it is likely that Sumaki Höyük may not be the **only Neolithic settlement** in the Lower Garzan Basin. Neolithic settlements and/or camp areas with a shallow filling would have been completely sealed by more rigorous landslides or similar external factors.

In the vicinity of Sumaki Höyük, especially in the southern part, there are reddish andosol soils due to the effect of the Kıradağı basalt. In our study area and its environs, reddish-brown soils (aridisol) where lime particles are highly concentrated are also common in lower levels of the earth. In the lower levels of these soils are caliche layers, which were formed by extensive calcareous accumulation due to drought. In areas where the evaporation was excessive and the precipitation insufficient, saltiness is observed caused by alkaline reaction. In other words, various minerals that became chemically-soluble in the lower layers of the earth with excessive rainfall tend to ascend to the surface of the soil by capillarity action in the drought phase after rainfall. The highest level to which water can rise is directly

related to external factors such as the void structure of the material and evaporation. As the void of the material increases, the level to which water can ascend also increases. The voids of materials such as nut grass and herbaceous plants used in the Neolithic structures of Sumaki Höyük are usually thin and calcified waters may easily be elevated due to capillarity action. The calcareous waters, which rise in the evaporation process bring the objects closer together by cohesion and adhesion. In other words, the calcareous waters "*capillarity*" which rise by evaporation penetrate the organic material used in the architecture of Sumaki Höyük and materials such as pottery and bones in the archaeological fillings are affected by the forces of cohesion and adhesion.

$\delta^{18}O$ and $\delta^{13}C$ isotope analyses were performed on samples of stratigraphically-taken carbonate sediments ($CaCO_3$) from the Sumaki Höyük Neolithic layers. In these isotopic analyses, unusually high $\delta^{13}C$ curves were determined between 9084±57 to 8123±50 CalBP but especially between the years 8501±56 - 8491±50 CalBP and from nearly 8200-8150 CalBP. In those years, there was significant drought at Sumaki Höyük and its surroundings, according to $\delta^{13}C$ isotope values. According to $\delta^{13}C$ isotope analyses, between the years 8501±56 - 8491±50 CalBP (end of Phase 5) there was a warm and dry period compared to previous and succeeding periods. Based on isotopic analyses and archaeological data, cold-and-humid periods occurred just before and after the warm-and-dry period. These cold-and-humid periods were significant in the years 8526±60, 8491±50 BP - 8461±49 BP, 8436±52, and about 8250-8200 or 8200-8150 CalBP.. Therefore, based on the isotopic data, a more stable climate is seen to prevail in the periods from Phase N6 to mid Phase N5, and in Phase N4; however, climatic oscillations are more stringent by the ends of phases N5 and N2. Both phytolith analyses and micro-morphological analyses such as XRD or XRF support the alternation of climatic fluctuations, possibly in a sequence of humid-arid-humid in the area where the settlement was built. Sumaki Höyük has 13 C_{14} dating falling between the years 9084 – 8123 CalBP. These dates showed that the area where the Sumaki settlement is, has been occupied between two serious climate events 9.2 ka and 8.2 ka. That might be the reason for area not have steady occupations.

Sumaki Höyük excavations were performed in three areas named A, B and C. Additionally, deep soundings were carried out with the aim of identifying the boundaries of the settlement in different areas. The total area opened was 2180 m^2. The settlement pattern and stratigraphy of the Neolithic settlement are largely based on excavation data from areas

A and B. Based on architectural, open area use and partial find assemblages, seven phases (from lower to upper N1-N7) were identified.

In areas A and B, buildings were located in accordance with the natural topography, but especially in the upper sections where the slope was flattened out. This situation is valid for all the Neolithic phases of Sumaki Höyük. Similar circumstances were identified in our ethno-archaeological field studies. In winter quarters in the Lower Garzan Basin, open areas (common areas) are generally left between the clusters of buildings erected in accordance with each other on the upper section of slopes. As in the current winter quarters, the open common spaces at Sumaki Höyük contain fire pits and/or hearths (tandır or floor furnaces in winter quarters). In winter quarters, generally the hearth and tandır locations are defined, damaged ones are repaired, or a new one is constructed nearby. Additionally, the "tradition of building structures on top of each other" encountered in many winter quarters is present in Sumaki Höyük Neolithic settlement. Equivalent situations are valid for the hearths, with many having renovated bases or being placed immediately above or close to each other.

The functions of these open common spaces are proposed to be analogous as well, in spite of the very long-time interval. This may be associated with cultural transfer, communication between generations, or the presence of social memory. Additionally, adverse climatic variations led mobile groups to adapt to the varying environment more easily and caused cultural development to occur differently. This cultural progression involved torrents that occurred first at 8459±49 CalBP and then at 8258±44 CalBP when Sumaki experienced disruption with very clear effects. After these intervening periods, although some changes are observed in the architectural tradition and construction techniques of the groups arriving to take up residence, external area use is similar.

The first habitation of the settlement is dated to 9084±57 CalBP. This earliest period is represented by Phase N7 with "temporary camp site" features; a series of post-bases or holes in different locations, hearths and fire pits were identified in a nearly 250 m^2 area only in Area B on the natural soil. In open areas, fire pits of 9-11 cm depth were placed close to each other. Calcified traces identified as reeds or herbaceous plants according to phytolith analysis were noticed in various parts of the open areas. It appears that the settlement was affected by drought and evaporation after experiencing an aqueous environment. The significant characteristic of this phase is the presence of well-burnished, mineral-tempered dark-faced vessels with an upright body and blunt handles. As a result, this inhabitation can

be said to comprise simple, temporary structures and was probably in the form of a small, seasonal “temporary camp site” (a summer pasture or a winter quarter).

During Phase N6, which is dated to 8708±90- 8594±49 BP, the settlement area was densely inhabited with discrete regular, partly-permanent structures that were constructed by the piled earth technique without stone footings. The structures were built following the topography of the period on rows of natural terraces with southwest-northeast and east-west orientation. Spread over 956 m^2, the dominant architectural tradition in this phase was Cell Buildings containing a central “L” or “T” shaped space and rectangular cells on both sides. Along with these, smaller single-roomed dwellings were also constructed. In the open areas, except for the hearths, no significant activity areas were revealed.

Although the settlement appears to have a particular pattern in Phase N6, there is no planned use or supporting a long-term settled lifestyle such as, public buildings, a varied external organization, architectural elements reflecting ritual traditions, and underfloor burials or burial areas. In open areas where hearths were found between structures in low numbers, no clear organization was encountered. Additionally, the buildings constructed of reeds, woody plants, branches and piled-earth standing directly on the natural surface had no stone footings or plastered floors. Briefly, having more wicker architecture with simple internal–external area organization and use, the ‘permanent’ settlement in Phase N6 is construed to have a shorter lifespan than other LPPNB sites. A noteworthy feature of this phase is the lack of continuation of the use of pottery from Phase N7; indicating that possibly in Phase N6, Sumaki Höyük was inhabited by a population continuing Pre-Pottery Neolithic B traditions, different from the group in Phase N7.

The succeeding Phase N5 dated to 8526±60 - 8491±50 CalBP according to four radiocarbon dating, had a similar character to the previous Phase N6. It was recovered in an area of 865 m^2 in areas A, B and C; however, area B was more densely settled. Here, structures comply with the low terraces of the topography of the period, as in Phase N6, but are more crowded. Both in building layout and construction technique, notable changes are recognised in Phase N5. Similar to the previous phase, this phase continues the cell building tradition along with multi-roomed and double-roomed buildings. Single-roomed structures were also in use. In the walls of N5B11, N5B12 and N5B13, both piled earth - similar to the walls of Phase 6 - and kerpiç blocks were used together for the first time. Furthermore, the lime floor in multi-roomed N5B12 building is the only interior floor in Sumaki Höyük

Neolithic settlement. Single-roomed buildings display two different traditions. They were either built by the piled earth technique as in Phase N6 or were 'temporary' structures having similar dimensions to the cell buildings that had only reed surroundings (probably with a flimsy upper cover), as is documented in structures N5B14 and N5B15. Close to these 'temporary' structures are fire pits similar to the ones in Phase N7. It should be particularly emphasised that these structures are located in the same area as the Cell Buildings. In the open areas there are hearths with stone pavements beneath their single plastered floors, although some examples were identified directly on the ground. Another distinctive feature of Phase N5 is the reappearance of the pottery of Phase N7 after an approximately 200-year interval.

These variations lead to questions open to different interpretations. Does the use of two different wall techniques/traditions (mud-brick, piled earth and duripan) together in the same architecture, and the continuation of the cell plan building traditions with multi-roomed and double-roomed structures with different plans and sizes, indicate that groups from two different traditions met in Sumaki settlement? Considering that the majority of PPNB settlements with kerpiç architectural traditions on the plains of Northern Mesopotamia were abandoned around 9000 CalBP, could different groups have gathered in the compatible living conditions of Sumaki Höyük located at 700 m elevation in the mountain-plain transition zone? Is the repeated onset of pottery use part of the adaptation process of a PPNB society to a semi-nomadic pottery-using society? And, did those staying in single-room shelters with reed surroundings using fire pits, probably arriving in certain seasons of the year (or were they partly-permanent residents?), only use fired-earth containers? Perhaps all of the above is conceivable. Indeed, considering the current relationship of winter quarters beside settled villages in the Lower Garzan Basin - the integrated model of camp sites where the nomads engaged in daily interaction with the settled villagers but led a lifestyle independent of the village (Model 2), as documented in Bazivan, Mezrik, and Işıkveren Kom 2; or winter quarters structures or tents constructed within the villages and/or vacant areas of the village, as permitted by the villagers, with some members staying in the village all year round but continuing the lifestyle characteristics of a semi-nomadic culture in socio-economic terms (Model 3), such as Şeyhosel, Sulan, and Memika Kom - we can propose the existence of a similar lifestyle model for Phase N5 at Sumaki Höyük.

During Phase N4, the primary reason for changes in settlement pattern and architectural traditions is clearly the forced abandonment of the settlement due to the flood/torrent episode experienced at the end or shortly after Phase N5. Following this break in occupation in Phase N4, which is dated to 8461±49 - 8436±52 CalBP, was identified in a total area of 840 m². There is a change in both architectural conception and settlement pattern. First of all, the re-habitation of the settlement ended the cell building tradition. However, the construction of multi-roomed and double-roomed buildings with piled earth walls continued, and the number of temporary single-roomed short-duration dwellings with reed surroundings/walls increased. The use of mud-brick in walls is not encountered, with piled earth the sole technique. The fire pit tradition continued along with these structures. The hearths are not much different from the ones of Phase N6 but are larger. There is also an increase in their number, and they are usually concentrated in particular areas. Some have renewed floors.

The light brown earth line of 3-4 cm thickness identified in different trench sections both in areas A and B above the Phase N4 filling shows that geomorphologically, this area was not used for a specific period or remained open. Accordingly, after Phase N4 Sumaki Höyük was deserted again. The settlement organization of the newcomers (Phase N3) was different from the Phase N4 inhabitants.

Phase N3, dated to 8395±28 CalBP, covers a total area of 693 m² scattered throughout areas A, B, and C. In this phase, the architectural tradition radically changes. The settlement pattern and architectural tradition of phases N6-N4 disappear. Lasting nearly 250 years, the permanent settlement transforms into a temporary "campsite" with features partly similar to Phase N7. Oval temporary structures now replace the practice of permanent buildings, and according to the distribution of artefacts, intensive usage of open areas. Hearth and fire pits are similar to those of the previous phases but the fire pits are larger. Comparative examination of isotope values from this phase identified warm-dry and cold-rainy periods that were experienced sequentially. Clear fluctuation peaks observed in graphic interpretations of the isotope values indicate the presence of a more irregular climate, contrary to the generally more stable climate in Phase N4. This change in climate might be the dominant factor accounting for the area not being occupied permanently.

