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Kazane Höyük and Urban Life Histories in Third Millennium Upper Mesopotamia

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ABSTRACT

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This dissertation addresses the problem of the development of cities in Upper Mesopotamia in the third millennium B.C.E. I investigate these cities through their settlement patterns and urban plans. I argue that these cities were not planned *or* organic, but exhibited *degrees* of planning. I treat my reconstruction of the developmental pathways of these cities as urban life histories. This approach examines how socio-political and economic processes are expressed in the social production and construction of urban space.

At the core of this dissertation is a case study of the 100 hectare city of Kazane Höyük, located in southeastern Turkey, which was the capital of a regional polity. My study of regional settlement patterns identifies the shape of Kazane's polity, its growth and decline, and its relation to other nearby polities. I study the organization of space within Kazane through magnetometry analysis of several large areas. I study the use of space through excavations and analysis of artifacts and ecofacts. The results reveal a roughly 2 hectare area in the outer city that is characterized by elite and institutional architecture, including houses, storage facilities, and temple-related contexts, adjacent to a main street. My analysis of storage capacity indicates that this part of the city engaged in specialized administration and distribution of cereals and other products. Faunal remains show that this area also participated in a highly specialized system of animal management.

Finally, I compare Kazane's urban plan and life history with that of several other third millennium cities in Upper Mesopotamia. I find that their plans are most in keeping with the

theoretical perspective that these polities were heterogeneous societies in which even the most powerful ruling families were rarely able to control all socio-political or economic aspects of the polity. Instead, different factions in society concentrated on the specific socio-economic goals that best suited their needs. These strategies, and the tension between them, are expressed in the urban plan and the life history of the city.

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CHAPTER 1

INTRODUCTION

Approaching Urbanization in Upper Mesopotamia

In the middle of the third millennium B.C.E. cities developed across Upper Mesopotamia in modern-day southeastern Turkey, northern Iraq and northern Syria (Figure 1.1). These were not the first cities in the region – those came a millennium earlier when cities developed in Lower Mesopotamia and parts of Upper Mesopotamia.[1] Yet the third millennium cities in Upper Mesopotamia, which developed after the early third millennium period of settlement dispersal and regionalization of material culture, spread urbanism throughout the region and established a polity pattern of small states formed around urban centers. This pattern persisted across the Bronze Age from the third to the second millennium, surviving urban collapse and the expansion and contraction of large late third and second millennium empires into which these small states were absorbed and for which they became basic units. The largest centers grew to 100 hectares or more and hosted 10,000 – 20,000 residents. These settlements were a remarkable socio-political and economic development, evidenced not only by population size but by the spread of writing in state administration, extensive craft specialization, and by urban infrastructure, including monumental buildings, paved streets, elaborate defensive systems, and internal neighborhood divisions.

The urbanized polities that developed in third millennium Upper Mesopotamia have been the subject of much scrutiny to discern their origins and character. Was the development of

[1] Recent work at the sites of Tell Brak (Emberling 2003; Emberling and McDonald 2003; Matthews 2003; Oates 2005; Oates et al. 2007) and Hamoukar (Gibson et al. 2002) in northeastern Syria, and Arslantepe (Frangipane 2002) in eastern Anatolia, revealed evidence for large, urban settlements in these areas in the 4th millennium, prior to the appearance of Uruk colonies from Lower Mesopotamia. These finds indicate that urbanism developed in both Upper and Lower Mesopotamia simultaneously, rather than beginning in the south and spreading north.

these cities and states spawned by longer-lived cities in Lower Mesopotamia, or did they develop from local processes? Did urban centers grow by design or "organically" through "natural" processes? Were socio-political and economic power highly centralized among the elite at the core of the states in their urban centers, or was this power spread among a host of competing social groups? Were these states stable entities whose existence could only be shaken by drastic environmental changes, or were they loosely integrated, fragile polities that pushed the limits of their environment?

Although it is difficult to answer these questions, one place to begin is with the urban centers themselves. As a center in every sense of the word, these cities were the seat of government, including temple and palace households, and the socio-economic focus for the polity. These centers likely had their own culture and meaning, although various groups in the city may have experienced these differently. In this dissertation, I conduct a case study of one of the largest cities in Upper Mesopotamia, the 100-hectare site of Kazane Höyük. I examine this city's socio-political and economic structure through its place within its settlement system, its internal organization, and evidence for craft production and cereal and meat provisioning systems. Studying large sites is a difficult task, but this study demonstrates the merits of combining satellite and earth-based remote sensing, survey, and targeted excavation trenches. Through the combination of these methods, I attempt to reconstruct a portion of Kazane's urban life history. I then compare Kazane's life history with that of other cities in Upper Mesopotamia, and attempt to explain similarties and differences between these polities.

Approaching Ancient Cities

Although everyone knows a city when they see one, it is difficult to define a city in simple terms. On television and in print, popular shows and literature often describe the Near Eastern Neolithic sites of Jericho and Çatal Höyük as among the first cities, based on a town wall and stone tower at the former, and craft production and tightly-packed housing at the latter (Kenyon 1957; Mellart 1964). This view is also held within the scholarly community (Soja 2000), and is gaining traction as the requirement of a rigid hierarchical government is decoupled from definitions of the city (e.g. McIntosh 2005). Yet, many scholars of the Near East would not describe any settlement as a "true" city before the emergence of small states based in cities (often called city-states) in Mesopotamia in the fourth millennium. This is because they associate the development of cities (and states) with socio-political and economic changes that involve the formation of hierarchical government, and a complex division of labor in which many persons no longer produce their own subsistence goods.

For 19th and 20th century social scientists, *urbanization* – the process of developing *urban* or city-like characteristics – produced, and was produced by, a fundamentally different set of core cultural characteristics that set urban (city) residents apart from those in rural settlements. Treating the rural – urban distinction as fundamentally a social problem, they codified these distinctions into ideal-type dichotomies, such as Tönnies *Gemeinschaft* (community) and *Gesellschaft* (society) (Tönnies 1988), Durkheim's mechanical and organic solidarity (Durkheim 1933), and Redfield's "folk society" and urban society (Redfield 1947; Redfield and Singer 1969). These dichotomies, which were not perfectly mutually exclusive, emphasized key features of socio-political organization that distinguished rural or village life from urban or city life. Rural life was characterized as socially and culturally homogeneous, religious, governed by age-old social customs, and organized on the basis of kinship relations. In contrast, urban life was seen as governed by new economic relations determined by the division of labor, such that individuals are no longer accountable to tradition and religion but to state rules and their employer. Although the rural-urban dichotomy persists today in many forms, it has been challenged and broken by several studies (e.g. Schwartz and Falconer 1994; Williams 1973; Wolf 1982).

Other approaches to urbanization recognize that social changes do take place in cities, but assert that these alone are not the defining traits of a city. Instead, cities are said to be recognizable by a host of features, most famously those defined by Childe (1974). Child's urban traits include unusually large size, a divese, non-food producing resident population, centralized collection and distribution of surplus subsistence goods, monumental architecture, high levels of craft specialization and international trade, and incorporation of writing into urban administration. Recognizing that very different cities share many of Childe's urban traits, other scholars favor a typological approach that assigns cities to idealized types according to their major economic base and form of government (Fox 1977; Finley 1981; Weber 1958). In order to distinguish ancient cities from modern cities, some typologies describe various types of pre-industrial cities (Redfield and Singer 1969; Sjoberg 1955, 1960). Pre-industrial city types emphasize the presumed endurance of so-called rural or folk-type social relationships and lifeways within cities, including the primacy of kinship in sacred and secular institutions, and the central importance of subsistence agriculture in the urban economy.

All of the definitions of and approaches to the problem of urbanization, or becoming a city, discussed so far implicitly or explicitly emphasize the greater number and type of functions performed in cities than in rural settlements. Borrowing from central place theory of geography, other scholars argue that cities form naturally through the energy optimizing, hierarchical clustering of complex functions (Blanton 1976). As an example of this approach, Bruce Trigger's analysis of urbanism (1972) marked a shift from a focus on the kind of social organization in cities, the social experience of the individual, or grand models of linked traits, towards an understanding of what functions are uniquely entwined in the city. According to this model, as social complexity and the division of labor increases, the *natural* hierarchy of human activities will create spatial hierarchies with "the higher or more specialized functions being performed from a smaller number of centers" (Trigger 1972:578). In addition, in order to adhere to an assumed desire for economic efficiency and economies of scale, related activities and functions will tend to concentrate in specific locations. This concentration of functions further accelerates the development of cities, with larger settlements performing a greater range and number of functions (Trigger 1972:578-579).

Although there is little doubt that urban centers contain a concentration of many functions relative to rural settlements, a spatially driven model runs the risk of marginalizing or ignoring the role of agency, heterarchy, and power-sharing in city and state formation. With an increasing emphasis on agency and practice theory in the 1980s and 1990s, some scholars of cities turned away from systems models and typologies. They also rejected Weber's (1958) bounded, autonomous city, and argued that coercion is not enough to hold together the social groups within cities (Hirth 2003; Smith 2003:3). Echoing the work of Mumford (2003), recent approaches examine how various members of society actively create the city, how competing social factions negotiate differing goals to maintain urban cohesion, and how the city articulates with its hinterland (Cowgill 2004:528; Monnet 2003; Smith 2003:2). This work is influenced by a consideration of native (emic) perspectives on what the city meant to different cultures in antiquity (Hirth 2003; Marcus 1983; Mieroop 1999:42-62). Also influential are studies that show the continued importance of kinship in cities and the social role of neighborhoods, not only in Sjoberg's preindustrial cities, but in modern cities as well (Campbell and Lee 1992; Hannerz 1969; Lloyd 1973; Logan and Spitze 1994; Smith 2003:3; Stack 1974; Stone 1987; Wilson 1993). These approaches argue that in order to understand the city, one must not view it in isolation but as a part of the larger society in a variety of ways, including social, economic, and political. In this view, urbanization is a regional phenomenon, not a site-specific phenomenon, as Soja's "cityspace" extends beyond the confines of the cities themselves (Soja 2000:13, 16).

In spite of these greatly expanded approaches to urbanism, we still struggle to find a definition of "the city" that is sufficiently narrow to exclude pre-urban settlements, and sufficiently broad to be applicable in broad cross-cutural contexts. The core element of many of the treatments of cities cited above is an especially dense cluster of many different groups of people. These groups are different in terms of their lineages, but also in terms of the distribution of occupational and craft specialization among them. This clustering is a highly stimulating environment (Soja 2000:13) in which higher numbers of social and economic relationships stimulate economic growth and increasing specialization. Thus, cities are central places that may grow exponentially through the draw of economic growth and increasing specialization.

This definition of cities would be at home in many definitions of cities, including Childs' Urban Revolution, and Trigger's clustering of fuctions. The fundamental difference between those earlier definitions of the city and more recent definitions is that we now acknowledge that the degree of hierarchy in cities varies, and that social hierarchy, and implied conflict, are not the single driving forces behind urbanism. In this respect, there is room for several definitions of the city. Definitions that only require clustering of heterogeneous groups and specialization of labor would count Jericho and Çatalhöyük among the ancient cities (e.g. Soja 2000). Definitions that require the expression of strong social hierarchies would likely exclude such Neolithic sites. Yet, even these models aknowledge the role of horizontal power relationships, or variable nodes of power, as embodied in the concept of heterarchy (Crumley 1995, 2001). We also acknowledge that these variable nodes of power do not all pursue the same goals, but may adopt a variety of complementary or conflicting socio-economic goals (Blanton et al. 1996). Finally, we acknowedge not only the persistence of corporate forms of social organization, but the key structural role these groups play,[2] even within highly centralized cities (Blanton 1998; Stone 1997, 1999).

In response to scholarship's century-long struggle to define cities and states, Adam Smith recently argued that the proper object of study is not the city, the state, or urbanism, but the "regime," which he defines as:

> …the spaces defined by political and social elites with a direct interest in reproduction of structures of authority in concert with broader coalitions supporting authoritative rulers. Regime thus incorporates the spaces created both by the horizontal circuits of prestige, influence, and resources among elites and by the vertical ties (kin, ethnic, religious) that extend down to grassroots levels (Smith 2003:27).

Defined in this way, "regime" is the sum of interpersonal relationships that "produce urban landscapes as built environments and imagined places" (Smith 2003:189). Smith emphasizes that the urban landscape is full of social and political divisions that are hidden by "a highly politicized urban imaginary" (Smith 2003:189). Although Smith is keen to highlight the

[2] For example, McIntosh defines "clustered cities" in the Middle Niger as "a segmented community of specialists who voluntarily come together to take advantage of the services of others and to exploit a larger market for their products, but who maintain physical separation in order to reinforce their separate identies" (McIntosh 2005:185). In this model, the clustering of people is not at a single site, but at groups of nearby sites within a larger region. For McIntosh, the reluctance of the Middle Niger people to come together into single centers reflects their resistence to centralized authority, their strong corporate identities, and their ability to balance the requirements of resilience and environmental sustainability (2005:204, 206). McIntosh contrasts these corporate, "clustered cities" with the highly centralized, "citadel cities" of Mesopotamia, which he argues may be descended from clustered cities.

multidimensional nature of the relationships that make up the regime, reaching down to the "grassroots" or non-elite, local level, his approach is admittedly top-down, setting aside studies of resistance to elite goals until after we fully comprehend the ruling strategies (Smith 2003:280).

Smith's regime concept is designed to move us away from defining the city or the state, towards an investigation of what these polities do and how they do it (Smith 2003:25). Yet, much of what falls within the concept of regime is often a part of studies of cities, states, and urbanization. Although Smith dismisses the state as "an illusion, a fiction created to justify domination by government," (Smith 2003:97), one could argue that the state is a polity politically organized by a particular kind of regime. Clearly, Smith views urbanization as a fundamentally coercive, conflict-based process. In contrast, other uses of regime theory identify several different types of regimes, each with different bases of power, different abilities to exercise power, and a range of effective or ineffective strategies (Stoker 1996). The regime concept itself arose from the realization that in very complex polities, it is difficult for one group to maintain complete control over government, or achieve consensus with non-ruling groups on complex issues (Stoker 1996:273). This forces ruling groups to network with other groups in society, sharing power, forming coalitions, and negotiating decisions. The key contribution of Smith's regime approach is his attempt to flesh out the kinds of relationships and manufactured space that constitute urbanism, and complex societies in general, with an emphasis on the production and reproduction of authority. The emphasis on authority assumes that non-elites have virtually no influence on the production of urban space, a position I cannot accept. Even in the most coercively organized societies, non-elites participate in building urban infrastructure, and impact the use of urban space in which they work and live.

Smith's landscape approach to cities breaks up the notion of planned versus unplanned or organic cities to argue that urban space is emergent but socially determined. In a similar vein, in his recent study of ancient urban planning Michael Smith argues that the planned versus organic distinction is a false dichotomy (Smith 2007:5). Instead of planned or organic, Michael Smith identifies degrees of planning that change over the life of a city and embody multiple levels of meaning, as described by Rapoport (Smith 2007:30; Rapoport 1988, 1990). Although I disagree with Adam Smith's regime-first approach to urban studies, I find appealing his view of cities and states as manufactured landscapes within the larger landscape of other polities. Adam Smith's landscape approach, combined with Michael Smith's degrees of urban planning, recalls the urban ecology of Robert Park and other Chicago School urban geographers. Robert Park argued that the physical parts of a city, including streets and buildings, are mere artifacts until they are brought to life through connection with "the vital forces resident in individuals and in the community" (Park 1915: 578). In this view, despite any formal planning, the city is an expression of its inhabitant's culture, which organizes the city that in turn imposes certain restrictions or order upon is residents. Like organisms, the city's parts – it's people groups – interact, compete, and change in relation to each other. Other urban geographers such as Burgess (1925) and Hoyt (1939) developed models of urban development that we can use to interpret the growth and degrees of planning in ancient cities (Marcus 1983).

In sum, a fruitful approach to cities is one that relies not on defining what a city is or is not, or that limits the key features of a city to a list of social, cultural, or material traits, but one that treats the city as part of a multi-scalar, human-produced landscape. The city is a landscape in its own right, but it is also part of its polity landscape, and the larger micro-and macro-regional landscape. By examining the city at several landscape levels in conjunction with the urban plan, we can identify the features that make each city unique, but also the commonalities that make it possible to link similar cultural developments into simple models that begin to explain their existence. In the last few decades of archaeological research many scholars cast aside the systems models that focused on the evolution of complex societies as a process of increasing integration. New approaches to complexity eschew narrow hypothesis testing in favor of building simple models that describe how a society or phenomenon works (Kohler and van der Leeuw 2007:2). These new models also view complex society as a system, but recognize that the system is emergent, driven by the agency (intentions) of many different actors, not centrally controlled, entwined with environmental factors, non-linear, and historically contingent (Kohler and van der Leeuw 2007). The latest models attempt to understand not only the range of state power, but also the limits to state power (Yoffee 2005:41). In constructing such models, a multi-scalar landscape approach holds much promise.

Urban life histories

In this study, I propose to analyze the landscape of cities through the concept of *life history*. Life history is both a concept and a method employed in a range of fields, from biology and ecology to psychology, urban geography, ethnology and archaeology. In ecology and biology, an organism's life history is recorded with the goal of determining which behaviors and adaptations lead to successful growth and reproduction (Odum and Barrett 2005:280). In psychology and ethnology, life history attempts to understand how the experiences of an individual or a community shaped their lives and contributed to who they are today (Langness and Frank 1981). In urban geography, an approach that acknowledges that cities are "lived spaces" constructs "life stories" (Soja 1989:14, 2000:11) or "narratives" (de Certeau 1998: 142) in a method that can be compared to "writing a biography, an interpretation of the lived time of an individual; or more generally to historiography, the attempt to describe and understand the lived time of human collectivities or societies" (Soja 2000:11). In archaeology, life history is generally studied in relation to the "social life" of material culture (Appadurai 1986), or spaces, such as individual houses, which are analyzed in fine detail to discern the ways in which house *space* is converted to a historically contingent *place* through the actions of real people in their every day lives, often over very long periods of time (Anderson and Gale 1992:4; Gillespie 2000; Hodder 2007: 22; Tringham 2003:94-95; Pred 1984:279; Verhoeven 1999:20). Although the life history method recognizes that each life history is unique, comparison of multiple life histories generally reveals patterns of experiences and behaviors that help us understand the processes involved in cultural development.

When applied to cities, the life history approach acknowledges that cities are not static or fully formed, but are produced over time by dynamic human processes (Soja 2000: 9). Thus, instead of simply looking at the *distribution* of space, I look at the contested *social production* and *construction* of space in the city, which emphasizes agency and recognizes changes, both minor and major, that impact urban space (Lefebvre 1991; Low 1996:862; Whyte 1980). After Low (2000:127-128), the *social production of space* "includes all those factors – social, economic, ideological, and technological – that result, or seek to result, in the physical creation of the material setting." A related concept, the *social construction of space, is "*the actual transformation of space – through peoples' social exchanges, memories, images, and daily use of the material setting – into scenes and actions that convey meaning" (Low 2000:128; Soja 1989:80). Both concepts describe the urban process that makes up the life history of a city. By examining the production and construction of urban space, we can identify vectors of growth and decline, episodes of centralized planning and decentralized planning, and the structuring impact of past spatial decisions upon future residents. Although the life history approach reifies cities and urban "parts" or "social groups" to some extent, it is effective because it looks for the "big picture" of how urbanization unfolded, while acknowledging the agency of real people.

In contrast to the fine-grained studies of small spaces that are necessary for reconstructing the life history of a single element of the built environment,[3] such as a house or temple, the study of the multi-scalar landscapes that comprise ancient cities requires a combination of methods. At the broadest level, surface and remote sensing survey are necessary to study the local and regional landscapes. At the level of the city, remote sensing[4] is necessary to discern the structure of space in a short time frame without recourse to old-style massive horizontal excavations with railroad tracks moving enormous amounts of earth to towering dumps. Finally, excavations are necessary to supplement remote sensing data and acquire information about micro-level, structure-specific construction and use of space. Accordingly, this dissertation makes use of all of these methods to study the macro and micro landscapes of the Harran Plain, Turkey, and the ancient city of Kazane, located at the northern end of the Plain.

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[3] After Lawrence and Low (1990:454), the built environment is "any physical alteration of the natural environment, from hearths to cities, through construction by humans." This includes buildings, public spaces, landmarks, or elements of any of these.

[4] Although remote sensing provides more or less information about city form due to differences in instruments and site characteristics, the variety of methods make it likely that at least one technique will yield some results. Common methods include magnetometry, resistivity, ground penetrating radar, and satellite imagery. In the best cases, remote sensing reveals individual structures and small features, but even in "less successful" cases, these methods may reveal large features, such as streets, middens, or city walls, as well as aspects of the natural landscape, such as buried stream beds, bedrock, or landslides.

Studying an ancient city: Kazane Höyük

In the middle of the third millennium B.C.E., Kazane Höyük grew from a small village or town[5] of perhaps 10 hectares to a 100-hectare city located at the northern end of the Harran Plain in southeast Turkey. The city's acropolis, situated upon the mounded ruins of Neolithic and Chalcolithic settlement, is located in the northwestern quadrant of an oval lower city surrounded by a massive wall (Figure 1.2). At 100 hectares, Kazane was among the largest cities in Upper Mesopotamia and served as the capital of a small state in the Harran Plain. Kazane shared the fertile soils of the Plain with several secondary centers between 9-17 hectares in area, and the large city of Harran, a 50 – 125 hectare site located at the southern end of the Plain.[6] Unlike Kazane, Harran is mentioned in third millennium texts but its size at that time is unknown due to overlying settlements from later periods. These texts provide insight into political relationships between the Eblaite state, located in western Syria, and Harran, but do not mention any ancient site that can be correlated with Kazane.[7] Over the last three decades, dams along the Euphrates River and its major tributaries sparked intensive research along these waterways. This work greatly advanced our understanding of cities and states in these areas, but the Harran Plain was one of the last areas to be surveyed, and aside from Kazane there are no broad excavations of third millennium sites in the area. For these reasons, the Harran Plain is in many ways a blank spot in our understanding of third millennium Upper Mesopotamia, and my study begins the process of filling in this gap.

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[5] Although a surface survey identified pre-urban, early third millennium ceramics in just a 2 hectare area on the tell (Wattenmaker and Mısır 1994:179), it is likely that this underestimates the size of the site in this time period because later remains obscure the visibility of surface remains. It is possible that the site was as large at 10 hectares prior to its urban expansion (Wattenmaker, personal communication).

[6] The basis for these site sizes is discussed in chapter 3.

[7] Possible ancient names for Kazane are discussed in chapter 3.

The dissertation research described here builds on the work of Dr. Patricia Wattenmaker, the director of research at Kazane since 1992.[8] In an effort to determine the size of the pre-urban settlement, in 2002 I conducted a surface survey and excavated 43.25m^2 of test pits on the high mound (Figure 1.2). To address the spatial organization of the lower town, in 2003 I conducted gradiometry in five different parts of lower city, covering a total of 37,520 square meters (Figure 1.3).[9] The final fieldwork for this dissertation took place in 2004, when I excavated 393 m^2 in ten operations in the lower town gradiometry areas (Figure 1.3). The magnetometry maps made it possible to target trenches to specific rooms or outdoor spaces, making the best use of resources, and sampling multiple spaces.[10] These trenches uncovered evidence for urban administration and infrastructure in the form of storage facilities, streets, and temple-related contexts. As a result, I am able to describe the character and development of a roughly 2-hectare portion of the city. This new data, in conjunction with previous research at Kazane, makes it possible to reconstruct a portion of Kazane's life history and compare it with the life histories of third millennium cities across Upper Mesopotamia. The results of this comparison contribute to general models of how these cities developed and declined, how they were organized socially, politically, and economically, what they had in common and how they differed.

In addition to the fieldwork desribed above, the recent publication of a surface survey of the Harran Plain (Yardımcı: 2004) provided the raw data for settlement and sustaining area

[8] Previous work at Kazane is described in chapter 2.

[9] Conditions at Kazane make it a good site for the use of sub-surface remote sensing techniques, particularly gradiometry / magnetometry. In many parts of the site, previous excavations confirmed that remains lie just beneath the surface and structures are built with limestone foundations. These characteristics are particularly amenable to magnetometry because limestone contrasts well with the iron in the soil.

[10] I deliberately chose a strategy of long, narrow, ground-truthing trenches followed by expansion in selected spaces. As discussed in chapters 4 and 5, larger exposures of single structures may have provided more information about the use of space, but multiple test trenches yielded a broader picture of urban organization and aided in the interpretation of the magnetometry data.

analysis of the Kazane and Harran states. Through a GIS-based study of this survey data in conjunction with analysis of declassified CORONA satellite imagery, it is possible to sketch the political territories of Kazane and Harran despite the destructive impact of the recent implementation of intensive irrigation agriculture in the Plain. I also analyze these two states' sustaining areas and relation to the landscape, and estimate their socio-political integration from spatial models. I find that the absence of true secondary sites forms a decidedly primate[11] settlement system, with Kazane and Harran as large centers in the midst of a host of third and fourth level sites.

Organization of the study

In scalar terms, this study is organized as an hourglass in which I first address the macro region, followed by the micro region, and the site, before returning to the macro region to compare the results from Kazane to data from other cities in Upper Mesopotamia. Chapter 2 explores the historical and environmental context of third millennium urbanization in Upper Mesopotamia, discusses various theoretical models of socio-political and economic organization in these cities, and reviews previous research at Kazane. Chapter 3 examines the environment, landscape and historical geography of the Harran Plain before evaluating and analyzing the settlement survey of Yardımcı (2004). Through the use of satellite imagery, Thiessen Polygons, rank-size plots, and sustaining areas, I define the political and subsistence territories of the two capital cites in the plain, Kazane and Harran. Chapter 4 shifts from the micro-region to Kazane, reviewing the results of the magnetometry work I conducted in 2003. Chapter 5 describes the excavated results that contribute to our understanding of the social production and construction

[11] A primate system is one in which a single site is significantly more than twice as large as the second largest site.

of space. Chapter 6 explores these processes at Kazane through analysis of architecture and artifacts from the excavations discussed in Chapter 5. Chapters 7 and 8 examine the provisioning of cities through evidence for storage and distribution of cereals and meat. This discussion centers on the contents of two excavated storage structures at Kazane, and analysis of faunal remains recovered in this study. Chapter 9 begins with an attempt to sketch the life history of Kazane in relation to the urban spatial models of the Chicago school of urban geography. I then compare the life history and spatial model of Kazane with several other cities of Upper Mesopotamia, including Titris, Mozan, Leilan, Sweyhat, Brak, Al-Rawda, Chuera, and Beydar. Chapter 10 concludes the study with a summary of the findings, their significance, and directions for future research.

CHAPTER 2

CONTEXTUALIZING AND MODELING THIRD MILLENNIUM URBANISM IN UPPER MESOPOTAMIA

Introduction

This chapter reviews the geography and ancient and modern climatic conditions in the study area. I also discuss the time periods immediately before and after third millennium urbanization, bracketing the development and decline of these cities. Next, I review several models of Mesopotamian urbanism, and a few sites that may correspond to these models. Finally I track the life history of Kazane, based on previous work at the site, and introduce the new work that forms the basis of this dissertation.

Defining Upper Mesopotamia

The study area for this project is Upper Mesopotamia. The Greeks coined "Mesopotamia" as a name for the land between the Tigris and Euphrates Rivers in what is today Iraq. We now use this term more broadly to include the land in between and around the Tigris and Euphrates Rivers and their tributaries in Turkey, Syria and Iraq (Leick 2002:xiii). This area can be divided into Upper and Lower regions on the basis of differences in climate and physical environment (Figure 1.1, 2.1). In this discussion, "Upper" and "Lower" are used interchangeably with reference to "Northern" and "Southern" Mesopotamia. There are important environmental differences between Upper and Lower Mesopotamia, differences that probably played significant roles in the kinds of cities and states that developed in each region.

Lower Mesopotamia, located in Iraq, is bordered to the south and west by desert, to the north and east by the foothills of the Zagros mountains, to the southeast by marshes along the

Tigris and the head of the Persian Gulf, and to the northwest by the Upper Mesopotamian Plain (Pollock 1992:29). Lower Mesopotamia is characterized by flat plains and less than 200mm annual rainfall. The flat land and low rainfall made irrigation agriculture[1] an ideal and perhaps necessary adaptation to sustain high-population urban centers in Lower Mesopotamia, with the development of urbanized states beginning in the fourth millennium B.C.E. The major rivers, their tributaries, and canals also provided an ideal network for transporting bulk goods among these early polities (Algaze 2005a:26).

The perimeter of Upper Mesopotamia is marked by the resource rich[2] Taurus Mountains to the north and west, the Zagros Mountains to the east, the Syrian Desert to the south, and the plains of Lower Mesopotamia to the southeast.[3] Within the space between the Tigris and Euphrates, smaller mountain ranges and major tributaries of the Rivers split the land into different sub regions. Significant in this regard are the Balikh and Khabur Rivers, the Tur Abdin mountain range in Turkey, and in Syria, Jebel (mount) Abdul Aziz (800m) and Jebel Sinjar (1457m) (Brice 1966:229-230). Moving north to south from the foothills of the Taurus Mountains, the topography of Upper Mesopotamia becomes a hilly plateau around the Tigris, which continues as the "Jazira," or the "island" plateau between the two rivers,[4] and finally crosses the Euphrates and the 200mm rainfall isohyet, where the land transitions to the Syrian

[1] Of the two rivers, the Euphrates is better suited for irrigation because it has a lower discharge and therefore a less deeply incised channel, making it easier to divert water with simple dams and canals, rather than lifting and pumping it out of a deep channel. The lower discharge of the Euphrates is due to a lower gradient than the Tigris and water loss from evaporation in the steppe and desert of Syria and Upper Iraq (Potts 1997:7-11).
[2] Key resources exploited from these Mountains include timber, tin, obsidian, and other raw materials. From the beginning of human settlement in these areas, raw materials were exchanged south and east to areas of Mesopotamia and beyond that lacked substantial deposits of metals, stone, and timber.
[3] The Upper Euphrates, Balikh and Khabur River Valleys are part of the "Fertile Crescent," the name given by James Henry Breasted to the land between the desert and the mountains, which arcs from the southern Levant across Upper Mesopotamia and along the eastern border of Lower Mesopotamia to the Persian gulf (Breasted 1935:135, and map after page 146). This area incubated the first settled farming communities with domestic plants and animals in the Neolithic Period (10,000 BP) (Leick 2002:xiii).
[4] Below the escarpment that runs east to west through the modern cities of Birecik, Urfa, Mardin, Nusaybin and Cizre.

Desert (Brice 1966:230; Zohary 1973:9-13). In contrast to the irrigation-friendly conditions of Lower Mesopotamia, in Upper Mesopotamia, a steppic, hilly landscape makes non-mechanized irrigation more difficult,[5] and rainfall between 200 – 500mm per year makes rainfall agriculture possible (Wilkinson 2000a: 222).[6] Also, the lack of extensive transport canals in northern polities of the third millennium forced them to rely on wheeled carts for moving goods upstream or between settlements not located along the same river branch.

The third millennium climate

Human impact on the environment contributes to the difficulty of determining the environmental conditions of the last 5000 years. Human activities began to affect the environment with the spread of agriculture and animal domestication in the Neolithic Period, but took their greatest toll in the last 5000 years[7] (Butzer 1995; Clason and Clutton-Brock 1982). Despite current conditions, the third millennium landscape and climate can be reconstructed through micro and macro botanical remains collected from archaeological excavations, lake and ocean sediment cores, geological studies of lake levels and river flows, and historical accounts of the landscape that begin several thousand years ago (Bottema 1995; Bottema and Cappers 2000;

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[5] River or well irrigation may have supported small (less than 10 – 15 ha) settlements in very dry areas, or supplemented rain-fed farming around larger sites (Wilkinson 1998a; 1998b:165), but the size of irrigated fields or the quantity of their produce was not comparable with that of southern Mesopotamia.

[6] Upper Mesopotamia is not a uniform environment. Decreasing rainfall north to south makes it possible to further sub-divide the areas of settlement in Upper Mesopotamia into various zones of agricultural stability (Wilkinson 2000b).

[7] Although the exact extent of devastation is difficult to measure, it was during the last 5000 years of increasing population and social complexity that land clearing for agriculture and culling of trees for fuel (for cooking, plaster manufacture, ceramics, and metallurgy) increased exponentially, sheep and goat grazing expanded on ever more denuded lands, and river flows were compromised by erosion from clear-cut slopes and diversion for irrigation. In antiquity, the Taurus and Zagros regions were famous for their lush forests and plentiful wildlife including lions, ostriches, elephants, bears and tigers or leopards (Izady 1992:20-21). Over the last 3000 years these animals were hunted into extinction, the rich forests were cleared for fuel, construction and export, domesticated animals grazed the hills bare and aborted new forest growth, while erosion and dams silted up the rivers and sapped nutrients from the soil (Brice 1966:97, 1978; Erinç 1978:97,107-08).

Brice 1978:141; Landmann et al. 1996; Lemcke and Sturm 1997; Luz 1982; Miller 1998; Moore et al. 2000: 327-422; Roberts 1982; Roberts et al. 2001; van Zeist and Bottema 1991; van Zeist and Woldring 1978; Wilkinson 2003:19-32). The data from these studies indicate that under the 'natural' conditions that prevailed at the start of the third millennium, the Taurus Mountains hosted forests and woodlands, which transitioned to woodland steppe, steppe and finally desert as one moved north to south into increasingly lower elevations from southeast Turkey across the Euphrates in Syria (Moore et al. 2000:50). Weather patterns and annual rainfall rates were likely similar to those of today.[8] The region experiences a variation of the Mediterranean and semi-continental climate with hot, dry summers and cold, wet winters in the steppe of the plains and plateaus between and around the Tigris and Euphrates (Zohary 1973:27). Within the steppic areas, annual rainfall amounts decrease north to south, ranging from 500mm to less than 200mm per year. This means that rainfall agriculture is increasingly risky as one moves south into a progressively desert-like environment.

Initial Urbanism: 4000 – 2700 B.C.E.

