Old spaces, new places: legacy data and the spatial organization of Early Bronze III houses in the non-elite domestic quarter of Tell eṣ-Ṣâfi/Gath, Israel.

by

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Abstract

The goal of this thesis is to contribute to a more dynamic and holistic vision of the social complexities of early urban societies in the Near East by increasing the knowledge of intra-settlement household organization and variability. While the earliest urban centers and states appear in Mesopotamia, few studies have investigated the effect of early state formation on households in the surrounding regions experiencing secondary state formation (e.g., southern Levant). The earliest cities in the southern Levant appear during the Early Bronze Age (3600-2000 BCE; EB). The change from the EB I (3600-3100 BCE) to the EB II-III (3100-2500 BCE) periods saw dramatic changes in social organization that impact the nature of urban households beginning in the EB Ib.

The Early Bronze Age II-III period in the southern Levant is the pinnacle of early urbanization throughout the region. It is characterized by aggregation of population, centralization of power, large-scale fortifications surrounding sites, construction of monumental public structures (temples, palaces), and construction of urban centers following an urban plan including domestic structures. Much of the understanding of this region in the Early Bronze Age II-III comes from large tell sites with deep stratigraphy that limit large horizontal exposure and investigation into large areas of sites. Consequently, most research has focused on limited exposures of the grandiose architecture of palaces, temples, and granaries. This has provided a top-down (from the upper echelons of society) approach to the understanding of the period. Thus, there is a limited understanding of the spatial organization of domestic daily life within households in early urban society of the southern Levant. Thus, a household, or bottom-up, approach is vital to learning more about the everyday life of the populations in this period.

Households provide the social and economic foundation for any society. For the most part, households are associated with the structures where the residents reside (i.e., houses). While approaches to understanding the household as the foundational social unit in ancient societies are varied, it is proposed here that a spatial analytic approach can provide insight into the social organization of not only the unit but also wider social interactions within a community and city.

The site of Tell eṣ-Ṣâfi/Gath is one of the many large, fortified sites of the Early Bronze Age III and has multiple successive phases of non-elite domestic architecture. Intensive archaeological investigations have yielded a minimum of five occupation phases (E5-E9), one of which has three subphases (E5a-c). The last of these subphases (E5a) clearly shows that the site was abandoned at the end of the period rather than destroyed.

Spatial analyses of the Tell eṣ-Ṣâfi/Gath EB artifactual assemblages are used to conduct a detailed analysis of the distribution of activities and by implication the nature of household organization. The material record contained in seven neighboring houses provides a clear case study for the use of space at the end of the Early Bronze Age III in the region. This study uses the distribution of artifactual data from the last EB III habitation phases (E5). The habitation sub-phases are continual and include interior structural renovations and remodeling.

This thesis approaches the household from a materials perspective, using three specialist datasets (chipped stone, ground stone, and osseous or bone tools), to identify the boundaries of households and their continuity between phases. Additionally, questions approaching the use of both rooms and areas of courtyards are investigated using spatial and statistical analyses.

To conduct the analyses proposed for this thesis, a geographic information system (GIS) that integrates all the data from over a decade of field excavation was constructed. This GIS spatial database enables data to be both stored and analyzed. It also allows for the integration of specialist

data, in this case the three material corpuses, and the implementation of a variety of analytical tools such as hotspot and frequency analysis, both of which are built into the chosen GIS software. The GIS framework provides for the easier implementation of statistical analyses such as correspondence analysis (CA) and constrained correspondence analysis (CCA). In this thesis, CA and CCA allow investigations of spatial distributions between and within both buildings and phases.

The digitization of the site data and their integration are also vital in the examination of legacy data as is used in this thesis. The term 'legacy data' refers to any data that are from an obsolete information system. In the field of archaeology, this often translates to non-digital data (e.g., paper files, and obsolete digital file types). The digitization and analysis of such data are theoretically possible for any site and allows for reexamination of the site after years of being archived. The process provides for the creation of an electronic database (where one may not have previously existed) that allows for renewed data access and addresses storage concerns.

This thesis makes a substantive contribution to the understanding of early urban society in the southern Levant by approaching the dearth of research on Early Bronze Age households from a spatial analytic perspective. Data from Tell eṣ-Ṣâfi/Gath (Israel) are used to generate models of the spatial dynamics of households in this early urban center. A clearer understanding of generational continuity of habitation of architectural units, architectural units as a representation of households, use of space within architectural units, and household (domestic) level tasks provides information that is not accessible from top-down approaches. The use of legacy data in the analysis tests the feasibility of these types of analyses on data collected before digitization was widespread. This thesis tests whether the digitization process and subsequent analysis of legacy data are valuable and return meaningful results.

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To those loves lost,

those found,

and those renewed,

let each shape you and

may you never be bored on

this journey

we call life.

"Not in doing what you like, but in liking what you do is the secret of happiness" – J.M. Barrie

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Chapter 1. Introduction

The Early Bronze Age (**EB**) II-III encompasses a full cycle of the rise and fall of the complex social system as exhibited by city-states in the southern Levant. This includes the emergence and collapse of stratified societies based on fortified urban centers, centralized administrative structures, and a more stratified socio-political organization than were previously encountered in the region (Chesson and Philip 2003, Greenberg 2011b, 2017, Paz and Greenberg 2016, Ur, Karsgaard, and Oates 2007, Paz 2012). Explanations for the changes associated with the rise in complexity during the EB II-III have focused on *macro-level* processes that contributed to the formation and maintenance of elite power as demonstrated by the monumental and public structures of the period (e.g., temples, palaces, fortifications, etc.).

A relative lack of comprehensive research on the non-elite members of EB Levantine urbanized society has resulted in a relatively poor understanding of daily life, the nature of activities taking place within and between households, and the socio-economic organization of households. The goal of this thesis is to address this dearth in the literature by paying attention to smaller scale social processes. This is accomplished by focusing on the micro-level of intra-settlement organization rather than the macro- levels, such as public, ritual, and administrative organization. Thus, this research concentrates on activities carried out by individuals or smaller social groups at small spatial scales within an EB residential neighborhood.

The approach employed in this thesis uses the house, the physical remains represented in the archaeological record, to understand the household, an intangible social construct or unit composed of relationships found in human engagement. The house performs several functions not limited to shelter of the household. It provides a physical boundary between spheres of public and private lives and hosts the myriad of activities associated with family daily life. Household

archaeology is a body of theory that seeks to characterize and understand social interactions on a familial or individual level within a household.

In this thesis, data from the most recent excavations in the non-elite EB III domestic quarter at Tell eṣ-Ṣâfi/Gath are used to increase our understanding of the organization of domestic life in the context of an early urban domestic neighborhood. These data are used to address the broad question "What is an Early Bronze Age household?" Additionally, questions regarding the use of space within a household within and between strata are investigated.

To begin these analyses, twelve years of excavation data from Area E have been digitized into an integrated GIS database. The GIS database was constructed from a combination of paper field records and excel spreadsheets provided by the various excavators and specialists. More information regarding the creation of the database and digitization process are in Chapter 3.

Statistical analysis of these data, using correspondence (CA) and constrained correspondence (CCA) analyses run in CRAN R, provide new insights into the interpretation of the archaeological record from the EB domestic residential neighborhood at Tell eṣ-Ṣâfi/Gath beyond the few special artifacts previously used in similar analyses (e.g., Greenfield, Ross, Greenfield, et al. 2022, Greenfield, Ross, Albaz, et al. 2022, Richardson et al. 2021, Greenfield, Shai, and Maeir 2020, Greenfield, Greenfield, et al. 2018, Greenfield, Shai, and Maeir 2017, 2016, etc.). Specialist analyses of three material corpuses (i.e., osseous tools, ground stone, and chipped stone tools) are used to investigate the houses at Tell eṣ-Ṣâfi/Gath. These three data categories are the most populated as well as the most informative corpuses available for research from this part of the site. The other corpuses are mostly characterized as singletons and do not lend themselves to statistical spatial analyses. The singletons are considered as part of the larger matrix of material, but the analysis focuses on those data categories with sufficient quantities to allow statistically

meaningful analyses to be conducted. Also, the analysis is limited to those materials either sitting on the floors or floating within the ashy buildup immediately above the floors of the various buildings. Detailed information regarding these corpuses can be found in Chapter 7, while information on the other corpuses can be found in Chapter 5 §VI.

This thesis is divided into two major parts: first, the background (Chapters 2-5), then the current research (Chapters 6-10). The background begins with Chapters 2 and 3 which, respectively, provide a theoretical and methodological background for the proposed analyses. Chapter 4 summarizes the relevant knowledge of the Early Bronze Age in the southern Levant beginning in the Early Bronze Ib and continuing until the end of the Early Bronze III when the system collapses. Chapter 5 presents the site of Tell eṣ-Ṣâfi/Gath, its location, history of research, and the non-elite residential EB III neighborhood in Area E. This chapter also provides a report on the artifactual assemblages not included for analysis in this thesis, outlining the reasons these decisions were made.

The current research, beginning in Chapter 6, includes investigation of the function of rooms in buildings, the structure of activities in and around them, and the nature of activities will be identified through spatial analysis of georeferenced archaeological data. From these analyses, the organization of activities (e.g. production, consumption, and discard) can be inferred as can how each change over time. The research questions relating to these topics are contained in Chapter 6.

Chapter 7 describes the assemblages used for analysis. The results of the qualitative and quantitative analyses are presented in Chapter 8. These results are then used to address and discuss the individual hypotheses and research questions (originally presented in Chapter 6) in Chapter 9. Following this, the overarching conclusions and future considerations are addressed in Chapter 10.

Chapter 2. Houses and households: Theoretical frameworks

Household archaeology provides an interpretive framework to examine the organization of life in domestic contexts by focusing specifically on understanding domestic space and the occupants of those spaces. The adoption of household archaeology as a separate field of research in North America began with Flannery (1976) with his pioneering work in Mesoamerica. In 1982, Wilk and Rathje coined the phrase "household archaeology" in their seminal paper with the same title (Wilk and Rathje 1982). In the subsequent decades, household archaeology has become a diverse subfield in both practical application and theoretical frameworks.

This includes frameworks to understand the use of space, the concepts of public and private, and social organization within domestic contexts among other concepts. This chapter begins with a brief history and some of the relevant theoretical issues in household archaeology. That is followed by the use and application of spatial studies within household archaeology. The chapter concludes with an examination of the application of both aspects to the archaeology of households from the southern Levantine Bronze Age. After these overviews, the theoretical framework chosen for the current research will be defined.

I. What are houses and households

Household archaeology is a well-established approach designed to understand social interactions at small spatial and social scales including intra-settlement relations on a familial or individual basis (Tringham 2015, 219-223). It is vital to understand the differences and distinguish between houses and households. These terms are often used interchangeably but are in fact separate entities.

The *house* is a physical structure that performs a number of functions not limited to shelter, the host of daily activities, a physical boundary between spheres of public and private, and the host

of daily, seasonal, and annual activities occur as well as the hub of family life (Bawden 1982, Blanton 1994, Flannery 1976, Rapoport 1969, Routledge 2013, Wilk and Rathje 1982). A *household* on the other hand is the social unit that may or may not be fully contained in the house, usually a family, composed of relationships found in human engagement (Flannery 1976). The people who make up households have usually been understood as a family, but households can be tied together by social relationships that go beyond kinship. Both the house and household are dynamic units, both more or less fluid in nature (Foster and Parker 2012). Another way to describe households is as a composition of three separate elements. The first, the social element is the demographic unit and includes the relationships and number of members (Wilk and Rathje 1982, 618). The second are the material possessions, within the archaeology record include dwellings and activity areas associated with the social unit (Wilk and Rathje 1982, 618). Finally, the behavioral element encompasses the activities that the household performs. This sphere is interpreted from the material elements that meet the productive, distributive, and reproductive needs of the household (Wilk and Rathje 1982, Laslett 1972).

II. Behavioral frameworks

Foster and Parker (2012, 1) frame household archaeological theory as "a development from social archaeology presenting more humanized reconstructions of the past." Whereas Allison (1999, 2) refers to households as an ethnographic phenomenon representing people living as distinct social units and their inter- and intra-group relationships. These interpretations allude to the ethnic, behavioral, and relational aspects of households, for instance family and kinship systems. Kinship systems which dominated much of 20th century academic discourse, were also investigated by archaeologists and ethnologist alike (e.g., Allen and Richardson 1971, Murdock 1949, 1967, Hrnčíř et al. 2020).

The early studies of kinship-based households fit within the boundaries of early studies provided by ethnographic research on households. These households became defined, in part, by the dwellings that they shared (Bender 1967). Tringham has described these as kinship-based co-resident domestic groups (Tringham 1984, 2012, 1972, 2015). Later the social unit was used to identify and determine the relationships within the domestic unit (familial/kinship or social) as well as the number of individuals in the domestic unit (Laslett 1972, 28-34).

Fortes (1958) investigated the household as an entity of many interlocking facets through the framework of a "developmental cycle of domestic groups," in which the household mimicked a living organism. This framework highlighted the social, economic, and spatial transformation each household underwent as a cycle but was too general to be effectively implemented widely, the opposite issue that was faced by those who were influenced by the ethnographic kinship systems discussed previously (Foster and Parker 2012). Other behavioral frameworks focus on mobility and ecological setting occasionally in terms of 'ecological determinism' though this is not always the case as mobility can also be influenced by social and ritual aspects (Kent and Vierich 1989, 97).

With the emergence of processual archaeology, the formal study of households began to emerge. The adoption of household investigations began as an abstract concept as a reaction against regional level analyses. However, these investigations did not use 'household' in the anthropological sense until later. In this process material culture was no longer considered a trait but evidence of human behavior and a physical representation of the link between theories of change and behavior.

III. Archaeological context- Material elements

There is a paradox facing archaeologists when they investigate households that does not address the behavioral aspects directly. Archaeology is many respects is a snapshot in time of a longer-term process. It may represent a decade or a century or longer. The household can be associated with an archaeological unit only if it is treated as a static entity – i.e., as though it does not have the dimension of time. Households are dynamic in nature, while archaeological units are static. To reconstruct and understand archaeological household dynamics, one can examine the variability between household units, in addition to household specializations (Gnivecki 1987). Therefore, the archaeologist's view of the household is the aggregate of material culture remains, especially from the last point in time that they were used (Gnivecki 1987, 186).

A processual archaeology approach to household archaeology provided the opening for the use of archaeological materials such as the physical structure and material remains to understand the social unit and its interaction in the sociopolitical sphere. As the household is culturally defined and task oriented, it usually resides within a single or several connected architectural units (Laslett 1972, 28-34). This is represented in the archaeological record as part of the material unit. The material unit encompasses the dwelling, material culture, and activity areas (Hardin 2010).

One overall objective of the emerging field of household archaeology was to investigate the factors that determine the relationship between spatial patterning and social organization in respect to production, distribution, and social ranking (Kramer 1982, 1979a). From these beginnings as a descriptive approach, household archaeology has branched into explanatory approaches. Therefore, it has evolved from only providing straightforward inferences into those that are more cautious and sensitive to variation. Inevitably this shift toward examination of variability between household units led to a clearer understanding of social and ideological aspects

of life and relationships between material objects and nonmaterial aspects, such as taboos, norms, and religious understandings. One of the largest factors in this shift was the implementation of ethnoarchaeological research, contributing various cautionary tales against jumping to automatic correlations between material remains and social realms (e.g., Cameron and Tomka 1996, Haviland 1988, Kent 1999, 1995, Kramer 1982, 1979a, b).

The largest criticism of household archaeological theory is that it has not progressed past its functional and processual roots, rarely viewed as anything more than an adaptation to any number of factors with a homogenous social behavior. This can be seen in the research of Byrd (2000, 2005, 1994) and their model of household change in relation to the urbanization and emergence of large settlements in the ancient near east during the Late Bronze and Iron Age transition, between 1,100 and 800 BCE as discussed in the following sections. Another criticism of household archaeology is that archaeologists do not actually excavate households, as these are behavioral units that are not directly observable in the archaeological record. They can be inferred from the distribution of material remains, but not directly observed. Intangible elements (such as kinship, or other social elements) are not going to be uncovered via excavations. For this reason, the key to understanding households archaeologically is the identification of tasks and activities completed by the domestic group as discussed in the following section (Hardin 2010, 10).

III.A. Deposition and site formation

To begin there must be a discussion of the formation of the archaeological record. Archaeologists begin their interpretation with the remains found in the archaeological context and make inferences about the societies that lived there from that evidence.

The formation of the archaeological record begins with the actions of the people within a behavioral system. The artifacts within a behavioral system can be related to the acquisition,

manufacture, use, reuse, and eventual discard of the durable materials of society, such as tools or pottery (Schiffer 1972). In the case of a stone tool these steps would be the acquisition of the raw material, the manufacture of the tool, using it, sharpening it (maintenance), or using it for a different purpose than originally intended (lateral cycling), its eventual discard, then its potential recycling. The process for consumable goods, foodstuffs or fuels primarily, is slightly different and entails procurement, preparation, consumption and discard (Schiffer 1972, 158). The storage and transport of both durables and consumable goods provide spatial and or temporal displacement and may take place at any place within the systemic context (i.e., within or between processes or stages; Schiffer 1972, 158).

After the final discard of an object, the object enters the abandonment context in one of three forms of refuse, primary (location of refuse is the location of use), secondary (location of refuse is different than the location of use), and de facto (material that reaches the archaeological record without the performance of discard activities) (Schiffer 1972, 160-161). The materials recovered in refuse locations (pits, dumps, alleyways, or used in the construction of walls) would then be in secondary refuse, whereas those found on floors or in living layers would be in primary contexts. Arguably, materials left behind after site abandonment would be considered *de facto* refuse. Thus, the archaeological context represents the materials that were lost, abandoned, or discarded.

The spatial implications of the life cycle of material culture are varied. The most important aspect is that there is a spatial location for each of the steps within the systemic context (Schiffer 1972). Archaeologists often reconstruct the manufacturing activities when addressing materials in varied states of construction in conjunction with waste products. It is also important to note that the spatial implications of the locations of the material culture will also provide context to what

point in the systemic context the object was at when it was last handled. It has been established that materials within their systemic or living context are correlated with anthropologically relevant variables (household size, structure, social, and economic status) however, this has not been as securely established with materials in de facto refuse (Schiffer 1972). As de facto refuse is inherently within the systemic context with its deposition coming about through the abandonment of a structure or dwelling with usable and unusable materials alike being left behind, the analyses applied to materials within their systemic context should in fact also be applied to materials within contexts of de facto refuse. An added step when dealing with a material corpus within de facto refuse can be to compare it with a material corpus within systemic context to determine whether the two contexts are in fact comparable (Porčić 2012, 25).

III.A.1 Archaeological transforms

Schiffer (1975) outlines a number of archaeological laws pertaining to the processes affecting the recovery and context of material culture. These laws also define two types of transforms, cultural (c-transforms) and natural (n-transforms). C-transforms refer to the cultural inputs to the formation of the archaeological record. There are a number of c-transforms that Schiffer refers to that are crucial in the understanding of archaeological sites such as Tell eṣ-Ṣâfi/Gath during the Early Bronze III when investigating them quantitatively and spatially. The first pertains to the discard location of materials. Schiffer (1975, 840) states that when there is an "increasing population and intensity of occupation and activity area, fewer items are discarded at their locations of use". Thus, in a densely populated city or area of such, the material culture remains will likely not be in the place of their original usage. Based on this, an argument can be made that the material remains in an alleyway, a potential refuse area, are from the dwellings closest to it.

N-transforms refer to the effects of the natural world on post-depositional remains, particularly the modification and destruction of materials through processes of erosion, deposition, and specific n-transforms describe the environment and cultural deposited materials (Schiffer 1975, 840-841). In other disciplines, this is known as taphonomy (Efremov 1940). These transforms include, but are not limited to various transformational processes, such as the decay of natural materials, burial, and subsequent modification (Schiffer 1975, 841).

C- and n-transforms are vital in the discussion of material culture and site formation, so are correlates. Correlates are 'laws' that relate variables within the broad categories of organization, behavior, space, and material (Schiffer 1975). These concepts are all important to archaeologists as the materials and sites that are recovered, analyzed, and published are all affected by c- and n-transforms. The analyses conducted often include behavioral and organizational inferences, and the results of said analyses often are used to explain changes and variability in past cultures (Schiffer 1975, 844). Binford contested Schiffer's approach referring to it as an inductivist approach. In short, he argued that Schiffer's approach neglected the daily tasks and saw past processes as frozen in time (Binford 1975, 1977, 1980). In contrast, Binford shows that it is unreasonable to believe that archaeologists can remove distortions or disorganizing processes of the formation of the archaeological record and subsequently reconstruct a cultural system as Schiffer proposed. However, when keeping these arguments in mind, researchers can take Schiffer's paradigm and implement it in parts to address questions such as those presented here.

III.B. Spatial studies and household archaeology

Spatial archaeological approaches have long been recognized in archaeology as vital to the interpretation of the materials recovered in the field. The key to understanding the past is not only about what we find, but where we find it. The tools used to conduct spatial analyses changed

significantly in the 1980s, with the introduction of computers, and again in the 1990s and early 2000s, with the introduction of Geographic Information Systems as is discussed in Chapter 3 §III.B. It is vital to note that spatial archaeology is not a subdiscipline of household archaeology, rather the inverse is true.

As Seibert (2001) points out, addressing archaeological remains with a formal spatial analysis approach is one of the key components of archaeology as a discipline. Spatial analysis dovetails nicely with household theory as it provides insight into past human behavior ranging from subsistence to identity (Seibert 2001, 2073). The process of archaeological studies at individual sites are intrinsically spatial through the process of recording the context and provenience of artifacts as they are excavated. In many ways spatial studies provided a body of materials that the earliest followers of household archaeology used at the start of the discipline. Despite this, there is a consensus that the explicitly spatial approaches to archaeology developed during the period of the inception of processual archaeology (Taylor 1948).

Other researchers use spatial studies (such as space syntax analysis) to analyze the built environment. They examined the social, cultural, and ideological aspects of past cities (e.g., Carr 1984). This research approaches how power was idealized and realized in the ancient landscape through built forms in the landscape (Ashmore and Wilk 1988, Ashmore and Sharer 2000, Ashmore 2002).

Most important to the research presented here is the plethora of investigation that has been devoted to the association of households with their spatial and material aspects, specifically dwellings, work areas, storage pits, and floor assemblages. This research ranges from the relationship between room size or form and function by researchers such as Ciolek-Torrello (1984, 1985), Dohm (1990), and Hole (2000), to the relationship between architectural modification and

modes of inheritance or ownership, changes in the domestic cycle, and socioeconomic inequality (Banning and Byrd 1987, Byrd 2000, 2005, Blanton 1994, Gnivecki 1987, Groover 2001, Van Gijseghem 2001). However, through all these research topics, 'activity area research' has been a recurrent and vital theme even when it was not always within the typical field of household archaeology and its theoretical tenets.

III.B.1 Activity areas

Activity area analysis developed as a branch of spatial archaeology to address identifying the use of space first within and later outside of sites (Whallon 1978, 1974, 1973a, b, Carr 1984). This approach includes the spatial investigation and analysis of house floors and the identification of activities taking place within and outside of the domestic space. In addition, activity area research has addressed the effects that formation processes have on the creation of archaeological contexts relating social units to refuse distribution, movement patterns, the reuse of structures and abandonment (Cameron 1991, Cameron and Tomka 1993, Tomka 1993). Activity area analysis has been primarily concerned with economic organization as this is the most archaeologically visible aspect of the household. There a large body of literature focused on craft production, subsistence, surplus specialization, and the household as part of an exchange system (Cveček 2023, de Munck 1994, Douglass and Gonlin 2012, Düring 2007, Falconer and Fall 2013, Groover 2001, Hendon 1996, 2004, Lowell 1991). The archaeological investigation of production and the associated activities include the procurement of resources, the work done to increase their value, and the organization of such activities (Hardin 2010, Wilk and Netting 1984, 6-9, Wilk and Rathje 1982). These activities often include what has been described as 'domestic labor' e.g., housekeeping, food processing, etc. (Hardin 2010, Berk and Berk 1979).

The built environment is the location that all these activities are occurring within and provides physical boundaries that interrupt the flow of materials and goods, these are clear within the archaeological record and can be used to define spaces of activity between but also within households. Domestic space is also contained within the built environments that household archaeology studies. To address these three aspects, blending the work of Schiffer with that of Carr is a clear path to address the work of moving through the archaeological, abandonment, and systemic contexts to focus on the use or function of built spaces and therein assess their domesticity and the use of space within them.

IV. Household and society in the Levant

As shown above the beginnings of household archaeology were conducted in Europe and the Americas however, there has been a substantial amount of progress in the field of household archaeology carried out in the Near East on ancient households particularly in household methodology. Studies in the Neolithic and 'Ubaid periods have brought to light the reactions to social crowding, constructed boundaries, the histories of individual structures, and the concept of 'home.'

The study of early urbanism and the house is often directed to the Near East as household studies here have been used to study the social development within neighborhoods. These studies have been coupled with the study of architecture and domestic economy in addition to written documentation of the period. This has created a holistic understanding of the social unit, daily life, and house of the region. This holistic representation is revealed by various analytical techniques including micro-debris analysis, microstratigraphy, soil characterization, as well as digital recording and visualization. When these techniques are combined with recent approaches to

ethnoarchaeology and activity area research, activity residues from the members of ancient households become clearer (Yasur-Landau, Ebeling, and Mazow 2011).

The social configuration of built space is of interest within current research. Fisher (2009) explores this dynamic of household archaeology to determine the arrangement and relation of spaces to each other in houses. This is also used to understand the mediation role that the house plays in the relationship between visitors and occupants. This is done by access mapping of the house; each room is marked as a circle and the passageways between rooms are marked with lines. The rooms that are the same distance from the outside are the same size and level on the map. This process aids in the identification and understanding of the spectrum of public and private in a society, or even a class of society. This understanding of the continuum of public to private also sheds light on the power structure of society as well as the power of architecture. Continued research encompasses activity areas, focusing on the material culture and micro-archaeological record. This analysis is also applicable to the study of small settlements in addition to domestic and public buildings.

The incorporation of digital analysis into household archaeology contributed significantly to the implementation of household archaeology. Digital recording and visualization have been used to create databases that focus on the material goods of the house. With these databases, maps of artifact and ecofact distributions can be created, statistical analyses run, and activity areas identified and analyzed to determine use of space.

Other research has attempted to address regime changes and influences as well as cult practices using the house and household as a unit of analysis. In regard to the southern Levant, Herrmann (2011) attempts to garner a better understanding of the impact that the Assyrian empire had on the southern Levant during their period of power. With opposing textual records Herrmann

(2011) sees the household as an impartial or unbiased view into the daily life of the subjects of the new regime, offering a level of detail that cannot be attained elsewhere. Hitchcock (2011) addresses the concept of cult through what she terms as 'cult corners,' domestic cultic areas that can hold two to three people defined by the cultic objects found in them during excavations. She conducted a regional study of household cultic centers and features using architecture and spatial association to explore the role that cult held in the house (Hitchcock 2011). Though neither of these are purely household theoretical approaches to archaeology it seems as though this is the direction which the theory may be applied in the future in addition to the traditional theoretical applications.

IV.A. Early Bronze Age household studies

The single example of a household study during the EB of the southern Levant is accomplished through the study of a small (village-size, 1.2 ha) EB III settlement (Numeira) in the Jordan Valley. It examined the remains produced by the everyday lives of the people (Chesson 2012, Glassie 1975, 2001). In this study, the nature of household activity is studied through storage practices. Approximately 170 storage features associated with a 250-year occupation provided the dataset. The results provided insight to not only the patterning of storage and activity areas, but also larger societal issues. This analysis allowed the human aspect of daily practice and interaction to be brought back into the structured interpretation of data.

V. Conclusions: Theoretical approach for current research

Using the material record and data that are available, a spatial analytical approach encompassing activity areas will be the core theoretical approach for the analysis and interpretation of this thesis. A detailed spatial map of the available materials has been created and when combined with the specialist analysis of materials, this approach will provide insight not only to

the activity of the household and deeper questions of urbanization at the site of Tell eṣ-Ṣâfi/Gath. The method of analyzing the materials uncovered in a non-elite urban center is the subject of the following chapter.

Chapter 3. Method of analysis

This chapter discusses the history and application of digital archaeology and spatial analysis and describes the techniques and technologies used in this dissertation for both the qualitative and quantitative analyses of archaeological data from the EBIII non-elite residential neighborhood at Tell eṣ-Ṣâfi/Gath.

I. Spatial analysis: method, framework, analytical tool

As discussed in the previous chapter, spatial analysis in archaeology is as old as the discipline of archaeology itself and has long been used to investigate both inter- and intra-site relationships (e.g., Layard 1849, Bliss 1899, Bliss and Macalister 1902, Woolley 1934). Spatial analysis consists of quantitative and qualitative methods and techniques that use the location of objects to understand spatial patterns and infer behavioral significance (Goodchild 1996, 241). Techniques in this approach include both quantitative (i.e., complex statistical analyses) and qualitative methods (i.e., visual assessments of distributions and clusters) . Distribution maps can be interpreted both quantitatively and qualitatively. These methods should not be confused with the software (tools) that are used to reach the end results (Wheatley and Gillings 2002). For instance, while GIS is a tool used by spatial analysts, it is not the same as the analytical tool to complete spatial analysis. There are analysis tools in software, such as ESRI's ArcGIS Pro, however these are not fundamental in the creation of a GIS. The incorporation of such tools is a response to the complementary nature of the two methods (O'Sullivan and Unwin 2014). Spatial analyses fall into one of five general categories: spatial clustering, predictive modeling, point pattern analysis, spatial autocorrelation, and shape analysis. Additionally, multivariate statistics including cluster analysis, correspondence analysis, etc., can be applied to more complex data to further understand the strength of relationships within the data (Wheatley and Gillings 2002, 146).

The research conducted involves the spatial distribution of artifacts and analysis is most often conducted to detect locational differences among artifact classes within a site (Berry, Mielke, and Kvamme 1984, 54). The specific analyses conducted are further discussed in section III.B.3.

Prior to the introduction of computers, relationships were painstakingly worked out with hand-drawn maps (e.g., Adams 1966, Kasakoff and Adams 1977, etc.). Some even included detailed and lengthy calculations (e.g., Johnson 1970, Hanvery and Johnson 1971, Johnson 1973b, etc.). The analytical process (calculations, spatial representation, etc.) is more modernized with both digital maps and computer calculated sophisticated statistical analysis. The proposed research uses the software program ArcGIS Pro (ESRI Inc.) to map the architecture, daily basket and locus boundaries, material culture finds, and installations. Once these aspects have been integrated into the GIS database it is used to create maps and the results can then be used in spatial analysis and as visualization aids. This thesis also incorporates quantitative statistical analyses of the spatial database performed with CRAN R and using built in analytical tools in ArcGIS Pro. It also incorporates qualitative aspects including frequency analyses. Each of these aspects are discussed at more length below.

II. Digital archaeology: a history and discussion of application

The broad field of digital archaeology is the integration of many different methods and techniques in the field and encompasses photography, 3D reconstruction, and most important to the current research, Geographic Information Systems (hereto after referred to as GIS). The application of GIS in archaeology has been likened to the introduction of carbon dating to the field as it has revolutionized recording and analysis in archaeology (Wescott 2000, 1).

II.A. GIS

GIS was originally developed and implemented in the early 1960s. It was used in one of the first attempts at automated computer-based mapping, with the first significant milestone being the development of the Canadian Geographic Information System (CGIS) in 1963 (Maliene et al. 2011). The goal of the early development of the CGIS was as a digital mapping system that could be linked to a land inventory of Canada. However, further developments of this tool, and advances made in the US on GIS software expanded its applications to any quantitative spatial database.

Early GIS software programs were developed to run on large mainframe computers, as these were the only computers capable of integrating, compiling, and analyzing geographic information. However, the software was transitioned in the late 1980s to run on personal computers. This transition was possible because of the greater processing capacity provided by newer generations of chips in personal computers (Zubrow 2006). The availability of PC versions of GIS software led to the widespread application of this tool in Geography as an analytical framework. It led to development of new sub-fields in the discipline and readdressing existing fields, such as population research, geographical tracking, urban planning (O'Sullivan and Unwin 2014), and now has applications that benefit many other disciplines where there is a significant spatial component (Unwin, O'Sullivan, and Manley 2003).

II.B. GIS in Archaeology

Hasenstab (1983) is credited with the introduction of GIS into archaeology in the early 1980s. Reactions to and acceptance of GIS in the field have varied since then. In the 1980s and early 1990s, GIS saw initial enthusiasm as a useful mapping and database tool, followed by more intense scrutiny in the mid-to-late 1990s (Unwin, O'Sullivan, and Manley 2003, Wheatley and Gillings 2002) when usage declined. However, it made a rapid comeback in the 2000s and is now

considered an indispensable research method for integrating and analyzing archaeological spatial data (Verhagen 2018). In the early 2000s, GIS was largely limited to data visualization, simple mapping, and predictive site location modelling (Church, Brandon, and Burgett 2000). Since then, there has been a focus on the analytical power and repertoire of analyses available. Additionally, there has been a push for the integration of more sophistication in maps including, to an extent, 3-dimensional modelling (De Roo et al. 2014).

II.C. Applications

There are two broad applications of GIS in archaeology, the first is data management and the second is spatial analytical research. Data management pertains to the storage, maintenance and analysis of existing databases whereas research pertains to actively using those databases to understand placement of features, movement and landscape-scale approaches (Wheatley and Gillings 2002, 243).

Spatial analytical applications of GIS in archeology can be broadly classified into three primary analytical approaches. The first of these approaches is site location analysis (Verhagen 2018, 13). Site location analysis includes catchment analysis, site preference analysis, and predictive modelling from the mid-1970s. During the 1980s and 1990s it faced criticism from post-processualists because of perceived limitations in accounting for human agency and temporal dimension. More holistic versions of these methods that incorporate human agency were developed in the 1980s, and despite criticism, they continue to be used in many studies (Verhagen 2018, 14). Although these methods are not the only approaches available to determine the placement of settlements, they are the most versatile in identifying anomalies, patterns, and preferences of an area over time and allow for more robust comparative analysis (Verhagen 2018, 13-14).

The second spatial analytical approach is the application of GIS is through the modelling of movement and transport (Verhagen 2018, 13). Least-cost path analyses are a set of methods used to discover the ideal path between any number of locations with applications in archaeology. Thes analyses often use a digital elevation model (DEM) and other variables, including obstacles that are both physical and social in nature. The algorithm may determine the cost of movement over a surface to identify trade-offs between distance traveled, impedance and obstacle avoidance. Social network analysis also is another analytical tool used understand the interaction between settlements and other transportation routes (Matney et al. 2001, 17, Verhagen 2018). A third example of this category of application is using GIS to identify spheres of influence. This is conducted through a cost surface analysis and can cause issue as the analyses built into the software were developed for the modern world (i.e., modern economic theory and rationality) rather than landscape influencers (Pellini 2009, 237).

The third major spatial analytical approach using GIS in the field of archaeology is that of visibility analysis (Verhagen 2018, 13). Visibility analysis calculates lines of sight and viewsheds to determine what places and objects can, or cannot, be seen from other points in the landscape. These analyses can be conducted with different ranges of view. When visibility analyses are combined with either of the other major analytical applications of GIS in archaeology it allows for a more holistic understanding of the cultural aspect of building monuments and monumental feats of construction such as burials, and megalithic monuments (Trifković 2006). As with modelling movement and transport, the success of the analysis is dependent on the quality of the DEMs and vertical accuracy. The other dependent variable is the similarity of the modern landscape to the prehistoric one, something that is completely out of the control of the archaeologists and purely conjecture.

II.D. General limitations of GIS

While the data collected during archaeological excavations is generally 3-dimensional in nature, GIS principally uses a 2-dimensional (often planimetric/planar enforced) layer model. This limits studies in archaeology where there is often a strong 3-dimensional component in many study sites. This - is ameliorated somewhat by the recording of the height of each object (stored as x, y, and z coordinates). However, when several features have the same northing and easting (x and y coordinates) but different elevations, the point may be considered a duplicate in some analyses (De Roo et al. 2014). Newer models of GIS software have attempted to address these issues, but still have limited capabilities in representing the vertical dimension of features. This gives archaeologists no other choice but to use 3-dimensional modelling software (e.g. Computer-aided Design, CAD), which usually lack the analytical tools available in GIS (Verhagen 2018, Wheatley and Gillings 2002, 241).

III. Techniques and technologies

GIS was used to develop an inventory database and analytical framework. The GIS software program, ArcGIS Pro was used for spatial analysis in combination with the statistical program CRAN R as discussed below.

III.A. GIS as a technique

The primary and most basic geographical data collected in archaeology are spatial coordinates often gathered by a differential GPS or a total station. A differential GPS corrects locations collected from satellites by calculating offsets using a base station operating at a known location. There are two forms of differential correction: real-time in which the corrections are broadcast from the base station to the mobile receiver, and post-processing where the corrections are made by the base-station to the values collected and saved by the mobile receiver at a later

time. Differential correction provides coordinates with centimeter level accuracy. Because the receivers are portable, they are often used in large-scale archaeological surveys and mapping or when line of sight cannot be guaranteed. For small-scale surveys and sites, Total Station are often used. These stations are placed at known coordinate points and the device uses line of sight distances and triangulation to a survey pole to collect the coordinates of features (Howard 2007). Once downloaded either the system or data are integrated with non-spatial information such as site photographs, finds photos, and database records. These data are then mapped to create a visual representation and provide the ability to conduct spatial analysis on the X, Y, and Z coordinate systems.

III.B. GIS data types

There are two types of data in a GIS, raster, and vector data. Raster data are composed of rectangular grids of pixels, often associated with images (McPherron and Dibble 2002). Vector data are collected in the field and are comprised of points with the associated dimensional coordinates (McPherron and Dibble 2002). The points in vector data can be linked together to form lines which then can be linked to create polygons to delineate areas. Archaeologically these polygons can represent features, daily basket boundaries, and loci. The data for this research are vector data. They include polygons representing daily baskets and loci as well as points that represent special finds such as whole tools, beads, and figurines.

III.C. Reconstruction or digitization in GIS

The reconstruction process can be tedious and difficult for a variety of reasons not limited to incomplete records due to loss, incomplete recording, illegible writing, or simply different recorders and recording techniques from one season to the next.

First each of the excavation squares was plotted on the site grid to produce the GIS used to conduct the analyses in this thesis. Aerial photographs were georeferenced to provide a base layer image for the data and to aid with the mapping of architectural structures (walls, installations, and alleyways). Then each of the early season's hand drawn top plans had to be digitized into the GIS database that was used in Area E during the latest seasons of excavation. This digitization process included manually mapping all the daily basket boundaries, special find point data, locus boundaries, and architectural features from each of the early seasons (2004-2014), and integration of both hand drawn and digital data from the latest seasons (2015-2017). For the digital data collected in the later seasons, the individual points from the field were linked to define the boundaries of daily baskets, and these daily basket boundaries were used to define the excavation loci. Special find points were labeled with the field data (material, type, condition).[1]

Once this process was completed the centroid of the daily basket was calculated using the feature to point function in the geoprocessing pane of ArcGIS Pro. For subsequent spatial analysis of artifacts collected by basket, the centroid was used as the find location for all constituents of the basket. After the data were digitized, integration of specialist analysis of each of the material types began (i.e., worked bone and faunal remains, chipped stone remains, and ground stone remains).

The specialist databases complete with their findings were linked using an external database. This linked database was then incorporated into the GIS spatial database by a table join using a common value pairing. For example, specialist data on fauna, analyzed by daily basket and

[1] Each of the assemblages was analyzed by the appropriate specialists to acquire data about use, typology, provenance, and material. Methods related to these specialist analyses will not be covered here as the finalized database was used for the current research.

associated with the pottery basket of the day, was linked to the spatial daily pottery basket as these shared a common key value (the pottery basket ID). Thus, in the final database each basket feature in the spatial database (with its corresponding boundaries point location) contained all specialist attributes enabling spatial analysis by stratum or substratum, material type, or class of material. The tables used to join the centroids and specialist data were created from daily field journals.

III.D. Application to the research

When preparing the data for this thesis, the reconstruction of extensive amounts of vector data from daily top plan drawings, to create the basket and loci drawings, was required. The spatial data collection method of the earliest years of excavation in the EB strata recorded daily levels in each of the loci, often at the center of the locus, as well as a range of Z-coordinates that allow for the placement of the material removed that day in the stratigraphy. Later data were recorded using a total station, which provided more precise spatial boundaries, details, and elevations. The nature and quality of the reconstructions from these two field collection approaches influence the kinds of analyses possible, with later datasets permitting more in-depth spatial analysis. Once the data are incorporated into the GIS, it is possible to begin spatial and statistical of the finds. These analyses are discussed in greater detail below.

This thesis will combine the archaeometric analyses conducted by materials' specialists, such as zooarchaeologists, with digital architectural maps to create a visual representation of the assemblages within each of the separate phases of the EB strata at Tell eṣ-Ṣâfi/Gath using ArcGIS Pro.

III.E. Spatial analyses using R and Arc GIS

Spatial analyses, such as hotspot analysis, and statistical techniques like kernel density analysis can be used to determine the statistically significant areas within the assemblages, and

sub-assemblages (defined through the archaeometric analysis of the materials) and can be mapped onto the architectural framework (e.g., Richardson et al. 2021, Susnow 2021, , etc.). Multiple archaeometric techniques can provide both quantitative and qualitative data to reconstruct the houses and activities associated with the daily life of ancient societies. Common examples include various material analyses, the construction of GIS, typologies, and replicative studies (Bivand, Pebesma, and Gómez-Rubio 2008).

Integrated tools in ArcGIS Pro provide kernel density and hotspot analyses. Kernel density analysis addresses the density of, in this case, materials within rooms or buildings. Density here refers to the frequency per unit or area. Kernel density analysis is a tool for the visualization of spatial patterning. Kernel density analyses serve a dual purpose when looking at multiple datasets, (1) identification of overlapping footprints of different materials, and (2) assessing the placement of activity areas. Hotspot analysis aids in the visualization of the presence or absence of materials, their placement, extent, degree of clustering, and identification of activity areas.

To perform specialized statistical analyses for methods not available in ArcGIS Pro the program CRAN R was used (R Core Team 2023). CRAN R is a freely available statistical language designed for statistical problem solving. This software can be expanded by installing packages comprising libraries of functions authored by third-party programmers. These contributors are typically from specialized fields and actively engage in their respective areas of expertise. Many new methods are introduced into academic fields through packages distributed to the CRAN R Repository, including archaeology. The software package ‘sf’ (Pebesma and Bivand 2023) was used to import the spatial database from ArcGIS. The attribute table, which included the specialist finds, was then analyzed. For this study, correspondence analyses (CA) and canonical (constrained) correspondence analyses (CCA) were performed. CA and CCA are multivariate

methods where the data usually consist of counts or frequencies of two or more variables (Carlson 2017, 279). In the present study, those variables are artifact counts (for CA) and for CCA artifacts constrained by strata and room-type. CA is a symmetrical analysis as both the observations and variables are analyzed simultaneously. This provide the ability to project the observations visually into the space defined by the variables and create biplots summarizing both. In CCA the constraints (explanatory variables) can also be included in the analysis and a tri-plot constructed (Carlson 2017, 293).

In this study, the software package 'vegan' (Oksanen et al. 2021) was used to perform CA followed by CCA to compare the materials within rooms by type (anteroom, courtyard, alleyway) and between the strata (within and through time). CA was conducted first and used to examine generational shifts within the domestic structures as defined by architectural remodeling represented by archaeological strata present. CCA was performed subsequently to determine if time and feature type significantly contribute to the pattern of materials found at the site. The data analyzed were from buildings with different percentages of excavation complete, between 100% and 45%. Both CA and CCA were run on the data twice, the first using the absolute frequencies as measured regardless of the percentage excavated, and the second with the frequencies adjusted by the reciprocal of the proportion of the space excavated for instance, if a room was 50% excavated, each of the counts of materials would be doubled (Table 25 provides the percentage of each room excavated by stratum). Although there may be other spatial modelling approaches, the simple adjustment of the raw data was used to provide insight on the influence of the extent of excavation on the results. Some buildings had excavations that were too incomplete to recover any artifacts, and these were excluded from analysis (Building 6).

IV. Processing data for spatial analysis

To complete the spatial analyses for this research, the various finds were organized by baskets, loci within architectural units (e.g., buildings). Values were expressed as absolute frequencies to examine usage by depositional context, while typology and usage followed the decision made by material analyst. When point data were not available for the individual artifacts, the centroid of the daily basket was calculated and used to represent the location of the object. The statistical frequencies of finds and categories in addition to their placement in the house were analyzed to address the research questions discussed in Chapter 6.

In the available assemblages, there are certain categories of material that have higher frequencies and more non-zero values, particularly osseous, ground stone, and chipped stone materials. The vast faunal assemblage (including food waste, tools, ritual, and personal objects) was analyzed by Drs. Haskel and Tina Greenfield, chipped stone tool assemblages by Dr. Francesca Manclossi (i.e., the flint assemblage) and the groundstone assemblage by Dr. Jeremy Beller. The small and special finds, such as beads, spindle whorls, figurines, and weapons, were analyzed by Dr. Shira Albaz.

A further discussion of the artifact classes used for analysis is in Chapter 7, those not included in the current research are presented in Chapter 5 §VI. Research presented here primarily concentrates on classes with higher data density, notably chipped stone, bone, and ground stone tools.

V. Digital material sampling at Tell eṣ-Ṣâfi/Gath

The method of data collection for this thesis was refined throughout 15 years of excavation by the area supervisors and site director before the author joined the project. The sampling strategy for digital information evolved with the technology that was available at the time. Data from early

field seasons were retained in this study as the meticulous hand recorded site information enabled spatial reconstruction even though precise location was not directly documented in the field.