Phase N2 was revealed over a total area of 1204 m² in areas A, B, and C. Since no C_{14} dating has been done, this phase has been relatively dated to about 8258±44. The

settlement pattern and spatial distribution density were recreated similar to phases N6 and N4. The buildings were located beside each other and built following the topography of the period. The architectural tradition of this phase is single-roomed rectangular-planned temporary buildings. Accordingly, in this phase, the Circular Temporary Structures from Phase N3 are replaced by rectangular temporary structures. Similar temporary structures (Type 1) were documented in the winter quarters of Lower Garzan Basin, in our ethno-archaeological field studies. This type of structure was encountered at Memika Kom, Mezrik Kom and Bazivan Kom, Besides, these temporary buildings with reed surroundings, three buildings constructed of piled earth walls, a Cell building (N2B9) and two single-roomed buildings (N2B1 and N2B7), were identified. Cell buildings, which dominate the architecture in phases N6 and N5, reoccur in this phase but did not become popular. Two different construction traditions in Phase N2 may indicate that even though the settlement displays a temporary (semi-nomadic) character, there were some individuals who stayed in the village year-round. Hearths are not different than to those of the previous phases.

The stable isotope composition of Phase N2 shows that a warm-and-humid period was replaced by a cold-and-wet period at nearly 8123±50 CalBP. The flood/torrent episode in Phase N2 ended the combination of a sedentary and semi-nomadic lifestyle.

The final habitation of the Neolithic settlement, represented by Phase N1, was dated to nearly 8150-8100 CalBP according to comparative chronologic data. The architectural tradition in this phase displays a different style to nearly all the previous phases. In this phase, stone is the dominant construction material. This occupation is represented by rows of large left-over basalt grinding stones placed in different directions, sometimes forming corners. The plentiful lime fragments observed in previous phases are virtually non-existent in the fill from this phase. Based on ethnographic examples (Type 3), they are similar to the stone surroundings of tent dwellings in the winter quarters of nomads as were encountered at Sulan Kom, Sulane Girgiz Kom, Işıkveren Kom I, and Işıkveren Kom II in the Lower Garzan Basin. During ethno-archaeological fieldwork, I observed that tents, which were set up on sloping land or with one side near a slope, were always protected by stone rows or walls. As with the architecture and outdoor organization, noteworthy changes are observed in the artefact assemblage of Phase N1. Plant-tempered either plain or red-washed ware in different forms replaced the mineral-tempered dark-faced burnished hole-mouth ware. Instead of the unfired clay figurines made of bitumen-mixed clay in previous phases, very

few fired clay figurines with different shapes were found. All these changes illustrate an entirely different tradition; perhaps the presence of semi-nomadic societies coming from different region(s).

In the LPPNB and following period, there are frequent changes in settlement patterns and architectural traditions in various regions of Northern Mesopotamia as evidenced by differing data from the sites; although, as detailed in Chapter 2, the changes between regions and basins is not the same. In almost every settlement, the architectural traditions between phases and the open space arrangements with material usage were sometimes different, sometimes similar. In addition, another phenomenon is that there was a hiatus between occupation of the Late PPNB settlements and the later periods. Research and various analyses in recent years have shown that the sudden climate change (RCC) called the 9.2 and 8.2 ka events during Holocene had an enormous impact on the Near East. The International Commission on Stratigraphy (ICS) in 2018 used 8.2 ky as a distinct criterion for determining the stages of the Holocene period, and the ICS dubbed the period between 8.2 ky and 4.2 ky as *Northgrippian.* In this context, the most important reason for socio-economic differences between the settlements of Northern Mesopotamia may be climate change phenomenon. It is very likely that the increased visibility of the semi-nomadic lifestyle in LPPNB, which has been substantially discussed in the context of archaeology in the Near East, might be linked to human adaption to this Rapid *Climate* Change (RCC).

In many contemporaneous settlements, lime pieces or limey areas were identified in both the architecture and open areas. Examples include Phases 1 and 2 of Salat Cami Yanı; the LPPNB and Pre-Proto Hassuna levels of Tell Seker al-Aheimar; Phase 3 of Tell Sabi Abyad II; Structure 5 in Phase C in Hajji Firuz; the Hassuna Ia layer of Tell Kashkashok II, and LPPNB layers 12-8 of Tell el Kerkh. In these settlements, limey areas are usually concentrated in brown or orange-coloured pise-walled structures, or on the surface of walls or floors of rooms and cells in these structures. They are often interpreted as plaster or intensive use of lime in the excavation reports. These interpretations were usually based on field observations rather than detailed XRF, XRD or phytolith analysis. For example, partially-dried mudbrick blocks used in the construction of structures at Tell Hassuna Ib were straw- and lime-tempered. Although not chemically analysed, the powdered lime-like material that separated Phase A from Phase B at Gritille was thought to be associated with burnt lime fragments in the deep pit in Operation 16. In Tell Seker al-Aheimar, traces of

weeds and reeds documented in phytolith analyses of lime and soil samples from the floors of the structures were thought to be related with indoor activities. Considering that the use of these analyses in archaeology has become widespread in recent years, it is likely that many archaeological interpretations are based on field observations. However, XRF, XRD, EDX and isotope analysis of the calcified remains on the structure walls or in the open areas of Sumaki Höyük present a very different picture. Considering the effects of the 8.2 ky event, especially in the last 20-25 years of climatic investigations of its impact on the Near East, the calcified areas in many LPPNB levels of sites should be re-evaluated.

The presence of a water well with a diameter of 2 m and a depth of 4.5 m at the LPPNB level of Tell Seker al-Aheimar, located next to the Khabur Stream,[19] shows that there was a serious water shortage in the settlement. Although the digging of the well has been interpreted as due to pollution from the Khabur Stream and the need for better quality water, a more realistic approach would be that the well was directly related to a shortage of drinking water, given that there is no industrial waste to pollute the water and the amount of domestic waste could not have been enough to pollute the river. The water well with a diameter of 1.5 m and a depth of 5.7 m at the LPPNB levels of the submerged site Atlit-Yam also indicates the shortage of drinking water during LPPNB. As mentioned above, the drought and climatic changes of circa 9000 CalBP in the Near East also support this interpretation.

The Çayönü Neolithic settlement has an uninterrupted stratigraphy from PPNA to the end of Late PPNB. Determining factors for the change in structural plans, settlement pattern, artefactual assemblage and nutrition habits appear to range from the great inundation experienced in the Early Cell Building Subphase (c1) of the PPNB and continuous flood events on various scales from the late Cell Building Subphase (c3) to the fourth layer of the Large Room Building Subphase (lr4). Although the 9.2 and 8.2 ka events are not mentioned

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[19] I feel to add here that not only Khabur Stream but norther Syria (part of North Mesopotamia) had a serious drought in 2007 to 2010. This situation resulted many social problems, shortage of agricultural products and loss of herds, migration of habitants of the area to the cities like Damascus, Aleppo etc. (Years of Drought: A Report on the Effects of Drought on the Syrian Peninsula by Massoud Ali (2010)

in Çayönü-related literature, it can be argued that the changes might have been caused by this climatic phenomenon. The most apparent change in the settlement layout can be observed in the Plaza. The Plaza, representing the "privileged area" of the settlement in the Cell Building Subphase, totally lost its status and became a utilitarian open area. Another significant change is in the layouts of residential and communal buildings. Although it was attempted to maintain the tradition of communal buildings – after the Terrazzo Building was deliberately and brutally destroyed then filled in – with a series of consecutive rectangular-plan buildings in the early Large Room Building Subphase (lr1-3), they had lost their former individuality. Characteristics of the PPNB tradition are almost totally absent in the following phases of the Large Room Buildings (lr4-6). Even the main construction material, stone, was still in use because of its easy availability in the vicinity; there was no trace of kerpiç-walled constructions. These later phases of Large Room Buildings were mainly represented by a few structures with flimsy walls, some stone alignments, traces of post-holes and unclean open areas without any specific organization.

Radical changes in the architectural tradition and settlement layout are also observed in Mezraa Teleilat. In phases IV and II there are cell-planned permanent structures built on top of each other with stone and kerpiç/pise; while during Phase III dated to 8021 – 7977 BP (8887±100 to 8844±110 CalBP or 6937±100 to 6894±110 CalBC), a totally different architectural tradition is observed. The superstructure of the simple constructions is thought to be made of organic materials such as twigs or reeds and supported by wooden posts. Another characteristic feature of Phase III is the fire-pits. From these characteristics, it can be said that this phase is similar to Phase N7 of Sumaki Höyük, dated to 9084 ± 57 CalBP.

There are no signs of a cultural breakthrough (such as at Mezraa Teleilat) in Tell Seker al-Aheimar, which shows a continuous stratification from Mid-PPNB to the end of the Proto-Hassuna period. In the early Pottery Neolithic layers, the cell buildings with stone footings and pise walls were replaced by large room buildings built directly on the ground with flimsy walls, which are quite similar to those of Çayönü. In these layers, the presence of architecture of a temporary character and fire pits indicates that the settlement was a temporary or short-lived one. Not only the fire pits but also the construction technique and dimensions of walls display a similarity to those of Sumaki Höyük.

Tell El Kowm 2-Caracol settlement comprises Final PPNB and Early PN periods. Phase A represents the PPNB period and Phase B the early period of PN. In Phase A, the

settlement seems to be more permanent with cell buildings having a T-shaped corridor. These structures with pise or kerpiç walls were built directly on the natural ground, and some walls have reed traces. In this context, it can be compared to phases N6 and N5 of Sumaki Höyük in terms of both plan type and wall construction technique. Phase B, which has left no architectural remains, is considered as Early PN based on the sherds found in a few pits. According to archaeozoological data and absence of architectural remains, it is suggested that the settlement in this phase was mostly used by nomadic groups. Layer Ia of Tell Hassuna, which rests on natural earth, has been interpreted as a temporary campsite based on the presence of oval or round fireplaces and many traces of woven reed mats rather than any remains of permanent dwellings. This layer can be compared to the temporary camp of Sumaki Phase N3. At Jarmo, although the architecture is mainly represented by tauf-walled structures erected on the natural ground, in Phases J-II,3 and J-II,1 the rows or walls were predominantly constructed of stone. Qdeir 1, which is dated to 7560±340 BP displays a nomadic camp character during Final PPNB. It may be comparable to Phase N3 of Sumaki Höyük, however, the PPNB tradition was kept by not using fired-clay containers.

Accordingly, various analyses indicate that climatic changes such as warm-and-humid, warm-and-dry, cold-and-humid, and cold-and-dry periods were experienced sequentially between 9084±57 and 8123±50 CalBP. In other words, Sumaki Neolithic settlement was understood to be occupied between the 9.2 ka and 8.2 ka events, the time of climate change crises occurred. These climatic fluctuations affected the loose clayey units beneath the Kıradağ basalt flow south of Sumaki Höyük, which resulted in frequent flooding, overflows or earth flows that affected the settlement. This is probably one of the main reasons why the settlements of Sumaki Höyük were partially interrupted and the area was not occupied permanently. Another fact might be the environmental character of this region; being in the mountain-plain transition zone was favourable for semi-nomadic communities, as it is today. In the Neolithic Period, specifically the PPNB, the presence of semi-nomadic communities has been discussed at length; however, most of the time the hypotheses are questionable because of the vague nature of the data. Sumaki Höyük excavations, albeit in a limited area, offer some data on this problematic issue.

Other data are provided by the Sumaki Höyük excavations. With the deterioration of a harmonised lifestyle in PPNB settlements due to climatic changes between the 9.2 ka and 8.2 ka, the partial or total abandonment of the settlements is what led the PPNB communities

to adopt a lifestyle whereby they could maintain their ‘long standing' habits. For example, it is evident in Sumaki Phase N6 that the Cell Buildings, which generally have kerpiç walls on stone footings in various sites in Narth Mesotamia, became 'compatible with the new material'. According to the data of Sumaki Phase N7, the use of pottery, which seems to be a tradition among semi-nomadic communities, was not assimilated by the PPNB society of Phase N6. In other words, the PPNB community kept to its traditional habits by not using fired-clay containers. The strict PPNB tradition of “burying buildings and abandoning them forever” also lost its significance. The structures were only cleaned before being left. The absence of graves under the floor levels in the cell buildings of Sumaki Höyük indicates that this PPNB tradition also ended. The architectural data of Phase N5 indicate the arrival of different communities. In this phase, the presence of kerpiç and kerpiç-walled buildings with plastered floors, which is the main construction method of settlements on the plains of Northern Mesopotamia, implies that the newcomers were from this area. This phase shows the adaptation of a construction method using piled earth, which had already been in use in Phase 6. The tradition of single-room temporary structures with reed surroundings from Phase N5 to Phase N1 indicates that semi-nomadic communities adapted to living together with the former PPNB community using piled earth walled structures, or vice versa. This harmony, established at the end of the PPNB, continued for thousands of years, even though the conditions were not always the same. The organisation of open areas, either in a temporary settlement or in a sedentary village, is not very different from each other where we have found common cooking areas, heaped ashes, and left-over artefacts scattered around.