Before discussing the development of urbanized states in the mid third millennium B.C.E. it is useful to consider the historical context of these polities as far back as the fourth millennium B.C.E., when cities first appeared in Mesopotamia. During the fourth millennium B.C.E., urbanized states developed in Southern Mesopotamia and Southwestern Iran (Adams 1981; Algaze 2005a; Nissen 1988; Pollock 1992; Wright, H. 1986, 1998; Wright and Johnson

[8] As recently summarized by Wilkinson (2004:14-17), scholars disagree on the degree of climate change since 6000 B.P. Some see little change (Gremmen and Bottema 1991), others see no large trends but localized changes lasting for short periods of time (Butzer 1995), and still others argue that significant trends did occur, most significantly a harsh drying period in the last few centuries of the 5th millennium BP that contributed to the collapse of cities across Upper Mesopotamia (Weiss et al. 1993).

1975). In addition to a multi-tiered settlement and administrative hierarchy, increased social stratification, monumental architecture, specialization of labor, and centralization of food production, religious ritual and military leadership, the complexity of these polities was marked by intensive use of administrative devices, beginning with clay seals and tokens, and the development of writing by the end of the fourth millennium (Rothman 2002:263). The largest site from this period in southern Mesopotamia is the city of Uruk, which lends its name to the time period. Excavations in this 250 hectare[9] city, which may have housed 40,000 people, uncovered numerous monumental administrative structures in the core of the settlement. These structures, possibly temples, were associated with the earliest writing dating to the late fourth millennium (Leick 2002:30-60; Nissen 1988: 65-127, 2002, 2003).

The standard and still dominant narrative of urbanism in Mesopotamia describes cities as developing first in Southern Mesopotamia in the fourth millennium and then spreading to the north and beyond in the third millennium. This narrative may soon change as recent research indicates that at least two sites in Upper Mesopotamia, Tell Brak and Hamoukar, reached urban proportions and possessed urban features[10] in the fourth millennium, contemporary with the emergence of cities and states in the south (Emberling 2003; Emberling and McDonald 2003; Gibson et al. 2002; Oates 2005; Oates et al. 2007). This suggests that urbanized states did not simply emerge in the south and spread outward, but developed in multiple places.[11]

[9] Uruk is estimated to have been 250 hectares in the late fourth millennium (Algaze 2005a:19).
[10] Urban features in this context refers to settlement size in excess of 30 hectares, monumental, public architecture, goods management in the form of seals and sealings, centralized leadership, and specialized labor.
[11] Algaze recently compared fourth millennium urbanism in Upper and Lower Mesopotamia (Algaze 2005a: 16-20). He argues that the few examples of large, urban sites in fourth millennium Upper Mesopotamia were relatively isolated from one another and were short-lived. In contrast, the cities of southern Mesopotamia marked a dense, continual, accelerating urban development from the fourth to the third millennium. In other words, according to Algaze's interpretative model, when considered by the entire region, the fourth millennium cities of Upper Mesopotamia were of a completely different – and smaller – physical and developmental scale than contemporary cities in the south, and their development ceased at the end of the fourth millennium.

Nonetheless, the cities of Upper Mesopotamia sustained their urban size and density for shorter periods of time, unlike their southern counterparts, which remained cities from the fourth to the third and even into the second millennium (Algaze 2005a).

Beginning in the mid fourth millennium, Uruk cultural traits, including material culture and iconography, ceramics, architecture, and administrative tools, began to appear at sites along important transportation corridors in Upper Mesopotamia (Algaze 1989; 2005b; Stein 1998a:91). These cultural traits appeared both in newly founded settlements and alongside indigenous cultural traits in existing settlements. Some scholars argue that the presence of Uruk cultural traits marks the presence of Uruk people, who immigrated as part of an imperialist expansion on the part of the Uruk, motivated by a desire for greater access to resources, such as metals, wood, and precious stones, which were absent in the plains of Southern Mesopotamia (Algaze 1993; 2005a). Other scholars view the interaction between any Uruk colonists and indigenous Upper Mesopotamian peoples as a more even balance in which locals accepted the southerners because they benefited from the exchange relationships they provided (Stein 1998a:168-169).[12] Yet, despite much discussion of colonies or other models that place southern Mesopotamians on the ground in northern settlements, there are few sites for which the actual presence of southerners is unequivocally attested or strongly argued, among them Jebel Aruda and Habuba Khabira South along the bend of the Euphrates in Syria, and Haçinebi Tepe along the Upper Turkish Euphrates (Boese 1989/90; Stein 1998a; Strommenger 1980; Vallet 1996). Thus, it remains possible that northerners were emulating, copying, or importing southern material culture, not hosting colonies.

[12] Still another view describes the 'colonists' as immigrants fleeing economic despair in southern Mesopotamia, heading north to start a better life (Johnson 1988-89).

For reasons still unknown, at the end of the fourth millennium many sites with and without Uruk-style material culture were abandoned. Aside from the large fourth millennium settlements at Tell Hamoukar, Tell Brak, and Tell Hawa,[13] prior to the appearance of southern-style goods and possibly people as well, much of Upper Mesopotamia was organized into what could be described as chiefdoms with shared sub-regional material culture and cultural traits. Although one might expect interaction with the handful of northern cities, or with southern, urbanized states to spur northern chiefdoms into widespread urbanization and state development, this did not happen. Settlement complexity did increase in some areas but at the end of the fourth millennium, complex, hierarchical settlement patterns broke down as large sites were abandoned or shrunk dramatically, and new small sites appeared (Algaze 1999:541-546; Schwartz 1994a; Weiss and Courty 1993).

During the first part of the third millennium, ca. 2900 – 2700 B.C.E., the numerous 20 – 400 hectare cities of Southern Mesopotamia continued to thrive (Weiss and Courty 1993:133). In contrast, cities were absent or just starting to develop in Upper Mesopotamia, where the standard settlements were small villages of just a few hectares. Likely organized as a complex chiefdom society[14] (Schwartz 1987), cultures in the north developed various sub-regional cultural attributes but lacked traits that one might expect in a hierarchical state society, including writing, exceedingly rich grave goods, monumental architecture or elite art (Akkermans and Schwartz 2003: 211-232). Yet, excavations at several small sites on the middle Khabur River revealed large, enclosed storage structures, associated with cylinder seals and sealings. The

[13] And probably other sites as still unknown.
[14] For definitions of chiefdoms and complex chiefdoms, see Earle 1978, 1987, 2002:16; Feinman 2005, and Wright 1984.

political purpose of these facilities is a matter of debate,[15] but regardless of whether these facilities stored food for local human or animal consumption, or for shipment downstream to other polities, they indicate a relatively high level of economic and political specialization (Akkermans and Schwartz 2003:223; Hole 1999; Pfälzner 2002; Schwartz 1994b). In addition, in western Syria there is evidence for craft specialization in the areas of metallurgy and ceramics, and public architecture in the form of multiple phases of small temples at the site of Halawa on the Upper Euphrates (Akkermans and Schwartz 2003:226-231). Despite this evidence for complex societies in northern Mesopotamia in the first part of the third millennium, small states with urban centers, like those seen in the south, were lacking, although they would soon emerge and spread across the region.

Ecology, subsistence and the urban pattern in third millennium Mesopotamia 2700 – 2200 B.C.E.

Small states with urban centers developed across Upper Mesopotamia in the mid third millennium. These states are often called "city-states" (Stein 2001a; Stone 1997; Yoffee 1997), a term used to describe a variety of polites around the world (Nichols and Charlton 1997b; Hansen 2000b; 2006). Trigger contrasts "city-states" with "territorial states." According to Trigger, territorial states are large polities administered via hierarchical centers. In contrast, city-states are small polities comprised of a central city and its hinterland (Trigger 2003:92). Other definitions of city-states require economic and political self-sufficiency, regular spacing upon the landscape, ethnic homogeneity and common language (Charlton and Nichols 1997a; Hansen 2000a). Some of these aspects are found in Mesopotamian states, but others, especially ethnic

[15] I discuss these storage facilities in greater detail in chapter 7.

homogeneity, are not. For some scholars, the wide variation in size, character, and origin between so-called city-states makes the concept useless or misleading at best (Marcus and Feinman 1998:8-11). Others see this variation as illustrative of the flexibility of the term, which provides an opportunity to compare these polities across a wide range of cultures or civilizations (Yoffee 1997: 263). Finally, city-states are sometimes described as intermediate polities that form as chiefdoms evolve into states, or as states collapse or decline (Ferguson 1991; Marcus and Feinman 1998:8-11).

On the surface, the smallest polities referred to as city-states are difficult to distinguish from complex chiefdoms or confederacies of complex chiefdoms, which are sometimes referred to as segmentary states, peer-polity interaction spheres, or chieftaincies (Earle 2002: 16). The closest similarities between complex chiefdoms and city-states are their size, both in population and territory, and the importance of kinship in their governance. What sets the Upper Mesopotamian polities called city-states apart from complex chiefdoms is the complexity of their administrative bureaucracy, which is "at least partly disembedded from kinship rules" (Baines and Yoffee 1998: 205) within an increasingly stratified society, and widespread craft specialization and craft consumption by non-elite households, both in cities and villages (Wattenmaker 1994b:204). Although I prefer to refer to the polities of Upper Mesopotamia as "small states," the city-state term is useful because it emphasizes the small size of the polity and the critical role of the capital city in administering and forging the identity of the state. When we talk about these states, we are essentially talking about the capital city and its immediate surroundings,[16] with a political border that often ends roughly 15 km, or less than a day's walk, from the center. At that point one encounters the edge of a neighboring polity. The development

[16] This area is often referred to as the 'hinterland.' In the case of these small states, I avoid this term because the space around the capital city is not remote, backwoods territory, but an integral part of the polity.

of the primate capital city took place as small secondary towns and villages developed in the surrounding area. Thus, the state formed as the capital settlement, and perhaps secondary centers as well, underwent urbanization.[17] Through warfare, threats, and treaties, some states extended their political hegemony well beyond the roughly 15km radius zone of immediate control. Yet, it seems that politically subordinate polities were not ruled directly by administrators from the more powerful polity, and could break treaties or cease tribute payments when their overlords became weak, as in a dynastic transition.

The third millennium Upper Mesopotamian polities were secondary states,[18] developing a millennium later than the first cities and states, which developed in Lower Mesopotamia and parts of Upper Mesopotamia. These states were relatively small, with core territories of approximately 1000 km^2, and extended political territories up to 5000 or 10,000 km^2.[19] They had a population of 45,000 – 85,000 in their immediate territory, although the largest states had 100,000 – 275,000 persons[20] in their wider political territory. The largest urban centers were 35 – 125 hectares, and hosted 10,000 – 25,000 people. Their primary subsistence base was dry-farmed barley, supplemented by wheat, lentils, and secondary products from sheep and goats (Stein 2004). Production of textiles and metals, along with trade, were also important parts of the economy. Unlike cities in Lower Mesopotamia, Upper Mesopotamian cities seem to have lacked a central temple that defined the city's cosmic identity. Instead, most temples in these states were small structures, which may indicate that they played a smaller role in the economy.

[17] It is possible that state formation took place in the early third millennium, prior to urbanization, but we do not have much data from this period to address this problem.
[18] Recent work at the sites of Tell Brak (Emberling 2003; Emberling and McDonald 2003; Matthews 2003; Oates 2005; Oates et al. 2007) and Hamoukar (Gibson et al. 2002) in northeastern Syria, and Arslantepe (Frangipane 2002) in eastern Anatolia, revealed evidence for large, urban settlements in these areas in the 4th millennium, prior to the appearance of Uruk colonies from Lower Mesopotamia. These finds indicate that urbanism developed in both Upper and Lower Mesopotamia simultaneously, rather than beginning in the south and spreading north.
[19] As suggested for Nagar (Tell Brak) by Jason Ur (2004:273).
[20] This range is suggested for Nagar (Tell Brak) by Jason Ur (2004:273).

Kings, who adopted methods and symbols of rule from southern Mesopotamian states, including cylinder seals, cuneiform writing and iconography, ruled these states.

The growth of these states is most apparent in the emergence of hierarchical settlement patterns radiating from large cities, which expanded from small sites of 10 hectares or less to 25, 50, and 100 hectares (Wilkinson 1994). This urban development began ca. 2600 B.C.E. in the Lower Euphrates and the Khabur River areas, and about a century later in the Upper Euphrates (Algaze 1999:546; Wilkinson 1994). As with any dramatic shift in social complexity, we cannot pinpoint a single impetus for the development of urbanized states at this time. Key variables must include trade, peer competition, political compromise, and conflict. These states were ruled by royal families based in relatively large, 40 – 100 hectare urban centers. These rulers negotiated trade and peace treaties with neighboring polities near and far. At home, each polity intensified agriculture and animal husbandry to support a growing population and fund specialist activities. Most of these Early Bronze Age Upper Mesopotamian states were located along the Tigris or the Euphrates and their major tributaries, but some were situated in the spaces between the Rivers, often in more marginal environments. Cities near rivers had ready access to water for humans, livestock and perhaps small-scale irrigation, as well as waterborne transportation for travel and trade with polities downriver. In contrast, cities located away from rivers, especially those in areas with lower rainfall, may have relied more heavily on trade or pastoral products to sustain their economy and food supply (Wilkinson 2000b:10-11).

The discovery of thousands of third millennium texts from the destroyed palace at the city of Ebla in Western Syria provides insight into the activities of urban administrators, and makes it possible to attempt to reconstruct political relationships among Upper Mesopotamian polities (Astour 1992:3; Matthiae 1981:151-189, 1986). Although these texts paint a vivid picture of Eblaite adminstration, we must remember that they only cover about 50 years spanning the mid or late 24th millennium, and only document the activities of some subset of the administration (Akkermans and Schwartz 2003: 243-244; Michalowski 1985; Wattenmaker 1998a:49). Thus, besides being biased towards the specific offices they record, they are also quite limited in their time frame. For these reasons, we should be careful just how much we generalize from these texts to describe city and state development and organization at Ebla and in Upper Mesopotamia in the mid and late third millennium. In the following discussion, I cite studies of these texts that treat them largely at face value, so this version of events may be limited in its applicability across space and time. In addition, not all scholars accept the view that Ebla was any more powerful than the other large cities in Upper Mesopotamia. One could argue that the Ebla texts cloud our view of political relationships because we know so much about Ebla, and so little about other cities, that Ebla seems more important or powerful than it may have been (Michalowski 1985:297).

Although the states of Upper Mesopotamia were perhaps on equal footing as peer polities (Renfrew 1986) at the beginning of their development,[21] the earliest available texts indicate that during the mid third millennium four cities, which were capitals of regional states cobbled together through treaties, royal marriages, and tribute relationships, attempted to dominate the political landscape: Abarsal, Ebla, Nagar, and Mari (Archi 1998:1-3). Abarsal's location is not known, and scholars place it anywhere from Tell Chuera in the Jazira (Archi 1998:4; Ur 2004:243) to Kazane in the Upper Harran Plain (Michalowski and Mısır 1998:53; Liverani 1994:508), to someplace along the Upper Euphrates (Astour 1992:27, 33; Astour 1988:147-148).

[21] Henry Wright recently emphasized that in a variety of cultural contexts, complex socio-political developments, such as state formation, arise when several emerging centers in a region compete socially, politically and economically as they grow (Wright 2005:167).

Ebla is located about 100km west of the Euphrates, southwest of the modern Syrian city of Aleppo. Mari is located on the south side of the Euphrates River, about 375km southeast of Ebla in a very marginal environment. Nagar is located at the site of Tell Brak, along a tributary of the Upper Khabur River, about 375km northeast of Ebla and 225km north of Mari. Textual accounts leave the impression that the polygon of these four cities, especially Mari, Nagar and Ebla, were more powerful than other Upper Mesopotamian cities in the mid- third millennium until about 2300 B.C.E. when the emerging Akkadian Empire conquered the region and assumed hegemony over some of its cities through administrators and royal marriages. These powerful polities competed, often violently, for the allegiance of less powerful polities, access to trade routes, and monopolies of trade goods[22] (Peltenburg 2007:9-10).

Through letters, treaties, and lists of goods exchanged, the Ebla texts detail Ebla's socio-economic relations with settlements under its direct rule or hegemony, including villages and small cities, and with peer states of relatively equal power. Although the measure of Ebla's power varied over time, some readings of the Ebla texts suggest that Ebla was the premier power of western Upper Mesopotamia for at least a 50-year period during the mid third millennium. Other scholars argue that those who publish and interpret the Ebla texts overstate the power of Ebla; one could argue that if we had archives from other, supposedly less powerful polities, these polities would also appear powerful in their own right (Michalowski 1985). Regardless of the extent of Ebla's power, it wrestled with its apparent chief rival, Mari, for control or influence over other states across Upper Mesopotamia, sometimes signing treaties, sometimes attacking the subordinates or the home city of the other (Archi and Biga 2003; Archi 1998:1-3; Astour

[22] A recently published (Merola 2008) tablet from Ebla details the shipment of spear points to its allies, including Nagar, which received 2000 spear points around 2300 B.C.E.

1992).[23] The numerous other cities in the region no doubt struggled to improve their own degree of power and influence with their neighbors, and with Ebla, Nagar, Mari and Abarsal. Depending on which chronology one ascribes to, the conflict between Ebla and Mari over polities, resources and trade routes along the Euphrates weakened or perhaps destroyed these cities just before the rise of the Akkadian Empire, ca. 2350 B.C.E., seriously damaged or put an end to what remained of their primacy in the third millennium (Archi and Biga 2003:35).

The Akkadian Empire was established around 2350 B.C.E, when its first king, Sargon, conquered or gained control of the cities of southern Mesopotamia, and attacked the most powerful cities of the north. The extent of Akkadian control of Upper Mesopotomia is not clear, but the destruction of administrative buildings at several cities, including Ebla, Mari, Bi'a, and Brak coincides with the period of Akkadian campaigns into the north, and Sargon or his successors claim to have destroyed some of these cities. It is also possible that these cities were attacked during local conflicts not related to Akkadian Imperialism, but there is evidence for resident Akkadian administrators at Brak and Leilan, and possibly Mozan and Mari as well. Outside the Khabur region, Akkadian rule is difficult to detect, but the destruction of many powerful cities may have hastened the widespread collapse of cities at the end of the third millennium (Akkermans and Schwartz 2003:278-282).

Urban demise: the undoing of cities in Upper Mesopotamia: 2200 – 1900 B.C.E.

In the last quarter of the third millennium, many cities and states across Mesopotamia and the Levant collapsed and some major centers shrank dramatically or were abandoned. In some areas, there may have been massive population movement out of some centers into small sites in

[23] According to some readings of the Ebla texts, a third regional state, Nagar (at tell Brak) seems to have been the only state on par with Ebla and Mari in Upper Mesopotamia (Archi 1998).

the countryside, surviving centers in other regions, or nomadic pastoralism. In Southern Mesopotamia the powerful Akkadian Empire collapsed. Before its collapse, this empire consolidated cities in Southern Mespotamia and wielded political control over states in the Khabur Plains (Weiss and Courty 1993). The successor state to the Akkadian empire, the Third Dynasty of Ur, also collapsed by the turn of the second millennium (Yoffee 1988). In Upper Mesopotamia, many large cities were either abandoned or greatly reduced in size. On the Khabur Plains there was no permanent settlement from 2200 – 1900 B.C.E. at Tell Leilan, Tell al-Hawa, Tell Taya, Tell Bderi and numerous other centers (Weiss and Courty 1994:141). Despite the continuation of greatly reduced settlement at Tell Brak, Tell Mozan and a few other centers, 74% of sites in Khabur region were abandoned, total occupied area shrunk by 93%, and average site size reduced from 11.17 hectares to 2.92 hectares (Ristvet and Weiss 2005:1). In the Upper Euphrates area of Turkey, large centers also shrank at the end of the third millennium. This reduction is most apparent at the 43 hectare city of Titriş Hoyuk, which shrank to just 4 hectares (Algaze 1999:552). In the northern Euphrates valley of Syria, many key sites were abandoned, and public buildings, city walls and other monumental architecture went out of use at shrinking centers such as Tell es-Sweyhat, Tell Hadidi, and Tell Halawa (Cooper 2006a:21, 24-25).

Although the late third millennium decline, disruption, or collapse was widespread, not all polities collapsed, those that did may not have collapsed at the same time, and the long-term impact in areas that did decline was not evenly felt. In some areas, such as the Khabur Plains, nearly three hundred years passed before complex polities were reestablished, while in Palestine the gap was four hundred years (Cooper 2006a: 19-20). In contrast, in the Upper Euphrates Valley of Syria complex polities with considerable continuity in terms of material culture, architecture and other cultural features began to reappear only a century after their collapse (Cooper 2006a:26). Just across the border in Turkey, sites in the Zeugma-Carchemish area along the Euphrates did not collapse at all, but increased in size substantially during the late third to early second millennium transition (Algaze 1999:552). At that time Carchemish was possibly as large as 40 hectares, and likely served as the capital of a small state with several secondary centers (Algaze 1999:552-553). In addition, the demise of the Akkadian Empire allowed some northern polities to reassert their power and influence at the end of the third millennium. In some places, the resilience of a pastoral economy may have mitigated the impact of environmental changes upon crops, and political changes upon the productive system (Porter 2007:70).

For some, the widespread collapse or decline of complex polities at the end of the third millennium, which extended across Mesopotamia to the Levant and even into Egypt (Morris 2006; Peltenburg 2000), lends credence to an environmental explanation. Widespread and sudden environmental change (especially drought) is one of a range of explanations for late third millennium collapse (Courty and Weiss 1997; Weiss and Courty 1993; Weiss et al. 1993; Wilkinson 1997). A related model argues that the small states of Upper Mesopotamia, and those elsewhere in the Near East, engaged in increasingly risky maximization strategies to produce as much grain or other foodstuffs as possible (Wilkinson 1994). When faced with decades of lower than average rainfall, the large centers could no longer support their population. Many people relocated to smaller settlements or wetter regions, or took up pastoralism (Weiss 2000:88). The difference between these two models is one of emphasis. In the climate-first model of Weiss and Courty, environmental change alone was enough to doom the small states. In the Wilkinson model, the states contributed to their own demise by over-intensifying agricultural production around large urban centers, reducing the productivity of the soil and making them more susceptible to production shortfalls during normal cycles of wet and dry years.

Although the evidence for some climate change in the late third millennium is generally accepted, it is unclear how much this contributed to the collapse of cities and states. Internal socio-political conflicts, or agricultural practices, may have already pushed these polities to their developmental limit when climate change exacerbated existing problems. Thus, instead of a prime mover, climate change was probably just one of a range of problems that broke the back of some of these complex polities. According to Porter, the actions of the Akkadian Empire in Upper Mesopotamia interrupted what was otherwise a normal cycle of development in this region, and the story of widespread collapse accompanied by dramatic socio-political changes is overstated, in part due to problems with our ceramic chronology (Porter 2007:107). In a similar fashion, Schwartz argues, "there were numerous crises in different regions at different chronological junctures from *ca.* 2300 to 1900 B.C., not a single catastrophic event" (Schwartz 2007:62). Thus, the collapse of many polities in Upper Mesopotamia in the later third millennium was a complex process of cyclical development influenced by local socio-political circumstances more than specific changes in the climate. Indeed, climate change itself was episodic across time and space, challenging societies to respond to stressors, such as drought, but not precipitating a single, regionwide event that could explain socio-political collapse (Kuzucuoğlu 2007:476).

Modeling third millennium Mesopotamian cities and small states

As with most studies of states or cities in general, studies of the socio-political structure of Mesopotamian urbanism emphasize either the power of the city governing authorities or alternatively the strength of the citizens as expressed in assemblies and other factions. At the risk of oversimplification, these approaches can be assigned to three general categories: 1) Cities organized by coercive centralization; 2) Cities organized by consensual agreements between social groups; 3) Cities with a mix of coercion and consensualism, where the differing goals of different groups evoke different kinds of socioeconomic strategies. The increasing emphasis on practice and agency in anthropological theory over the last three decades has prompted wider acceptance of the third model, but arguments for the coercive or consensual models also persist. These models fall within what Service (1978) called conflict or integation models of states.[24] In the following section, I discuss each approach and cite some possible examples. In some cases, these models were developed for states, but since the large urban centers in Upper Mesopotamia were the capitals of small states, these models also apply to urban organization.

Cities organized by coercive +/ centralization

This kind of model, appropriately labeled the "coercive centralization" model by Stein (1998b:15-16), places power in the hands of a few dominant urban institutions that use their monopoly to funnel wealth to their coffers and enforce their economic strategies upon the population. The coercive centralization model has its roots in Durkheim, Engels and Weber, as well as Biblical accounts, which describe or treat cities as autonomous centers of regulation, excess, materialism, and domination, embodied by citadels, walls and other symbols of oppression[25] (McIntosh 1991:202; 2005: 23-27). In early versions of these models, urbanism

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[24] The question of whether society is more accurately described as organized on the basis of conflict or integration is an old one, considered throughout the humanities for some time (Cohen 1978; Wrong 1979).

[25] In some cases, "oriental" cities were not treated as cities at all because early excavations only uncovered palaces and temples, leading some scholars to dismiss them as imperial encampments, the seats of highly despotic rulers, rather than inhabited cities (Liverani 1997: 89-90).

itself was treated as the transition point from communal or folk society to state society, in which "primitive democracy passes to autocracy" (Gelb 1972:81). Classic studies from sociology depict the inhabitants of cities as suffering from exploitation, social control, and competitive aggrandizement (Simmel 1969; Wirth 1938). Excavations of temples and palaces, spectacular structures whose monumental scale loomed over the urban landscape, reinforce these ideas. Numerous texts recovered from temples and palaces, biased to their sources, also emphasize the apparent domination of these institutions over economy and society. An old view that the temple by itself controlled the entire urban economy of Southern Mesopotamia (Deimel 1931; Schneider 1920) has been discredited (Gelb 1969), but the salience of central institutions in the urban economy is still difficult to judge in many cases.

Coercion played a central role in Child's model of the urban revolution, and in Wittfogel's "hydraulic civilization" model (Child 1974; Wittfogel 1957). Also falling within the purview of this model are the information and systems theory approaches of the late 1960s to early 1980s, which de-emphasized the role of coercion but still placed most significant power, control, and decision-making in the hands of state administrators (for example Wright 1977; 1978; Wright and Johnson 1975). These models, which describe states but implicitly apply to urban centers in states, also imagined a centralized, well-integrated, self-regulated socio-economic system that developed in response to external stressors (Stein 2001a:213). These kinds of cities are highly integrated economically, which maximizes growth but makes them vulnerable to disruption or collapse due to what Flannery called hypercoherence (Flannery 1972).

A recent application of the coercive centralization model to a specific city is Harvey Weiss and colleagues' interpretation of data from their excavations at Tell Leilan in the Upper

Khabur region of Syria (Figure 2.2). Leilan expanded from a small site to a 90 hectare city ca. 2600 B.C.E. The city came under the direct control of the expanding Akkadian empire around 2300 B.C.E., as evidenced by Akkadian administrative and school texts, and sealings of Akkadian officials found on the acropolis in this period (Ristvet et al. 2004). Weiss argues that the Akkadian imperialist agenda focused on mobilizing large work forces, supported by rations, to build public architecture and intensify agriculture (Weiss et al. 2002:4-5). This agenda included concentrating the local population at Leilan, presumably by force or decree, as the nearby 50 hectare site of Mohammed Diyab shrunk to 10 hectares (Weiss and Courty 1993:139). The Akkadians' goal was to produce agricultural surplus that they could ship to the Akkadian heartland to support their political center (Weiss and Courty 1993:132). In this model's original conception, the evidence for the Akkadian imperial agenda includes the city wall, the citadel wall, massive administrative structures and storerooms on the citadel, and standardized 1-liter ration bowls produced by "state-sponsored, ration-dependent potters" (Senior and Weiss 1992:19; Weiss and Courty 1993:138-140). Further evidence for rations comes from lower town house floors, which contained mostly cleaned and processed barley and lentils, suggesting that city residents were receiving pre-processed food rations (Weiss and Courty 1993:140).

Weiss and colleagues' emphasis on the overwhelming might of Akkadian imperialism would seem to preclude any challenge to state power, and implies that the city population was entirely engaged in ration-supported, state directed activities. Yet, since it's original formulation in the early years of the project, the Akkadian imperialism model at Leilan has experienced some chinks in its amour that question the role of rations, craft specialists, and building projects. Regarding specialist production of so-called ration bowls, Stein and Blackman demonstrated that pottery production at Leilan and in its surrounding villages was likely the work of decentralized, independent specialists (Stein and Blackman 1993). In addition, although rations were certainly at least part of the state economy, aside from their relatively standardized capacity there is no evidence that the so-called ration bowls were actually used for rations. Recent botanical analysis also indicates that as the Akkadian administrators were busy intensifying barley cultivation, private households may have developed or continued a previously existing independent subsistence strategy that exploited a variety of crops. Evidence for these differing strategies derives from the contrast between storerooms on the acropolis, which contained mostly barley, and private houses in the Lower town, which recent analysis shows contained a wider variety of crops, including pulses (Weiss et al. 2002:10-11).

The extent of Akkadian building projects at Leilan is also changing. The outer city wall, formerly dated to the Akkadian period, is now dated to the initial expansion of the city in 2600 B.C.E. (Ristvet et al. 2004). In addition, the Akkadian administrative buildings and storerooms on the citadel were built on top of earlier, in some cases ruined, storerooms and public buildings. These findings indicate that prior to Akkadian rule at Leilan, the city had already expanded to its maximum size, built a city wall, and constructed public architecture on the citadel. The pre-Akkadian storerooms indicate that agricultural intensification also pre-dated Akkadian rule. Thus, while the Akkadians may have further intensified barley production and even shipped some surplus to the heartland, many other aspects of the Akkadian imperial model of Leilan were already in place before the Akkadians arrived. If the model still applies to the socio-political situation at Leilan in the mid and late third millennium, its source is in pre-Akkadian changes, which set in motion processes built upon by the Akkadians. Finally, the power that the model attributes to the central authorities is diminished by evidence for independent craft specialists and alternative household subsistence strategies.

Another example of a site that may support the coercive centralization model is Tell Beydar, a smaller, 17-hectare city in the Khabur region (Figure 2.3). Based on the number of officials and persons mentioned in ration lists in texts from Beydar, compared to the number of villages mentioned in texts and their neatly corresponding archaeological equivalents as discovered in surveys, Sallaberger and Ur estimate that the central institutions at Beydar "controlled not only its surrounding farmland but also the land of the entire province," and "administered a substantial portion, if not all, of the able-bodied men" from the surrounding villages (Sallaberger and Ur 2004:57-8). Yet, there is some disagreement between the authors about the extent of central authority. Sallaberger argues that Beydar administered all agricultural land at outlying villages, and Ur argues that the center only controlled part of village land (Sallaberger and Ur 2004:57 footnote 13). Widell's analysis of the plow teams in the Beydar texts concludes "the five main officials of the archive…and the institution to which they belonged controlled all the arable land around Tell Beydar" (Widell 2003:723). Either way, the ruling authority at Beydar controlled much of the land and employed many of the men in its hinterland. In addition, much of the core of Tell Beydar is occupied by a palace, several temples, and related administrative buildings (Figure 2.3) (Sallaberger and Ur 2004: 58, 66), while the lower town was uninhabited. This indicates that the city population was less than might be expected based on overall size alone. An under-populated core may have forced the administration to obtain more labor from outlying villages.

In sum, the Beydar polity was centered on a palace and temple core, and administered much of the land and people within the core and the surrounding villages. Although there was certainly room for independent craft production and subsistence activity within the Beydar polity, the extent of central control over the subsistence economy, as interpreted by some some scholars, would lead some to believe that this city fits the coercive centralization model of cities. For example, Sallaberger states that at Beydar, "the main part of the population of the city depended on the central administration, which distributed monthly wages in grain….even animal husbandry was controlled by the center, as the documents concerning sheep and goat herds and their shepherds testify" (Sallaberger 2007:418). Others would argue that as with the Ebla texts, the Beydar texts only record a narrow range of palace-related activities, which leaves an impression of substantial control. In addition, rations distributed as wages may simply be the terms of employment, not coercive control over labor. Outside the purview of the texts we would expect independent land ownership, craft activities, and a range of socio-political relationships not managed by the ruling authority. Indeed, the Beydar texts do not mention a host of specialized jobs that may have been conducted independently of any intervention by the city government.

The consensual or corporate city

Consensual models of Mesopotamian cities emphasize the importance, complexity, and potential power of the urban populace, and question the degree of centralization in Mesopotamian cities. Earlier versions of these models, such as those of Jacobsen (1943) and Oppenheim (1977), emphasized the important role that assemblies of urban residents played in mitigating the power of the central institutions, and performing important legal and social roles. Later models, such as Stone's (1997), acknowledge the importance of assemblies but also argue that kinship remained a key organizing principle in cities, and kinship groups forced ruling households to negotiate rather than dictate policy. Consensual models imply that cities are well integrated socio-economically, but power is not concentrated solely in the ruling institutions.

Thorkild Jacobsen was an early proponent of the consensual model of Mesopotamian urbanized states. Based on analysis of selected texts, Jacobsen argued that assemblies of town residents were important agents of "primitive democracy" throughout the Bronze Ages (Jacobsen 1943). Jacobsen argued that assemblies of citizens and councils of elders played important roles in judicial affairs, approved the king's decision to go to war, and were the locus of sovereignty. Jacobsen described the human assembly as parallel to the assembly of the gods, which granted kings the right to rule, and led dynasties to their demise when their time was up. In Jacobsen's view, the earliest Mesopotamian states of the fourth millennium were the most democratic, with the assembly playing a large role in governance. Over time, increasingly autocratic kings vied with the assemblies and one another to conquer and subsume rival cities into larger polities. This competition eroded the formerly democratic nature of Mesopotamia states, but the weakened assembly continued to chafe against the aggrandizing goals of the king's household. According to some interpretations, over time, land formerly held in common became the sole property of the palace, the temple, and elite families (Diakonoff 1972:43).