In the first ten field seasons, the site was recorded using hand drawn maps (2004-2011), many of which outline the daily basket boundaries or at minimum the locus boundaries in each square when they were opened. In addition, many, but not all, special finds were marked on the daily top plans with the associated basket number. Thus, for this time period, many daily basket boundaries are the same as the locus, thereby creating a lower level of resolution for finds. As the seasons progressed, the daily maps and notes became more meticulous. Furthermore, maps drawn by students for the field school were often more precise and inclusive than those drawn by non-student volunteers. The reasons may be twofold (1) as they were being graded, they did a better job and (2) the supervisors acknowledged that the students were being meticulous, so they focused more on other daily tasks. In the later seasons (2013-2017), daily basket boundaries were drawn into printed top plans, with the addition of digitally recorded boundaries and elevations using a total station. In 2012, the entire excavation was done using exclusively digital recording and no paper records were used. This season was subsequently lost due to corruption of the daily files and backups by a poorly designed software program created by Brown University (i.e., REVEAL). In the 2013-2014 seasons, the special finds were recorded only in digital form.

The most recent sampling strategy, implemented in 2015, involved daily boundaries for each base basket (pottery) that define the extent of excavation that day. During this field season, elevations were also recorded for each special find, as well as boundaries of floors, walls and installations or intrusions, as defined by the area supervisors. The data collected represent the architectural and material finds of the area to the best of the ability of the technology available in

the field, and the excavator's understanding. A discussion of artifact recovery is located in Chapter 5 §V.B.

VI. Conclusion

The versatility of GIS allows it to be paired with other techniques of analysis, modelling, and statistics. GIS, combined with spatial analysis, is indispensable in archaeology by offering efficiency over traditional methods (Wescott 2000, 1). It dramatically reduces analysis time and enhances theoretical interpretations by integrating multiple data layers for landscape analysis and interpretation. The integration of multiple layers of information allows research archaeologists the means to interpret landscapes and sites in new ways. It both informs and is impacted by archaeological theory in the process (Wescott 2000, 1). In addition to analytical applications, a GIS spatial databases provides efficient storage and capacity to retrieve information using spatial and attribute queries (McPherron and Dibble 2002, 189).

Spatial analyses conducted before the inception of personal computers and digital spatial databases were qualitative and quantitative in nature. However, they were not often presented with statistical tests (e.g. confidence intervals, variance explained, statistical significance, etc.). Statistical assessment of spatial characteristics in archeology has significantly expanded with the advent of personal computers and software in the discipline.

In this thesis, the analyses conducted on the artifactual datasets include both statistical analyses (using CRAN R including CA and CCA analyses), as well as other qualitative and quantitative analyses. These analyses can show trends through time and space, as well as material type clustering to address the hypotheses presented in Chapter 6. The next chapter provides the setting for the site of Tell eṣ-Ṣâfi/Gath, the period of the Early Bronze III.

Chapter 4. The Early Bronze Age of the Near East

This chapter summarizes the archaeological record from the larger Near East from the Early Bronze Age (EB) Ib-III of the southern Levant. The materials for this thesis are from the EB III period. To reach this end, the chapter will be divided into three sections.

First, there is a summary of the geographical extent and overall Early Bronze Age chronology of the southern Levant periphery. This is followed by an overview of the culture history of the southern Levant Early Bronze Age from the perspective of this thesis. The final section will discuss the cities and settlement trends during the EB II-III and is followed by a sub-regional division and discussion of selected prominent EB III sites. As no Early Bronze I materials were recovered (nor analyzed) from Area E at Tell eṣ-Ṣâfi/Gath, the discussion of this period will be brief. The review of the Early Bronze II will address aspects of urbanism that set the stage for the EB III. Moreover, this section will focus more heavily on a narrow, subregional view of the Shephelah, the location of Tell eṣ-Ṣâfi/Gath, placed only briefly in the larger regional context.

I. Geographic and chronological setting of the periphery

The chronological framework of the Ancient Near East contains multiple regional variations. Egypt, Mesopotamia, Anatolia, and the Levant (northern and southern) each have slightly different dates and chronological schemes that researchers have defined. The southern Levant, the focus of this research, was often under the influence of other regions during the Bronze Age with both Egypt and Mesopotamia alternatingly taking an interest in and likely meddling in the affairs of the inhabitants of the region. Often, the period is marked by the of one of the regional powers' projecting influences across parts or the entire region. This is generally accompanied by changes in material culture. This can be in the nature of indirect and direct influence. For example, Egyptian power is directly accompanied by the presence of Egyptians who build bastions such as

forts or in cases occupy various significant sites during the EB Ib (e.g., Nahal Tillah, Erani, Sakan, etc., Braun 2009, Czarnowicz et al. 2014, Dessel 2009, Kansa, Kansa, and Levy 2006, Kansa and Levy 2002, Miroschedji 2022, Rosen 1988, Shalev 2017). An example of indirect influence is the adoption of Egyptianizing wares (such as ceramics) that imitate true Egyptian materials when found within a local setting with no other indicators of Egyptianizing (such as trade goods) except these wares (Higginbotham 2000, Sala 2012).

The discussion of Egypt in this thesis is tangential to the overall research and included only for a wider understanding of the geopolitical situation of the region during the Early Bronze Age in the southern Levant. During the Levantine Early Bronze Age, the boundaries of the Egyptian Empire fluctuated to control as far north as the southern edge of the northern Levant and can be exhibited through the presence of Egyptian materials, trade goods, strongholds, and garrisons.

II. The southern Levant

This section begins with the overall geography of the southern Levant, followed by the wider chronological framework for the region.

II.A. Geography of the southern Levant

In this section, the geographical and chronological variation for the region will be summarized. The southern Levant is composed of three modern political entities: Israel, Palestinian territories, and Jordan (Richard 2003b, 2013, Suriano 2014).

The southern Levant is subdivided into many regions. These regions include the Rift Valley, Jordanian Escarpment, Golan Heights, Jezreel Valley, Galilee, Kineret/Hula Valleys, northern and southern Coastal Plain, Shephelah, and Negev (highlands and lowlands), among others (Miroschedji 2014, Richard 2014).

During the Early Bronze Age, large scale settlement systems associated with urban centers appear across the region. Many of these have been intensively investigated. For example, there are major urban sites in the Rift Valley (Jericho), Kineret (Bet Yeraḥ), southern Coastal Plain (Erani, Sakan), Jezreel Valley (Megiddo), and Shephelah (Tell eṣ-Ṣâfi/Gath, Azekah, Lachish). Urban centers are notably lacking on the east side of the Rift Valley and atop of the Jordanian escarpment further east, where the top of the settlement hierarchy is dominated by, at most, walled towns (Chesson 2019, 2015, Chesson and Goodale 2014, Chesson 2012).

II.B. Bronze Age chronology of the southern Levant

In general, most regional chronologies across the Near East (from Egypt to Iran) are based on synchronisms founded in historical time periods. The dating of any earlier periods was largely educated guesswork (Childe 1944, 1934). Beginning with the radiocarbon revolution of the 1950s, prehistoric periods were increasingly dated more precisely with this method (Renfrew 1973, Mellaart 1971). Although the method was adopted later by archaeologists working in the southern Levant (1970s).

Proto-historical periods such as the Early Bronze Age remained largely dated by synchronisms to historically dated deposits and monuments in Egypt and Mesopotamia (Kantor 1992, Albright 1960). This led to the creation of what is now known as the Low Chronology, where the crash of the urban systems at the beginning of the Intermediate Bronze was tied to the collapse of the Old Kingdom in Egypt (Albright 1960, Bell 1971). In recent years, a new High Chronology has been proposed for the region based on Bayesian statistical analyses (Regev et al. 2014, Regev, Miroschedji, and Boaretto 2012, Regev et al. 2012, Regev et al. 2020) that de-links the southern Levantine and Egyptian chronological sequences and moves the EB of the southern Levant 500 years earlier. While some have continued to argue against the new High Chronology

(Nigro et al. 2019), this thesis will use the new High Chronology which has been tested at Tell eṣ-Ṣâfi/Gath (Shai et al. 2014) and elsewhere (Regev et al. 2012, Regev, Miroschedji, and Boaretto 2012, Regev et al. 2014, Shalev 2017, Finkelstein et al. 2018, Cohen 2016).

It must be noted that there are discrepancies regarding the chronology of the southern Levant rooted in the differences between relative and absolute dating techniques. There is notable variability in radiocarbon dates within each period of the EB across different sites in the region, with the terminus of the EB III differing by almost 1000 years across locations (Regev et al. 2012, Bar-Yosef 1992, Ben-Tor 1992b, Gonen 1992). In general, this thesis will utilize the new High Radiocarbon dating system that has been developed over the past 20 years for the region (Regev 2013, Regev et al. 2014, Regev et al. 2021, Regev, Miroschedji, and Boaretto 2012, Regev et al. 2012, Regev et al. 2020).

The Early Bronze I (ca. 3700-3100/3050 BCE) is the earliest division within the EB (Greenberg 2014b, 2019, Regev et al. 2012, Regev et al. 2014, Shalev 2017, Finkelstein et al. 2018, Cohen 2016). Dramatic changes in settlement patterns, economy, level of urbanization, architecture, burial practices, and material culture among other things appear in this period that have been interpreted as the result of the introduction of a new cultural group (Gophna 1995, Gophna and Blockman 2004). The EB I is divided commonly into IA and IB phases (3700-3300 and 3300-3050/3000) (Regev et al. 2012, Regev et al. 2014, Shalev 2017, Finkelstein et al. 2018, Cohen 2016). Cultural developments between the EB Ia and Ib are described in the next section.

The Early Bronze II (3050/3000-2900 BCE) is marked by significant changes in the nature, distribution, and size of settlement (Regev et al. 2012, Regev et al. 2014, Shalev 2017, Finkelstein et al. 2018, Cohen 2016). These changes suggest the presence of settlement hierarchies, and by implication a level of regional political and economic organization, that signal the rise of complex

urban societies. This is accompanied by shifts in household architecture, subsistence patterns, and material culture (Greenberg 2014b, 271, 2019, Richard 1987, 2003a, 2013, 2014).

The Early Bronze III (2900-2500 BCE) is identified by the appearance of fully-fledged complex urban societies throughout the southern Levant (Regev et al. 2012, Regev et al. 2014, Shalev 2017, Finkelstein et al. 2018, Cohen 2016). The material culture from this period is relatively continuous with the EB II. This makes it difficult to observe a the shift in material culture unless the site is excavated and the material separated stratigraphically. This is further discussed in Chapter 4 §III.B.

The Early Bronze IV (2500-2000 BCE) in some chronologies is also referred to as the Intermediate Bronze, and the terms will be used interchangeably (Regev et al. 2012, Regev et al. 2014, Shalev 2017, Finkelstein et al. 2018, Cohen 2016). Some chronologies (Ben-Tor 1992b, c) also refer to this period as Middle Bronze I, but with advances in dating practices this has been shown to be incorrect (Regev et al. 2012, Regev et al. 2014, Shalev 2017, Finkelstein et al. 2018, Cohen 2016). At the end of the EB III, the complex urban system collapsed and the population scattered across the landscape into village, hamlet, farmstead and pastoral sites (Greenberg 2014b, 271, 2019, Richard 1987, 2013, 2003a, 2014). This is likely associated with a major climatic shift across the southern Levant (Langgut, Adams, and Finkelstein 2016, Langgut et al. 2015, Langgut et al. 2014, Bar-Matthews and Ayalon 2011, 2004).

III. Urbanism in the Early Bronze Age of the southern Levant

In this section, the rise of urbanism in the southern Levant beginning with the Early Bronze Age IB through its pinnacle in the Early Bronze Age III is summarized. This sets the context for understanding the household patterns investigated at Tell eṣ-Ṣâfi/Gath in the EB III. The Early Bronze Age IV is omitted in this discussion as the research materials were obtained from the site

of Tell eṣ-Ṣâfi/Gath where settlement disappeared at the end of the EB III during the collapse of the regional urban system.

The Early Bronze Age breaks from the cultural patterns from earlier periods with the evolution of complex settlement systems (Sharon 2014). Most of the Late Chalcolithic settlements of the southern Levant were abandoned at the end of the period with new settlements being founded in new locations and in larger numbers at the beginning of the Early Bronze I (Miroschedji 2014, Rowan 2014, Greenberg 2019). This is true of most regions, however in others such as the far south and the far north (e.g., Jezreel valley, Negev), there is a clear drop in settlements from the Chalcolithic to the Early Bronze I (Levy and Alon 1987, Joffe 1993). These settlement shifts signal increased social complexity across the region which culminated in the appearance of fortified urban centers as the Early Bronze Age progressed.

III.A. Early Bronze I

Early Bronze Ia settlements are represented by three levels of settlement hierarchy. These include transitory settlements, small villages, and few large villages (Miroschedji 2009, 105). Small villages of the Early Bronze I rarely exceed an area of 5 hectares, whereas a few villages such as Tell Beth Yeraḥ and Megiddo reach a size of 25 hectares and Yarmouth reaches 16 hectares (Miroschedji 2014, 309-310). These larger settlements were sparsely built and do not appear to be laid out in an organic pattern where the location of dwellings and other activities were organized by a central authority. Instead, they are characterized by a disorder in their dwelling distribution. For example, there are no rows of buildings of the same type and size and domestic areas are separated by abundant open spaces (e.g., en-Esur, Yannai 2006). The dwellings of the Early Bronze Age IA were primarily courtyard house-types that were in use since the Late Neolithic. A

new dwelling type also appears during the EB Ia, which is oval or elongated with apses at both ends. This type of dwelling is less common in the archaeological record (Braun 1989).

During the Early Bronze IB, new multi-room public buildings for storage and cultic activities began to appear, as do fortified sites. These EB IB fortified sites, such as Jericho, were only 2-3 hectares, while the largest, including Yarmouth and Tell Beth Yerah, were 18 and 25 hectares respectively. The average size of fortified settlements was between 5 and 12 hectares. It appears as though the strength of the fortifications was related to the hierarchical position of the settlement within the regional system. In the largest cities, fortifications reach up to 40m thick, though on average the walls were 2.5m to 9m wide. These fortifications surround densely built settlements that show rapid transformation in layout.

It has been argued that this beginning of Early Bronze Age urbanism in the southern Levant was rooted in both the need for defense against increasing Egyptian hegemony (e.g., Arad), as well as indicators of Egyptian controlled sites (e.g., Erani, Sakan, etc., Beit-Arieh 2002, Ben-Tor 1991, 1982, Braun 2009, Greenberg and Eisenberg 2002, Greenberg et al. 2012, Höflmayer 2014, Kafafi 2014, Richard 2014, Yekutieli 2015). This attribution of these fortifications to a threat from Egypt is supported by an intensive Egyptian presence during the Early Bronze I. However, this is not the case (to explain the presence of massive fortifications) during the EB II and III where there is no evidence of Egyptian incursions into the region. At the same time, this is when the social shifts toward urbanism are first seen in the archaeological record. At the end of this period, Egyptian influence wanes as the Egyptian focus shifts to issues rising in Egypt proper.

III.A.1 Early Bronze I-II transition

Miroschedji (2014) terms the shift in settlement structure between the EB I and EBII as ‘deep change.’ It does not represent a full-scale transition to rigid urban hierarchies, rather it

reflects a sense of purpose typically associated with shared ideologies (Greenberg 2014b, 271). Greenberg and others speculate that this change, accompanied by a broad-spectrum shift in material culture, food processing, and architectural style, was brought about by a crisis or general dissatisfaction in the social system of the Early Bronze I (2014b, 271).

The proximity of Egyptian presence in the Early Bronze I to the region would suggest that it has its roots in Egyptian hegemony, as discussed earlier, but this shift actually reflects the process of secondary state formation under the influence of Mesopotamian developments rather than the Egyptian influence and administration (Joffe 1993, 58). This ideological shift from Egyptian to Mesopotamian influence is likely due to the swift abandonment of the region by Egyptian forces at the end of the Early Bronze I, creating an ideological vacuum, easily filled by Mesopotamian influence and power. The coinciding power vacuum between the Early Bronze I and II caused by Egyptian retreat left an opportunity for local hegemons to rise to power and effect change across the region (Adams 2017). Regionally, the bulk of the Early Bronze II is spent as an urban society (Greenberg and Eisenberg 2002, Miroschedji 2014, 2018b, 2022).

This proposed ‘deep change’ is accompanied by the abandonment of many Early Bronze IA settlements with concurrent construction of new settlements. These are surrounded by vast fortifications representing the aggregation of populations and a shift to city life at the start of the Early Bronze II. This is reflected by the drop in the overall number of sites in this period. Few have consecutive EB IB and EB II sequences. Sites with continuous occupation layers have larger, concentrated populations (Greenberg 2014b, 271). In the Jordan valley, there are some continuously populated Early Bronze I-II village sites that show a clear shift in the settlement area of the site. They also add fortifications during the transitional period or during the EB II.

Additionally, new sites were located on the controlling places of arable lands, transportation routes, or both, such as in the Shephelah region. At sites with continual EB occupation in the Jordan Valley, often the center of occupation moves from the lowlands to the highest points and a wall is added to further separate the dense clusters of houses from the alluvial soils essential for farming, such as Bet Yeraḥ (Greenberg 2014b, 271), others do not (e.g., Yaqush, Rotem et al. 2019). The movement of site centers and the location of the newly established sites supports theories proposed by scholars who suggest that such fortifications and settlement shifts were the result of frequent resource skirmishes or wars (Nigro 2014, 42).

A multi-tier (five-tier) settlement hierarchy also appeared, likely signifying the appearance of state-like political structures with their elaborate social stratification (Johnson 1973a). Fortified regional centers were the highest tier, medium or small fortified settlements followed, then villages (unfortified), hamlets either permanent or semi-permanent, and camps were the lowest tier (Miroschedji 2014, 314).

Some sites, such as Megiddo and Tell Beth Yeraḥ, show increasingly dense dwelling areas causing the sites to take on a more urban appearance during the transition from the Early Bronze IB to the Early Bronze II. Additionally, during the Early Bronze IB-II transition, monumental temples began to appear. For example, at Megiddo a 50x30m building with walls up to 3.6m wide was erected that suggests to some scholars the appearance of regional cultic centers (Miroschedji 2014, 311, Ussishkin 2018), although such structures also are present in earlier EB strata at Megiddo (Adams, Finkelstein, and Ussishkin 2014).

III.B. Early Bronze II/III

The EBII/III is difficult to differentiate between in terms of material culture when there is a lack of stratigraphy (Golani 2003, 246, Ben-Tor 1992a, 51-52, Mazar 2012, 2-24, Finkelstein et

al. 2018, 69-70, Ben-Tor and Bonfil 2003, 10, Greenberg 2019, Cohen 2016, 74-81). This causes a lumping of the periods, consisting of several centuries, particularly when discussing surface survey material and when using these data to reconstruct a "settlement picture" the resulting analysis lacks precision (Zuckerman 2003, 7). Results from these analyses suggest that all sites were contemporary in real time and were inhabited for the full period. Without precise radiometric dating of these occupational strata from these sites, this creates an unclear conceptualization of site hierarchy in the EB II/III (e.g., Levy-Reifer 2016, Lawrence and Wilkinson 2015, 331, Philip 2008, Sherratt 2005 etc.).

The same issue is seen across the rift valley in modern day Jordan. Kafafi (2014) cites the reliance on old datasets, reliance on surface survey, and uneven regional recovery rates of materials as major factors in the absence of a well-defined site hierarchy for the Transjordan (see also Savage et al. 2007).

III.B.1 Urban centers

The Early Bronze II urban centers are different than the villages of the period in both construction and organization. The settlement density of the southern Levant during this period varies throughout the region and these numbers are potentially linked to the issues discussed above. There are higher densities in the north and the Shephelah whereas there are lower densities in the northern Negev where only villages are represented aside from a single fortified site (Miroschedji 2014, 314). These urban centers house public buildings including temples, appearing in the Early Bronze II, and palaces, appearing in the Early Bronze III. They are also fortified with thick walls. Temples are the main form of monumental public architecture in the Early Bronze II, there have other forms have been unearthed. Aside from one monumental granary at Yarmouth, their use is uncertain (Miroschedji 2014, 316-17). Toward the end of the Early Bronze II, the architectural

changes also began to include monumental architecture (such as that seen at Megiddo including palaces (Philip 2001, Chesson 2019, Miroschedji 2014).

During this period, the archaeological record implies a sense of city planning and time-space routines for public ceremony and economy that represent a highly developed concept of social stratification and disparity between classes. This is particularly true of the large urban centers dotting the landscape across the region. The scale of urbanism, size of settlement, and extent of fortifications appears to be most extensive in the Shephelah, Jezreel Valley, and Sea of Galilee regions. As one moves from west to east across the region, sites in the Jordan valley and along the Jordanian escarpment tend to be smaller and less fortified. It appears that there was not the same level of urbanism to the east as was attained further west. The EB III is not only a time of extensive trade contacts across the region (Greenfield et al. 2020), also a time of migration of peoples (Greenberg, Shimelmitz, and Iserlis 2014).

III.B.2 Domestic architecture

The Early Bronze II is defined by a shift in architectural styles in domestic neighborhoods from primarily round structures to those which are seldomly ellipsoid, but more often rectangular. Both Early Bronze II and III urban center domestic dwellings were comprised of one or two rooms, a courtyard, and one or two storerooms (Miroschedji 2014, 316-17). These structures were closely built, their grouping formed apartment like structures, possibly hosting extended families, bordered by streets (Greenberg 2002, 2011a, Miroschedji 2014).

III.B.3 End of the EB III-EB IV transition

The end of the Early Bronze III period of the southern Levant represents the destruction of urban developments in the region until this point. What is seen by some as a continuous inhabitation sequence can also be viewed as punctuated periods of growth and decline (Greenberg

2014b, 273). By the close of the Early Bronze III, there is little to represent the people of the region other than a few heavily fortified centers. Fewer than twelve sites have a continuous stratigraphic sequence into the EB IV, providing insights into the decline of urbanism. Most are located near continuous freshwater sources in the Jordan Valley, like Jericho, or at the Jordanian escarpment's edge. (e.g., Greenberg 2014b, 273, Vieweger and Häser 2017, Richard 2020a, b, etc.).

The sites that continue to be occupied in the EB IV show a disintegration and disorganization of urban social and economic lifestyles, with a shift toward small villages and/or pastoral lifestyles.

III.C. Summary

The southern Levantine Early Bronze Age I (which is largely contemporaneous with the later Chalcolithic of Mesopotamia) can be seen as the setting of a trajectory for a tenuous movement toward urbanism in the region (Greenberg 2014b, 272). The beginning of the Early Bronze II represents another point along this trajectory, a point between urbanism and heterarchy, when a shared sense of purpose integrates communities of the southern Levant with a shift from village life to city settlement (Greenberg 2014b, 273). The EB II is marked by the appearance of fortified cities and some monumental architecture marking an acceleration of urbanization in the region. A peak in urbanism defines the Early Bronze III in the western portion of the southern Levant accompanied by high levels of fortification and social stratification leading to a widespread collapse from which the region does not recover from for almost five centuries.

IV. Early Bronze II-III continuous settlement and cities

While the Shephelah, the subject of the next section, is the setting for the current research, there are multiple EBII-III continuous occupation sites that are in the surrounding regions that should be highlighted as potential parallels for the site of Tell eṣ-Ṣâfi/Gath. Table 2 provides a

short summary of the site attributes for each during these periods and is followed by a more in-depth description and analysis of selected sites. The sites of Tell Beth Yeraḥ and Yarmouth, discussed below and in the following section respectively, are widely excavated sites from the same period as the research site, Tell eṣ-Ṣâfi/Gath. Both sites have similar interpretations as capitals for their surroundings and most importantly, have non-elite domestic structures similar in size as Tell eṣ-Ṣâfi/Gath. Both sites are also considered type-sites for the Early Bronze III in the southern Levant and provide essential comparison with the results from Tell eṣ-Ṣâfi/Gath.

IV.A. Tell Beth Yeraḥ

Bet Yeraḥ (also known as Khirbet Kerak), although not located in the Shephelah, is an important type site for the Early Bronze Age. At Bet Yeraḥ during the Late Period C and Period D (EB III), there is public architecture across several building phases similar to Tel Yarmouth. These public structures include (1) the circles building, the earliest of the non-domestic construction phases, (2) Wall B, (3) Building BS 040/050, (4) Southeastern Enclosure, and (5) Wall C. The last four structures are included as part of the Period D public architecture building projects. Each of these structures shows prior planning and organization of labor forces, as well as military planning particularly when speaking about Walls B and C.

In addition to the EB public architecture, there is domestic architecture from Periods C and D in the southeast areas of excavation, in particular Building EY and Area BS and SA. Furthermore, in the terminal EB stratum, Period E, there are four square or rectangular houses that are subdivided into a number of small rooms that are entered through a courtyard. The remaining two houses are of the simple two room plan seen elsewhere at the site in the EB III strata.

V. The Shephelah

The site of Tell eṣ-Ṣâfi/Gath, the subject of this research, is located in the Shephelah region of central Israel. The following sections will discuss this subregion as a whole. The next chapter will provide a thorough discussion of the site of Tell eṣ-Ṣâfi/Gath.

The Shephelah was a central and densely populated area in the southern Levant during the Early Bronze Age. Research here has provided a substantial amount of data for understanding the Early Bronze Age in the southern Levant.

V.A. Regional description and setting in the Early Bronze

The Shephelah is defined as the area of foothills between the Philistine coastal plain and the Judean highlands (Morton 1962, 324). The region is located in the lower part of the western low, rolling hills of the region which indicate the ascent into the hill country and cover over 790km^2. Five river valleys (Ayalon, Sorek, Elah, Zephathah, and Qubeiba) cross the area and form natural routes of west-east movement that provide access to the mountains and other regions to the east from the southern coastal plain in the west.

The Shephelah is approximately 50km long and 16km wide, an overall area of 800km^2. which is divided into two north-south strips: the Upper Shephelah in the east and Lower Shephelah in the west (Levy-Reifer 2012, 557). Geologically the Lower Shephelah is characterized by hills covered by hard Nari (a calcrete crust) and low valleys. The entire region possesses rich and fertile soil in addition to a climate conducive to a solid agricultural basis of grain, olives, and grapes, as well as grasses for herds (Morton 1962, 324-325, Frumin et al. 2021, Frumin, Maeir, and Weiss 2023, Olsvig-Whittaker et al. 2015). The climate can be characterized as Mediterranean semi-arid to sub-humid, characterized by hot dry summers and cool rainy winters. This climate is conducive to a variety of vegetation including isolated trees, dwarf shrubs, shrubs, and a variety of herbaceous

plants. This contributed to the Early Bronze I economy of orchard-based agriculture in the region, when olives and grapes became a major economic staple for the population of the region (Levy-Reifer 2012, 554). With this agricultural basis, the region provided wine, raisins, grain, and flax to the Arad valley and Egypt (Ilan and Sebbane 1989, 158). The adoption of terracing expanded the area of orchards and allowed wide swaths of the Shephelah to be cultivated providing a food surplus. This encouraged the growth of urban centers, such as Yarmouth and Horvat Shovav among others (Levy-Reifer 2012). Around these agricultural sites a rural population developed and gradually transformed into an urban population (Joffe 1993, Stager 1992, Frumin, Maeir, and Weiss 2023, Frumin et al. 2021). In addition to the orchard economy, animal husbandry and field crops were central to the economy of the period in the Shephelah. Some researchers postulate that these elements combined with the demand of goods from Egypt and other regions in the Levant were the incentive for the formation of cities during the Early Bronze Age (Levy-Reifer 2012, 558).

V.B. Early Bronze inhabitation in the Shephelah

There are many multiperiod sites located in Shephelah because of the numerous benefits that the region possesses as discussed above. These sites in the Shephelah are larger than their counterparts to the south and are abundant during the Early Bronze Age. Survey data from the Early Bronze Age Shephelah suggests that there were at least 63 sites (43 settlement) during the EB I, 167 (88 settlement) sites in the EB II, and 108 (52 settlement) sites in the EB III (Levy-Reifer 2012, 559).

Both villages and cities are represented in the archaeological record. Though there are various definitions of a ‘city’ as opposed to a ‘village’ based on cultural, geographic, and period constraints or a combination thereof, the general definition of a city or urban site follows that of

Levy-Reifer (2012). Most urban settlements have a system of fortifications with a wall built along them, public and/or monumental buildings, less sprawling buildings, and the location and nature of a building's construction signals that it is planned by some central authority. In contrast, a 'village' generally has a lower population and building density with a lower quality of building and there is often a lack of fortifications, though not always. In cases where there are fortifications, they are generally thinner and less complex or advanced than those of the larger centers. Levy-Reifer (2012) defines the division of settlement into three broad sections, (1) a governing center, (2) a city, and (3) small towns. Small towns can be further subdivided into three settlement types (1) villages, midsized rural settlements, (2) hamlets, small rural settlements, and (3) farmhouses (Levy-Reifer 2012, 560). Undoubtedly in addition to these divisions, there are also seasonal campsites of shepherds and hunters as well as seasonal agricultural sites. In the Early EB I, approximately the first 500 years, settlement is generally rural in nature and comprised of villages with or without walls.

As the EB I progresses, so does the settlement pattern undergo changes. This reflects the progression of society toward a more complex nature highlighted in the appearance of the first city states in the EB II (Esse 1991, Portugali and Gophna 1993).

These data and the typological division of the settlement types as presented in Levy-Reifer (2012, 560, see Table 1) shows that during the EB I- EB II transition there was a 100 percent increase in the number of settlements. This is reflected in every aspect of settlement pattern influencer (economic hierarchy, social settlement membership, political and cultural change, establishment of political and urban systems). In contrast, there is a 37.5% decline in the number of settlements during the EB II-III transition, driven by an abandonment of small villages in favor of larger urban centers. This is a different trend than is seen in other regions of the southern Levant.

This is a process seen elsewhere in the Near East (e.g., S Mesopotamia) with the advent of warfare between city-states (Adams 1981, Wright 1981).

Table 1: The distribution of site typology by period in the Shephelah.

	Governing centers	*Cities*	*Towns*	*Large villages**	*Villages*	*Farmhouses**	*Hamlets*	*Total % change*
EB I (44)	--	--	--	*10*	*12*	*22*	--	
EB II (88)	*3*	*4*	*10*	--	*24*	--	*47*	*+100%*
EB III (50)	*5*	*2*	*10*	--	*10*	--	*25*	*-37.5%*

**These designations were only used for EB I sites, after* (Levy-Reifer 2012, 560).

V.C. Early Bronze Age cities of the Shephelah

Among the sites designated as cities in the previous section are Yarmouth, Azekah, Gezer and Tell eṣ-Ṣâfi/Gath, the focus of this research which will be discussed in section V.C. Below the other main cities in the region from the EB will be briefly discussed to provide comparison to the site of Tell eṣ-Ṣâfi/Gath.

V.C.1 <u>Yarmouth</u>

One of the largest sites of the Early Bronze Age in the Shephelah is Yarmouth. The site was first settled in the Early Bronze I and (unlike Tell eṣ-Ṣâfi/Gath as discussed later) has an abundance of public architecture. Yarmouth was continuously occupied until the end of the EB III when the settlement was abandoned (Miroschedji 2018a, 1999, 2003). The site is 10-15 hectares in size, dependent upon sub period, and is composed of an acropolis and lower city, both with fortifications (Miroschedji 1999, Jasmin and Miroschedji 2020). Yarmouth developed rapidly in size and complexity at the EB I/ EB II transition, following the trend seen above. Fortifications are built at an early stage in the EB II comprised of a series of large bastions with inner chambers

(Miroschedji 2003). The EB II occupation at Yarmouth is defined by both domestic and public architecture including casemate architecture and massive platforms to represent the public buildings from this period. Both the acropolis and lower city of the site host the public buildings of the EB II and III with domestic architecture evident in the lower city (Miroschedji 2003).

EB II public architecture is located in the western corner of the lower city and includes the "White Building," named as such due to its thick plaster floors. The building's casemate construction and thick plastering are similar to other cultic buildings from the Early Bronze of southern Canaan. This led researchers to interpret the structure as a temple (Miroschedji 1999, 9). After its destruction during the EB II, the ruins were surrounded by dwellings and other buildings, Building C is one of those. It is likely that this 700m^2 building was public or even palatial due to its sheer size though there is little archaeological evidence to build on.

Palatial architecture appears in the EB IIIC with the Monumental Palace B, located in the lower city, in the southwest portion of the site exhibiting elaborate planning and building techniques. This palace compound covers approximately 1.5 hectares (Miroschedji 2003). To the south-west, it is bordered by City Wall B and Gate E. To the north, it was bordered by terraced dwellings at a lower level (1m and 2m respectively) than the palace floors. The palace is further separated by a street running parallel to the north-eastern wall (Miroschedji 2003, 156). There were additional monumental structures located to the south-east of the palace on successive terraces though they are not extensively investigated or discussed. While the monumental architecture is key in the discussion of the site and period and provides juxtaposition to Tell eṣ-Ṣâfi/Gath, the domestic architecture cannot be overlooked. Area J contains the domestic architecture of the site.

VI. Conclusion

The Early Bronze Age in the southern Levant was a period of urbanization and centralization of populations and power. There are trends across the region from the EB Ib-III periods including fortification of sites, construction of monumental structures, and consolidation of domestic structures following an urban plan. Virtually all these sites were abandoned by the end of the EB III.

The site of Tell eṣ-Ṣâfi/Gath is a large, fortified site that began in the EB II. The domestic architecture from this site, as discussed in the next chapter, follows patterns seen at the type-sites of Tell Beth Yeraḥ and Yarmouth. This provides the opportunity for research conducted to shed light on others in the region and period.

Table 2: Selected Early Bronze Age sites in the southern Levant.

	Size (ha)	Period		Fortified?	Public structures			Domestic architecture	
		EBII	EBIII	Yes/ No	Temple	Palace	Granary/ Silos	Yes/ No	Type
*Tell Beth Yeraḥ (Greenberg et al. 2006)	25	X	X	Yes			Yes	Yes	Separate courtyard houses often with one to two adjacent rooms
*Yarmouth (Miroschedji 2003, 1999, 2020, 2006)	16	X	X	Yes		Yes		Yes	Multiple types of domiciles including courtyard houses
Khirbet ez-Zeraqon (Tumolo and Höflmayer 2020)	8	X	X	Yes	Yes	Yes	Yes	Yes?	Multiple domestic installations but location and surrounding deposits suggest public function
Megiddo (Finkelstein, Ussishkin, and Cline 2013, Finkelstein, Ussishkin, and Halpern 2000, 2006)	25	X		Yes	Yes	Yes	Yes	Yes	Partial houses exposed
Bab edh-Dhra	4	X	X		No	No		Yes	
Tell Abu-Kharaz (Fischer 2011, 2014, 2008)	4	X	X early	Yes	Yes	Yes		Yes	Square/rectangular multiroomed structures
ʻAi	27	X	X	Yes	Yes	Yes		Yes	Various shapes, built adjacent to fortification wall
Tell Halif (Jacobs and Seger 2017)	~1.2	X	X	Yes	No	No		Yes	Partial domestic structures recovered, rectangular (?) in nature with cobbled floors
Tel Qashish (Ben-Tor and Bonfil 2003, Zuckerman 2003)	~1	X	X	Yes	No	No	No	Yes	Rectangular, associated with the fortification wall
Tall Zirāʻa (Soennecken 2022)	4.5	X	X	Yes	Yes	Yes		Yes	Broadroom houses, domestic activities cannot be inferred with the find contexts

** Sites chosen, of those discussed here, as type-sites for the EB II/III, similarities to Tell eṣ-Ṣâfi/Gath in size, fortification type, and domestic architecture. Tell Beth Yeraḥ, Yarmouth, and Tell eṣ-Ṣâfi/Gath were all large cities, and major archaeological sites, in the Early Bronze Age III.*

Chapter 5. Tell eṣ-Ṣâfi/Gath

Tell eṣ-Ṣâfi/Gath, located in south central Israel is a multiperiod site that was investigated continuously by a team from Bar-Ilan University (with collaborations from institutions around the world) for over 20 years (Maeir 2012d, Maeir and Uziel 2020, Shai, Greenfield, and Maeir 2023). This chapter will begin with a description of the site's location and environment. A history of the research pertaining to the site will follow. A description of the initial Bar-Ilan University survey will then be discussed providing the framework for the joint Bar-Ilan University-University of Manitoba excavations to be examined. Finally, the findings within Area E, the neighborhood this dissertation focuses on, will be provided.

I. Location and surrounding environment

The site of Tell eṣ-Ṣâfi/Gath is located on the border of the Shephelah region and southern coastal plain of the modern State of Israel (Figure 1). It sits atop an isolated hill at the western edge of the Shephelah (rolling hill country between the Mountains of Judea and the Coastal Plain) that overlooks the Coastal Plain.

The site reaches a maximum height of 231m above sea level. The upper tell sits atop a lozenge-shaped natural hill with steep, white chalk cliffs on the northern and western sides (Ackermann and Bruins 2012, 123). The lower tell is found in the river valley to the north of the hilltop site (Creekmore and Maeir 2021).

This location would have provided ancient settlers with security, water, and room to grow crops, grazing areas for livestock, and other resources. The active channel of Nahal Ha'Elah (Elah River) now only supplies water during winter floods, but probably flowed year-round during the EB as the alluvium was 3m lower then (Ackermann, Bruins, and Maeir 2005). The valley bottoms would have provided fertile agricultural areas attested to by the cross-channel agricultural terraces,

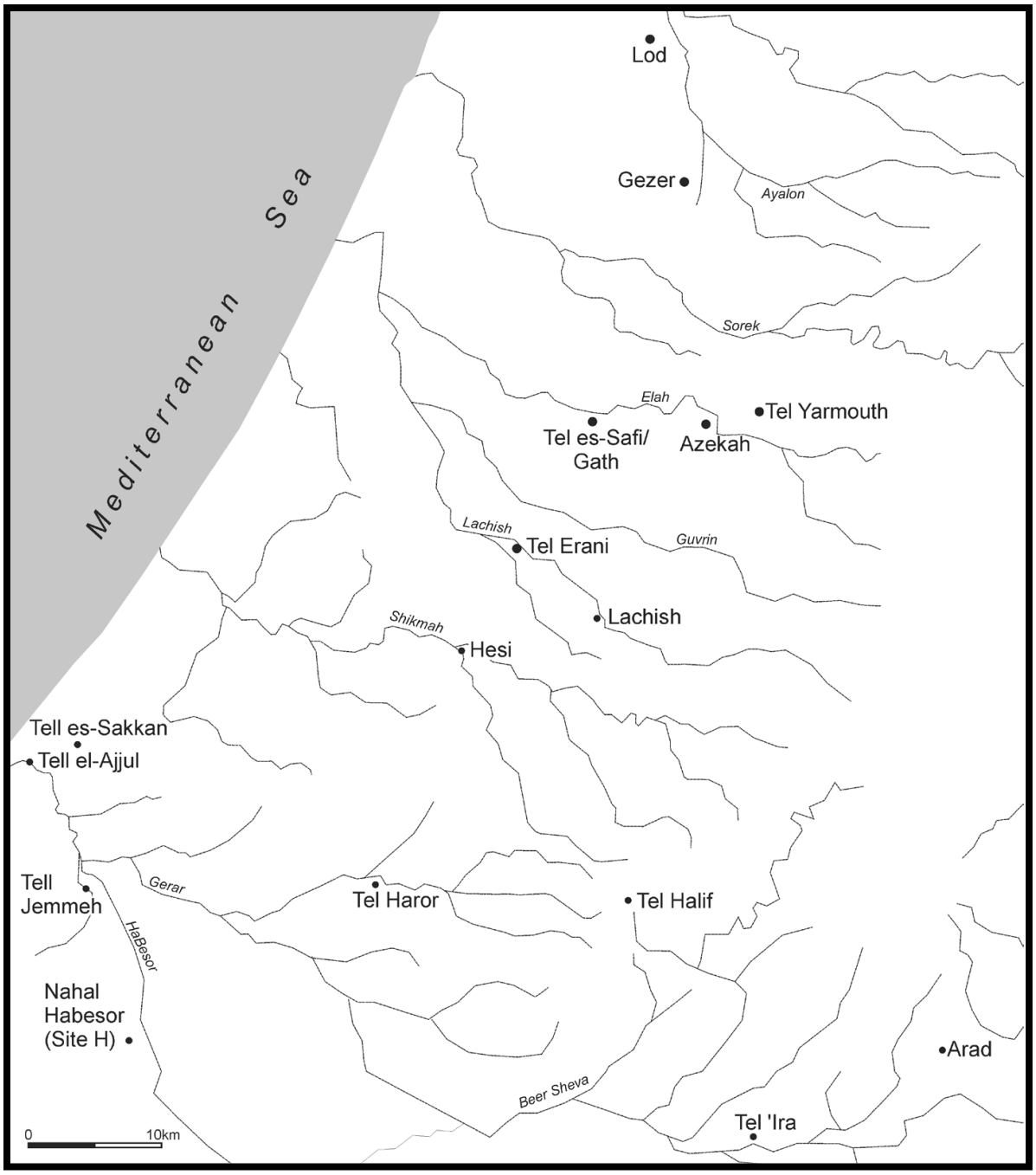


Figure 1: Location of Tell eṣ-Ṣâfi/Gath.

while the surrounding gently sloped hills would have provided adequate pasture area for grazing herds (Frumin et al. 2021, Frumin, Melamed, and Weiss 2018, Ackermann and Bruins 2012, Ackermann, Bruins, and Maeir 2005, Ackermann et al. 2017, Greenfield, Ross, Albaz, et al. 2022).

Individually, each of these attributes makes for an ideal settlement location in this region and allowed the site of Tell eṣ-Ṣâfi/Gath to grow and flourish during each of the settlement phases.

II. History of research at the site

II.A. Early research

There was continued interest and small-scale excavation at the site throughout the 19th and early 20th centuries. The earliest large-scale systematic excavations at Tell eṣ-Ṣâfi/Gath first occurred in 1899 under Bliss and Macalister, though explorations of the site occurred as early as 1838 by Robinson and Smith who mentioned that it was an ancient site of significance and briefly discussed the Crusader period remains (Maeir 2012a). In 1857, R. Porter walked the site and was the first to suggest that it should be identified as Gath of the Philistines. This attribution has held up through the years as the site is still recognized as the biblical Iron Age city of Gath, home of Goliath (Maeir 2012a). Hence, it is known through the literature now as Tell eṣ-Ṣâfi/Gath. However, the time periods under investigation for this thesis are not within this timeframe.

Other visits in the 1850s focused on the recording of the Crusader period remains (Maeir 2012a). In the period between Porter's identification and the 1899 excavations of Bliss and Macalister, there were numerous visits to the site that either agreed or disagreed with the equation of the site with biblical Gath. However, these early visitors did not convincingly argue this attribution either way (Maeir 2012a). In the second half of the 20th century, a convincing argument was put forward primarily by Rainey (1975, Rainey and Notley 2006), and by Schneidewind (1998). This identification is based upon textual sources, including biblical and Assyrian sources, the Madaba map, and references made by Josephus, Eusebius, and Jerome (Rainey and Notley 2006, 154-156).

Bliss and Macalister published their 1898 findings in 1902 in addition to their findings at neighboring sites in the Shephelah. Their expedition was funded by the Palestine Exploration Fund and included excavations at three large sites and five smaller sites in addition to Tell eṣ-Ṣâfi/Gath (Avissar and Maeir 2012). Based on reanalysis of their excavation's materials, the finds of Bliss and Macalister date the occupation at the site from the Early Bronze I to the Ottoman period with gaps from the end of the EB III to the MBII (i.e., Intermediate Bronze) and from the Persian to Islamic periods. The only remarkable difference in the findings of current excavations from Bliss and Macalister's is that the earlier excavations did not note the 9th century destruction layer seen throughout the site (Avissar and Maeir 2012). Further, Bliss and Macalister identified the large stone fortifications that surrounded the upper tell as Judean (in other words, Iron Age). Today, we understand that this fortification system began in the EB III (and maybe EB II) at the site (Chadwick et al. 2017, Chadwick et al. 2020, Shai, Chadwick, et al. 2016).

After the excavations of Bliss and Macalister, there was a hiatus in the exploration of the site until the institution of the British mandate in 1920 when occasional visits from the Palestine Department of Antiquities are reported. The site was archaeologically surveyed and listed among recognized archaeological sites after the founding of the State of Israel in 1948. The 1950s saw the beginning of archaeological surveys by the late Moshe Israel who, though not an archaeologist, amassed an in-depth knowledge of the site (Maeir 2012a, 95). Aharoni and Amiran conducted another brief survey of the site in 1955 during which they noted the large size and amounts of Bronze and Iron Age pottery on the surface (Maeir 2012a).

Unlawful excavations were conducted at the site in the 1950s and 1960s. These were confined to the north of the main tell in the "lower city," the pits having been identified by pedestrian survey and discussions with locals (Maeir 2012a, 95-96). In 1965, a small salvage

excavation northwest of the tell in the "lower city" took place under the direction of Rahmani during which some Iron Age vessels were found (Maeir 2012a).

A cursory architectural survey of the Crusader remains was undertaken by R. Ellenblum in the late 1980s. Additionally, more intensive surveys conducted by Y. Dagan in 1991 and A. Shavit in 1994/1998 took place. While all these surveys noted the impressive remains from the site highlighting the Bronze and Iron Ages, they did not note the widespread finds in and around the site (e.g., in the "lower city") nor did they note the siege system surrounding the site (Maeir 2012a).