Supported by ethnological field studies and geo-archaeological investigation and interpretation, this study revealed many similarities in the Neolithic Period in addition to distinctive aspects in the context of social movement, compared with modern settlements. Thus, the lifestyle model and details of architectural tradition reflecting changes over time of these “mobile” groups were revealed. As a result, my greatest wish is that this thesis study forms a foundation for new research into architectural variety and the human-environment interaction and adaptation processes of mobile groups in different geographies in terms of both detailed mineralogy and architectural data.

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Education

BACHELOR

University	İstanbul University
Academic Unit	Faculty of Letters
Department	Archaeology and Art History
Programme	Classical Archaeology
Country	Turkey
Graduation Year	2005

MASTER

University	Çanakkale Onsekizmart University
Institute	Graduate School of Social Sciences
Thesis Topic	Archaeology (Prehistory)
Title of Thesis	The Pottery and the Architecture of Halaf Period of Kerküst Höyük
Country	Turkey > Directors: Assoc. Prof. Dr. Aslı Erim-Özdoğan
Graduation Year	2008

DOCTORATES

University	Université Paris Nanterre
Institute	École Doctorale (ED395)
Department	Laboratoire Préhistoire et Technologie (UMR 7055)
Title of Thesis	Microarchaeological Observations on the Neolithic Architectural Structures and Cultural Landscape of Sumaki Höyük
Directors	Prof. Dr. Catherine Perlès
Graduation Year	

University	:	Çanakkale Onsekizmart University
Institute	:	Graduate School of Social Sciences
Department	:	Geography
Title of Thesis	:	Lower Garzan Basin Geomorphology and Physical Environment Affecting of the Archaeological Settlement Distribution
Directors	:	Prof. Dr. Telat Koç
Graduation Year	:	

ARTİCLES / PAPERS / BOOKS / PRESENTATİONS		
		Year
Published in international periodicals		
1	S. Sarıaltun, Erim-Özdoğan, A., "Studies on the Halaf Pottery of the Kerküşti Höyük", *Anatolia Antiqua XIX (2011)* , p:39-52	2011
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1	Baxşəliyev, V., C., Marro, R., Berthon, Z., Quliyeva, S., Sarıaltun, *Kültəpədə Arxeoloji Tədqiqatlar (2013-2016)*, AMEA ISBN:978-9952-8176-6-9	2017
Chapter in book published at International		
1	Sarıaltun, S., 2011, "A Halaf Site At Kerküşti Höyük", *nterpreting the Late Neolithic of Upper Mesopotamia,* (eds) O. Nieuwenhuyse, Pettter Akkermans ve Rainhard Bernberk , Brepols Publishers, Begijnhof 67, B-2300 Turnhout p: 503-512 ISBN:978-2-503-54001-6	2011
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1	Erginal, A.E., O. Erenoğlu, H. Öniz ve S. Sarıaltun, 2018, "Dana Adasının Jeolojik Mirası Kıyı Eoliniti:İlk bulgular", *Akdeniz'in En Büyük Antik Tersanesi Dana Adası*, Hakan Öniz (ed.), Arkeoloji ve Sanat Yayınları, s:168-179 ISBN: 978-605-396-484-1	2018
2	Erim-Özdoğan, A., S. Sarıaltun, 2018, "Sumaki Höyük, Batman/Beşiri", *Ilısu HES Kurtarma Kazıları, (*ed) F. Baş, Batman Müzesi, s:55-88 (Türkçe - İngilizce) ISBN:978-975-17-4009-0	2018

3	Erim-Özdoğan, A., S. Sarıaltun, 2011, "Ilısu Baraj Alanı Garzan Vadisi ve Batman Çayı Çevresi Kültür Envanteri", *Ilısu ve Kargamış Baraj Gölleri Altında Kalacak Arkeolojik Kültür Varlıklarını Kurtarma Projesi, 2002 Yılı Çalışmaları, (*eds) Numan Tuna - Owen Doonan, ODTÜ / TAÇDAM Yayınları s: s:945-1146, (İngilizce-Türkçe) ISBN:978-975-429-288-6	2011

Paper presented at international congress, conference or symposium, and published as full text in proceedings		
1	Sarıaltun, S., 2018, "Deniz Seviyesinde Meydana Gelen Değişikliklerin ve Depremlerin Menekşe Doğu Çatağı'ndaki Etkileri: Erken Demir Çağı'ndan Helenistik Döneme" *Türk Coğrafya Kurumu 75. Yıl Uluslararası Kongresi Bildiri Kitabı, (eds.) Ertek, A.; Çiçek, İ. et al.* p: 611-617, (Turkish)	2018
2	Sarıaltun, S., 2017, "Determination of Potential Clay Beds with GIS Based Approach in the Kerküşti Höyük and Its Vicinity", *International Symposşum on GIS Applications in Geography & Geosciences Proceeding Book, (eds.) Özden, S.; Akbulak, C. et al.* p: 33-41, (English)	2017
3	Sarıaltun, S., 2010, " A Halaf settlement in the Northern Mesopotamia: Kerküşti Höyük ", *Studies in Southeastern Anatolia Symposium Proceedings, Settlement Archaeology Series 3* , (eds.) Burcu Erciyas, p: 87-106, Publisher, (English and Turkish)	2010
4	Erim-Özdoğan, A., S. Sarıaltun, 2009, " Ilısu Dam Project, Garzan Valley Cultural Inventory ", *I. International symposium on the history and culture of Batman and its vicinity* , (eds.) Salim Çöhçe –Adnan Çevik, p: 94-126, Batman Governorship Publisher. (English and Turkish)	2009
International congresses, symposium, panel discussions presented at scientific meeting such as the program summary as publishes in the paper or poster presentation or demonstration		
1	S. Sarıaltun, "Investigating the changes in settlement strategies at the Late Chalcolithic site of Sorsu", *International Conference, Lyon - The Araxes River in Late Prehistory. Bridge or Border,* 14-15 May 2019, Lyon, France	2019
2	Marro, C., V. Bakhshaliyev, N. Gailhard, S. Sarıaltun, "Relationships between Nakhchivan and the region of Urmia during the Chalcolithic period as seen from the Sirab area (4900-3500 BC)", *International Conference, Lyon - The Araxes River in Late Prehistory. Bridge or Border,* 14-15 May 2019, Lyon, France	2019

3	Erginal, A.E., H. Öniz, S. Sarıaltun ve O. Erenoğlu, "The First Record of Coastal Eolianite on the Mediterranean Coast of Turkey: Eolianite of Dana Island and its Geoarchaeological Importance", *72. Türkiye Jeoloji Kurultayı,* 28 Jan-01 Feb 2019, Ankara, Turkey	2019
4	Sarıaltun, S., "Sumaki Höyük Mimarisinin Fitolit, SEM/EDX Analizleri ve Etnoarkeolojik Gözlemlerle Değerlendirilmesi", *40. Uluslararası Kazı, Araştırma ve Arkeometri Sempozyumu 07-11 May 2018*, Çanakkale, Turkey	2018
5	Sarıaltun, S., ve M. Aydın, "Raw material source identification of ground stone tools from Sumaki Höyük using multiple analytical methodsi", *71. Türkiye Jeoloji Kurultayı,* 23-27 April 2018, Ankara, Turkey	2018
6	Sarıaltun, S., "Local landscape Organization and Site Selection of Mobile Pastoralist Groups in the Garzan Basin /Batman", *International Symposium on GIS Application in Geography & Geoscience,* 18-21 October 2017, Çanakkale , Turkey (Poster)	2017
7	Sarıaltun, S., " Paleoclimatic Interpretations of Sumaki Höyük Neolithic Period Using Stable Carbon and Oxygen Isotopes", *39th International Symposium of Excavation, Surveys and Archaeometry,* 22-26 May 2017, Bursa, Turkey	2017
8	Sarıaltun, S., "Microarcheological Investigation of Filling Processes of Circular Structures at Ovçular Tepesi: A Late Chalcolithic and Kuro-Araxes Site", *41st International Symposium on Archaeometry - ISA2016,* 15-21 May 2016, Kalamata / Greece, (Poster)	2016
9	Sarıaltun, S., "Microarcheological Studies at Sumaki Höyük in Upper Mesopotamia", *4th Symposium - Archaeological Research and New Technologies ARCH_RNT,* 1-3 October 2014, Kalamata / Greece	2014
10	Sarıaltun, S., "A Halaf Village at Kerküşti Höyük in Northern Mesopotamia", Archaeological *Research in the Kurdistan Region of Iraq and the adjacent areas* 1-3 November 2013, Athens / Greece	2013
11	Sarıaltun, S.,"Paleo-environmental Investigations of the Neolithic Period of Sumaki Höyük and Its Vicinty ", *II. International Ilısu Dam Archaeology Symposium,* 7-13 October 2013, Mardin / Turkey	2013
12	Sarıaltun, S., "Microarchaeological Studies from Early Neolithic Site In Southeastern Anatolia", *AEA Spring Conference,* 19 Nisan 2012, Plymouth / England	2012
13	Sarıaltun, S., "Prelimanary Micro-Archaeological Work Done on the Neolithic Architectural Data of Sumaki Höyük", *International Ilısu Dam Archaeology Symposium,* 19-21 October 2011, Mardin / Turkey	2011

14	Sarıaltun, S., "Microarchaeological and Social Practice Reflect on Halaf Pottery of Kerküşti", *Cultural Interaction: Local Communities between North Mesopotamia and Anatolia in the Sixth Millennium BC,* 6 June 2011, İstanbul / Turkey	2011
15	Sarıaltun, S., N., G., Kıyak, 2010, "Geoarchaeological Studies From Neolithic Site in Batma-Southeastern Anatolia", *2nd Symposium - Archaeological Research and New Technologies ARCH_RNT,* 21-23 October 2010, Kalamata / Greece	2010
16	Sarıaltun, S., 2009, "A Neighbour of Tell Halaf: the Halaf Site of Kerküşti Höyük", *Symposium, Interpreting the Late Neolithic of Upper Mesopotamia,* 26-28 March 2009, Leiden / Holland, (Poster)	2009
National congresses, symposium, panel discussions presented at scientific meeting such as the program summary as publishes in the paper or poster presentation or demonstration		
1	Sarıaltun, S., "SEM/EDX Characterization of a Halaf Pottery Clay from KerküştiHöyük", *16th National Clay Symposium,* 2-5 September 2015, Çanakkale, Turkey	2015

RESEARCH PROJECT				
				Yıl
Taking Part in Projects Supported by International Organizations and Agency				
1	**Project**	:	Çayağzı Mevkii - Nakhchivan (Sirab)	2018
	Supporting	:	CNRS / France (Mission Archéologique du Bassin de l'Araxe (Turquie, Iran, Azerbaïdjan)	
	Position	:	Excavation responsible	
2	**Project**	:	Şorsu Tepe - Nakhchivan (Sirab)	2014<>2017
	Supporting	:	CNRS / France (Mission Archéologique du Bassin de l'Araxe (Turquie, Iran, Azerbaïdjan)	
	Position	:	Excavation responsible	
3	**Project name**	:	Ovçular Tepesi - Nakhchivan (Dize)	2012<>2014
	Supporting	:	CNRS / France (Mission Archéologique du Bassin de l'Araxe (Turquie, Iran, Azerbaïdjan)	
	Position	:	Researcher (Architecture-Geoarchaeology)	
Taking Part in Projects Supported by National Organizations and Agency				
1	**Project**	:	Çayönü Tepesi Kazıları	2015<>....
	Supporting	:	Ministery of Culture and Tourism of Turkey	
	Position	:	Project Coordinator	
2	**Project**	:	Çemialo Sırtı Kazıları	2009, 2013-2017
	Supporting	:	DSI, Ministery of Culture and Tourism of Turkey	