Oppenheim described the main socio-political parts of Mesopotamian cities as a trichotomy consisting of the palace and temple households, and the assembly of the citizens. In contrast to Stone (see below), Oppenheim argued that ethnic or tribal affiliations had no social role in the city, because all citizens were united in the assembly. At the same time, Oppenheim recognized that assemblies had sweeping powers only in the "old, rich, and priviledged cities," implying that their power was circumscribed in many cities (Oppenheim 1977:112). In contrast to Jacobsen, and despite his dismissal of the role of tribal affiliations in the city, Oppenheim describes the meeting of the assembly not as an example of democracy, but "rather like a tribal gathering, reaching agreement by consensus under the guidance of the more influential, richer, and older members" (Oppenheim 1977:112). Like Jacobsen, Oppenheim conflates the role of assemblies over time due to his (necessary) dependence on multiple, fragmentary textual sources. Nonetheless, he musters evidence for the assembly's role in checking the king's power, and negotiating with the palace household over political and economic matters.

In contrast to Jacobsen's view, Bruce Trigger argues that early urbanized states were not democratic because governing decisions were made by a limited number of people (Trigger 2003:219). Marc Van De Mieroop believes that Jacobsen has the developmental process backwards, because in his estimation, "the powers and the independence of the citizenry increased over time in Mesopotamian history" (Mieroop 1999:118). This view derives in part from the increasing availability of texts over time and their references to the citizens 'assembly,' which was comprised of a highly varied group of people. Focusing on first millennium texts, Mieroop argues that as small states expanded into larger, more diverse polities, urban residents gained more rights, including freedom from taxation, forced labor, and military duty (Mieroop 1999:135). Granting these rights was necessary to maintain the allegiance of cities located at a distance from the imperial center, or in hostile regions where outpost cities were under threat. Yet, Mieroop recognizes that residents of some favored cities received more rights and protections than others, and those outside the city were not accorded the same treatment (Mieroop 1999: 137). Thus, while Jacobsen's model may paint too idyllic a picture of the early days of Mesopotamian states, and too dark a picture of later historical developments, his emphasis on the role of assemblies in asserting and maintaining the rights of some citizens is still accepted today. Although he conflates the role of the assembly across thousands of years, and perhaps overestimates its power in the earliest states, Jacobsen's model of Mesopotamian political development resonates with later consensual models, such as Elizabeth's Stone's.

Elizabeth Stone argues that consensual states (and consensual cities) will be most common in cases where land is readily available but labor is necessary to improve the land, as in slash and burn or irrigation systems (Stone 1997:16). Thus, the key to creating surplus is control over labor, not control over land. Also, consensual states often depend at least in part on subsistence resources from sources beyond the control of the central government, including pastoral nomads, wetland communities and hunters (Stone 1997:16). In consensual states, the strength of vertical ties, such as kinship, is greater than horizontal ties, such as class. Citing Yoruban and Islamic city-states as examples, Stone argues that in consensual states, the strength of kinship prevents the king from leading by command, and city counsels represent the citizens in negotiations with the royal household. The king's main role is to negotiate inter-polity socio-political relations, and provide symbolic unity for the polity (Stone 1997:16). In the Yoruban and Medieval Islamic examples, the king's household becomes isolated from other centers of power in society, particularly the religious institutions.

Stone applies the consensual model to the Bronze Age states of the irrigated Southern Mesopotamian alluvium. Mesopotamian states relied on intensive irrigation agriculture, thus requiring substantial labor input. These states also obtained key subsistence goods from sheep, goat and cattle herding. Texts indicate that cities had assemblies of residents that contributed to decision-making and balanced the power of the king. Texts also indicate that administrators, elites, and assembly members came from a variety of ethnic, kin, and professional backgrounds, showing high social mobility within the polity (Mieroop 1999:121-125). In addition, excavations show large and small, richer and poorer houses within the same neighborhoods, suggesting that elites lived among the general population, rather than in class-segregated neighborhoods. In some cases, surveys and excavations also reveal evidence for craft production throughout neighborhoods, rather than concentrated in single spaces where it could be controlled by central authorities. This suggests that urban residents lived in neighborhoods or wards organized by ethnicity, kinship or principles other than profession or class. Finally, in southern cities, palaces, when found in excavations, are usually located far from temple complexes, suggesting that the palace did not control the temple's purse strings. In sum, Stone finds evidence for citizenship, consensus, and egalitarian values in the socio-political organization of southern Mesopotamian city-states (Stone 1997:23).

Stone recognizes differences in socio-political organization between the irrigation-dependent states of the southern alluvium and the dry-farming-dependent states in the northern part of Lower Mesopotamia. For example, she argues that in the early third millennium, the consensual organization found in the irrigation-based states stood in contrast to more coercively organized polities further north. In the upper part of Southern Mesopotamia, multiple secondary centers were unified under the rule of the one major city, Kish (Stone 1997:23). Over the course of the third millennium into the second millennium, more large cities developed in this upper area, as secondary centers shrank in number. Thus, both Upper and Lower Mesopotamia developed settlement patterns characterized by primate cities and a dearth of secondary centers. Attempts to combine multiple cities into larger states via warfare and political coercion rarely succeeded for very long.[26] Stone argues that the failure of unified states demonstrates that the consensual organization of single-city states could not be applied across the breadth of a unified state (Stone 1997:25). Citing Eisenstadt (Eisenstadt et al. 1988:186-192), Stone attributes this

[26] In a similar vein, Porter (2007:108) argues that some Upper Mesopotamian cities were abandoned at the end of the third millennium when the population rejected increasingly autocratic rulers. For the Middle Niger, McIntosh (2005) argues that highly centralized, single-site cities, such as those in Mesopotamia, failed to materialize, due to the strength of corporate ties and resistence to single, hierarchical rulers. Instead, these polities formed urban clusters that maintained corporate independence but still created an urbanized landscape.

failure of unified states in part to the lack of a segregated, hereditary elite that could be exploited to rule subordinate polities. Without an established ruling elite willing to rule in their stead, the conquering polities resorted to war and coercion, which fueled rebellions among subordinate polities whenever the ruling king died or was perceived to be weak.

Daniel Fleming (2004) argues that the consensual or collective social organization Stone sees in the cities of Southern Mesopotamia also existed in northern cities. Fleming uses evidence from letters between the king of Mari and his officials, excavated at Mari, to argue that this powerful city depended on tribal relationships among its governing families to manage its polity. Fleming also cites councils of elders and the assembly as evidence for collective organization, although he acknowledges that we have too little textual information to really understand how the councils and assemblies worked, and how much power they wielded (Fleming 2004:166, 204). In his analysis of Akkadian linguistics, Fleming argues that states such as Mari were defined not by the central city, but by the people who occupied the land administered from the central city (Fleming 2004:106). Fleming also argues that the Akkadian word for "town" was applied to villages, small cities and large cities alike because it was a political word that referred to their form of social organization – collective – not their size or relative economic power (Fleming 2004:108). Despite these assertions, Fleming admits that the land of the state was named for its leading city, in this case Mari (Fleming 2004:121) and that many polities became vassals of Mari through diplomacy and warfare. In sum, Fleming finds evidence for both collective and coercive socio-political organization at Mari, but believes that the collective aspect played a large role.

From consensual to coercive: the Upper Euphrates Valley

As discussed above, in practice, the coercive / consensual dichotomy is often a continuum in which the degree of either extreme rises and falls over time. Anne Porter traces this process in the Upper Euphrates Valley in Syria. Porter's model for city and state formation in the Upper Euphrates Valley relies heavily on mortuary evidence. Bronze Age sites throughout the Upper Euphrates Valley contain highly visible, and occasionally monumental burial chambers or mounds. Porter argues that these visible burials were "used to demarcate the territorial and social boundaries" of a largely mobile, pastoral society (Porter 2002a:1). According to Porter, over time, control over ancestor-veneration rituals and knowledge based around visible burial sites became concentrated among a small, emerging elite. These elites manipulated ancestor traditions to maintain their power, while emphasizing a perhaps increasingly fictive or nominal social unity. Thus, ancestor traditions were an avenue to power but also placed limits on power because they emphasized group unity, and required leaders to govern within traditional socio-political arrangements (Porter 2002a:1). Porter notes that textual evidence shows that the ruling families of the states of Ebla and Mari manipulated ancestral traditions differently. Ebla emphasized the exclusionary, hereditary right of kings to rule, while Mari emphasized inclusionary tribal unity (Porter 2002a:6, 8). Nonetheless, in each case, ancestral traditions played a central role in maintaining and justifying power relations in society.

Above ground, visible burials were by no means the only form of interment in the Early Bronze Age. Other forms of burial include simple pits, stone or brick lined pits, shaft graves with multiple chambers, and burial inside vessels, among others (Carter and Parker 1995). Nonetheless, the period 2600 – 2400 B.C.E. witnessed the "sudden" appearance of monumental, presumably elite tombs, at many sites. These tombs include the hypogeum at Til Barsip

(Bunnens 1989; Thureau-Dangin and Dunand 1936), tomb 302 at Jerablus Tahtani (Peltenburg 1999), and the numerous tombs on the acropolis at Umm el Marra (Schwartz et al. 2003, 2006). At Tell Banat, White Monument II, a large mound that may have a tomb in the center, tomb 7, a multi-chambered, cut stone tomb beneath a “palace” courtyard in Area C, and tomb 1, a rich multi-chambered earth-cut tomb, date to this period (Figure 2.4) (McClellan and Porter 1999; Porter 1995a, 2002a:10-21). Porter argues that the multiple secondary burials at many of these sites enforced the corporate ethos of the pastoral people that founded the cities and states of the Early Bronze Age in the Upper Euphrates by de-emphasizing the individual (Porter 2002a:22). At the same time, visible monuments that emphasize the group may also focus on specific groups, or individuals, presumably elites or elite lineages, while non-elites were buried in non-visible, and non-monumental contexts. Schwartz and colleagues suggest that disturbed tombs at Umm el-Marra were intentionally desecrated by “powerful individuals who wanted to sever the connection between the living community and the deceased individuals buried in the tombs (Schwartz et al. 2006:633). Although this assertion cannot be proven, it highlights the potential for visible monuments to be manipulated not only to support but also to denigrate or destroy the asserted unity or primacy of a lineage or group.

At Tell Banat, Porter traces socio-political development in several stages. In her interpretation, the site developed around tribal burial monuments that emphasized corporateness and marked territory. Over time, as a permanent settlement grew at the site, a single lineage assumed control over the burial monuments, and emphasized the maintenance of their own monument (the “white monument”) over all others. The emerging palace, or the household of the paramount family, became increasingly segregated from the rest of society, and a stratified, segmented, society replaced the corporate society that founded the site (Porter 2002a:25-28).

Despite this fundamental shift in the nature of social organization, the ruling families continued to cater to the ideals of corporateness, even as they undermined them in their daily practice. At the end of the third millennium, the city dissolved in part due to the citizens' rejection of this increasingly autocratic rule (Porter 2007).

Although Porter applies her model of urban development specifically to the Upper Euphrates valley, a marginal environment where extensive pastoralism endured even in urban periods, her description of the shift from a corporate to stratified society over the course of the third millennium recalls Jacobsen's description of the erosion of "primitive democracy" by increasingly despotic rulers in southern Mesopotamia (Jacobsen 1943). The models of these two scholars demonstrate that cities and states in Mesopotamia were not either corporately or hierarchically organized. Instead, most polities fell along a continuum of corporate to hierarchical organization (Stone 1997:15). Often, extremely hierarchical polities went to the greatest lengths to foster ideals of corporateness, to shore-up the elites' fragile hold on power.

Was there a general shift from cooperative to coercive organization in Upper Mesopotamia throughout the third millennium? There certainly seems to have been an increase in wealth, and by extension, power, associated with the growth of urbanized states. The issue is how this power was distributed among groups in society. Certain families, for example the palace household, clearly attained more wealth and power than other families, but the heterogeneous model, dicussed below, argues that this power had very real limits, and that as the elites increased their wealth, so too did non-elites and those living beyond the capital city.

The heterogeneous, dual city

In response to the coercive centralization model of states, and the subsequent systems models that treated the state as a centralized, integrated system controlled by ruling decision makers, many scholars turned to models that describe states as heterogeneous, loosely integrated entities (Stein 2001a: 213-214). Influenced by practice theory and the concept of heterarchy, these models emphasize the agency of the many different factions that make up society, giving attention to the historically contingent goals, decisions, and strategies of these groups (Brumfiel 1992, 1994; Stein 2001a: 215). Heterogeneous models emphasize the limits of state power, the fragile nature of socio-economic integration, and the dual or tri-partite economy that results from state institutions, elites, and the general public pursuing differing economic goals (Renger 1990: 27-28; Stein 2001a:16-17, 2001b:359-360; Yoffee 2005). Cooperation between these different sectors of society is necessary to maintain stability in these polities (Trigger 2003:195). Applied to Mesopotamia this model describes elites and institutions as working to produce their own utilitarian goods and attempting to control prestige goods as well by funding attached specialists who work exclusively for their patron. At the same time, the non-elite sector also produces its own craft goods in parallel, independent workshops (Stein 2001a:16). This dual economy is indicative of poor socio-economic integration,[27] and factional competition that prevents the kind of highly centralized states posited by coercive centralization models.

In support of the heterogeneous, dual city model, studies in Upper Mesopotamia demonstrate that elite and institutional control of craft production was often limited to specific categories of prestige goods, such as metals and textiles, while ceramics and lithics were

[27] After Blanton et al. (1993:16), "integration" is "the interdependence of units." Poor integration is recognized by self-sufficiency in units at various scales, such as households and villages, while greater integration is evidenced by closer connections via "flows of material, energy, information or people" between units.

produced by independent workshops (Hartenburger 2002; Stein and Blackman 1993). In addition, production debris for a variety of crafts is often found throughout cities and across neighborhoods, rather than consistently concentrated only in workshops attached to institutions or elite houses (Rainville 2001, Reade 1968). Other studies argue that non-elite demand for specialist-produced goods was an important part of the economy (Wattenmaker 1994a). This dual system results in a multiplication of production contexts and creates a less integrated economy and society. Under these conditions, small groups have greater nodes of power available to them and greater opportunities for agency, but the city is not organized by strictly 'consensual' arrangements.

On agency, coercion, and the moral dimension

The heterogeneous model of Upper Mesopotamian states is powerful because it recognizes the heterarchical distrbution of power in these polities, and the limits to the power of the central authorities that created most of the texts we have found. At the same time, it acknowledges that many groups in society, particulary those at the low end socio-economically, are all but invisible in our current data (Stein 2005). This is because much of our research has focused on the citadels of these cities, which tend to contain palaces, temples, and related facilities. In the past this focus was due to an interest in these institutions, their riches, and their texts, instead of the "masses" in the lower city below the citadel, or outside the city walls. In more recent years, extensive irrigation, farming, and development of lower cities makes it difficult to work in these areas. Nonetheless, excavation and remote sensing in lower cities has uncovered houses and production areas at many sites, including Titriş, Chuera, Sweyhat, and Kazane.[28]

The lack of substantial evidence for non-elite activities clouds to some extent the applicability of any model of Mesopotamian states, while the abundance of evidence for institutions, especially in the form of monumental architecture and rich finds, has the ambiguous effect of elevating our perception of the power of these institutions, and minimizing our perceptions of the potential negative impact of such an accumulation of wealth and power. In an attempt to highlight this issue, Susan Pollock titled her textbook about Southern Mesopotamia *Ancient Mesopotamia: the Eden that Never Was*. Although the subtitle was omitted from the cover, in her introduction she explains that it was meant to highlight the plight of common people, upon whose backs the glorious Bronze Age civilizations were built (Pollock 1999:1-3). In her view, in the process of urbanization and state formation, there were winners and losers (Wolf 1999: 11). She argues that the cultural achievements of these civilizations, enshrined in museums around the world, did not arise through the visions of charismatic leaders alone, but through the creative energies of the general population, unfortunately often accompanied by structural violence[29] directed towards huge numbers of common people who provided the labor to fund the construction of monumental buildings, the manufacture of prestige goods, and warfare.[30] Indeed, these were highly diverse societies, including have-a-lots, have-some, and have-nots.[31] At the bottom rung were indentured servants, slaves and captives, often doomed to

[28] Most housing the lower city at Kazane excavated so far dates to the early second millennium.
[29] Structural violence may be defined as the abuse of structural power, both in terms of allocating labor and dispersing ideology (see Wolf 1999:5, 18).
[30] This is often true in modern times as well (e.g. Hayden 1995: 20-21).
[31] Diakonoff actually defines three classes, based on their access to the means of production, and the extent to which they rely on their own labor or the labor of others for their income (Diakonoff 1972: 47-48). In contrast, Gelb defines two to three "classes," depending on how one emphasizes economic factors in the definition (Gelb 1972: 92).

work for the state for little compensation (Englund 1991; Stein 2005:133; Wright, R. 1998).[32]

Although Pollock applies her interpretation of socio-political relationships to southern Mesoptomia, and the texts describing the most glaring exploitation of slaves and other personnel come from specific periods in Southern Mesopotamian states, these sources raise the important issues about how we view changes in the distribution of power as urbanized states developed, and to what extent we should attach a moral dimension to our analysis.[33] Although the heterogeneous model expects looser socio-political integration, and limits to state power, it does not preclude the existence of potentially extreme inequality in the distribution of wealth and access to land, although we might expect this unequal distribution to arise not just from the central authorities, but through a complex network of socio-political relations, including lineage and family ties. Thus, poorer, less powerful families in a lineage may remain poorer even during the transition to urbanized states, depending on their ability to mobilize kin or specialize in order to obtain access to wealth. Yet, even poorer families caught in a socio-political and economic system that perhaps limited their mobility could use a variety of strategies to combat the extension of elite power[34] and accumulate resources (Scott 1986).

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[32] See also Kramer's (1972) analysis of lamentation and other texts from Sumerian society, which reveals some of the problems faced by the residents of "Eden."

[33] As Cohen notes, Marxist theories or interpretations, such as that described by Pollock, tend to attach a moral dimension to analysis of the past (1978:17). In this view, it is not enough to dispassionately or objectively describe and interpret the past. Instead, if we truly wish to understand the everyday lives of ancient peoples, we should be willing to make judgements about their emotional and moral experience.

[34] Relevent in this regard is the distinction between "power to" and "power over." This distinction emphasizes that the exercise of power is not limited to domination and exploitation (power over), but includes everyday actions by individuals and groups (power to). These "power to" actions do not have to include coercion or domination (Miller and Tilly 1984). For example, even the poorest non-elites could withhold their labor from the projects of rulers, or emigrate, although, as we see in our own times, refusing to participate in an oppressive system, or attempting to leave for another place that hopefully is ruled more fairly, is not always easy to accomplish. Instead, those without "power over" may attempt to alter the system from within by manipulating its own rules (Scott 1986). Trigger states that in all early civilizations "inequality was regarded as a normal condition and injustice as a personal misfortune or even an individual's just deserts rather than as a social evil (2003:142)." In contrast to this fatalistic view of those at the low end of the power structure, Scott (1986) describes how those apparently resigned to their position in society may nonetheless push back against coercion directed at them.

As discussed above, there is debate about whether the power of the common persons in these early states began strong and was eroded over time by increasingly powerful elites, or whether the power of the citizenry began weak and gained strength as they asserted themselves within the urban economy. The issue of the role of power-sharing, or lack thereof, in the development of urban space is addressed by John Mollenkopf (1992) in his study of modern New York City Politics. Although he is dealing with a contemporary dataset, his discussion illuminates studies of ancient cities as well. In his summary of urban political studies, Mollenkopf identifies two main camps: pluralists and structuralists. Prominent up to the 1950s, pluralists argued that "since every…. group commanded some important resource (if only the capacity to resist) and no one group commanded sufficient resources to control all others…the bargaining among a multiplicity of groups defined the urban power structure…and coalition building was central to the definition of power" (Mollenkopf 1992:24). In contrast, structuralists argue that the political agenda is shaped by institutional forces, which "bias the rules of the game," promoting the interests of the ruling groups (Mollenkopf 1992:27). In other words, agency exists, but some groups' agency is stronger than others due to differential access to resources. This perspective is similar to that of Neo Marxists, who argue that in many cases, "systematic and cumulative inequality of political capacity undergirded and indeed was ideologically reinforced by a superficial pluralism" (Mollenkopf 1992:28).

In response to the pluralist and structuralist positions, Mollenkopf argues that powerful political groups may weild much power in cities, but their power is limited by the extent to which they must negotiate for the support of less powerful groups. He defines the group with the strongest agency as the "dominant political coalition," comprised of "political actors ….[who]

join together to exercise the policy powers of the state to produce a steady flow of benefits to their allies" (Mollenkopf 1992:39). Although dominant coalitions operate in elite circles, they must also forge a "grassroots base of legitimacy" (Mollenkopf 1992:41). Mollenkopf's "dominant political coalition" is comparable to Adam Smith's "regime," although the regime concept emphasizes the effects of politics upon urban space. In Upper Mesopotamian cities, we might think of successful (long-lived) ruling families and their close allies as dominant political coalitions who managed to forge successful networks with kin and non-kin at a variety of socio-economic levels.

In an attempt to explain the role of families of different socio-economic levels in the social construction of ancient cities, David Schloen argues that patrimonial relationships, not bureaucracy, were the organizing factor in the cities and states of the Bronze Age Near East (Schloen 2001:51). Building on Max Weber's patrimonial type of social organization, Schloen argues that the entire society, both rural and urban, haves and have-nots, was integrated through a series of nested households in what he terms the "patrimonial household model" (Schloen 2001:52). These households were integrated through real and fictive kinship, and metaphor. At the pinnacle of this integration was the household of the ruler, who was elevated as the father of the people (Schloen 2001:51). Schloen's model places households at the center in the discussion of the socio-political and economic integration of ancient cities and states.

Although kinship relationships were central to the operation of ancient cities, non-kin relations also played significant roles in the organization of society. This is especially true in large cities, where multiple households would be forced to work with non-kin households to support the economy. The metaphor of the ruler as "father" of all citizens is unlikely to be sufficient to maintain social integration in the absence of concrete socio-economic relationships at multiple levels, often outside the strict hierarchy of nested households suggested by Schloen. In urban environments, distinctions between ethnic, religious and other groups may become even more pronounced or acknowledged as closer quarters make such differences even more evident. Indeed, ethnicity is intensified by relationships of domination and resistance, and is a product of historical processes (Comaroff 1987:313; Emberling 1997:304). Instead of nuturing structured sets of nested households, the urban environment may have created tension within traditional kinship relationships, creating new identities, allegiances, and opportunities for social mobility.

In general, I subscribe to the heterogeneous model of Upper Mesopotamian states and their urban centers. I also share Pollock's view that even the earliest of these polities were not the Eden that is often portrayed in popular literature. At the same time, I believe that the power of the government and the nature of its rule were not uniform across all the states of Upper Mesopotamia. Instead, each city likely had its own character, forged by local socio-political relations and strategies. In certain periods, some polities, such as Ebla, Brak and Nagar, may have wielded a degree of political power over other small states. Yet, our impression of the extent of their control is heavily influenced by texts, and excavations do not reveal evidence for extensive control by these polities. Thus, in my exploration of urbanization in Upper Mesoptamia, I acknowledge the multiple agents in society, both individuals and groups, but in keeping with the heterogeneous model, I do not assume that all cities were organized in the same manner, or that the impressions of power offered by texts can be interpreted at face value.

The social construction of cities

The general models discussed above paint different pictures of the socio-economic and political organization of cities. One means to approach this problem is through the social production and construction of urban space (see chapter 1). Elizabeth Stone makes the most explicit connection between urban space and social organization in Mesopotamian cities (Stone 1999). She argues that in hierarchically (and coercively) organized states, urban centers are smaller spaces in which religious, political and economic institutions are concentrated and segregated within urban space. These institutions maintain exclusive access to prestige and other high value goods, while the bulk of the population lives outside the city and is denied access to prestige goods. In contrast, less hierarchical, more corporate states, especially city-states in her model, have large urban centers in which the major institutions are more widely dispersed within the city, and a large resident population distributed among mixed neighborhoods housing elites and non-elites side by side. In these corporate states, social mobility is high, access to prestige goods is widespread, and the separation between rulers and the ruled is narrowed by councils of elders and others who represent the many segments of society and contribute to polity-wide decision-making.

The organization of urban space also yields insight into urban development and change, and the role of central authorities in these processes. As discussed in the previous chapter, recent studies of urban planning in ancient cities dismiss the organic versus planned dichotomy in favor of a sliding scale of more or less planned cities. This scale, and other principles of urban planning outlined by Smith (2007) make it possible to compare and contrast cities through their degree of planning, an inventory of their features, and the history of their growth and development. Although there is not a simple one-to-one correlation between the urban plan and socio-economic organization or the path of urbanization, the urban plan is a strong place to start when comparing large settlements. The difficult task is to construct some idea of the urban plan and the city's life history from surface collections and disconnected excavation units. Remote sensing techniques increasingly provide pictures of part or the entire plan of many cities. When combined with excavations to confirm the relative date of portions of the city plan, these remotely sensed plans become a powerful tool for the study of urbanization. In the next section I introduce the study site for this dissertation, Kazane Höyük, discuss previous work at this site, and describe the new work and goals of this dissertation.

Previous research at Kazane Höyük

The study site, Kazane Höyük, is located in southeastern Turkey 3 kilometers south of the modern city of Şanlıurfa on the Harran Plain (Figure 1.1). Research at Kazane began in 1992 under the direction of Dr. Patricia Wattenmaker of the University of Virginia. Kazane consists of an 8-12 hectare, 20m high tell, occupied from the sixth to the early second millennium B.C.E., and an 88 hectare Lower town occupied during the urban period when a fortification wall enclosed the city (Figure 1.2, 1.3). Kazane was first extensively occupied in the Halaf period (ca. 5900 - 4800 B.C.E.), when the settlement may have reached 20 hectares. At that size, Kazane would be among the largest Halaf sites, possibly a regional center.[35] Settlement continued into the Ubaid period (ca. 4800 – 3800 B.C.E.), but its size at this time is not clear (Wattenmaker n.d.). In the Late Chalcolithic Period (ca. 3800 – 3100 B.C.E.) settlement was focused on the tell, and was probably no more than 8 - 12 hectares, as seen in the step trench, and

[35] Surface collections revealed concentrations of Halaf pottery on the tell, south of the tell in an irrigation canal trench, and in the southeastern part of the city (Bernbeck et al. 1999:116; Wattenmaker and Mısır 1994: 178-9). Excavations took place in the southeastern part of the city after bulldozing removed some 1m of later remains, exposing Halaf remains close to the surface (Bernbeck et al. 1999:116). Excavations revealed portions of typical Halaf key-hole shaped structures built of mudbricks and pise, in one case with a stone foundation Coursey et al. 1998). The structures, which were not tightly spaced, were associated with pebble and earthen surfaces, and middens.Additional excavations in the southeastern part of the site in 2004, directed by Sue Ann McCarty, exposed additional Halaf structures associated with pebble and earthen surfaces.

test trenches excavated in 2002 (Wattenmaker and Mısır 1994:179; Wattenmaker 1997; Creekmore n.d.b.; S. Baltali personal communication). The Late Chalcolithic ceramics belong to the local tradition, indicating that Kazane was not a colonial outpost of the southern Mesopotamian city of Uruk (Creekmore n.d. b; Wattenmaker 1997:82). The limited exposures of remains from this period, in the step trench and in an expansion at its base, as well as a test trench dug in 2002, are all domestic in character (Wattenmaker 1997:82; Creekmore n.d.b.; S. Baltali personal communication 2002).

In the first part of the Early Bronze Age (ca. 3100 – 2700 B.C.E.) the site apparently shrank to just a few hectares on the tell, as indicated by surface collections and a small exposure at the top of the step trench[36] (Wattenmaker and Mısır 1994:179, Henry Wright, personal communication 2002). My attempt in 2002 to locate early third millennium remains in test trenches around the southern half of the tell turned up Late Chalcolithic, Mid to late third millennium and early second millennium remains (Creekmore n.d. b). Notably, soundings beneath mid third millennium structures in the southern part of the outer town yielded Halaf remains in one case, suggesting that the city expanded directly onto the ruins of the Halaf occupation. Also, extensive excavations in the southern part of the city in 2004 did not yield any early third millennium remains mixed in later contexts, as one would expect if there were remains from that period in that area.

In the mid to late third millennium B.C.E. the site expanded considerably to form an 88 hectare lower city around the tell, with a city wall enclosing a total of 100 hectares (Wattenmaker and Mısır 1994:179). The wall is preserved as a 3.5km mounded ring around the lower city. Excavated sections through the wall reveal that it was built with mudbrick facing

[36] The size of Kazane in this period is unclear, but it likely ranged from 2 to 10 hectares.

around a ca. 20m wide gravel core, resting upon a 40m wide gravel base (Pati Wattenmaker personal communication). Topographic breaks in the ruins of the wall may indicate the position of two gates on the western side of the city, one on the southern part of the city, two on the eastern side, and one on the northwestern side.[37] A similar topographic break in the western side of the tell may indicate the ancient approach to the citadel in the urban period, as well as the earlier and later periods. To date there is no evidence for settlement outside the city walls. Within the city, high areas occur east of the tell and in the center of the southern part of the city. These high spots may indicate longer periods of occupation in these areas (e.g. small Halaf tells beneath later remains), more extensive (and monumental) remains from the third and second millennium, or areas less disturbed by bulldozing, deep plowing, and stone collecting (for lime manufacture) in recent years.

Aside from small exposures in soundings in the northern part of the city, excavations exposed mid to late third millennium settlement in two parts of the lower town. East of the tell on a low rise, excavations uncovered portions of a monumental building with east to west dimensions of 50m long and north to south dimensions of at least 18m (Wattenmaker 1997:84) (Figure 2.5). The southern wall of the building was 50m long, and consisted of a 5m thick stone facing to defend or reinforce an inner mudbrick wall. The stone wall contained pillars or buttresses, and despite its size, was built in an ad hoc manner with rough, uncut fieldstones laid in at least 3 courses (Wattenmaker 1997:84). A few rooms inside the structure were excavated. These rooms had two phases, the first belonging to the monumental structure's original phase, and the second built in a less formal manner that suggests a change in the use of these rooms. Some earlier phase rooms had plastered walls and floors, ovens, and a stepped or niched façade

[37] It is not clear whether these topographic breaks are ancient or derive from more recent activities, such as bulldozing and trenching.

at the threshold to a larger room. Based on its large size, the thickness of its walls, and the stepped façade, this building is reasonably interpreted as a palace.

Mid to late third millennium remains were also excavated in the southern part of the outer city, in Area F. Here, trenches revealed a structure with thick stone walls associated with a cobblestone work surface and some poorly preserved mudbrick structures (Figure 2.6). The exposed room of the stone structure contained storage jars, clay sealings, and jar stoppers, indicating its use for storage (Wattenmaker 1997:86). The adjacent cobblestone surface contained a variety of weaving tools, suggesting that it may have been a workshop. The associated mudbrick structures might be houses, but were not exposed or preserved well enough to judge (Wattenmaker 1998a:52).

An additional 500m^2 of excavations by Dr. Wattenmaker in Area F in 2002 and 2004 uncovered six rooms or spaces of a structure with large stone foundations nearly 2 meters wide (Figure 2.7). Traces of plaster were found along some walls, and a door sealing was found near a threshold between spaces A and C (Creekmore and Wattenmaker n.d.). Room D contained a bench along one wall and a cobblestone surface along another wall, while four massive limestone blocks covered a subterranean chamber in the middle of the room (Creekmore and Wattenmaker n.d.). The chamber measured approximately 6m East – West by 2m North-South, and was 2.20m deep. A doorway at its eastern end, which may have contained steps (this space was not excavated), led to the chamber. The chamber was built from at least 5 courses of well-laid stones, and a large limestone basin with a drain was resting in the middle of the chamber, along the northern wall. This basin was approximately 1m by 1.75m. It is possible that the basin was used in funerary rituals, if indeed this chamber was a tomb. The presence of the tomb indicates that the structure is a house, while its monumental walls mark it is an elite or public structure. In the southeastern part of this building,[38] room F contained an andiron and hearth, providing the only direct evidence for cooking in Area F.

During the Middle Bronze Age (ca. 2000 – 1400 B.C.E.), the settlement at Kazane reduced in size but was still a substantial city, although it was slowly abandoned during the latter part of this period (Wattenmaker and Mısır 1994:180).[39] The main second millennium settlement was around the tell, but additional, discontinuous settlement was scattered throughout the lower town, perhaps totaling 25 – 40 hectares (Pati Wattenmaker, personal communication). Excavations on the lower, southern terrace of the tell exposed Middle Bronze Age graves and domestic buildings along a street (Figure 1.2, excavation unit A) (Wattenmaker and Mısır 1994:180). The walls of these buildings were 0.5m – 0.7m thick. In the northern part of the lower town, excavations uncovered wide stone foundations of late third to early second millennium domestic structures alongside a cobblestone street with well-built drains (Wattenmaker n.d.). The width of the walls, and some metal artifacts found in one room, may indicate that these houses belonged to wealthier residents (Wattenmaker n.d). In addition, the tight spacing of houses indicates that the second millennium city was densely occupied in this area (Wattenmaker n.d.).

The work conducted at Kazane between 1992 – 2002 forms the foundation for the present study. The new work is intended to contextualize the earlier surface collections and test trenches by the application of remote sensing and test trenches at the site. One goal is to measure the extent of Kazane's mid third millennium urban growth by confirming the size of the pre-urban,

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[38] Rooms C, E and F may actually belong to another building, or at least a separate wing of this building. This issue is taken up in chapter 4.

[39] In addition to the excavations discussed here, in 2004 additional Middle Bronze Age burials and poorly preserved architecture were found during excavations of Halaf remains in the southeastern part of the city (Sue Ann McCarty, personal communication).

early third millennium site through test trenches on the tell. Another goal is to conduct magnetometry and test trenches in several parts of the lower town to examine the organization of space throughout the third millennium city. In particular, despite many test trenches in several parts of the site, most of the third millennium architecture uncovered by Dr. Wattenmaker is monumental in its wall thickness and structure dimensions. Were these findings the chance of recovery, or is there extensive monumental architecture in the lower city at Kazane? Such architecture is usually concentrated on the citadels in these cities, not in the lower or outer city. At the same time, can we locate non-monumental architecture in the urban fabric, and discern the degree of socio-economic variation between houses or housing areas? Finally, can we locate areas of craft production within the urban landscape? The answers to these questions would greatly inform our understanding of Kazane's urban development, its socio-political and economic structure, and its life history. The results of the new work, presented in the following chapters, provide the data for a reconstruction of Kazane's life history, and the data to analyze aspects of urban planning and use of space in the city, as well as urban growth and decline. Comparing Kazane to other third millennium cities (chapter 9) reveals interesting patterns that shed light on the interpretive models presented in this chapter.