II.B. Modern history of research at the site

In 1996, an intensive, full-scale survey of the tell and surrounding area was conducted, and an initial mapping project at the site occurred prior to subsequent excavations by the Bar-Ilan University expedition (Uziel and Maeir 2012b). This expedition began as a joint endeavor and is now headed by Dr. Aren Maeir. Continuous, full-scale excavation of the site occurred in multiple areas since 1997 and continued until 2021 based upon the results of the 1996 surface survey, discussed in length below.

III. Surface survey

Through surface survey data, it was determined that the site of Tell eṣ-Ṣâfi/Gath was settled intermittently from the Chalcolithic period (5th millennium BCE) through modern times (Maeir 2012c). The surface survey, led by Joe Uziel (then of Bar-Ilan University), collected a small amount of chipped stone tools that represent the Paleolithic, Neolithic, and Chalcolithic periods. It is unclear whether all these periods are represented by on-site activity and/or settlement throughout those periods. In general, the site is approximately 50ha in size when all periods are considered as it includes both an upper and lower city (or tells). When the surface and excavation

data are broken down by periods, there is a clear difference in scale between each, as will be discussed next.

The first clear settlement is from the Chalcolithic based on the ceramics recovered during the surface survey and given the widespread distribution of pottery sherds across a large section of the site. However, the nature of the settlement is impossible to define given that no excavated Chalcolithic architectural or feature remains were uncovered despite the large-scale excavations across the site.

Substantial amounts of Early Bronze (EB) pottery were collected in the survey. It is largely restricted to the upper tell. It became apparent through the distribution of these pottery sherds that the site was one of the largest in the region during the EB at approximately 24 hectares (Uziel and Maeir 2012b, 175-177, 2005). The EB I spatial distribution is smaller than the subsequent EB periods (c. 7.5 ha in the EB I and c. 24 ha in the EB II/III). This is followed by a peak in settlement during the EB II/III as indicated by a substantial amount of pottery from this period (Uziel and Maeir 2005, 56). Of the ceramic materials collected from this survey, 4.8% of the sherds were from the EB II/III which were scattered over 29.5 hectares, and 6% of the material corpus collected was from the EB I-III (Uziel and Maeir 2005, 68). When considering ancient periods of occupation, the EB scale of occupation is only second to the Iron Age in the percentage of sherds collected which comprised 25.2% of the sherds collected. The EB II/III scatter size was comparable to the Iron Age I and Iron Age IIB, 28.5 and 29.5 hectares, respectively (Uziel and Maeir 2005, 68).

Evidence of settlement at the site after the end of the EB III until the Middle Bronze (MB) II is nonexistent, except for a cave off-site. This is not an entirely unexpected hiatus in occupation in this region, similar occupation breaks are seen at contemporary southern Levantine sites.

The resettlement during the MB II is limited to the western half of the site nearer the acropolis. The site appears to have been abandoned once again from the end of the MB II until the Late Bronze (LB) III (13th century BCE) when the site is resettled, probably by the Philistines (as well as by locals) (Maeir et al. 2019).

During the Iron Age, the site grew to over 50 ha and included a large lower city. During this period both the upper and lower city are surrounded by a large fortification system. This re-occupation continues through the end of the mid to late 9th century BCE when the site is surrounded by a large-scale siege system and ultimately destroyed. It is likely that King Hazael of Damascus destroyed the site (Maeir 2012b).

After this destruction, the site was occupied as part of the Kingdom of Judah. Settlement at the site again shrinks to a small portion of the upper tell (around the acropolis at the western edge). This small settlement is likely destroyed by the Assyrians in 701 BCE (Maeir 2020). The site is intermittently occupied until the foundation of the modern State of Israel – 1948 CE (Maeir 2012c, 11), after which it becomes part of the National Park system and further occupation is forbidden at the site.

IV. Site-wide settlement in the Early Bronze Age III

The widespread nature of the Early Bronze Age settlement is substantiated by excavated deposits across the tell in addition to survey collected surface ceramics. Both of these sources of data demonstrate that the entire upper tell was occupied during the EB II/III (Greenfield, Shai, and Maeir 2017). It is important to put the EB materials from Area E into context within the larger site. Therefore, the finds from each area will be discussed here, first the fortifications followed by any other architectural finds from each area.

IV.A. Fortifications

The EB III settlement was fortified with stone-based walls (several meters high), as seen in Areas F, P, and J (Maeir 2020, Chadwick et al. 2017, Chadwick, Welch, and Maeir 2023). The wall lines connect throughout the different areas and are part of the so-called Iron Age "Judean" fortifications that were recorded around the perimeter of the tell by Bliss and Macalister's 1899 excavations. Similar fortifications are recorded at almost every major and minor tell site of the period in the region (for site examples see Miroschedji 2012, Greenberg 2003) which signals to the unstable political situation of the time.

The Early Bronze III remains from Area F are represented by strata F16 and F17. The F17 stratum represents the city walls which were about 2.5m wide, with both outsets and inset structures, respectively (Chadwick and Maeir 2020, Table 5.1). The fortifications in Areas F and P appear to have supported a brick superstructure. The stone foundation was composed of large fieldstones that varied between 1.5 and 2.0 meters in height and included 54cm, or 1 cubit, outsets. These were the same height and construction style as the rest of the wall and supported a brick superstructure. Both the wall and outsets were footed in dark brown soil that contained EBIII sherds as the final layer of ceramics placed directly on earlier EB domestic surfaces (Chadwick et al. 2020, 346). This excavated section of wall clearly is connected to the visible outset, labeled as outset "b" by Bliss and Macalister (1902, fig. 6.8), and follows the same construction patterns as wall segments and outsets excavated in Areas P and J (Chadwick et al. 2020, 346).

In Area P, the stone foundation was exposed to its full height and shown to be over 3m in height. Without the mudbrick superstructure, the stone foundations would not have been tall enough to have provided adequate, if any, protection to those living within the city walls (Chadwick et al. 2020, 346, Chadwick et al. 2017, Shai, Chadwick, et al. 2016, Welch et al. 2019).

An additional line of fortifications was found at the east end of the site that would have surrounded Area E (Welch et al. 2019).

The fortifications that surround the entire upper tell, when combined with the pottery finds in each area, corroborate well with the original findings on both the site size and inhabitation patterns from the surface survey (c. 24 ha – Uziel and Maeir 2012b). This suggests that Tell eṣ-Ṣâfi/Gath was a "major regional polity" during the Early Bronze Age, possibly in competition with Yarmouth (Greenfield, Shai, and Maeir 2016, Greenfield, Ross, Albaz, et al. 2022, Maeir 2020).

IV.B. Public or administrative buildings

No public EB buildings have been uncovered in the excavated areas of the site to date as they are likely buried deeply under subsequent strata on the site's western ridge, likely under what is called the acropolis of the site (Greenfield, Shai, and Maeir 2016, 479, 2020, Greenfield, Ross, Albaz, et al. 2022).

IV.C. Domestic buildings (Area E)

Early Bronze materials aside from fortifications were uncovered in Areas A, E, F, J, and P in deep probes that extended several meters below the surface. Except for Area E, these finds lack the broader context of remains (Maeir 2020). Area E had the widest exposure of domestic contexts as it was on the slope with extensive erosion of the overlying LB and IA deposits. As a result, there was direct access to EB deposits after the later material was cleared, thereby providing a small window into the EB period at Tell eṣ-Ṣâfi/Gath.

Early Bronze III domestic remains were recovered from two areas of excavation: A and E. In Area A, EB remains were uncovered immediately below the remains of an Iron I temple and neighboring buildings in a few small probes. However, deeper excavation was halted in this as this was not its *raison d'etre* for excavation in this area. Instead, a new excavation area was opened to

the east on the steep slope of the site to better understand the stratigraphic sequence. This led to the discovery of Iron Age I-II remains on the northern side of the area, a large LB building (mansion), and the presence of extensive EB remains (Shai et al. 2014, 28).

The extent of the EB neighborhood at the east end of the site is not possible to reconstruct given the limited scale of excavation. However, the architectural remains exposed in Area A are aligned to the same orientation as those found in Area E, which given their proximity suggests that the neighborhood uncovered in Area E likely continues to the west end of Area A.

In Area P, the excavations within the EB fortification wall did not extend deep enough to reach the EB occupation level. It ceased in the thick LB stratum. However, in a deep probe outside of the EB fortification wall, the wall appears to sit atop what is probably an EB II house foundation. The orientation of the house foundations is currently unclear as only part of the structure has been uncovered.

In Area F, some evidence of EB buildings was found, as discussed above, including at least two stages of EB III fortifications with interior walls in addition to adjacent buildings. These buildings were set into dark brown soil as the wall and outsets discussed above were, with EB III ceramics capping the domestic surfaces (Chadwick et al. 2020, 346).

V. Area E

Though the excavations and survey across the tell recovered Early Bronze Age materials, it is in Area E that the most EBA materials were recovered. Preliminary excavations in Area E began in 1999. Systematic and large-scale excavations were conducted in Area E between 2004 and 2017 (when full excavations on the top of the tell ceased) and uncovered the remains of several domestic residences that provide information regarding daily life in the EB III. The finds that were

recovered from the excavations there included cooking vessels, evidence of hearths, storage, etc. that support this interpretation.

V.A. History of Area E excavation

The early years were supervised by Dr. Itzick Shai (2004-2011, 2013), while the later years were supervised by Eric Welch, Tina Greenfield, and Shira Albaz (2012, 2014-17). Excavations were largely halted at the end of the 2017 field season, except for targeted excavations within the deep test trench in Square 93B which was finally closed in 2018.

The early years (until 2012) largely focused on the Iron and Late Bronze Age deposits whereas the later years were focused largely on the systematic uncovering of the EB levels under the direction of Aren Maeir and Haskel Greenfield. The goals for the excavation of each of these time periods were different and therefore the resulting methods differ slightly.

V.B. Limitations on excavation extent

The extent of excavation was limited by the activities of later inhabitants who created deposits (e.g., pits, trenches) that disturbed the EB levels. Excavation of these areas was avoided and included limiting excavations to the north, east, and south as these areas were riddled with pits and later intrusions leaving little of the later levels of the EB intact. This was also due to the erosion that occurred at the site, because the slope is steep and erosional forces could be seen between seasons in the open squares. Excavations to the west were limited by the meters high balk left separating Areas A and E.

V.C. Field recording methods

In this section, the excavation recording methods for the EB levels in Area E at the site are discussed. Changes in methods were implemented over almost 15 years of excavations as new goals were established. Excavation methods and artifact recovery procedures shifted significantly

when the focus of excavation moved from the Iron and Late Bronze Ages to the Early Bronze Age. The goal of the second phase of excavations in Area E was to investigate the Early Bronze Age after the overlying Iron and Late Bronze Ages deposits were removed. This shift in direction was accompanied by a change in excavation staff beginning in 2012 as was mentioned above.

The recovery of the materials located in Area E was done within a basket system wherein basket numbers were assigned to each type of material from a specific day. These baskets were recorded on paper in the field then transferred to a digital database either during the season after the return from the field or after the season concluded in post-processing. The basket numbers were sequential, and the spatial data was recorded for the pottery baskets. Each type of material (e.g., bone, stone, etc.) from that day of excavation and that location of recovery was linked to the pottery basket in the basket notes.

The artifact and ecofact recovery method for Area E was based on a selective judgmental sampling strategy. In general, all materials visible to the naked eye were collected in the trenches during excavation. Sediment from primary contexts were also sampled with a dry sieve (5 mm mesh) in the field, but it was found to damage specimens more than enhance recovery (particularly with the fauna). As a result, one or more 10L buckets of sediment from each primary depositional context (basket) were subjected to floatation and wet sieving. The number of 10L buckets sent for wet sieving was dependent upon the judgement of the square and area supervisors, but was >3000L in total as there are more than 300 separate floatation and wet sieving samples. Some contexts, such as floors or materials on floors, installations, or particularly interesting loci were more intensively subjected to wet sieving, but this was conducted at the discretion of the area supervisors. This higher sampling intensity during excavation may be reflected in the number of

specimens recovered from these contexts, however as we are discussing living layers or occupation layers this should not skew the data.

During the excavation process, there were two schools of thought about the nature of stratigraphic relationships that were employed. In some different squares, excavators were "lumpers" while in others they were "splitters." The term "lumping" is used to describe the process of keeping multiple areas of excavation within a trench together (as part of the same locus and basket) even if there were slight visible differences in soil color or composition, or a concentration of a specific type of materials. In these cases, these were mapped, but the finds were all lumped together from each of the spaces making it impossible to see the spatial differences in the find spatial distribution. In the opposite case, "splitting" describes the process of creating new baskets, if not new loci, to differentiate these areas of change, causing more paperwork but also allowing for a more in-depth understanding of the spatial distribution of the materials uncovered.

Sometimes the decision to split baskets or loci was not necessary. However, the process of dividing loci and baskets to rectify the lumping of deposits was simple. Loci could be divided along the line of daily baskets. Splitting of loci occurred when there are changes in soil composition or color representing a new or different deposition type.

Other times, baskets or loci needed to be merged as it was decided after the fact that splitting of loci and baskets was premature. There are locations in excavation where both methods have their uses. However, when investigating the use of space, splitting (which creates smaller sections) produces higher resolution datasets for postprocessing analysis. In the future, this is what needs to be done to more effectively conduct spatial analysis of remains.

V.D. Stratigraphy

The early seasons in Area focused on and excavated primarily on investigating the Iron Age I and Late Bronze Age remains. The Iron Age stratum was heavily eroded with patchy architecture. Beneath the surface (Stratum E0), a series of strata have been uncovered. Stratum E1 (E for Area, 1 for first stratum) was a heavily mixed erosional stratum just below the surface that contained British Mandate/Ottoman remains. Below this were the Iron IIA (Stratum E2) and Iron IB remains (Stratum E3). Beneath Stratum E3, there is a thick and well-preserved LB II stratum (Stratum E4, also subdivided into E4a and E4b) that contained the remains of a large mansion (built atop a series of terrace walls) with substantial amounts of pottery, animal bones, and other remains (Maeir 2020, 10, Greenfield, Shai, and Maeir 2017, Shai, Uziel, and Maeir 2012). Beneath Stratum E4, there is a long settlement hiatus during the IB and MB periods in this part of the site as noted above. No stratum number was assigned for this layer as it was not recognized at first given its sterile nature.

The EB series of strata begin below Stratum E4 and are named Strata E5-9, with various subdivisions. The remains from each of the EB strata used in the analyses for the presented research will be described in the next chapter. Other assemblages will be discussed in this chapter in §VI. Of the EB strata, the E5, E6, and E7 strata were the only strata extensively excavated. The earlier periods (E8-9) appear only in deep probes and in contained areas (Maeir 2020, Greenfield, Shai, and Maeir 2020, etc., 2017). Strata E6 and E7 was not completely cleared within Area E and, since the extent and nature of the architecture was not clear, house numbers were not assigned for these strata. Strata E8-9 were only excavated in a deep 2x2m probe that extended for another 2.5m below E6 to bedrock. This is the only place across the tell where bedrock was reached. At the bottom of this deep probe in Stratum E9, the pottery appears typologically to date to the EB II

(Maeir 2020, 10, Albaz 2023). This probe was dug beginning in the 2017 field season and continued in special fall and spring excavation seasons specifically to determine how much material still separated the widespread excavation levels (E5-7) from the basal horizon at the site (E9).

The terminal EB occupational stratum is designated as the E5 stratum. The end of this period was well documented with radiocarbon dates from inside a vessel from the E5a Stratum and dated to c. 2550-2600 BCE. The E5 stratum is divided into three sub-phases, the latest of these is the E5a stratum. The E5a and E5b sub-strata were heavily damaged by pits and intrusions from the later E4 and E3 strata. These intrusions affected the buildings and deposits of the lower E5c sub-stratum, but to a much lesser extent.

While Strata E5a stratum, b, and c are treated as separate strata, they are in reality phases of building renovation, as the same structures are renovated sequentially over time. This is very different than in E6, where there are different buildings than in the overlying strata. Strata E6 and E7 seem to be renovations of the same buildings. It is unknown what the relationship is between E8 and 9, but they appear from the limited exposure to be a third set of buildings. All this is of course hypothetical until new excavations expose more of the deposits.

V.E. Strata E5 architecture

In Area E, parts of nine buildings were uncovered from the E5 strata within a 20x20m area. The inclusion of Area E within the fortification line exposed in Area J suggests that the EB neighborhood was within the fortification limit and was not an external neighborhood. The architectural remains in Area E delineate at least two rows of dwellings separated by an alleyway containing multiple layers of accumulated waste. It is possible to identify at least five to six buildings depending on the stratum, and two west of the alleyway (see Figures 3-5 in Greenfield,

Shai, and Maeir 2017). These buildings are arranged along a series of terraces descending in elevation in a northwest-southeast orientation that step down the slope of the tell (Figure 2).

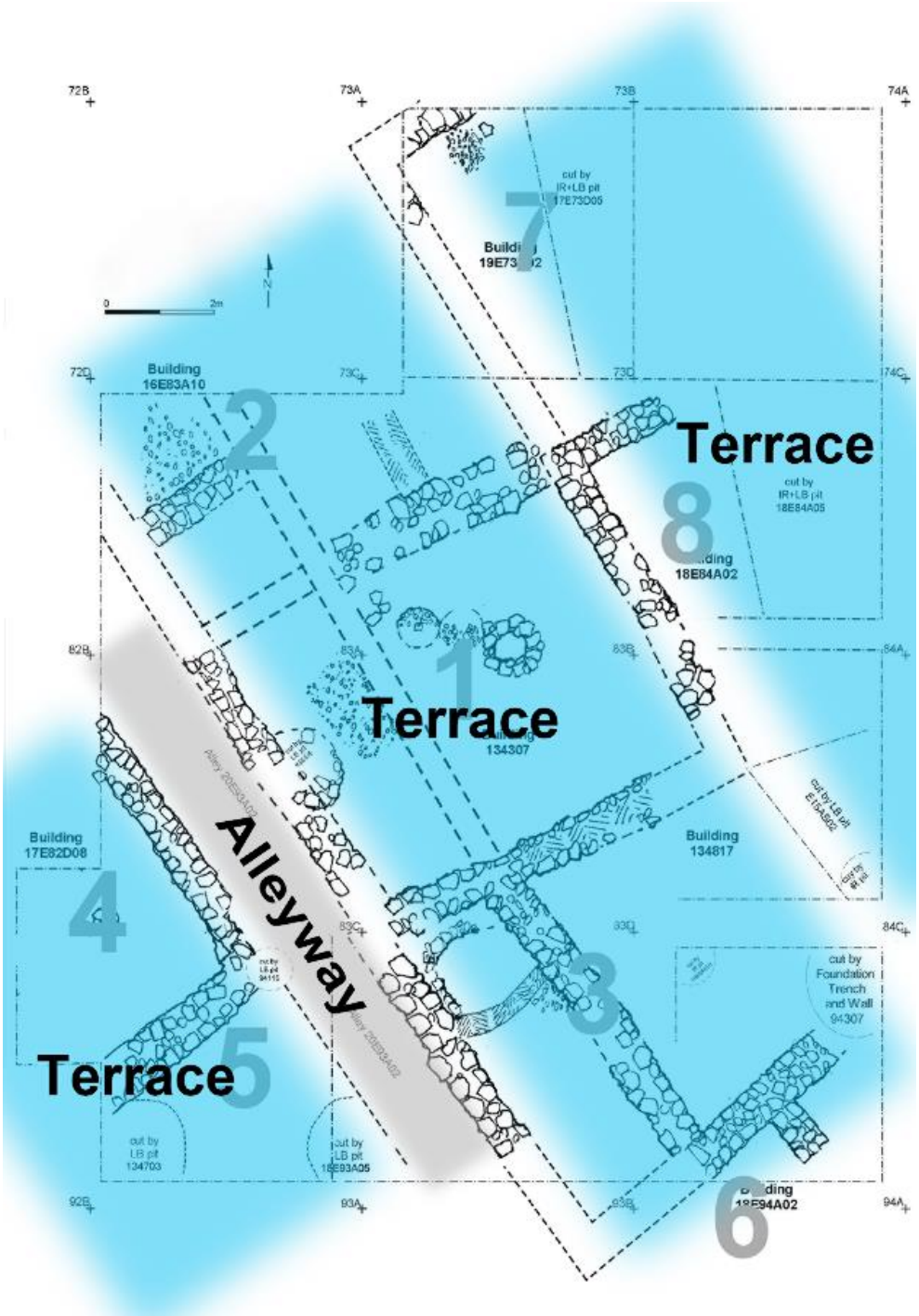


Figure 2: Location of terracing in Area E

The buildings that were uncovered in the E5 strata from Area E share strong similarities to those from contemporary sites elsewhere in the region (Shephelah). They often share wide walls that delineate different residences, much like modern apartments. These buildings have no evidence of a second story, the walls do not appear to be thick enough to support one. The structures may, however, have had flat roofs which would have allowed storage upon them (Greenfield, Ross, Albaz, et al. 2022, Greenfield, Ross, Greenfield, et al. 2022, Greenfield, Shai, and Maeir 2020, Albaz 2019).

The outer architectural units are continuous between E5 phases with each building having a different identification number for each phase. These building numbers may be referenced as will any additional room or floor numbers if they differ from the associated building number. In addition to the architectural units, or houses, there are installations, primarily hearths, but also tabuns (ovens) and installations for grinding grains. The pebbled stone installations of Tell eṣ-Ṣâfi/Gath are similar to those found at contemporary sites in the region (Eliyahu-Behar, Shai, et al. 2017a, Eliyahu-Behar, Shai, et al. 2017b). These pebbled installations (PI) are most commonly found in the E5 strata, are identified in almost every structure whether a room or a courtyard, and even at times superimposed indicating a tradition of both location and use. The installations are comprised of small local riverbed round or oval stones between two and five (2-5) cm in diameter (Eliyahu-Behar, Shai, et al. 2017b, 47).

Table 3, located below, neatly associates the building numbers with their room, courtyard, and floor numbers separated by phase. Additionally, the installations are listed with the associated courtyard/floor or room/floor combination.

Table 3: Division of buildings by smaller architectural unit organized by phase.

Phase	Building	Courtyard	Room	Floor	Installations
E5a	74808	74808			
	94413	94413		84805	94413
			104601		104602
	74505	74505			74515 134506 84109
			114207	114210	114207
	114402	74612			104207
			114402	114415	94205 104208
	E15AW04	E15AW04			
	104311	104108		E15AT05	E15AT04 E15AT06
			104311	104311	
	94118	94418			114115
E5b	114805	114805		114806	104804
	134309	134309			134506
	84405	84405		84805	
			114307	114312	
			114308		
	74512	74512		74512 84602	94606
			E15Q09	144502	144511 (Pit)
	84309	84309			E15AW14 20E94A04
			13483	E15AW08	
	16E82D05	16E82D05			16E82D02 16E82D07 (Pillar base) 16E82D09 (Pit) 17E82D07 (Pit)
			16E93A02		
	E15AU09	E15AU09		E15AU12	16E93A06
E5c	19E73D02	17E73D06			17E73D07
	16E83A10	16E83A10		20E83A05	
	18E84A02	18E84A02		18E84A06	
	134307	114502		11452 134307 18E83C09	94606 E15AM09 17E83B07 66004 (Pit) 134602 (Donkey Pit)
	134817	134814			
			134817		134413

					134414
	18E94A02	18E94A02			
	17E82D08	17E82D08		17E93A02 18E82D02	19E83C09 (Donkey Pit) 19E82D04 (Donkey Pit) 20E93A05 (Donkey Pit)

Each of the buildings underwent renovation over time, these renovations are defined by the various stratigraphic sub-phases E5a stratum, E5b stratum, and E5c (Greenfield, Shai, and Maeir 2017, 248, Shai et al. 2014). These renovations include the repurposing and division of larger spaces. One constant through the renovations is that the buildings appear to consist of a large, open courtyard space, each with multiple installations, with one or more narrow auxiliary rooms attached (Greenfield, Shai, and Maeir 2017, 250).

V.F. EB household archaeology at Tell eṣ-Ṣâfi/Gath

Until this thesis, all publications on the EB buildings and their contents from Area E have been analyzed from a qualitative perspective (Albaz et al. 2022, Greenfield, Ross, Albaz, et al. 2022, Greenfield, Ross, Greenfield, et al. 2022, Greenfield, Shai, and Maeir 2020, Shai et al. 2014, Albaz 2019, Richardson et al. 2021). These studies reached the following conclusions:

1. Ceramic production is not being done at the household level (Ross et al. 2020).
2. Rows of domestic buildings were constructed according to a plan and were built on a series of terraces along the face of the tell (Greenfield, Ross, Albaz, et al. 2022, Greenfield, Shai, and Maeir 2017, 2020).
3. The activities within these structures is domestic in nature and there is no evidence of industrial activity within the buildings (Greenfield, Ross, Albaz, et al. 2022, Greenfield, Shai, and Maeir 2017, 2020).
4. Cooking took place in the courtyards where there were hearths and tabuns (ovens). The fauna consumed were both wild and domestic species that were locally grazed

(Arnold and Greenfield 2017, Arnold et al. 2018, Arnold et al. 2023, Greenfield, Ross, Albaz, et al. 2022). The flora was cultivated from the immediate surroundings as part of intensive agricultural methods (Frumin, Melamed, and Weiss 2018, Frumin et al. 2021, Frumin, Maeir, and Weiss 2023).

5. There was a wide trade network that the site was a part of during the Early Bronze Age III. Exotic (trade) objects include basalt ground stones, bitumen, metal objects, and beads (Beller 2023, Greenfield, Ross, Albaz, et al. 2022).

VI. Artifactual assemblages in Area E

The assemblages presented below are not included in the deeper quantitative or qualitative analysis discussed in later chapters. The assemblages in this section include the pottery, figurines, botanical remains, larger faunal assemblage, metal objects, weights and spindle whorls, beads, gaming objects, and foundation deposits. The botanical assemblage was not available for integration into the current research and is therefore only summarized below. The other assemblages were not included in the statistical spatial analysis for a variety of reasons including quantities, collection methods, and issues in incorporating assemblages into the analysis. Each of these issues will be addressed in the appropriate sections below.

The assemblages analyzed for this thesis include the osseous tool, ground stone, and chipped stone tool assemblages. These materials are the most copious find groups after the pottery and can be used to infer activities that occurred in those locations. These assemblages are discussed in Chapter 7.

In this section, the artifacts/ecofacts not included in the spatial analyses are summarized.

VI.A. Pottery

Pottery type frequency (absolute and relative) distribution for each by house, and phase are described in detail in Albaz 2019. The collection of pottery data (though standardized) was not done in a way that would provide analysis opportunities past the qualitative analysis that was completed by Albaz in her thesis without significant data modification. In particular, the pottery data were not quantified by morphological type consistently across the excavation area for each stratum. For the most part, the pottery data was organized typo-chronologically to examine changes in vessel morphology during the EB. As a result, the pottery assemblage was not quantified in a manner that allows for a statistical spatial analysis.

The pottery corpus includes cooking pots, platters, and serving dishes and has been analyzed by a number of people for different aspects, Drs. Shira Albaz and Jon Ross both took part in the beginning stages of the typological organization of the pottery assemblage in its entirety.

Other pottery types including bowls, platters, vats, holemouth vessels, large and small jars, and pithoi were also recovered (Albaz 2023). The quantities of these are reported in various publications specific to certain contexts (e.g., courtyards, by strata, etc. (Albaz 2023, Uziel and Maeir 2012a) and a complete list and can be found in Albaz (2019). Large jars, pithoi, and vats vessels would have been used to store grains, oils, and other foodstuffs. Other items such as tools and larger objects would not necessarily have needed to be stored in something rather, they may have just been placed into storage areas such as auxiliary rooms or pits as we have seen at other sites with the stacking of ceramic bowls and plates.

Additionally, small objects may have been placed in organic vessels such as skins, baskets, or cloth bags. Unfortunately, the environmental conditions at the site are not conducive for the preservation of such materials.

VI.A.1 Secondary use ceramic objects

An additional material corpus that should be discussed here is the secondary use ceramic sherds. These sherds were determined to be a material corpus and specialists began their analysis in 2020. The initial specialist analysis has not been completed; therefore, these objects were not included in these analyses. These sherds have been modified from their original use to presumably be used in craft and industrial contexts. These sherds include a number of modifications not limited to rounding or beveling of the edges, wear on the edges, and are irregular, triangular, or rectangular in shape. It is their shape and wear patterns that separate these secondary use ceramics from other types such as spindle whorls. The sherds used here are from a variety of vessels as identified by ceramic specialists Ross and Albaz, including but not limited to holemouth and storage jars, serving vessels, and bowls.

VI.B. Figurines

There were twelve figurines uncovered from EBA contexts, ten of those are in the E5 layers, seven from the E5a stratum, one from the E5b stratum, and two from unstratified E5 contexts. Two types of figurines were recovered, donkey and sheep (Greenfield, Ross, Albaz, et al. 2022, Greenfield, Ross, Greenfield, et al. 2022). Two donkey figurines were recovered from secondary (EB fill) contexts below the E4 floors. In contrast, the eight sheep figurines were recovered from more secure E5 depositional contexts (on floors or in living layers), one of which was found on a raised square stone platform in the E5a stratum. The figurines were considered singletons in this research with their low numbers and excluded them from further statistical analyses.

VI.C. Botanical remains

The botanical analyses conducted by Frumin (Frumin, Maeir, and Weiss 2023, Frumin et al. 2021, Frumin, Melamed, and Weiss 2018, Frumin 2017, Greenfield, Ross, Albaz, et al. 2022)

shows that the EB strata are characterized by a rich and diverse assemblage. The vast majority of her analysis is based on floatation deposits from the E5a-c strata. The analyses show that most of the botanicals exploited for food were domestic crops commonly found in the region from the Neolithic onwards and includes hulled emmer (ca. 40%), barley, olive, figs, lentils, grapes, Atlantic pistachios, grass peas, fava beans, and flax. These crops (broadly cereals, pulses, nuts, sweet fruits, and oil plants) comprise approximately half of the assemblage and suggest that there was a structured and intensive agricultural economy supporting Tell eṣ-Ṣâfi/Gath during the EBIII (Frumin et al. 2021). Canaanean and sickle blades, in addition to other chipped stone tools would have likely been utilized for the harvesting and threshing of cereals (for discussion of types of chipped stone tools see Chapter 7 §III), whereas ground stone tools likely would have been used to transform the whole grains to flours (for discussion of ground stone tools see Chapter 7 §II) (Greenfield, Ross, Albaz, et al. 2022).

Although Frumin's analysis of the botanical data from the early years of excavation is complete (Frumin 2023), a large assemblage of botanical remains from later years of excavation (i.e., the E5c-E9 strata) still await analysis. As a result, there is limited possibilities for making any kind of temporal or spatial analysis in the research presented below.

VI.D. Faunal assemblage

The faunal assemblage was largely analyzed and interpreted by Drs. Haskel Greenfield and Tina Greenfield, who were assisted at times by numerous students and other specialists. For a full preliminary faunal analysis see Greenfield et al. (2016). At the time of analysis for this thesis, there were 11,783 zooarchaeological specimens identified and analyzed from the EB strata in Area E. This assemblage is different than many others from the region as the culturally modified bones (i.e., ornaments, tools, toys, etc.) were all sent to the archaeologist for identification before they

were placed in the special finds catalogue. As a result, this assemblage is a more listing of all possible bone tools.

Analysis has also been conducted on the faunal material to identify butchery, burning, and other cooking evidence on the materials. For the purposes of this thesis, the wider faunal assemblage (cooking, butchery, special identifications, etc.) and numerous singletons in the toy, ornament, and decoration categories are out of the scope of the research. In contrast, the worked osseous materials that are identified as tools are included in the analyses and discussed in detail in Chapter 7 §I. Aside from the wider faunal analysis including information on species, age, butchery, and cooking, etc., there are two clear categories of worked osseous materials, (1) toys, and (2) ornaments and decorations. These are discussed below.

VI.D.1 Toys

The 'toy' category is comprised of gaming pieces namely die or casting pieces. They are identified based on changes in bone morphology (shaping) as well as the nature of use wear polish. It is the polish on the exterior raised surfaces of the bone caused by handling that distinguishes these objects from the other bones in the assemblage. There is a total of 31 game and/or divination pieces from the larger faunal analysis which consist of 19 astragali, 2 calcanei, and 10 carpals or phalanges. All the samples have at least light polish, while medium polish with some shaping was present (i.e., flattening on one or more sides) on eight specimens, the remaining two had heavy modification with lots of shaping.

VI.D.2 Ornaments and decorations

The ornaments consist of toggles, pins, and beads. Twenty-seven ornaments or decorations were identified during the faunal analysis. Two possible beads (N=1 bone, N=1 ostrich shell) in various incomplete stages of working were identified through morphology including shaping and

puncturing. There were also thirteen toggles that were identified through polish and use wear. Specimens identified as toggles (i.e., straight buttons) were done so based upon the shaping (smoothing) and polish on the bone. As would be expected, the differential polish was higher toward the center of the bone where it would have been fastened into place presumably with string or cord. There was also polish on the proximal and distal ends, likely from the process of use. Seven of those artifacts identified are complete, and an additional two specimens are represented by 50% of the artifact.

Fourteen ornamental or decorative fragments are also identified that appear to be decorative including two others that are perforated - one fragment has an ovular hole, another has multiple (two complete and three incomplete) drill holes, and a third may be a toggle. According to the nature of modification and the location of use wear polish, they are clearly ornaments or decorations. However, their specific use is not clear from the fragments recovered. One of the perforated fragments is hippo ivory. The fragment with the ovular hole is part of a horn core. Among the fragments unidentifiable to a specific use type, a large percentage (N=6, 46%) are made of raw materials emanating from birds and fish, including a potential shark tooth. This is notable as there are not many of these classes of bones in other worked osseous materials. However, there are too few for a statistical spatial analysis.

VI.E. Metals

Though metal objects are exciting and rare finds during excavation, this is the exact reason that they are not included in the statistical spatial analyses for this research. These objects create singletons which when included in statistical and other analyses result in distortions of patterns based on larger assemblages of remains. Very few metal tools and objects (N=10 total; N=2 tools)

were uncovered during the excavations. They will be described here for completeness although they were not included in the overall analysis as their small number created singletons.

Metal objects (N=8) include those of a personal nature, such as a ring from inside an intact vessel from the E5a stratum, and multiple pins found throughout the E5 strata.

VI.F. Weights and spindle whorls

Spindle whorls are indicative of the type of work being conducted in a space. However, the methods of spatial data collection and the low numbers that are located in secure E5 contexts preclude them from being included in the quantitative data analyses. In addition to the tools already discussed, there were twenty-eight (28) ceramic and stone spindle whorls found in all the E5 strata.

VI.G. Beads

A number of beads were recovered in the excavation of Area E. These were analyzed by Dr. Shira Albaz with the help of others (Albaz and Reed 2021, Albaz 2018, Eliyahu-Behar, Albaz, et al. 2017, Eliyahu-Behar et al. 2016). These objects are composed of several materials including bone shell, carnelian, limestone, steatite, agate, or faience. They are quite rare and beautiful finds. However, they are not a type of material find that informs researchers about the use of space. They are largely found scattered across the excavation areas. They are found on floors, in floors, above floors, in destruction/reconstruction layers, and in fills. There was one cluster found within an E5c ceramic pot and included a cylinder seal. However, the material that they are made from can provide insight into the social standing of a household. Eighty-one specimens were identified.

VI.H. Gaming

There were three fragments of gameboards recovered from E5 strata contexts, two from the E5b stratum and one from the E5a stratum. The board from the E5a stratum appears to have been used twice as both sides are incised with different board patterns (for further discussion see Albaz

et al. 2022). A stone game piece from the E5b was also recovered as were 18 bone casting pieces as discussed above. All of these appear to be forms associated with the Egyptian game Senet (Albaz et al. 2022). There were also four chalk game pieces found in the E5 strata.

VI.I. Foundation deposits

Ritual objects in this discussion include foundation deposits, figurines, and divination pieces. Though the latter two may also be considered personal objects, the locations of some of those retrieved during excavation led them to be classified as ritual. As the foundation deposits are not on or above the floors (which is the primary locus for this analysis), they are not included in the analysis. The same is true for the figurines and divination pieces. However, they were mapped to identify their association with other materials discussed in this thesis.

The numerous donkey skeletons recovered from under E5 floors at Tell eṣ-Ṣâfi/Gath have been the subject of intensive research headed by H. and T. Greenfield and their team (Arnold et al. 2016, Greenfield et al. 2023, Greenfield et al. 2020, Greenfield, Greenfield, et al. 2018, Greenfield, Ross, Greenfield, et al. 2022, Greenfield et al. 2021, Greenfield, Shai, et al. 2018, Greenfield, Shai, and Maeir 2012, Shai, Greenfield, et al. 2016). There have been six complete or nearly complete articulated donkeys, indicating that they were sacrificed, and two partial skeletons found within the E5 strata contexts. Each of these were buried beneath the earthen floors of the buildings as they were being built or renovated (Greenfield, Ross, Greenfield, et al. 2022). The E5a stratum contains two of these donkeys, one in the northwest end of the alleyway (Alley 104306), and one under Courtyard 94413. The E5b stratum contains two articulated skeletons, one under the floor of Room E15AQ09 of Building 74512, and another under the floor of courtyard 16E82D05 of Building 16E82D05. The E5c stratum had the most specimens with four full skeletons recovered, three under the floor of Building 17E82D08 and one under the floor of

Building 134307. These were sacrificed and buried as part of the ritual leading to the construction of the neighborhood's buildings at the beginning of the E5c stratum, and as such represent foundation deposits.

The foundation deposits, aside from the articulated donkey skeletons, are comprised of miniature pieces of pottery, and in the latest phase (E5c) a possible ceramic lamp and bowl deposit (Greenfield, Ross, Albaz, et al. 2022, Greenfield, Ross, Greenfield, et al. 2022). These donkey burials and foundation deposits show not only that the construction of these dwellings was carefully planned, but that the process of construction and renovation of the buildings was embedded within ritual (Greenfield, Ross, Greenfield, et al. 2022). It is arguable that these deposits, while contributing to the larger distinctive social and economic configurations of early urban lifestyles, also would have contributed to the process of commemorative history making (Greenfield, Ross, Greenfield, et al. 2022, 29).

VII. Conclusions

Systematic excavation of the EB domestic neighborhood strata at Tell eṣ-Ṣâfi/Gath has yielded an exceptionally large assemblages of tools (chipped stone, bone, and ground stone), faunal material, botanical remains, and special finds from each house (Frumin, Maeir, and Weiss 2023, Manclossi and Rosen 2023, Greenfield, Ross, Albaz, et al. 2022, Beller et al. 2023, Greenfield et al. 2016). None of these of yet have been quantitatively analyzed within a spatial framework. The goal of this thesis is to rectify this gap in their analysis. For the most part, the artifact types that are categorized (above) as singletons will be considered in light of the results from the statistical analysis in Chapter 8.

This information is explored within a spatial analytic framework to provide unique insights into daily life in the EB. The chipped stone, bone, and ground stone data are discussed in depth in Chapter 7 for subsequent qualitative and quantitative analyses.

Chapter 6. Hypotheses and research questions

The larger research questions investigated here center around the anthropological issue of the nature of households in an early urban complex society. In the absence of written texts (outside of Mesopotamia and Egypt), only the archaeological record can provide insights into the size and composition of the household, spatial extent of the household, how space is used in a household, what buildings were associated with a household, etc. These are crucial questions when discussing the evolution of early state societies because they address the social interactions of the non-elite populations and provide insight into the division between individual responsibility and state-controlled (e.g., collective) tasks. Some examples of the tasks thought to be associated with households include initial and subsequent butchery, food preparation, hide processing, and tool repair and upkeep.

Texts and monumental architecture only address the elite segment of the population, and more rarely the lower strata of society. Texts do not discuss the role of the non-elite in an everyday capacity within the community, much less the behavior of social groups on the micro-level of the household. Questions of food distribution mechanisms can be addressed by monumental architecture (such as granaries) and texts (the degree of processing, amount of food dispersed, and processes for cooking).

The Early Bronze Age of the southern Levant is when the first urban centers appeared. House shapes and sizes change from individual dwellings of different sizes and shapes, to nearly identical in size and shape and organized in neat rows across sites. This suggests that individual EB households may have been allocated nearly identical buildings for residence across these early urban sites. Thus, with the evolution of early urban state-level societies, the first urban households

were created. This period is the first time that top-down urban planning in the southern Levant organized by administrative forces can be inferred (Nigro 2006, 2010b, a, Miroschedji 2018b).

The changes in the shape and layout of these houses suggests that early urban households in the southern Levant were different than those seen in Mesopotamia but were more similar to those from Egypt. In Mesopotamia, there is strong textual and architectural evidence to suggest that house complexes contained multi-generational and multiple consanguineal households (Algaze et al. 2021, Battini 2020, Buccellati, Helms, and Tamm 2014, Mas 2014, Nishimura 2008, 2007). In contrast, the architectural evidence from Egypt (Moreno Garcia 2012, Saleh 1996) and the southern Levant suggest that buildings contained nuclear families[2] (Chesson 2012, Yekutieli 2015, Chesson 2003) suggesting that there was not a single straightforward pathway in the evolution of early urban households. The quantitative research conducted in this thesis intends to provide evidence, through the research questions below, to address this aspect of household and urbanism in the Early Bronze Age southern Levant.

These issues will be investigated through a quantitative examination of the spatial distribution of material remains. While analyses conducted in the past utilized qualitative data to address such questions (e.g., Chesson 2012, 2003, Veenhof 1996 etc.), a quantitative approach to the data allows for statistical analysis that provides researchers with more tools to use in generating interpretations of their findings, particularly when discussing the continuity of aspects through time. Given that archaeological material remains are the residue of human activities (Schiffer 1974,

[2] While the authors cited here, and others, use the term 'nuclear family' this term is not used in the current research as the social nature of the family and family composition cannot be determined from the data available.

1972, 1975, 2017, Skibo and Schiffer 2008, LaMotta and Schiffer 1999), their spatial distribution can shed light on the nature of activities (e.g., Kent 1987b, 1999, 1984, 1993, 1987a, Gnivecki 1987, Greenfield and Lawson 2020). This was further discussed in Chapter 3 devoted to household theory.

Consequently, the quantitative spatial distribution of material remains can be used to reconstruct the behavioral social structure, from which the interactions within and between households can be informed (which is the behavioral organization). We cannot assume that an individual building represents the residence of a single household. This must be demonstrated instead. It is possible that a single household may have inhabited several nearby buildings, expanding and contracting depending upon family dynamics and fortunes (Blanton 1994, 1995, Kent 1995, Kramer 1982, Meraiot, Meir, and Rosen 2021, Netting, Wilk, and Arnould 1984, Wilk and Netting 1984). A quantitative spatial analysis will allow for identification of activities, activity areas, and whether there is duplication between buildings that might suggest the presence of different households. It can help determine if each architectural unit in a site is the residence of a single household or if a household occupies multiple adjoining buildings.

In this study, the data recovered from the excavation of an Early Bronze Age III non-elite residential quarter from the site of Tell eṣ-Ṣâfi/Gath (modern Israel) are used as a test case within a GIS spatial framework. No similar quantitative spatial analyses have been published on the distribution of material remains from non-elite Early Bronze (or early urban) centers. The closest attempt is by Nishimura (Nishimura 2008, 2023) where she investigated the distribution of remains at the EB site of Titriş Höyük. However, the nature of her analysis is more qualitative than quantitative and does not employ spatial analysis.

Spatial analytic studies have been conducted at a number of archaeological sites from various periods and regions over the past 50+ years. In particular, it has been argued that those sites that were cataclysmically destroyed (e.g., Pompeii) or suddenly abandoned (e.g., hunter-gatherer campsites) have material assemblages that capture a moment in time and as such are superior for spatial investigation. However, sites that are slowly abandoned are just as useful because the occupants leave behind a material culture assemblage that is more comparable to previous occupation levels in the same site that are simply rebuilt and not abandoned. In this case, the occupants generally clean up the large items and leave the bulk of the small ones to be buried in the construction renovation process. This is particularly true of both dirt and cobbled stone floors. This process allows comparison between different phases of occupation within the same site or between sites of the same period. This is the situation at Tell eṣ-Ṣâfi/Gath.

Given all the above, the EB layers at Tell eṣ-Ṣâfi/Gath are a useful case study for a quantitative statistical spatial analysis as there is no evidence that the EB non-elite quarter (known as Area E) or other excavations areas (A, F, J, P) on the upper tell were violently destroyed. The site appears to be slowly abandoned as most rooms have no intact vessels and little debris on the floors (e.g., Area E, Sq. 83C, 93B, etc.), Only a single room in a single building contained several intact vessels and an abundance of material culture (e.g., Area E, Sq. 82D/92A, Stratum E5a) signifying its singularity. It is not representative of the excavation area in general.

This thesis approaches the study of early urban houses and households from a materials perspective to answer the following research questions on the organization of domestic space utilization at Tell eṣ-Ṣâfi/Gath during the Early Bronze Age. The questions are organized below under the umbrella question ‘What is an Early Bronze Age household?’.

I. Research questions

The overarching question of the nature of the EB archaeological record excavated in Area E will be investigated through the following general and specific questions:

Does the building represent the household? What buildings are associated with a household?

- Do architecturally defined buildings actually reflect socially valid units, such as different families or households? For example, are they small social units or extended units?
  - Hypothesis: Ethnographic literature suggests repetition of the means of production (food, goods) and reproduction (sleeping areas) in each small architectural unit (e.g., separate buildings) defines a household; Null – no repetition amongst buildings represent a single household.

- What activities are completed in a building?
  - Is there repetition of tool assemblages between architectural units?
    - Hypothesis: If there is repetition in the assemblages between architectural units, then the same types of activities are occurring in each unit; Null – no repetition meaning that they are doing different activities in different units.
- What is the distribution of activities between buildings within the same stratum?
  - Are the same activities completed in each of the buildings within a stratum?
    - If activities are the same between buildings, then this suggests that each building represented a different household.
- What are the similarities in activities within a building over time?
  - Are the same activities completed in the same building between strata?