	Position : Researcher		
3	**Project** : Sumaki Höyük Kazıları **Supporting** : DSI, Ministery of Culture and Tourism of Turkey **Position** : Field responsible		2007-2010, 2014
4	**Project** : Cultural Inverntory of Batman City **Supporting** : Batman University, Governorship of Batman (Turkey) **Position** : Team responsible		2012
5	**Project** : Sumaki Höyük Atölye ve Envanter Çalışması **Supporting** : DSI, Ministery of Culture and Tourism of Turkey **Position** : Researcher		2012
6	**Project** : Çayönü Tepesi Arkeolojik Çevre Düzenlemesi **Supporting** : Ministery of Culture and Tourism of Turkey **Position** : Team responsible		2010
7	**Project** : Cultural Inventory of Ilısu Dam Project Garzan Valley and its vicinity **Supporting** : DSI, Ministery of Culture and Tourism of Turkey **Position** : Team responsible		2009
8	**Project** : Ege Gübre Neolitik Kazıları **Supporting** : Ege Gübre AŞ. **Position** : Team member		2006
9	**Project** : Kerküsti Höyük Kurtarma Kazıları **Supporting** : Ministery of Culture and Tourism of Turkey **Position** : Field responsible		2005<>2006
10	**Project** : Akziyaret Höyük Kurtarma Kazıları **Supporting** : Ministery of Culture and Tourism of Turkey **Position** : Team member		2005
11	**Project** : Garzan Vadisi Kültür Envanteri Çalışmaları **Supporting** : DSİ ve ODTÜ (TAÇDAM) **Position** : Student / Photographer		2002
12	**Project** : Bakü-Tiflis -Ceyhan Boru Hattı Projesi (Kayseri-Adana) **Supporting** : Botaş ve ODTÜ (TAÇDAM) **Position** : Student / Photographer		2001
13	**Project** : Akarçay Tepe Kazıları **Supporting** : DSİ ve ODTÜ (TAÇDAM) **Position** : Intern student		2001
14	**Project** : Çayönü Tepesi Arkeolojik Çevre Düzenlemesi **Supporting** : Diyarbakır Valiliği / Ergani Kaymakamlığı **Position** : Intern student		2001
Taking Part in Projects Supported by the University			
1	**Project** : Menekşe Çatağı Klasik Dönem Deprem Araştırmaları **Supporting** : ÇOMU, BAP / Project No:2007/23 **Position** : Researcher		2006<>2008

2	**Project** : Menekşe Höyüğü, Doğu Çatak Son Tunç Çağ/Erken Demir Çağ ve M.Ö. 5. yy Kutsal Alanı kazıları **Supporting** : İstanbul University / Project No:379/03062005 **Position** : Field responsible		2005
3	**Project** : Menekşe Höyüğü, Doğu Çatak Kazıları **Supporting** : İstanbul University / Project No:239/29042004 **Position** : Field responsible		2004
4	**Project** : Menekşe Çatağı Höyüğü, Doğu Çatak Kazısı **Supporting** : İstanbul University / Project No:1662/30042001 **Position** : Intern student		2001

OBSERVATIONS MICROARCHÉOLOGIQUES SUR LES STRUCTURES ARCHITECTURALES NEOLITHIQUES ET LE PAYSAGE CULTUREL DE SUMAKI HÖYÜK

Les nouvelles fouilles et recherches menées dans les sites néolithiques en Haute Mésopotamie nous ont donné des informations variées. Ces nouvelles données complètent l'information existante, mais conduisent également à une vision renouvelée du Néolithique dans cette région. Ainsi, dans l'archéologie préhistorique le Proche-Orient, mais surtout de Haute Mésopotamie, il est nécessaire d'apporter des changements à des concepts acceptés de longue date. L'objectif de cette thèse est de s'appuyer sur les données architecturales de l'habitation néolithique de Sumaki Höyük pour débattre sur le processus de mouvement culturel en Haute Mésopotamie et son environnement proche entre les années 8000-7000 BP.

Dans cette étude, les différences de politique de peuplement et d'utilisation des terres à Sumaki Höyük ainsi que la variabilité culturelle de l'architecture sont examinées dans le temps et dans l'espace par des méthodes archéologiques et géographiques. En outre, en comparant les techniques structurelles, les plans structurels et les schémas de peuplement avec des peuplements contemporains similaires en Haute Mésopotamie et dans sa proche géographie, j'ai cherché à examiner l'architecture néolithique de Sumaki Höyük et son organisation sociale dans le contexte géographique et culturel.

Bien que les gens puissent changer l'environnement, l'impact de l'environnement sur les populations humaines et / ou les établissements humains est incontestable. Cette interrelation a toujours été au centre de l'archéologie et de la géographie. En prenant en charge les vestiges archéologiques avec des méthodes de datation absolues et des études interdisciplinaires, les modèles environnementaux de différentes périodes peuvent être reconstruits et les conditions paléo-environnementales déterminées. L'architecture néolithique de Sumaki Höyük, notre sujet principal, peut être interprétée plus systématiquement en déterminant les conditions paléo-environnementales. Par analyse micro-morphologique, les remplissages de tassement, la structure du sol, la formation et le processus d'accumulation sont également évalués. À cet égard, l'objectif principal est de définir le processus géomorphologique ayant une incidence sur le choix de la zone résidentielle; afin de déterminer la relation environnement-homme et ses impacts.

Le but principal des études ethnoarchéologiques est d'analyser l'organisation sociale des nomades pastoraux contemporains, du présent au passé, en se concentrant sur les

changements ou les transformations, en particulier dans leur style architectural. La culture matérielle des communautés situées dans le bassin inférieur du Garzan, telles que les structures ou les éléments structurels, est notre sujet principal plutôt que leur organisation socio-économique. De cette manière, nous pourrons comprendre les technologies de construction des différentes phases de Sumaki Höyük. Nous visons également à examiner la structure sociale des zones résidentielles ainsi que le dynamisme des établissements temporaires dans la relation entre l'espace et le temps. Nous avons également essayé d'expliquer l'emplacement et la fréquence d'utilisation des bâtiments les uns par rapport aux autres d'un point de vue critique.

Sumaki Höyük est situé à 1 km à l'est du district de Beşiri dans la province de Batman. La colonie est située dans la partie nord de la basse vallée de Garzan, à environ 2,5 km à l'est du ruisseau Garzan. La colonie est située sur un sol légèrement en pente orientée sud-ouest / nord-est, sur une surface érosionnelle de 700 à 710 mètres d'altitude. La colonie est située au niveau de la base Plio-Quaternaire, le Kani Huşur s'étendant dans une vallée très profonde immédiatement au nord du site. Le bassin inférieur du Garzan hébergeant la colonie, qui constitue une partie importante du bassin du haut Tigre, est une zone aride - semi-aride basée sur les données actuelles.

La coulée de basalte Kıradağı à la topographie très plate est située au sud de Sumaki Höyük. Cet écoulement, équivalent à une «mesa» en termes géomorphologiques, se trouve au-dessus des argilites, mudstones, grès d'âge et du grès du Miocène supérieur et des conglomérats de la formation de Şelmo. Cela a des conséquences géomorphologiques critiques sur le peuplement néolithique de Sumaki Höyük. Premièrement, cette masse de basalte sert de réserver d'eaux de pluie qui s'infiltrent dans la roche et les eaux souterraines qui rejoignent la couche d'argile sous-jacente remontent à la surface par des sources en pente. L'eau émergeant sous terre et des pluies saisonnières devient un écoulement de surface sur des pentes très abruptes. Ces pentes formées par des unités d'argile sont également des zones d'érosion extrême et de glissements de terrain. En raison de la masse massive de basalte et de l'instabilité des pentes, des glissements de terrain se produisent très souvent autour du Sumaki Höyük. On peut observer des traces de glissements de terrain et de paléo-reliefs sous la forme de surfaces de rupture, de gravats et de doigts de pied sur le versant ouest du bassin inférieur de Garzan. Les données des fouilles ainsi que les environs du site révèlent des traces indiquant que la colonie de Sumaki Höyük a été

directement touchée par ces glissements de terrain et / ou les processus d'écoulement des sols.

Il existait une relation distincte et mutuellement interactive entre le modèle de peuplement, l'architecture et l'environnement naturel des communautés néolithiques antérieures à la poterie au Proche-Orient, par exemple. Çayönü, Göbeklitepe, etc. Considérant qu'une partie de ce réseau est symbolique et que les colonies de peuplement sont organisées en conséquence, il ne serait pas vain de prétendre qu'un changement environnemental "long et sérieux", tel que l'événement de 8,2 ky, a un "effet multidimensionnel". ". En effet, selon les données archéologiques, au cours de la période du LPPNB, la plupart des grandes colonies avaient été soit abandonnées, soit considérablement réduites, et un mode de vie différent était apparu. Dans ce contexte, il est nécessaire de déterminer comment et dans quelle mesure les communautés du LPPNB situées en Haute Mésopotamie et dans ses environs, dotées d'une structure géographique complexe, ont réagi à ce changement soudain et à ces turbulences en redéfinissant leur stratégie d'adaptation. Sumaki Höyük, où les modifications apportées au modèle de peuplement, à la tradition architecturale et aux effets géographiques ont été déterminées en détail, se situe dans la zone de transition plaine-montagne de la Mésopotamie septentrionale.

Dans le règlement néolithique de Sumaki Höyük, les modèles de communautés semi-nomades ou sédentaires et le processus de changement peuvent être déterminés en détail. Ce processus est observé dans l'architecture (plans structurels, différentes utilisations de la pierre, de l'argile et / ou de matériaux organiques au cours d'une phase ou entre phases); dans les modes de peuplement (position des structures, des espaces ouverts, des éléments communs dans les espaces ouverts, de la disposition des abris temporaires); dans divers objets quotidiens (poterie, pierre, outils en os, etc.) et dans la détérioration et les changements causés par les conditions environnementales affectant différents modes de vie (déformation structurelle, calcification de la matière organique, modification de la texture du sol, torrents, glissements de terrain, etc.).

Le néolithique du Proche-Orient, datant de 10 000 à 6 500 BP, a été classé en deux étapes principales, le néolithique pré-poterie (PPN) et le néolithique potier (PN), avec plusieurs sous-unités et cultures en termes de technologie telle que la production de poterie. Celles-ci incluent PPNA, PPNB, PPNC / Final PPNB ainsi que des stades culturels tels que le proto-néolithique, le sultanien, le nemrikien, le mlefaatian et le mureybetien

pour la période néolithique pré-poterie. Il est également utilisé dans les nomenclatures culturelles telles que Early PN, Pre-Proto-Hassuna, Proto-Hassuna, Hassuna, Samarra, Yarmoukian, Pre-Halaf et Early Halaf pour la période néolithique de la poterie. Des noms régionaux tels que Amuq A-B (Helmer, 1989: 111-112) et Balikh IIA-IIIB (Gerritsen et autres, 2008: 245) ont également été utilisés.

La période néolithique, l'une des ères "critiques" du processus culturel préhistorique, pose de nombreux problèmes. L'une d'elles est que le processus qui a débuté à la fin de la PPNB a également été défini comme une période d'effondrement ou de dégénérescence suivie d'un retournement. En d'autres termes, cette période dans PPNB fait référence au renouvellement de l'ordre économique, de la structure sociale et du système idéologique.

Au début de l'Holocène, il y a 12 000 ans, lorsque des conditions environnementales favorables se présentaient au Proche-Orient, diverses communautés de différentes régions ont créé des habitats permanents de longue durée. Ces facteurs positifs ont accru la taille des colonies et ont entraîné une croissance de la population. Avec une structure sociale qui mûrit, des espaces publics communs ont émergé, définis par la "Plaza", dont le meilleur exemple est la colonie de Çayönü. Cependant, des structures spécifiques ou publiques, où les premiers exemples ont commencé à apparaître dans le PPNA, mais sont devenues apparentes au milieu du PPNB, ont été identifiées dans de nombreux campements.