Summary and Conclusions

In this chapter I defined Upper Mesopotamia, reconstructed its third millennium climate, and reviewed the developmental context of urbanization there from the fourth to the second millennia. Subsequently I discussed the coercive, consensual, and heterogeneous models of urban society in third millennium Mesopotamia, tracing in part the history of their development and how they have been applied to Mesopotamian urbanized states. I concluded that of these three general models, the heterogeneous model is most in tune with recent thinking about how those polities worked. I also highlighted the problem of characterizing changes in power relations during urbanization, and cited Mollenkopf's (1992) attempt to find a middle way between pluralists and structuralists or neo-Marxists. Finally, I traced the history of research at Kazane, which forms the foundation for this dissertation. In the following chapter, I explore the development of the states based at Kazane and Harran through an analysis of settlement patterns in the Harran Plain. This analysis will situate Kazane within its landscape and the larger socio-political context in which it developed.

CHAPTER 3

LANDSCAPE AND SETTLEMENT IN THE HARRAN PLAIN: THE CONTEXT OF THIRD MILLENNIUM URBANIZATION

Introduction

In this chapter I examine landscape, environment, settlement, and historical geography of the Harran Plain, the setting for two third millennium states based at the cities of Kazane and Harran. I address several questions including: 1) How did settlement in the Plain change during thedevelopment of urbanized states in the third millennium, and how does this settlement relate to the landscape? 2) How large were the catchment and political territories of the states in the Plain? 3) Based on estimated population, did the size of urban centers in the Plain stretch the limits of their subsistence base? A recently published survey (Yardımcı 2004) provides the raw data for an assessment of settlement in the Plain. Through the use of Thiessen Polygons, site ranking, catchement buffers, and analysis of CORONA satellite imagery, I identify the settlement structure of the Kazane and Harran. The results of this analysis show that Kazane and Harran were at the head of primate settlement patterns in the third millennium. Settlement was especially dense in the third millennium, but most sites were small villages less than 5 hectares. In the third millennium the lack of significantly large secondary sites would permit Kazane and Harran to grow to 100 hectares or above, even at high population levels such as 200 persons per hectares, if third order centers supplied the primate centers with grain and other forms of subsistence. As two relatively small states, circumscribed by mountains bordering the Plains to the east and west, Kazane and Harran likely served as gateway communities for the northern and southern ends of the Plain, controlling trade and political interaction along the key routes into and out of the Plain. Despite settlement disruption at the end of the third millennium, both

Kazane and Harran were centers once again in the second millennium, although each reduced in size by at least half and smaller sites reduced in number.

The shape of states: modeling urban systems in Upper Mesopotamia

The shape of states is perhaps best displayed by their settlement patterns. Defined in spatial terms, the polity, in our case the state, is the "highest order [autonomous] socio-political unit in the region" (Renfrew 1986:2). The conceptual territorial boundary between early states is assumed to lie at the midpoint between the administrative centers of adjacent states, best shown with Thiessen Polygons. Administrative centers are usually the largest sites, and are assumed to contain the major administrative institutions and their households, in our case the main temple and palace facilities. This spatial analysis assumes that larger size means more people, functions, activities and complexity (Trigger 1972). Although this may not always the case, it seems to hold true for most large cities in Mesopotamia. In assuming that the largest sites were the socio-economic centers for their region, *I do not assume that smaller sites were insignificant, identical, or lacked a variety of political, religious and economic features*.

Differences in the climate and topography of Upper and Lower Mesopotamia are a common explanation for basic differences in the organizational structure of urbanized states in each region during the third millennium (Stone 1995:236). In such discussions, environmental features are often treated as prime movers, but it is best to conceive of them as "structural parameters" (Stein 2004) that provided differing opportunities and obstacles to developing polities. In Southern Mesopotamia, irrigation agriculture produced high yields, and rivers and canals facilitated transport of bulk goods. Under these conditions, large population centers cold exist without relying on secondary centers to supplement their produce. Irrigation agriculture required construction and maintenance of extensive canal networks, providing important political and economic work for the government (Potts 1997:19-21) and creating valuable irrigated land near cities (Stone 1995:237). Thus, the location of cities in Lower Mesopotamia formed a dendritic pattern along the rivers and their major branches. Control points along these networks gave upstream polities potential power over their downstream neighbors (Pollock 1992:311; Wilkinson 2003:210).

In contrast to the irrigated polities of Lower Mesopotamia, the rainfall agriculture of Upper Mesopotamia did not require substantial energy investment to prepare fields, and there were no control points with which to coerce neighboring polities (Stone 1995:237). Yields from rainfall agriculture were also lower than that from irrigation, requiring larger areas of cultivation to support growing cities in Upper Mesopotamia. At the same time, the lack of canals limited most transport of bulk goods to wheeled animal carts, reducing the distance one could economically ship grain away from major rivers. Thus, unlike the dendritic settlement patterns in Lower Mesopotamia, in Upper Mesopotamia mega-cities above 150 hectares are lacking, and major cities are more evenly spaced across the landscape, with secondary centers and small villages in between, forming a cellular or modular settlement pattern (Wilkinson 1994:491, 2003:111).

Tony Wilkinson's (1994) model of state formation in the dry-farming region of Upper Mesopotamia approaches the problem from an ecosystem and landscape perspective. Wilkinson combines analysis of settlement patterns with evidence for land use to argue that the growth of third millennium states and their urban centers was limited by the productivity of dry farming. Urban centers in this region tend to be not much larger than 100 ha, which Wilkinson attributes to the difficulty of moving bulk food over distances greater than 10-15 km, and the high labor requirements of intensive agriculture around the urban center. Thus, the size, or population, of the main urban centers at the core of states was constrained by ecological and technological factors. Nonetheless, these centers attempted to maximize their productive potential, a strategy that Wilkinson believes contributed to their collapse because a period of drought could seriously compromise their highly specialized food supply.

Although northern cities are more evenly distributed across the landscape than in the south, their settlement patterns are not all the same. Some regions have a well-developed three-tier system of primary, secondary and tertiary centers, while other regions lack significant secondary centers. An ideal example of a three-tiered settlement hierarchy is found around the center of Tell al-Hawa, located in the Jazira Plain just west of the Tigris River (Figure 1.1, 2.1). The Tell al-Hawa hierarchy is defined by its large, 66 ha urban center, surrounded at a fairly regular distance (9 – 12km) by three secondary centers, 10-20 ha in size, which in turn are the focus for small, 1-5 ha sites located within 3-5km of each secondary site (Wilkinson 1994:488). This settlement system most closely matches Wilkinson's provisioning model, in which the evenly spaced secondary centers collect surplus grain from their satellites and ship it to the primary site.

The ideal three-tiered settlement pattern was *not* maintained around the center of Titriş Höyük, located along the Upper Euphrates River (Figure 1.1, 2.1). This 40 ha site boasted only one secondary center among numerous third order sites. Wilkinson explains the lack of a complete settlement hierarchy at Titriş by way of its fractured terrain, in which limestone hills created pockets of farmland quite different from an open plain (Wilkinson 1994:489). According to Wilkinson's model, the smaller size of Titriş might be explained in part by the lack of enough secondary centers to contribute surplus grain to the center. Limited areas of cultivable land are also deemed to be partly responsible for the lack of a complete settlement pattern around the 31 ha center of Tell es-Swehyat on the Euphrates (Figure 1.1). Aside from a few small sites and a comparably sized peer center, Tell es-Swehyat lacks a settlement hierarchy, as do the other centers in the Upper Euphrates Valley (Cooper 2006b:61).

We can estimate the subsistence territories – not the wider-ranging political power or influence – of third-millennium polities by totaling the amount of cultivable and cultivated land around sites, the population of sites, and the number of persons that could be fed by the available land based on the minimum calories necessary for subsistence. Tony Wilkinson and his students refined this method in the Upper Khabur region where preservation of the ancient landscape is especially good. As a cross-check of estimated sustaining areas, Wilkinson measured pottery sherd scatters and pathways around sites as proxies for field boundaries. Wilkinson recognized that the extensive scatters of denuded potsherds in the topsoil around third millennium sites were not simply background noise from centuries of erosion, but residue from fertilizing fields with garbage. Wilkinson found that the largest, densest concentrations of sherds occured around major sites, and diagnostics within the scatters dated the material to the period of largest site extent (Wilkinson 1994:491). The period of intensive sherd scatters also coincided with the increasing use of dung fuel (evidenced by botanial studies) due to ever scarcer sources of wood fuel. With dung needed for fuel, farmers turned to household, farm, and industrial refuse to fertilize their fields (Wilkinson 1994:492). Thus, the sherd scatters around sites mark the limits of fertilized fields dating to the period of agricultural intensification under third millennium urbanism, a pattern Wilkinson found again and again at numerous sites.

In addition to sherd scatters, Wilkinson estimates the extent of cultivated areas by measuring the length of “linear hollows” or “hollow ways,” long depressions that cut across the landscape. Although some scholars interpret these features as canals or waterworks, because they tend to collect water due to their depressed topography (McClellan et al. 2000), Wilkinson demonstrates convincingly that they are pathways that developed during repeated use by humans and herds of animals. Linear hollows are distinguished from waterworks because they radiate spoke-like from settlements, connect settlements, cut across watersheds, lack the upcast an excavated canal would exhibit, and reseamble other pathways in the Old World (Ur 2003; Wilkinson and Tucker 1995:24-28). Expanding on the work of van Liere and Lauffray (1954), Wilkinson and Jason Ur traced extensive hollow way systems in Upper Mesopotamia (Ur 2003; Wilkinson and Tucker 1995:24-28). Many linear hollows connect major and minor sites, while others dead-end about 2-4 km from major centers (Wilkinson 1994:493). Wilkinson interprets dead-end linear hollows as limited pathways between intensively cultivated fields (Wilkinson 1994:493). Thus, the termination of dead-end linear hollows marks the limit of cultivation.

In recent years, Wilkinson teamed with others to incorporate the latest survey data, satellite analysis, textual analysis, pastoralism and computer simulations to refine his model of urbanization in Upper Mesopotamia. The latest expression of this model is conceived in terms of "complex adaptive systems," in which multiple low-level activities undertaken by a variety of agents for various motives produce broad patterns and processes due to similar socio-economic and ecological circumstances in which actions are taken (Wilkinson et al. 2007:52). In this case, the assumption is that the settlement patterns in Upper Mesopotamia are not simply caused by environmental forces, but by common solutions to production and transport problems faced by those pursuing similar economic goals within similar political contexts. For my analysis of the Harran Plain I will employ Wilkinson and colleagues' latest estimate of the variables necessary to calculate sustaining area and land use intensity in the Upper Khabur. The Khabur region is an appropriate comparison for the Harran Plain because the two regions share roughly the same latitude, have comparable rainfall levels (Böke 1987; Wilkinson 1994: Figure 1), and similar terrain, were occupied at the same time, and contain urban centers of comparable size.

Wilkinson and colleagues use the standard ethnographic sources[1] to calculate population density with the figure of 100 – 200 persons per hectare. Their land-use intensity factor, or the land required to provide food for one person per year, is 1.33 hectares (Wilkinson et al. 2007: 56). This factor is based on assumptions derived from analysis of ethnohistoric agricultural practices in the region, and nutritional studies. This factor assumes that each person needs 250 kilograms of grain per year, that grain yields are 500 kilograms per hectare, and farmers practice biennial fallow (Wilkinson et al. 2007: note 3). This factor indicates that 1 hectare of *cultivable* land is needed to feed a person for a year. Yet, Wilkinson and colleagues note that on average, 25 percent of Upper Mesopotamia could not be cultivated due to rivers, roads, basalt flows, hills, and other impediments to successful planting (Wilkinson et al. 2007: note 3). Thus, the area needed to support 1 person per year is 1.33 hectares.[2]

The figures in Wilkinson and colleagues' calculations are not universally agreed upon. Some would argue for 40% lower population estimates at urban sites, due to large areas devoted to public buildings (Stein and Wattenmaker 2003:363; Weiss 1986:Note 8), or larger populations due to multi-story dwellings and urban packing (Postgate 1994b). Others argue that allowing 250 kilograms of grain per person per year is too high, due to the contributions of meat and dairy products. One could also argue that the correct unit for calculating sustaining area is not

[1] e.g. Kramer 1980, 1982; Van Beek 1982. See also Adams 1981:69.
[2] I have not calculated the percentage of the Harran Plain that would be unsuitable for agriculture, or taken up by settlements, communication routes and bodies of water. Based on soil charts (Kapur et al.2002; Şenol et al. 1991) and aggregate settlement area (Yardımcı 2004), the 25% figure employed by Wilkinson may be a slight overestimate.

individual food needs, but household consumption, because infants and older people do not consume as much as younger adults (Hunt 1995). Others do not believe that the field scatters of potsherds are convincing evidence for manuring, and thus dismiss the suggested halos of intensive agriculture that informed Wilkinson's original (1994) model (Oates 1994; Weiss and Courty 1994). I find the evidence for manuring and hollow ways sufficient, and I accept their use in the model. I also recognize that lowering food needs, violating bieenial fallow, reducing population estimates, or incorporting small scale irrigation and the contribution of the animal economy would all result in smaller sustaining areas. Yet, I see the Wilkinson approach as a powerful heuristic model that we can test against the spacing of urban centers and their relationship to the landscape. Applying the model provides insight into how these states and their capital cities developed, how their size stressed, or did not stress their environment, and how the people adjusted to periods of growth and decline. In the following sections, I introduce the Harran Plain, evaluate survey data from the Plain, and analyze the settlement patterns. As part of this analysis, I apply Wilkinson and colleagues' model of urban systems to the third millennium states of the Harran Plain.

The physical environment of the Harran Plain

The Harran Plain is variously named after the cities at its northern and southern ends, Urfa and Harran, or the river that trickles through it, the Cullab[3] (Lloyd and Brice 1951:81; Rosen 1997:396; Yardımcı 2004:14). In this discussion I refer to the entire plain as the Harran Plain. Located in Şanlıurfa province in southeastern Turkey, this plain is approximately 40km wide and 55km long (Figure 1.1, 3.1). The Plain extends south from the city of Urfa between the

[3] Here, the Turkish spelling is used, in which "C" has a "J" sound, such that Cullab is pronounced Jool – lahb.

Fatik and Tek Tek mountains, crosses into Syria and opens up into the Syrian Jazira. The Fatik and the Tek Tek are low, eroded ranges consisting of limestone deposits dating to the Middle Eocene, Oligocene and Lower Miocene (Rosen 1997:396). Eroded alluvial deposits from these mountains form the fertile Harran Plain, which slopes down gently north to south, dropping from about 450m to 350m above sea level (Yardımcı 2004). If not for human intervention, the presumed natural vegetation of the region is steppe ("dwarf-shrublands") in the Plain and lower elevations, with oak forests and shrubs (maquis) on the hills (Rosen 1997:396; Moore et al. 2000:50-68; van Zeist and Bottema 1991:31-32; Wilkinson 1990a: 10). At the northern end of the Plain the rivers Cullab, coming from the northeast, and Karaköyün,[4] flowing through Urfa, form two major branches of the headwaters of the Balikh River (Harrak 1992:209; Lloyd and Brice 1951:81). Today, water use practices, including dams and irrigation canals, leave both rivers mostly dry. In antiquity these rivers were a vital source of water for consumption and agriculture in Urfa and down the Harran Plain (Yardımcı 2004:14).

Soil maps of the Harran Plain show that the main soil types are calcisols, cambisols, and fluvisols, overlying marine limestone, calcrete, basalts, mudflows, vertisols, marls, alluvial and lacustrine (lake) deposits (Dinç et al. 1991: Figure 2; Dinç et al. 2005:Figure 5).[5] Throughout most of the Plain, these brown or reddish brown, neutral soils (pH mostly 7.5 – 8.0) are deep or moderately deep, over 150 cm in 77% of the area (Ozer and Demirel 2002), although soils are very shallow on the eroded hills around the Plain (Doğan 1990). Soils in the Plain overlie gravel, lime, sand, and stone, with heavy textured soils comprising 95% of the plowzone, and the

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[4] Named Dayşān in the Hellenistic and Roman (Parthian) periods.

[5] Calcisols (called Calcids in the US Soil Taxonomy) are "soils with substantial accumulation of secondary lime" (FAO 2006:74). Cambisols (usually called Inceptisols in the US Soil Taxonomy) are "soils with at least the beginnings of horizon differentiation in the subsoil evident from changes in structure, colour, clay content, or carbonate content" (FAO 2006:75). Fluvisols (called Fluvents in the US Soil Taxonomy) are soils that "developed in fluvial deposits," which may include river, lacustrine and marine deposits (FAO 2006:75).

remaining percentage having medium texture (Ozer and Demirel 2002). Recent studies of these soils in conjunction with topography define most of the Plain (67%) as "highly suitable" to agriculture, and much of the rest is defined as "moderately suitable" (Şenol et al. 1991:Figure 3) (Figure 3.2). These land-suitability ratings are based on the parent soil, soil depth, the texture, structure, stone, organic and $CaCO_3$ content of the surface horizon, texture and structure of subsoil, slope and drainage properties, and salinity (Şenol et al. 1991:50). Although these variables may have changed since antiquity, and the suitability ratings are targeted towards deep-plowed irrigation agriculture, they provide a general picture of the relative fertility of land in the Plain. Areas defined as having "severe limitations" or "restricted use" occur mostly on poor substrates, on the edges of the Plain, along the eroded hills, or in the finger of hills reaching down in the northeastern corner of the Plain.[6] Notably, mixed substrates and topography that negatively influence agriculture cluster in the southwestern quadrant and northeastern corner of the Plain. As we will see below, ancient settlements in these areas are much fewer in number than in the rest of the Plain.

Geoarchaeological research conducted near Urfa in the Upper Harran Plain, and phytoliths analyzed from the site of Kazane Höyük indicate that during the Late Chalcolithic Period and the first part of the Early Bronze Age (fourth millennium to early third millennium B.C.E.), the surrounding hills were forested and the area received more rainfall than today, perhaps even hosting a seasonally swampy area with wet-land vegetation in the floodplain of the Karaköyün, which runs beside Kazane (Rosen 1997: 412). A climate shift of uncertain date and duration changed the conditions such that by the Middle Bronze Age (early second millennum B.C.E.) the wetlands had dried up and area streams were entrenched (Rosen 1997:414). This

[6] I believe that land with "severe limitations," especially around Harran and northeast of Akçakale, may include highly salinated areas degraded by modern irrigation, although this is not clear in the report (Şenol et al. 1991).

local picture of climate change is similar to the wider regional climate trend over this period. Analysis of geology, pollen from lake cores, and botanical remains from archaeological sites indicates that from the fourth to the second millennium B.C.E., the climate in Upper Mesopotamia shifted from a moister and more vegetated condition to a drier regime accompanied by significant degradation of the landscape (Miller 1997:126-127; Rosen 1998:236-237; Rosen and Goldberg 1995:32-37; Schwartz et al. 2000:446-447; Schlee in Algaze et al. 1995: 28-32; Wilkinson 2003:103-105).

The modern climate in the Harran Plain consists of hot, dry summers with an average temperature of 30 C (86F) in July, and hot, wet winters with an average temperature of 5 C (41F) in January (Dewdney 1971:38-39, 42-43). The Plain averages just under 500mm of rainfall per year at the town of Urfa at its northern end (Dewdney 1971:43), and closer to 300mm per year at its southern end at the city of Akçakale (Böke 1987). Today, as in antiquity, the Harran Plain provides fertile ground for agriculture, and the surrounding mountains provide pasture for sheep, goat and cattle. It is likely that land use in the Harran Plain in antiquity was similar to that in the late nineteenth and early twentieth centuries. The Plain was traditionally a place for dry farming of grain in the Plain and sheep-goat herding on grain stubble and in the surrounding hills (Wilkinson 1990a:10).[7] In recorded history, well-irrigation supplemented rainfall in some places, and the Cullab River was used for small-scale irrigation of adjacent fields (Lloyd and Brice 1951:82). Away from the River, wells permitted local irrigation of cotton, chickpeas, lentils and trees (Kapur et al. 2002:327). Early twentieth century accounts of the inhabitants of the Harran Plain describe a mix of semi-settled and nomadic groups (Lewis 1988:687-688). The former lived in permanent villages but a large portion of the population moved with the herds

[7] For a detailed map of suggested land-use in the Harran Plain area, see Wilkinson 1990a:Figures 1.2, 2.5.

during the winter months as they grazed on the grass and shrubs of the Tektek Mountains (Lloyd and Brice 1951:82). The remaining nomadic groups were landless tribes whose presence and 'squatting' annoyed the settled groups (Lloyd and Brice 1951:82).

The last two decades witnessed a radical shift in the land-use regime in the Plain when the waters of the Euphrates, collected by the Ataturk Dam, were pumped through tunnels and canals to irrigate the Harran Plain as part of the Southeast Anatolia Project (GAP).[8] The availability of a year-round and reliable water supply led to intensive agriculture throughout the Plain, with cotton farming becoming increasingly important in recent years. Landsat images taken just a decade apart demonstrate this shift from a partially to a fully irrigated landscape (Kouchoukos et al. 1998:484-6).[9] Landsat images also indicate the dramatic shift to cotton farming that accompanied the irrigation works (Waterwatch 2003). By 2002, cotton comprised 85% of irrigated crops in the Plain[10] (Ozer and Demirel 2002), and increasing salination is already a problem in some areas (Çullu 2003). Not surprisingly, intensive irrigation agriculture is taking a toll on archaeological sites (Yardımcı 2004:21). Smaller sites are often flattened or

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[8] The Southeastern Anatolia Project has it roots in the modernizing reforms of Kemal Atatürk, founder of the Turkish State, who established the Electric Works Studies Agency in 1936 to explore opportunities for hydraulic sources of electric power. This agency conducted comprehensive geological studies on both the Tigris and Euphrates until 1954 when the State Hydraulic Works Administration (acronym DSI in Turkish) was established to expand such studies to include all the river basins in Turkey. In 1977, the Tigris and Euphrates utilization schemes were lumped together as the "Southeastern Anatolia Project" (Güneydoğu Anadolu Projesi; acronym GAP in Turkish). In 1986 the GAP was united with an official Regional Development Agency in order to expedite the development and integration of industry, housing, mining, agriculture, and transportation that are planned in conjunction with the hydroelectric and irrigation projects (Akmansoy 1996:5).

Although other dams already exist in southeastern Turkey, such as the Keban Dam and Attatürk Dam on the Euphrates, completed in 1974 and 1992, the GAP is a gigantic undertaking involving 21 dams, 19 hydroelectric power plants, numerous irrigation projects, and agricultural, social and economic infrastructure to be installed in six provinces through which the Tigris, Euphrates and their tributaries flow (Kolars and Mitchell 1991:19). When completed sometime around 2020 (the date continues to be moved forward), the GAP is expected to increase the total irrigated land in the Tigris-Euphrates river basins to 2 million ha. In 1986 the irrigated land in the GAP provinces represented 4 percent of the irrigated fields in Turkey. When GAP is completed, this figure will increase to a remarkable 64. Additionally, the GAP will provide nearly 50 percent of Turkey's energy production when all the hydroelectric plants are in place.

[9] The latest image shown in Kouchoukos et al. (1998:486) dates to 1992. Since then, tunnels from the Ataturk Dam were completed and the Plain is now even more extensively irrigated.

[10] Another study places the proportion of cotton at 90% by 2002 (Binici et al. 2006:228).

removed altogether, while larger sites suffer cuts from canals and bulldozing to create level fields for irrigation.[11]

The Historical context of the Harran Plain in the third millennium

Associating archaeological sites with places mentioned in ancient texts is a difficult but rewarding task. Identifying ancient places on the modern landscape enables us to more accurately reconstruct the sociopolitical relations of antiquity on a large scale. Ancient sites are mentioned in letters, treaties, trade documents, and accounts of journeys. Sometimes, a city will record the topographical order in which it delivers or collects goods from a series of settlements (Archi 1988a:2). Other times, a ruler will record his journeys of conquest or diplomacy by listing the order of settlements he visited, and obstacles overcome to reach the destination (Goetze 1964). Details about a good place to cross a river, or a topographic marker, such as a mountain or canyon, often provide the key to deciphering how the ancient site names correspond to modern archaeological sites. In excavations, ancient names may appear on tablets, inscriptions, architecture, sealings, objects, or stamped bricks.

Of the sites in the Harran Plain, only two, Harran and Sultantepe, are clearly associated with ancient (pre-classical) place names.[12] Sultantepe, ancient Huzirīna, was an Assyrian provincial town mentioned in texts from the late second and early first millennium B.C.E., and texts from the later period were found at the site (Ellis 1974; Gurney 1954; Gurney and Finkelstein 1957-64; Kuhrt 1995; Postgate 1975; Reiner 1960; Reiner and Civil 1967). Harran is

[11] This statement is based on reports inYardımcı (2004), and recent satellite images that show clear bulldozing and earth-borrowing at large and small sites alike.

[12] See Yardımcı 2004:14-18 for some guesses about the locations of named Assyrian period satellites or contemporaries of Harran, including Dûru, which may correspond to the site of Anaz Höyük in the northeastern part of the Plain (Unger 1938).

mentioned in third millennium texts from Ebla, and in Assyrian texts from later periods. In the Ebla texts, Harran appears as an independent polity engaged in a relatively balanced exchange relationship with Ebla in the third millennium (Archi 1988a:1, 4). This exchange included gifts of cloth and precious metal objects from Ebla to Harran, with Harran sending raw metals, especially silver, to Ebla. The low quantities involved indicate that these exchanges were not large-scale trade but meant instead to maintain political relationships (Archi 1988a:4).

The three cuneiform texts from Kazane were found out of context by local residents, date to the second millennium and do not mention any identifying characteristics of the city (Michalowski and Mısır 1998). Abarsal and Uršu are the only ancient cities mentioned by cuneiform scholars as possibly correlating with Kazane (Michalowski and Mısır 1998:53; Liverani 1994:508). Uršu is generally believed to be located in the region of the modern city of Gaziantep, some 125 km west of Kazane, or further up the Euphrates at Samsat (Sallaberger 2007:439). The Gaziantep location for Uršu would seem to be supported by texts from the city of Mari, which indicate that Uršu was west of but near the Euphrates River and relatively close to or in the vicinity of Carchemiš (Beitzel 1992:55). Gaziantep is 54 km from the Euphrates crossing point at Birecek, and 60 km from Carchemiš. Unlike Uršu, Abarsal is not mentioned in any texts dating later than the third millennium, meaning that if Kazane is Abarsal, it may have lost its importance in the second millennium, or taken a new name (Michalowski and Mısır 1998:53).[13]

Abarsal is mentioned in the Ebla texts, most notably in a treaty in which Abarsal is clearly the subordinate polity (Archi 1989:15; Sollberger 1980).[14] Part of the treaty discusses

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[13] Of course, this could also be the accident of discovery, and texts may yet surface describing relations between Abarsal and other polities.

[14] This treaty was initially reported, incorrectly, to be between Ebla and Ashur (Pettinato 1981:103-105).

riverine trade between Ebla and Abarsal, prompting scholars to place Abarsal along the Euphrates or one of its tributaries (Astour 1992:27, 33; Astour 1988:147-148, see esp. note 54). Yet, as Jason Ur observes, although the text discusses riverine trade, Ebla is not located on a river, so why must Abarsal be located along a river (Ur 2004:242)? More likely, Ur suggests, Ebla and Abarsal both controlled riverine trade through subordinate sites located along rivers (Ur 2004:242). Thus, Ur (2004:243), along with Archi (1998:4) proposes that Abarsal is Tell Chuera, located southeast of Harran in the Syrian Jazira. In contrast, Bunnens suggests that Abarsal may have been located along the Euphrates far north of both Chuera and Kazane (Bunnens 2007: 4-50).

If we permit Abarsal to be located someplace other than along a major river, Kazane's candidacy improves. Yet, Tell Chuera's identification as Abarsal may also be strengthened by its settlement history. Chuera was occupied from 2800 to 2200 B.C.E., and then abandoned for a long period before being reoccupied from 1400 to 1100 B.C.E. (Orthmann 1997:491). The long hiatus in settlement at Chuera may explain why Abarsal is not mentioned in any texts after the third millennium[15] (Michalowski and Mısır 1998:53; Sallaberger 2007:439). Chuera was not a large city during Ur III times, and by the time it was resettled around 1400 B.C.E., its ancient name may have been forgotten.

If we cannot identify Kazane's ancient name, can we place the Upper Harran Plain within the territory of a known polity? According to Astour's reading of the Ebla texts,[16] in the 24th millennium, Ebla maintained indirect, hegemonic control over numerous client cities and states

[15] Of course, other sites are also missing from the Ur III texts, including Harran, Karkemish, and Nagar (Sallaberger 2007:439), but we know the location of these sites.

[16] As in the previous chapter, this discussion of politial relationships in Upper Mesopotamia is based mostly on the Ebla texts, which are biased to their context and only cover about 50 years in the mid to late 24th millennium. Thus, this summary should be taken with the proverbial grain of salt.

in the Euphrates watershed of northern Syria as far north as the modern Turkish city of Gaziantep (Astour 1988:142). Gaziantep is located at roughly the same latitude as Kazane, but 125 km to west, while Harran is just 33 km from Kazane. Assuming that the territorial border between Kazane and Harran split the Harran Plain, then Kazane's sustaining zone and area of greatest influence butted against that of Harran (see below), a city that in at least one text appears to be on good, equal terms with Ebla. Perhaps Kazane's location beyond Mari's reach and at the margins of influence from Ebla or Nagar (Tell Brak), combined with the geographical buffer formed by the hills surrounding the north end of the Harran Plain, put Kazane in a position of effective independence from any significant political pressure from Ebla or other regional powers. This could explain why there is no sure-fire candidate ancient place name for Kazane in the Ebla texts – it had little direct interaction with Ebla – or its absence is just the accident of discovery and a better name for Kazane may yet appear among the many unpublished and undiscovered texts.

Harran is located along the major northern route across Mesopotamia, which crossed the Euphrates near the site of Carchemish, continued across the Balikh by Harran, moving eastward through the Upper Khabur River area and on to the Tigris, where it followed the River to Nineveh, Ashur, Baghdad and Babylon (Lloyd and Brice 1951:81) (Figure 3.3). The southern route across Mesopotamia followed the Euphrates River, and joined with the northern route via the Balikh and Khabur River Valleys. Harran's position provided direct access to the northern route, and close access to the southern route and points beyond. Located at the northern end of the Harran Plain, just south of the east-west escarpment running from Birecik to Cizre, Kazane must have served as a gateway to the fertile Plain and routes passing through Harran, and facilitated trade between the Taurus foothills and the Plain (Brice 1966:234). It is likely that sites outside the northern end of the Plain were within Kazane's zone of political and economic influence. The most likely routes for contacts outside the northern end of the Plain are southwest towards Biricik and down to Carchemish, southeast towards the city of Mozan, and northwest through the İncesu valley towards the city of Titriş Höyük, 48 km from Kazane (Lebeau 2000). At 43 hectares Titriş Höyük was at least three times larger than any other site in its region (Algaze et al. 1992:46). Its major period of growth may have taken place slightly later than Kazane's but both sites were occupied during the mid to late third millennium B.C.E. There is no direct evidence for interaction between Titriş and Kazane, but the Canaanean blade (flint knife) workshop discovered at Titriş may have supplied other sites, including Kazane (Hartenberger 2003; Matney et al. 1999:190-193).

Although Kazane was no longer inhabited by the mid second millennium, Harran continued to be an important city throughout the Assyrian period, even receiving special rights under Sargon II (late 8th century) and briefly serving as the last Assyrian capital, which fell at the end of the seventh century (Postgate 1973).[17] From the sixth century on, Harran remained a key city (Heidemann 2002), unfortunately located in a border zone between competing states and empires. Political control over the city changed hands multiple times until the late 13th century, when conflict caused the city to be evacuated because its location was deemed too difficult to defend (Sinclair 1990:29-32).[18] After its official abandonment, Harran remained a significant outpost but was never more than a citadel or center for nearby villages. The city of Urfa was founded in 300 B.C.E. as the city of Edessa, and remained an important political and economic center across the classical and Islamic periods until today (Sinclair 1990: 2-8). Although Edessa

[17] For detailed expositions of Harran's role in the Assyrian Empire, see Postgate 1973, and Yardımcı 2004:14-18.
[18] Today, Harran is small village that is a popular tourist destination because of its Biblical associations (Genesis 11:31-32; 12:4-5; 27:43; Second Kings 19:12; Isaiah 37:12), the excavated remains of the Great Mosque and fortress (Lloyd and Brice 1951), and the distinctive 'beehive' houses of current residents (Özdeniz et al. 1998).

was by no means the direct descendant of Kazane, it echoed Kazane's position as a large urban center at the northern end of the Harran Plain.

Archaeological research in the Harran Plain

Classical writers, including Strabo, Pliny, and Herodotus, all discussed Upper Mesopotamia, and medieval writers and Ottoman period travelers occasionally provided specific information about Urfa, Harran, the Harran Plain and adjacent regions (Günay and Whallon 1980:91; Sinclair 1990: 184). Such accounts generally focus on Urfa or Harran, classical ruins, and geography. The first attempt at organized archaeological survey in the Plain took place in 1963 when the joint Istanbul – Chicago Universities project initiated surveys in the Siirt, Diyarbakir and Urfa regions (Çambel and Braidwood 1980). Their work in the vicinity of Urfa lasted just four days; they collected material from few sites, and only surveyed four sites in or around the Harran Plain (Benedict 1980:152). Thus, this survey provided little information about settlement patterns in and around the Harran Plain.