- If activities are the same between strata of the same building, then this suggests residential continuity (generational continuity by a household) and use of space within each building over time.

II. Conclusion

In this chapter, the questions, and hypotheses to be investigated in the rest of this thesis are presented. Ultimately, it is hoped that using a systematic framework for investigating spatial behavior will enhance analytical results and will allow for the creation of models that can be applied widely to other early urban societies. The next chapter discusses the data used for analysis surrounding the research questions and hypotheses presented here.

Chapter 7. Data description of the Tell eṣ-Ṣâfi /Gath tool assemblages

For this thesis, the data from the latest three occupational layers of the Early Bronze Age sequence are analyzed, the E5 (and its sub-divisions into the E5a, E5b, and E5c strata) as it contains the widest exposure of the EB III contexts. Each data set presented below has been analyzed by specialists from the excavation team. Each section provides a total number of objects for the E5 strata, which is then broken down by data type given the number of objects by phase, building, and room type.

The data categories discussed in this thesis are limited to tools within the categories of osseous materials, chipped stone, or ground stone. These are the three material assemblages with the largest frequency of remains that were analyzed quantitatively by each of the specialists and their analyses are from which the data presented is derived. The decision to use the three material assemblages was also made to limit the number of singletons characteristic of many special finds (e.g., beads, figurines, game pieces, etc. – see previous chapter). Furthermore, the osseous materials, chipped stone, or ground stone data categories represent tools used in daily life.

These are the largest corpuses of materials available for analysis and provide the widest understanding of the potential use of space. The different tool types may represent a variety of domestic daily life activities, such as food preparation (grinding stones, sickle blades, choppers), hide working (rubbers and mullers, scrapers, scoops, and defleshers), weaving (spatulas), small object preparation (retouched flakes and potential retouched flakes used as drills and scrapers), and weight measurements (weights). All of the tools discussed in this chapter are tabulated by stratum and simplified building number (Table 6 osseous tools, Table 7 ground stone tools, Table 8 chipped stone tools).

A simplified building numbering system was implemented during analysis that uses the same number across strata and is presented in Table 4. This simplified numbering is used to discuss the materials presented below. If no building number is assigned in Table 4 for a stratum, then there were no remains that can be linked to a living layer (e.g., floor, installation, etc.) for that location in the stratum. For example, no material remains were identified for Building 8 in the E5a stratum, but the precursor building exists in the underlying E5b and E5c strata. This building appears to have eroded downslope. The alleyway, for ease of analysis, was labeled as Building 9 and this label is employed for easy tabulation of remains.

The frequencies described below only represent the remains derived from floors or floating in the ash layer immediately above the floors, unless specifically described as otherwise.

I. Osseous tools

This assemblage includes both the osseous materials special finds (i.e. bone, antler, horn, and ivory tools, ornaments, and toys that were recorded as such in the field and subsequently have individual point locations), as well as objects that were found and identified during the analysis of the faunal assemblage. These are associated with the daily basket boundaries and their calculated centroids (for further explanation see Chapter 3). The toys and ornaments are discussed in the previous chapter.

The tools are the largest category of osseous artifacts recovered from the Strata E5 living layers (N=624 including unidentifiable fragments (N=364); N=260 or 41.66% identifiable to tool type). They include eight primary subcategories including awls, points, dustpans, handles, scoops, scrapers, shovels, and spatulas (Table 5). Since items may be multi-functional and have changing function through their life history, these categories may not necessarily correspond with their entire range of possible functions. It is important to note that these tools include those that were identified

during the faunal analysis and were, for the most part, not identified as such in the field. Hence, most of them do not have special find numbers. In the following paragraphs, each object type will be examined. This examination includes the number of identified specimens from living layers of the E5 Strata, a general overview of the species they are created from, type of working, and polish level. Table 6 shows all the bone tools divided by stratum and simplified building number.

I.A. Awls

The awls (N=22) are identified by their shape, use-wear, and polish. In general, these tool fragments are long, narrow, and come to a definite point. The tip of the end of the awl is more highly polished and shaped than the rest of the bone. They tend to be made from straight long bones, such as ulnae, metapodia, and tibiae. It has been theorized that these were used with textiles, leathers, or weaving (Amiran et al. 1978, 58, Peyronel 2014). It does not appear that there was a preferred species for the production of such tools as there is a variety of both medium and large mammals represented, as well as a mix of wild and domesticated species.

Eleven awls were recovered from E5a stratum, three from E5b stratum, and eight from E5c stratum living layers. In the E5a stratum, the alleyway (Building 9, N=7) has the most awls. In the E5b stratum, all three awls are in the alleyway (Building 9). In the E5c stratum, Buildings 1, 2, and 9 (the alleyway) each contain one awl, Building 3 has two, and Building 7 has three. For the distribution by building number, see Table 6 below.

I.B. Points

Bone points (N=9) are identified and differentiated from awls by their shape and the element that they were produced from. Point morphology is wider than that of awls. Points are generally created from flat bones (i.e., ribs) that have been shaped and polished as well as vertebral processes. Though these have been classified as points, the flexibility of some of the artifacts due

to their thinness suggests that they may have been used for weaving purposes, either baskets or textiles.

There were six points recovered from the E5a stratum. Buildings 3 and 4 each had one point, and Buildings 2 and 9 (alleyway) each had two points during that period. In the E5b stratum, one point was recovered from Building 9, the alleyway. In the E5c stratum, two points were recovered from Building 1. For the distribution by building number see Table 6 below.

I.C. Handles

Handles (N=101) are identified by their unique shaping toward the midshaft of the raw material and are generally made from long bones. The shaping is indicated by beveling and/or smoothing of the chopped off end of the shaft to allow a tool to be inserted. In addition to this shaping, there usually was differential polish toward the far end of the shaft where the handle would have been held during the use.

In the E5a stratum, 58 bone handles were recovered. In this stratum, most handles were found in Building 2 (N=29) and the alleyway (Building 9, N=9). During the E5b stratum, 27 specimens were recovered. Building 1 (N=13) had the most handles recovered in the E5b stratum. During the E5c stratum, 16 handles were found in the buildings. Building 1 (N=7) had the most handles recovered during this period. Table 6, below, also shows this data.

I.D. Spatulas

Spatula (N=91) and scraper (N=4) specimens are identified by their unique element of choice, polish, and shaping. These fragments are often created from whole (medial and lateral faces intact) or split ribs (one scraper was created from a scapula). They are identified by the rounding of the split edge and end of the shaft as well as the flattening of the interior section of bone. A small number of these tools were moderately polished and/or displayed use wear marks

and moderate shaping which suggests that they were past the tool production phase and into their use-life (spatulas N= 20 or 37.73% and scrapers N=4 100%). The remainder of the spatulas were lightly polished or shaped. This implies that they either were used in an *ad-hoc* fashion, or these specimens broke early in their life history and were discarded before the full production process was completed. The more complete fragments in this assemblage are made from quite thick and rigid ribs that suggests their use as a spatula or scraper, rather than a weaving or ceramic implement as has been identified in other assemblages (e.g., Paz 2014, Greenberg 2014a, etc.).

There were 53 spatulas recovered from the E5a stratum, 16 from the E5b stratum, and 22 from the E5c living layers. In the E5a stratum, the most spatulas were recovered from Building 2 (N=22) and the alleyway (Building 9, N=19). During the E5b stratum, over half of the spatulas recovered were from the alleyway (Building 9, N=9). In the E5c stratum, seventeen spatulas were found in Building 1. The scrapers were found in all three strata (E5a N=1, E5b N=2, E5c N=1). For the full distribution by building number see Table 6 below.

I.E. Shovels and dustpans

The specimens that have been identified as potential shovels or dust pans (N=14; N=12 shovels, N=2 dustpans) were all created from scapulae aside from one specimen created from an innominate. They are identified by their unique shaping (often rounding) of the proximal (widest) end of the bone and polish on the neck where it can be hypothesized that the tool would have been held. Dustpans were found in the E5a (N=1) and the E5c (N=1) strata. Shovels were recovered from all three strata (E5a N=9, E5b N=2, E5c N=1). For the distribution by building number see Table 6.

I.F. Scoops

Scoops (N= 15) comprised of osseous materials are identified by their morphology and or polish, as well as the element they are created from, frequently long bones. As an example, one scoop, bone 16E83C122/2, was created from a *Bos taurus* femur and identified by the polish present and the finished edges. These are hypothesized to be used for the removal of material from smaller spaces. Specimens were recovered from the E5a (N=9), the E5c (N=5), and the E5b (N=1) strata. For the distribution by building number see Table 6.

I.G. Defleshers and shredders

The defleshers and shredders (N=5) were primarily created from mandibular pieces. However, two long bones were used, one of which has serrated modifications to the working end carved into it. It is hypothesized that these were used for tanning or a similar purpose where material had to be removed from the hide or a surface. Shredders were found exclusively in the E5a (N=3), whereas defleshers were recovered in the E5b (N=2) strata. No tools of this type were recovered in the E5c stratum. See Table 6 for the distribution by building number.

I.H. Unidentifiable to type

In addition to the osseous materials are identifiable to a specific morphologically recognizable tool type, there are also a number of fragments that are obviously worked or culturally altered in one way or another that do not fit into one of the afore mentioned categories. These fragments are not complete enough to identify their morphology or use and are listed as unidentifiable fragments (N= 364). The sheer size of this portion of the osseous artifact corpus is indicative of the small amount of these materials that the identifiable tools represent and would have been missed if only the materials identified in the field were analyzed as tools by specialists. However, this is a discussion for another place. These materials were mapped and spatially

analyzed to see if there was a visible pattern of materials that might represent an osseous artifact production area.

In the E5a stratum (N=190), there were 83 unidentifiable tool fragments in the alleyway (Building 9) while most were recovered from Building 2 (N=45). In the E5b stratum (N=58), there were fifteen unidentifiable tool fragments in the alleyway. Most were found in Building 8 (N=19). In the E5c stratum (N=113), there were 4 unidentifiable tool fragments in the alleyway. The most (N=83) were found in Building 1. See Table 6 for the distribution by building number.

II. Ground stone assemblage

The groundstone assemblage is comprised of 177 identified specimens from the E5-E9 strata. Many were identified in the field and analyzed post-excavation though there were a few that were identified after their excavation. These include vessels, pounders, grinding stones, mortars and sockets, rubbers or mullers, and weights discussed below. For detailed information see Table 7.

The assemblage spans from the E5 through the E9 with 118 or 66.67% being found in the strata relevant to this research. Of those, 47 are from the E5a stratum, 21 are from the E5b stratum, and 32 are from the E5c strata. The ground stone tools discussed here are of a variety of materials though primarily they are composed of basalt, limestone, brecciated chert, and chalk. Other materials include sandstone, chert, and breccia. The specimens discussed below are only those from the living layers relevant to current research.

II.A. Lower and upper grinding stones

For the E5 strata of the floors and living layers, the lower grinding stones (N=24) were primarily composed of basalt and the remaining samples were brecciated chert, sandstone, and limestone. These lower grinding stones were used for food production (Beller 2023) when paired

with the upper grinding stones (N=9). These were also dominantly basalt with the remaining four being limestone, coquinite, sandstone, and breccia.

In the E5a stratum, lower grinding stones (N=16) were most commonly found in Building 1 (N=5), Building 3 (N=3), and the alleyway (Building 9 N=4). In the same stratum, upper grinding stones (N=5) were found in Buildings 1, 2, and 7. The E5b lower grinding stones (N=4) were found in Buildings 1 and 2, as well as the alleyway (Building 9). The upper grinding stones (N=2) were both found in Building 1. In the E5c stratum, the lower grinding stones (N=4) were found in the alleyway (Building 9) and Buildings 1 and 8. The upper grinding stones (N=2) from this stratum were found in Buildings 1 and 4. For a detailed distribution by phase and building see Table 7.

II.B. Mortars or sockets, pounders, and pestles

Five mortars or sockets were recovered, all of which were created from limestone. One pestle and eleven pounders were recovered. The E5a mortars (N=2) were found in Building 7, as was one of the pounders. The second pounder from this period was recovered from Building 2. The E5b pounders (N=4) were recovered from Building 1 (N=2) as was the pestle from this period. In the E5c stratum, mortars (N=3) and pounders (N=3) were both recovered. For further details see Table 7.

II.C. Rubbers or mullers and vessels

Five rubbers or mullers were identified in the assemblage, three limestone and two chert. They were recovered from the E5a (N=1) and E5c (N=4) strata. Each of these samples was polished and potentially used in industrial contexts. Two vessels were also identified, one each in the E5a and E5c stratum. For further details see Table 7.

II.D. Weights

Ground stone weights are included in the statistical analysis of the ground stone tools. Sixteen are found in the E5a-c living layers. Six were recovered from the E5a stratum, four from the E5b stratum, and six from the E5c strata. For further detail see Table 7.

III. Chipped stone assemblage

The chipped stone assemblage is comprised of 674 objects and debris pieces, with numerous types found in the E5a (N=263), in the E5b (N=201), in the E5c (N=210) strata. The assemblage consists of bladelets, cores, canaanean blades, flakes, tabular scrapers, large geometric (cores?), choppers, sickle blades, biface axes, drills, primary flakes, scrapers, and a multitude of retouched forms. These are categorized into two distinct categories: (1) debris and debitage (including flakes, cores, chips, waste, and chunks of flint) and (2) tools (e.g., sickle blades, Canaanean blades, retouched blades, tabular scrapers, and bladelets) displayed in Table 8. If the debitage types are closely grouped together, this would provide evidence of a centralized area for the creation and retouching of flint tools.

III.A. Debitage

The various types of debitage in the E5a stratum (N=176) are largely found in the alleyway (Building 9, N=136). In the E5b stratum (N=157), this trend continues with 116 pieces being recovered from the alleyway. This potentially reflects the cleaning up processes of garbage and broken tools during these periods. In the E5c stratum, this pattern shifts as flakes and waste are more prevalent in the buildings (N=126), rather than in the alleyway (N=49).

III.B. Tools

In the E5a stratum, there were five types of tools, including retouched flakes (N=15; one of which is identified as a scraper), Canaanean blades (N=4), and one each sickle blade, and tabular

scraper found in the various buildings. In the alleyway, retouched flakes (N=39) included potential drills (N=3) or scrapers (N=3), blades and retouched blades (N=4 and N=1), Canaanean blades (N=13) and sickle blades (N=3) were recovered. In the E5b there were five types of tools found in the buildings including retouched flakes (N=16), scrapers (N=4), and drills (N=1), Canaanean blades (N=5), and tabular scrapers (N=2). In the alleyway (Building 9) retouched flakes (N=15) dominated the tools representing the E5b stratum. In the E5c there were four types of tools found in the buildings, retouched flakes (N=14), blades (N=2), retouched blades (N=1), and Canaanean blades (N=9). There were also a number of flakes (N=18) and retouched flakes (N=8) found in the alleyway (Building 9). For a complete inventory of the chipped stone tools see Table 8.

IV. Conclusions

The data presented here are used to investigate the research questions and hypotheses presented in Chapter 6. Searching for spatial clustering patterns among such tools can provide insight to the use of space in the house in terms of craft, industry, and possibly foodways. The results from the analyses are presented in Chapter 8.

V. Tables

Table 4: E5a-c strata simplified building reference numbers.

Building number on plan	Thesis building number	Stratum
74504	1	E5a
94413	2	E5a
74612	3	E5a
104108	4	E5a
94418	5	E5a
84504	6	E5a
74808	7	E5a
NO NUMBER ASSIGNED	8	E5a
Alley 104306	9	E5a
74512	1	E5b
84405	2	E5b
84309	3	E5b
16E82D05	4	E5b
E15AU09	5	E5b
17E94A03	6	E5b
114804	7	E5b
134309	8	E5b
Alley 19E83C12	9	E5b
134307	1	E5c
16E83A10	2	E5c
134817	3	E5c
17E82D08	4	E5c
NO NUMBER ASSIGNED	5	E5c
18E94A02	6	E5c
19E73D02	7	E5c
18E84A02	8	E5c
Alley 20E93A02	9	E5c

Table 5: Bone tool frequencies by phase.

	E5a	**E5b**	**E5c**	**Grand Total**
Awl	11	3	8	22
Burnisher			1	1
Deflesher		2		2
Dustpan	1		1	2
Handle	58	27	16	101
Point	6	1	2	9
Scoop	9	1	4	14
Scraper	1	2	1	4
Shovel	9	2	1	12
Shredder	3			3
Spatula	53	16	22	91
Unknown	190	58	113	361
Grand Total	**341**	**112**	**168**	**561**

Table 6: Bone tool type frequencies divided by phase and building.

	Awl	Handle	Deflesher	Dustpan	Point	Scoop	Scraper	Shovel	Shredder	Spatula	Unknown	Grand Total
E5a	**11**	**58**		**1**	**6**	**9**	**1**	**9**	**3**	**53**	**190**	**341**
1	1	2								2	12	12
2	2	29			2	5		3	1	22	45	80
3					1					2	12	15
4		5			1					1	4	6
5		5								1	4	4
7	1	8						4		6	30	43
9	7	9		1	2	4	1	2	2	19	83	124
E5b	**3**	**27**	**2**		**1**	**1**	**2**	**2**		**16**	**61**	**115**
1		13	1			1				2	6	10
2		6						1		3	16	20
4											2	2
5												1
7		3										3
8		1								2	19	21
9	3	4	1		1		2	1		9	15	31
E5c	**8**	**16**		**1**	**2**	**4**	**1**	**1**		**22**	**113**	**168**
1	1	7		1	2	2	1	1		17	83	115
2	1	4								1	8	14
3	2	1				1				2	9	15
4		1								1	7	9
7	3	3								1	2	9
9	1					1					4	6
Grand Total	**22**	**101**	**2**	**2**	**9**	**14**	**4**	**12**	**3**	**91**	**364**	**624**

Table 7: Ground stones frequencies by phase and building.

	Lower grind stone	Upper grind stone	Mortar/ socket	Pestle	Pounder	Rubber/ muller	Vessel	Weight	Grand Total
E5a	**16**	**5**	**2**		**2**	**1**	**1**	**6**	**33**
1	5	1							6
2	1	2			1			2	6
3	3								3
4	1					1			2
7	2	2	2		1				7
9	4						1	4	9
E5b	**4**	**2**		**1**	**4**			**4**	**15**
1	1	2		1	2			2	8
4					1			1	2
5	2				1				3
9	1							1	2
E5c	**4**	**2**	**3**		**3**	**4**	**1**	**6**	**23**
1	1	1	2		1			4	9
3								1	1
4		1	1				1		3
8	1				2	3		1	7
9	2					1			3
Grand Total	**24**	**9**	**5**	**1**	**9**	**5**	**2**	**16**	**71**

Table 8: Chipped stone objects by phase and building number.

	Flake	Retouched flake	Blade	Retouched blade	Canaanean blade	Sickle blade	Tabular scraper	Waste	Grand total
E5a	**154**	**54**	**4**	**5**	**18**	**4**	**2**	**22**	**263**
1	8	2		2	1	1			14
2	14	4		1	2				21
3	9	5		1			1		16
4	7	4			2			1	14
7	1								1
9	115	39	4	1	13	3	1	21	197
E5b	**84**	**31**	**1**	**3**	**6**		**3**	**73**	**201**
1	11	3	1	3	3		1		22
2	2	1							3
3	5	5			1				11
4	7						1		8
5	5	3							8
7	2	4			1				7
8	9								9
9	43	15			1		1	73	133
E5c	**97**	**22**	**2**	**1**	**10**			**78**	**210**
1	37	3	2	1	3			12	58
2	4	2			1			9	16
3	19	7			5				31
4	14	2						26	42
7	1								1
8	4								4
9	18	8			1			31	58
Grand Total	**335**	**107**	**7**	**9**	**34**	**4**	**5**	**173**	**674**

Chapter 8. Data Analysis

The data presented in Chapter 7 were analyzed to address the questions and hypotheses posited in Chapter 6. In this chapter, two types of analyses are conducted and presented below, qualitative and quantitative. The first set of analyses are descriptive tabulations of materials. These analyses are considered qualitative because they required no quantitative analysis on the part of the researcher other than description of their tabulation. The quantitative analysis, presented subsequently, is conducted in two parts: hotspot and multivariate statistical analysis. The statistical analyses includes the consideration of data trends through time and across space using correspondence analysis (CA) and constrained correspondence analysis (CCA).

In order to place the analyzed data within the larger data corpus, maps are provided containing all centroids for each period (Figures 7-9). These maps include the centroids for every basket associated with the living layers from a stratum. Each centroid represents the center of an individual daily basket (pottery basket with associated other materials) excavated for each stratum. Centroid clusters often correspond with where the majority of objects are located in the frequency maps.

I. Descriptive tabulations

The frequency of each tool material type (osseous tools, ground stone tools, and chipped stone tools) are mapped by stratum. The related distributions within buildings, both in anterooms and courtyards, and the alleyway are described below. The data are also organized in the referenced tables.

I.A. Osseous tool frequencies

The osseous tool distribution throughout the E5 strata varies by tool type. As seen in the previous chapter, individual types are spread out within buildings and the alleyway. This section discusses the frequencies and distributions of tool types within architectural units by room type.

I.A.1 Awls

In the E5a stratum (Figure 10), three awls were recovered from three courtyards (one in each), one from an anteroom, and seven in the alleyway. In the E5b stratum (Figure 11), three were recovered from the alleyway. In the E5c stratum (Figure 12), six were recovered from three courtyards, one from an anteroom, and one from the alleyway.

Table 9: Bone awls by stratum, building number, and room type.

Building	E5a	E5b	E5c	Grand Total
1	**1**		**1**	**2**
Courtyard	1		1	2
2	**2**		**1**	**3**
Anteroom	1		1	2
Courtyard	1			1
3			**2**	**2**
Courtyard			2	2
7	**1**		**3**	**4**
Courtyard	1		3	4
9	**7**	**3**	**1**	**11**
Alleyway	7	3	1	11
Total	**11**	**3**	**8**	**22**

I.A.2 Points

The points found in the E5 strata (N=9) are primarily recovered from stratum E5a (N=6). In this stratum, four were found in buildings, two in courtyards, and two in two anterooms (Figure 19). The remaining two were recovered from the alleyway. In the E5b (N=1, Figure 20) and E5c strata (N=2, Figure 21), all specimens were found in the alleyway. For details, see Table 10.

Table 10: Bone points by stratum, building number, and room type.

Building	E5a	E5b	E5b	Total
2	**2**			**2**
Courtyard	1			1
Anteroom	1			1
3	**1**			**1**
Anteroom	1			1
4	**1**			**1**
Courtyard	1			1
9	**2**	**1**	**2**	**5**
Alleyway	2	1	2	5
Total	**6**	**1**	**2**	**9**

I.A.3 Handles

In the E5a stratum, there were 36 handles in five courtyards, 13 handles in two anterooms, and 9 handles in the alleyway (total N=58, Figure 13). The E5b stratum contained 27 handles (Figure 14): 7 from two different anterooms, 16 from three different courtyards, and 4 from the alleyway. The E5c handles (N= 16, Figure 15) were recovered from two anterooms (N=4) and four courtyards (N=12). For the distribution by building number see Table 11.

Table 11: Bone handles by stratum, building number, and room type.

Building	E5a	E5b	E5c	Grand total
1	**2**	**13**	**7**	**22**
Anteroom		1		1
Courtyard	2	12	7	21
2	**29**	**6**	**4**	**39**
Anteroom	12	6	3	21
Courtyard	17		1	18
3			**1**	**1**
Anteroom			1	1
4	**5**		**1**	**6**
Anteroom	1			1
Courtyard	4		1	5
5	**5**			**5**
Courtyard	5			5
7	**8**	**3**	**3**	**14**
Courtyard	8	3	3	14
8		**1**		**1**

Courtyard		1		1
9	**9**	**4**		**13**
Alleyway	9	4		13
Total	**58**	**27**	**16**	**101**

I.A.4 Spatulas

In the E5a stratum, 13 spatulas were found in anterooms, 21 from courtyards and 19 from the alleyway (Figure 16). In the E5b stratum, four spatulas were recovered from anterooms, three from courtyards, and nine from the alleyway (Figure 17). In the E5c stratum, 20 specimens were recovered from courtyards and two were recovered from anterooms (Figure 18). Table 12 has more information.

Table 12: Bone spatulas by stratum, building number, and room type.

Building	E5a	E5b	E5c	Grand total
1	**2**	**2**	**17**	**21**
Anteroom	1	1	1	3
Courtyard	1	1	16	18
2	**22**	**3**	**1**	**26**
Anteroom	10	3	1	14
Courtyard	12			12
3	**2**		**2**	**4**
Anteroom	2		1	3
Courtyard			1	1
4	**1**		**1**	**2**
Anteroom			1	1
Courtyard	1			1
5	**1**			**1**
Courtyard	1			1
7	**6**		**1**	**7**
Courtyard	6		1	7
8		**2**		**2**
Courtyard		2		2
9	**19**	**9**		**28**
Alleyway	19	9		28
Total	**53**	**16**	**22**	**91**

I.A.5 Shovels and dustpans

Dustpans (N=1) were only recovered from the E5a stratum. The single specimen was found in the courtyard of Building 2 as were two shovels. The remaining shovels from this period were recovered from the courtyard of Building 7 (N=4), the anteroom of Building 2 (N=1), and the alleyway (Figure 19). The shovels from the E5b stratum (N=2) were recovered from the courtyard of Building 2 and the alleyway (Figure 20). A single specimen from the E5c stratum was recovered from the courtyard of Building 1 (Figure 21). For more information see Table 13, below.

Table 13: Shovels and dustpans by stratum, building number, and room type.

	E5a		E5b	E5c
Building	Dustpan	Shovel	Shovel	Shovel
1				**1**
Courtyard				1
2	**1**	**3**	**1**	
Courtyard	1	2	1	
Anteroom		1		
7		**4**		
Courtyard		4		
9		**2**	**1**	
Alleyway		2	1	
Total	**1**	**9**	**2**	**1**

I.A.6 Scoops

Scoops were found primarily in the E5a (N=9) and the E5c (N=5) strata. A single object was found in the E5b anteroom of Building 1. In the E5a stratum (Figure 22), seven of the specimens were found in Building 2, four in the courtyard and three in the anteroom. The remaining two were found in the alleyway. The specimens in the E5c stratum were recovered from two buildings as well as the alleyway. All objects from the buildings were found in courtyards (Figures 20-21). For more information see Table 14.

Table 14: Scoops by stratum, building number, and room type.

Building	E5a	E5b	E5c
1		**1**	**3**
Anteroom		1	3
2	**7**		
Courtyard	4		
Anteroom	3		
3			**1**
Courtyard			1
9	**2**		**1**
Alleyway	2		1
Grand Total	**9**	**1**	**5**

I.A.7 Defleshers and shredders

Shredders were found exclusively in the E5a stratum (N=3, Figure 19). They were recovered from the courtyard of Building 2 and the alleyway. The defleshers (N=2, Figure 20) were found exclusively in the E5b stratum in the courtyard of Building 1 and the alleyway. For more information see Table 15 below.

Table 15: Defleshers and shredders by stratum, building number, and room type.

Building	E5a Shredder	E5b Deflesher
1		**1**
Courtyard		1
2	**2**	
Courtyard	2	
9	**1**	**1**
Alleyway	1	1
Total	**3**	**2**

I.A.8 Unidentifiable to type

The tool fragments that are unidentifiable to type are found in every context though quantities are higher in the courtyards than the alleyways (Figures 23Figure 23-26). The exceptions to this are in Buildings 1 and 2 during the E5b stratum, and in Building 3 during the E5c stratum. The alleyway also has many of these fragments. For more details, see Table 16 below.

These tool fragments may represent the remains of everyday wear and tear on objects and subsequent breakage, or they may represent waste from the production of new bone tools. Given the morphology and polish level on these tools, the former is more likely. One waster was found in an unclear context that appears to be the offcut of a handle. Though it is not included in these analyses, it does support the idea that household level bone tool production (or reuse of broken tools) may have occurred during this period.

Table 16: Unidentified fragments by stratum, building number, and room type.

Building	E5a	E5b	E5c	Building total
1	**12**	**6**	**83**	**101**
Courtyard	12	3	83	98
Anteroom		3		3
2	**51**	**16**	**3**	**70**
Courtyard	37		8	45
Anteroom	14	16		30
3	**12**		**9**	**21**
Courtyard			4	4
Anteroom	12		5	17
4	**4**	**2**	**7**	**13**
Courtyard	4	2	7	13
5	**4**			**4**
Courtyard	4			4
7	**30**		**2**	**32**
Courtyard	30		2	32
8		**19**		**19**
Courtyard		19		19
9	**77**	**15**	**4**	**96**
Alleyway	77	15	4	96
Total	**190**	**58**	**113**	

I.B. Ground stone frequencies

The field recording of ground stones was often done using precise point locations for each of the objects discussed below.

I.B.1 *Lower and upper grinding stones*

In the E5a stratum, there were four *lower* grinding stones found in the alleyway and 12 in five of the courtyards (N=16). Five *upper* grinding stones were found in three courtyards during this stratum (Figure 26). In the E5b stratum, one *lower* grinding stone was found in the alleyway and three were found in two courtyards (N=4). There were two *upper* grinding stones found in an anteroom during this period (N=3, Figure 27). In the E5c stratum, two *lower* grinding stones were found in the alley and two were found in two separate courtyards (N=4). There were two *upper* grinding stones found in two courtyards during this period (N=2, Figure 28Figure 28). For more information see Table 17 below.

Table 17: Lower and upper grinding stones by stratum, building number, and room type.

	E5a		E5b		E5c		Grand total	
Building	Lower grind stone	Upper grind stone	Lower grind stone	Upper grind stone	Lower grind stone	Upper grind stone	Lower grind stone	Upper grind stone
1	**5**	**1**	**1**	**2**	**1**	**1**	**7**	**4**
Anteroom				2			0	2
Courtyard	5	1	1		1	1	7	2
2	**1**	**2**					**1**	**2**
Courtyard	1	2					1	2
3	**3**						**3**	**0**
Courtyard	3						3	0
4	**1**					**1**	**1**	**1**
Courtyard	1					1	1	1
5			**2**				**2**	**0**
Courtyard			2				2	0
7	**2**	**2**					**2**	**2**
Courtyard	2	2					2	2
8					**1**		**1**	**0**
Courtyard					1		1	0
9	**4**		**1**		**2**		**7**	**0**
Alleyway	4		1		2		7	0
Total	**16**	**5**	**4**	**2**	**4**	**2**	**24**	**8**

I.B.2 Mortars/sockets, pounders, and pestles

Mortars/sockets are only found in the E5a and E5c strata. In the E5a stratum, they are recovered from courtyard contexts, whereas in the E5c stratum they are recovered from both courtyards and anterooms. Pestles and pounders, found across the E5 strata, are recovered exclusively from courtyards (Figures 28-32). For more information see Table 18 below.

Table 18: Mortars/sockets, pounders, and pestles by stratum, building number and room type.

	E5a		E5b		E5c	
Building	Mortar/ socket	Pounder	Pestle	Pounder	Mortar/ socket	Pounder
1			**1**	**2**	**2**	**1**
Anteroom					1	
Courtyard			1	2	1	1
2		**1**				
Courtyard		1				
4					**1**	
Courtyard					1	
7	**2**	**1**		**1**		
Courtyard	2	1		1		
8				**1**		**2**
Courtyard				1		2
Total	**2**	**2**	**1**	**4**	**3**	**3**

I.B.3 Rubbers/mullers and vessels

Rubbers/mullers and vessels are only found in the E5a and E5c strata in courtyards and in the alleyway. Their recovery in some contexts shows that they were in use. For more distribution information see Table 19 (below) and Figures 29 and 32.

Table 19: Rubbers/mullers and vessels by stratum, building number, and room type.

	E5a		E5c	
Building	Rubber/ Muller	Vessel	Rubber/ muller	Vessel
4	**1**			**1**
Courtyard	1			1
8			**3**	
Courtyard			3	
9		**1**	**1**	
		1	1	
Total	**1**	**1**	**4**	**1**

I.B.4 Weights

The weights from the E5a stratum (N=6) were in the alleyway (N=4) and the courtyard for Building 2 (N=2, Figure 32). In the E5b stratum, the weights (N=4) were found in each of the three contexts, one each in an anteroom and the alleyway, and the final two in the courtyard of Building 1 (Figure 33). All the weights in the E5c stratum (N=6) were found in courtyards with most in the courtyard of Building 1 (N=4, Figure 34). For further information see Table 20.

Table 20: Weights by stratum, building number, and room type.

	E5a	E5b	E5c	Grand Total
1		**2**	**4**	**6**
Courtyard		2	4	6
2	**2**			**2**
Courtyard	2			2
3			**1**	**1**
Courtyard			1	1
4		**1**		**1**
Anteroom		1		1
8			**1**	**1**
Courtyard			1	1
9	**4**	**1**		**5**
Alleyway	4	1		5
Grand Total	**6**	**4**	**6**	**16**

I.C. Chipped stone frequencies

Chipped stone frequencies will be discussed within the larger classes of debitage and tools. Multiple maps will represent the individual types from each class then a composite map for each type will represent the entire class. Tables presented can represent more than one class.

I.C.1 Debitage types

The flakes (N=335) are more often found in the courtyards (N=124) of buildings than in the anterooms (N=35) across all strata (Figures 35-37, Table 21). In the E5a and E5c strata, Buildings 1 and 2 contain no flakes in the anterooms. The alley contains a number of flakes in the E5a and E5b strata. In the E5b stratum, waste is only found in the alleyway. In the E5a stratum, the waste is primarily found in the alleyway (N=21 95.45%). Waste is most widely dispersed in the E5c stratum. During this period, less than half (N=31 39.74%) of the waste is located in the alleyway, with the remaining waste in Buildings 1, 2, and 4 in the courtyards.

Table 21: Flakes and waste by stratum, building number, and room type.

	E5a		E5b		E5c		Grand total	
Building	Flake	Waste	Flake	Waste	Flake	Waste	Flake	Waste
1	**8**		**11**		**37**	**12**	**56**	**12**
Anteroom			5				5	0
Courtyard	8		6		37	12	51	12
2	**14**		**2**		**4**	**9**	**20**	**9**
Anteroom			2				2	0
Courtyard	14				4	9	18	9
3	**9**		**5**		**19**		**33**	**0**
Anteroom	8		3		15		26	0
Courtyard	1		2		4		7	0
4	**7**	**1**	**7**		**14**	**26**	**28**	**27**
Anteroom	2	1					2	1
Courtyard	5		7		14	26	26	26
5			**5**				**5**	**0**
Courtyard			5				5	0
7	**1**		**2**		**1**		**4**	**0**
Courtyard	1		2		1		4	0
8			**9**		**4**		**13**	**0**
Courtyard			9		4		13	0

9	**115**	**21**	**43**	**73**	**18**	**31**	**176**	**125**
Alleyway	115	21	43	73	18	31	176	125
Grand total	**154**	**22**	**84**	**73**	**97**	**78**	**335**	**153**

I.C.2 Tool types

The chipped stone tools are presented below. The E5a stratum tools (Figures 38 and 39, Table 22) are largely found in courtyards and the alleyway. The retouched flakes are the only type recovered from anterooms (N=7 in anterooms, N=7 in courtyards). For this analysis, the potential drills and scrapers primarily identified as retouched flakes are not separated from this corpus. In the E5a stratum, most tool types are found in the alleyway (~70%). These tools include retouched flakes, Canaanean blades, and sickle blades. All blades from this period were recovered from the alleyway as was one of the tabular scrapers (N=2).

In the E5b stratum, more of each type of tool (other than retouched flakes) were found in the buildings than in the alleyway (Figure 40, Table 23). Retouched flakes recovered from buildings were found in both the anterooms (N=6) and the courtyards (N=10). The blade and retouched blades were recovered from the courtyard of Building 1. Five of the six Canaanean blades were recovered from buildings (courtyards N=4) and two of the three tabular scrapers were also found in courtyards.

The E5c stratum tools (Figure 41, Table 24), were primarily found in buildings. There were no tabular scrapers from this stratum. The retouched flakes (N=22) and the Canaanean blades (N=10) were found in courtyards (N=9 and N=6 respectively), anterooms (N=5 and N=4 respectively), and in the alleyway (N=8 and N=1 respectively). The remainder of the tools (N=3) were found in the courtyard of Building 1.

Table 22: Chipped stone tool types in the E5a stratum by building number and room type.

	E5a					
	Retouched flake	**Blade**	**Retouched blade**	**Canaanean blade**	**Sickle blade**	**Tabular scraper**
1	**2**		**2**	**1**	**1**	
Anteroom	1					
Courtyard	1		2	1	1	
2	**4**		**1**	**2**		
Courtyard	4		1	2		
3	**5**		**1**			**1**
Anteroom	4		1			1
Courtyard	1					
4	**4**			**2**		
Anteroom	2			1		
Courtyard	2			1		
9	**39**	**4**	**1**	**13**	**3**	**1**
Alleyway	39	4	1	13	3	1
Grand Total	**54**	**4**	**5**	**18**	**4**	**2**

Table 23: Chipped stone tool types in the E5b stratum by building number and room type.

	E5b				
	Retouched flake	**Blade**	**Retouched blade**	**Canaanean blade**	**Tabular scraper**
1	**3**	**1**	**3**	**3**	**1**
Anteroom	3				
Courtyard		1	3	3	1
2	**1**				
Anteroom	1				
3	**5**			**1**	
Anteroom	2			1	
Courtyard	3				
4					**1**
Courtyard					1
5	**3**				
Courtyard	3				
7	**4**			**1**	
Courtyard	4			1	
9	**15**			**1**	**1**
Alleyway	15			1	1
Grand Total	**31**	**1**	**3**	**6**	**3**

Table 24: Chipped stone tool types in the E5c stratum by building number and room type.

	E5c			
	Retouched flake	**Blade**	**Retouched blade**	**Canaanean blade**
1	**3**	**2**	**1**	**3**
Courtyard	3	2	1	3
2	**2**			**1**
Courtyard	2			1
3	**7**			**5**
Anteroom	5			4
Courtyard	2			1
4	**2**			
Courtyard	2			
9	**8**			**1**
Alleyway	8			1
Grand Total	**22**	**2**	**1**	**10**

I.D. Qualitative conclusions

The data presented above provide some insight into the use of space during the Early Bronze Age III in the non-elite domestic quarter of Tell eṣ-Ṣâfi/Gath. Most of the tool remains are found in the courtyards in all three periods, and often objects are found in the alleyway, particularly in the earlier periods. The implications of these observations will be discussed further in the next chapter.

II. Quantitative analyses

Quantitative analyses were conducted using GIS and CRAN R from frequencies and locations of occurrences derived from the qualitative data above. The observations from the hotspot analysis will be discussed in the first section followed by multivariate analysis.

II.A. Hot spot analyses of data

Results of kernel density analyses conducted follow the trends of the frequency maps referenced above. Maps of the osseous and chipped stone tools were also created to investigate the relationship between concentrations of materials and the centroids of baskets. While the size of the

hot spots vary, their locations and shape reflect the use of centroids for many of the baskets included in the analysis. Figures 44 through 49 present these maps. The brighter center of a sphere represents a higher concentration of materials. The blue stars represent basket centroids.

II.B. CA and CCA analyses

The data were constrained by architectural units, and this will be discussed below. Correspondence analyses (CA) and constrained correspondence analyses (CCA) were conducted to investigate the distribution of tools in each stratum. The analyses were run twice, first using raw counts of the materials in the structures as presented above. The second time the assemblages were standardized to account for bias in the frequencies because of incomplete excavation. The raw counts are assumed to each represent an individual object, none of the data represent the same object twice or more. The standardization process follows the percentage of the building excavated as represented in Table 25 below. When standardizing data partial objects were not considered.

Table 25: Percent of each structure excavated by room type including multiplier used to standardize data.

Building	Room	Percent excavated	Multiplier
1	Anteroom	100	1
	Courtyard	100	1
2	Anteroom	70	1.43
	Courtyard	50	2
3	Anteroom	100	1
	Courtyard	95	1.05
4	Anteroom	70	1.43
	Courtyard	55	1.82
5	Courtyard	50	2
7	Courtyard	30	3.33
8	Courtyard	40	2.5
9		100	1

II.B.1 Correspondence analyses (using R)

Correspondence analysis was used to calculate the statistical correlation between the objects in the different contexts (building, room type) through time. The results from the non-standardized data show that 51.6% of the total variance is accounted for by space. The CA of the standardized data shows that 51.5% of the total variance is accounted for by space, or where the object was found.

When investigating the non-standardized data, the artifact spread on the CA axes show three main trends (Figure 3). First, and strongest, is that chipped stone waste is isolated and negative on the first axis. These waste fragments are clearly associated with the E5b and E5c alleyway as well as Courtyards 2 and 4 in the E5c stratum. This supports the assertion that the alleyway is a refuse dump in the earlier strata. The association of the chipped stone waste and the two E5c courtyards may be due to the locations that they were found (in loci abutting walls). When remodeling took place waste may have been pushed along the wall as the centers of the courtyards were cleared for new surfaces.

Second, bone spatulas, handles, awls, and upper grinding stones are located on the positive dimensions of the first and second axes. This suggests that the E5a and E5c courtyards and anterooms are associated with bone spatulas, handles, awls, and upper grinding stones. All of these associations support the assertion that courtyards are working areas.

Third, the remainder of chipped stone tools are clustered with the anterooms and courtyards around zero on the first axis suggesting that they are more average. Sickle blades and lower grinding stones are the most negative on the second axis and are grouped with three courtyards from three buildings in three strata.

The main trends on the standardized CA (Figure 4) remain nearly identical, if slightly clearer, suggesting that the frequencies are reasonably robust, even with partial excavation of some of the buildings or rooms. The only exception is that the results were flipped over the second, arbitrary, axis. One noticeable change is the addition of the anteroom of Building 2, across strata, to the cluster containing bone handles, spatulas, awls, and upper grinding stones. This may be reflective of the more widespread excavation of this portion of Building 2 that provided a larger corpus before standardizing the data, or it may indicate something else entirely. One additional observation to note is that though the alleyway is a completely different depositional context, the association with the chipped stone waste in the earlier phases is clear. This further supports the assumption that alleyways are refuse areas as this is the only true refuse type included in the statistical analysis. The repetition of trends in frequency and co-occurrences show that both the standardized and non-standardized data are robust and consistent.

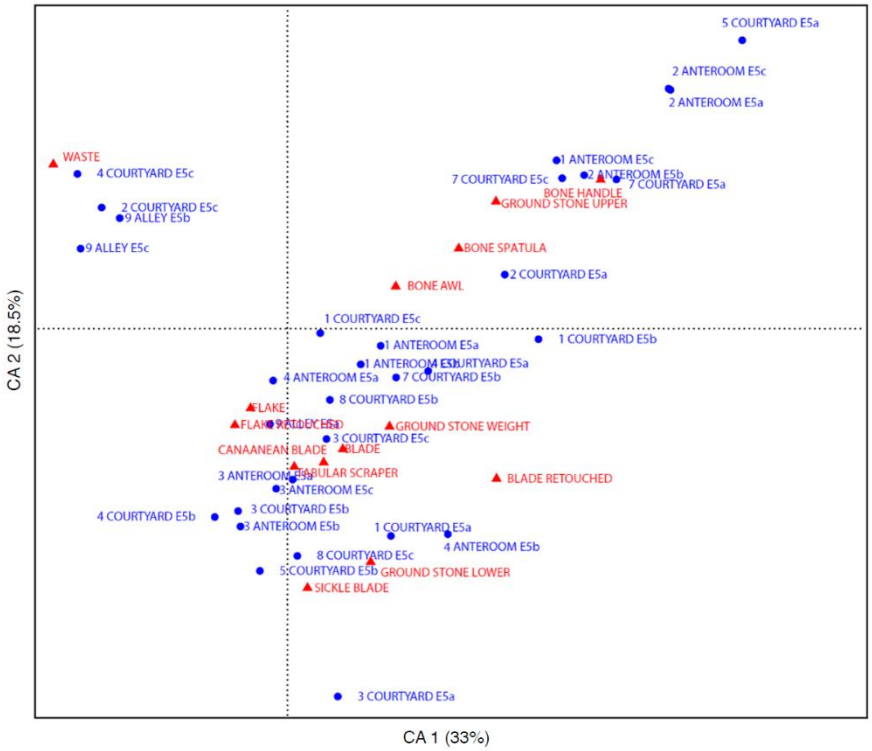


Figure 3: Biplot of CA results using non-standardized data.

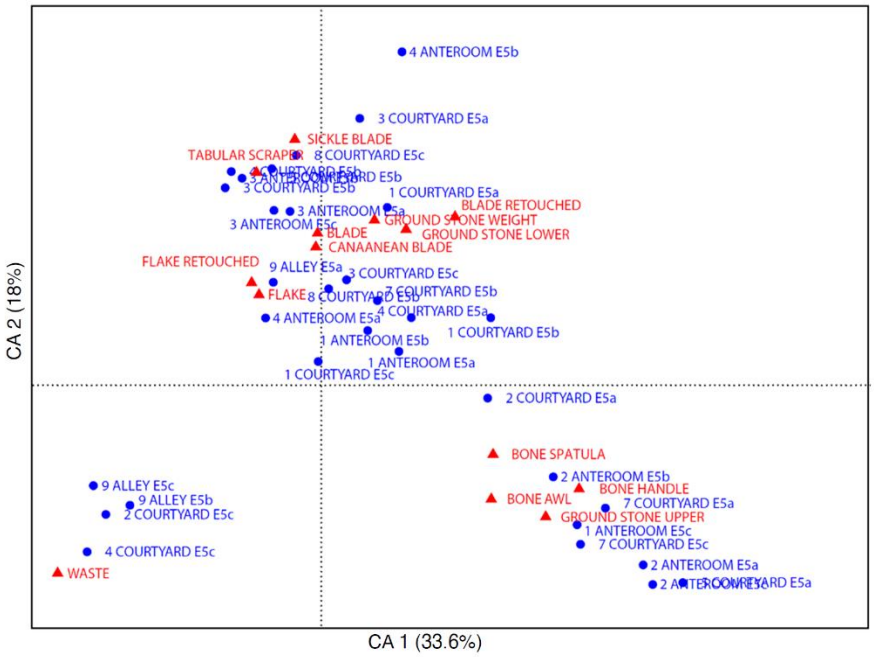


Figure 4: Biplot of CA results using standardized data.