À la suite de tous ces événements et phénomènes combinés, des facteurs négatifs pour les communautés de la phase culturelle (définis comme PPNB tardif ou PPNB final) ont commencé à se produire. La durabilité est devenue plus difficile avec l'impact négatif de l'environnement, de la population et du climat sur la structure culturelle. En conséquence, les colonies sont devenues plus petites, ont été abandonnées ou ont eu un caractère différent. La tradition de la construction architecturale, l'un des éléments culturels matériels ainsi que l'ordre social de nombreux établissements de la PPNB, ont commencé à se détériorer ou une tradition architecturale différente est apparue.

Il est très difficile d'identifier toutes les traces de la vie individuelle ou collective quotidienne ou à court terme dans les vestiges archéologiques. La raison la plus importante est peut-être que la preuve possible de la mobilité quotidienne ou saisonnière s'est accumulée au fil du temps. La mobilité est classée de différentes manières en fonction du mouvement des communautés. Lorsque la «mobilité» est la principale donnée

déterminante, la durée et la qualité de cette activité sont prises en compte. De ce point de vue, les communautés sont décrites comme *nomades*, *semi-nomades*, *semi-sédentaires* ou *sédentaires*. Les critères pour les évaluations basées sur le modèle de règlement et la qualité sont “continuité du règlement” et “taille du règlement”. Cependant, il convient de noter que l'incapacité à détecter la mobilité n'est pas suffisante pour définir la communauté comme étant *sédentaire*. Ceci est également valable dans le cas contraire. Bien que la quantité, la qualité et la stratégie des mobilisations varient selon les sociétés et les périodes, la mobilité est un moyen de garantir aux communautés l’accès à des ressources plus efficaces

Au cours de la période du FPPNB, datant d’environ 8000 BP, de nombreuses colonies au Proche-Orient sont devenues plus petites, ont été abandonnées ou ont eu un caractère différent. Néanmoins, étant donné qu’il n’y a pas eu de destruction massive ni d’événements violents dans les colonies où une rupture culturelle s’est produite; au contraire, cela a été interprété comme la préférence des communautés. À la suite de l'abandon de villages sédentaires dans le FPPNB, les communautés ont repris la vie pastorale. Cependant, les évaluations socio-économiques de cette période sont encore très controversées.

Les nouvelles fouilles et recherches effectuées dans les colonies néolithiques de la Haute Mésopotamie ont fourni des nouvelles informations. Cette augmentation de nos connaissances a conduit à l’émergence d’un modèle très différent, qui complète les aspects manquants des connaissances actuelles. Ainsi, dans l'archéologie préhistorique du Proche-Orient, mais surtout pour la Haute Mésopotamie, il devient nécessaire de modifier quelque peu les concepts acceptés depuis longtemps. Des études récentes ont révélé de nouveaux concepts pouvant être «facilement» adaptés pour définir les cultures néolithiques supérieures mésopotamiennes, par exemple: *Néolithique de montagne*. Cette étude participe aux discussions sur le processus de mobilité culturelle dans la Haute Mésopotamie et ses environs entre 8000 à 7000 av. J.-C. avec les données architecturales de la colonie néolithique de Sumaki Höyük.

Dans cette thèse, je traite de la stratégie et de l'architecture des colonies néolithiques de la Haute Mésopotamie et de ses environs, contemporaines de Sumaki Höyük. Les établissements ont été choisis dans sept régions différentes en fonction de leur emplacement géographique et de leur zone de culture. Toutefois, dans le choix de la colonie, l’ampleur et / ou la présence de fouilles ont également été prises en compte. Les

données de relevé de surface n'ont pas été spécifiquement abordées car elles ne sont pas directement liées à notre étude. Étant donné que notre thèse porte principalement sur le changement de tradition architecturale entre 8000 et 7000 BP, ainsi que sur les facteurs socio-économiques et environnementaux liés à ce changement, seuls les établissements contemporains mis au jour ont été évalués. En conséquence, les régions évaluées sont le bassin du Haut-Tigre (Çayönü et Salat Camii Yanı), le bassin de la Haute Euphrate (Mezraa-Teleilat, Akarçay Tepe et Gritille), la région montagneuse de Zagros et la région d'Urmia (Jarmo et Hajji Firuz), les régions de Jazira et Mosul (Ginning et Tell Hassuna), Bassins de Khabur et Balikh (Tell Seker al-Aheimar, Tell Kashkashok II et Sabi Abyad II), Bassin de Doura (Tell El-Kowm 1, Tell El-Kowm 2 / Caracol et Qdeir 1) et Bassin de Rouj (Dites el-Kerkh 2). Chaque région est traitée séparément sous les rubriques suivantes: architecture des colonies sélectionnées, leur stratigraphie et, si elles sont connues, détails des gisements culturels.

L'existence de semi-nomades pastoraux à la fin du LPPNB est discutée en particulier avec deux arguments. Le premier concerne des changements notables dans le modèle de peuplement tandis que le second concerne les changements importants ou les distorsions partielles dans les traditions architecturales. Dans le cadre de cette thèse, les structures périssables et fragiles de Sumaki Höyük et une architecture similaire exposées dans d'autres sites de la Mésopotamie septentrionale seront abordées. Par exemple, l'architecture hautement développée de Çayönü a été transformée en un espace où la décharge d'ordures a été mise au rebut et où la "Plaza", partiellement perturbée pendant cette période, a été utilisée comme espace commun.

Il existe des structures rectangulaires aux murs de pierre dans les quartiers d'hiver du bassin inférieur de Garzan. Il n'y a pas de débris de briques de boue sur les murs de pierre / les abords de ces structures de semi-nomades pastoraux puisqu'elles servent à enfermer des tentes. Il a été observé que les jambes de force qui assurent la tension des tentes ne sont pas enfouies dans le sol et ne laissent donc aucune trace. En conséquence, dans de nombreuses fouilles archéologiques, il est tout à fait normal de ne pas laisser de traces de poteaux sur le bord des abords de pierre et / ou des murs. Les dégradations architecturales, clairement documentées à Ain Ghazal et Beidha au Levant, ont été interprétées comme la «nouvelle tradition» appartenant aux semi-nomades pastoraux. Peut-être après la fin de cette période, l'architecture en pierre a été remplacée par des structures temporaires fragiles et / ou des tentes. Nombre de colonies prises en compte n'étaient pas

des colonies permanentes. C'étaient soit des zones semi-sédentaires à court terme, soit des sites saisonniers utilisés par des groupes mobiles comme camps temporaires. Par conséquent, dans le cadre de cette thèse, les colonies de peuplement de différentes régions ayant des cultures différentes ont été sélectionnées. Par exemple, l'architecture de la colonie de Tell El-Kowm 2 / Caracol dans le bassin de Doura, située dans une zone de transition semi-aride et semi-désertique, est également évaluée par la colonie de Jarmo, qui se trouve principalement dans les murs et les sols.

La raison la plus importante est peut-être que, les traces architecturales semi-nomades étant difficilement identifiables sur le terrain, des investigations micro morphologiques seront utiles. Par conséquent, ce type de données a été ignoré ou non discuté en détail comme dans Mezraa Teleilat. Cependant, dans des expositions limitées, telles que Ginning et Tell el-Kerkh 2, les rapports de fouilles ont des commentaires très ambitieux. Comme pour Tell el-Kerkh 2: Même s'il n'existait aucune donnée relative au stockage, les petites pièces rectangulaires ont été interprétées comme des fins de stockage. Malgré des expositions très limitées (5x5m), il est écrit qu'aucun fragment de poterie n'a été trouvés dans les structures, les deux seuls tessons de la couche 7 ont été trouvés au-dessus de la structure 12. En conséquence, la couche 7 a été datée de la période de FPPNB sur la base de l'assemblage de pierres ébréchées. De l'autre côté, Baird & Campbell estimait que la structure à cellules prévue à Ginning avait été complétée au fil du temps, mais il n'existait aucune preuve sérieuse à l'appui de cette interprétation.

L'une des découvertes intéressantes et importantes à Tell Seker al-Aheimar est le puits d'eau du niveau LPPNB datant de 8065 BP. Ce puits d'eau représente l'exemple le plus ancien connu en Syrie. Il est situé à 4,5 m de profondeur et à 2 m de diamètre dans le secteur C de la place E13. Le fait que ce puits ait été ouvert dans la colonie située juste à côté de la rivière Khabour indique une pénurie d'eau dans la colonie. Nishiaki a interprété l'ouverture du puits avec la possibilité que le ruisseau Khabur soit probablement contaminé et qu'une eau de meilleure qualité soit nécessaire. Cependant, considérant qu'il n'y avait pas de déchets industriels pour polluer l'eau en question et que les déchets ménagers n'auraient pas pu être assez volumineux pour polluer le fleuve à cette époque, l'ouverture du puits semble être directement liée au problème de l'eau potable. Cette interprétation est également corroborée par la sécheresse et les changements climatiques survenus vers 8000 ans BP au Proche-Orient. Les mortiers de basalte et de calcaire, les pilons et les meules,

qui ont été jetés intentionnellement dans le puits pourraient être liés à des pratiques rituelles. Bienvenue dans l'eau potable!

Dans de nombreux campements contemporains, des morceaux de calcaire ou des zones calcaires ont été identifiés à la fois dans l'architecture et dans les zones ouvertes. Les exemples incluent les phases 1 et 2 de la Salat Cami Yanı; les niveaux LPPNB et Pre-Proto Hassuna de Tell Seker al-Aheimar; Phase 3 de Tell Sabi Abyad II; Structure 5 en phase C chez Hajji Firuz; la couche Hassuna Ia de Tell Kashkashok II et les couches LPPNB 12-8 de Tell el Kerkh. Dans ces agglomérations, les zones calcaires sont généralement concentrées dans des structures à murs de pise de couleur marron ou orange, ou à la surface des murs ou sur les sols des pièces et des cellules de ces structures. Ils sont souvent interprétés comme un enduit ou une utilisation intensive de chaux dans les rapports de fouille. Ces interprétations étaient généralement basées sur des observations de terrain plutôt que sur des analyses détaillées de XRF, XRD ou de phytolithes. Par exemple, les blocs de briques de boue partiellement séchées utilisés dans la construction de structures à Tell Hassuna Ib étaient trempés à la paille et à la chaux. Bien qu'il n'ait pas été analysé chimiquement, le matériau en poudre ressemblant à la chaux qui séparait la phase A de la phase B à Gritille était associé à des fragments de chaux vive dans la fosse profonde de l'opération 16. À Tell Seker al-Aheimar, des traces de mauvaises herbes et de roseaux ont été documentées. Dans les analyses de phytolithes de la chaux et des échantillons de sol prélevés sur les sols des structures, on pensait qu'ils étaient liés aux activités intérieures. Considérant que l'utilisation de ces analyses en archéologie s'est généralisée ces dernières années, il est probable que de nombreuses interprétations archéologiques sont basées sur des observations sur le terrain. Cependant, l'analyse XRF, XRD, EDX et isotopique des restes calcifiés sur les murs de la structure ou dans les zones dégagées de Sumaki Höyük donne une image très différente.

En conclusion, dans la Haute Mésopotamie, entre les années 8000 et 7000, il y avait différentes communautés / zones d'installation - à court ou à long terme, sédentaires ou temporaires - vivant dans des environnements physiques similaires ou différents. Compte tenu du nombre limité de colonies envisagées dans le cadre de cette thèse, il est très difficile de faire des comparaisons entre les régions culturelles, en particulier dans le contexte architectural. Le plan rectangulaire, qui est généralement vu dans les colonies de peuplement, est dominé, la disposition des bâtiments n'est pas standard en dimension ou en forme. Même ceux-ci ont été construits en pierre ou en *Kerpiç*, en pisé ou en matériaux

mixtes, toujours compatibles avec la topographie de la région. À l'exception de Çayönü Tepesi, aucun des sites ne dispose de données sur le *plancher de vie supérieur* érigé dans les sous-sols à cellules planifiées. Bien que les bâtiments / sous-sols à cellules planifiées et les corridors en forme de "T" ou de "L" ne soient pas standardisés, les cellules et les corridors sont très petits pour vivre. En conséquence, on pense que les bâtiments à cellules planifiées avec ou sans couloirs dans la plupart des sites tels que Salat Camii Yanı, Mezraa Teleilat, Akarçay Tepe, Tell Seker al-Aheimar, Tell El Kowm 2 - Caracol, Tell al-Kerkh 2, et peut être Sumaki Höyük ont des étages de vie supérieurs.