Excavations in the Harran Plain have been limited to a few sites. Over the last 50 years, development in Urfa sparked limited excavations of mostly Neolithic and classical period remains in and around the city (Hauptmann 2003; Sinclair 1990:3). In the 1950s, Lloyd and Gokçe excavated important Assyrian period remains, including tablets, at Sultantepe (Gurney 1953; Lloyd and Gokçe 1953). Around the same time, soundings at the small site of Aşağı Yarımca, near Harran, yielded an Assyrian stele (Gadd 1951; Lloyd and Brice 1951). Also during the 1950s, an expedition mapped the standing Islamic ruins at Harran, uncovered the Great Mosque of the 7th to 13th centuries (Lloyd and Brice 1951; Sinclair 1990:33-36), and excavated a deep sounding into the mound, which revealed a long sequence of habitation from historic times to the Early Bronze Age (Prag 1970). Another 1950s expedition mapped the often visited but rarely published classical period ruins at Sumatar, located in the Tek Tek Mountains east of the Harran Plain (Segal 1953). Excavations focusing largely on the Islamic period city at Harran resumed in the 1980s and continue today (Yardımcı, 2004:20). Over the last decade and a half, the German Institute conducted important excavations at the Neolithic sites of Göbekli Tepe in the hills north of the Plain, and Gürcütepe, just north of Kazane (Beile-Bohn et al. 1998; Hauptmann 1999; Schmidt 2000). Finally, research at Kazane began in 1992 and continues today (Wattenmaker and Mısır 1994).

Despite the important excavations of the last century, and the foray of the Istanbul-Chicago Universities joint survey, very little was known about settlement patterns in the Harran Plain until the recent publication of a survey by Nurettin Yardımcı, (2004). This survey covered most of the Plain, from the Syrian border to the Urfa-Mardin highway (highway E90/400), bracketed by the hills to the west and the Tektek Mountains to the east (Yardımcı 2004:20) (Figure 3.1). For many of the 208 sites identified in the Plain, the survey report provides a topographic and section map, UTM coordinates, elevations, area and volume calculations, photographs of the site, and photos and drawings of finds collected.[19] As the authors note, many of the sites are threatened or already destroyed by irrigation development in the Plain (Yardımcı 2004:21). The photographs published in the report will assist in identifying damaged sites, and documenting destruction. In the next section, I will use the Harran survey data to conduct spatial analysis of state formation in the third millennium.

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[19] Survey and collection methods are not specified, but one can infer that the team located sites by driving along roads, walking fields, and asking local inhabitants for the location of artifact scatters, mounds, or ruins.

The Yardımcı Survey

Nurettin Yardımcı conducted a survey of the Harran Plain that allows us to place Kazane within its regional context. To facilitate analysis of the Harran survey data, I entered site coordinates, size, and habitation periods into a Microsoft Access database.[20] I imported queried data tables into ArcGis 9.2[21] for spatial analysis, and Microsoft Xcel for rank-size and pivot-table analysis. The surveyors could not provide maps and area measurements for 79 sites[22] due to the special nature of the site, bulldozing, modern settlements or military installations[23] upon the sites. Of these 79 sites, in 10 cases the surveyors provide diameters from which I estimated site size (assuming a circle). In most other cases I estimated site size from a combination of Yardımcı's photographs and CORONA images. Of the 79 unmapped sites, I estimate that two are between 5-10 hectares, two are about 5 hectares, and the rest are less than 5 hectares (in many cases just a couple of hectares).[24] These 79 sites are fairly evenly distributed over the

[20] This database permits complex queries and data sorting.
[21] Once I mapped the sites in ArcGis9, I noted 12 coordinate errors. These errors were both obvious, in the case of sites that mapped well outside the Plain, and subtle, including site coordinates that duplicated those of nearby sites. In some cases an obvious typographical error was to blame but in other cases I used the surveyors' maps of the Plain (Yardımcı 2004) to estimate the correct coordinates. The coordinate errors and my corrections are: site 13 (Y value changed to .77 at end because the original seems incorrect); site 14 (Y value is too large, at 40667751.41, but should be about same Y as site 191, or 406765; I estimate that it is 4067751.41); site 36 (X valued changed from 4084916.69 to current value. Y value seems too high-- should be closer to 4080500); site 65 (X value changed from 4949448.62 but still seems incorrect); site 85 (X and Y values seemed reversed, so I switched them); site 101 (the coordinates were same as site 100, so I changed Y by adding 1.5km); site 110 (Y value listed as 407456.11 is in error, I suggest 4097556.11); site 116 (original coordinates duplicated site 103; I estimate correct values as X = 505050, Y = 40930000); site 131 (Y listed as 410919, but seems incorrect, so I estimate 4101919); site 165 (X value originally 416996, I changed it to 516996); site 172 (Y listed as 407733, I suggest 4077533); site 184 (X value was too large so I added a decimal before the last 4).
[22] These sites are: 22, 55, 58, 68, 69, 70, 71, 73, 75, 76, 79, 80, 81, 83, 84, 85, 86, 89, 90, 91, 92, 96, 104, 106, 107, 108, 109, 113, 117, 122, 126, 127, 133, 136, 137, 239, 140, 142, 143, 145, 146, 148, 149, 151, 152, 156, 159, 160, 163, 164, 165, 166, 168, 169, 170, 171, 174, 175, 176, 178, 180, 181, 182, 183, 186, 187, 190, 191, 192, 194, 196, 198, 200, 201, 202, 204, 205, 208. I also identified some problematic site areas. I checked each questionable site size against its topographic map, if available, to confirm its size.
[23] Site 55, İsmail Dirik Karakolu, is located in the border zone between Turkey and Syria.
[24] I used these area estimates in my study in order to avoid omitting such a large number of sites from analysis of site size, distribution, population, and sustaining area.

Plain, demonstrating the rather even and extensive impact of development and modern habitation.

The Harran survey focused on mounded sites, although the surveyors also identified some very low mounds under 2m high, bulldozed sites,[25] and flat sites, as well as a few unusual sites including a stone quarry (site 161), a scattering of large stones on the surface (site 149), and the ruins of a possible han[26] (site 133). The Harran survey identified 209[27] sites spread over 1632.10 square kilometers.[28] These figures yield a site recovery rate of 0.128 sites per square kilometer, or 1 site per 7.81 square kilometers (Figure 3.4). This rate falls within the range of other Near Eastern surveys, which recover between 1 site per square kilometer to 1 site per 10 square kilometers (Wilkinson et al. 2004:189). The Harran recovery rate probably falls at the lower end of the scale due to a combination of the survey methodology, habitation practices, and the nature of the landscape. Applying Taylor's (1972) concept of "landscapes of survival" and "landscapes of destruction," Wilkinson (2000a,) notes that sites survive better in dryer areas that are less hospitable to agriculture and long-term settlement, such as highlands and deserts (Wilkinson 2003:41). In contrast, moist areas, especially lowlands, tend to be inhabited repeatedly over long periods of time, with intensive agriculture and new settlement obscuring and destroying settlements from earlier periods. The Harran Plain is increasingly a "landscape of destruction," in which repeated settlement across time has impacted the survival and visibility of

[25] Some sites were bulldozed after the surveyors' initial visit. These include site numbers 47, 83, 127, 143.
[26] "Han" refers to an inn for travelers in the Islamic period. Han's were often isolated forts along travel routes, with many rooms and large inner courtyards to accommodate and secure travelers and their goods.
[27] The city of Sanliurfa was not surveyed in this study, but finds unearthed during development, combined with historical texts, demonstrate that the site was at least occupied in the Neolithic, Hellenistic, Roman, and Islamic periods. Although we do not know the size of Urfa in those periods, I included it in my analysis.
[28] The survey report lists the area of the Plain as 2000 square kilometers. This figure is a rough calculation that assumes that the Plain is square. When the actual survey boundaries are traced, between the east and west mountains, the southern border with Syria, and the Urfa – Mardin highway, the actual area as calculated in ARCGIS is 1,632.10 square kilometers.

settlements and associated features, including fields, roads and paths. The rate of landscape transformation and site destruction in the Plain has increased dramatically in the last decade and a half due to irrigation agriculture. During the course of the Harran survey, numerous sites were completely flattened, cut in half, or cut back to a central cube among the fields.[29] It is also not clear to what extent natural processes, such as river and stream aggradation, or alluvial fans, have buried sites in the Plain.[30]

Despite the destruction experienced by landscapes inhabited over long periods of time, Wilkinson and colleagues (2004:196) show that even intensive surveys in the Near East recover significantly fewer sites than intensive surveys in Greece and Italy, and "ghosts" of destroyed sites are rarely discovered. They explain the difference as due to two key factors: building materials and reuse of the same sites over millennia. Due to the scarcity of wood and the difficultly of moving stones, Near Eastern sites make extensive use of mudbricks for building, and it is not profitable to rob and reuse this material. Abandoned sites tend to form mounds

[29] Since the early 1990s, the Ataturk dam has provided Euphrates water to the Harran Plain through tunnels and canals. The resulting irrigation schemes prompt increasing bulldozing of sites to level them for easier flow of irrigation water. Land leveling is not simply malicious destruction by rogue farmers, but part of the official GAP irrigation implementation strategy (Kudat and Bayram 2000: 290, 297). Land leveling is designed to remove slopes and improve yield (Kudat and Bayram 2000: 282). Unfortunately, farmers often feel ignored by or do not trust the institutions developed to train them in irrigation practice. Farmers are also reluctant to permit state-sponsored leveling operations because these interrupt their growing season and have a high cost (Kudat and Bayram 2000: 290). As a solution, farmers often conduct their own land leveling (Kudat and Bayram 2000: 285-6, 290). This practice no doubt exacerbates the rate of archaeological site destruction, especially of small sites that can be leveled rather cheaply. Farmers are apparently not trained or informed of the importance of archaeological sites, and many profess real or feigned ignorance of the antiquity of the mounds in their fields. For the leveled site 47, Yardımcı's report (2004:195) records the following exchange: "When we questioned the farmer [about the bulldozing], he replied that he held a deed and had not been informed of any restrictions or precautions regarding what he could or should do with his land." Site 122 was completely bulldozed except for a small cube in the center, which was left because it has a tomb on top. Yardımcı (2004:450) records an exchange at this site that reveals that locals are aware that the mounds are archaeological: "We heard that primary-school pupils in the area followed the bulldozers during the leveling of the slopes [of the site] and collected a good number of 'finds.'" Now that Yardımcı has publically documented the sites in the Harran Plain, one might hope they can be protected; however, as is the case around the world, local economic needs often outweigh archaeological preservation, especially in areas where conservation is not a developed aspiration, and many persons are either poor and powerless to prevent destruction, or benefit economically from levelling.

[30] For example, in the Amuq Plain, coring and trenching has identified sites, especially from pre-third millennium periods, buried several meters below natural sediements (Casana 2007:198).

comprised largely of mudbrick and refuse, which, if not very tall, can be easily plowed and farmed (unlike stones which would have to be cleared from fields). Thus, even in a landscape of destruction, abandoned sites do not suffer as much as they might if they contained reusable building materials or obstacles to agriculture. For this reason, a surprising number of small sites in the Harran Plain were plowed but survived with minimal damage until very recently, when intensive irrigation made it profitable and necessary to completely flatten small sites to ease the flow of water in canals and fields.

Although some (especially small) sites disappear due to later settlement and development, Wilkinson and colleagues demonstrate that with a few sub-regional exceptions, from the Neolithic through the first part of the Bronze Age, Near Eastern sites tended to reoccupy the same location, forming mounds or tells. In contrast, in the Iron Age and later periods sites are often dispersed more evenly across the landscape (Wilkinson et al. 2004:202-203). Site re-use and tell formation may be related to cultural and political factors such as land-ownership practices, community identity, and form of government. Thus, the states of the Early Bronze Age formed nucleated settlement patterns, whereas under the Assyrian and Roman Empires, settlement dispersed across the landscape into small sites (Wilkinson et al. 2004:202-203). In the Harran Plain, the vast majority of sites were occupied for multiple periods (Figure 3.5). Only 19 sites[31] (9%) were occupied for just one period, while 125 sites (60%) were occupied for four or more periods, and 161 (77%) were occupied for three or more periods.

The reuse of site locations over many millennia created what Wilkinson terms a "signature landscape," in which repeated use of the landscape for similar socio-economic purposes results in patterns of associated features, such as tells, roads, and irrigation canals, that

[31] Of the 19 single period sites, 16 are Islamic, while 1 is Early Bronze Age, 1 is First Millennium, and 1 is Roman.

structure later settlement and thus persist over time (Wilkinson 2003:214). The Harran Plain falls into the northern part of Wilkinson's "Intermediate Zone" of Near Eastern landscapes. In this zone, comprised of the marginal rain-fed steppe, preservation of ancient landscapes is generally good, especially since many of these areas experienced light, dispersed settlement after the 1st millennium B.C.E., and were lightly settled between the 15th – 19th centuries C.E. (Wilkinson 2003:42). This zone is characterized by its many tells, which were inhabited largely from the Neolithic to the Late Bronze Age, with Iron Age settlement often shifting off of tells to adjacent lower settlements or new foundations (Wilkinson 2003:100). The conspicuous tells in this landscape endure despite accelerated destruction in the last century.

In a landscape of tells, merely counting sites is an insufficient means of analyzing changes in settlement over time. Near Eastern surveys generally recover between one site per square kilometer to one site per 10 square kilometers (Wilkinson et al. 2004:189). In contrast, more intensive Mediterranean surveys recover from one site per square kilometer to 10 sites per square kilometer (Wilkinson et al. 2004:189). To account for the reuse of sites in tell landscape of the Near East Wilkinson and colleagues tallied the total number of periods for each site in a survey, divided by the total survey area (Wilkinson et al. 2004:203, and Figure 14:1). This calculation moves some Near Eastern survey areas closer to the low end of Mediterrean survey site densities of 1 site per square kilometer. For the Harran Plain, the 209 sites were occupied for a total of 859[32] periods, as defined by the survey (see below, and Figure 3.7). Those 859 periods are spread over 1632.10 square kilometers, with one site period per 1.9 square kilometers (Figure

[32] Five sites were not defined by period, but we can assume that they were occupied for at least one period. Note that the figure for the Chalcolithic period may be inflated due to double counting/ reporting of Halaf, Ubaid, and general Chalcolithic materials. If we eliminate sites designated as both Chalcolithic and Halaf (27 sites), and Chalcolithic and Ubaid (12 sites), then the total Chalcolithic sites are reduced by 39 sites. This reduction changes the sites to area ratio to 1 site per 2.44 square kilometers.

3.4). The periods occupied ratio is significantly greater than the site ratio of 1 site per 7.81 square kilometers, and puts the Harran survey in the company of the Tell Beydar survey in terms of site recovery rate (Wilkinson et al. 2004: Figure 14.1). This still relatively low recovery rate is likely related in part to intensive use of the Harran Plain over time, especially in recent years, the survey methodology employed, and the broad definition of time periods. It is possible that the use of remote sensing techniques, including CORONA satellite imagery taken before recent development, would aid in identifying sites not recorded by the Harran survey team.

The CORONA program launched numerous satellites between 1960 and 1972 to take photographs of the Soviet Union and other countries of special interest, especially in the Middle East (Challis et al. 2002-4:140; Day et al. 1998; Kennedy 1998:555; Peebles 1997). The photographs from the CORONA mission were declassified in 1995 and made available for public purchase in two batches in 1996 and 2002. Despite a relatively high failure rate, successful missions captured high-resolution (2-8m) images of broad areas. Although these images are of lower resolution than newer satellites, such as the 0.61m – 2.44m QuickBird satellite images available for purchase from DigitalGlobe (Challis et al. 2002-4:139), they have a higher resolution than SPOT and LANDSAT images (Wilkinson 2003:Table 3.1). CORONA images are also available at low cost,[33] and were taken prior to the last 35 years of development in the subject areas. Thus, many archaeological sites and landscape features that have been altered, built over, or outright erased with bulldozers, can be analyzed from their position and appearance in CORONA images. In recent years, numerous researchers have used CORONA images, often in combination with archaeological survey, GIS software, and other types of satellite imagery, to analyze settlement patterns, irrigation systems, roadways, catchement areas,

[33] The 2007 price for a single 70mm X 29.8 high-resolution scanned image is $30 plus handling from https://edcsns17.cr.usgs.gov/EarthExplorer/.

landscape features and landscape change (e.g. Alizadeh and Ur 2007; Beck et al. 2007; Challis et al. 2002-4; Gheyle et al. 2004; Hritz 2004; Kennedy 1998; Kouchoukos 2001; Philip et al. 2002; Ur 2003).

To analyze the Harran Plain settlements via CORONA imagery I obtained overlapping images from the area,[34] rectified them with reference to a mosaic of Digitally Orthorectified Imagery 10 meter resolution images (DOI-10m),[35] and plotted the surveyed sites over the images in an ARCGIS9 database. In the satellite images, mounded sites appear as light areas against the darker surrounding soil, due to differences in moisture content (Ur 2003:105). Particularly tall tells are further highlighted by a dark shadow appearing consistently on one side of all tells in an image due to the position of the sun at the time of the photograph. Unfortunately, many of the smaller sites in the Plain, precisely the ones that have suffered the most destruction and were often not measured by the Harran survey, are difficult to identify in the CORONA images, and even some larger sites are difficult to define precisely (Figure 3.6). This problem is due to three factors: 1) Many sites already had modern settlement covering them at the time of the CORONA missions; 2) Most of the CORONA images I am using were scanned at 1200 dpi, which does not capture the full potential of their 2m resolution (Challis et al. 2002-4); 3) The CORONA images in my possession vary greatly in their quality. Some are very dark while others are very light. These flaws can be mitigated with editing in Adobe Photoshop or other image manipulation

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[34]CORONA images are provided by the U.S. Geological Survey, EROS Data Center, Sioux Falls, SD. I obtained fifteen 1200 dpi scanned CORONA images from The Center for Middle Eastern Landscapes, Oriental Institute, University of Chicago (thank you to Dr. Scott Branting, Director of the Institute, and Dr. Gil Stein, Director of the Oriental Institute), and a 1200 dpi scanned image segment from Dr. Jason Ur of Harvard University. I also purchased a 3600 dpi image set directly from the USGS at https://edcsns17.cr.usgs.gov/EarthExplorer/.

[35] The National Imagery and Mapping Agency (NIMA) provided these images. They consist of 10 Meter Resolution Digital Orthorectified Imagery derived from SPOT data. I obtained an initial image from The Center for Middle Eastern Landscapes, Oriental Institute, University of Chicago (thank you to Dr. Scott Branting, Director of the Institute, and Dr. Gil Stein, Director of the Oriental Institute). I subsequently downloaded a mosaic of the entire Harran Plain from http://geoengine.nga.mil/geospatial/SW_TOOLS/NIMAMUSE/webinter/rast_roam.html

software, but enhancement through sharpening and filtering can reduce visibility of certain feature signatures just as it increases visibility of others.

After rectifying and reprojecting the CORONA images to common coordinate systems, most sites generally corresponded to their UTM coordinates as listed in the Harran survey.[36] In many cases, a feature was visible in the general vicinity of the site location, but its exact perimeter, even in cases of obvious mounds, was not always clear. Thus, while I could identify a site, I often could not measure its actual size. Despite the limitations of the images, I was able to make several observations about the sites identified in the Harran survey. Site 86 was not measured in the survey report, but I estimated its size at 5 hectares based on photographs in the report, and it measures 4.15 hectares in the CORONA image. I estimated site 125 to be 10 hectares, and it measures 7.8 hectares in the CORONA image. I estimated site 165 to be 2 hectares, and it measures 3 hectares in the CORONA image. Finally, I estimated site 160 to be 2 hectares, and it measures 1.15 hectares in the CORONA image. Although measurements from the CORONA images are not as precise as the topographic maps in the survey report, due to errors introduced in the rectification and layering procedures, the closeness of the measured size to the sizes I estimated from photographs suggests that my estimates are generally correct. In addition, site 124, now bulldozed, appears intact in the CORONA image, and site 115 has an interesting halo of lighter color or higher reflection that may indicate a lower settlement of uncertain period.[37] Finally, although I identified several potential sites in the CORONA data, confirming the nature and date of these features requires ground-truthing that is beyond the scope

[36] Site UTM coordinates rarely exactly matched their position in the satellite images due to the errors inherent in the rectification and reprojection processes.
[37] Alternatively, this halo may be related to erosion and moisture retention, combined with scattered settlement, brick pits and other ancient activities, as suggested for the halo around Tell Brak (Wilkinson et al. 2001).

of this project.[38]

Due in part to the large area of their project, the Harran Plain surveyors collected material from mound surfaces, but did not walk measured transects. Thus, the given site sizes are maximums and size in any specific period cannot be determined. The report notes whether material from a given period was sparse, dense, or very dense.[39] This notation, while not quantified with actual numbers or percentages, may contribute to some estimate of site size, or simply reflect duration of habitation or the extend of overburdern from later periods. Surface finds were classified by time periods,[40] including Neolithic, Chalcolithic (sub-divided into Halaf, Ubaid, and Chalcolithic), Late Chalcolithic to Early Bronze Age transition, Early Bronze Age, Second Millennium, First Millennium, Hellenistic, Roman, and Islamic. Further subdivision of large periods was not possible due to the lack of diagnostics with limited time ranges, and the difficulty of identifying subphases on the basis of individual sherds rather than excavated assemblages. Chronologies specific to the Harran Plain have not yet been developed since substantial excavations have occurred at only three sites (Kazane, Harran, Sultantepe). Based on standard usage, I suggest the following ranges for the Harran Plain survey

[38] In his analysis of the CORONA imagery for the Harran Plain, Wilkinson (2007:39) observes that "a number of large, sprawling sites of late, presumably Islamic, date are clustered in the region of Harran." From his description of their size, it would seem that Wilkinson has identified sites not noted by the Yardimci survey or my review of the images.

[39] In the master list, some sites are marked "Y" (no key) instead of "YA" (key for "very dense"). I interpreted the Y's as YA's, or "very dense."

[40] In a few cases, the master list at the end of the report shows a period that does not appear in the individual site report. In other cases, the site report lists periods or shows pottery from periods that are not in the master list. I based my data on the master list, but in cases where the site report did not agree, I added periods if they were marked by artifacts shown in the site reports. Examples include: neither the master list nor the site report for site 46 mention EBA, but photo 3 clearly shows EBA pottery; the report for site 56 records Hellenistic, whereas the master lists notes Roman; the report for site 83 does not mention Halaf or LC-EBA, but those appear in the master list; the report for site 94 does not mention Roman, which appears in the master list; the report for site 95 does not mention Roman, which appears in the master list; the report for site 104 does not mention second millennium or Roman, which appear in the master list; the master list does not show EBA at site 105, but it appears in the report; the master list does not mention the EBA pottery that appears in the report for site 162.

timeperiods:[41] (Figure 3.7) Neolithic (9000 – 5900 B.C.E.); Chalcolithic (5900-3000 B.C.E.), subdivided into Halaf (5900-4800 B.C.E.), Ubaid (4800-3800 B.C.E.), and Late Chalcolithic (3800-3100 B.C.E.); Late Chalcolithic to Early Bronze Age Transition (3100 – 2900 B.C.E.); Early Bronze Age (2900 – 2000 B.C.E.); Second Millennium (2000 – 1000 B.C.E.) [includes Middle (2000-1400 B.C.E.) and Late (1400 – 1200 B.C.E.) Bronze Ages, and Old (2000 – 1200 B.C.E.) and Middle (1200-1000 B.C.E.) Assyrian]; First Millennium (1000 – 300 B.C.E.), [includes Iron Age and Late Assyrian (900 – 600 B.C.E.)]; Hellenisitic (400 – 50 B.C.E.) [=Seleucid to Parthian]; Roman (50 B.C.E. – 400 C.E. [= Parthian]); Islamic[42] (800 C.E. – 1800 C.E.).

In the survey report the Chalcolithic designation is ambiguous. Based on the pottery shown and described with sites marked "Chalcolithic," this designation is used for painted Halaf or Ubaid sherds, or plain wares from the Halaf, Ubaid, or Late Chalcolithic periods. Thus, sites with only Halaf painted wares are labeled Halaf *and* Chalcolithic; however, in many cases Chalcolithic sites also contain straw tempered body sherds or "plain ware" that could date to the Late Chalcolithic. In the artifact drawings from Chalcolithic sites I could often identify Late Chalcolithic shapes but in other cases no examples are provided. In only five cases[43] do the individual site reports mention "Uruq" pottery, equivalent to the fourth millennium or Late Chalcolithic, and Uruk pottery is listed under both Chalcolithic and Chalcolithic to Early Bronze Age transition designations. For example, site 4 lists Chalcolithic pottery including "Halafian,

[41]The period ranges here are modified from Wilkinson 2003:xviii, and include a mix of generic periods ("Bronze Age") and cultural or political periods ("Sassanian"). The periods listed here apply specifically to the Harran Plain region of Upper Mesopotamia; period names or breaks for other parts of Mesopotamia differ by varying degrees. Period breaks are not sharp, as diagnostic ceramics from one period continue into later periods. Thus, early period divisions are made within broad transitional periods while later periods tend to be marked by recorded historical events, although material culture does not always change at the same pace as these events.

[42] The survey does not record Byzantine / Sassanian materials, which fill the gap (400 – 800 C.E.) between the Roman and Islamic periods.

[43] The sites with noted Uruk material are sites 1, 3, 4, 47, and 127.

Obeid, and Uruq pottery as well as plain ware" (Yardımcı 2004:43). Given this ambiguity, we should assume that Chalcolithic sites include some Halaf and Ubaid sites that do *not* also date to the fourth millennium. Thus, Late Chalcolithic sites are over-represented under the general category of Chalcolithic.[44] Halaf and Ubaid painted pottery are highly visible and relatively easy to identify, and perhaps would be more readily noticed than plain wares during a surface collection. For this reason, it is unlikely that Halaf and Ubaid plain wares would be collected from a site without also collecting the associated painted wares. This means that we may be able to obtain a closer estimate of the actual number of Late Chalcolithic sites by counting sites designated Chalcolithic that lacked both Halaf and Ubaid material. This exercise yields 61 sites, perhaps a more accurate counting of the Late Chalcolithic settlement in the plain.

Settlement patterns in the Harran Plain

In order to contextualize the settlement pattern in the third millennium I will examine the relationship between sites and the landscape, relative number of sites, site size versus height, and site size across all periods. When we examine all sites across the Harran Plain in relation to topography, we find that sites are located in every part of the Plain but are especially sparse in the northeast and southwest corners of the Plain (Figure 3.1. In the northeast corner, the area nearly devoid of sites occurs on a finger of hills reaching down into the Plain. These highlands have just one site, a stone quarry (site 161). The area of few sites in the southwest corner of the Plain corresponds to more varied terrain with poorer agricultural soils (Figure 3.2) (Kapur et al. 2002; Şenol et al. 1991: Figure 3; Wilkinson 1990a: Figure 1.2). More striking are the linear

[44]It would be possible to narrow the potential Late Chalcolithic sites by only counting those where clearly Late Chalcolithic forms are presented in the drawings or photos. I decided against this approach since it is unclear what portion of material from a site is presented, and detailed ware descriptions do not accompany the drawings and photos.

trajectories that many of the sites follow. These "lines" of sites correspond to the routes of rivers and streams in the Plain. Figure 3.1 only marks the major rivers and their tributaries, but many other seasonal streams and relic streams appear throughout the Plain, and lines of sites run along them. Given the general aridity of the Plain it is hardly suprising that sites would be located along or near water sources.

A list of the Harran Plain sites by time period shows that the settlement pattern is similar to that of neighboring regions (Figure 3.14) (Wilkinson 2000a). The small number of Neolithic sites is likely an under-representation deriving from the limited visibility of pre-pottery Neolithic sites due to their low relief, resulting from shorter periods of occupation and use of ephemeral building materials, or the superimposition of later period habitation or natural sediments (e.g. Casana 2007:198).[45] Factors contributing to the possible undercounting of Halaf and Ubaid sites are the impact of irrigation and modern villages upon small sites, and the thick superimposed layers of later settlement on large sites. Yet, the painted ceramics of the Halaf and Ubaid periods are very distinctive and perhaps more likely to be spotted during surface survey. Thus, we may expect that Halaf and Ubaid sites are more accurately counted than other small sites, such as the Neolithic or Late Chalcolithic to Early Bronze Age transition period, which lack highly diagnostic, eye-catching ceramics.

The number of sites jumps from 5 in the Neolithic to 56 in the Halaf and 41 in the Ubaid period, when societies were transitioning from bands of hunter-gatherer's into more complex kinds of social organization, including chiefdoms. During the Late Chalcolithic period, the presence of Uruk material culture along the Euphrates Valley accompanied expansion of local

[45] Wilkinson (2003:Figure 6.5) shows how pre-pottery Neolithic sites are more visible in some parts of Upper Mesopotamia where shifting watercourses prompted later settlement to move away from the early sites, rather than covering them.

settlement and (presumably) increasing economic prosperity. Although the Harran survey noted Uruk pottery at only 5 sites, the proximity of the Plain to intensive Uruk contact zones along the Euphrates may have positively impacted the local economy. The second greatest number of settlements, 129[46], was occupied in the Plain during this time, although as noted above, a more accurate number for this period may be 61 sites.[47] The reorganization of settlement across Upper Mesopotamia at the end of the fourth and beginning of the third millennium is marked by a reduced settlement pattern in the Harran Plain, with just 25 sites noted.[48] The emergence of urbanized states in the Upper Euphrates in the mid and late third millennium is marked by a jump in the number of sites from 25 to 129. The widespread decline or collapse of states in many parts of the region at the end of the third millennium is marked by a substantial reduction in the number of occupied sites, from 129 to 50. However, it should be noted that the decline witnessed at the beginning of the second millennium was countered by regrowth in the mid to late second millennium during the Mittanni and middle Assyrian Periods. As with the third and first millennia, the Harran Plain survey combines all second millennium sites into a single period, thus over-representing the number of sites occupied at the beginning, middle or end of the period.

The Iron Age (First Millennium) marks a resurgence in settlement nearly equivalent to Early Bronze Age numbers, with 123 sites. In the Hellenistic Period, the number of sites drops to a suspiciously low 18 before resurging to 105 in the Roman period, and peaks at 176 in the Islamic period. The relatively low number of sites in Classical periods, as compared to the

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[46]This figure is probably too high because not all sites designated Chalcolithic were occupied in the Late Chalcolithic (see above).

[47] The smaller value is plotted in Figure 3.14.

[48] Although the number of sites dating to this period is small, this is also a short period, lasting just a few hundred years. In contrast, the Late Chalcolithic Period covers 700 years, and other periods cover even greater ranges.

Chalcolithic and Early Bronze Age periods, may be due to a shift to dispersed, flat sites, or to sites in the uplands, [49] sites that may have been missed or not within the boundaries of the survey area.

Site continuity, or the occupation of one site in two successive time periods, provides insight into the degree of settlement movement over time (Figure 3.8). For the Harran Plain, there is 80% settlement continuity from the Neolithic to the Halaf period, and 52% from the Halaf to Ubaid period. Settlement disruption in the late fourth millennium is seen in the low settlement continuity from LC1 to LC/EBA transition, which is just 15 % or 11%, depending on how the LC is counted. Despite this disruption, 72% of LC/EBA transitional sites survived into the mid and late third millennium. A drop to just 30% settlement continuity from the third to the second millennium marks further settlement disruption at the end of the third millennium. Second to First Millennium sites fared better with 66% continuity, but this dropped to just 10% in the Hellenistic period. The final periods show high continuity, with 83% from Hellenistic to Roman, and 93% from Roman to Islamic. These continuity figures do not necessarily indicate that a site was occupied uninterrupted from one period to the next, but they do show the percentage of sites that were chosen repeatedly for settlement in different periods. This repetition suggests the relative degree of cultural continuity as descendant populations may be returning to or maintaining their ancestral settlements.

A useful means of describing sites is to plot site height versus site area (Wilkinson 2000a:234). After plotting this figure for the Tell Beydar survey area, Wilkinson defined three types of sites: a) tells that are at least 8-10m high, but with a relatively small area; b) small tells (he calls them "small sites"), usually less than 5m high with an area less than 5 hectares; c)

[49] A similar settlement shift was noted in the Amuq Valley (Casana 2007; Wilkinson et al. 2004:198).

"lower towns" next to tells, usually relatively shallow and ranging from 5 – 25 hectare in area. The Harran survey report provides cross-sections of all measured sites from which one can figure the maximum height[50] in most cases.[51] There are no obvious size or height gaps in the Harran Plain. Site sizes for all periods cover the full range of values from just above 0 hectares to just over 10 hectares, with the exception of Harran, Kazane, and Sultantepe, which are well above 10 hectares[52] (Figure 3.9). Site height also covers the full range of values from about 1m to almost 30m, with the exception of 6 sites over 32m high (Figure 3.10). Splitting height into ranges reveals that many sites, 43%, are less than 5.01m high, and 72% are under 10.01m high (Figure 3.11).[53] At the same time, the middle range of sites from 5.01m – 30m comprises 54% of the sites. This finding is not surprising in light of the extensive reuse of sites described above, as evidenced by the preponderance of multi-period sites in the Plain. Reuse of sites in the Plain was so extensive that many relatively small sites, under 5 hectares, still rise over 5m high (Figures 3.12, 3.13). Unlike the Beydar survey, in which sites under 5 hectares and 7m high cluster into Wilkinson's "small sites," (Wilkinson 2000a Figure 2a), in the Harran Plain, sites under 5 hectares cluster in the 1 – 12m, and 12-20m ranges. This indicates that overall, sites were occupied for longer periods of time and / or site reuse was more prevalent in the Harran Plain than in the Beydar region, resulting in a greater percentage of higher tells in the Harran Plain.

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[50] To calculate height, I measured the distance between the highest elevation on the section or site measurements, and the lowest point on the site section or its baseline. For the most part my height calculations matched the height above the Plain often given in the site descriptions.
[51] Of 209 sites, 151 had measurable heights. With a few exceptions, the unmeasured sites are most likely less than 5m high.
[52] Of 209 sites, 207 had measurable or estimable areas.
[53] This figure includes my best estimate for the 58 sites without a given height. I placed 53 of those sites into the 0-5m category, and 5 into the 5-10m category (sites 85, 86, 164, 190,194).

Another useful way to examine settlement trends in the Harran Plain is to compare total occupied hectares by period (Figure 3.14).[54] This comparison shows the dramatic rise in settled area from the LC-EBA transition to the urbanized states of the EBA, when over 600 hectares were occupied. The rise in settled area, and by extension population, at the beginning of the third millennium indicates that the cities of Harran and Kazane grew not just by drawing in the population of local villages, but through immigration from outside the Plain, possibly including newly sedentary or semi-sedentary nomadic groups. A dramatic drop in settled area in the 2nd millennium marks the collapse or shrinkage of states at the beginning of that period, and shows that as the cities declined in size, a significant portion of the population left the Plain or became mobile. Settled area peaked again in the Islamic period, when Urfa and Harran were important cities.