II.B.2 Canonical (constrained) correspondence analyses (using R)

The results of the CCA are as follows. The total variance in the assemblage accounted for by time and feature type in the non-standardized data is 26.3% (22.5% on the first axis and 2.4% on the second axis). When investigating the total variance in the standardized object assemblages by time and feature type, 25.2% (22.5% on the first axis and 1.8% on the second axis) of the variance was accounted for by these variables. This is slightly lower than the non-standardized, but it is likely due to the lower number of outliers in the standardized data. Observations concerning the non-standardized data will be presented first followed by those observations concerning the standardized data. In both cases, only the first axis is statistically significant.

When constraints are placed on the non-standardized data, the chipped stone waste, retouched blades, osseous spatulas, and handles are the most important sources of variation on the first axis. This is seen in Table 26. The overall model is statistically significant at $p < 0.001$. Both time ($p<0.007$) and feature type ($p<0.001$) are significant and account for 85.5% of the constrained

variance on CCA1. Figure 5 represents the results of the CCA analysis with the objects and constraints (time and room type). However, it does not present the room number and phase. The data trends are clearer when presented in this manner.

Both the alleyway and the courtyards are located close to the origin of the axes, indicating that there is less variance within these areas over time. However, the tabular scrapers, spatulas, and Canaanean blades appear more frequently in the anterooms as time progresses. Both bone spatulas and handles increase in frequency over time in the non-standardized data as well. These are both seen more frequently within courtyards. Upper grinding stones also follow this pattern in the courtyards.

As was also seen in the CA analysis, the alleyway is unique. The object types in this context do not change considerably over time. Chipped stone waste (shifted slightly toward the vertical axis to conserve room on the triplot by the author) continues to be an outlier and remains associated with the alleyway and courtyards. This material is more frequent in the earliest periods (E5c and E5b). Higher frequencies of flakes, retouched flakes, blades, and bone awls are also seen in the alleyway in the earlier phases.

When constraints are placed on the standardized data, the chipped stone waste, and upper grinding stones as well as osseous spatulas and handles are most important sources of variation on the first axis. This is seen in Table 27. This (and the next) table breaks down the proportion of variance by object on each CCA axis. The larger coefficients have a greater influence on the amount of variance. Both time ($p<0.006$) and feature type ($p<0.002$) are significant and account for 89% of the constrained variance on CCA 1 for these data (Figure 6). The overall model is significant ($p<0.001$). The first axis of the CCA is also significant ($p<0.002$).

Table 26: Cumulative proportion of variance of each object type accounted by CCA axis in non-standardized data.

	CCA1	CCA2	CCA3
Retouched flake	0.000689027	0.177739253	0.179250725
Retouched blade	0.142479126	0.176720053	0.181041836
Tabular scraper	0.019487194	0.023838071	0.023838111
Canaanean blade	0.025382293	0.039346398	0.043949635
Sickle blade	0.020775366	0.062383757	0.304445796
Blade	0.00204079	0.010915139	0.089566271
Waste	0.570979351	0.582796969	0.586949614
Flake	0.020611938	0.026162598	0.041999064
Spatula	0.254741302	0.261146441	0.27351369
Handle	0.374391293	0.379643013	0.387862645
Awl	0.000831782	0.001708056	0.002502163
Lower grind stone	0.068836372	0.105090713	0.146569429
Upper grind stone	0.107663442	0.11987284	0.131625437
Ground stone weight	0.00365383	0.041146793	0.041415557

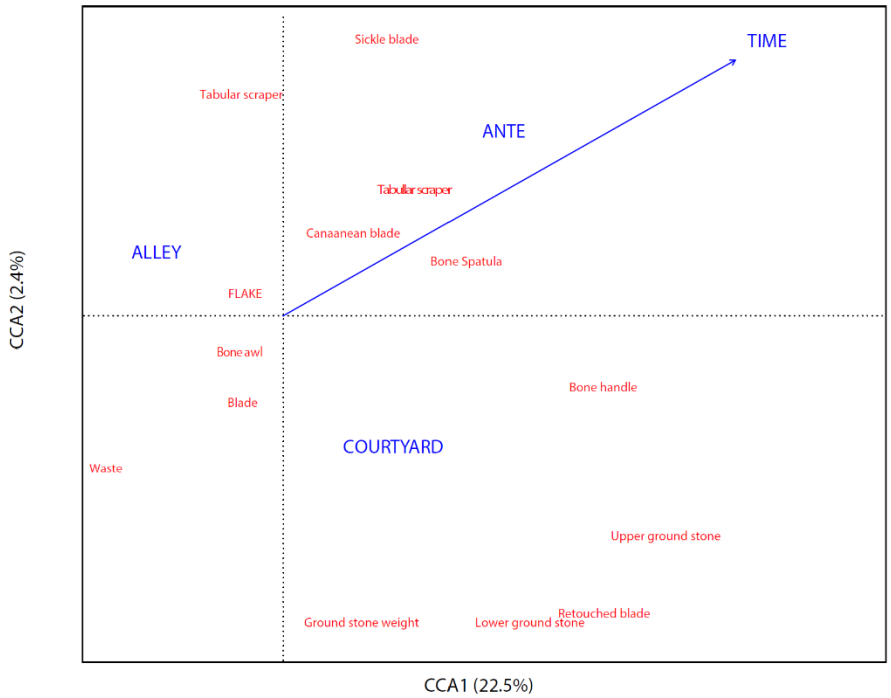


Figure 5: Triplot of CCA using non-standardized data

The same trends that are observed in the non-standardized data are seen in the standardized data though the grouping is more pronounced.

Table 27: Cumulative proportion of variance of each object type accounted by CCA axis in standardized data.

	CCA1	CCA2	CCA3
Retouched flake	0.004636	0.107431	0.107466
Retouched blade	0.08944	0.101245	0.105342
Tabular scraper	0.004795	0.007664	0.007848
Canaanean blade	0.008279	0.024936	0.028671
Sickle blade	0.002495	0.090511	0.258968
Blade	0.023498	0.026686	0.090024
Waste	0.547528	0.555031	0.556781
Flake	0.058578	0.061871	0.069939
Spatula	0.323157	0.334167	0.340075
Handle	0.420374	0.427075	0.433125
Awl	0.002723	0.012386	0.014086
Lower grind stone	0.066697	0.093282	0.136049
Upper grind stone	0.172442	0.193162	0.194238
Weight	0.000497	0.017955	0.01829

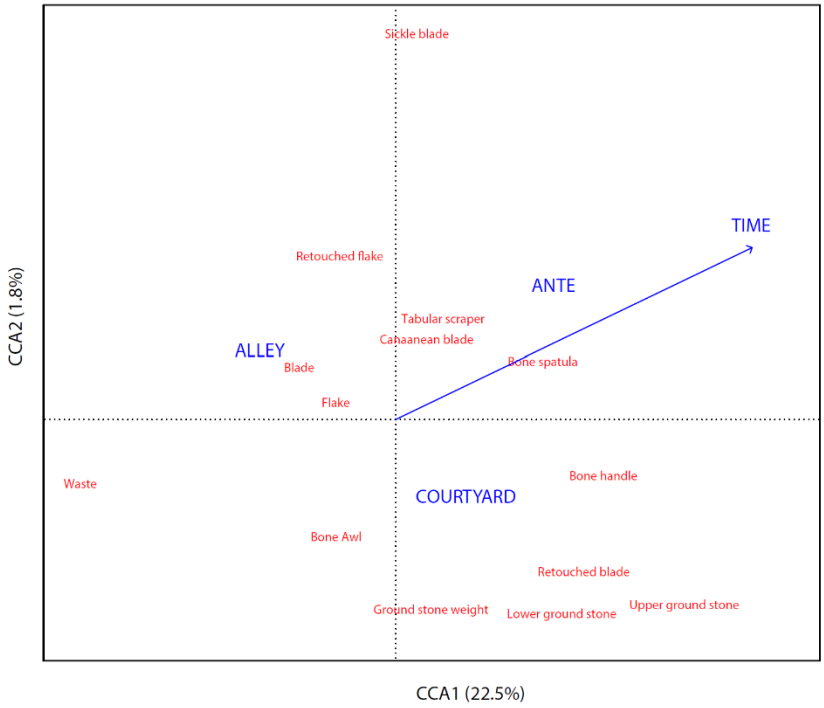


Figure 6: Triplot of CCA results using standardized data

III. Conclusions

The results presented in this chapter are interpreted and discussed in the following chapter (Chapter 9). This is approached through the restatement and subsequent discussion of the research questions and hypotheses.

Chapter 9. Discussion

This chapter uses the results presented in the previous chapter to investigate the research questions and test the hypotheses presented in Chapter 6. The questions will be presented as they were in Chapter 6 and the relevant data discussions will follow. Additionally, questions regarding the use of legacy data are outlined and addressed in §II of this chapter.

I. Data research questions and hypotheses

The research questions and hypotheses from Chapter 6 are restated below with the supporting or refuting data subsequently explained.

I.A. Does the building represent the household?

This question is also paired with 'What buildings are associated with a household?'. Both questions are addressed by identifying social units (i.e., single or extended households) and the size of these units (large or small). The hypothesis states that the repetition of (1) the means of production including food and goods or (2) reproduction (such as sleeping areas in each small architectural unit) signifies that each unit is occupied by an individual small scale social unit. If there is no repetition, then the social unit inhabits multiple architectural units.

Given the small size and standardization of form of each of the buildings, it would imply that each architectural unit is likely occupied by a single small-scale social unit. Using the data that are available for this research, the understanding is that the household of a small family unit is represented by each individual architectural unit consisting of a courtyard and associated anteroom(s). This is evidenced by the repetition of the tool types between buildings and the CA and CCA result. The CA results show that approximately 51.5% of the differences in any assemblage are accounted for by space – i.e., where they are located. The 48% of variation is likely due to a host of other variables such as discard of waste into the alley where objects are mixed,

cleaning, and renovations of buildings. In the CA the analysis looks at the clustering of individual aspects, each anteroom, courtyard, and alleyway phase is separate, i.e., in the CA individual snippets are investigated rather than a trajectory through time as is addressed in the CCA.

The CCA results state 89% of the constrained variance of the assemblage is accounted for by time and type of place (courtyard, anteroom, or alley). These statistics support the repetition of means of production such as food or goods. Using the assemblages available for analysis, it is not possible to infer sleeping areas in each architectural unit.

It is not possible to determine if the adjacent architectural units (e.g., houses) represent the extended multi-generational household system. If the case were that siblings, parents, grandparents, and so on inhabit neighboring or adjacent architectural units, they would represent an integrated multi-building household system. The extended household may inhabit multiple identical architectural units. In the absence of texts, it is not possible to determine if monogamy or polygamy is the standard marital practice in this region and time. With the data available from Tell eṣ-Ṣâfi/Gath, it is not possible to archaeologically identify different kinship systems (i.e., nuclear families, extended families, etc.). The repetition of artifacts between each architectural unit consists of a courtyard and associated anteroom(s). This architectural layout is repeated over and over again in neighboring units. Given the small size and repetitive nature of the architectural units (i.e., buildings), it would imply that each architectural unit is likely occupied by a separate small household unit.

The repetitive nature of each building's contents also suggests that each building represents the domicile of separate domestic residential units. This is evidenced by the repetition of the tool types between buildings and the CA and CCA result. The CA results show that approximately 51.5% of the differences in any assemblage are accounted for by time and space variables. The

CCA results state 89% of the constrained variance of the assemblage is accounted for by time and room type. These statistics support the repetition of means of production including food or goods. Using the assemblages available for analysis, it is not possible to infer sleeping areas in each architectural unit. Thus, the size and architectural patterning suggests that each architectural unit (i.e., building) represents the residence of a small-sized social unit. In sum, the repetition of architectural units and the artifacts in each suggests that each building contains a single social unit.

The nature of any interaction between social units inhabiting adjacent architectural units (i.e.., buildings) cannot be inferred. The social units may have been integrated into an extended multi-generational household system. If the case were that siblings, parents, grandparents, and so on inhabit neighboring or adjacent architectural units, the various neighboring buildings would represent an integrated household system as the extended household may inhabit multiple identical units. In the presence of polygamous marital practices, each wife may have a separate domicile area. However, in the absence of texts, it is not possible to determine marital practices (e.g., monogamy or polygamy) for this region at this time. Consequently, it is not possible to archaeologically identify or distinguish between different kinship systems with the data available from Tell eṣ-Ṣâfi/Gath.

I.B. What activities are completed in a building?

This question is approached with two smaller ones: (1) Is there repetition between buildings in their artifactual assemblages? (2) If so, what is the meaning? The hypothesis states that if there is repetition in the assemblages, then the same types of activities occur in each unit.

A wide range of materials were recovered from the non-elite residential neighborhood excavated in Area E at Tell eṣ-Ṣâfi/Gath. If the few exotic goods found in the houses are discounted (Greenfield et al. 2020), the material corpus retrieved from each of the architectural units suggests

that the activities were domestic in nature. The repetition in assemblages between each of the architectural units is clear. This is likely the result of similar domestic activities occurring within each individual architectural unit.

While the specific tool function for each of the morphological types has not been identified by the specialists, the use of each tool type can be inferred from their morphology and comparative studies. For example, grinding stones were likely used for cereal and grain grinding. Bone spatulas and scrapers have a variety of uses including fine scraping or cleaning of hide and weaving of either baskets or textiles. Neither textiles nor baskets are preserved in the archaeological record in this part of the region. It may be inferred that these activities took place from the spindle whorls (likely for weaving) and secondary use ceramic sherds (burnishers likely for hide processing) in the assemblages. Bone awls are likely also used in both situations.

Thus, numerous domestic activities were conducted in each of the buildings, including food storage (from the pottery), food processing (ground stones, cooking pots, butchered fauna), tool upkeep and modification (chipped stone debitage, bone tool debitage), garbage disposal (debitage), entertainment (game boards and playing pieces) and ritual (figurines, donkey burials) (Greenfield, Shai, and Maeir 2020, Greenfield, Ross, Albaz, et al. 2022, Greenfield, Ross, Greenfield, et al. 2022, Albaz et al. 2022). The tool types analyzed also suggest the presence of weaving, basketry, and or leather working (spatulas, spindle whorls, defleshers, scrapers, etc.) (Richardson et al. 2021). Garbage disposal is evident in the alley with the large amount of debitage and unidentifiable worked bone as discussed with both the CA and CCA results in Chapter 8 (Greenfield et al. 2016, Brown, Greenfield, and Maeir 2021).

I.C. What is the distribution of activities between buildings within the same stratum?

The original hypothesis addresses the specific question "Are the same activities completed in each of the buildings within a stratum?" This hypothesis states that if activities are the same between buildings, then each building represents a different household.

This question is investigated with the tool types that are present in the respective assemblages from each building. There is little variance between the tool types in each building as discussed above. This supports the assertion that each building has its own production area, be it food, textile, basketry, tool upkeep, etc. These activities are often confined to the courtyard areas. More complete examples of small tools are found in the anterooms than in the courtyards or alleyway. However, these more complete examples are found at a lower frequency than any examples in courtyards and the alleyway.

Additionally, when considering the singletons, or data that had low occurrences, such as objects for recreational or adornment (game pieces, beads, figurines, toggles), and tools (spindle whorls, and metal objects), their value or usefulness precluded them from being recovered in every stratum as they continued to be used. The objects that were recovered were broken, or in the case of beads, likely lost as they were not found in groupings (other than the vessel containing beads and a cylinder seal). When these objects were recovered in the architectural units, they are located often in courtyards. This supports the suggestion that such activities were taking place in these locations (i.e., courtyards) and these areas were used for gathering.

Investigating the activity areas bound by the courtyards would be ideal, however the data collection method (large baskets, few special points) does not provide the resolution of spatial data necessary for an analysis at such a scale. The use of centroids allows incorporation of both occasional point data, as well as information from the larger baskets. However, as seen in the

frequency maps, the overlapping boundaries, and subsequent overlapping centroids creates a false concentration of objects. This data collection hurdle is addressed further in the next chapter.

I.D. What are the similarities in activities within a building over time?

The original hypothesis addresses the specific question, "Are the same activities completed within the same building between strata?" If so, what are their implications? The hypothesis predicts that if activities are the same between strata, then the same social unit inhabits the same building over time. This suggests generational continuity of occupants within an architectural unit such as a building. This conclusion is supported by the stratigraphic observations that buildings are being reconstructed over and over again along the same lines – new walls are constructed directly atop early walls so that the size and layout of the building maintains continuity over time (e.g., from Stratum E6 to E5c stratum, Stratum E5c to E5b to E5a) (Greenfield, Shai, and Maeir 2017).

The CCA analysis supports the understanding that there is generational continuity of social units over time (i.e., between strata). This suggests the same social unit occupies the same space over time. The same tools with a similar distribution from one stratum to the next suggests the same activities are occurring in the space. There are increases in certain tool types through time (including handles, spatulas, and upper ground stones - Figures 5-6), however this may also be due to the lack of an occupation gap between renovations (strata) and the tendency for whole, useful tools to continue their use life from one phase to the next. There is no logical reason that the objects still in working order would have been discarded if the population and activities remain constant in these locations over time. The lack of certain objects through the strata that have been identified as singletons (i.e., cylinder seals, figurines, metal objects, and metal tools, etc.) have long been thought to fit this paradigm. If an object is valuable or difficult to replace it would have been used from one phase to another, not discarded. There is no reason to think that this did not also apply to

tools made from bone, chipped stone, or ground stones as they still take time to construct even if the materials are readily available, particularly bone. Therefore, in this case, the lack of certain object types in different strata does support the continuity of a population through time.

The alleyway is consistently used for refuse disposal, particularly chipped stone waste (Figures 5-6) in the earlier phases (E5c and E5b strata), whereas there is less of this material represented in the alley in the E5a stratum, presumably due to the abandonment of the site rather than another phase of remodeling. If we are to also consider the donkey burials, though they are not part of the living layers analyzed here, their presence under each of the floors of the same buildings in each stratum support the generational continuity of occupants (Greenfield et al. 2021, Greenfield, Ross, Greenfield, et al. 2022). As with the above question, this could be better addressed with a more discerning field data collection method.

II. Questions on legacy data usage

In addition to the research questions and hypotheses introduced in Chapter 6 and addressed above, this research deals with the concept of 'legacy data.' The technical definition of legacy data is data from obsolete information systems (Allison 2008). This translates in real-world contexts to data that are not yet digitized, georeferenced, or manipulated for digital analyses at the time of analysis. Hand drawn technical maps or drawings are examples of legacy data in the digital world. Therefore, for the purpose of this thesis, legacy data are defined as data that are not digital.

Throughout the digitization process for this thesis, questions arose regarding the potential to apply this approach to other sites excavated prior to the advent of computer databases and GIS tools. The original, overarching, questions regarding this dataset were:

(1) Can a digital spatial database be built from legacy data?

(2) Will the digital spatial database contain statistically significant data?

(3) Are the data statistically significant through both time and space?

(4) What are the benefits to implementing spatial analysis of legacy data?

Each of these questions will be investigated and discussed below with examples from this dataset as evidence for the conclusions drawn.

II.A. Can a digital spatial database be built from legacy data?

A digital spatial database can be built from legacy data. These legacy data include hand drawn paper maps and written notebooks. All of the analyses discussed in this research contain data from field seasons where data were recorded on paper maps and written in notebooks. The digitization process is time consuming and tedious at times. However, the results of digitization and subsequent analyses provide a different level of quantitative analysis that is not as easily accomplished with non-digital analyses.

II.B. Will the spatial database contain statistically significant data?

Spatial databases built from legacy data can contain statistically significant data as shown here. However, it must be noted that the outputs are only as precise as the inputs. In other words, the care that is taken to digitize the data can impact the types of analysis and results. Additionally, the excavation and recording methods (and their precision) also impact the utility and resolution of the digitized data in terms of statistical significance and spatial analyses.

II.C. Are the digitized data statistically significant through both time and space?

The data analyzed for this thesis returned results that are statistically significant through time and space as shown and discussed above. However, this may not always be the case for all data, nor are the results necessarily the result of the digitization process. Rather, the analyses may return non-significant results because the data contain no statistically significant patterning. There are many reasons this may occur.

II.D. What are the benefits to implementing spatial analysis of legacy data?

There are several benefits to implementing this type of analysis. First and foremost is the creation of an integrated GIS database. This occurs not as a goal, but as a byproduct of the preparation for analysis. This integrated GIS database is a comprehensive catalogue of all strata, architectural units, excavation units, material culture, and their spatial parameters. It indicates the spatial relationships amongst all potential variables. A database such as this is a formidable archival tool. Archiving the data within such a framework creates a sharable set of files in a format that can be used with multiple software programs. Files should be saved in a format that ensures that the data are readable far into the future and that the file type will not become obsolete.

The database created for the above analyses from Tell eṣ-Ṣâfi/Gath is the only integrated database for Area E that includes specialist information associated with the spatial and related excavation data. The linkages in the database provide both the excavators and the specialists with more information than is otherwise available when analyzed on their own. It avoids the compartmentalization of specialist analyses and reports common to the literature.

A different approach to the initial question is instead asking 'Is this type of spatial analysis worthwhile implementing over traditional analyses in a complex tell formation?' This is a loaded question, and one that the author initially was interested in from a qualitative approach. The process of digitizing archaeological data from one excavation area of a single stratum site is in and of itself a large undertaking. When applying this digitization method to a tell site where multiple strata are superimposed, the process is exponentially complicated and lengthened.

If the data are considered quantitatively, then the level of achievable analysis is dependent upon the resolution of the data available (as discussed above). While this is true, the ease of analysis and visibility of patterning are definite benefits to the process, as exemplified in this thesis.

III. Conclusions

In this chapter, the research questions presented in Chapter 6 were addressed with regard to the results of analyses (from Chapter 8). The next chapter, Chapter 10, applies these findings to broader regional questions. A discussion of the significance of the use of legacy data is also included.

Chapter 10. Conclusion

This chapter has four sections. Section one applies the results of this thesis to our knowledge of urban planning and urban households in the southern Levantine region during the EB III. Section two summarizes the obstacles in and outcomes from creating a digital spatial database for this thesis. These are used to highlight three main considerations for future excavations that have emerged from the digitization process. Section three contains a discussion of the significance of the methodological application of legacy data in the field. Finally, section four provides the final conclusions for this thesis.

I. Significance of archaeological findings in general terms

I.A. Urban planning

Urban planning organized from a central administrative authority is evident at several sites in this region during the Early Bronze Age II and III (e.g., Miroschedji 2012, 1993, Greenberg 2011a, 2014a, Greenberg and Paz 2014, Miroschedji et al. 2001, etc.). The site of Tell eṣ-Ṣâfi/Gath also shows signs of such urban planning. This is represented at Tell eṣ-Ṣâfi/Gath by the construction of a massive fortification system around the entire upper city, by the construction of lines of terraces where rows of houses are constructed in the non-elite domestic quarter (Area E), as well as the conjoined construction of the houses and their uniform size and layout. The reuse and remodeling of the structures along the same property lines from phase to phase suggests that they were used by multiple generations of the same social unit. Only small changes were made to the internal structure to fit the household's changing needs, while the outer structure did not change over time. Additionally, activities within houses and their associated rooms did not change significantly over time, further supporting reuse, remodeling, and planning of the use of space on the micro and macro scales.

I.B. Urban households

The structures in Area E have been thought to represent domestic residences due to the nature of the vast majority of material corpus recovered from them (e.g., Greenfield, Shai, and Maeir 2020, Greenfield, Ross, Albaz, et al. 2022). Given the size of the architectural units (c. 5x7 m = 35m^2), their layout, and the repetitive nature of domestic activities occurring within, it is suggested that they were occupied by small sized residential units, in other words small households.

From the analyses presented in this thesis, it is clear that the courtyards are the major areas of activity. Activities conducted within the courtyards include food preparation, tool modification and upkeep, hide preparation, and weaving (either basketry or textiles). Additionally, these spaces were used as gathering areas evidenced by the recreational (game pieces and boards) and personal adornment (beads, toggles, etc.) objects.

The anterooms may have also been used for other activities such as for resting or activities requiring privacy, but it is impossible to know given the nature of the evidence. The anterooms and courtyards, while within the same architectural unit, also share some material types. The smaller whole objects are often found in the anterooms, whereas the fragmented (but functional) objects and larger whole objects are found in courtyards. This suggests that the anterooms were storage areas, and the courtyards were used for production and upkeep of tools.

Also, since doorways were not preserved for the most part, it is unclear if one enters the residence through the anteroom or courtyard. The alleyway was used as a midden and contained refuse through all three phases. The abandonment of the site at the end of the E5a stratum meant there was less refuse deposited than in earlier phases where its removal was necessary for remodeling. In this stratum, there are higher depositions of waste in the courtyards.

II. Summary of database completion and obstacles

This thesis uses data collected over 14 excavation seasons (2004-2017) at the site of Tell eṣ-Ṣâfi/Gath as a case study to examine households in the Early Bronze Age III of the southern Levant. Before analyses for this thesis could be conducted, the osseous tools, ground stone tools, and the chipped stone assemblages were analyzed by specialists. These tools were selected from the larger assemblage as they provided sufficient quantities to yield statistically significant patterns in the data. Singletons, such as the single cylinder seal, are not included in the statistical analyses conducted for this thesis. The specialist data were compiled and analyzed to address the research questions pertaining to the nature of the spatial organization of households.

The methods used to collect field data placed constraints on the nature and range of analyses. These limits include large mapped daily excavation locations (baskets) and undifferentiated loci containing multiple depositional contexts and time periods (strata). Field methods such as this inhibit the precision of any spatial analyses as they present general rather than precise coordinates when investigating the spatial distribution of individual objects.

As a consequence, significant results from analyses using distance between objects as a metric (permutation tests) are unobtainable. The use of a locus and basket system inherently centralizes data, and when the same large area is excavated over several days, as is often the case in the excavation of tell, this creates a stack of centroids. This provides a false area of artifact (and by implication activity) clustering. One means by which such results can be avoided is through the use of smaller boundaries of excavation, for instance breaking a $5x5m^2$ area into 25 individual $1m^2$ areas. The remains from each must be separately recorded. The size of the collection unit determines the kinds of spatial questions that can be addressed by spatial analysis and sampling strategies must be adjusted accordingly. Of course, this begs the question of paperwork and

manpower against ultimate payoff. The ideal is to separately map and record each object. These decisions need to be made before excavations begin by the director of excavations, and they need to be consistently carried out by the excavation and registration staff.

The obstacles encountered in the construction of the GIS and spatial database have highlighted three key future considerations for future projects intending on conducting spatial investigations. The recommendations are as follows.

First, the resolution of data collection on new projects needs to be precise. Small excavation units (e.g., baskets) and more data points enable a larger range of analyses to be conducted. In short, the greater the spatial precision of the data (with more objects represented by point locations), the greater the options will be for spatial analyses and the broader range of questions that can be addressed.

Second, the collection methods used need to be established with spatial analyses in mind and adhered to. The creation and subsequent implementation of data recording and collection protocols must be equally enforced across an area or site by the director and senior staff. The importance of precision in data collection and small sized daily excavation areas (i.e., baskets) needs to be explained to all levels of staff and the importance passed on to volunteers and students where it is implemented.

Third, the creation and upkeep of a unified database that all excavators and specialists use over time is crucial. An excellent example is the one from Ziyaret Tepe (Matney et al. 2017). This creates a seamless, integrated database for future analyses. A database that can be implemented in the first phase of excavation provides excavators with a fully digital, spatial database incorporating each specialist's data and providing an easily accessible and sharable database.

III. Insight on legacy data use - the view from Tell eṣ-Ṣâfi /Gath

While the corpus of legacy data is potentially large, accessibility to previously excavated sites and the associated data is limited by the very nature of the media. Paper files can only be accessed directly (until digitized). Digital files can be easily shared around the world. The ability to share, analyze, and reanalyze data far in the future is a widely recognized goal in the field and there are archives that now ensure such continuity of accessibility (e.g., Alexandria Archive). Yet ensuring this can happen is time-consuming and often expensive, making it difficult to achieve for many. Many archaeological projects still work under conditions where it is difficult to record everything digitally in the field. However, digitizing data recorded in a legacy format eventually promotes its sharing and access.

The process of compiling the GIS database used in this thesis (see Chapter 3 §III.C) took multiple years. This process was lengthened by the need to await finalization of the stratigraphy that continued to be refined until recently. It was only 5 years after the completion of excavation (November 2022) that all potentially useable loci were finally assigned to particular phases (i.e., strata) of occupation in Area E.

The collection methods used in Area E were less than ideal with large expanses attributed to daily baskets and few points taken. This does not mean that the data are unusable, in fact the opposite has been shown above. However, it does mean that there are certain levels of analysis that are not attainable (i.e., activity areas within a courtyard) for these strata as data were often simply collected across the entire courtyard with the same daily basket. In Area E, there was a shift to smaller daily basket boundaries in the latest field seasons that encouraged the spatial analysis of the E5a-C strata. Future spatial analyses on the earlier Early Bronze Age II/III levels may be conducted once the specialist analysis of these levels is complete.

The integrated GIS database developed by the author in this thesis is the only integrated database for any excavation area of the site that includes both field and specialist data. The ability to archive all these databases together with their spatial linkages is vital to the post-excavation organization and analysis of data. The chosen file types are supported by most GIS software for the foreseeable future, and hopefully will continue to be supported. The database will be able to be shared in bulk form, with linkages intact, in a compressed file format (e.g., .zip, etc.), and readable with both paid and open access programs. The implications for data archiving and sharing when using such a database include saving physical space as well as ease of data sharing and access. This addresses two of the biggest hurdles that both physical and digital copies of field excavations and laboratory analysis face in both the short and lng terms.

IV. Final conclusions

This thesis investigates the household use of space in an early urban center in the southern Levant. To accomplish this goal, a spatial database was constructed and the specialist analysis of three material corpuses (osseous, ground stone, and chipped stone tools) was integrated. The results from this analysis suggest five key findings. First, each architectural unit (house) is represented by an independent set of tools. Second, these tool sets repeat between houses in the same stratum. Third, the tools are more often found in courtyards than anterooms. Fourth, the alleyway is used for refuse in each stratum. Finally, fifth, the same activities are being conducted in the same rooms throughout time (strata). This indicates that the same social units are inhabiting the architectural units over time. The data presented support earlier observations by the excavation team concerning the size and nature of construction of each of these architectural units. Both statistical analyses point toward the occupation of each of these architectural units by a small sized social unit household. This is a very different pattern of occupation than one sees in the contemporary

archaeological record of Mesopotamia, where buildings are much larger and likely occupied by larger social units (e.g. extended family households). Such an interpretation is supported by the textual record of Mesopotamia (Gruber and Roaf 2012, Ascalone, Peyronel, and Spreafico 2014, Brusasco 1999-2000, Buccellati, Helms, and Tamm 2014, Keith 1999, Kolinski 1996, Mas 2014).

Additionally, insights to the use of legacy data into a spatial database and their use in spatial analyses were gleaned. These include the process of digitizing such legacy data and the types of analyses that can be conducted on digitized data. The creation of a spatial database for legacy datasets also addresses concerns of archiving and providing access to these sets in the future. The insights can also be used to guide new projects when in the planning phases of excavations.

Figures

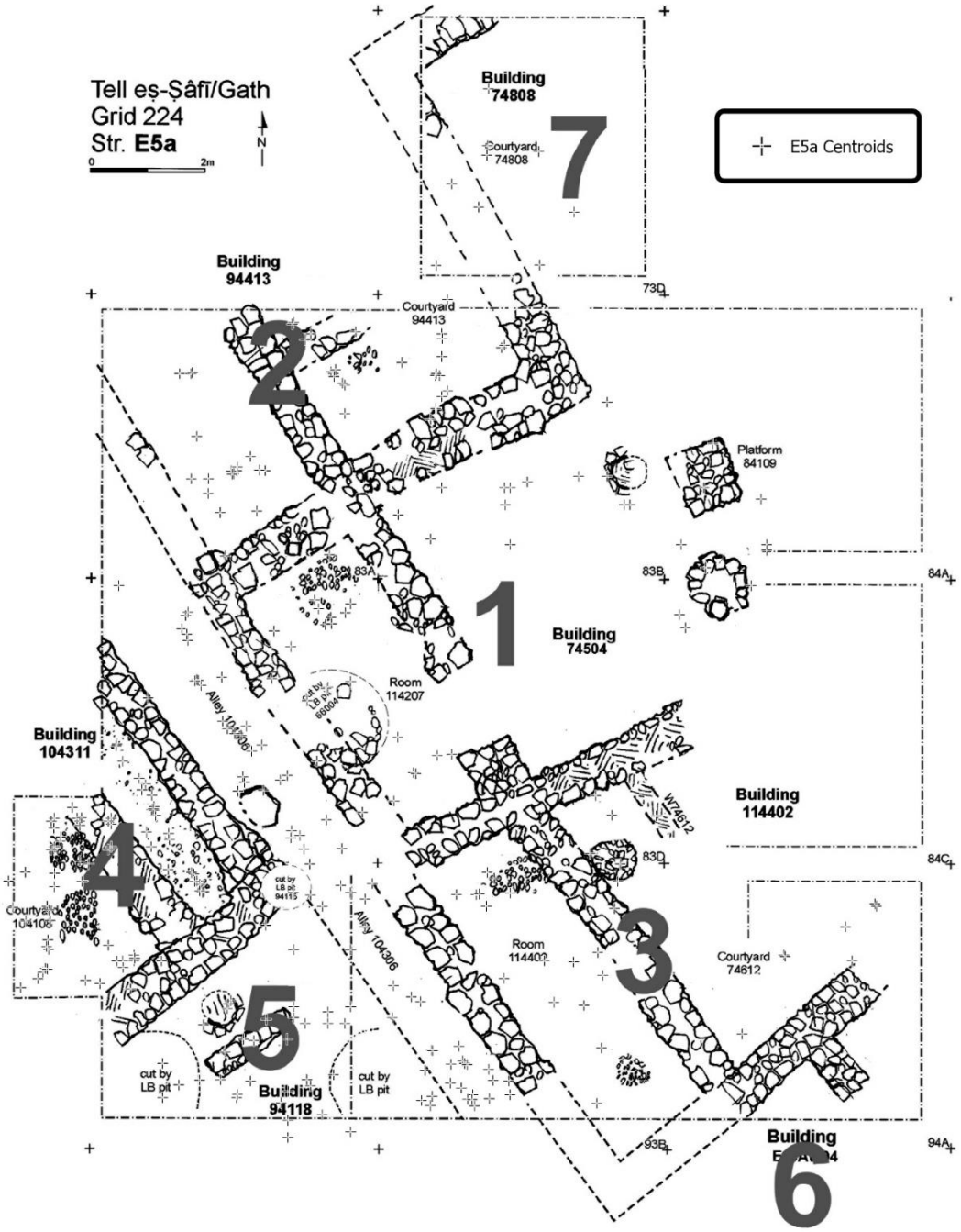


Figure 7: Map of all centroids from the E5a stratum.

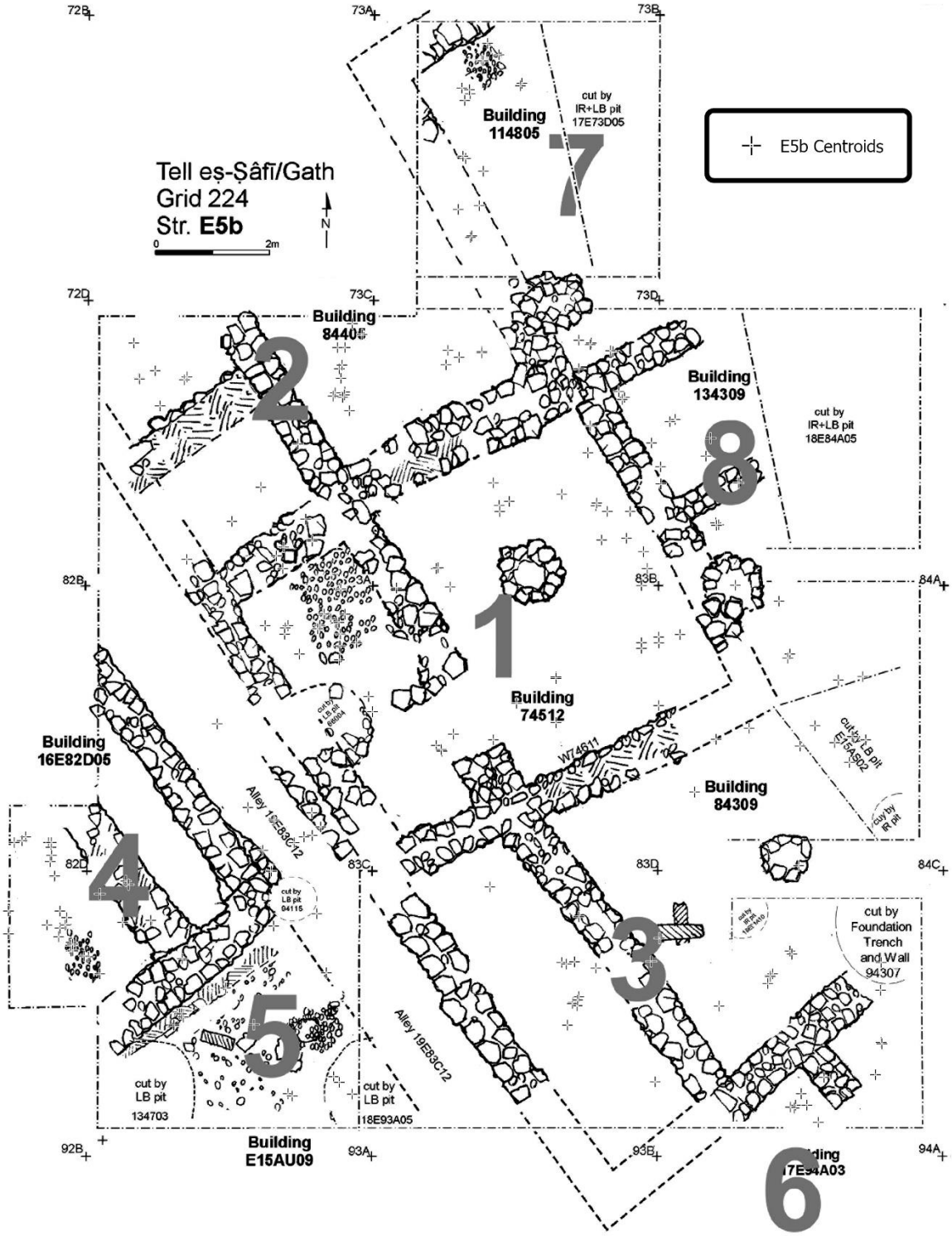


Figure 8: Map of all centroids from the E5b stratum.

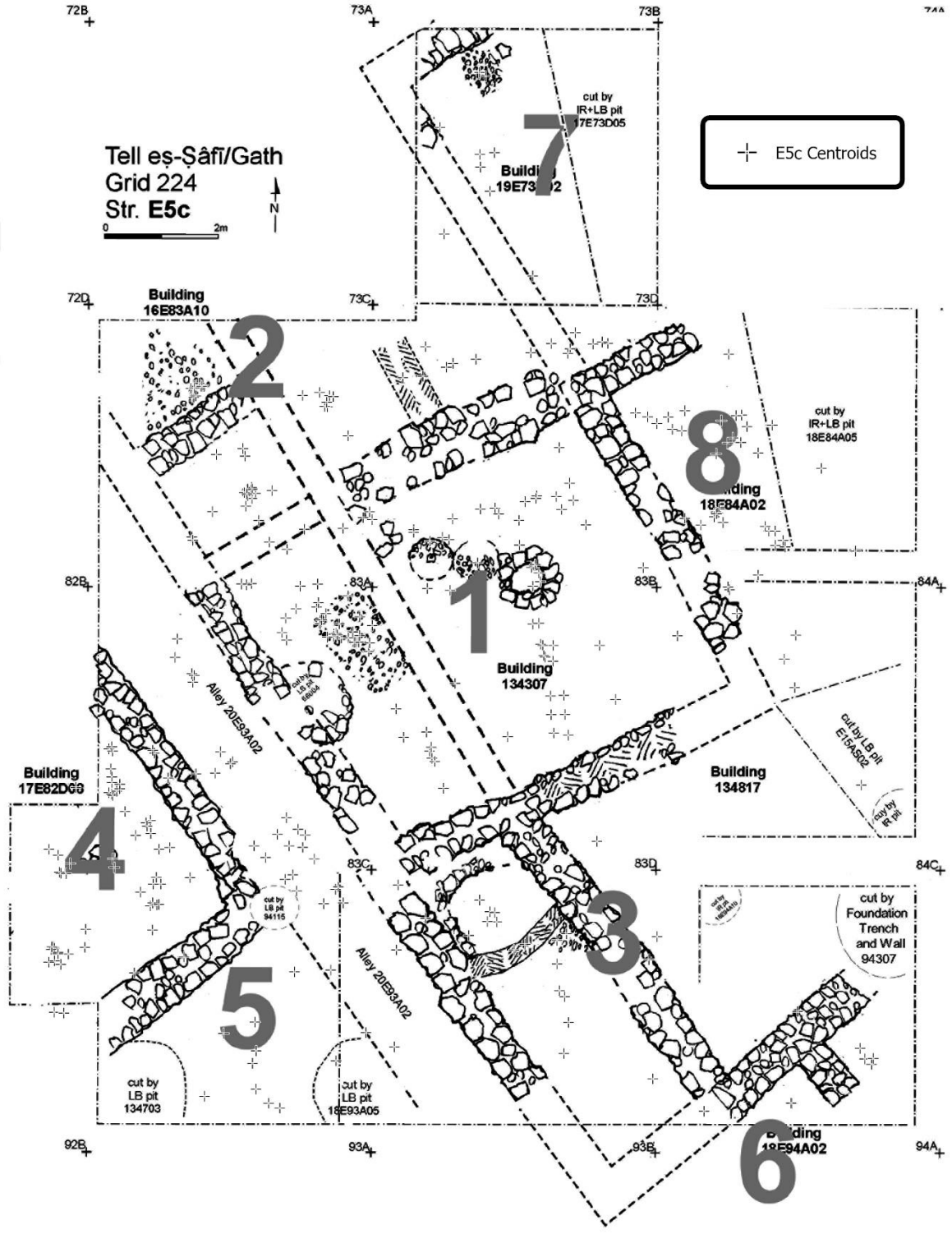


Figure 9: Map of all centroids from the E5c stratum.

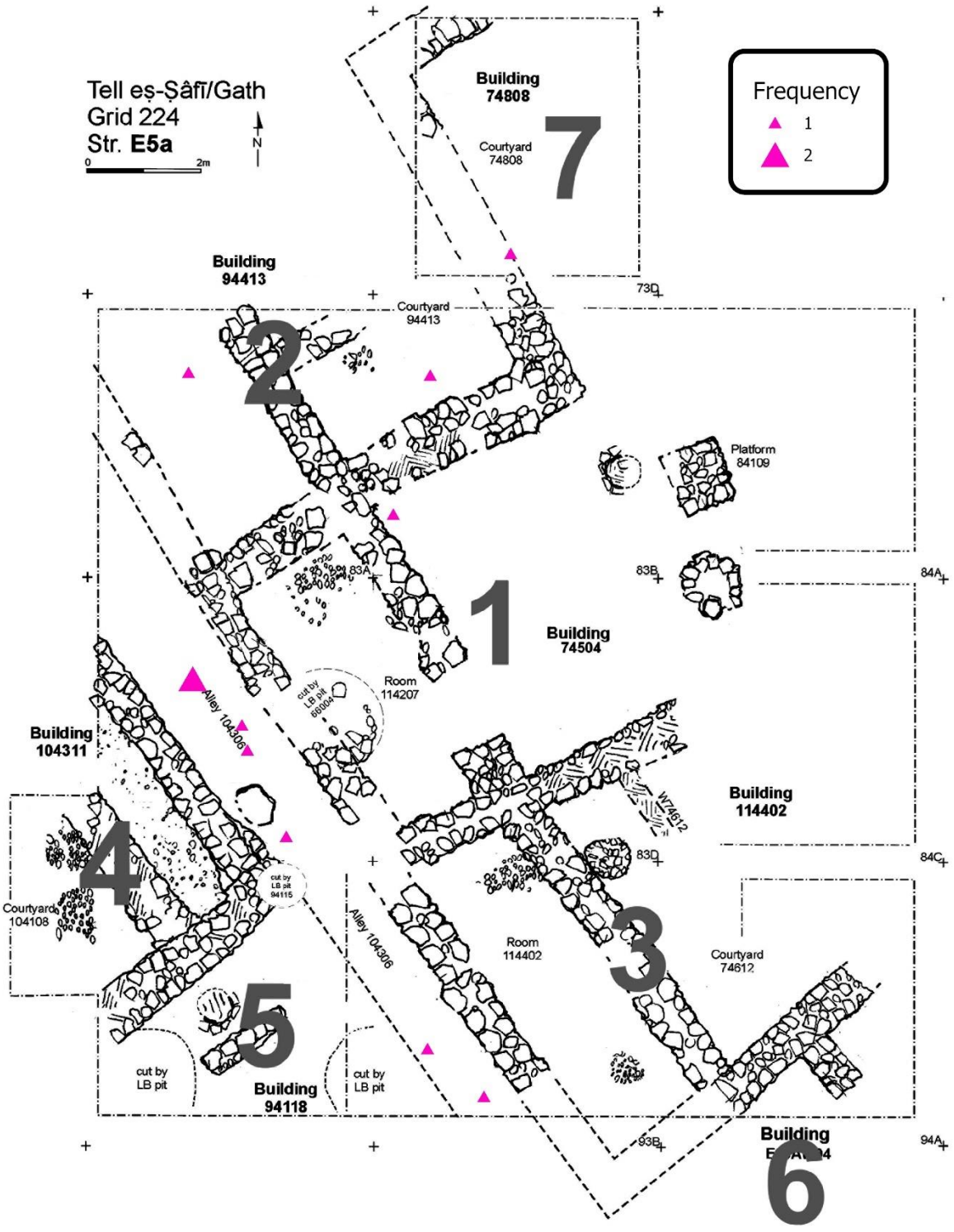


Figure 10: Frequency map of the locations of awls in the E5a stratum.