Dans la plupart des sites, les activités quotidiennes telles que la cuisine, la couture, etc. se déroulaient dans des zones ouvertes plutôt que dans des espaces intérieurs. Cela peut être lié aux conditions socio-économiques et / ou environnementales. Un autre problème intéressant, qui mérite d'être abordé ici, est que les bâtiments de la quasi-totalité des sites LPPNB / FPPNB et EP mentionnés ci-dessus ont été délibérément nettoyés avant de partir. Cette situation est également valable pour les bâtiments de Sumaki.

L'étude du modèle de peuplement et du modèle vivant d'un peuplement archéologique constitue une occasion de comprendre la tradition architecturale et le mode de vie des communautés, ainsi que d'examiner les traces d'organisation sociale. Dans ce contexte, la preuve matérielle la plus importante pour déterminer le fond culturel d'un établissement est l'accumulation / le remplissage des couches et l'organisation spatiale. Puisque la taille, la fonction et l'emplacement des structures ou des zones utilisées montrent une variabilité liée à des facteurs environnementaux externes aussi bien qu'aux activités humaines, cette thèse tente de révéler le mode de vie de la société néolithique de Sumaki Höyük dans le contexte des relations entre l'homme et la période néolithique. . La topographie de la colonie, les caractéristiques climatiques, la proximité des sources de matières premières, les conditions paléo-environnementales et les effets du choix humain font partie de ces facteurs.

Il n'est pas facile de comprendre le modèle de peuplement et les processus architecturaux d'un règlement néolithique ni de révéler tous les aspects en fonction des vestiges retrouvés. En termes de technique et de fonction, il existe plusieurs méthodes pour comprendre une structure architecturale et / ou des éléments structurels dans un règlement néolithique. Parmi celles-ci, l'utilisation de plusieurs méthodes d'analyse, la création d'un modèle d'élévation de la zone et la détermination des conditions paléo-environnementales ainsi que l'observation, la comparaison et les études sur le terrain peuvent être répertoriées.

Les enquêtes ethnoarchéologiques sont une autre méthode permettant de comprendre et d'interpréter la vie quotidienne des communautés du passé.

Les projets de recherche sur les sociétés préhistoriques cherchent des réponses à un certain nombre de questions. La plupart des projets archéologiques et parfois des enquêtes géomorphologiques sur le néolithique ont principalement porté sur trois sujets. Le premier et le plus controversé est le processus de transition et de progression vers la vie sédentaire, qui a été partiellement éclairé. Le deuxième problème est le processus de production de la poterie et son développement dans le contexte du temps et de l'espace, tant du point de vue technologique qu'artistique. Ce sujet a été en partie compris à partir des données de fouilles récentes. La troisième se concentre principalement sur la période de transition entre les périodes néolithiques pré-poterie et néolithiques, ainsi que sur le contexte impliquant une perturbation culturelle ou des colonies abandonnées. La structure sociale de cette période de transition et les différents modes de vie dans différents domaines sont très complexes et il semble qu'il n'y ait pas de réponse unique. Cette thèse est principalement basée sur la réponse à certains aspects de la troisième question ou aspect en effectuant des recherches à travers une fenêtre architecturale.

Afin de comprendre les conditions paléo-environnementales de Sumaki Höyük et de ses environs, des études géomorphologiques détaillées ont été effectuées dans le bassin inférieur de Garzan et les données pertinentes ont été combinées et comparées aux données d'excavation. Les données géomorphologiques importantes ont été obtenues par l'hydrographie de la rivière Garzan, les mouvements de masse et les activités liées aux glissements de terrain, ainsi que par différentes structures de sol dans le bassin de Garzan. En outre, diverses données laissant entrevoir un changement climatique rapide depuis 8000 ans av.

Les glissements de terrain et les écoulements de sol à Sumaki Höyük et dans ses environs ont été modélisés spatialement à l'aide de techniques SIG et corrélés à la dynamique géomorphologique et aux processus efficaces sur la région. Les surfaces de dépôt par érosion où est situé le Sumaki Höyük se sont généralement formées au Quaternaire, mais principalement à l'Holocène. En raison de l'envasement important de cette zone, de la morphologie en pente du piémont et de la structure géologique; des reliefs tels que des glissements denses, des effondrements et des écoulements de sol se sont produits abondamment. De plus, lors de fouilles archéologiques et d'enquêtes géomorphologiques menées par nous autour de la colonie, de nombreuses nouvelles

fractures dues à des glissements de terrain ont été identifiées. Par conséquent, la zone de la colonie n'était pas entièrement façonnée par des glissements de paléo, mais par la poursuite des mouvements de masse, comme récemment observé.

Dans les couches néolithiques de Sumaki Höyük, de nombreuses traces d'inondation/d'inondation/d'écoulement du sol ont été identifiées, dont deux particulièrement bien définies. En raison de ces facteurs externes, le règlement a été abandonné par intervalles. Dans les périodes où il ne convenait pas même pour un peuplement temporaire en raison des risques d'inondations, de débordements de sol, etc., il est entendu que des tentes ont été installées dans certaines zones par de petits groupes. L'abandon de la colonie n'était pas uniquement déterminé par des données archéologiques. Dans les couches supérieures du remblayage de la phase N4, une formation de sol de 2 à 3 cm d'épaisseur a été identifiée après une inondation probable, créant un environnement aqueux. Les analyses XRD et XRF montrent que pendant les périodes inhabitées de la colonie, des gisements de composition minéralogique différente y ont été transportés par des facteurs externes. Par exemple, la brucite et la sphalérite sont liées à un environnement aqueux. La présence de cyanite et de chalcopyrite, provenant de formations volcaniques, indique que ces minéraux ont probablement été transportés par les écoulements en pente provenant des basaltes de Kıradağı.

Dans les tranchées 20/20 et 20N, un marais/une zone humide de près de 35 cm d'épaisseur a été clairement identifié, ce qui indique que la colonie était également affectée par des facteurs externes tels qu'un torrent ou un glissement de terrain après le néolithique. En outre, la pente abrupte ou l'ancien cours de la rivière (?) Dans la tranchée 20G dans la partie nord-est de la colonie a été comblée par un glissement de terrain et/ou une inondation. Les tessons de poterie dans certaines des couches néolithiques ont des surfaces oxydées de couleur verdâtre sous l'effet d'une longue durée sous l'eau. Des matériaux archéologiques légers tels que des tessons, des figurines, des outils en pierre déchiquetée, etc. emportés par les torrents ou les inondations se sont accumulés dans les zones de dépression. Étant donné que des matériaux lourds, tels que des objets en pierre broyée, n'étaient pas exposés à ce mouvement, il est entendu que la capacité de charge du débit de l'inondation ou des écoulements de sol pendant la période néolithique était relativement faible. De fortes inondations ou des écoulements de sol qui ont perturbé ou entièrement recouvert les structures n'ont pas eu lieu à Sumaki Höyük et ses environs, du moins à l'époque néolithique. Il convient de noter ici que nos interprétations sont principalement

valables pour Sumaki Höyük et ses environs. Généraliser le bassin inférieur du Garzan n'entre pas dans le cadre de notre étude. Enfin, il convient de souligner qu'il n'est pas très concevable que Sumaki Höyük soit le seul établissement néolithique situé dans le bassin inférieur de Garzan. Dans d'autres régions, des facteurs externes tels que des écoulements de sol plus importants peuvent avoir recouvert et scellé des établissements néolithiques permanents et temporels. La preuve en est que lors de notre inventaire culturel du bassin inférieur de Garzan en 2002, un règlement appelé Kani Kervana daté du Moyen-Âge a été trouvé sous environ 40 cm d'alluvion du ruisseau Garzan. Le règlement a été trouvé par hasard en raison d'un canal creusé pour les activités agricoles.

La composition minéralogique des gisements néolithiques a été déterminée par analyse XRD. Le facteur le plus important dans l'identification ou la formation de minéraux est la tradition architecturale autant que des facteurs externes tels que les inondations, car le pourcentage de calcaire dans les échantillons de calcaire provenant de structures architecturales ainsi que la composition minérale des remplissages calcaires de phases est presque identique, soutenant cet argument. Les minéraux dominants étaient le quartz, la calcite et le dioxyde de silicium. Dans différentes remplissages, différentes quantités de carbone, d'oxyde de fer, d'hydroxyde de magnésium et de silicate d'aluminium ont également été déterminées. La principale raison en est, avec la tradition architecturale, les différences de décomposition/dépôt dues au facteur d'inondation. La composition minérale des zones inondables montre une accumulation hétérogène; Cependant, les échantillons provenant de remblais non touchés par les inondations sont relativement plus homogènes. Les remplissages "stériles" sont connus pour être généralement dominés par la calcite, le dioxyde de silicium et le quartz; tandis que des échantillons de terre provenant de zones inondables ont été identifiés comme contenant des minéraux non trouvés dans des gisements archéologiques, tels que la cliftonite, le plumbago/graphite, la brucite, la sakhite, l'altaite, la chalcopyrite et la sphalérite. Leurs combinaisons de minéraux montrent que ces remplissages ont été transportés par des facteurs externes.

En examinant les échantillons de sol prélevés dans les gisements du néolithique de Sumaki Höyük par flottaison, différentes espèces de plantes ont été détectées, principalement les restes de Triticum/Hordeum, Triticum turgidum, Triticum, Fabaceae, Lens culinaris et Linum. En outre, les restes de Chrozophora tinchoria, Medicago et Lathyrus/Vicia ont également été trouvés dans ces échantillons de sol.

Dans l'analyse phytolithique des couches néolithiques de Sumaki, des phytolithes multiformes de Trichome ont été identifiés. Cependant, il convient de noter que les phytolithes panicoïdes dans la plupart des échantillons étaient mal préservés. Dans presque tous les échantillons, la présence de phytolithes bulliform en forme d'éventail comparée à d'autres morphotypes de type bullorma panicoïde prouvait que le couvert végétal paléoblastique était prédominant. Les phytolithes de Chloridoid et Festucoid ont des fréquences variables, avec des niveaux extrêmement bas de chloridoïdes d'arête remarquables dans les couches néolithiques. Un trichome multiforme et de longs phytolithes ont également été détectés.

Sur la base de l'origine anatomique et des caractéristiques structurelles, la couverture végétale dominante des phases N6 - N4 à Sumaki Höyük est, en général, de l'espèce Andropogonea/Reed. Dans les phases ultérieures telles que N3 - N1, la couverture végétale est représentée par les pâturages chloridoïdes et Festucoïdes. Par conséquent, il est clair que des alternances humide-sec-humide ont été observées dans la zone d'habitation et ses environs.

Le climat correspond aux conditions météorologiques moyennes sur une très longue période dans une vaste région. Le climat contrôle le caractère d'une région et de sa couverture végétale en raison des conditions météorologiques. Il existe presque d'innombrables types de climat. Cependant, comme dans toutes les branches de la science, les types de climatologie dispersés peuvent être combinés pour former de grandes ceintures climatiques présentant de nombreux aspects communs. Les principaux facteurs qui déterminent le caractère du climat en Anatolie sont les systèmes de pression et de vent, ainsi que la localisation.

Entre 8600 et 8000 ans BP, la région Est de la Méditerranée présentait un cycle hiver/printemps régulier à intervalles réguliers, mais était sous l'effet d'une masse d'air polaire très froide. Du fait du renforcement de la circulation atmosphérique au-dessus de l'Atlantique Nord et de la Sibérie, lors de périodes avec RCC (changement climatique rapide) telles que l'événement de 8,2 ky, un flux d'air régional est venu directement de la Sibérie, produisant des jours voire des semaines de conditions hivernales et printanières. Au cours de la fameuse oscillation climatique de l'évènement de 8,2 ky dans l'holocène, les glaciers ont progressé dans l'hémisphère nord selon les registres de l'Atlantique Nord et de la Sibérie: cette période n'a toutefois duré que très peu de temps.