Settled area can serve as a proxy for population, with ethnographic studies in near east suggesting population ranges of 100 – 250 persons per hectare (Kramer 1980, 1982; Van Beek 1982).[55] Considering that not all sites in a given period were necessarily occupied simultaneously, the following population estimates are maximums for each period. Population is greatest in the EBA and Islamic periods, with maximum ranges of 61,925 – 123,850 for the EBA period and 70,152 – 140,305 for the Islamic period. During the EBA, this range indicates a population density for the plain of 37-75 persons per square kilometer.[56] For the EBA, Thiessen Polygons (see below) indicate that 427.9 hectares of settled area fall under Harran's influence,

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[54] To avoid counting the extremely large sites of Urfa, Kazane and Harran at their maximum size for every period, I estimated their size over time based on Kazane survey and excavation data, and my best realistic estimate. I assigned the following sizes to Urfa, Harran, and Kazane: *Urfa:* Neolithic - 2ha, Hellenistic - 30ha, Roman - 50ha, Islamic -100ha; *Harran*: Halaf – 5ha, Chal1- 10ha, LC-EBA - 2 ha, Second and First Mil - 50ha, Hell -30ha, Roman and Islamic – the maximum size given by the survey; *Kazane:* Halaf - 20ha, Ubaid - 5ha, Chal1 - 12ha, LC-EBA - 2ha; Second Mil - 50ha, First Mil – none (because despite its inclusion in the Harran survey report, surface collections and excavations at the site did not recover any First Millennium material).
[55] For lower estimates, see Stein and Wattenmaker 2003:363; for higher estimates, see Postgate 1994b.
[56] This density is equivalent to 1.32 – 2.64 hectares per person (hypothetically, 0.38 – 0.76 persons per hectare).

while just 207.56 hectares fall under Kazane's influence because this city's full territory to the north and northwest was not surveyed. Thus, within the survey area, Harran's territory contained 42,790 – 85,580 persons and Kazane's contained 20,756 – 41,512 persons.

The shape of third millennium states in the Harran Plain

As I will discuss below, linear hollows are not apparent in the Harran Plain, and data on sherd scatters are not available. Nonethless, the catchement model Wilkinson developed for polities in the Khabur and applied to Tell es-Sweyhat and Titriş Höyük may also be applied to Kazane and Harran to examine how settlement patterns and land use in the Harran Plain compares to that in neighboring regions. As a prelude to applying the catchement model I will use Thiessen Polygons and Rank-size curves to establish the basic features of the settlement systems. These methods analyze sites based on their location and relative size. Each method has strengths and weaknesses, but when used together, they provide insight into the settlement structure of third millennium states in the Harran Plain.

Thiessen Polygons

Thiessen polygons, also called Voronoi diagrams or Dirichlet tessellations, are a good way to examine the distribution of sites in the Harran Plain. This method draws lines between neighboring points, creating polygons in which the area inside each polygon is closer to the enclosed point than to any other point (Conolly and Lake 2006: 211-213; Wheatley and Gillings 2002:150). These polygons show the hypothetical "territory" of a point or site, but assume that the points exist in a plane. Thus, the polygons do not consider landscape or cultural features, including site size or location, mountains, rivers, and roads. Conveniently, the only genuine obstacle to settlement or travel in the Harran Plain is a finger of hills that crosses the northeastern corner of the survey area, creating a blank spot in the survey, which lacks settlement. The land in the southwestern corner of the survey area also contains more varied terrain and soil types (see discussion above), but not obstacles to travel. Thus, Thiessen Polygons are a good way to examine the spacing of sites in the Plain, and when combined with information on site size and catchement (see below), they accent the picture of settlement structure.

For all periods combined, there is a higher density of small sites in the southern part of the Plain around Harran (Figure 3.15). This phenomenon may be due in part to two factors: survey methodology and cultivation practices. The Harran survey team has been excavating at Harran since the late 1980s, and they are no doubt very familiar with its immediate surroundings. Perhaps this familiarity and contacts with staff in the region led to the team to discover more sites. The southern part of the Plain also received irrigation water a bit later than the north, which has experienced greater development due to its proximity to Urfa and the major east-west highway. Thus, small sites in the north may have suffered more damage and destruction than those in the south.

Neolithic sites, clearly undercounted, are widely distributed across the Plain, with two nearby sites, which are probably one shifting or expanding settlement, in the southeastern quadrant (Figure 3.16a). The polygons are fairly uniform for all Chalcolithic Period (Chal 1) sites, showing an even distribution of sites throughout the Plain, although the weight of settlement is along the center of the Plain along the major waterways (Figure 3.16d). The exceptionally large polygons at the northern edges can be explained by the hills in the northeastern corner of the area, and the artificial northern border of the survey area. It is likely that more sites exist beyond the highway that forms the northern border of the survey area, and those sites would reduce the size of the northernmost polygons. When we examine the Chalcolithic sites by their component periods (Figure 3.16b, c. 17a), we see a denser grouping of Halaf sites in the southern half of the Plain, a concentration of Ubaid sites along the center of the Plain, and a sputtered distribution of Late Chalcolithic (Chalcolithic without Halaf or Ubaid – Figure 3.17a) in which an even distribution is broken by clusters of very small sites. Finally, the LC-EB transition (Figure 3.17b) is marked by relatively few sites widely distributed across the Plain, with the exception of a couple of hot spots in the northern half of the Plain, where a few small, probably shifting, sites occur close together.

In the third millennium or EBA (Figure 3.18a), the polygons are fairly evenly distributed across the Plain with larger polygons appearing in the area of the hills in the northeast, and in the southwestern corner of the Plain. Polygons are especially intensive around Harran and southeast of Kazane. A nearest neighbor analysis of the EBA sites finds that the sites are dispersed, and that this dispersal is non-random.[57] When weighted by site area, the Morans I statistic indicates that the distribution of sites is random (neither clustered nor dispersed).[58] As we will see below, sites over 5 ha are located in the space between Kazane and Harran, or at the periphery of these two sites' sustaining areas.

In the second millennium (Figure 3.17c) there are fewer sites but the smaller polygons remain clustered around Harran and southeast of Kazane. In the first millennium (Figure 3.19a) the polygons are once again small and evenly distributed, resembling those for the Chalcolithic1

[57] For all EBA sites, the nearest neighbor observed mean distance is 2001.71m, the expected mean distance is 1731.61m, and the nearest neighbor ratio is 1.16, with a z score of 3.35 standard deviations. These results indicate dispersal, with less than 1% chance that the dispersal is the result of random chance (calculated with ArcGIS9).

[58] For all EBA sites, the Moran I index is –0.01, the expected index is –0.01, the variance is 0.00, and the z score is –0.37 (calculated with ArcGIS9).

and EBA periods. In the Hellenistic period (Figure 3.19b), the small number of sites clusters in the southeastern quadrant of the Plain around Harran, with just four sites appearing in the northern half of the Plain. It is unclear if this clustering is due to political factors, such as the founding of Edessa at Urfa in the northwestern part of the Plain, border conflicts between polities of the period, the destructive impact of recent development, which has been more intensive in the northern half of the Plain, or issues of pottery identification. In the Roman and Islamic periods (Figure 3.19c, 20a), settlement once again mirrors the Chalcolithic 1 and EBA periods with widely distributed, small polygons. In both the Roman and Islamic Periods sites larger than 5 ha are relatively evenly distributed across the Plain (Figure 3.19d, 20b).

Rank-size curves[59]

The Thiessen Polygons help us visualize the distribution of sites and space within the Plain. Yet because they treat each site the same they fail to accurately illustrate the socio-political implications of site size and specific location. Although we could explore site size in each period, here I will limit my discussion to the EBA and second millennium periods. I will examine these periods due to this project's focus on the EBA, but also because the problem of site sizes is perhaps most surmountable in these periods. As discussed above, the Harran Plain survey did not conduct transects or area collections to estimate site size by period. Thus, all site sizes are maximums. It may be reasonable to assume that larger sites were occupied at or near their maximum size during the periods of the most growth, particularly the EBA. The greater problem is for periods of decline or dispersal, such as the LC-EBA transition and the early

[59]The rank-size curves presented here are by necessity limited by the available data. I recognize that a missed site or two, especially if it was of large size, would substantially alter the rank size curves presented here. Such a site could include a large lower town missed during the Yardımcı survey, a large mound truncated or destroyed by development, and sites outside the survey area at the northern end of the Plain.

second millennium. For example, surface survey reveals that Kazane was no larger than 10 hectares in the LC-EBA transition, but we do not have data for the size of this period at other large sites, including five[60] from this period that are over 5 hectares. As a result, rank-sizes and sustaining areas are greatly skewed, as evidenced by their poor fit with expected patterns. Due to these problems I will focus the following analysis on the EBA and second millennium, or MBA, when the largest sites were more likely to be at or near their maximum size. We do not know Harran's size in the EBA, but since it appears as an independent city in the Ebla texts and lies in a fertile plain, 50 or 100 hectares would not be an impossible estimate. The Yardımcı survey (2004) gives Harran's maximum size as 125 hectares, which is also possible, but doubtful, for the EBA. In the analysis here, I plot Harran as 100 or 125 hectares, but later in this chapter I model sustaining areas for Harran at 50 and 75 hectares. Also, for the purpose of analysis, I assume that Harran and Kazane were 50 hectares in the second millennium.

A quick way to visualize the third and second millennium settlement system in the Harran Plain is to conduct rank-size analysis. This method plots observed site size against its size rank within the total settlement system. The plot of observed size is contrasted with each site's expected size, derived from the rank-size rule. The rank-size rule expects that in a fully integrated settlement system, the top ranked site will be twice as large as the second ranked site, three times the size of the third ranked site, four times the fourth ranked site, and on down the line (Thurston 2001:138). Departure of the observed from the expected rank-size curve is then interpreted to describe the settlement system (Falconer and Savage 1995; Johnson 1980; Paynter 1982:145-173; Thurston 2001; Stein and Wattenmaker 2003). Among the variety of potential deviant curves, two common variants are concave and convex. Concave curves indicate that a

[60] These are sites 0, 35, 77, 112, and 125. Based on the data from Kazane, I assigned Harran a size of 2 hectares in the LC-EBA period. This is most likely an underestimate.

single site is much larger than the other sites, such that few, if any, second or third level sites are present (Thurston 2001:139). Concave curves suggest that the political and economic systems are highly centralized and specialized (Thurston 2001:140). A convex curve indicates a greater than expected number of larger sites, suggesting poor socio-political and economic integration between higher and lower order sites (Thurston 2001:140; Johnson 1987:108).

To demonstrate the problem of site size discussed above, I plotted the rank-size for the Chalcolithic 1 period (without Halaf or Ubaid) and the LC-EBA period (Figures 3.21 and 3.22).[61] Both cases exhibit convex curves with multiple uneven shifts as the curve descends. This curve indicates a higher than expected number of larger sites, which I believe is due to imprecise site size estimates rather than socio-political conditions in those periods. In contrast, the rank-size plots for the EBA[62] (Figure 3.23) are concave, which is what we would expect for these periods when sites were at their maximum or declining from it. Harran and Kazane top the observed curve, which drops substantially to the third order site, Sultantepe, which is just 13.5% the size of the largest site (instead of the expected 33%). Even if we allow Harran to be no larger than Kazane, the third order site is still just 17% of the first order site. After Sultantepe, site size evens out with a long string of sites between 4-10 hectares, before dropping off due to several very small sites under 1 hectare.

Sultantepe also demonstrates the problem of site size in the Harran survey. In the topographic map provided by both the Harran survey and the excavators of Sultantepe, the high tell measures just 5.5 - 6 hectares, with the remainder 11.3+ hectares of the site comprised of lower settlement around the tell (Lloyd and Gokçe 1953: Figure 1; Yardımci 2004:248). This

[61] The perfectly horizontal segment occurring in the last quarter of all the rank-size curves is due to a string of small sites without a measurable size, to which I assigned the value of 2 hectares. This sizes estimate is based on photographs and CORONA satellite photographs (see discussion earlier in this chapter).
[62] See previous note.

lower settlement is clearly visible in CORONA satellite images as a ring around the tell (Figure 3.6), partially covered with a modern village. A more recent satellite image shows more clearly the settlement skirt and modern village (Figure 3.24). The excavators believe the lower settlement dates to the 2-3rd centuries C.E., but surface collections or excavations in this area are lacking (Lloyd and Gokçe 1953:28), so we cannot be sure that the lower town does not date to earlier periods of expansion, such as the Early Bronze Age or mid Second millennium, or later settlement in the Islamic period. Although we cannot provide precise measurements for the change in site size over time, it is clear that Sultantepe was not 17 hectares in all periods, and may have been just 6 hectares, or over 17 hectares, when Kazane and Harran were very large in the Early Bronze Age.

Even with the caveat that the third order site, Sultantepe, may have been smaller, or even larger, in the Early Bronze Age, the EBA rank-size curves are a classic primate system in which large centers presumably dominate the socio-political and economic system, requiring substantially more food resources from their immediate surroundings than they are providing to the smaller sites. Traditionally, this curve also indicates that the primate sites are pursuing strategies that maximize production without investing significantly in administration or infrastructure at second order settlements, which are absent, or third order settlements, which are small and few (Johnson 1987; Thurston 2001). Although third order sites in this period are indeed small, it is still possible for them to have hosted elaborate administrative personnel, as well as economic, political, and religious infrastructure, as seen at the relatively small city of Tell Beydar in the Upper Khabur (Figure 2.3). Convex curves may result from combining ("pooling") two or more settlement systems (Johnson 1980:241; 1987:108). To eliminate the possibility that pooling separate settlement systems is contributing to misleading rank-size graphs, I used Thiessen Polygons to separate the sites in the Harran Plain based on their proximity to Kazane or Harran. This exercise identifies the expected range of sites within the territory of each center, without regard to estimates of sustaining areas (Weiss 1992:91).

The Thiessen Polygon border between Kazane and Harran (Figure 3.25) falls nearly exactly along the 15 km radius immediate political territories we would expect for each site based on the pattern of urban settlement systems in other parts of Upper Mesopotamia (Wilkinson 1994). The 15km radius buffer around Harran nearly reaches the southern edge of the survey area, suggesting that the survey covered the entire reach of the territory under that center's direct control. In contrast, ¾ of the 15km radius buffer around Kazane falls outside the survey area, indicating that the survey only recovered a portion of the territory under Kazane's presumed maximum catchement and zone of immediate political control. Approximately half of Kazane's 15 km radius buffer falls within the highlands, where settlement is unlikely. Thus, Kazane must have compensated for the local topography by obtaining more agricultural produce from the area of the Plain that extends north of the survey boundaries and the thin valleys that extend into the foothills north and northwest of the Plain. The phalanx of sites just beyond the eastern border of Kazane's 15km radius buffer may represent a band of supply sites that exploited the northeastern part of the Plain on Kazane's behalf. Obtaining produce from such a distance would have been difficult due to transportation costs, but without very large secondary centers requiring substantial support, such a strategy may have been worth the investment.

The Kazane polygon contains 489.83 square kilometers, just 43% of the Harran polygon, which contains 1142.27 square kilometers. Based on these relative areas, we expect that the Kazane polygon would contain a roughly equivalent percentage of sites compared to Harran, and the numbers bear this out. Harran's polygon contains 99 sites, and a total of 427.9 hectares.

Kazane's polygon contains 31 sites and a total of 207.56 hectares, or 49% of the hectares in Harran's polygon. The greater than expected difference in the number of sites between the two polygons is due to an especially high number of small sites within Harran's polygon. Nonetheless, these figures[63] indicate that the Harran survey area covered the main EBA secondary sites in Kazane's orbit, the two over 9 hectares.[64]

With the Thiessen Polygons as a guide to the territories of Kazane and Harran, we can create rank-size plots for each polity (Figures 3.26 and 3.27). These plots maintain the concave curves of the combined rank-size plot, although the concavity is less pronounced for Kazane. The difference in the graphs is due to the size of Sultantepe, which softens the concavity of Kazane's curve. In contrast, the difference between Harran's maximum possible size, 125 hectares, and the next largest site within it's territory, just over 10 hectares, creates extreme concavity in the Harran plot. In the second millennium rank-size curve for the entire Plain, Kazane and Harran's equivalent size softens the concavity of the curve, which otherwise nearly follows the expected rank-size (Figure 3.28). When these sites are separated by polygons, the rank-size for each territory is much less concave, with Sultantepe again softening Kazane's concavity (Figures 3.29 and 3.30).

Sustaining areas

Thiessen Polygons and rank-size curves cannot explain how the settlement systems worked, why the largest sites became large, or why sites were located where we find them. But

[63] The Kazane to Harran ratios (including the centers themselves) for site sizes are: 0-4.99 hectares 17:65 (26%); 5+ hectares: 7:21 (33%); 7+ hectares 4:10 (40%); 9+ hectares 3:3. Applying the Thiessen polygon territories to the second millennium produces ratios similar to those for the EBA. The second millennium Kazane to Harran ratios are as follows: total sites 13:37 (35%); total hectares 112.74:154.90 (72.8%); sites 5+ hectares 4:7 (57%).

[64] It is possible that additional sites of 10 – 20 hectares may lie off the beaten track within Kazane's 15km radius buffer, but much of this area was not subject to survey and has suffered from development.

these methods do show the shape and internal spacing of the settlement pattern, and identify sites that may be socio-economic and political centers or secondary centers. Another means to approach the settlement systems and explore how they worked is to estimate sustaining areas for the sites in the Harran Plain. In the following analysis, I plot three sustaining area values for populations estimated from 100, 150, or 200 persons per settled hectare. These sustaining areas use Wilkinson and colleagues (2007) model, which requires 1.33 hectares[65] per year to feed one person (see discussion at the beginning of this chapter). Although irrigation may have increased yields, it is not clear to what extent polities in the Harran Plain irrigated their fields.[66]

For the third millennium, there is considerable overlap between the sustaining areas of smaller and larger sites in the Plain (Figure 3.31).[67] This overlap may be explained in part by the problem of counting sites that were not occupied at the same time.[68] Small sites, especially those in close proximity, may indicate sites whose location shifted over time and thus were not contemporary.[69] Ideally we would separate this period into sub-phases, but this is not yet possible. Small sites wholly within the sustaining area of a larger site may have been supplied

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[65] Wilkinson and colleagues (2007) conclude that 1 hectare of *cultivable* land is necessary to support 1 person for 1 year, but they observe that up to 25% of land in Upper Mesopotamia is uncultivable, making the land use intensity factor 1.33 hectares per person per year. In his study of settlement in the Hadidi – Sweyhat area on Euphrates, Wilkinson describes 2 hectares per person as the amount of land necessary to support 1 person per year in years of *poor yields* (Wilkinson 2004: Table 7.1)

[66] The modern irrigation scheme demonstrates that the soil and landscape of the Harran Plain are quite suitable for irrigation agriculture. Yet, modern development also obscures evidence of past irrigation systems that may have been constructed in the third millennium or subsequent periods. Sources of irrigation include the Cullab and Karaköyün Rivers, the spring that feeds the famous pool of Abraham at Urfa, the many streams and drainages throughout the plain, and wells. In the 19th to early 20th century inhabitants of the Plain supplemented dry-farming with small-scale irrigation (Lloyd and Brice 1951:82). In addition, Tony Wilkinson documents possible use of irrigation to support small sites in the extremely dry lower Balikh River Valley in antiquity (Wilkinson 1998b). Yet, without physical evidence of how extensive irrigation may have been in the Harran Plain in the third millennium it is difficult to know how much it would have contributed to the agricultural economy. Certainly it would have offset some field requirements, perhaps explaining in part why Kazane grew very large despite its location near the edge of the Plain.

[67] The sustaining area radii for Kazane and Harran in the EBA are as follows: Harran: sus1 = 7279.457m; sus2 = 8915.4784m, sus3 =10294.70775m; for Kazane: sus1 = 6508.2015m; sus2 = 7970.8865m, sus 3 = 9203.9869m.

[68] Mis-identification of EBA sites seems unlikely, because the survey report shows clear examples of good EBA diagnostics for most sites dated to the EBA.

[69] See for example Wilkinson's model of shifting Chalcolithic sites in the Jazireh (Wilkinson 1990b: 96).

by the larger site, which obtained grain from other sites outside its sustaining area. When we set aside the smallest sites by limiting our plot to sites 5 hectares and larger, a pattern begins to emerge (Figure 3.32a). With a few exceptions, these larger sites fall near the edge or outside of the sustaining areas for Kazane and Harran.

If we further limit the plot to sites 7 hectares or larger, this pattern is reinforced and these site cluster at the edges of the sustaining areas for Kazane and Harran (Figure 3.32b). These larger sites are probably small secondary centers that may have contributed food, labor, and other resources to Kazane and Harran while drawing on nearby small sites to fill their own stores. If we further limit the plot to sites 9 hectares or larger, we find four sites situated between Kazane and Harran (Figure 3.32c). These four sites were probably the key secondary centers of the Plain, likely stops along the route between the sites, and perhaps political buffers as well. When we plot sites 5 hectares and larger against soil suitability ratings, we find that nearly all of these sites are located on land rated moderately suitable or higher according to modern measures (Figure 3.33). Yet sites are more likely to be located along waterways than in areas with 'highly suitable' soils, indicating that for more populated sites, immediate access to water was more important than the proximity of prime land.

After Kazane and Harran, the third largest site in the Plain is Sultantepe at 17.3 hectares. Sultantepe is located just over 9km from Kazane and 23km from Harran. Sultantepe's size may derive in part from its Assyrian period occupation (Lloyd and Gokçe 1953). A line of sites over 7 hectares in size begins due east of Kazane, snakes south and branches near the edge of the Harran sustaining area (Figure 3.32b).[70] These secondary sites are well positioned to exploit

[70] From north to south, these sites are: Anaz (site 160, 7.5 ha, 16.3km from Kazane), Mamuca (site 125, 10 ha, 16.8km from Kazane), Ulucanlar (site 111, 8.16 hectares, 19.6km from Kazane, 18.5km from Harran). From there the west branch consists of Hasantepe (site 110, 8.4 hectares, 17.9 km from Kazane, 16.3 km from Harran), Para

portions of the Plain mostly outside the sustaining areas of Kazane and Harran. Although some of these sites are quite distant from either center, none are large enough that they could have successfully challenged the presumed political hegemony of the centers. We may also speculate about the relationship between Kazane and Harran. There was clearly enough space in the Harran Plain for both centers to thrive and they must have had important trade relationships, with Harran providing access to goods coming via the route across Upper Syria, and Kazane providing goods coming down from the Upper Euphrates and Tigris regions. Although the Ebla texts indicate that Harran was on good terms with Ebla, the settlement patterns cannot tell us if Kazane and Harran were friendly, or if one asserted political hegemony over the other (and which site had the political upper hand could have changed over time).

Viewed without the numerous small sites that complicate the sustaining calculations, Kazane and Harran fit well with Wilkinson's (1994) ideal compound catchement model of north Mesopotamian states (Figure 3.34). In this model, primate centers require a 5 km sustaining radius, secondary centers are situated at a 10 km radius from the center, the combined sustaining radius of the primary center and its satellites is 15km, and neighboring centers are 28-30km apart. In the Harran Plain, Kazane is 33 km from Harran, and these two centers' sustaining radii, based on Wilkinson and colleagues' latest model (2007), range from 6.5 – 8.9 km. Only one site over 5 hectares and four sites under 5 hectares occur within Kazane's largest suggested sustaining area. This indicates that Kazane had almost full access to its sustaining area to provide for its own population. In contrast, numerous sites under 5 hectares, and seven sites over 5 hectares occur within Harran's largest sustaining area. This may indicate that Harran faced

Para (site 77, 9.57ha, 12.3km from Harran), Karatepe (site 61, 7.18ha, 14km from Harran), Asağı Beğdaş (site 51, 8.9 ha, 11.2km from Harran), and Bilece (site 206, 7.4 ha, 24km from Harran), and the eastern branch consists of Atatürk Köyü (site 115, 10.71 ha, 12.8km from Harran), Eski Harran (site 105, 8.5ha, 8.36km from Harran), and Bellitaş (site 95, 8.03 ha, 10.52km from Harran).

greater difficulty in providing for its population, due to a higher local population resident at closely spaced small sites. On the other hand, Harran's maximum size, just over 125 hectares, may overestimate its size in the EBA.

We might be able to estimate Harran's EBA size by modeling the sustaining areas of Harran with its size set at 50, 75, and 100 hectares (Figure 3.35a-c). In these plots, the number of sites enveloped within Harran's sustaining area decreases as the center's size decreases. At 50 hectares, Harran's maximum sustaining area (200 persons per hectare) completely envelopes just one site over 5 hectares, while two other such sites are located at this area's edges. The minimum sustaining area intersects significant portions of just two sites over 5 hectares. At the maximum sustaining area for 75 hectares, nearly three sites over 5 hectares are completely enveloped and one is at the edge. At the minimum sustaining area for 75 hectares, one site over 5 hectares is fully enveloped and two are interested at their midpoint. At the maximum sustaining area for 100 hectares, three sites over 5 hectares are enveloped and two are at the edge. At the minimum sustaining area for 100 hectares, one site over 5 hectares is fully enveloped and two are just over half enveloped. Finally, at a maximum possible size of 125 hectares, the maximum sustaining overlaps just three sites over 7 hectares, all occurring at least 7 kilometers from the center.

As expected, the variable sustaining areas indicate that Harran could have more readily supported its population if it was 50 – 100 hectares, rather than 125 hectares in the EBA. Yet, the lack of larger centers on the order of 10 – 20 hectares within Harran's sustaining area even at 125 hectares still places the site at an advantage over Wilkinson's ideal model, which assumes up to 6 sites of 10 – 20 hectares located 10km from the center, associated with numerous, temporary small sites. In other words, the Harran Plain lacks a significant number of large secondary centers that could draw resources away from Kazane and Harran. This probably permitted these two sites to grow very large and even to overlap the sustaining areas of several small sites. At the same time, the lack of large secondary centers may have created labor shortages during critical periods, such as harvest time.

Kazane's position near the mountains in the Northwest corner of the Plain places approximately a third of its closest sustaining area in the uncultivable highlands. To compensate for the lack of sufficient land to the west, Kazane could have extended its cachement to the east, which may explain why at least three of Kazane's secondary sites are located beyond its 15 kilometer radius buffer. Also, although a significant portion of Kazane's immediate territory was located within the highlands, the close proximity of this land may have offset grazing requirements for herds, making it possible to use more land in the Plain for cultivation rather than grazing. Finally, both Kazane and Harran may have increased agricultural production with small-scale irrigation throughout their polities.[71]

Aside from the problem of over-counting contemporary small sites, discussed above, there is the question of the actual, rather than ideal, shape of the sustaining areas. Tony Wilkinson and Jason Ur's analysis of the hollow ways in the Upper Khabur shows that most cultivation areas are actually oval rather than circular (Sallaberger and Ur 2004:63; Wilkinson et al. 2007:Figure 2; Wilkinson 1994: Figure 5). Thus, the actual shape of sustaining areas in the Harran Plain may create less overlap between the sustaining areas of neighboring sites by making use of land that falls outside sustaining radii in a direction without overlap. Nomadic populations living in the surrounding hills may also provide labor at harvest time in exchange for a portion of the harvest. Small sites near the edges of the Kazane and Harran sustaining areas

[71] See note 62.

may have worked fields outside the first or second sustaining rings. The relatively small size of secondary centers in the Plain, none of which is larger than 17 ha, means that the bulk of food resources could be devoted to the two centers if necessary. Finally, the unbroken topography of the Plain and its relatively high rainfall level (particularly in the north) may have permitted especially extensive agriculture when compared to parts of the Jazira.

Checking sustaining areas with hollow ways

As discussed above, dead-end hollow ways can indicate the extent of field systems around sites, while other hollow ways connect contemporary sites and lead to key resources. Hollow ways are linear depressions in the landscape created by repeated passage of humans and livestock between sites and field boundaries, and between sites (Wilkinson and Tucker 1995:24-25). Hollow ways are usually marked by subtle depressions that are difficult to see at ground level, but readily apparent in aerial photographs (Ur 2003). Hollow ways can be dated by reference to the time period of the sites they connect, the artifact scatters in the ancient fields they serviced, and the stratigraphy of cross-cutting routes connecting sites of different periods (Ur 2003; Wilkinson 1994; Wilkinson and Tucker 1995). In the Jazira, hollow ways are just 0.5 – 1.5m deep but 60-120m wide, making them easy to distinguish from much narrower modern roads and tracks in satellite images (Ur 2003:102, 106). In the Khabur Plains, hollow ways appear as dark lines in CORONA images, often with light margins marking the subtle slopes of the depressed pathway (Ur 2003:106).

Possible hollow ways in the Harran Plain include dark linear features, sometimes with light margins, in the vicinity of sites 27, 34, 95, 99, and 102 (Figure 3.36).[72] In each case these potential hollow ways are just 20-30m wide, much narrower than those cited by Ur (2003). Other dark lines in the Plain may be hollow ways, but besides being very narrow, just 15-30m wide, these features often correspond to watercourses or the paths of modern roads, or mark field boundaries, suggesting that they are modern ditches for fields or areas of wetter vegetation at field edges where irrigation water collects. Most striking is the absence of any clear hollow ways around the major sites in the Plain, including Kazane, Sultantepe and Harran, which we would expect to be surrounded by the most intensively cultivated fields, and hense more restricted and therefore heavily traveled roads or paths.

Despite several possible examples, clear hollow ways are not readily apparent in the Harran Plain.[73] This is likely due to the extensive landscape modification that has taken place over millennia, especially in the last century. The western, northern and eastern edges of the Plain are likely affected by erosion from the surrounding hills, while stream and river aggradation has modified the landscape through the core of the Plain. Based on his analysis of CORONA images of the Harran Plain, Wilkinson suggests that the many seasonal stream beds or wadis in the Plain "appear to follow the lines of earlier canals or hollow ways" (Wilkinson 2007:39). Indeed, as discussed previously, many of the sites in the Plain are found along watercourses that could have served as transport routes. Wilkinson does not describe any obvious hollow ways or major routes running between the larger sites in the Plain. Intensive agricultural activities probably also removed or blurred ancient pathways, while the extensive

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[72] Sites 27 and 95 are in the center of the eastern edge of the plain, sites 99 and 102 are in the NE quadrant of the plain, and site 34 is just west of Harran.

[73] Higher resolution CORONA images may improve the visibility of potential hollow ways. Most of my images were scanned at 1200 dpi, although I did examine a portion of the northern end of the plain, including the area around Kazane, Sultantepe, and other third order sites there, with a 3600 dpi image.

network of modern roads, tracks and canals may obscure denuded hollow ways and add moisture that may mask hollow ways. Unlike drier regions, by the time of the CORONA missions, the Harran Plain was already heavily cultivated and modified by agriculture. Lastly, it is possible that the kinds of field systems and crop rotation that developed in the Harran Plain in the third millennium did not consistently restrict movement to just a few pathways. If so, this would reduce the intensity with which these paths were used such that wide, extensive hollow ways like those in the Upper Khabur might not form.

Summary and Conclusions

The application of Thiessen Polygons and basic statistics to settlement patterns in the Harran Plain shows the development of the small states of Kazane and Harran from the LC to EBA periods, evidenced by relatively strong settlement continuity and a dramatic increase in the number of sites and total occupied area from the early to mid and late third millennium. Rank-size curves indicate that these states were characterized by extremely large, primate centers, a few relatively small secondary centers, and a great number of very small villages. The large number of small sites may reflect intensification of agriculture, in which farmers dispersed across the landscape both to work the land and to reduce the population at the centers (Stein 2004:68). This dispersal may indicate a relatively stable political situation in the mid and late third millennim (e.g Adams 1981: 87)

Thiessen Polygons suggest that Kazane and Harran's immediate political territory extended roughly 15 kilometers from the center. The 33 km spacing between Kazane and Harran, and the distribution of the major secondary sites at the edges of the centers' sustaining areas roughly matches Wilkinson's (1994) model for Upper Mesopotamian states in the Jazira.

The application of Wilkinson and colleague's latest catchement model (2007) shows that with sustaining area radii ranging from 6.5 to 10.3 kilometers, Kazane and Harran could support themselves with the assistance of the many small sites within their territory. Both sites likely supplemented grain with other crops and animal products, with the adjacent hills and narrow valleys providing a rich source of pasture. Although a significant portion of Kazane's immediate territory was located within the highlands, the close proximity of this grazing land may have offset grazing requirements for herds. Kazane's catchment may also have stretched into the northeastern quadrant of the Plain, and both polities may have boosted yields with irrigation.

As two relatively small states, somewhat circumscribed by mountains bordering the Plains to the east and west, Kazane and Harran served as gateway communities for the northern and southern ends of the Plain, controlling trade and political interaction across the Plain. These routes included connections to the closest peer states, based at other large cities along the axis of the Euphrates and Balikh Rivers. The Harran Plain was a major 'inland' population center, located away from the corridor of the larger Euphrates River. Despite settlement disruption at the end of the third millennium, and the departure of perhaps half the population from the Plain, both Kazane and Harran were centers once again in the second millennium, although they both shrunk by at least half, and smaller sites reduced in number. Kazane was abandoned after the second millennium, while Harran continued to be an important center into the First Millennium and again in the Islamic Period.

CHAPTER 4

ARCHAEOLOGICAL GEOPHYSICS AND THE URBAN PLAN AT KAZANE

Introduction

Having examined the development of the states of Kazane and Harran through settlement patterns in chapter 3, I now turn to the internal organization of the city of Kazane. In this chapter I analyze the results of the application of archaeological geophysics to the urban landscape. Depending on the characteristics of local geology and buried features, geophysics can be the best way to quickly explore settlement structure over broad areas. At Kazane, I targeted five widely separated parts of the site in order to explore the range of features and the use of space across the city. To move beyond the static urban plan and explore the life history of Kazane, I excavated ground truthing trenches in three of these areas (see Chapter 5). The results demonstrate the impact of field conditions, characteristics of buried features, processing procedures, and unexplained factors upon the data. Geophysics uncovered numerous buildings, streets and other features in some parts of Kazane, but revealed few identifiable features in other areas. In the discussion below, I explore the reasons for differences in the data, and suggest potential interpretations of selected features with reference to geophysics data from comparable sites. The specific details of data collection and processing methodology are discussed in Appendix 1.