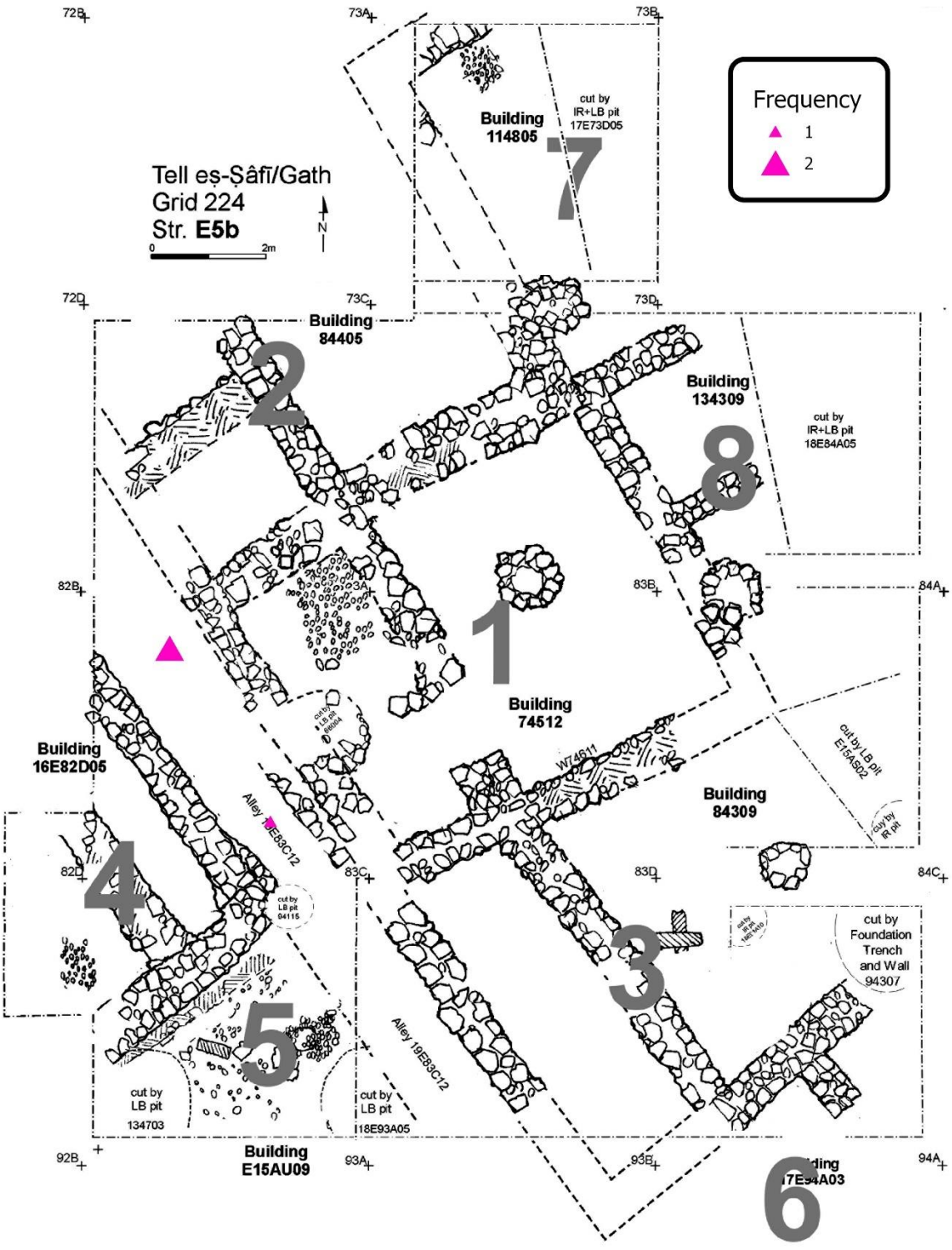


Figure 11: Frequency map of the locations of awls in the E5b stratum.

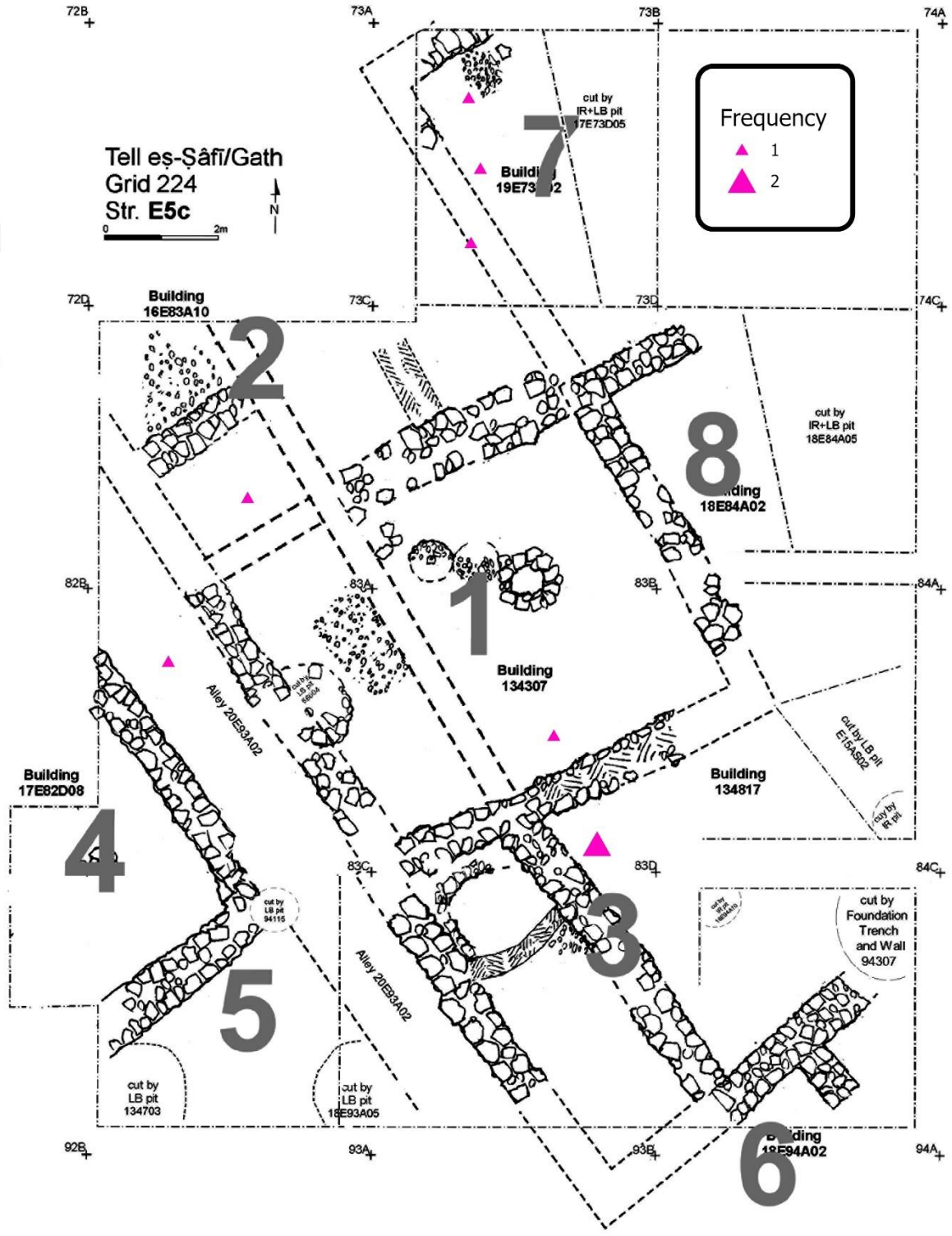


Figure 12: Frequency map of the locations of awls in the E5c stratum.

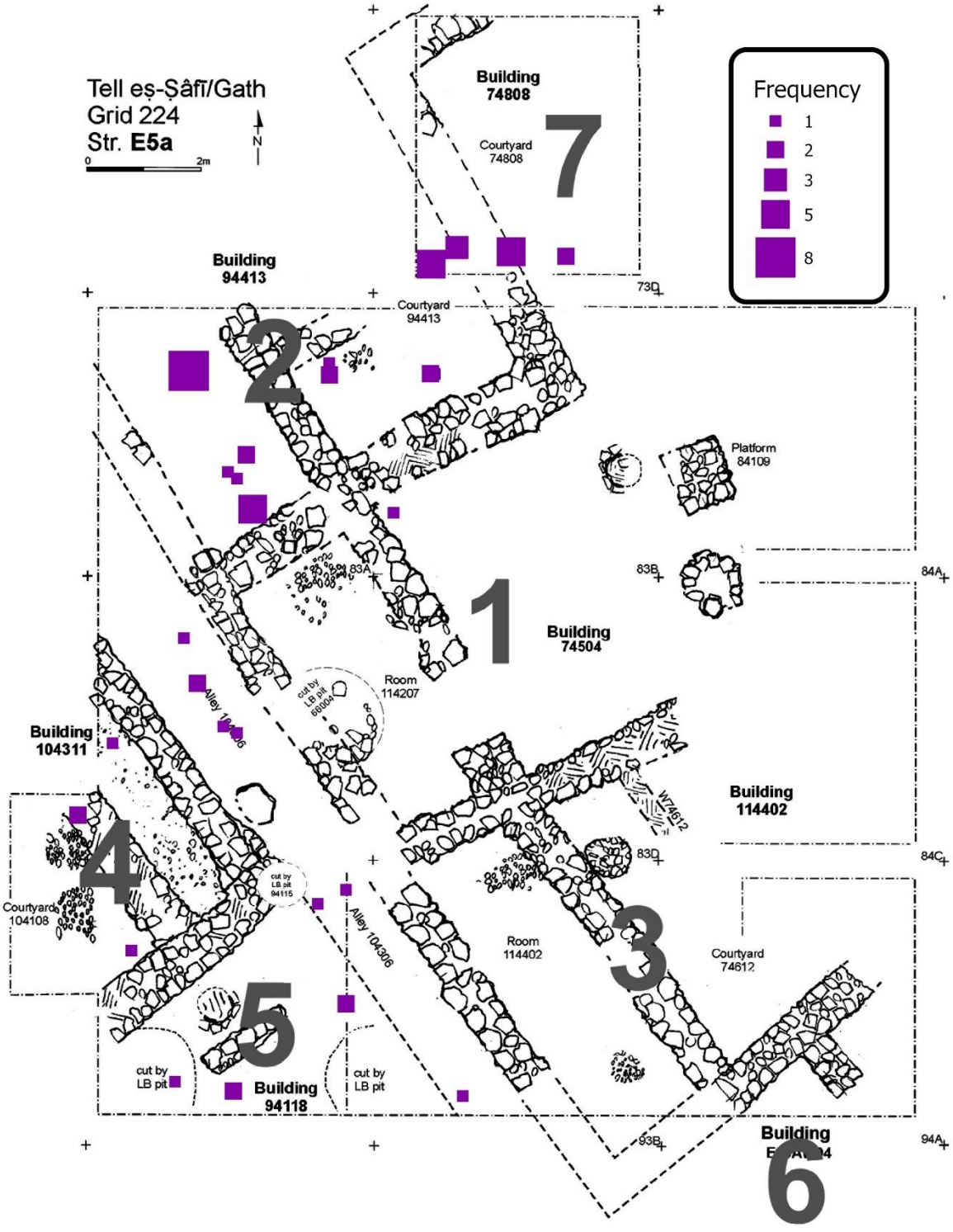


Figure 13: Frequency map of the locations of handles in the E5a stratum.

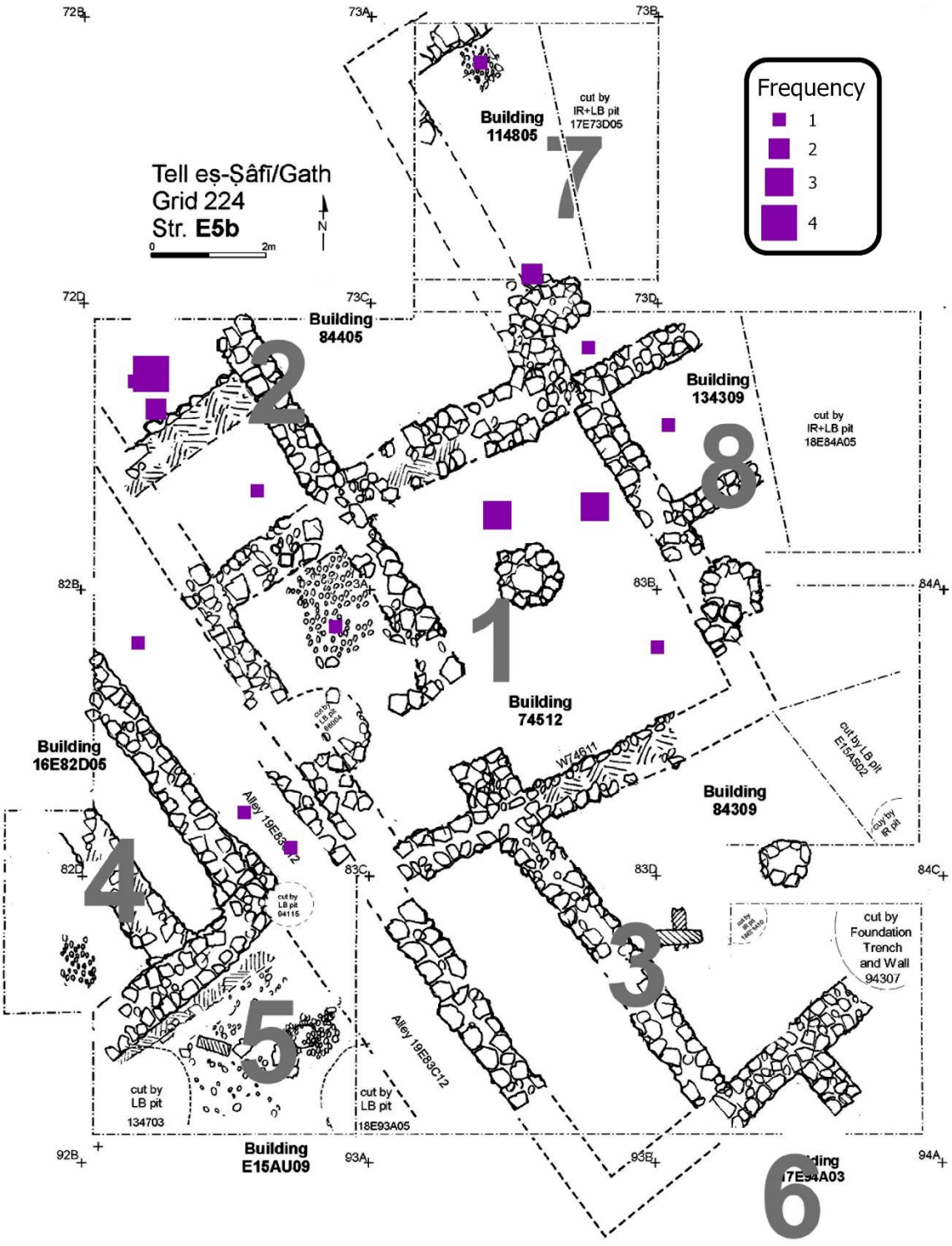


Figure 14: Frequency map of the locations of handles in the E5b stratum.

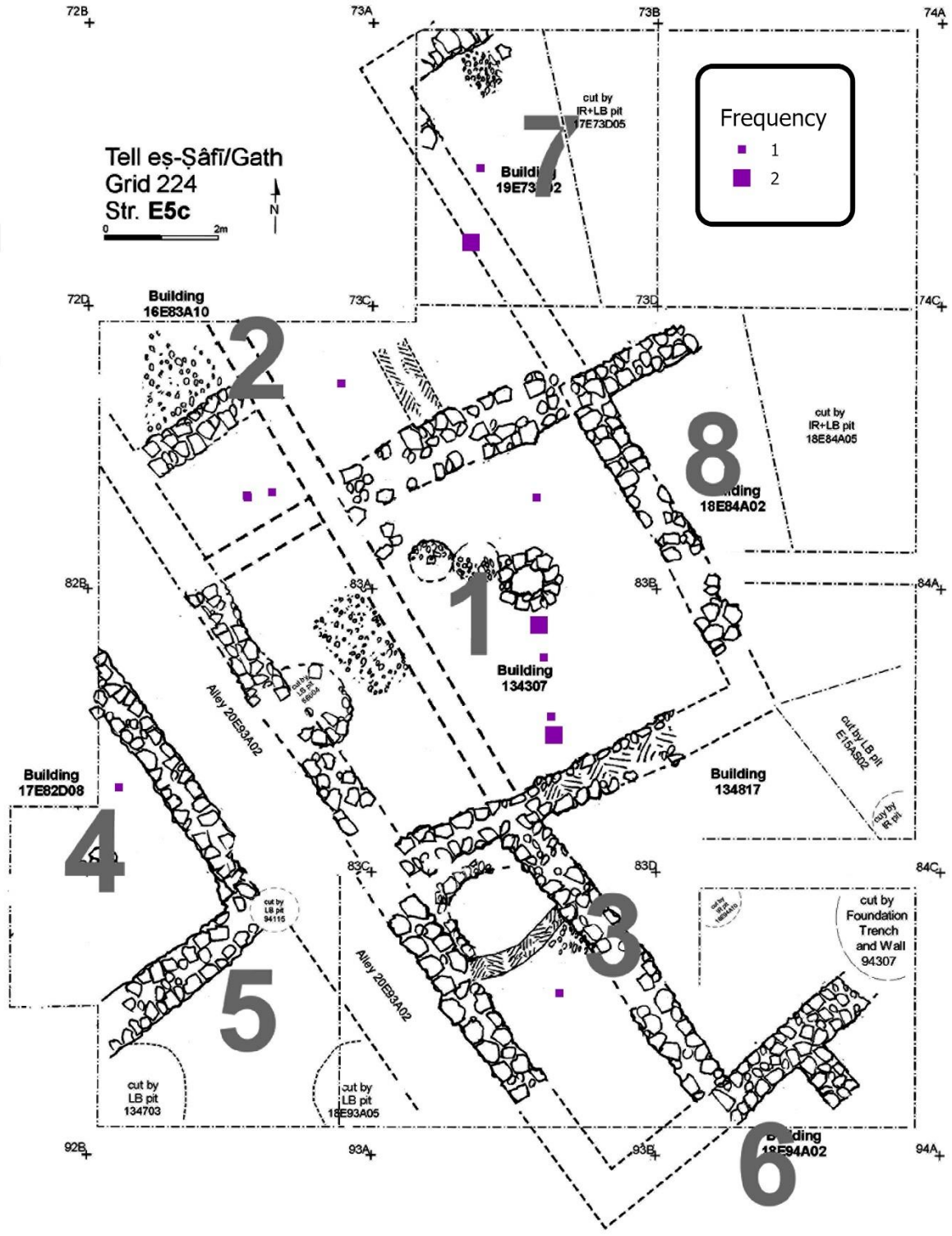


Figure 15: Frequency map of the locations of handles in the E5c stratum.

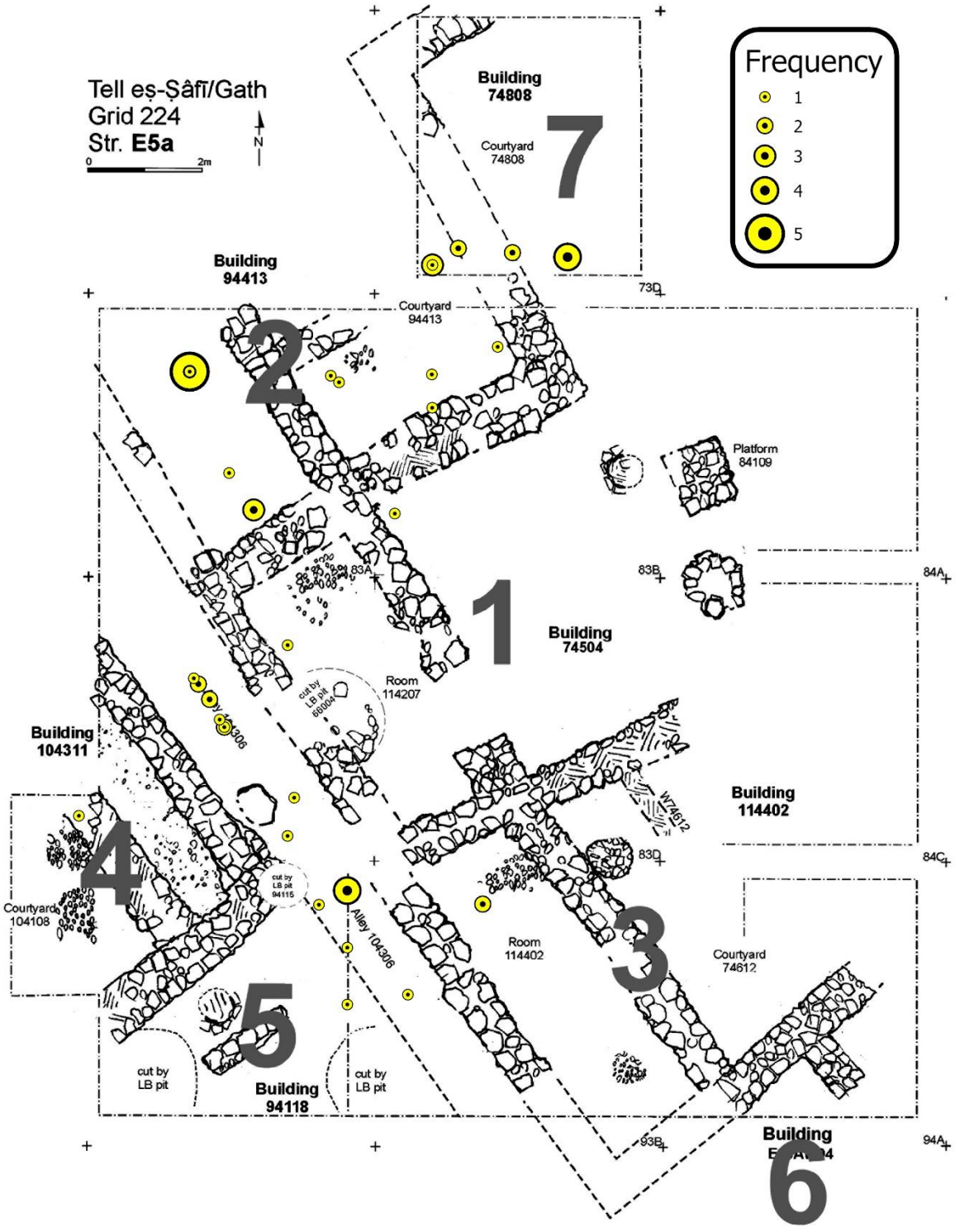


Figure 16: Frequency map of the locations of spatulas in the E5a stratum.

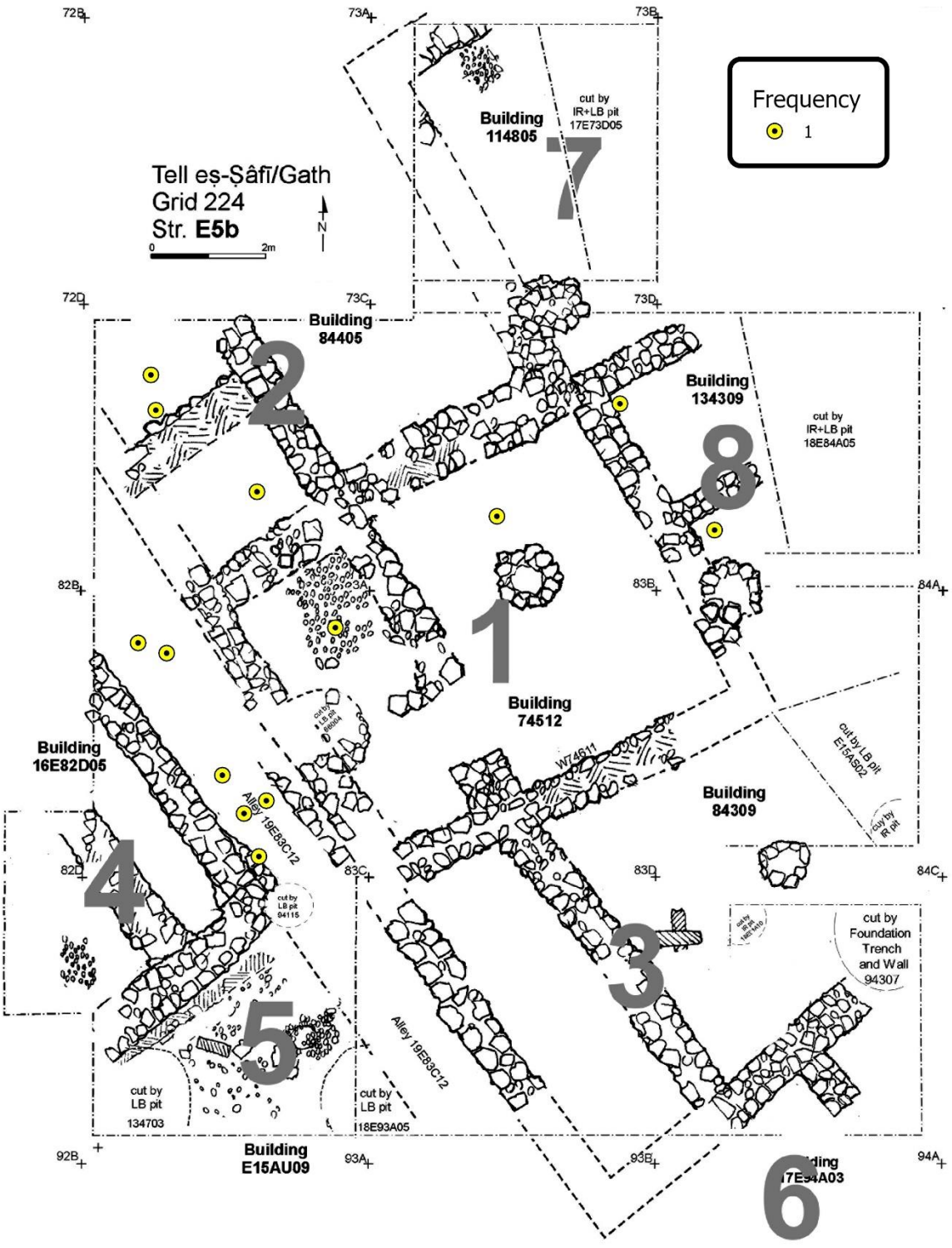


Figure 17: Frequency map of the locations of spatulas in the E5b stratum.

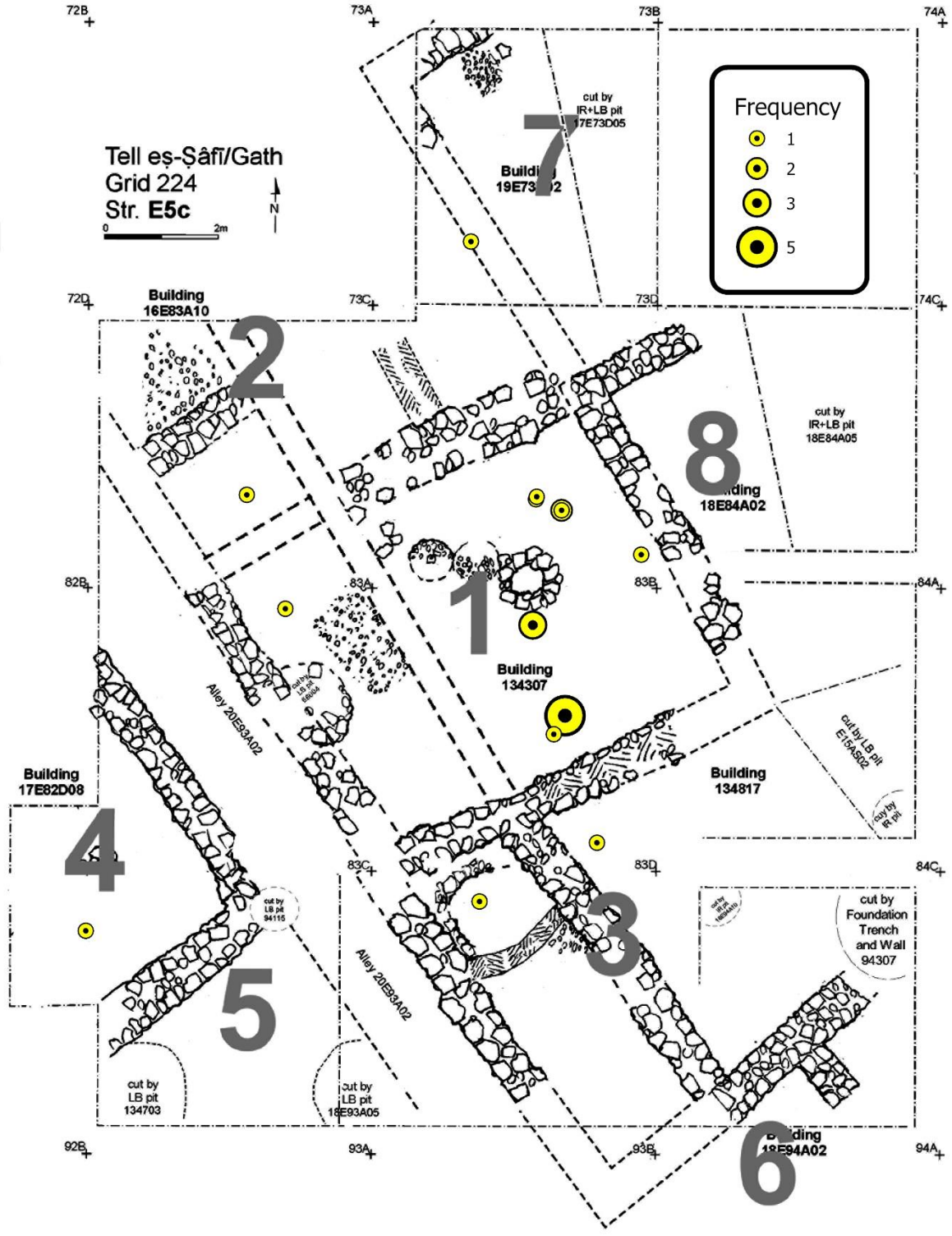


Figure 18: Frequency map of the locations of spatulas in the E5c stratum.

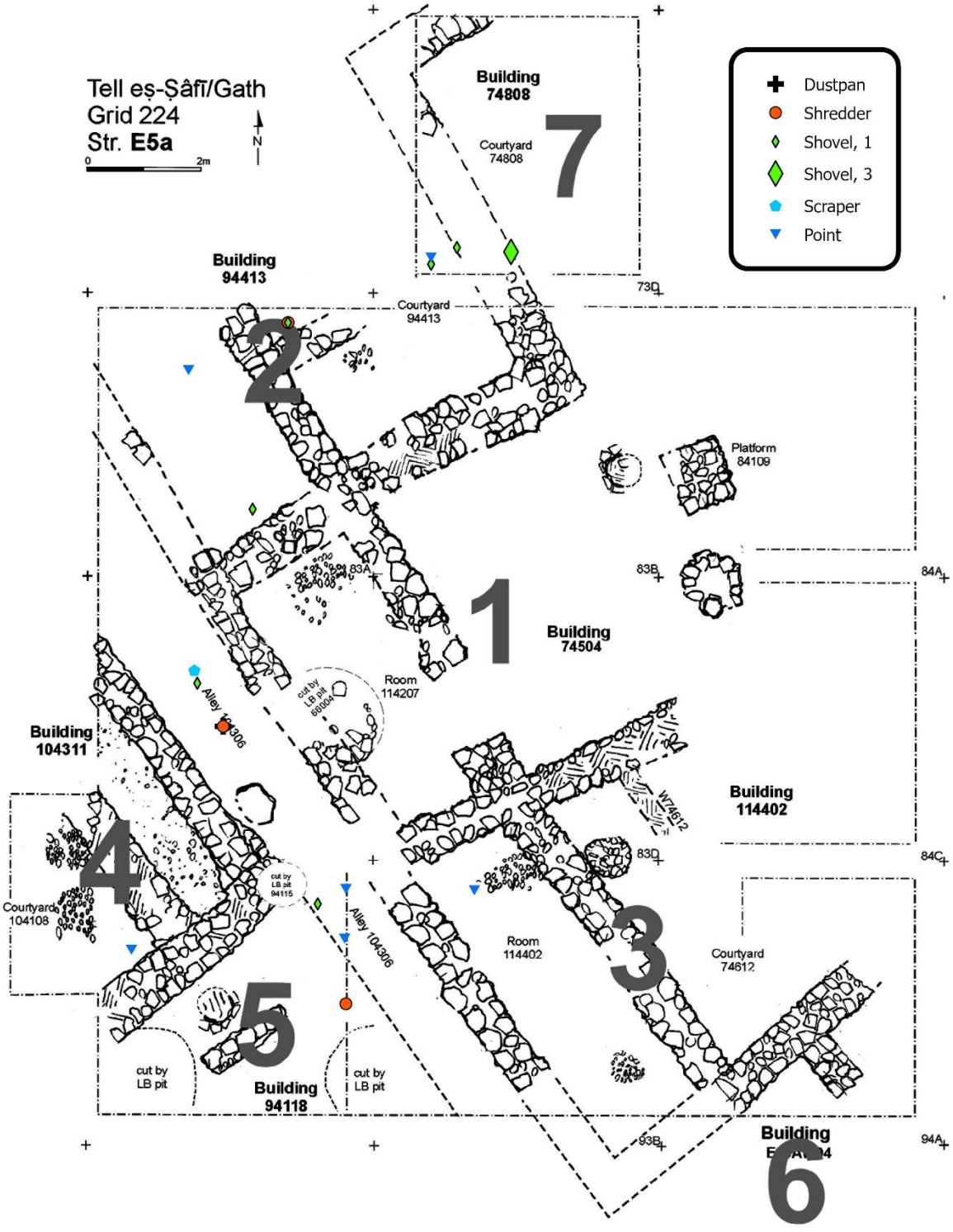


Figure 19: Map of the miscellaneous E5a stratum bone tool locations.

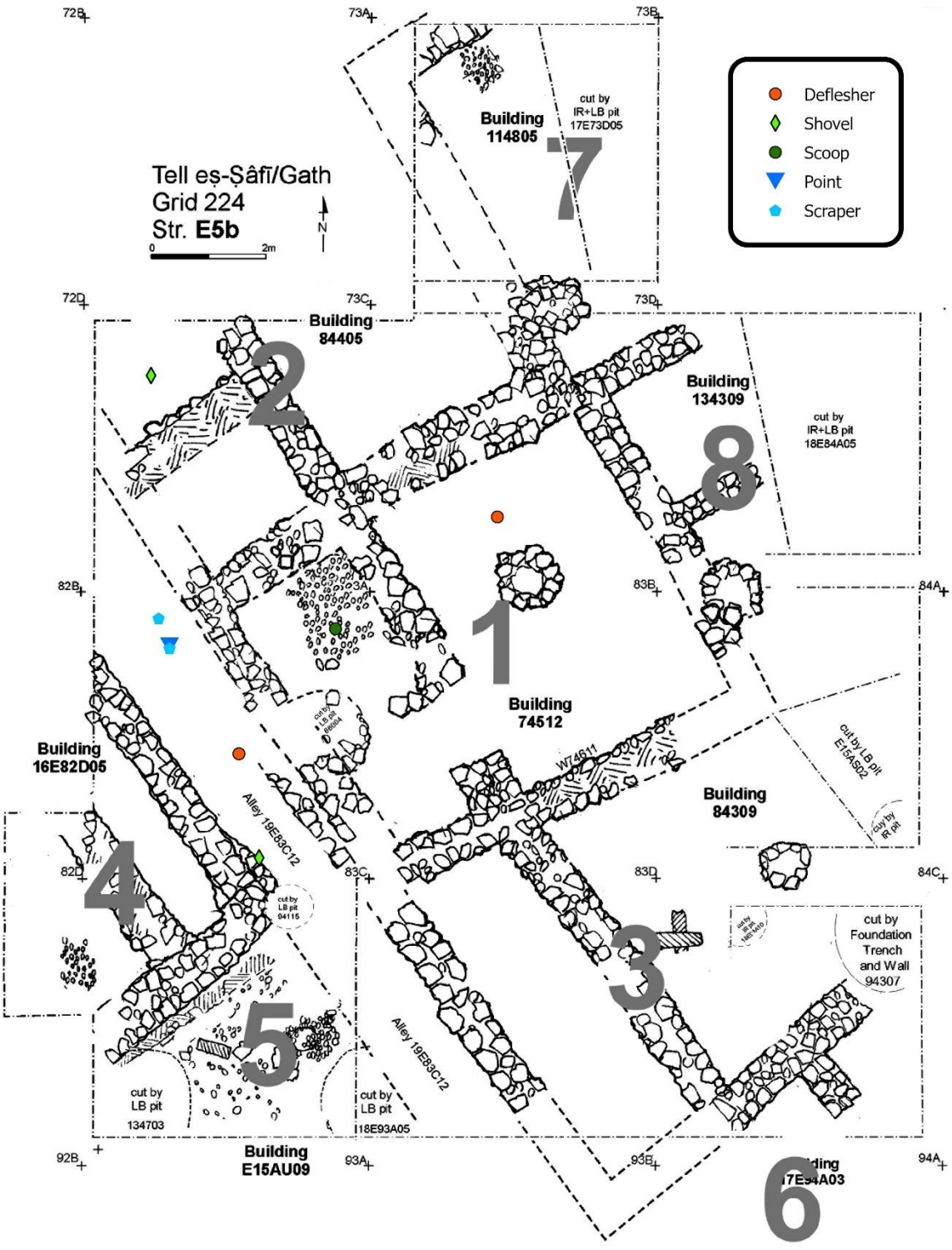


Figure 20: Map of the miscellaneous E5b bone tool locations.

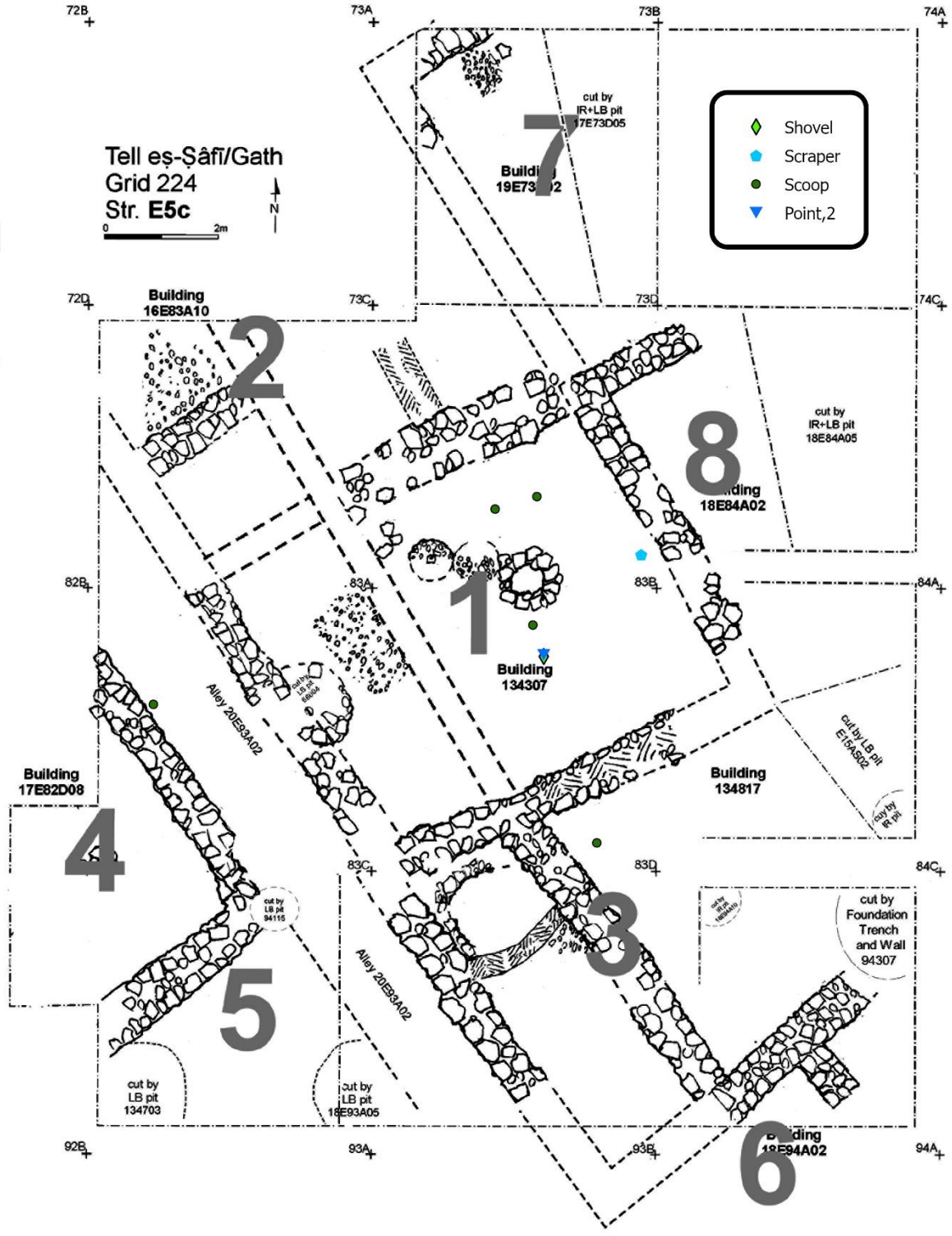


Figure 21: Map of the miscellaneous E5c stratum bone tool locations.

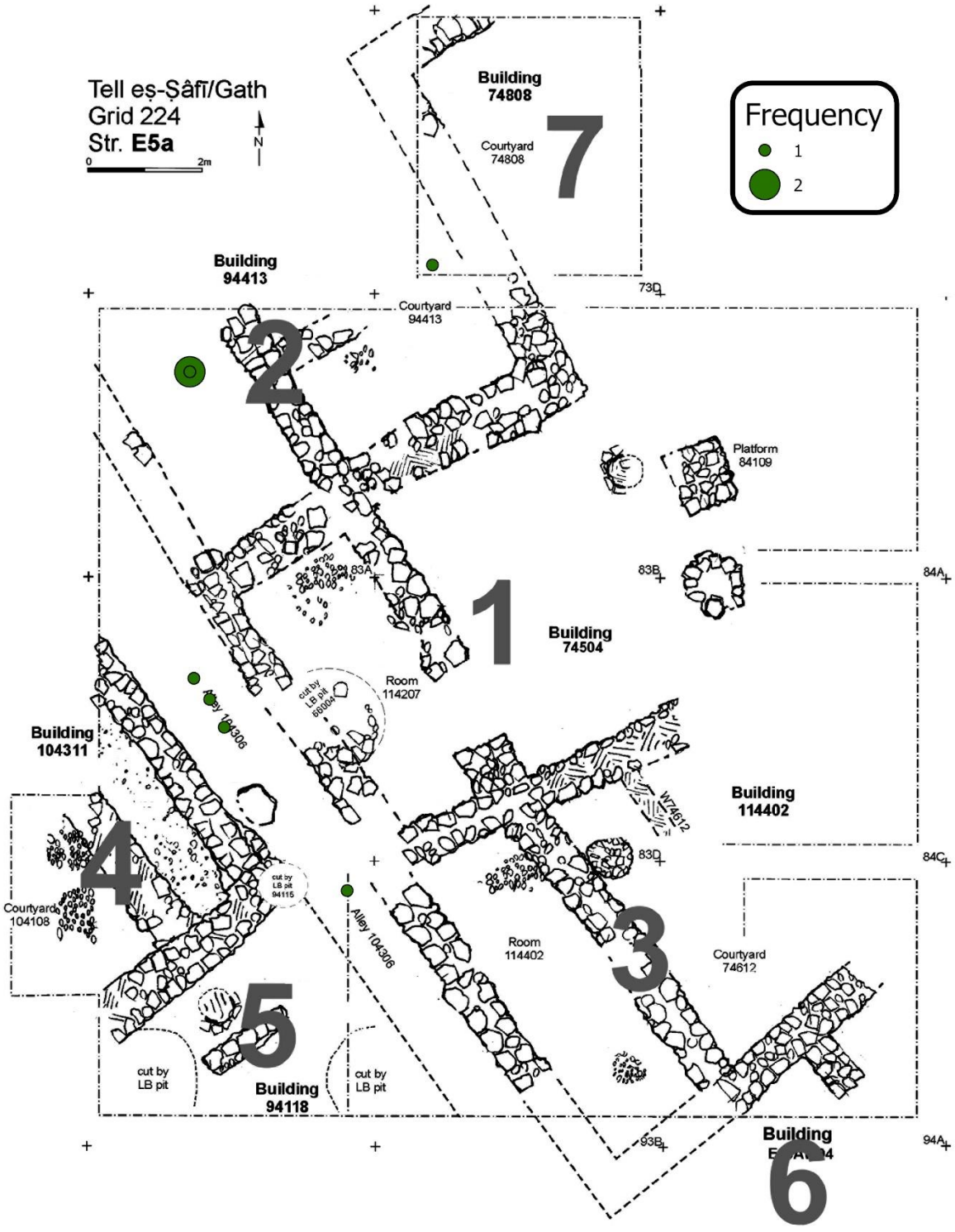


Figure 22: Frequency map of the E5a stratum scoops.