L’approche acceptée du changement climatique rapide (RCC), l’événement de 8,2 ky, est qu’en raison de la chaleur polaire transportée vers le nord, de l’eau de fonte a été libérée et a affecté la formation et la circulation des eaux profondes de l’Atlantique Nord. Toute variation de la circulation en eaux profondes de l'Atlantique Nord affecte sensiblement la géographie du Proche-Orient. Ce système de circulation est le principal facteur déclenchant les précipitations au Proche-Orient. Les vents du nord soufflant sur la Méditerranée vers le Proche-Orient gagnent en humidité lorsqu'ils traversent la Méditerranée et peuvent produire de la pluie sur un terrain proche-oriental.

Le changement climatique rapide au Proche-Orient au début de l’Holocène (maintenant appelé *Northgrippien*) est perçu à partir de diverses différences régionales. La vallée du Jourdain a connu une période très humide, d'environ 10 000 à 8 600 ans BP. Après une période de froid de près de 200 ans autour de 10 200 BP, cette période de froid de courte durée a été remplacée par un climat plus doux et humide à 10 000 BP. Cette période relativement plus chaude et humide a pris fin subitement et une période froide a été observée de 8600 à 8000 BP. Les deux cas de RCC (10,2 ky BP et 8,6 - 8,0 ky BP) montrent que, de temps à autre, la région de la Méditerranée orientale était sous l’effet de l’air polaire froid bien qu’elle se trouve dans un cycle régulier hiver / printemps. Parallèlement à cette période froide, les niveaux d'eau de la mer Morte et du lac de Van se sont effondrés vers 8600 - 8000 BP. Lorsque nous rassemblons toutes ces données, il est évident qu’au cours d’une certaine période, le Proche-Orient a connu une aridité rapide. Toutefois, selon les données de Soreq Cave, il y a eu parfois de fortes pluies au cours de cette période aride.

Dans les sections précédentes de cette thèse, la relation et le processus affectant la composition isotopique de l'oxygène et l'isotope météorique de l'oxygène dans les carbonates du sol ont été expliqués en détail. Des échantillons de sédiments carbonatés ($CaCO_3$) provenant des gisements néolithiques de Sumaki Höyük ont été soumis à des analyses isotopiques $\delta^{18}O$ et $\delta^{13}C$.

Les données sur les isotopes de carbone stables des échantillons prélevés sur les murs architecturaux sont collectées dans une certaine zone. De plus, elles présentent également des données très différentes, en particulier pour les phases 1, 2 et 4.Le fait que nous ayons également détecté des traces des inondations et/ou des torrents dans les obturations archéologiques correspondant au début ou à la fin de ces phases donne un sens à cette situation

Les analyses isotopiques du carbone déterminent des courbes δ13C extrêmement élevées pour les années comprises entre 8127 et 7325 BP et plus particulièrement pour les valeurs de 7712 ± 60 - 7700 ± 50 BP et de près de 7350 - 7300 BP. Selon les valeurs de l'isotope $\delta^{13}C$, une période clairement aride a été identifiée entre ces époques. Si ces valeurs $\delta^{13}C$ maximales sont comparées aux valeurs isotopiques de $\delta^{18}O$ pour la même période, il convient de préciser qu'il existait une période chaude définie, en particulier autour de 7712 ± 60 - 7700 ± 50 BP (fin de la phase N5). Selon les valeurs isotopiques et les données archéologiques, des périodes froides et plus humides ont été observées immédiatement avant et après cette période chaud-sec. Ces périodes froides et humides sont mieux définies pour les années 7752 ± 60 BP, 7700 ± 50 BP - 7647 ± 45 BP, 7613 ± 50 BP et environ 7500-7450 BP, 7400-7350 BP et 7350-7325 BP. En ce qui concerne les valeurs isotopiques, après une période relativement stable dans les phases N7 à N5, entre les années 7,712 ± 60 et 7,700 ± 50 BP, les courbes δ13C s'inversent. Il est fort probable que plus d'un stade humide ait été expérimenté au cours de ces années. Une période froid-humide s'est produite surtout entre les années 7,700 ± 50 et 7,647 ± 45 (fin de la phase 5) et entre 7,400 et 7,350 (fin de la phase N2). Au cours de ces périodes, un écart important a été identifié à la fois sur les courbes $\delta^{18}O$ et $\delta^{13}C$. L'analyse par XRD montre que pendant les périodes inhabitées de la colonisation, des dépôts de composition minéralogique différente y ont été transportés par des facteurs externes. Les gisements de différentes compositions minéralogiques confirment l'idée que la zone de peuplement a probablement connu des périodes humides.

En ce qui concerne la stratification archéologique de Sumaki Höyük; le règlement néolithique a été daté entre 8127 et 7325 BP (7134 - 6173 cal. BC). Après Çayönü Tepesi, cette colonie a également le privilège d'être la plus grande zone d'excavation et de recherche menée dans la Mésopotamie septentrionale, et plus particulièrement dans le bassin supérieur du Tigre. En bref, le règlement a une certaine importance dans le contexte de la révélation de la période postérieure à la "détérioration" mentionnée par la Mésopotamie du Nord dans son modèle de peuplement, ainsi que dans le débat sur les traditions architecturales et les modèles d'organisation sociale.

La première occupation de Sumaki Höyük Phase N7 est datée de 8127 ± 50 BP selon une seule date de C_{14} découverte dans une zone limitée. Le gisement de la phase 7 a été distingué de manière aléatoire dans une zone d'environ 130 m2 dans la zone B. Même si le sol naturel a été atteint dans de nombreuses parties des zones A et C, aucun résidu de

la phase N7 n'a été trouvé. Une série de bases de poteaux ou de trous situés à différents endroits sont considérés comme des systèmes de civière / support pour les logements temporaires, mais leur plan ne peut être identifié. En conséquence, la phase N7 a été interprétée comme un "camping temporaire" (un pâturage d'été ou un quartier d'hiver).

Dans la phase suivante, la phase N6, datée de 7871 ± 50 - 7810 ± 50 BP, il se produit un changement radical dans le schéma de règlement. La phase N6 semble afficher un personnage sédentaire, du moins pendant un moment. Bien que la colonie semble présenter un schéma particulier au cours de cette phase, il n'existe aucune organisation sociale spécifique indiquant un usage prévu et soutenant un mode de vie sédentaire établi à long terme, comme des bâtiments uniques, des structures permanentes gigantesques et différentes organisations externes, des éléments architecturaux reflétant les traditions rituelles, et les inhumations souterraines ou les zones d'inhumation identifiées dans de nombreux autres établissements PPNB. Dans les zones ouvertes où quelques foyers ont été trouvés entre les bâtiments, aucune organisation claire n'a été constatée. De plus, les bâtiments construits avec des brindilles, des roseaux et de la terre battue, reposant directement sur la topographie naturelle du néolithique sans fondations en pierre, n'avaient pas de sols pavés ou en plâtre. Bien que le règlement de la phase 6 soit permanent, avec une architecture plus fragile et une organisation simple entre zones internes et externes, sa durée de vie est supposée être plus courte que celle des autres sites PPNB. Dans la phase N6, qui a été exposée sur une superficie de 956 m2, le site était densément peuplé. Les bâtiments ont été construits directement sur le sol, sans fondations en pierre, et ont été localisés en laissant des espaces entre les terrasses basses de la topographie naturelle dans les zones A et B. Le type de plan principal est celui des bâtiments à cellules en forme de "L" ou de "T". chambres (couloir) au milieu et cellules presque carrées des deux côtés. Il existe également des habitations d'une seule pièce plus petites. Tous les bâtiments ont été construits selon la technique de la terre battue.

La phase N5 suivante, datée de 7752 ± 60 - 7700 ± 50 BP, selon la datation au radiocarbone, a un caractère similaire à la phase précédente N6 et a été récupérée sur une surface de 865 m2, dont 625 m2 dans la zone B, 200 m2 dans la zone A, et 40 m2 dans la zone C. La zone B semble être occupée plus intensément qu'auparavant, conservant le même schéma sur les terrasses basses de la topographie naturelle qu'il l'était en phase 6 lorsque la zone A était moins peuplée. Que ce soit dans l'aménagement du bâtiment ou la technique de construction, des changements notables sont constatés dans la phase N5. Dans

la phase N5, tandis que la pratique de la construction de cellules se poursuivait, des bâtiments à plusieurs et à deux chambres apparurent. Des structures à une seule pièce étaient également utilisées. Dans les murs de N5B11, N5B12 et N5B13, la technique de la terre battue - similaire aux murs de la phase 6 - et des blocs de *Kerpiç* ont été utilisés simultanément pour la première fois. De plus, le sol en chaux dans une structure à plusieurs pièces N5B12 est le seul plancher intérieur de la colonie néolithique de Sumaki Höyük. Les bâtiments d'une seule pièce affichent deux traditions différentes. Ils ont été construits selon la technique de la terre battue comme dans la phase N6 ou étaient des structures «temporaires» qui n'avaient qu'un environnement en roseaux (probablement avec une couverture supérieure fragile), comme le montrent les structures N5B14 et N5B15. À proximité de ces structures "temporaires", se trouvent des foyers similaires à ceux de la phase N7. Il convient de souligner en particulier que ces structures sont situées dans la même zone que les bâtiments cellulaires. Une autre caractéristique distinctive de la phase N5 est la réapparition de la poterie de la phase N7 après un intervalle d'environ 200 ans.

Suite à cette rupture d'occupation, dans la phase N4, datée de 7647 ± 45 - 7613 ± 50 BP, on assiste à une modification de la conception architecturale et du schéma de peuplement. La tradition de construction de cellules était finie. Cependant, la construction d'immeubles à plusieurs pièces et à deux pièces avec des murs en pisé a continué, et le nombre de logements temporaires de courte durée d'une seule pièce avec des murs / murs en roseaux et probablement recouverts de tentes ou de matériaux fragiles a augmenté. La tradition du foyer a continué avec ces structures. Les foyers ne sont pas très différents des précédents, mais sont plus grands. Il y a aussi une augmentation de leur nombre et ils sont généralement concentrés dans des zones particulières. Certains ont des sols rénovés. Presque toutes les bases des foyers ont des surfaces marbrées dues à un usage intensif. Selon le schéma général de la phase N4, il a été suggéré que les communautés sédentaires et les communautés semi-nomades ayant des logements temporaires partageaient le même territoire pendant certaines périodes, ou que des semi-nomades occupaient certains secteurs du pâturage.

La ligne de terre brun clair de 3-4 cm d'épaisseur identifiée dans différentes sections de tranchée dans les zones A et B au-dessus du remplissage de la phase N4 montre que géo morphologiquement, cette zone n'a pas été utilisée pendant une période donnée ou

est restée ouverte. En conséquence, après la phase N4, Sumaki Höyük est redevenu désert. L'organisation des nouveaux arrivants était différente de celle des habitants de la phase N4.

La phase N3 est datée de 7584 ± 50 ans BP. Il couvre une superficie totale de 693 m² répartis sur 421 m² dans la zone B, 242 m² dans la zone A et 30 m² dans la zone C. Au cours de la phase 3, la tradition architecturale a radicalement changé. Le modèle de peuplement et la tradition architecturale des phases N6 à N4 disparaissent. D'une durée de près de 250 ans, la colonie permanente se transforme en un “camping” temporaire avec des caractéristiques en partie similaires à la phase N7. Les tentes ovales remplacent maintenant la pratique des bâtiments permanents et, selon la répartition des artefacts, l’utilisation intensive des espaces ouverts.

La phase N2 a été mise en évidence sur une superficie totale de 1204 m², dont 495 m² dans la zone B, 669 m² dans la zone A et 40 m² dans la zone C. Etant donné qu'il n'y a pas de datation au C_{14}, cette phase est relativement datée et se situe entre 7450 et 7400 BP environ. . Le modèle de peuplement et la densité de distribution spatiale ont été recréés de manière similaire aux phases N6 et N4.