Archaeological Geophysics

Archaeological geophysics is "The examination of the Earth's physical properties using non-invasive ground survey techniques to reveal buried archaeological features, sites and landscapes" (Gaffney and Gater 2003:12). Common methods include magnetometry, resistivity, and ground-penetrating radar. At Kazane, I chose to use gradiometry, a type of magnetometry, because the characteristics of soil and buried features are similar to other sites where this method was effective,[1] this method is relatively quick, and I was able to rent a gradiometer from the British Institute of Archaeology in Ankara.[2] For this work, we used a Geoscan Research FM-36 Gradiometer (Figure 4.1), which can detect buried features up to about 1m below the ground surface. We collected an initial set of at least 5 adjacent grids in 5 different parts of the site before expanding in the most successful areas (Figure 4.2, 4.3). The selection of these areas was determined in part by modern obstacles or activities, including fences, houses, and irrigated cotton. We collected data at 8 samples per meter, in 20m X 20m grid blocks based on magnetic north, with 1m spacing between zig-zag traverses. We collected our first grids in Area 1 over reburied architecture excavated in 2002 in order to confirm that the machine and our chosen settings were working. In the field I processed data with Geoplot 2.0, but after the field season, I reprocessed all data with Geoplot 3.0 in the Kerkenes Dağ computer lab at Middle East Technical University.[3] Again, I refer the reader to Appendix 1 for a more lengthy treatment of the survey and data processing methology.

Results of the gradiometry survey

I present here the details of data collection in each area, the results and their initial interpretation prior to ground truthing. A grid-by-grid, systematic analysis of each and every anomaly in the data is unnecessary for the present study. Instead, I focus here on the key

[1] See Appendix 1 and later in this chapter for a discussion of magnetometry results from other sites.

[2] I thank Hugh Elton and the staff of the British Institute of Archaeology at Ankara for the loan of their FM-36 Fluxgate gradiometer.

[3] I would like to thank: Drs. Geoff and Françoise Summers and the 2003 Kerkenes Dağ spring season team for training me in remote sensing, and for permitting me to use the Kerkenes Dağ lab at Middle East Technical University to reprocess the Kazane data with the latest software; Nurdan Çayırezmez for assistance in collecting initial data in the field and processing the data; Dr. Tim Matney and Ann Donkin for advice on data collection and processing methodologies and the loan of a copy of Geoplot 3.0 to reprocess and reevaluate this project's data in fall 2006; and Dr. Roger Walker for advice on processing data.

anomalies and attempt to distinguish modern disturbances from archaeological features. Interpretations as to what is a building, a street, an oven or modern metal are based in part on the ground truthing results from magnetometry studies at other sites. Many interpretations are intuitive and difficult to reference, but references are provided whenever possible. In most cases, past excavations at Kazane and subsequent ground truthing, as noted, confirm the accuracy of the interpretations in Area 1, while the results in other areas are less conclusive. The images presented here are the most successful in terms of the overall appearance of the data.[4] For clarity of presentation, I numbered each grid block from left to right, bottom to top, in each area. Instead of cumbersome grid coordinates, I refer to grid blocks by their number (Figure 4.3). In total we collected 119 whole or partial grid blocks, including blocks collected two or more times to test resolution or fix errors, resulting in 95 unique grids totaling 37,520m^2.

Area 1: collection rational, procedure, and field conditions

We collected 54 whole or partial grids[5] (21,260m^2) in Area 1, also called excavation Area F (Figure 4.4). Due to the success of the initial grids, we greatly expanded this area and it became our largest coverage at the site. We collected data in this area because it is one of the few places in the city that has not been subjected to deep plowing or land levelling for cotton-farming. The area was also conveniently fallow during the field season, and excavations here in previous seasons revealed limestone wall foundations close to the surface (Creekmore and Wattenmaker n.d.; Wattenmaker 1997:87). The western part of this area is higher in elevation

[4] Regrettably, is difficult to export and publish images from the processing software in a manner that retains their original resolution. There is not a dramatic difference between the images in their original and those presented here, but in some cases certain features are less distinct in the published version.
[5] In two cases we could not collect the northwest corner of a grid (Area 1 blocks 33, 40), and in two cases we were only able to collect just over half a grid due to obstacles (Area 1 blocks 12, 25).

and is characterized by limestone boulders on the surface or partially buried in several places. The eastern part of this area grades into excavation Area D, where trenches dug in 1996, 1997 and 2004 found Halaf contexts cut by Middle Bronze Age features (Bernbeck et al. 1999; Sue Ann McCarty, personal communication 2006). This area is lower and flatter than the west and no large stones are visible on the surface.

Unfortunately, a farmer plowed the entire area in a southwest to northeast direction just before we began our work, adding to the difficulty of data collection and interpretation. Otherwise, dry straw covered parts of the area, two steel reinforced concrete power line pylons are in the area, and wooden power line poles border the area to the north. The eastern part of the area, near the road, contained lots of modern metal trash thrown out and burned by the residents of the large house east of the area. We collected two non-contiguous grids in this area and did not have time to expand the work.[6]

Area 1: results and interpretation (Figures 4.3, 4.4, 4.5)

We can eliminate some anomalies that derive from modern features. The plow-derived ridges and furrows that run southwest to northeast create a pattern of thin, alternating white and gray lines across the image. At regular intervals some of these plow marks are deeper and higher than the rest where the tractor doubled back. These exceptional plow marks are seen in especially bright white lines that appear roughly every 30 meters. Along the northern perimeter of the image, dark and light lines that run diagonally from block 33 to 50 correspond to plowing at the edge of the field, which drops down a few meters just beyond the image. Several small,

[6] Excavations in 1996, 1997 and 2004 show that this area has Halaf architecture close to the surface. Unfortunately we were not able to expand beyond the two grids collected in this area, which are too small in area to provide a coherent picture of any subsurface remains.

highly positive readings that appear as black spots in block 54 are most likely modern garbage observed in the plow zone.

The largest disturbance in this area is from the two power line pylons, appearing in blocks 8 and 32 as very strong positive signals. In block 8 the pylon lay in the center of a traverse, and several readings were 'dummied,'[7] making them appear as a rectangular white space in the middle of the black anomaly. Both pylons outshone any other features within a radius of about 5 meters. The high electrical lines strung between these two pylons and continuing to the northeast and southwest do not appear to have affected the data.[8] In between the pylons and on either side of them we see archaeological features similar to features elsewhere in the area.

Apart from modern-derived anomalies, the results from Area 1 reveal many small and large structures[9] sharing a general northwest to southeast orientation that parallels the long axis of the site. The structures all give strong or weak, low magnetic signals, indicating limestone construction. I intentionally began data collection around block 19, where excavations in 2002 uncovered the limestone wall foundations of a large structure (Creekmore and Wattenmaker n.d.). This permitted us to overlay the two data sets and confirm that the machine was working properly (Figure 5.2). It also provided a head start to the ground truthing, discussed below, which confirms that stronger negative signals, like those found in blocks 28 and 34, correspond to limestone features close to the surface, while fainter negative signals, like those in the eastern half of block 35 and in block 37, are more deeply buried and / or have a surviving mudbrick

[7] To "dummy" a reading on the FM-36, the operator manually enters blank values for the number of data points that cannot be collected due to an obstacle. The downloading and processing software interprets these dummy values as blank spots with no data.

[8] Other researchers report that while pylons have a large effect, high power lines generally do not effect gradiometers (Gaffney and Gater 2003:81-82).

[9] It would be necessary to define our interpretation of these anomalies if they were ephemeral or unclear. In this case, many of the negative-reading rectilinear anomalies form clearly recognizable buildings.

superstructure. Areas of strong positive signals, as in blocks 22 and 36, which were suspected to be areas of burning and / or concentrations of refuse and pottery, are confirmed by ground truthing to be burned mudbrick, burned earth, and spaces full of pottery.

A straight street, appearing as a slightly more positive signal between two negative signals, runs northwest to southeast along the western edge of the area from block 25 to block 4. Prior to ground truthing, it was possible to interpret this signal as a street based on is linear form, its non-conformity with plow furrows, and its slightly higher magnetic susceptibility. If this street continued along its orientation, it would intersect the tell to the north and the midpoint of the city wall to the south. This orientation suggests that the street is a main avenue for the city. The lack of obvious cross-streets is puzzling, but plow furrows, which are perpendicular to the street and have a similar magnetic signal, make it difficult to identify streets running northwest to southeast. For example, it is tempting to identify a second, southwest to northeast street, intersecting the first street in block 26 and running at least to block 40. The field border plow furrows that run along a path identical to the potential street complicate its interpretation. In addition, the 'empty' spaces in the data stand out in contrast with the clearly defined structures. These gray areas, for example blocks 16 and 21, nonetheless contain hints of structures that appear as faint white lines. These structures are probably buried deeper than a meter, or built from materials other than large limestone blocks.

Of the clearly visible features in Area 1, I tentatively identify at least 11 Building Units[10] that may comprise coherent structures, as well as isolated pieces of architecture that are probably part of larger entities (Figure 4.6). These structures, which may be houses, institutions, storage

[10] I use the term "Building Units" to identify specific groups of features that may form a single unit, and to distinguish the numbering system I use to discuss these structures. Otherwise, there is no difference between a "Building Unit" and a "structure."

facilities, or other kinds of buildings, range in size from less than 50 square meters to over 1000 square meters. Most buildings are less than 150 square meters, while a few are much larger and one is apparently enormous (Building Unit 6). It is likely that we are only seeing part of the picture, and these structures, especially the small ones, may be part of larger entities. In the remote sensing data the walls of these structures often appear to be a meter or more wide. Ground truthing confirmed that many of the walls are indeed quite wide, while others, the ones that appear thinner in the gradimetry data, are indeed less than a meter wide. For example, ground truthing revealed that Building Units 1, 2, 3, 6, and 8 have walls 1 – 2m wide, while Building Unit 11 and the southern part of Building Unit 4 both have walls about 0.5m wide.

Patterns of high positive signals (Figure 4.7) may indicate areas that burned, whether by accident or intentional destruction. Although high positives may be kilns, pottery concentrations, isolated deposits of burned material, or particular kinds of metallic stones, widely scattered burning may indicate a spreading fire. Scattered burning is evident in Building Unit 1 and in the southern end of Building Unit 2. The burning continues into Building Units 4 and 5 and is scattered across Building Unit 6. Building Unit 7 has an especially high positive signal indicative of relatively intensive fire, although the double peak of highs across this structure, bracketing a central negative signal, could indicate a round kiln that has lost its superstructure. In contrast to the scattered burning in may parts of the area, Building Units 8, 10, 11, and the northern part of Building Unit 2 have little, if any, evidence for burning. Ground truthing trenches, discussed in chapter 5, confirmed burning in Building Units 1, 4, 5, and 7, with especially intensive heat in Building Units 5 and 7.

Area 2: collection rational, procedure, and field conditions

We collected 19 grids[11] (7600 m^2) in Area 2 (Figure 4.3). We collected data in this area in hopes of locating and contextualizing the large mudbrick and stone structure found during excavations here in previous seasons (Figure 2.5) (Wattenmaker 1997:84-86). Unfortunately, a chain-link fence enclosing a horse recreation space to the north now bisects this area. The path of the fence runs across the structure excavated in 1996, prohibiting or compromising data collection over the long stone wall. The area is relatively flat to the west but on the east has undulations from shallow plowing and irrigating a garden north of the fence. At the time of data collection, the entire area had deflated plow and irrigation furrows from the previous crop seasons. The horse area north of the fence had sparse, denuded vegetation and a covering of small stones and artifacts, all trampled daily by horses. We observed some modern metal garbage,[12] and garbage burns identified as charred patches of grass or soil. A line of thin trees ran southeast to northwest through the summit of the area (Figure 4.9). The southern part of the area had shallow plow furrows running northeast to southwest, and dry grass. The highest part of the southern area, towards the fence, had large stones and was very uneven and pitted where stones were pulled out by farmers.

Area 2: results and interpretation (Figures 4.3, 4.8, 4.9)

Modern disturbances make it very difficult to identify archaeological features in the data from Area 2 with any degree of certainty. As with Area 1, plow furrows create a pattern of

[11] We were unable to collect the northern portion of block 8, and the northwest corner of block 9, due to the presence of the fence.

[12] Examples include shotgun shells, cans, and wire. We attempted to clear this material when we saw it prior to collecting data. Despite these efforts, we observed some metal objects during data collection and other metal, like wire, was often partially buried and impossible to remove.

diagonal lines across the image. Strong positive readings from the fence obscure any other anomalies at the northern end of blocks 8 - 9 and the southeastern corner of block 12.[13] The strong dipole (positive and negative) signals throughout the area, but concentrated in blocks 11, 13, 14, and 16 - 19, likely derive from modern metal debris[14] and garbage burning.[15] The circular form of these dipole anomalies is difficult to explain but may derive from regular dumping or burning at a certain distance from the house and stables north and east of the area. Alternatively, these dipole features may mark architecture built from basaltic or otherwise metallic stones. The thin trees north of the fence do not seem to have affected the data.[16] Subtle dipole or negative signals in blocks 6 and 8 correspond to stones on or protruding onto the surface. I suspect that near surface stone walls in the southern part of the area, in the vicinity of the structure excavated in 1996, were largely robbed out by farmers.[17] The area north of the fence contains numerous modern disturbances which, when combined with the fence, may mask the archaeological features. Some rectilinear features are visible in the data, for example in block 10, but none lend themselves to clearly architectural interpretation.

Area 3: collection rational, procedure, and field conditions

We collected 7 whole or partial[18] grids (2660 m^2) in Area 3 (Figure 4.10). Several years ago,[19] a farmer found several stacks of Early Bronze Age[20] kiln wasters in his garden adjacent to

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[13] The fence does not appear to have affected data more than about 5 meters distant.
[14] For similar dipole effects due to iron objects, see Kvamme 2003:444-445.
[15] Experiments show that even short-lived fires at relatively low temperatures can significantly alter (increase) the susceptibility of the area around the burning (Linford and Canti 2001; Morinaga et al. 1999).
[16] Trees generally do not affect gradiometry data unless they are large enough to create an obstruction or force the operator to tilt the machine (Gaffney and Gater 2003:84).
[17] While collecting data on the north side of the fence, we observed a farmer digging up stones on the south side of the fence and loading them onto a truck. These stones are likely the remains of the architecture found just below the surface here in 1994 (Wattenmaker 1997:84-86).
[18] We were not able to collect the eastern 7m of block 5 due to the presence of tall, dense, mature, irrigated crops.

this area. We collected data here not only to investigate the space between the tell and the city wall, but also with hopes of finding the kiln or kilns that produced the wasters.[21] Due to the presence of mature crops we were unable to test the exact space where the wasters were recovered,[22] but we did test a long, narrow, flat space just west of that. The area is relatively flat but slopes down from the tell to a slight depression in the center, then back up to the deflated city wall to the west. Shallow plow furrows ran north to south through the area, which was covered with dry hay. In the lowest part of the area, a recently deep plowed area about 4m wide ran north to south.

Area 3: results and interpretation (see Figures 4.3, 4.10, 4.11)

Aside from plow furrows, Area 3 does not appear to suffer from significant modern disturbances. Dipole anomalies in blocks 4, 5 and 7 probably derive from modern metal objects. In particular, the mix of dipole signals in the southeast corner of block 5 probably derives from a wooden electric tower with a metal covering around its base, located a few meters to the south of the grid. Besides these anomalies, we found parts of two to five structures and one possible pyrotechnic installation. The two clearest structures, oriented northeast to southwest, are square and cover 100 – 150 square meters. One structure is mostly located in block 3, while the other is mostly in block 7. A third possible structure appears in block 6, a fourth in block 5 and the edge of another possible structure is noted in block 1. The magnetic properties of these structures,

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[19] Dr. Wattenmaker, Personal communication, fall 2003.
[20] At least one of these stacks ended up in the possession of the Kazane project. Based on a cursory examination during 2003, the pots are small Plain Simple ware bowls with simple rims.
[21] As discussed above, gradiometers are especially suited to detect heated or burned soils and other materials such as bricks or pottery. Kilns, being heated often and to high temperatures, are often very visible in gradiometry data even if more deeply buried than other features.
[22] The farmer indicated that the wasters came from his garden, which sits on the skirt of the tell. During fieldwork, this garden was fully planted with dense, tall plants, and irrigated, preventing any work in that space.

being dark gray or slightly more metallic than the surrounding soil, may indicate that these structures are built from stones other than the negative-reading limestone we saw in Area 1.

These structures are also considerably smaller than similar structures in Area 1 and oriented along a different axis. Perhaps their size, orientation and material difference, along with their ambiguous location near both the city wall (the edge of town) and the tell (the presumed heart of political and religious institutions), indicates a different function or socioeconomic character than Area 1. A positive signal with a negative halo, located at the northeast edge of block 6 and continuing into block 7, may be a hearth. Prior to ground-truthing, I interpreted a strong negative anomaly in block 7 as a limestone pavement or collapse at the inside corner of two walls. For this reason, we excavated our test trench, Operation 10, over this area.

Area 4: collection rational, procedure, and field conditions

We tested 5 grids (2000 m^2) in Area 4 (Figure 4.3). This area is north of the tell, west of a large house built in 2002. A trench excavated in 1992 just 40m south of area 4 found 2m of erosion deposits from the tell over Early Bronze Age material (Wattenmaker and Mısır 1994:181 [Unit B – see Figure 2]). We did not expect interference from this erosion because Area 4, although close to the old trench, is much further from the base of the tell, and the area was bulldozed circa 2000, taking about 1 meter of soil from its surface.[23] Despite the bulldozing, the continued presence of large potsherds and stones in the plow zone prompted us to test this space, which unlike the adjacent areas north of the tell, remained fallow during our field season. The

[23] I estimate the depth of the bulldozing from the depth of the exposed cut to the south, where bulldozing stopped short of the slopes of the tell. According to local residents, when the area was bulldozed, a large truck came and carted away many large stones that were taken to the cement block factory. Ironically, the structures rapidly going up on the site are made from this same cement block. Thus the abandoned stones of antiquity are recycled to become part of economic revitalization made possible by the dams and canals that bring water to Kazane and the Harran Plain.

area had very deep and tall plow furrows running east to west, and a recently dug shallow drainage/irrigation ditch running northwest to southeast through block 2.

Area 4: results and interpretation (see Figures 4.3, 4.12, 4.13)

There were several piles of stones on the surface in this area,[24] collected by farmers when they were pulled up by the plow. Some of these piles of stones correspond to dipole signals clustering in blocks 2 and 5. At the same time, many of the dipole signals do not correspond to materials on the surface. The severe plow furrows make it difficult to interpret any linear features in the data.[25] Nonetheless, we can identify a faint negative linear feature running northwest to southeast across block 1. Based on ground truthing results in Area 1, this faint negative signal may indicate a wide limestone foundation about 1m below the surface. Other potential negative linear features run north to south in block 2. In general, the readings from this area give the impression of stone walls that were busted up and scattered by a bulldozer and plow. This would explain the many dipole and negative hot spots, some of which fall along roughly linear paths, as in block 4.

Area 5: collection rational, procedure, and field conditions

We tested 10 grids (4000 m^2) in Area 5 (Figure 4.3). We chose this area because it was a large, relatively flat, apparently not bulldozed, fallow field in an area near the city wall where no excavations had taken place. This area was flat with some shallow, deflated plow furrows from

[24] Most of these stones looked like limestone, but when tested by holding the machine next to them in proper orientation, these stones gave mixed positive and negative signals, indicating that some of them contain iron, while others were basalt.
[25] Attempts to remove the plow scars with filters were unsuccessful. If time had permitted, we would have redone this area while making a greater attempt to keep the machine at a constant height above the ground surface, a task made very difficult by the extremely deep plow scars.

the previous planting season running northeast to southwest, and lots of dry straw cover. The city wall lies about 100m to the east, and a road borders the area to the west and north (the large cement canal that traverses the site is also to the north). A steel reinforced concrete electric pylon identical to those in Area 1 lies at the northwest corner of the area, at the road junction, on the western edge of block 2. The area drops down suddenly about 1m in the north at the northern edge of blocks 8, 9, and 10, to a lower field. At the drop there were large, displaced stones in some areas. Given that this drop parallels the plow furrows, I suspect it is not a natural feature or the residue of buried architecture, but the result of slightly deeper plowing or even bulldozing and grading over time.[26]

Area 5: results and interpretation (see Figures 4.3, 4.14, 4.15)

Aside from the subtle striping of deflated plow furrows, the most obvious modern disturbance derives from the pylon on the western edge of block 2, which blacks or whites out the entire western five meters of the block. It is difficult to interpret the line of relatively large, strong and weak dipole signals running diagonally from block 2 to 9, or the other large dipole signals in blocks 3, 6 and 7. The strongest of these may be modern iron objects, basalt stones, or some other feature such as a series of hearths. If the features are hearths or kilns, they may be part of an industrial complex situated in an open area near the city wall so as to prevent heat and smoke from disturbing the residential areas. Alternatively, these kilns may be inside structures not visible to the magnetometer.

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[26] I inquired about any possible disturbances from the construction of the canal just north and west of this area. Local residents gave mixed answers, some insisting that the soil excavated from the canal was taken away, others maintaining that the soil was dumped in Area 5 or its vicinity. Ground truthing in this area (see below) demonstrates that if any fill was dumped in this area, it was certainly less than 0.50m.

Several rectilinear features, marked by dashed lines in the first four blocks and blocks 6 and 7, are parallel to the plow furrows and their perpendicular irrigation channels. Thus, these features are likely soil marks rather than buried structures. The best candidate for a structure in this area lies in the northwest corner of block 5. Here we identified a rectangular feature with at least one and possibly two rooms. Another possible structure is located in block 9 but it is obscured by the signals of stones on the surface. The signals of these walls are not highly negative, as in Area 1, but are similar to those in Area 3, indicating that they are built from mixed stones or mudbrick, not large limestone blocks. I chose to place our test trench, Operation 10, over what I believed to the inside corner of one of the potential structures.

Comparative magnetometry data

Comparable magnetometry data from other sites may aid in the interpretation of the Kazane data. The resolution of published images from geophysical surveys rarely matches those of the original images as viewed on screen in the processing software program itself. This makes it difficult for the reader to make independent interpretations of the data, especially if one possesses a photocopy or digital copy of the report instead of the original. Nevertheless, published data from several sites are very comparable with Kazane data. Especially comparable data from other Early Bronze Age cities include the work in Turkey at Titriş Höyük (Matney and Algaze 1995:36-37), and in Syria at Al Rawda (Gondet and Castel 2004; Castel et al. 2005), Sweyhat (Peregrine 1996; Peregrine et al. 1997), and Chuera (Meyer 2006: Abb.2; Buthmann et al. 2001; Pruss 2000b:1432).[27] The larger budgets and longer field seasons of these projects

[27] See also: http://www.geophysik.uni-frankfurt.de/~hartlaub/chuera.html

permitted much greater coverage at these sites, providing an opportunity to see how the smaller data set at Kazane data might fit into the larger picture of an urban site.

Here I briefly compare three anomalies as they appear in geophysics data at Kazane and other sites: 1) architecture (walls); 2) streets; 3) hearths or kilns. Spatial analysis and comparisons of the layout of these sites is taken up in chapter 9. In each case, the references from the previous paragraph are the sources for my observations.

Architecture

Near surface limestone walls appear as negative, linear features, with good visibility at Kazane, Titriş Höyük, Chuera and Al-Rawda (Figures 7.9; 9.7; 9.10). Visibility is not very clear at Sweyhat, and while this may be related to the difficulty of reproducing images for publication, the processing program used for the data, or the effect of kilns masking walls (as noted by the authors: Peregrine et al. 1997:77) I suspect that in some places it has to do with the apparently less substantial nature of the walls (fewer courses), their irregular width and uneven depth below the surface (see for example Figure 3.10 in Zettler 1997a:44, another view of this trench in Peregrine 1996:31 – figure 5, and compare to the magnetometry data from this same spot in Peregrine et al. 1997:83). Although it is difficult to tell from the small-scale plans in the publications, it would appear that excavated wall-width generally corresponds to feature width in the magnetometry images from these sites, as they do at Kazane.

Streets

Main streets, usually at least 2m wide, are highly visible in data from Kazane, Titriş Höyük, Chuera and Al-Rawda, while narrower cross streets are more difficult to discern against dense architecture. Streets appear as long, thin, positive magnetic signals that cut across the congested magnetic signals of the urban landscape. In the round cities of Chuera and Al-Rawda, streets form circles and spokes, with cross-streets in between (Figures 7.9; 9.10)(for in-depth discussions of the streets at Al-Rawda, see Gondet and Castel 2004:100-103). At Titriş Höyük a spoke-pattern is not evident but streets form long, thin, positive signals, with main streets winding through the town while secondary streets, which may meet at somewhat right angles, divide the urban space into large and small blocks (Figure 9.7) (see also Rainville 2005:Figure 5.4). At Kazane, a single long street in Area 1 is the only certain street in the data, although linear features elsewhere in Area 1 suggest the location of additional streets.

Hearths / kilns

Although kilns are reported in the data at Titriş Höyük (Algaze et al. 1995:23) the published resolution of the images from Titriş Höyük, Chuera and Al-Rawda are not sufficient to make a judgment about hearths or kilns. At Sweyhat, data clearly shows a horseshoe-shaped kiln and two other kilns as high positive signals (Peregrine et al. 1997:77,83-84). At Kazane, a suspected kiln in Area 1 was tested with a trench, Operation 3. This trench located a burned building but no evidence for kiln.

Summary and Conclusions

In this chapter I discussed the results of gradiometry survey at Kazane, interpreting features and attempting to explain their character with reference to the results of remote sensing work at similar sites. The best results, from Area 1, reveal several structures that share a similar orientation, are likely built from limestone foundations, and are bounded to the west by a long, straight street. The gradiometry images also reveal evidence for (probably destructive) burning in some structures. In contrast, I could not identify any obvious kilns or ovens, although there are some possible candidates for such features. Gradiometry uncovered significant portions of the urban plan over a 2 hectare space in Area 1, and hints of architecture in some of the other collection areas. In the following chapter, excavations reveal the goodness of fit between the interpretations of the gradiometry data and the actual buried features. Together, the gradiometry, and excavations provide the data for the use-of-space analysis I present in chapter 6.

CHAPTER 5

FROM GROUND TRUTHING TO LIFE HISTORIES: EXCAVATIONS AT KAZANE

Introduction

In order to move from the static plans produced by remote sensing to the dynamic life history of the settlement, we must excavate trenches. These trenches provide feedback to assess the interpretation of the remote sensing images, and samples of artifacts and ecofacts that provide the basis for the use-of-space discussion in chapter 6. Accordingly, this chapter introduces trenches excavated as part of this dissertation, and some additional trenches that bear on those findings. In total we excavated 681m^2 in remote sensing Areas 1, 3, and 5. In Area 1, these results revealed almost perfect correspondence between the remote sensing interpretation and the actual buried features. These trenches also revealed reuse of some third millennium structures at the beginning of the second millennium. In Areas 3 and 5, the correspondence between expected and actual remains was poor, probably due in part to surface conditions and the characteristics of the buried features. In addition to ground truthing trenches, we excavated 42.25m^2 in four trenches on the tell to determine the limit of the early third millennium settlement. These trenches and others excavated in 1994 – 1995 and 2002 provide samples from third and early second millennium contexts with which to compare the results of the lower city ground truthing trenches (Figure 1.2, 1.3).

Excavation procedures

Kazane is divided into several morphological areas, and trenches are numbered sequentially without respect to area. Thus, earlier trench numbers were excavated in earlier years, and adjacent trenches may have different numbers. Since ground truthing trenches are oriented with respect to specific features,[1] rather than the site grid, we assigned these trenches "Operation" numbers 1 – 10.[2] To be sure that the trench catches the edges of features in the gradiometry images, it is best to excavate perpendicular to features and overlap their perimeter by at least 1 or 2 meters. Thus, we excavated long, narrow trenches to confirm the location of a feature, and if time and resources permitted, we expanded these trenches to expose a wider context.

We excavated trenches by natural strata, and employed artificial sub-divisions to maintain tighter control over data. Locus numbers were assigned to each context within each trench. A locus, abbreviated as L# (e.g. L24), is any individual entity, including fill layers, pits, living surfaces, and walls. Often in the course of excavation it is not possible to see the totality of a locus, so it may be excavated as multiple loci that are combined in the analysis phase. We used daily planview drawings and digital photos of each trench and locus to track loci, elevations, and the provenience of collected artifacts.

Excavated trenches

This discussion of excavated contexts focuses on the key loci and how they relate to the use of each structure or space. For purposes of comparison, some structures in Area 1 are given Building Unit[3] numbers based on my interpretation of the magnetometry plan (Figure 4.6).

[1] This approach avoids the strictures of the site grid, which if followed would require excavating odd pie-wedge shaped trenches within rectilinear architecture, and would often split a single context into multiple trench recording systems that would have to be combined in the analysis phase.

[2] Although the profusion of area, trench and operation numbers can be confusing, each excavated context is tied to the others via UTM coordinates.

[3] It is possible that these Building Units are part of larger units, but I do not believe I have combined any units that are not part of the same entity.

Area 1: Trenches F37-F42, E700N550, Operations 1-8

Trenches F37-F42, E700N550: An elite house.

Dr. Patricia Wattenmaker excavated trenches F37-42 in 2002 (Figure 2.7, 5.1, 5.2) and these provided the first test of the gradiometry data. We collected our initial grids over these reburied trenches to confirm that the collection methodology and instrument settings were appropriate. These trenches uncovered several rooms of a large structure with 2 meter thick walls. An exceptional feature was a large subterranean tomb in room D (Figure 5.2:grid block 19; Figure 2.7), covered by massive boulders. These boulders do not appear in the gradiometry data because they were removed during excavation and not replaced during backfilling. Initial results showed that the walls previously identified in the trenches closely matched the features in the gradiometry image (Figure 5.2). This structure, Building Unit 1, communicates with Building Unit 2 through a threshold in their shared wall on the eastern side of room A. Dr. Wattenmaker found a sealing in the vicinity of this threshold, possibly indicating that access to one or both sides of this door was restricted (Creekmore and Wattenmaker n.d.). A small exposure of room F in 2004 in trench E700N550 revealed a clay andiron / hearth (Figure 2.7). This hearth matches a high positive signal in the gradiometry image, and collapsed, burned mudbrick in the threshold of room F match high positive signals in this area. The hearth from this structure is the only hearth uncovered in Area 1. This, along with the multiple rooms and subterranean tomb in Building Unit 1 suggests that Units 1 and 2 form a large house. The monumental size of the walls and tomb indicate that this house belonged to an elite household, possibly a leading family of an instiution.

Operation 1: (108 square meters): An elite house, and storage.

We excavated Operation 1 as a 1m X 9.5m test trench across two large structures and a presumed street or passage in between them in grid block 34 (Figure 5.1, 5.2). The original test trench is designated Operation 1.1; it's expansion into a 9m X 12m trench to uncover more of the western building is designated Operation 1.2, while an eastern extension and expansion is Operation 6. At the western end of the initial test trench we uncovered a 2m wide stone wall (Op 1.1 L4, Op 1.2 L8), with its burned, collapsed mudbrick superstructure sloping to the east (L6, 8, 9). In the geophysics image, the collapsed mudbrick shows up as a large area of high positive readings east and north of the corner of the building (grid block 34) because the bricks were burned and contrasted strongly with the adjacent limestone walls. Operation 1.1 exposed 3 courses, or 2.16m of the wall without reaching its base (Figure 5.3). The wall, L4, was built from massive limestone boulders, measuring 0.70m – 1.50m wide X 0.7 – 1.50m wide X 0.75m tall, set in two rows with a rubble core. At the base of excavation east of the wall, within Operation 1.1, we found a smashed storage jar resting upon an ash-covered earthen surface (L12) (Figure 5.4: 303, 304). This jar is the same type as those found in the jar-filled structure (Building Unit 4) of Operation 2.2 (see below). The presence of this jar upon an ashy surface indicates that the space between the structures that corner in grid block 34 was probably not a street, and may be indoor space, possibly a basement.

The trench Operation 1.2 uncovered a 9m X 12m area that exposed the northeast corner of the large structure first uncovered in Operation 1.1 (Figure 5.2, 5.5). We did not find a clear living surface within the building, but a cluster of flat stones (L6) near the northeastern corner of the room that may be part of the original floor or a platform.[4] The structure's northern wall

[4] Although it is built from limestone, this feature is not visible in the geophysics image.

(L14) was partially removed in antiquity, as evidenced by poorer preservation and several 18^{th} to early 20^{th} artifacts found in the upper layers, including a coin found over the wall, and a terra-cotta pipe bowl found east of the building in the subtopsoil (Figure 5.4: 628, 629). In the geophysics data, this stone robbing or disturbance corresponds to the part of the wall that gives a thinner white (negative) signal where it crosses from grid block 33 into 34.[5] Based on the gradiometry plan, I estimate the external dimensions of the portion of Building Unit 2 uncovered in Operation 1 as 18m X 19m, divided into two rooms, an 18m X 12m room in the north and a 5m – 7m X 12m room in the south. Accounting for the 2m thick walls and the internal cross wall, I estimate the total internal area as $240m^2$.[6] Gaps in the wall signals in the gradiometry image suggest that the rooms communicate at their midpoint, and that there may be an entrance in the southeastern corner of the northern room, and to the southern room at the midpoint of the southernmost wall.

We excavated a sounding against the northern wall of the structure in the northwestern corner of the trench (Figure 5.5, 5.6). This sounding exposed 2 courses, or 1.30m of the northern wall foundations, but did not reach its base. We identified a very thin surface (L17 / layer D) even with the base of the top preserved course of the wall, and additional surfaces (layer F) and burned features (L18, 19) further down. The upper surface may be a construction floor associated with the building, as seen in the sounding alongside wall L11 in Operation 2, or it could be a living surface. The deeper surfaces and two superimposed hearths, found over 1m below the preserved top of the wall, contained a large amount of fire-cracked rock, chipped stone

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[5] Within part of the removed courses, we found a circular arrangement of stones. It is unclear if this structure was originally part of a niche in the wall, or was built later after the building went out of use. The crudeness of the arrangement, when contrasted with the grandeur of the building, suggests that it is a later intrusion.