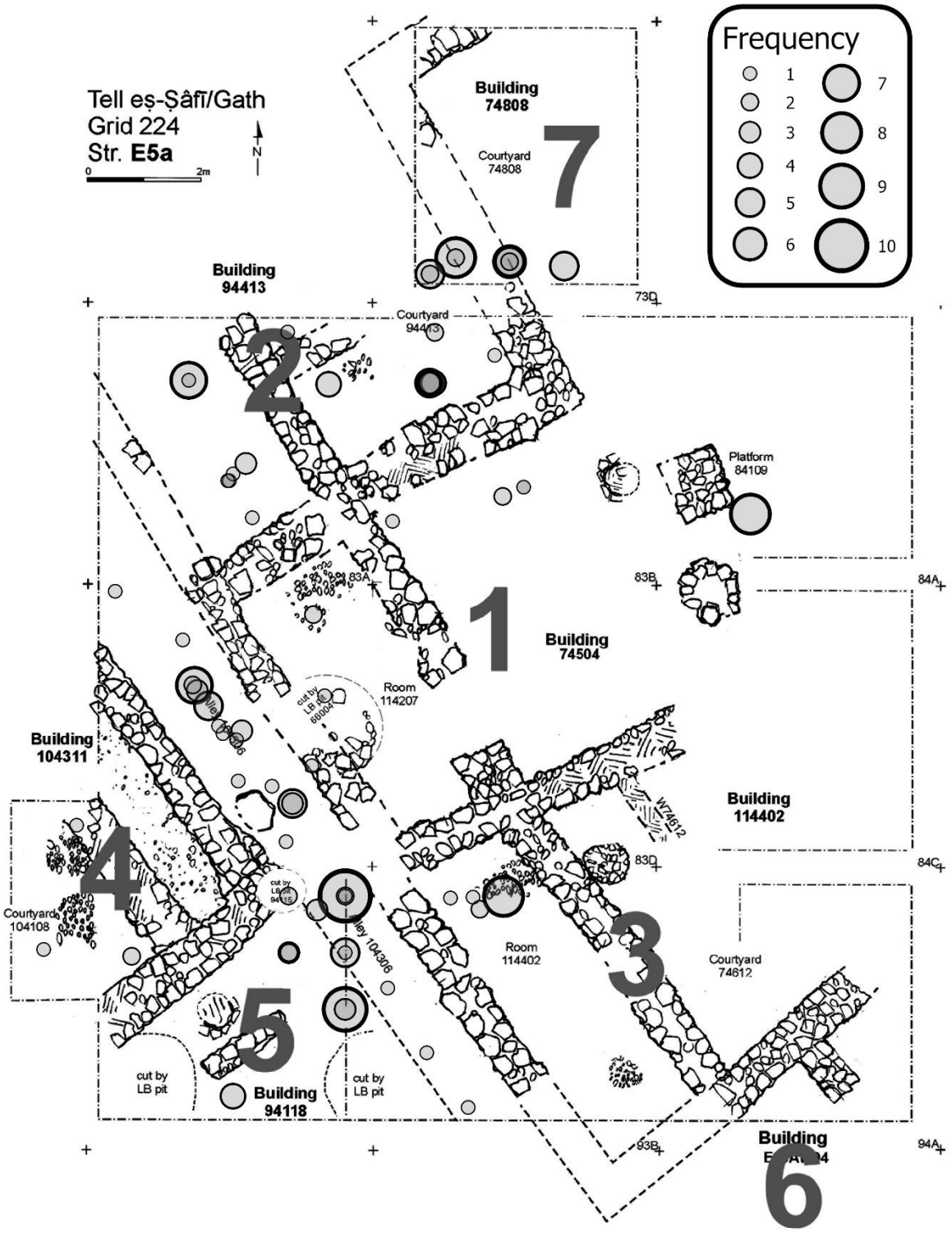


Figure 23: Frequency map of the unidentified tools in the E5a stratum.

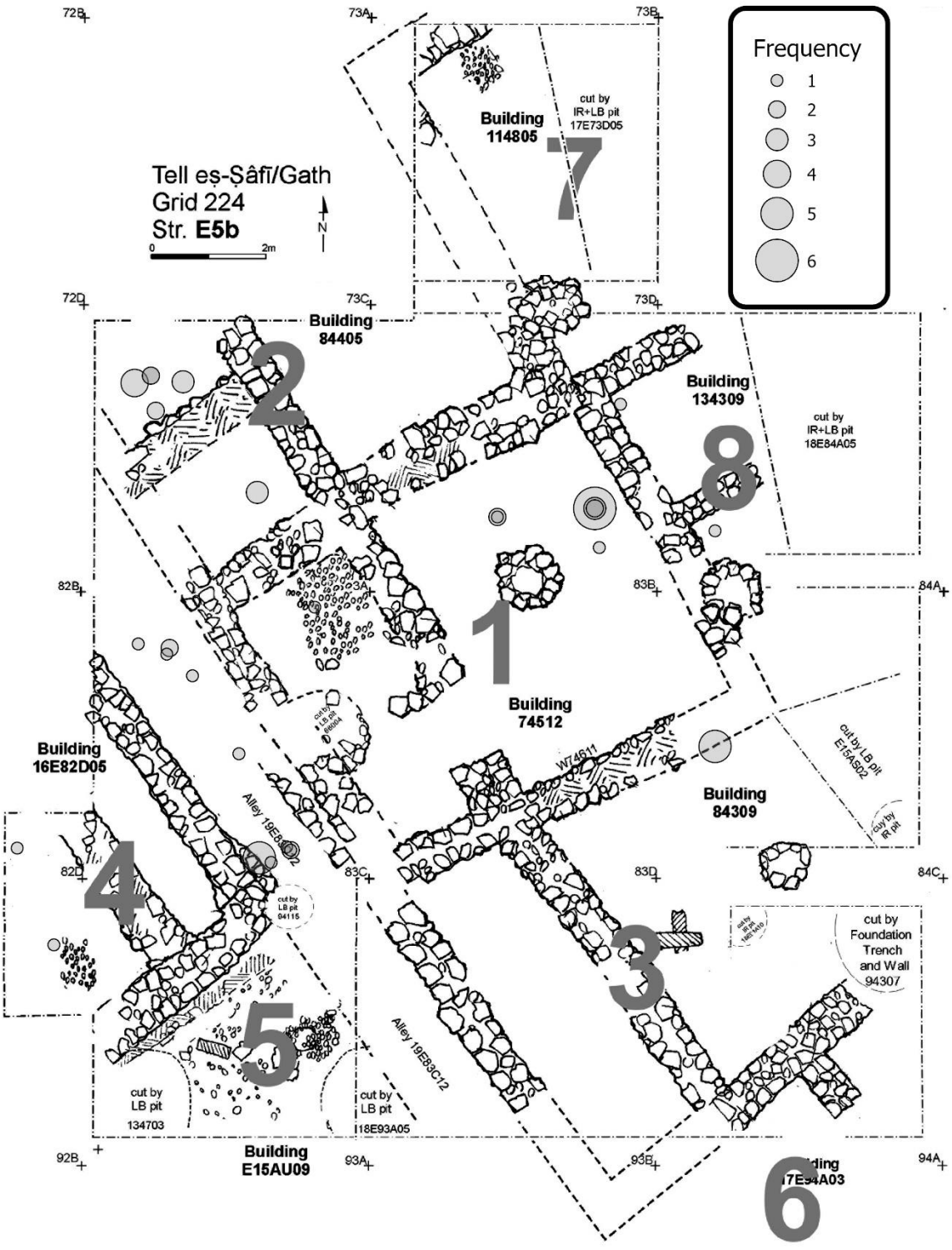


Figure 24: Frequency map of the unidentified tools in the E5b stratum.

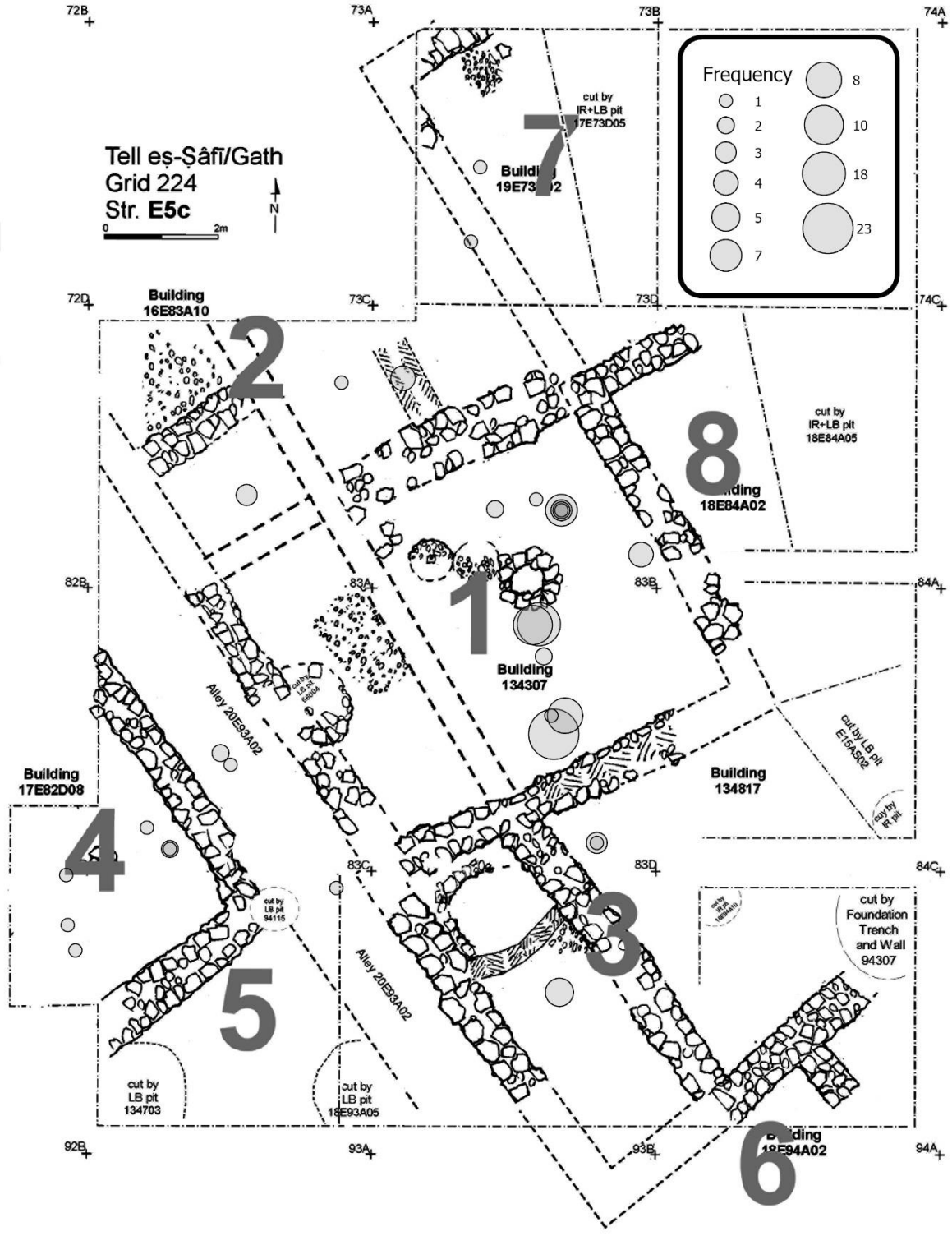


Figure 25: Frequency map of the unidentified tools in the E5c stratum.

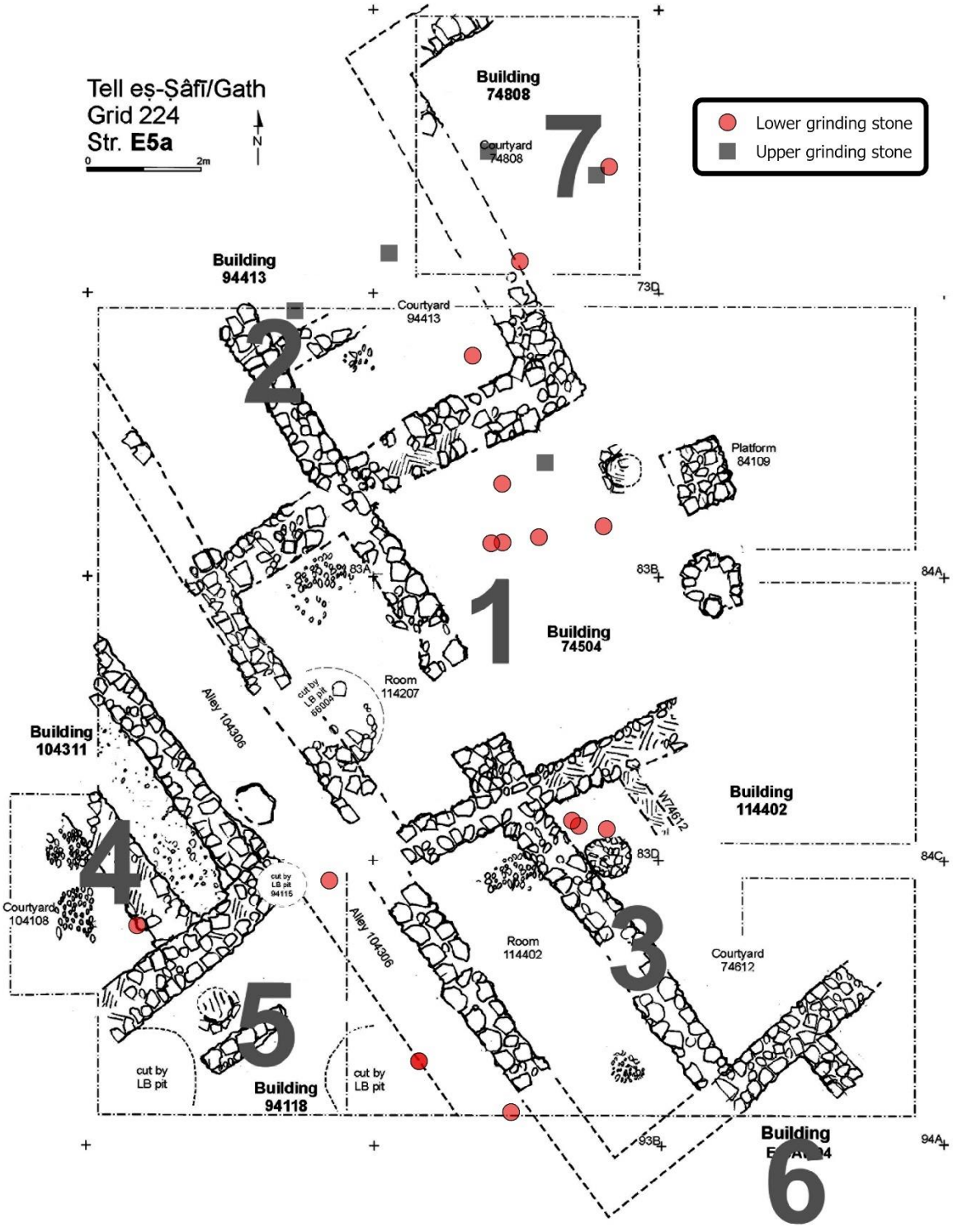


Figure 26: Location map of the E5a stratum grinding stones.

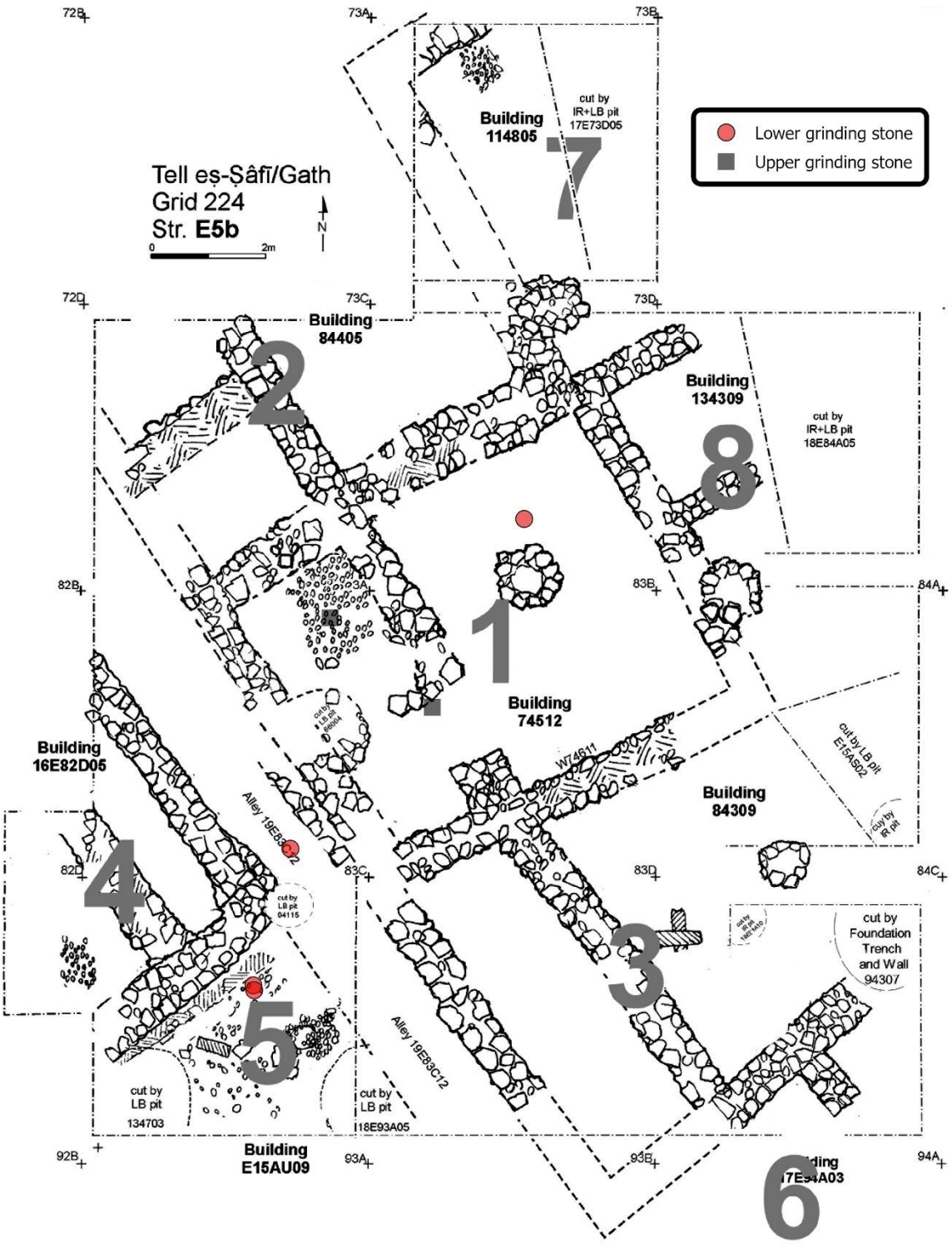


Figure 27: Location map of the E5b stratum grinding stones.

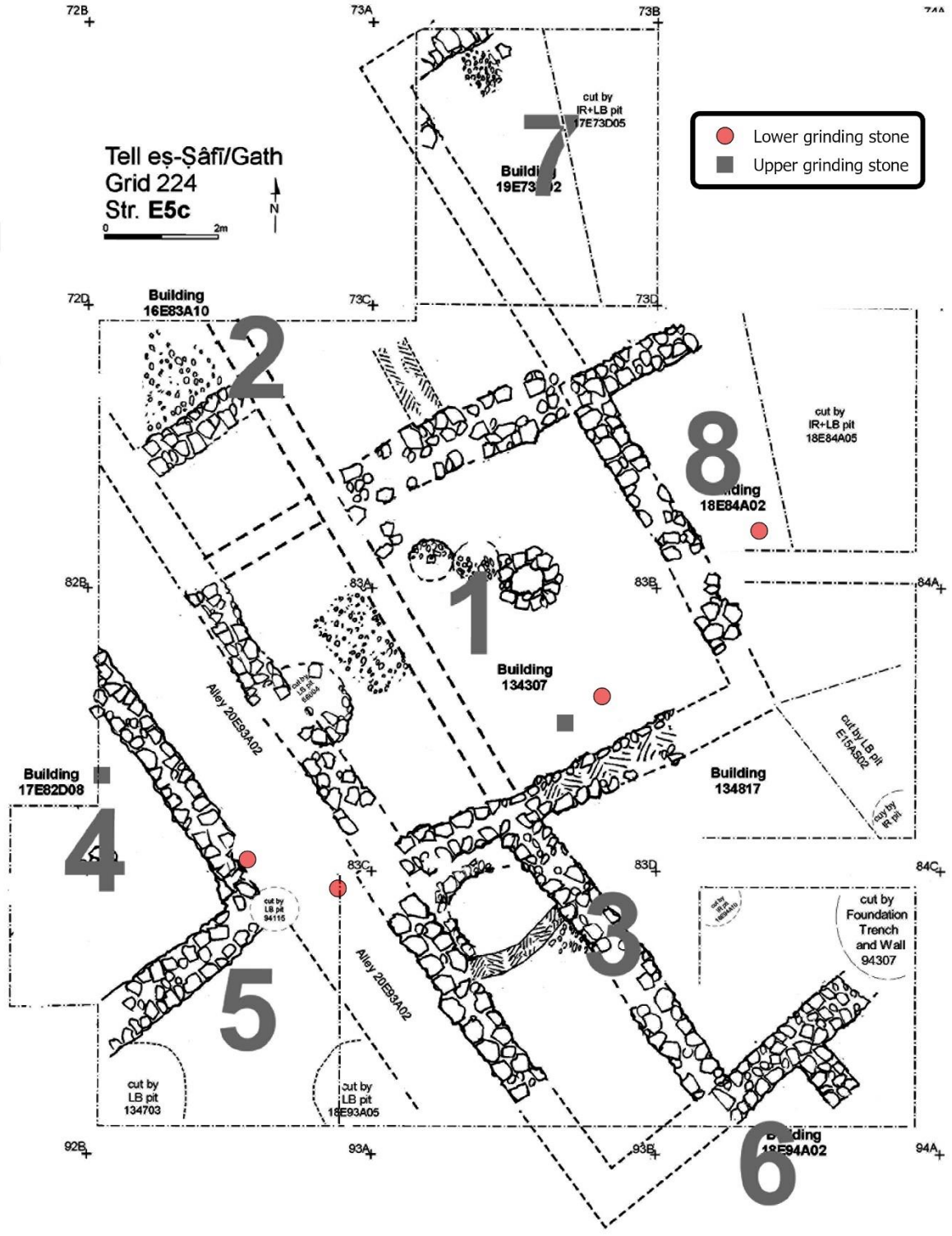


Figure 28: Location map of the E5c stratum grinding stones.

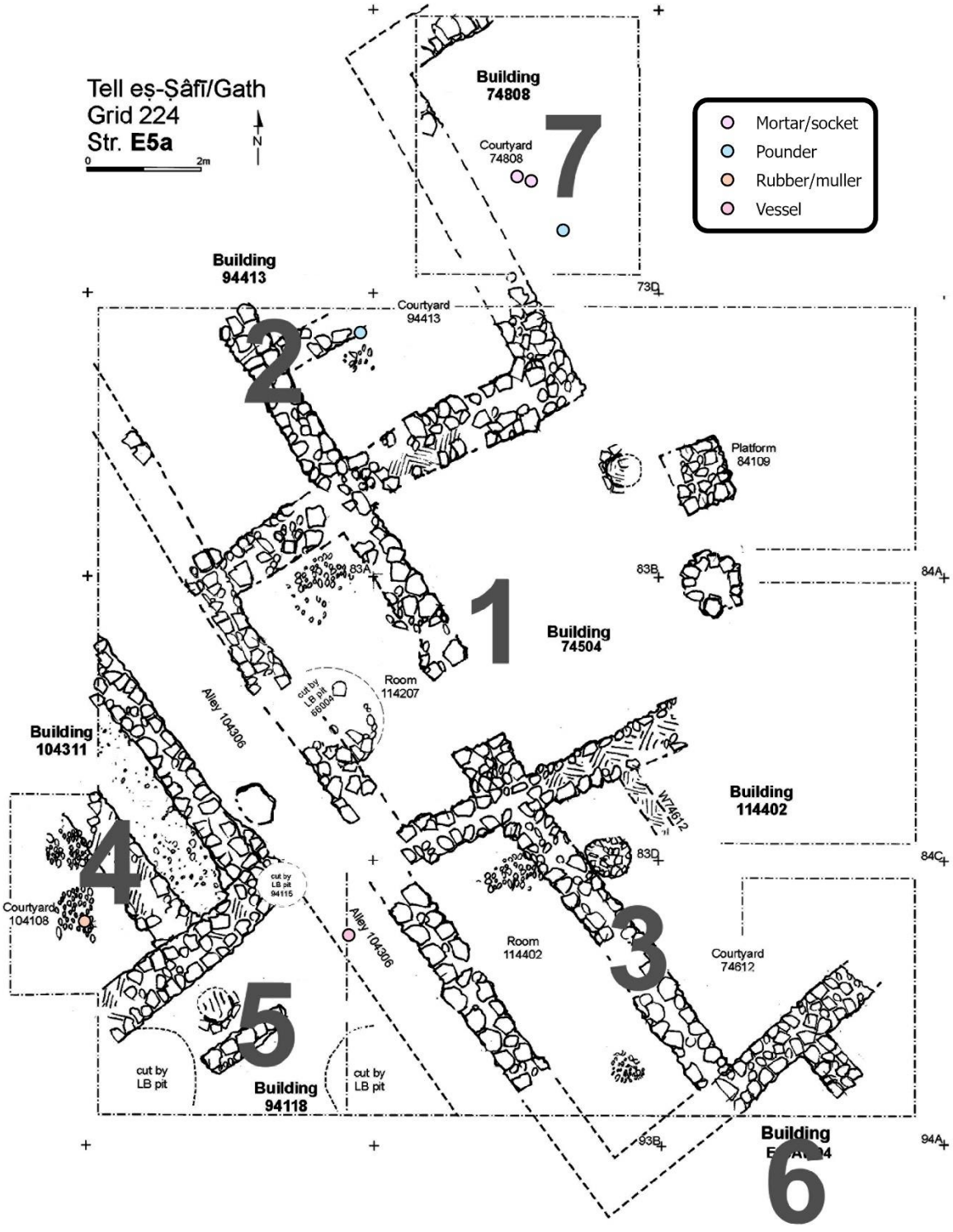


Figure 29: Location map of the E5a stratum miscellaneous ground stones.

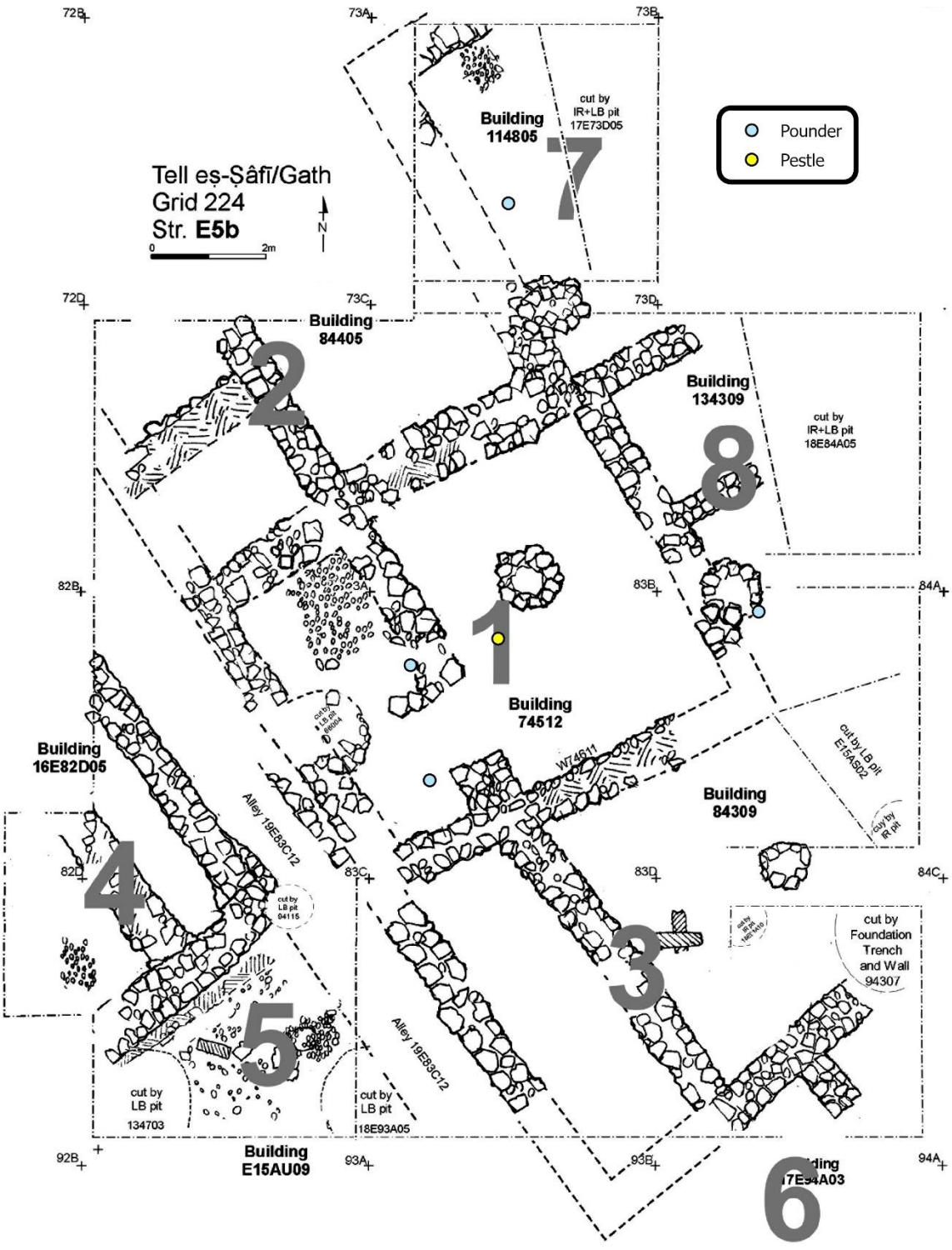


Figure 30: Location map of the E5b stratum miscellaneous ground stones.

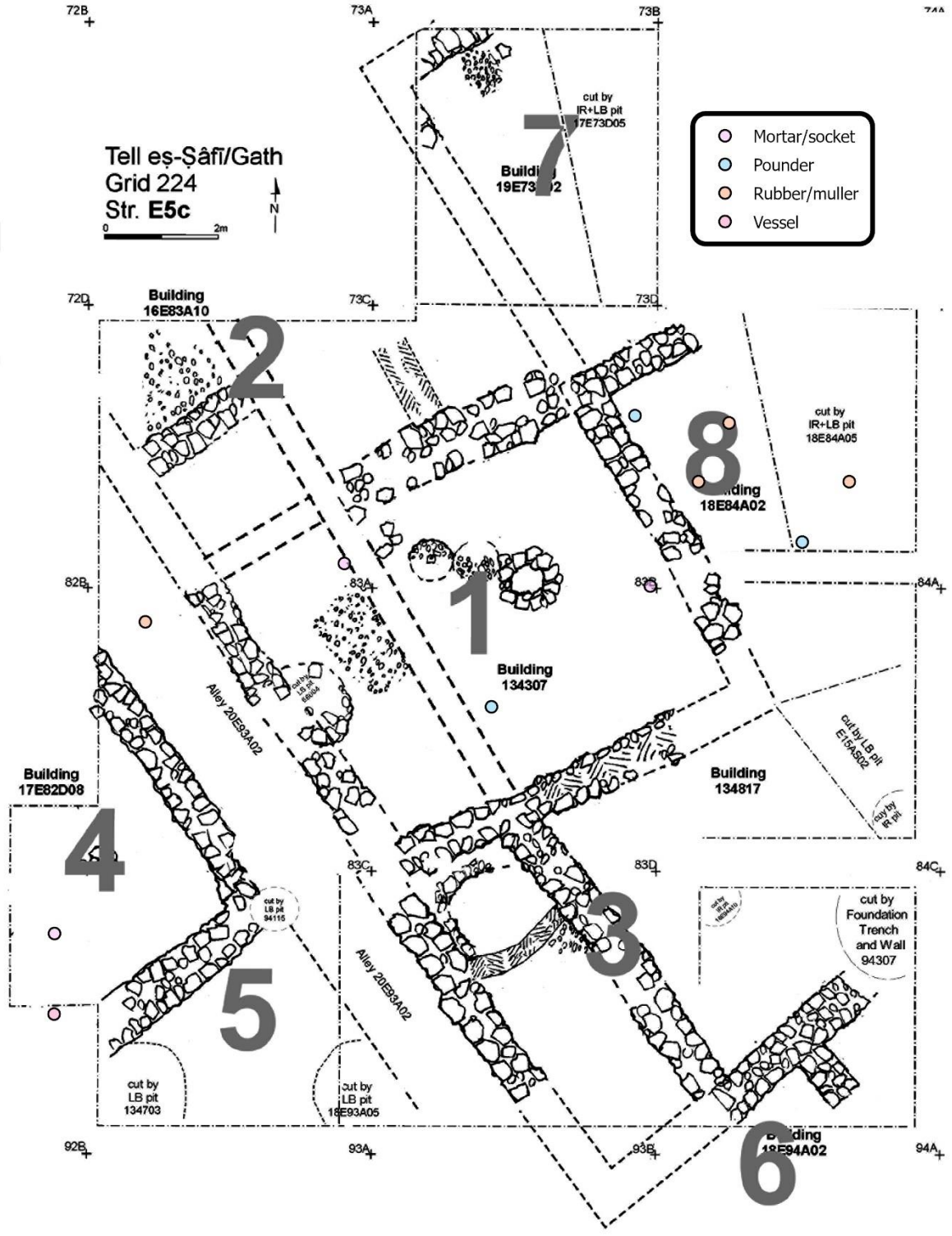


Figure 31: Location map of the E5c stratum miscellaneous ground stones.

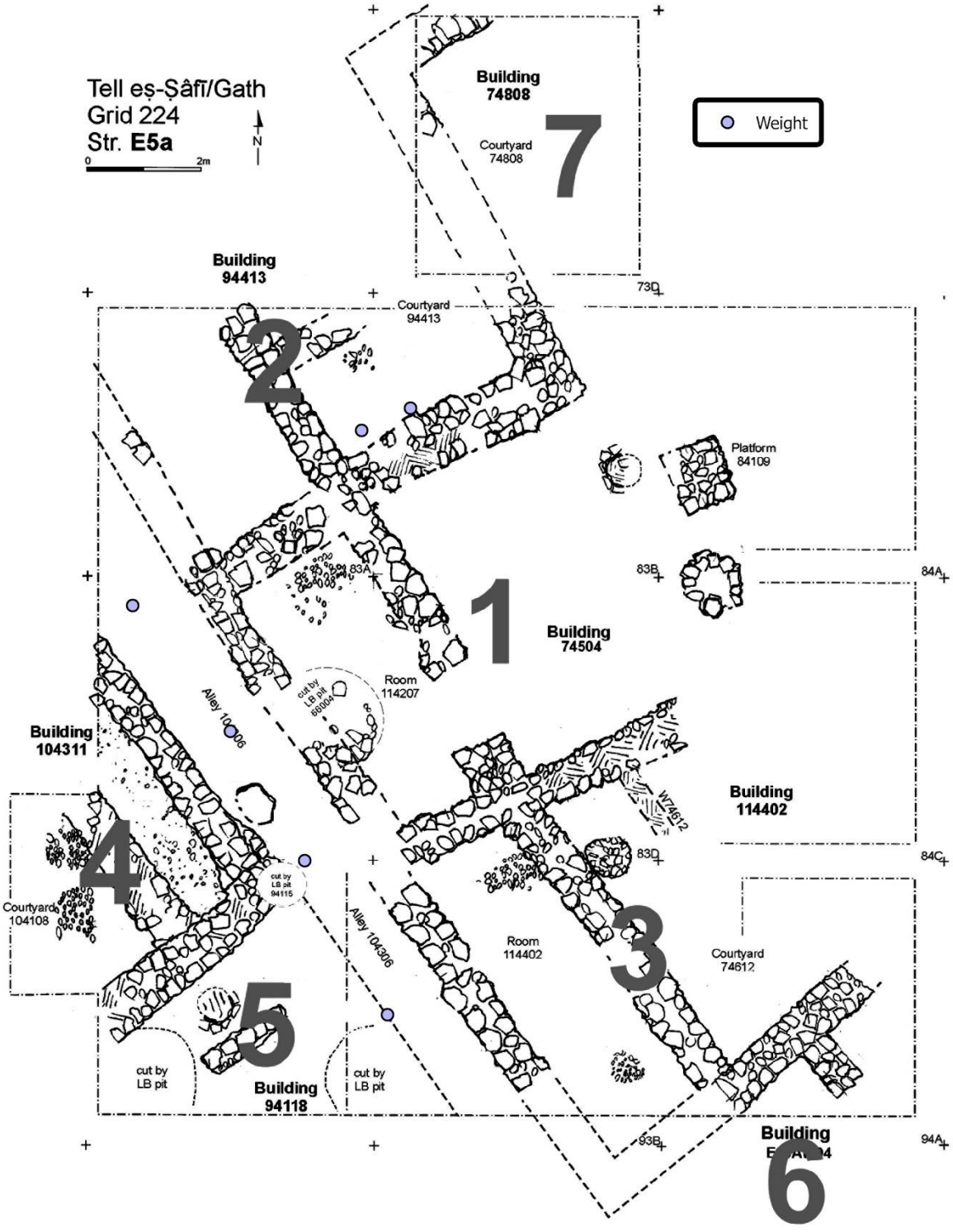
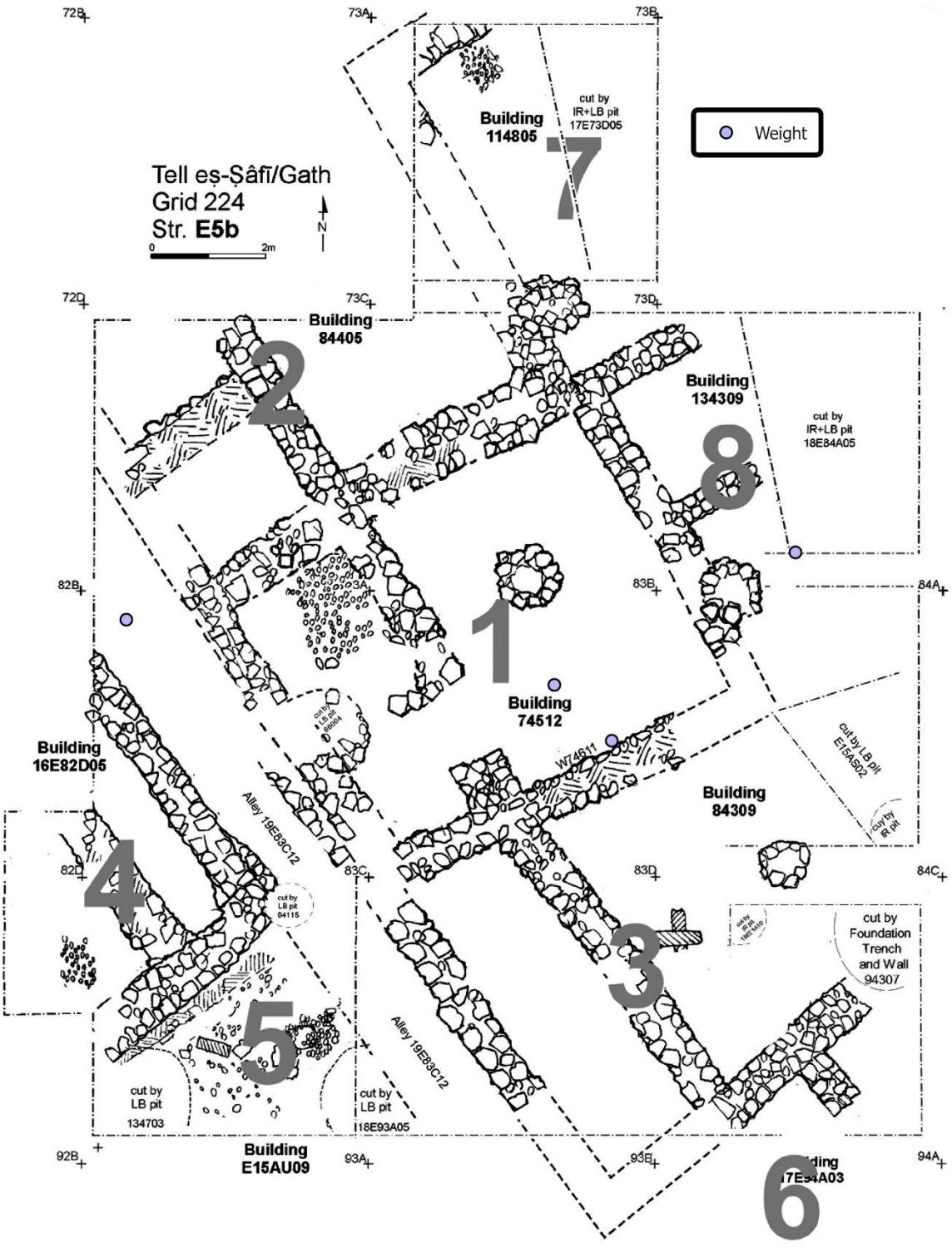


Figure 32: Location map of the E5a stratum weights.



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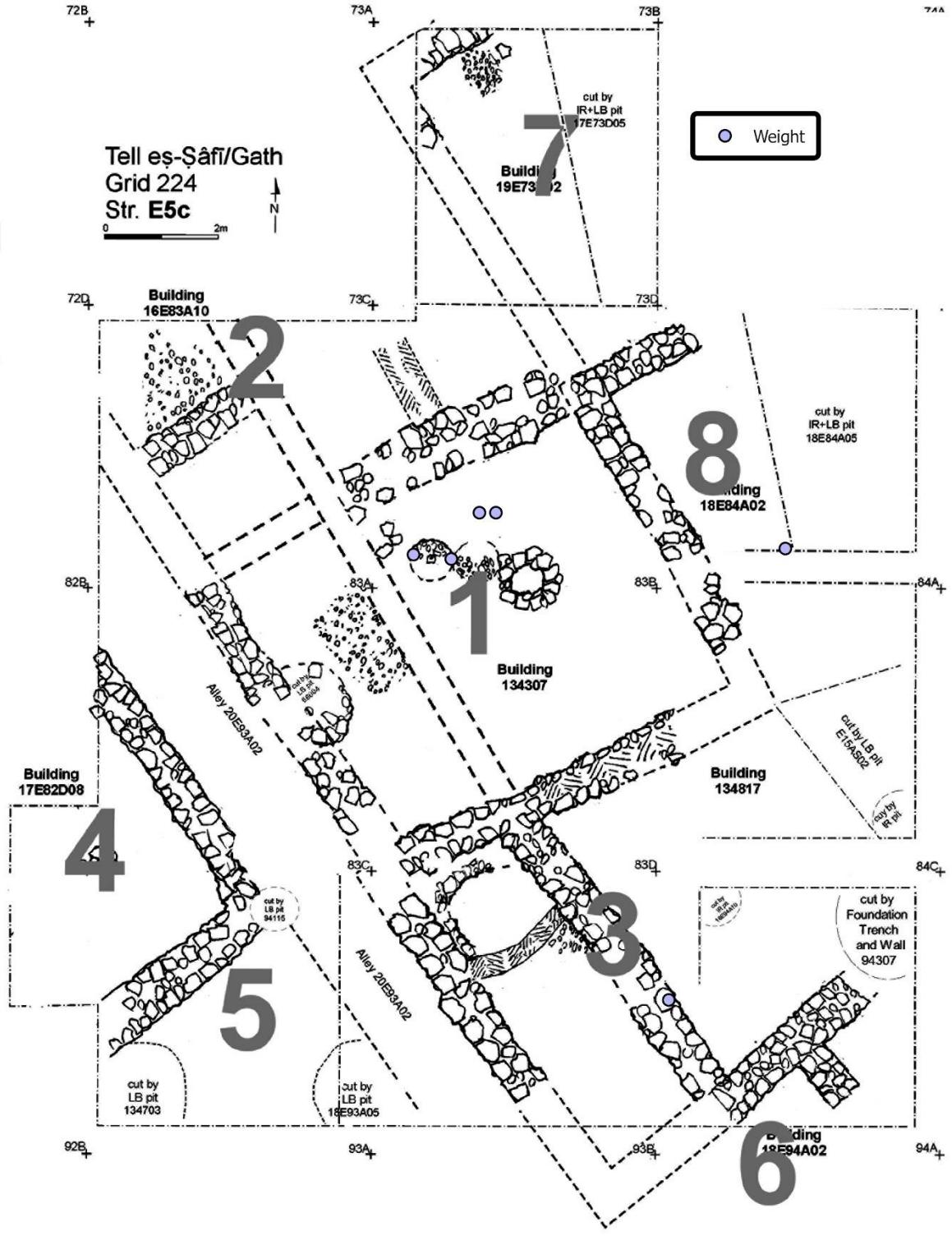

Figure 34: Location map of the E5c stratum weights.