Les bâtiments étaient situés l'un à côté de l'autre et construits selon la topographie de l'époque. La tradition architecturale originale de cette phase est constituée de bâtiments temporaires à une seule pièce. Cependant, trois bâtiments construits avec des murs en pisé, un bâtiment Cell (N2B9) et deux bâtiments d'une seule pièce (N2B1 et N2B7) ont été identifiés. La construction de cellules, qui dominent l’architecture dans les phases N6 et N5, a repris au cours de cette phase mais n’est pas devenue populaire.

Le remplissage de la phase N2 est généralement de couleur gris-chamois, parfois avec des cailloux denses et en partie cendré. Vers la fin de cette phase, un niveau d'inondation a été identifié, perturbant grandement le sol, avec des bâtiments inondés et d'autres caractéristiques. Les données relatives aux débits et à la sédimentation affectant la quasi-totalité du peuplement indiquent que l'inondation avait une orientation sud-ouest-nord-est. La similitude entre la composition minérale de l'inondation dans cette phase et les inondations de la phase N5 indique que la direction et les facteurs déclencheurs étaient les mêmes. Des tessons de poterie, des outils et des flocons d'obsidienne/de silex, des os d'animaux et des fragments de pierre broyée dans les couches archéologiques ont été déposés de manière désordonnée dans la zone de sédimentation hétérogène, comme dans la phase N5. Comme il n'y a pas de surface régulière, c'est probablement arrivé plus d'une fois.

La dernière habitation de la colonie néolithique, représentée par la phase N1, a été datée de près de 7350 - 7300 BP selon des données chronologiques comparatives. Le remplissage de cette phase n'étant pas bien conservé dans toutes les parties du site, les dimensions du village ne peuvent pas être estimées. La tradition architecturale de cette phase affiche un style différent de presque toutes les phases précédentes. Dans cette phase, la pierre est le matériau de construction dominant. Cette occupation est représentée par des rangées de grandes meules de basalte laissées en place, placées dans des directions différentes, formant parfois des coins. Ces rangées peuvent entourer les tentes ou les habitations en roseau de semi-nomades.

Immédiatement au-dessus de la phase N1 et au-dessous des couches du Moyen Âge, il y a un remblai semblable à un marécage ne contenant aucun matériel archéologique identifié comme ayant une épaisseur de 20 à 35 cm dans l'ensemble de la tranchée 20 / O et de la moitié sud de la tranchée 20N. L'existence de ce remplissage peut expliquer que Sumaki Höyük ait été inhabité jusqu'au Moyen Âge.

Cette étude pluridisciplinaire comprend des données provenant de levés géomorphologiques dans l'analyse sédimentologique et paléoclimatique de divers échantillons prélevés dans les gisements néolithiques de Sumaki Höyük dans le bassin inférieur du Garzan, des archives archéologiques du site et une étude détaillée de la section de tranchée, ainsi qu'une combinaison de toutes ces données. En général, ce chapitre porte sur les changements intervenus dans le processus d'établissement, les stratégies d'inhabitation ainsi que les interactions homme-environnement dues à diverses recherches et études. Dans ce contexte, j'ai essayé de définir, d'interpréter et de discuter des différents effets naturels et culturels sur la stratigraphie de la colonie néolithique de Sumaki Höyük et de ses environs.

Les données obtenues à partir des unités géologiques et des zones d'accumulation géomorphologiques à l'intérieur et autour du site ont joué un rôle important dans la compréhension de la topographie néolithique de Sumaki Höyük et de ses environs, ainsi que des facteurs externes rencontrés au cours des différentes phases et de leurs effets sur la stratégie de peuplement également sur le choix des matériaux en architecture. En conséquence, les données géomorphologiques ont été étudiées par distribution spatiale et morphométrique, telles que les traces de glissement de terrain autour de Sumaki Höyük, la structure du sol et la diversité de végétation possible. Les analyses de différents

échantillons de sol prélevés sur les remplissages de Sumaki Höyük et ses environs sont intégrées à d'autres données et discutées dans le contexte micro-archéologique.

Les glissements de terrain survenus dans des unités argileuses ont directement affecté les colonies de Sumaki Höyük et ses environs. Les données sur les glissements de terrain et les flux de terre ont été modélisées par des techniques SIG et liées à la dynamique et aux processus géomorphologiques. La surface d'érosion-accumulation où se trouve la colonie de Sumaki Höyük s'est généralement formée au Pliocène-Pléistocène, mais particulièrement à la période holocène. Des traces d'inondation, de débordement et d'écoulement terrestre, dont deux sont bien apparentes, ont été détectées dans les couches néolithiques de Sumaki Höyük. En raison de ces facteurs externes, le règlement a été abandonné par intervalles.

La confirmation de l'abandon de la colonie ne repose pas uniquement sur des preuves archéologiques. Par exemple, dans la partie la plus haute de la phase N4, on observe des lignes de sol de 2 à 3 cm d'épaisseur, éventuellement formées à la suite d'inondations ou d'inondations. Les analyses XRD et XRF montrent que différents sols ont été transportés vers la colonie et que différentes compositions minérales se sont formées à des périodes où l'habitation était partiellement interrompue. Un remplissage de marécage / zone humide d'environ 35 cm d'épaisseur, clairement détecté dans les carrés 20/O et 20N, indique que le site était également affecté par des facteurs externes tels que des inondations, des glissements de terrain et des débordements après le néolithique. En outre, dans la tranchée 20G, il a été déterminé que la pente abrupte (lit du ruisseau?) Sur le bord est de la colonie était remplie de matériaux de glissement de terrain/inondation. En particulier dans les phases N4 et N2, on observe une oxydation verdâtre à la surface des tessons de poterie après une longue immersion. On peut affirmer que de très fortes inondations, débordements ou ruissellements de sol susceptibles de déloger ou de recouvrir les structures n'ont pas eu lieu, du moins à l'époque néolithique, autour de Sumaki Höyük.

D'après les données sur les isotopes du carbone du sol de Sumaki Höyük et certaines données climatiques provenant de grottes et de lacs du Proche-Orient, tels que le lac Van, la Mer Morte et / ou la grotte de Soreq, l'un des facteurs les plus importants dans la survenue de ces glissements de la structure climatique instable, avec alternances froides et humides, chaudes et sèches, entre 8127 ± 50 et 7350-7300 BP de manière séquentielle. Sur la base de ces données, il est probable que Sumaki Höyük ne soit pas le seul établissement néolithique dans le bassin inférieur de Garzan. Les colonies néolithiques

sédentaires ou temporaires avec un remplissage peu profond auraient été complètement scellées par des glissements de terrain plus rigoureux ou des facteurs externes similaires.

En dehors de tout cela, les données archéologiques de la colonie de Tell Seker al-Aheimar, les données isotopiques de la grotte de Soreq et les modifications du niveau de l'eau du lac Van ont prouvé que les fluctuations de la période et les profonds changements physiques environnement ont été expérimentés. La mobilité des communautés au cours de la période étudiée est probablement due aux changements de l'environnement physique affectant l'environnement culturel. Bien sûr, ce processus d'interaction est une interaction mutuelle. Par conséquent, les changements dans l'environnement culturel résultant des changements dans l'environnement physique modifient également l'apparence de l'environnement physique.

Les changements dans l'environnement physique et culturel de la colonie de Sumaki Höyük constituent un bon exemple d'interaction de multiples variations. La répartition des bâtiments en fonction des phases a été construite en harmonie avec la topographie naturelle dans toutes les phases. Les effets des problèmes environnementaux naturels semblent se limiter aux espaces relativement vides situés à l'extérieur des bâtiments et ces zones d'accumulation ont toujours été utilisées comme zones communes au cours des phases suivantes. Autre exemple, en raison de l'occupation intensive et de l'utilisation de l'environnement physique, un ruisseau qui coulait dans la partie est de la tranchée 20G s'est asséché et pourrait s'être déplacé vers une autre zone. Lorsque tous ces éléments sont évalués ensemble, la physique peut modifier la culture des modifications de l'environnement, de la perception architecturale et des matériaux de construction, ainsi que de la structure physique de l'environnement naturel résultant de l'influence humaine. Cela peut être décrit comme un changement dialectique mutuel et une adaptation entre l'environnement culturel et physique, que nous pourrions appeler "*Paléo-Milieu*".

En conséquence, diverses analyses indiquent que des changements climatiques tels que des périodes chaudes et humides, chaudes et sèches, froides et humides, et froides et sèches ont été expérimentés de manière séquentielle entre 8127 ± 50 et 7350-7300 BP. Ces fluctuations climatiques ont affecté les unités argileuses libres situées sous l'écoulement de basalte de Kıradağ au sud de Sumaki Höyük, ce qui a entraîné de fréquentes inondations, des débordements ou des écoulements de terre qui ont affecté le peuplement. C'est probablement l'une des principales raisons pour lesquelles les colonies de Sumaki Höyük ont été partiellement interrompues et la zone n'a pas été occupée en permanence. Un autre

fait pourrait être le caractère environnemental de cette région; être dans la zone de transition de la plaine de montagne était favorable pour les communautés semi-nomades, comme c'est le cas aujourd'hui. Au néolithique, en particulier le PPNB, la présence de communautés semi-nomades a été longuement discutée; Cependant, la plupart du temps, les hypothèses sont discutables en raison de la nature vague des données. Les fouilles de Sumaki Höyük, bien que dans une zone limitée, fournissent des données sur cette problématique.

Les autres données sont fournies par les fouilles Sumaki Höyük. Avec la détérioration d'un style de vie harmonisé dans les colonies de PPNB due aux changements climatiques de 8000 BP, l'abandon partiel ou total des colonies de peuplement a incité les communautés de PPNB à adopter un mode de vie leur permettant de conserver leurs habitudes "de longue date". Par exemple, il est évident dans la phase N6 de Sumaki que les bâtiments cellulaires, qui ont généralement des murs en *Kerpiç* sur des semelles en pierre, sont devenus "compatibles avec le nouveau matériau". Selon les données de la phase N7 de Sumaki, l'utilisation de la poterie, qui semble être une tradition parmi les communautés semi-nomades, n'a pas été assimilée par la société PPNB de la phase N6. En d'autres termes, la communauté PPNB a maintenu ses habitudes traditionnelles en n'utilisant pas de récipients en argile cuite. La tradition stricte de PPNB consistant à "enterrer des bâtiments et à les abandonner pour toujours" a également perdu de son importance. Les structures ont seulement été nettoyées avant d'être laissées. L'absence de sépulture sous les étages dans les cellules de Sumaki Höyük indique que cette tradition du PPNB a également pris fin. Les données architecturales de la phase N5 indiquent l'arrivée de différentes communautés. Dans cette phase, la présence de bâtiments aux murs de *Kerpiç* avec des sols en plâtre, principale méthode de construction des colonies de peuplement dans les plaines de la Mésopotamie septentrionale, implique que les nouveaux arrivants venaient de cette région. Cette phase montre l'adaptation d'une méthode de construction utilisant de la terre battue, qui était déjà utilisée dans la phase 6. La tradition des structures temporaires à chambre unique avec un environnement en roseaux de la phase N5 à la phase N1 indique que des communautés semi-nomades adaptées à la vie ainsi que l'ancienne communauté PPNB utilisant des structures en pisé, ou inversement. Cette harmonie, établie à la fin du PPNB, s'est poursuivie pendant des milliers d'années, même si les conditions n'étaient pas toujours les mêmes. L'organisation des zones ouvertes, que ce soit dans une colonie temporaire ou dans un village sédentaire, n'est pas très différente l'une de l'autre. Ainsi,

nous trouvons des zones de cuisson communes, des cendres en tas et des restes d'objets éparpillés.

Appuyée par des études ethnologiques sur le terrain et des recherches et interprétations géo-archéologiques, cette étude a révélé de nombreuses similitudes au néolithique, ainsi que des aspects distinctifs dans le contexte du mouvement social, par rapport aux établissements modernes. Ainsi, le modèle de style de vie et les détails de la tradition architecturale reflétant les changements au fil du temps de ces groupes «mobiles» ont été révélés. Par conséquent, mon souhait le plus vif est que cette étude serve de fondement à de nouvelles recherches sur la variété architecturale et les processus d'interaction et d'adaptation homme-environnement de groupes mobiles de différentes géographies, tant en ce qui concerne la minéralogie détaillée que les données architecturales.

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