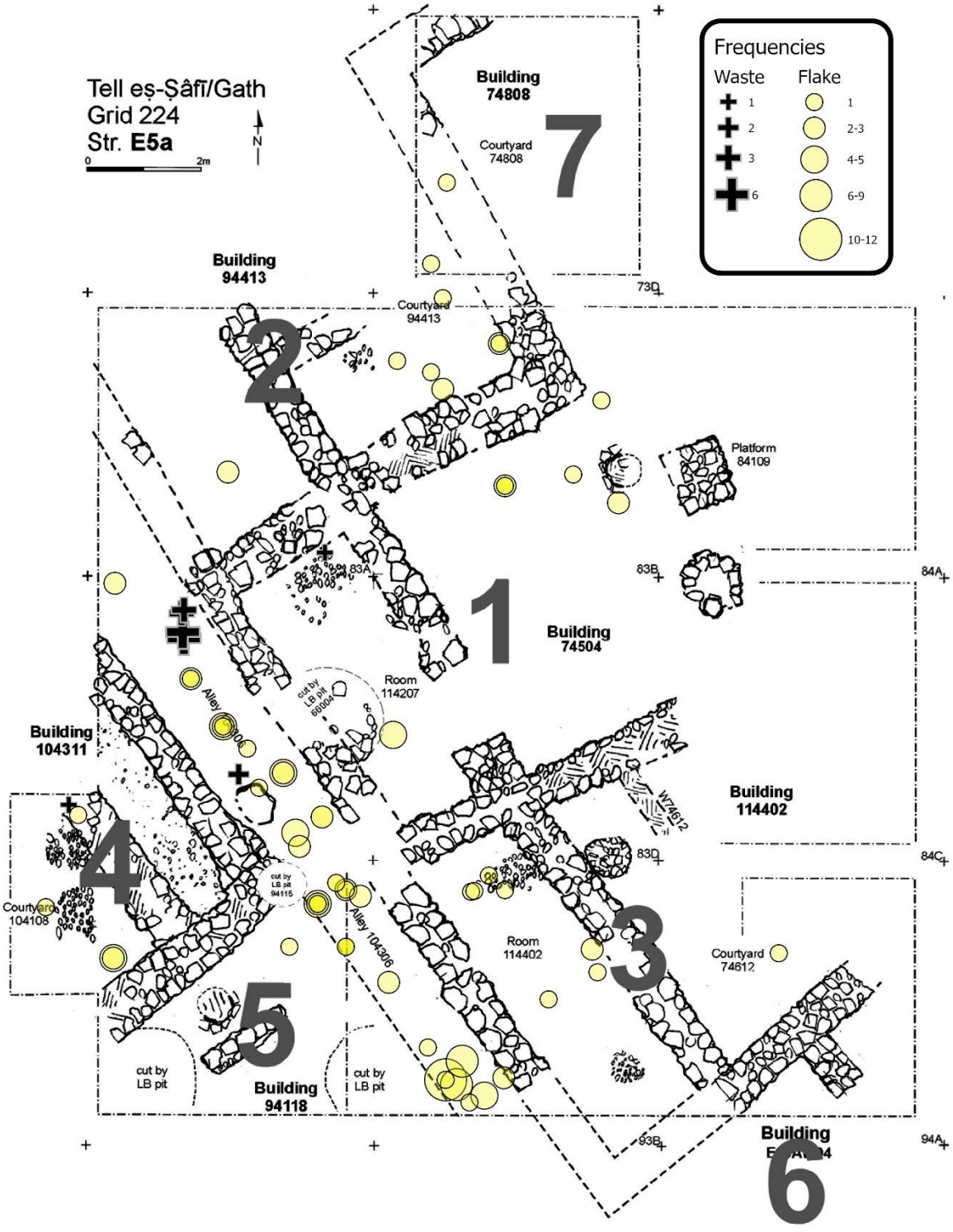

Figure 35: Frequency map of the E5a stratum debitage.

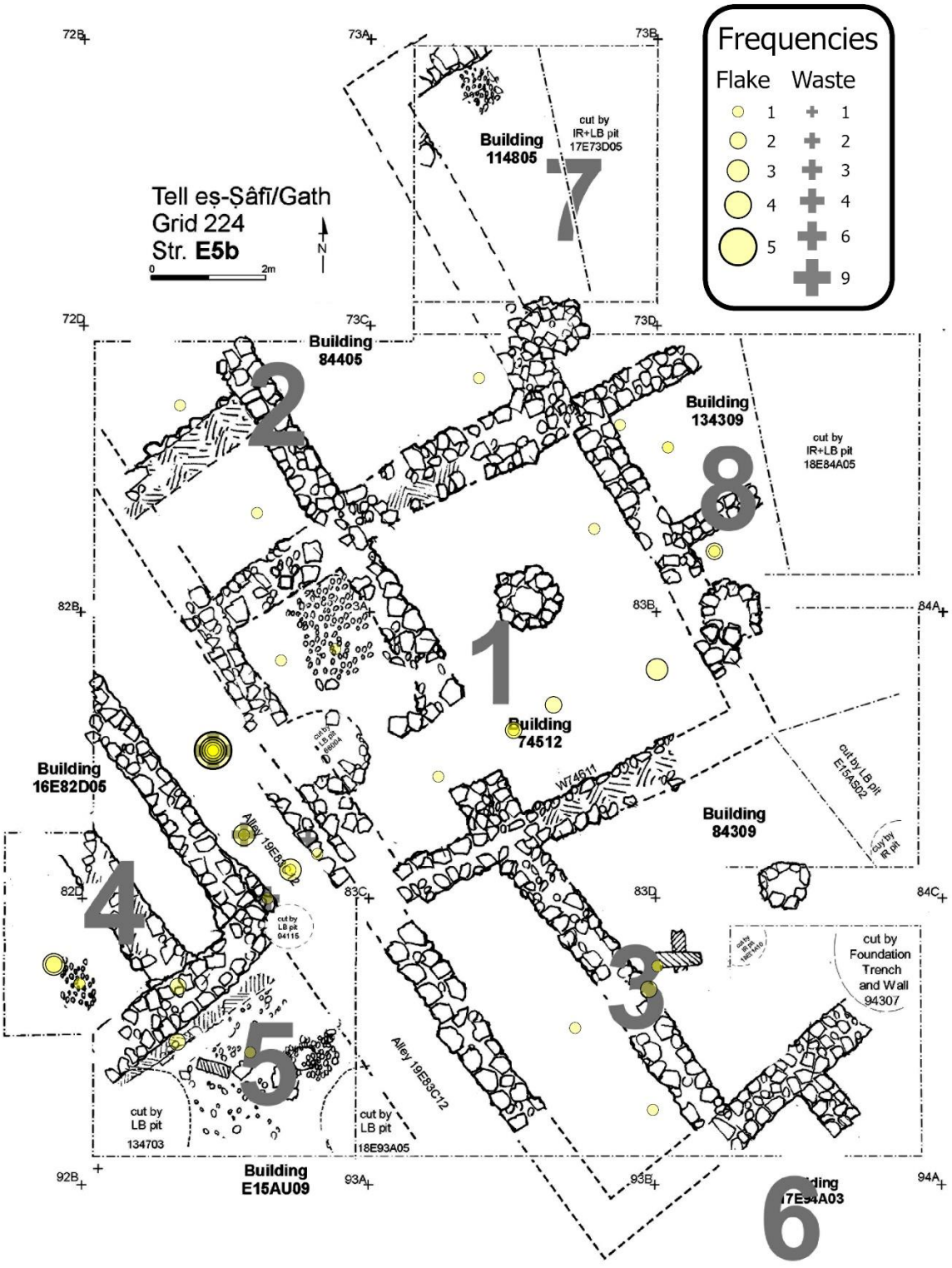

Figure 36: Frequency map of the E5b stratum debitage.

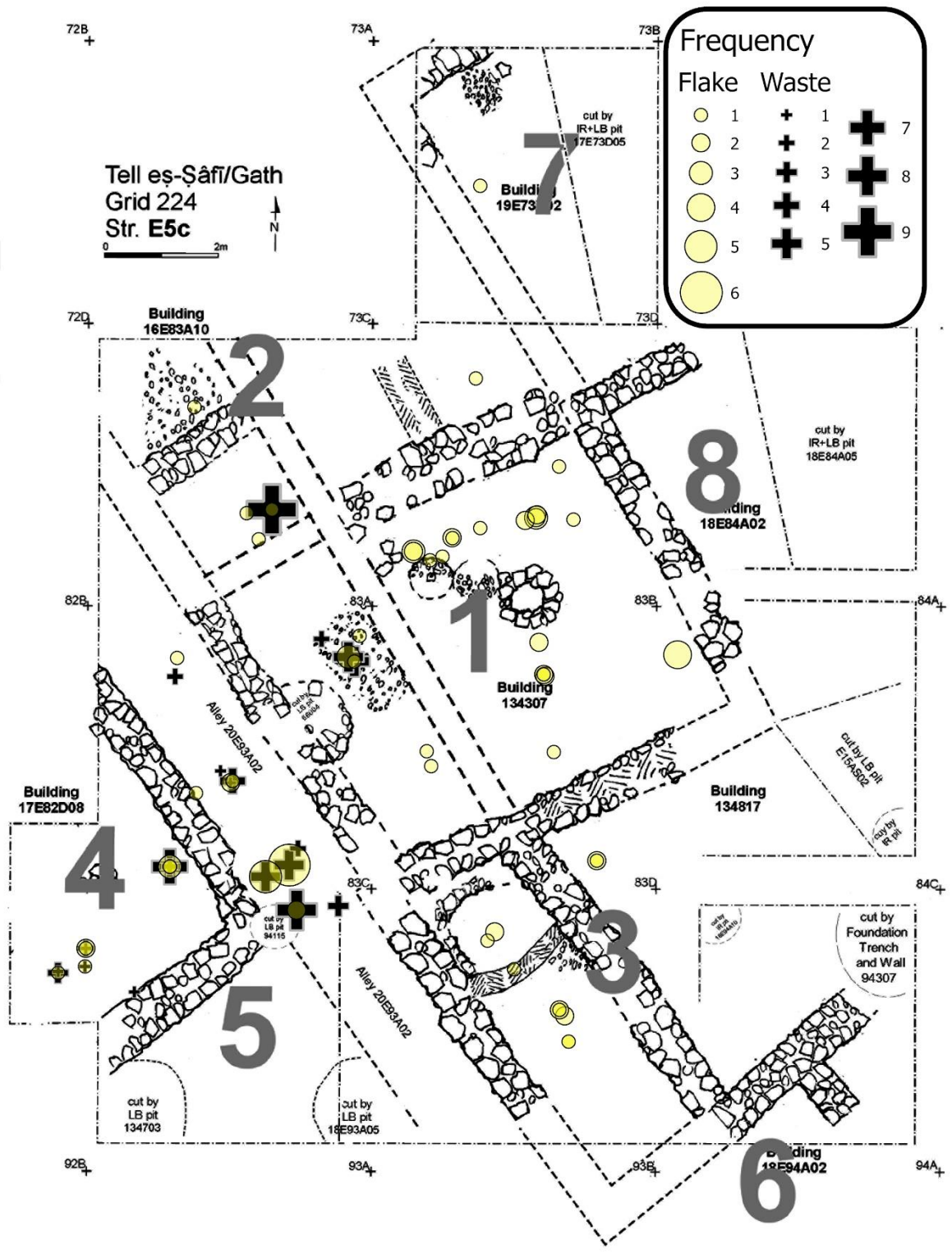

Figure 37: Frequency map of the E5c stratum debitage.

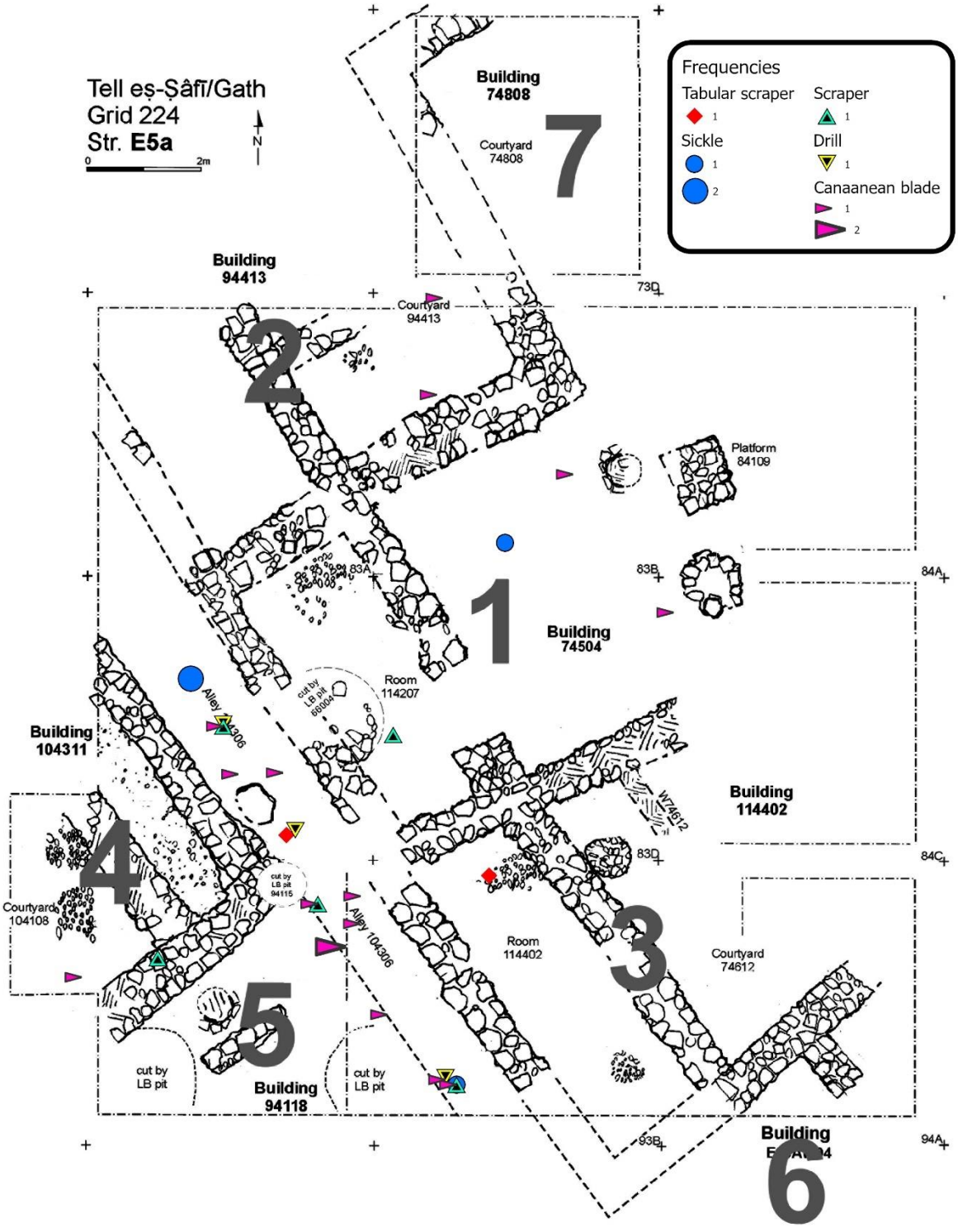

Figure 38: Frequency map of named chipped stone tools in the E5a stratum.

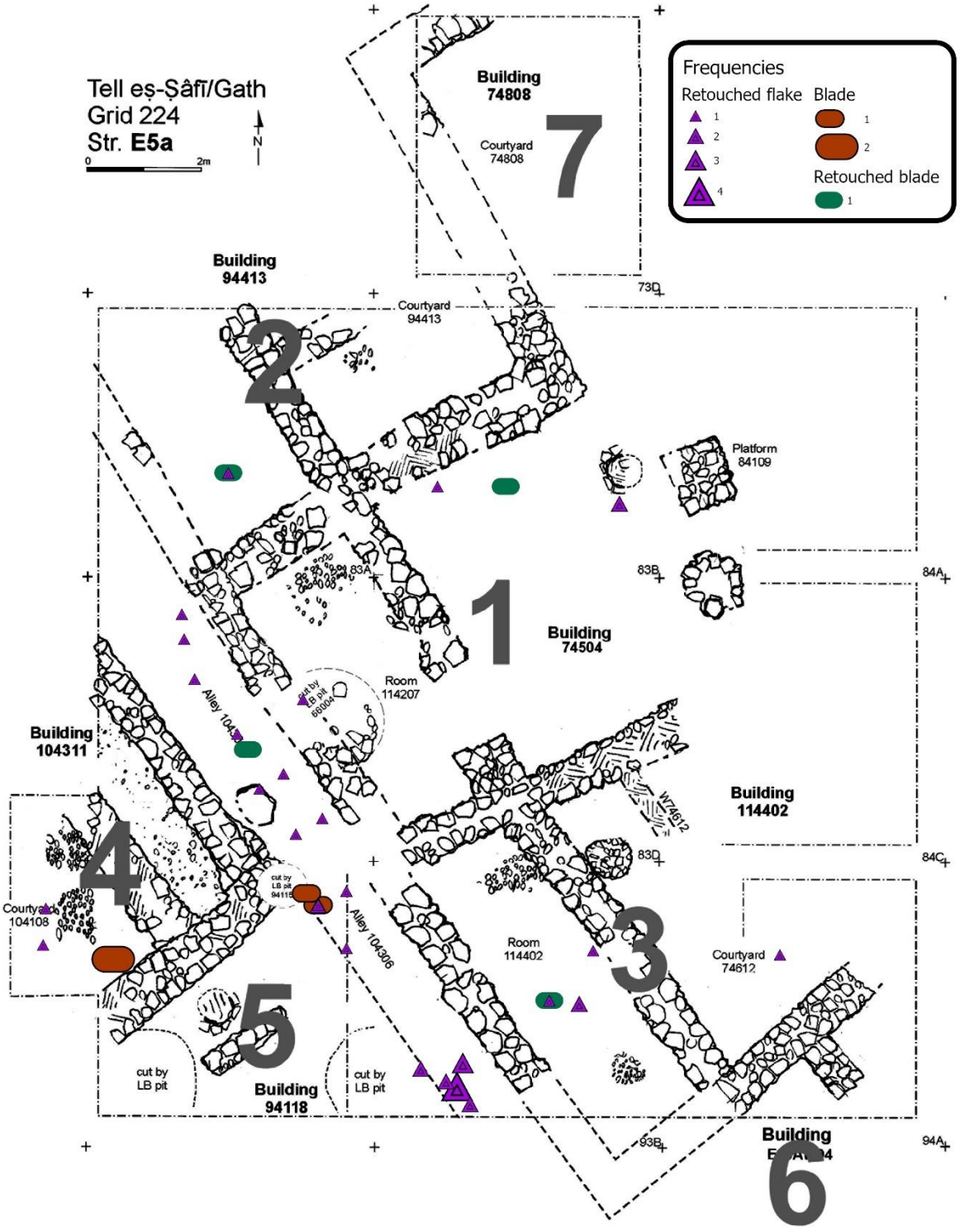

Figure 39: Frequency map of chipped stone blades and retouched flakes in the E5a stratum.

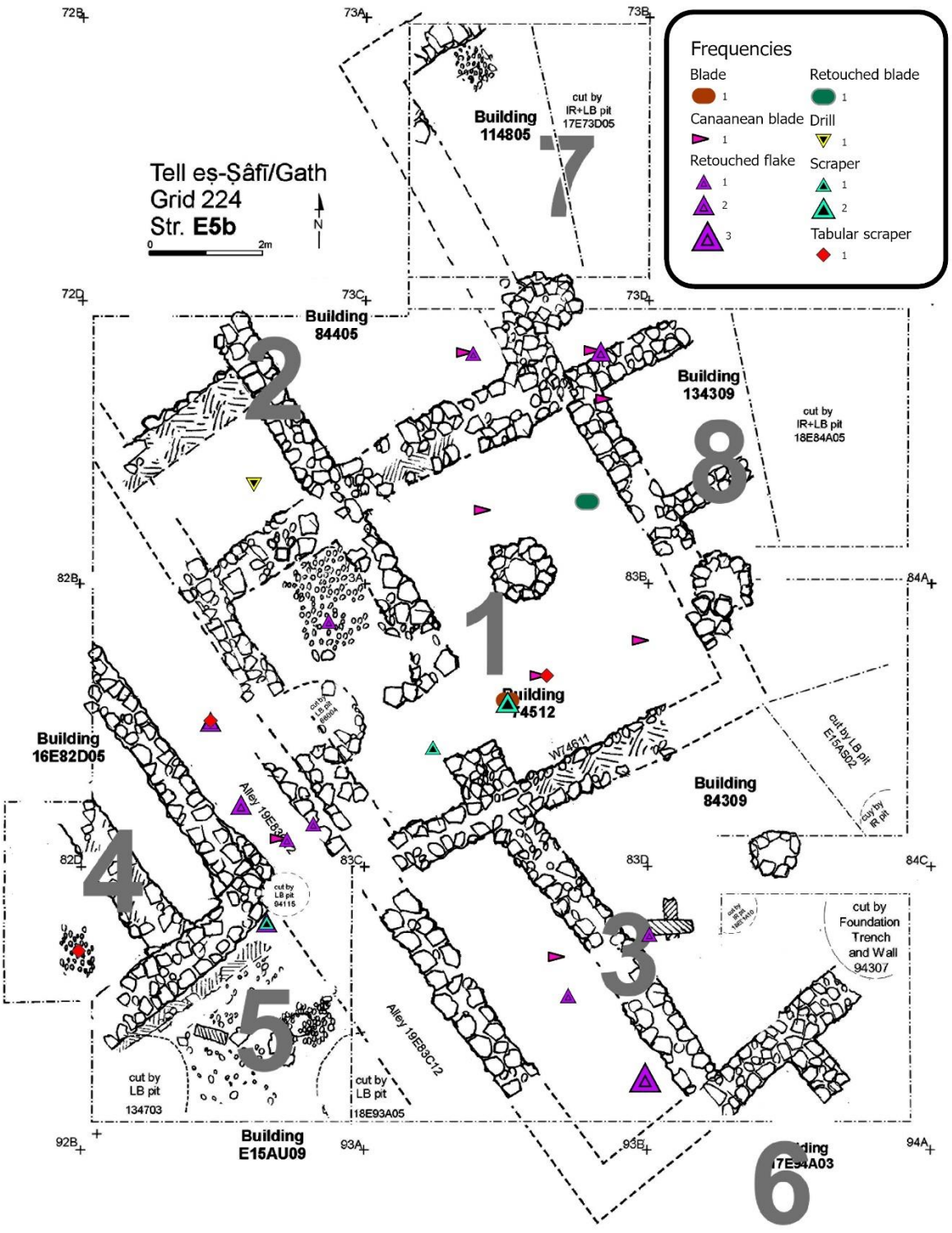

Figure 40: Frequency map of chipped stone tools in the E5b stratum.

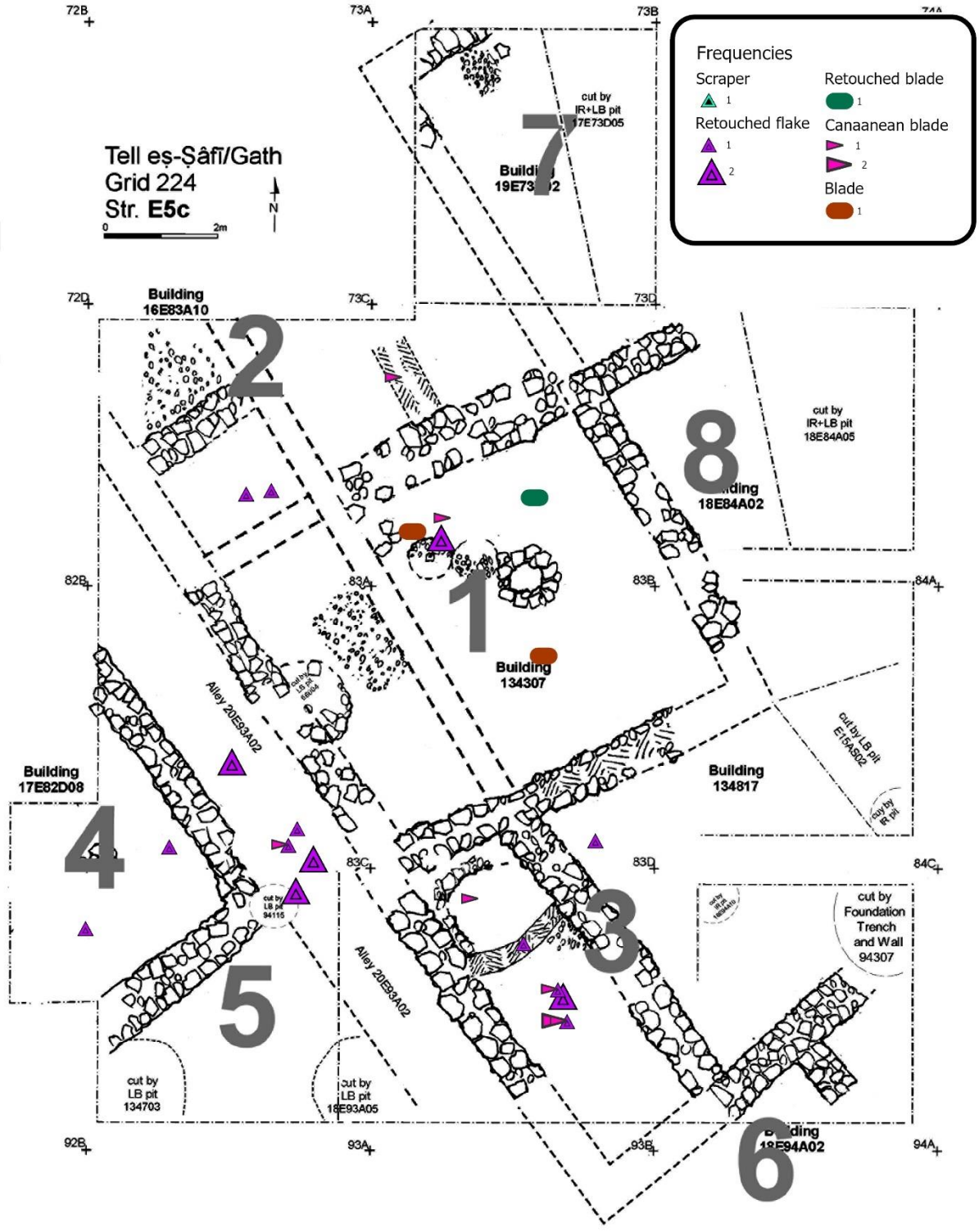

Figure 41: Frequency map of chipped stone tools in the E5c stratum.

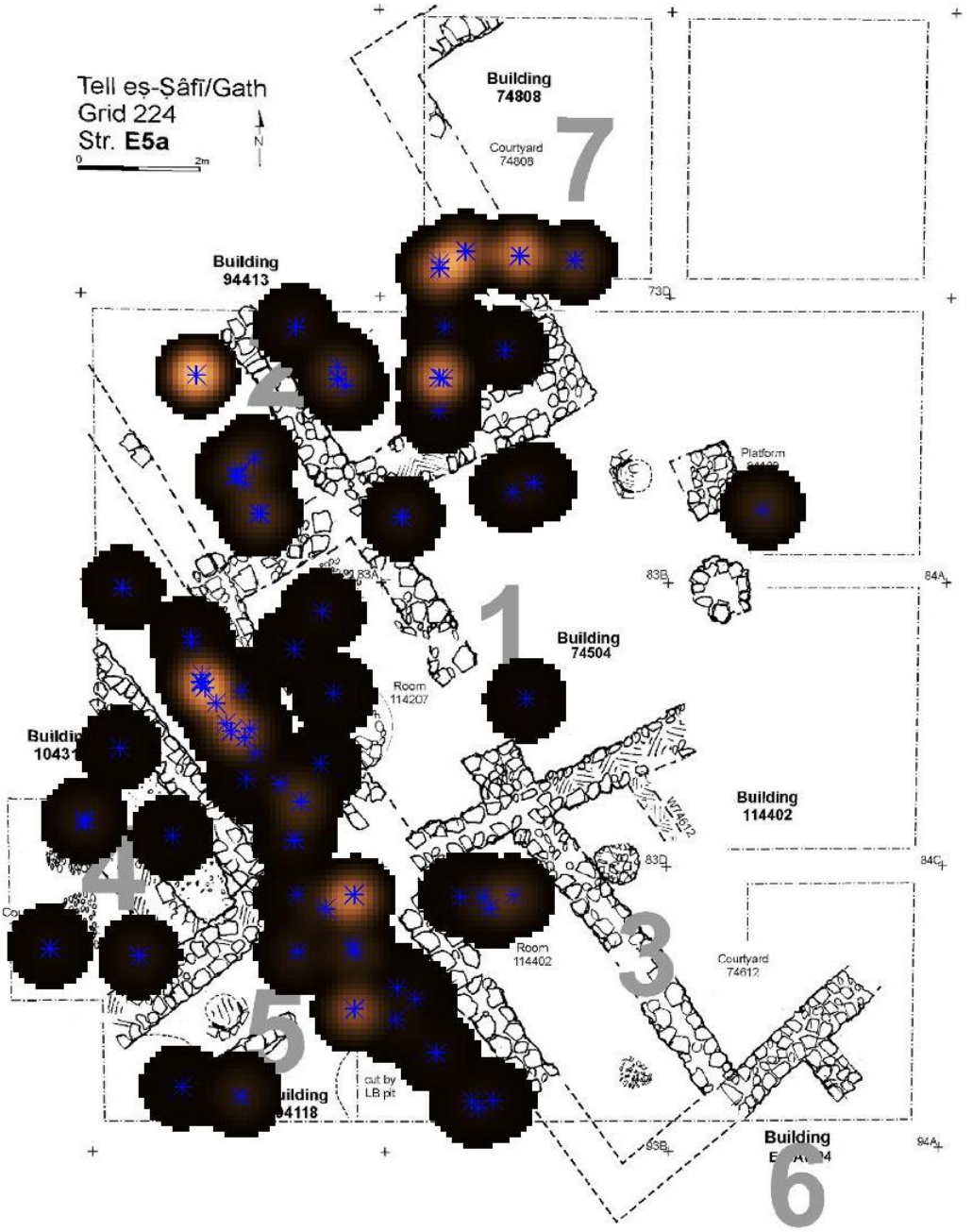

Figure 42: Heat map of the E5a identifiable bone tools.

Figure 43: Heat map of the E5b identifiable bone tools.

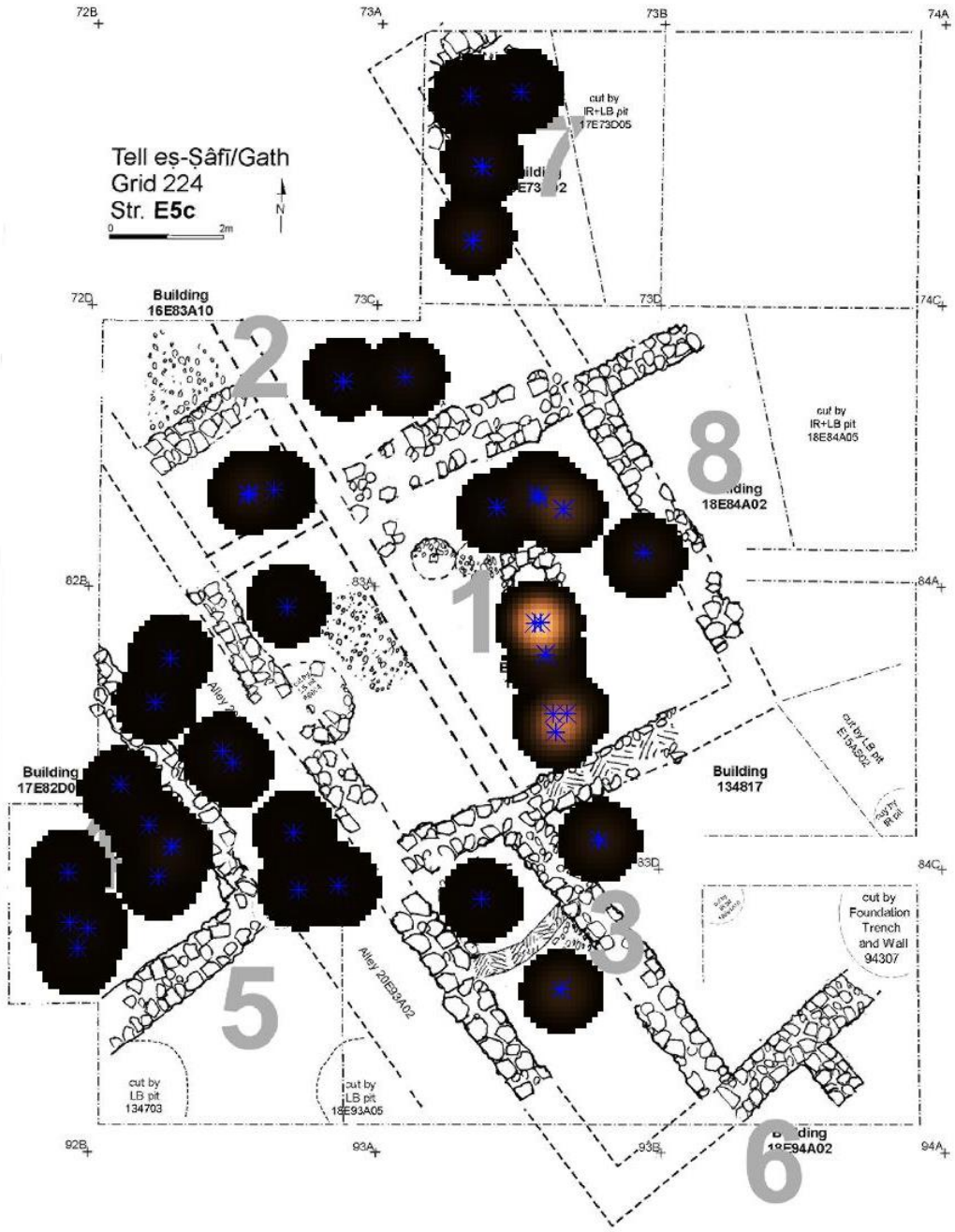

Figure 44: Heat map of the E5c identifiable bone tools.

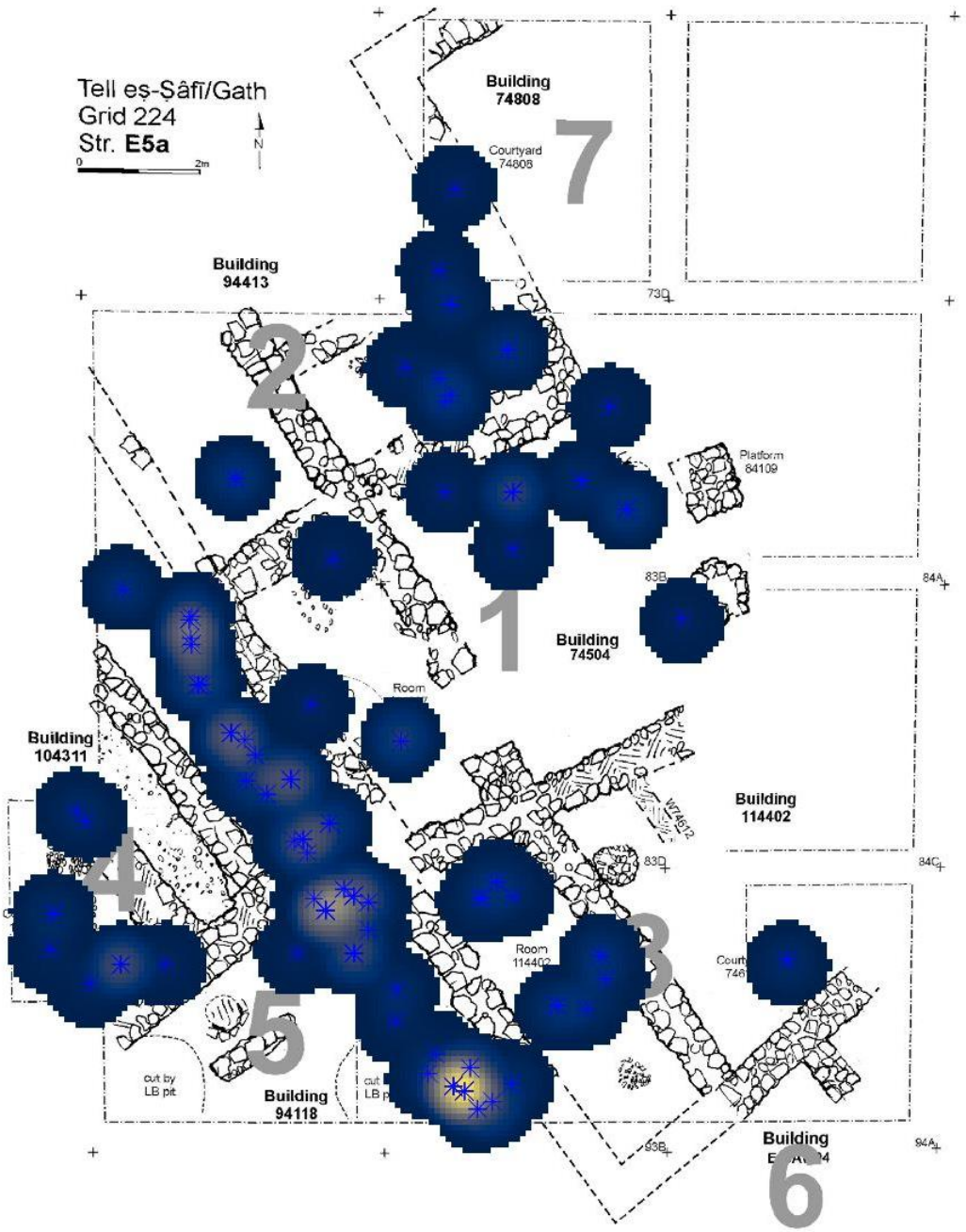

Figure 45: Heat map of the E5a identifiable chipped stone tools.

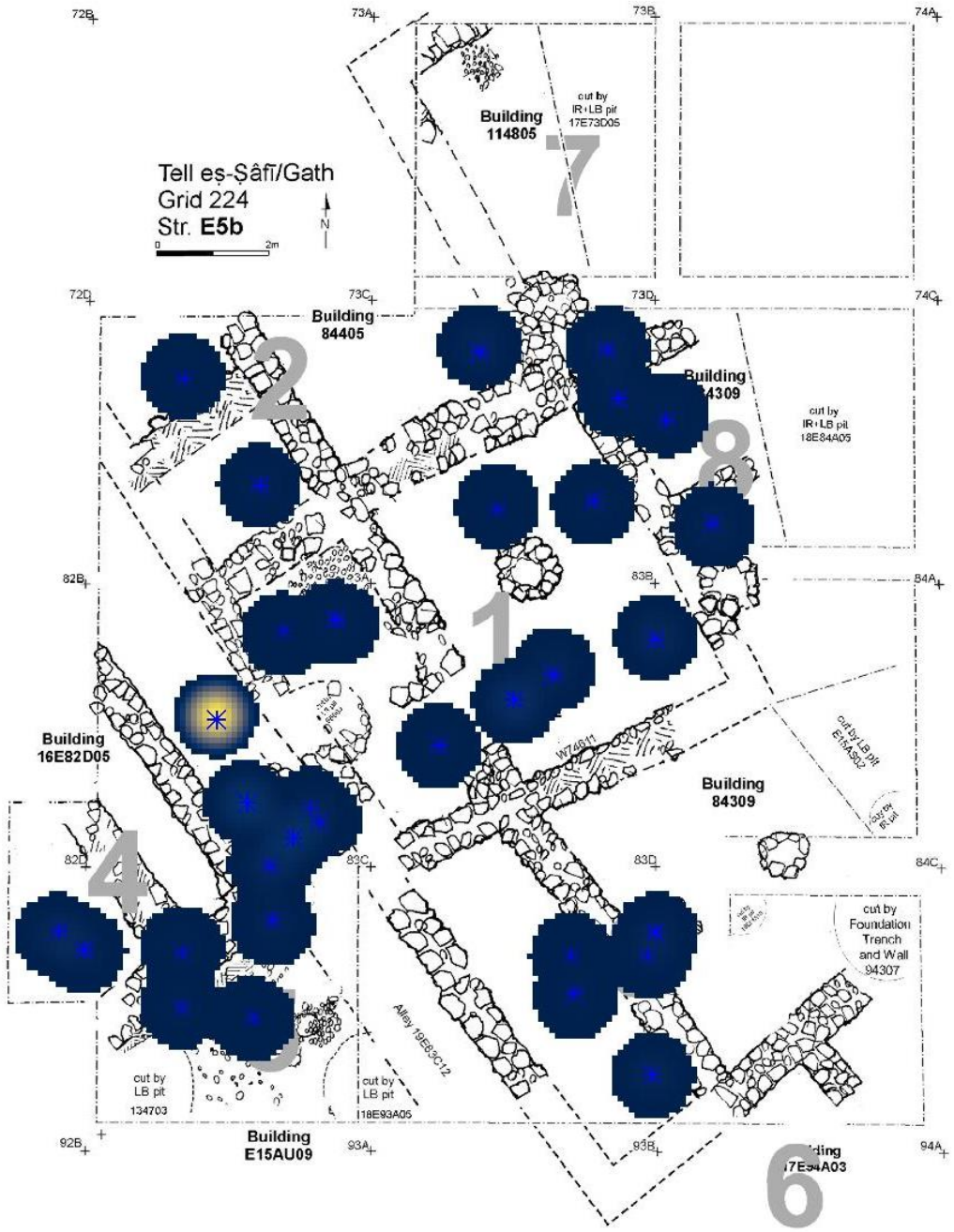

Figure 46: Heat map of the E5b identifiable chipped stone tools.

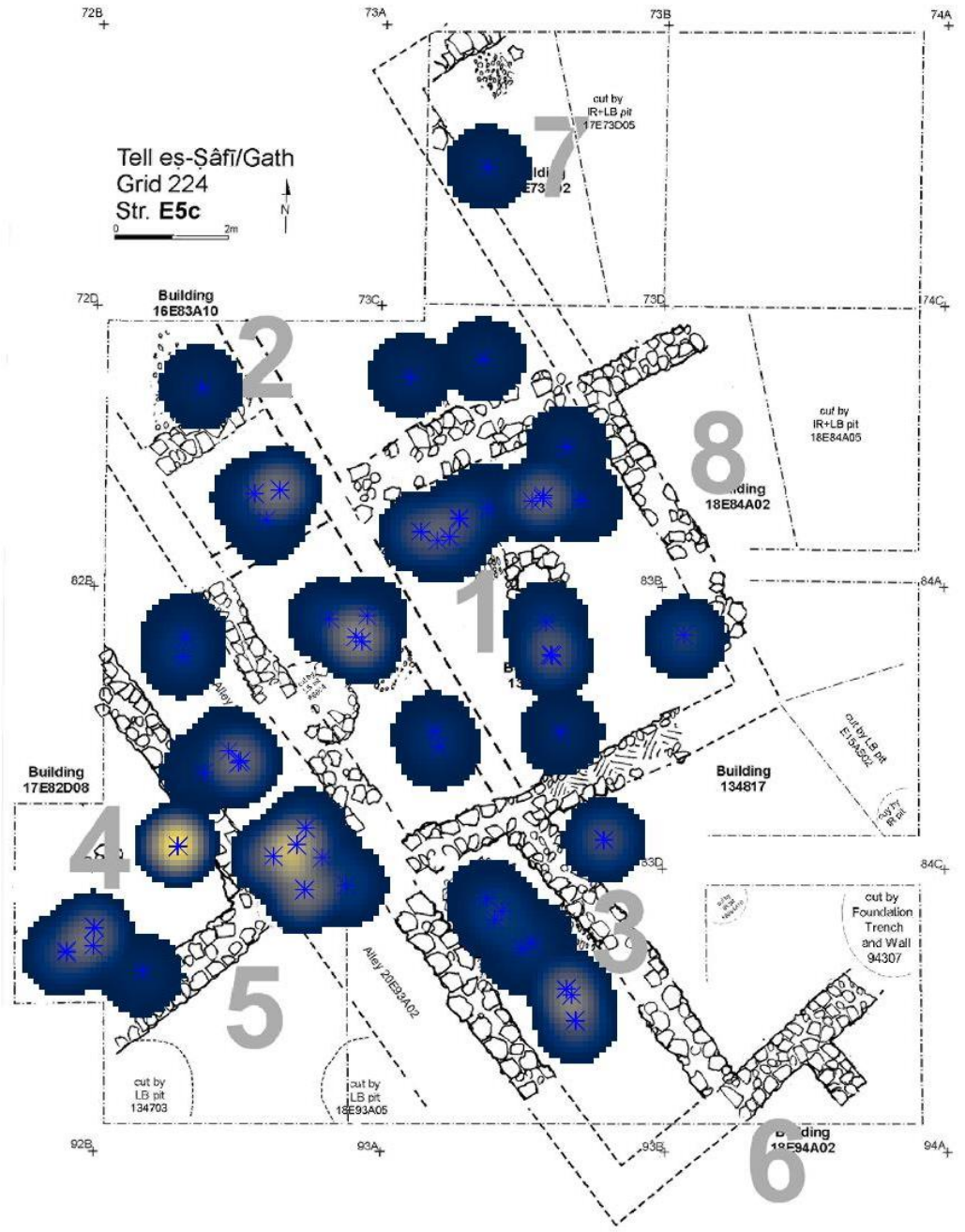

Figure 47: Heat map of the E5c identifiable chipped stone tools.

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