[6] The high accuracy of the geophysics data makes it possible to fairly accurately estimate the dimensions of the structure and the thickness of its walls.

and Halaf pottery. These features appear to be *in situ* Halaf contexts. The difference between the exposed depth of the surface against the eastern wall foundations in Operation 1.1 (453.30), and the shallower Halaf features found in the sounding against the northern wall in Operation 1.2 (454.25), indicate that the structure was built into the side of a slight topographical rise, perhaps necessitating especially deep foundations on at least one side of the building.

Although Building Units 1 and 2 share a common wall and are connected by a threshold, their internal spatial divisions are very different. Based on excavations and remote sensing data, Building Unit 1 contains multiple small and medium-sized rooms, whereas Building Unit 2 contains just a few large rooms, with smaller rooms added as appendages to the south (spaces E and F in Figure 2.7). In standard Upper Mesopotamian houses, long, rectangular rooms are interpreted as multipurpose living and reception rooms, or courtyards, while smaller rooms are reserved for storage and activities (Figure 7.14) (Algaze et al. 2001: 29-30). Living rooms are often plastered and kept clean. Although we did not identify a clear living surface in Building Unit 2, perhaps the large, rectangular space partially uncovered in Operation 1.2 is the main living room of a bi or tri-partite house joined to Building Unit 1 via a threshold in the western side of Unit 2's courtyard. Perhaps one of these Building Units was built first and the other added later to accommodate more residents or activities. Alternatively, these two Building Units may have began life as separate entities that shared the wall between them, and a threshold was cut through this wall when the Units were joined. If Units 1 and 2 are houses, then they are palatial in scale. Just the northern two rooms of Building Unit 2 measure 342m^2, which is larger than most houses at Titriş, where an especially large house comprised of several connected units is 434m^2 (Building unit IV; Algaze et al. 2001:Figure 3). At over 800m^2 each, Units 1 and 2 are almost double the size of the largest house at Titriş, and 130 m^2 larger than *Steinbau V*, the large house with stone foundations at Chuera (Figure 7.9, 9.4, 9.5) (Moortgat and Moortgat-Correns 1975: Plan V). Although the relative size and monumentality of structures does not necessarily correspond to degrees of power (Marcus 2003), if the threshold between these two Units indicates that they were integrated into a larger structure, then their size is truely palatial (Figure 5.7).

Operation 2: (276 square meters): two storage facilities.

This operation initially consisted of a 1m X 9.5m trench, Operation 2.1, placed across what the remote sensing data indicated to be a large, rectangular, burned building. We expanded the initial test trench to the south (Operation 2.1) and west (Operation 2.2), creating a 22.5m X 12.5m exposure that uncovered the southern half of the original structure and a significant portion of an adjacent structure to the west (Figure 5.1, 5.2, 5.8). Carbon dates from barley grains from each structure yielded calibrated dates with 95.4% confidence in the date ranges 2570 – 2290 B.C.E and 2570 – 2250 B.C.E (Figure 6.1a-b). I will discuss each structure in turn.

The Eastern Structure: Building Unit 5

The eastern structure in Operation 2.1, interpreted as a grain storage facility, was first identified from remote sensing data, in which we outlined a single rectangular room with signs of intensive burning (high positive/ black signals) (Figure 4.4). We excavated the southern half of this structure, which had a well-preserved brick superstructure over stone foundations. The brick walls were 1.25m to 1.40m thick, preserved to nearly 1m high, and plastered on their inner face.[7] The building had a hard-packed, plastered beaten earth floor with a cobblestone subsurface laid

[7] It is not clear if their outer face was plastered.

over relatively clean fill. This building contained burned, collapsed bricks, and burned barley in a single large room. Based on the gradiometery data, I estimate the eastern structure's total external dimensions as at least 153m^2, with about 100 m^2 of internal storage area. The preserved height of the walls indicates a storage volume of at least 100m^3. Gradiometry also suggests that the entrance to the building may be in its northwest corner. Alternatively, the entrance may have been through the roof or higher up on the walls than what is preserved, as noted in other storage facilities (Bourdier 1985:34 - P.5, 103 – p.44; D'Altroy and Earle 1992:188; Danti and Zettler 1998:220; Kemp 1986; Kramer 1982:106). A narrow probe (L39) across the southern wall of this building uncovered a pile of fieldstones that may be a collapsed perimeter wall surrounding this side of the structure.

The northern section of Operation 2.1 bisects the structure and provides insight into the burning and collapse of the building as well as its construction (Figure 5.9). In the section drawing, most of the intact collapsed bricks appear on the western side of the room in layer C, while the rest of the room is full of amorphous, eroded and pulverized brick debris mixed with ash (layer K). The collapsed bricks seen in the section were brightly burned, and correspond to a black area in the remote sensing data. The blackest and most concentrated ash is found in the center of the room in layer L. At the western side of the section, just above the floor, we found a white, gritty, powdery, hard pulverized layer, layer D, which is likely the collapsed, burned remains of the plaster from the face of the wall.[8]

Within the original 1m wide test pit, we removed the brick superstructure to reveal the stone foundations, and we excavated a sounding next to the western wall in order to study its

[8] Due to root and rodent activity, it was not possible to define individual bricks within the superstructure of the main walls of the building, seen at either end of the section. Instead, the bricks were defined as an area of red, brown, and tan brick material with a sharp edge where the ash and collapse within the room pressed against the walls.

construction and learn the depth of the foundations, which were 1m deep. In the section drawing, the approximately 10cm thick subfloor is visible as layer F. This carefully prepared layer consisted of sandy loam with a high percentage of pebbles and some cobbles. The subfloor itself was supported by thick layers of clay loam, layers G and J, interrupted by lenses of lime and grey stone chips, layers marked H. The layers of lime and stone chips roughly correspond to the base of the wall and the rubble fill between the first and second courses. Rubble fill was also noted beneath the base of the wall and just east of it in layer I. It is likely that a layer of rubble was laid in the foundation trench to level it for the first course, and on top of the first course to seat the second course.[9]

The Western Structure: Building Unit 4

We identified the western structure in Operation 2.2 in the remote sensing data as a small two or three room structure that burned (evidenced by high positive readings inside the rooms), with foundations close to the surface (evidenced by bright negative/white walls). Unlike the eastern structure, the brick superstructure of the western building was not preserved due to plowing. The stone foundations, which generally rise 10-25 cm above the level of the floors,[10] vary from 1.10m – 1.30m thick. The excavated portion of this structure has dimensions of 8.17m X 11.06m or 90.36m^2, with an internal space of at least 43.75m^2. However, the remote sensing data, if interpreted correctly based on the excavations, suggests that the total external dimensions of the building are 20m N-S by 10m E-W. This structure has an interesting plan that consists of three main rooms in the central unit, a hallway along the western side of the rooms, an outdoor

[9] The stone chip lenses of layer H are the evidence of these leveling activities.
[10] An exception to this rule is wall L48, the E-W wall between spaces 1 and 2. In places, this wall rises 0.5m above the level of center of the floor in space 1. Directly beside the wall, the floor rises higher and narrows this distance.

(?) space east of building between it and the eastern structure in operation 2, and an abutting southern addition. The three main rooms of this structure were full of storage jars (Figure 5.10, 5.11). For ease of discussion, these spaces are labeled 1-6.[11] (Figure 5.8). We excavated spaces 2, 3, and 6, half of spaces 1 and space 5, and the northern edge of space 4. I will discuss each space in turn.

Space 1

Space 1 is entered at its northwestern end, as suggested by the remote sensing data, or at its northeastern side, as suggested by a break in the wall exposed in excavation. This room is rectangular, with exposed internal dimensions 5.75m E-W by 2m N-S. Depending on the accuracy of the remote sensing interpretation, the room may extend another 2m to the north, making it 23 m^2 in size. The room contains a niche in the southern wall at its eastern end. The niche is 'full' in the sense that it runs the full depth of the exposed foundations. The excavated portion of space 1 contained at least ten large, four medium and two small storage jars resting on a plaster surface that covered most of the room (Figure 5.10). Some jars were upright, while others had fallen onto their side or were crushed into unrecognizable positions. One medium jar was found inside the remains of a larger jar (Locus 56), suggesting that the jars were stacked. The plaster floor consisted of large chunks of plaster and pebbles, rather than a simple thin layer, and was 5cm thick where probed.

When we removed the jars from the eastern third of the room we discovered that the storage jars and debris were resting on a large, smooth, cracked stone slab (Figure 5.8, L77).

[11] 1 = northern room; 2 = middle room; 3 = southern narrow room; 4 = southern addition; 5 = western hallway; 6 = space with jars east of building.

The western edge of this stone slab was partially covered by the plaster floor. The slab was 2.15m N-S X 2m E-W, and was apparently set in place before the adjacent walls were constructed against it. The purpose of this stone is not clear but it did not have conspicuous marks from any kind of processing activity. It is possible that it is a cover for a tomb, which would suggest that the original function of the building was something other than storage. The southeastern corner of space 1 contained at least one poorly preserved plaster object, believed to be a jar cover or stopper, and several sealings. These artifacts are discussed in chapter 7.

Space 2

At the southwestern corner of space 1, a stone threshold marks the entrance to space 2. Space 2 has external dimensions 7.74m E-W X 6.6m N-S, with an internal space of 24.59 m^2. A notable feature is a niche in the west end of the southern wall. This niche, which contained two small jars, was *not* a full niche that reached to the floor as the one at the eastern end of space 1. Instead it was a recess within the wall, approximately 0.90m E-W by 0.5m N-S. We articulated the top of the debris in this room, but did not remove this material except around the thresholds. The room contained ash and brick debris covering mostly large jars with a few smaller jars indicated by isolated rims. Based on the position of the smashed jars, I estimate that this room contained at least twenty-six large and four medium jars, with little space in between for moving through the room (Figure 5.10). If the jars were stacked, as is seen in ethnographic examples of storage (e.g. Bourdier 1985:138-P.60, 157-P.72; Pfalzner 2002: Figure 10), then many more pots may lie crushed beneath those visible at the top of the debris pile. We did not remove the contents of this room, but from a probe in the area of the northwest threshold and in the northeast corner of the room, it appears to have the same type of plaster floor as space 1. Space 2 communicates with space 6 via a doorway at the northeast corner of the room. This threshold was filled with collapsed, burned mudbricks, and we found two sealings in or beside this space.

Space 3

Space 3 is a long, narrow room, with external dimensions 8.89m E-W X 3.64m N-S, and an internal space of 7.65m^2. The room is accessed from hallway space 5 via a wide cobblestone and fieldstone threshold at its western end. This threshold is actually a small cross wall between the two longer walls, and creates a 0.36m step up from the earthen surface of space 5 to the pebble floor of space 3. Space 3 contained seven large storage jars, which, in so narrow a space, left little room for accessing the jars furthest from the entrance (Figure 5.10). This suggests that this room was for 'deep storage,'not accessed on a regular basis, or extremely valuable goods segregated into a special, more secure space.

Space 4

Space 4 is a southern addition to the structure, as indicated by its relatively thin, abutting eastern wall, which at 0.70m is half the thickness of the rest of the walls in the structure. This room is accessed from space 5 via a stone threshold at its northwest end. As with space 3, the entry to space 4 is a step up from space 5. Some plaster at the base of the section of this step may indicate an earlier surface at a level even with the surface in space 5. The exposed surface in space 4 is the same kind of chunky plaster floor as in space 1. The sole feature in this room is a pit along the northern wall. This pit contained sherds from a large storage jar, suggesting that it originally contained a jar set into the floor. Based on the remote sensing plan, this room may have external[12] dimensions of 8m N-S and 10m E-W, with an internal space of approximately 50m^2.

Space 5

Space 5 is a hallway with an earthen floor that provides access to spaces 3 and 4, and possibly space 1. We only partially excavated this space, but based on the remote sensing data, it is 19m long by 2m wide. The width of this space would make it easier to move the large jars into and out of the building, although the step up into Spaces 3 and 4 would present a challenge.

Space 6

Space 6 is an area east of the main structure, accessed via a threshold to space 2. This space contained collapsed, burned mudbrick debris around seven large, upright storage jars, and an upturned cooking pot (Figure 6.7:101). Due to plowing, the jars were missing their rims, but the lower 2/3 of the jars remained upright as if they were set on stands or in divots in the floor. The contents of one of the jars had burned, and contained two row, hulled barley, identical to that found in the eastern structure. We only reached the floor in a small space around the threshold to space 2. Here, the floor was a compacted pebble surface, with a small cooking pot resting upside down upon it.

The boundaries of space 6 are not clear. It may be outdoor space between the eastern and western storage structures, it may be outdoor space roofed via beams running between the eastern and western structures, or there may be a mudbrick wall just east of this space that incorporates this space with the rest of the western structure. Although we could not

[12] The internal E-W dimension is 9.2m , as exposed in Operation 2.2,.

conclusively identify such a wall, we did identify a pebble surface between the eastern and western structures, this surface was at the same level as the preserved height of the jars, and ended about a meter shy of the jars. This meter of 'empty space' is either bricky fill or it may contain an undefined wall.

Based on the remote sensing data, the southern wall of space 4 in Building Unit 4 continues to the west, where it joins the room (space F) with an andiron exposed by Dr. Wattenmaker (Figure 2.7, 5.2). This indicates that Building Unit 4, and possibly Building Unit 5 too, belonged to or were related to the structures in joined Building Units 1 and 2.

Operation 3: (14 square meters): temple related debris.

This operation consists of a 1m X 14m trench excavated across a building in block 22 (Figure 5.1, 5.2). Prior to ground truthing, we expected this structure to be a burned building or possibly a kiln, because the northern half of the structure gave a very high positive (black) signal. From the gradiometry image, we estimated the midpoints of the walls of this structure to be 12m NW-SE by 6.5m NE-SW, which would enclose $60.5m^2$ if the walls were 1m thick. The ground-truthing trench revealed two parallel walls where we expected them, bracketing almost 2m of burned, pulverized brick collapse. The foundations of the eastern wall (L7) are 1.25m thick (Figure 5.13).[13] The stone foundation of this wall consists of two main rows of 25cm – 50cm wide stones with smaller stones making up a rubble core. We exposed 3 courses and 0.65m of these foundations and noted a small bit of plaster surviving on the western face of the upper course.

[13] We identified traces of this wall's highly disturbed brick superstructure, much of which appears scattered towards the east within the subtopsoil layer (Figure 5.12, Layer N).

The mudbricks of the western wall (L4), survived intact nearly to the ground surface, and we exposed seven courses.[14] This wall was at least 0.75m thick; it may be thicker, perhaps up to 1m, but we were not able to distinguish the eastern face from piles of bricks collapsed against it. The space between the walls was 3.5m –3.75m, and it was filled with burned, pulverized bricks (L5), some whole, many turned to dust and powder. This debris contained lithics, animal bones, and pottery. This material included some large potsherds unlikely to be included in mudbricks, suggesting that this may be the remains of a collapsed upper story. About 1.60m below the ground surface in between the walls, we uncovered a thin layer of white, crumbly material that may be burned, collapsed wall plaster from the eastern face of the western wall (Figure 5.12, layer O). Near the base of excavation, at 1.85m below the ground surface, we encountered the beginnings of an ash layer, which suggests that we were nearing the floor of the structure.

East of the eastern wall (L7) we encountered sloping layers of debris (L8-10) that began about the same level as the top of the stone foundations (Figure 5.12, layers K, L, M). The layers contained a full range of artifacts, including lithics, bones, restorable pottery, ash, pebbles, and unique artifacts, including four eye insets and another "button" inset, probably for votive or divine statues (Figure 5.13, Figure 5.14). I interpret these debris layers as a series of surfaces created by the accumulation of debris in what was probably outdoor space. Notably, these layers did not extend all the way to the wall, but began about 0.75m east of it. Despite their lack of a connection, I believe that the debris layers are contemporary with the wall, and there is no evidence that the wall cut the debris layers. The elevation of the lowest exposed surface east of wall Locus 7, and the unexposed surface west of it beneath brick collapse, differ by at least

[14] The bricks were 0.10m tall X 0.17m – 0.22m wide X an uncertain length.

0.50m, suggesting that the lowest level of the structure was at least partly subterranean. The temple-related insets from outside the structure may indicate that this building was associated with a temple.

Operation 4: (120 square meters): a temple-related storage room.

After digging an initial 15.60m X 1m test trench to confirm its location, we placed an adjacent 10m X 11.60m trench directly over the southern half of a two-room structure seen in the geophysics data in blocks 1 and 4 (Figure 5.1, 5.15, 5.16). This building has monumental walls, ranging from 1.4m-2m thick, which correspond to the negative (white) linear anomalies in the geophysics image. The walls generally have two rows with smaller stones filling the core. The exception is the northern part of the western wall (L18) that has an extra wide middle fill, essentially forming a third row. The stones in the walls range from smaller field stones to large 1m X 0.60m boulders. The eastern wall of the structure (L4) breaks the ground surface in places, while the western wall (L18) has one or two fewer courses and is preserved to just a few centimeters above the floors of the rooms. Perhaps the higher stone courses of the eastern wall (L4) served to support the conserved brick superstructure of the earlier wall (L21) jutting into the room, as seen in the section (Figure 5.17, L21). The floors in the northern and southern room were beaten earth, and lacked plaster or other special treatment. Based on a break in the wall signals in the gradiometry data, the entrance appears to be in the NW corner of the building.

From the magnetometry data, I estimate the size of this structure at $177m^2$, with approximately $120m^2$ of internal space. The excavated southern room has internal dimensions of 6.8m X 3m, or roughly $21m^2$. The northern room narrows at bit to 6.20m wide, due to the widening of the western wall (L18) north of the entrance to the southern room. A thin ash layer (within L28) marked the floor of the northern room. A single small potstand was resting on this floor but otherwise it was clean. At the eastern end of the room we identified a bricky area (L21) extending out 1.60m from the inside face of the eastern wall (L4) (Figure 5.16, 5.17). It is possible that this feature was a bench or platform. When we excavated beneath the floor in the northern room we uncovered the top of a brick wall from an earlier phase of the structure. This wall corresponds precisely to Locus 21, suggesting that the ruin of the earlier wall was incorporated within the rebuilt structure for use as a platform or bench. The earlier wall has an internal buttress, door pivot or other mudbrick feature built against its inner north face.

The southern room of this building contained many smashed pots, including two large storage jars, a cooking pot, and many small cups and stands (Figure 5.18, 5.19). There were also two unusual tall cups, one well-burnished and black in color, a metallic ware cup, and an 0.80m tall fenestrated stand, preserved nearly to its top (Figure 5.19:99, 115, 207; Figure 5.20). The somewhat unusual vessel inventory, and a high percentage of incised, fenestrated stands found throughout the building, suggests that the room served as storage for a temple. It is possible that the northern room is actually a sanctuary, but aside from its clean floor and possible bench (L21) there is little proof of this. In the northeastern corner of the southern room, we excavated a small sounding that revealed that the lower courses of the middle wall (L23) run along a slightly more southwest line than the upper courses. These earlier foundations must be contemporary with the parallel earlier phase mudbrick wall seen beneath the floor of the northern room. A carbon sample from charcoal on the floor of the southern storage room yielded a calibrated date of with 95.4% probability of 2580-2300 B.C.E. (Figure 6.1c). This is consistent with the date obtained from the storage buildings in Operation 2.

The building in Operation 4 did not stand in isolation. Two large walls (L39-40) abut the southwest corner of the structure, forming a small room with a burned surface over cobblestones (L16) in one corner. Smaller walls or surfaces (L41-42) abut the southeastern corner of the building. These features are comprised of fieldstones, cobblestones, and potsherds. One of these walls, L41, has a pivot stone that may indicate a threshold. There is a narrow open space east of the structure (L6), possibly a street (Figure 5.16, 21). East of this space there is a 1m wide wall, foundation, or pavement (L7) made from small field stones laid in a single course. East of this construction there is another open space (L8). Curiously, the street seen in the gradiometry data and confirmed by Operation 5 appears to run from that trench to the eastern side of Operation 4. Yet, the characteristics of the street in Operation 5 are very different from the spaces (L6 –8) east of Operation 4. This suggests a possible reinterpretation of the magnetometry image in which the street ends at Building Unit 8, or skirts the eastern perimeter of this structure beyond the contexts exposed in L6-8.

Operation 5: (9 square meters): a street and drain.

We placed this 1m X 9m trench directly over a street seen in the geophysics data in block 13 (Figure 5.1, 5.2, 5.22). In the gradiometry image, the street appears as a long, narrow, generally straight line running from block 4 to 25. The street's magnetic signal is slightly more positive (black) than the background, and is bordered by slightly negative (white) lines, suggesting that it is bracketed by walls or curbs. Our ground-truthing trench uncovered a street (L8/11/14), a stone drain (L9, 12) channeling water away from the street, and the edge of a wall (L6) east of the street. The original street was about 1m below the ground surface, and comprised of pebbles, potsherds and other debris tightly packed together in many layers. The street was 2.35m wide, and was laid just below the top of the stone-lined drain to the west. The drain was 0.35m deep, 0.20m – 0.30m wide, and we exposed 2.15m of its length. The eastern end of the drain was covered with a large stone (L9) propped up on smaller, narrow stones laid with their narrow side up, but the rest of the drain was apparently not covered. Debris accumulated in thin layers up to nearly a meter above the street, suggesting that it remained in use long after the drain was buried, possibly widening after the drain filled in. The context east of the wall (L6) bounding the street may be the interior of a house, as suggested by the thin wall (L6), flat lying pottery on an earthen surface, and a grindstone.

Operation 6: (81 square meters): an elite house of the third millennium, and early second millennium activity areas.

This 9m X 9m trench overlays a geophysics signal in blocks 34, 35, 40 and 41 that showed a thick-walled structure with thin-walled internal subdivisions (Figure 5.1, 5.2, 5.23). Upon excavation, the ceramics on surfaces associated with the thin walls indicate that they date to the early second millennium (Figure 5.24, 5.25). These thin walls were laid upon third millennium monumental wall foundations nearly identical to those in adjacent trench Operation 1.1. In the southern half of Operation 6, the EBA SW – NE wall (L16) is 1.90m - 2m wide and made from stones as large as 1.50m on a side. At the east end of the massive wall, the width narrows as a smaller, 0.80m wall continues the line of the wall. It is not clear if this narrower wall dates to the second millennium, or if it blocked a threshold during the life of the original structure. The southern wall (L16) probably formed a building with another large wall running NW-SE and barely emerging in the western part of the trench – visible only as the tops of several large boulders. We did not uncover any surfaces or features contemporary with these large, earlier walls.

The later, narrow walls in the trench clearly postdate the original massive structure and mark the division and reuse of the structure into at least 3 spaces. These include a large, central space bounded by walls L9, L12, L16, and a possible fourth wall abutting L16 in the southeastern corner of the trench, a narrower room with a cobblestone surface (L22) just barely exposed at the northwestern baulk between walls L9, L12 and L21, and a cobble, pebble and pottery surface (L20) on the southern side of wall L9. Wall L12 is 0.80m wide and bonds at its western end with a 0.60m wide NW – SE wall (L9). These walls were made from field stones and cobblestones no larger than 0.40m X 0.50m. The eastern end of L12 ended at what is probably a threshold; a small storage jar rested on an earthen surface just to the north. The southern end of L9 was disturbed, probably by the plow, and its scattered stones formed a rough line towards the massive wall L16, with which it probably originally articulated.

On the southern side of L9 there was a surface comprised of cobblestones, pebbles, and potsherds tightly packed into the earth. This surface (L20) had multiple interlocking layers of debris (Figure 5.23). On the northern side of the juncture of walls L9 and L12, there was a surface made of cobblestones and fieldstones (L22).[15] It is possible that this surface was the packing on top of a larger wall built over by L9 and L12. In the eastern portion of the trench, at the base of excavation, a concentration of cobblestones (L18) and an adjacent baked earth and plaster surface were just emerging at the close of excavation. It is not clear if these surfaces connect to the later walls in the room of if they go with the earlier walls, although I suspect that they are later.

[15] A door pivot stone was built into the surface, but at the corner of the room where it could serve no purpose, unless there is an unpreserved threshold set into a higher level of the wall.

Just south of the center of the trench, a pottery-covered surface (L7) abutted the north face of the massive wall L16. This pottery surface consisted of thick sherds of large vessels laid out in a rectangle, with sherds on the edges standing upright (Figures 5.23). The sherds were mostly laid in a single layer, although multiple layers were noted in some areas. Based on the upright perimeter sherds and some cobblestones at its southeastern corner, it is likely that a mudbrick wall or other border originally surrounded the potsherds. This feature is presumably a surface for some type of processing activity.

The ceramics found in the fill and on the surfaces associated with the narrower walls inside the structure in Operation 6 date to the early second millennium (Figure 5.24, 5.25). It is likely that the much larger walls of the original structure date to the third millennium, because the outer dimensions, wall thickness, and construction method of this structure closely parallel those of the adjacent structure in Operation 1. Based on this parallel, I believe that the EBA structure in Operation 6 is also part of an elite house. It is not clear how much time passed between the last use of the EBA structure and its later subdivision, but since the later walls conform to the orientation of the earlier walls, it seems likely the gap in occupation was brief. The reuse of the foundations of this large structure for non-mounumental spaces and activity areas may be evidence of urban decline and restructuring at the end of the third millennium.

Operation 7: (12 square meters): a large storage facility or administrative building?

Immediately east of Operation 2, we identified another candidate for a dedicated storage or administrative structure in the gradiometry data and tested it by excavating Operation 7 (Figure 5.1, 5.2, 5.26). I suggest that this building is a storage facility on the basis of its large size and its long, narrow rooms, which occur in equivalent units throughout the building. Based on the gradiometry image, I estimate that this structure, Building Unit 6, covers 34m NW-SE and 32m NE-SW. Although the structure's walls are far from clear, several features mark its outer dimensions. A linear positive (black) area in block 36 separates the structure from the eastern storage building in Operation 2. Based on the ground truthing results from Operation 1.1, which cut across a similar feature, this signal likely marks burned, collapsed mudbricks from Building Units 5 or 6. The structure's eastern border is marked by a similar dark linear feature, which jogs south and then east in block 44. This feature's shape may indicate that it is collapsed, burned debris within a corridor that could be the eastern entrance to the structure. The southern boundary of the building is marked by a strong, linear negative (white) signal in block 3, which may indicate large limestone boulders close to the surface. Finally, the northern edge of the building is marked by a jagged linear negative (white) feature and associated high positive (black) signals in blocks 42 – 43. The uneven appearance of this wall indicates that it may be collapsed or disturbed by plowing.

As interpreted, the building is essentially square, except for its southeastern corner, where a room extends a bit south and east of the line of the main walls. The internal space is divided into five long, relatively narrow rooms, running along the NW-SE axis. These rooms may be further sub-divided by cross walls. In the gradiometry image, the internal walls of the structure give a weaker signal, and are relatively blurry when compared to the walls of other structures. These attributes prompted an initial interpretation that these walls were buried up to or greater than 1m below the ground surface, and that they may have collapsed and splayed or deflated.

To ground-truth and sample this large building, we opened a 1 X 12m NE-SW trench over two of the internal NW-SE walls. This trench exposed two wide, multi-coarse stone walls about 1m below the surface, separated by 2.75m (Figure 5.26). The western edge of the western wall (L3) was not reached, making it at least 3m wide. The eastern wall (L5) was 2.5m wide. In contrast to the large limestone block foundations seen in other buildings nearby in Operations 1, 2, and 6, these walls were made from fieldstones 0.3m –0.40m in size, easily carried by one person. In planview, these structures look more like pavements than walls, but the gradiometry image indicates that there are five or six of these features arranged in long parallel lines. Aside from some mud brick debris, we found no evidence for any superstructure or other features that could shed light on their function.

We excavated a small sounding along the eastern face of the western wall (L3) (Figure 5.27). As viewed in this sounding, the courses of L3 were uneven, with the edge of some courses packed with mud to match the wider edge of upper or lower courses. There are at least three courses but mud packing may obscure one or two additional courses. The base of the wall is just over 1m below its top. As was the case with the foundations of the eastern structure in Operation 2, the base of L3 rests upon a 0.20m thick layer of pebbles and cobbles (Figure 5.27, layer E). Thus, although the stones used in the walls in Operation 7 are not as substantial as those in other buildings in the area, care was paid to found them on a well-draining base layer. Perhaps the great width of these walls was designed to mitigate any perceived weakness due to the lack of large stones.

From my interpretation of the gradiometry image, I estimated that there are 6m – 7m between the midpoints of the NW-SE walls within the structure. Accounting for the wall thickness of 2-3m that we see in Loci 3 and 5 of Operation 7, this leaves 3-4m of space between the walls. This estimated space is a bit wider than the actual 2.75m space revealed between Loci 3 and 5. If we use this smaller value for the width of the 36m long rooms in the structure (31m if we account for wall thickness), we arrive at a rough estimate of 85.25m^2 area for each of the five units, or 426.25m^2 total area. This figure, which is about four times the area of Building Unit 5, does not account for possible cross-walls, installations, or variations in wall thickness. Nonetheless, it provides some idea of the amount of space available in this structure.

Although we considered many options for the function of field stone features Loci 3 and 5 in Operation 7, their multiple courses and well-draining base layer indicate that they are walls. These walls may have served as foundations for a monumental superstructure that has not survived, at least not in our small exposure. The long, narrow rooms in this structure are similar to storage facilities at many other Near Eastern Sites, including Beydar (Figure 7.5), Ebla (Figure 7.12), Sweyhat (Figure 7.8) and Mari (Margueron 1986: Figure 2), and recall the later stores of Temple I at the Hittite capital, Hattusha (Bittel 1970:Figure 13).

Operation 8: (21 square meters): Early Second Millennium domestic context (house?).

We placed this 7m X 3m trench over thin, white (negative) geophysics signals indicative of thin-walled structures in blocks 51 to 52 (Figure 5.1, 5.28). This impression was confirmed when we uncovered two walls, L12 and L13, that corner to form two rooms. There was no evidence for surfaces between the initial phase of the walls (phase I), which may date to the third millennium, but a later cobblestone surface, L8, covered L12. (Figure 5.29, 5.30). This surface, which contained many grindstones incorporated into its matrix, was covered with a thick layer of debris, including lithics, bones, and pottery dating to the early second millennium (Figure 5.31). It is not clear if the laying of surface L8 came after L12 and L13 went out of use, or if the room formed by these walls was always an outdoor space and L12 never had a brick superstructure (which is why the surface L8 partially covered the wall). The cobblestone surface L8 failed to reach wall L13, and there were several fieldstones in the gap that followed a rough line. It is possible that these stones and similar stones north of L13 formed shoddy walls built over L13 (Figure 5.30). If so, these walls may be contemporary with surface L8, or represent a later phase of its use.

At the abutment between the NE-SW wall (L13) and the NW-SE wall (L12), there is a long, narrow stone within L13 that narrows the width of the wall. This stone may mark a niche in the wall or a threshold for entering the room. Wall L12, which was 0.75m thick, was built from two rows of small fieldstones, while L13, 0.55m – 0.75m thick, was made from a single row of larger fieldstones. The thickness of the walls suggests that this is a domestic structure,[16] with L12 forming a main load bearing outer wall, which continues to the northwest beyond the trench, and L13 functioning as an internal room divider. Based on the remote sensing data we estimate that the room formed by walls L12 and L13 is 4m X 4m, and is in the corner of a structure that it is at least 11m E-W X 6m N-S.

Area 3: *Operation 9: (20 square meters)*

We excavated this 2m X 10m trench to investigate linear signals in the geophysics data in block 7 of Area 3 (Figure 1.2, 4.11). Prior to ground truthing, we interpreted these signals as thin stone wall foundations, possibly with a cobblestone or flagstone pavement in one corner of a building. This trench did not reveal any coherent architecture, instead uncovering a jumbled mix of large stones that must be the remains of a disturbed or destroyed wall or pavement of uncertain time period. The ceramics from this trench date to the mid to late third and early second millennium.

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[16] Alternatively, this structure may be a less monumental addition to an otherwise monumental struture, as seen in wall L44, part of an addition to Building Unit 4 (Figure 5.8)

Area 5: *Operation 10: (20 square meters): late third to early second millennium houses.*

We placed this 2m X 10m trench over what we thought would be thin-walled structures in block 5 of the Area 5 geophysics data (Figure 1.2, 4.15). We found at least three phases of domestic architecture consisting of thin stone walls, ovens, earthen and cobblestone surfaces (Figure 5.32, 5.34). The three phases in Operation 10 show similar use of this space for domestic architecture, but the phase 1 and 2 walls have a northeast to southwest orientation, while the phase 3 (earliest) walls run east to west. This shift may mark a chronological change from the late third to early second millennium transition to the early second millennium, but the ceramic sample from phase 3 is too small to place this trench earlier than the early second millennium with any certainty (Figure 5.33). Although the wall thickness in all three phases matches what we expected from the geophysics image, wall orientation does not. Thus, the features seen in the gradiometry data do not reflect buried features, but unexplained anomalies probably related to surface conditions.

Starting with the most recent remains, phase 1 consists of three walls forming at least 2 rooms. Wall L4 ran SW- NE, was 0.80m wide, and constructed of two rows of fieldstones not larger than 0.50m on a side. There was a door pivot stone on the southern face of the eastern end of this wall. Another wall, L6, ran parallel to L4, 2m to the north. L6 was 0.60m wide and built from two to four rows of cobblestones and fieldstones no larger than 0.40m on a side. This wall was not preserved as well as L4, and contained an approximately 1m gap in its eastern half that was filled largely with potsherds. This gap probably marks a threshold. The surface between walls L4 and L6 was beaten earth.

In the southwest corner of the trench, we uncovered the edge of a NW – SE stone wall (L16), at least 0.40m wide, built from at least two rows of fieldstones not larger than 0.50m on a side. This wall may articulate with wall L4. South of L4, a beaten earth surface surrounded an area of cobblestones covering the tops of two intersecting clay ovens. If they were set into the floor, then these ovens, L11 and L12, may go with the initial use of the room formed by L4 and L16. Alternatively, they may belong to phase 2, discussed below. In any case, at some point they went out of use, were filled in, and covered with cobblestones. Finally, two sets of stones in the northwestern and northeastern corners of the trench probably belong to the edges of walls belonging to phase 1.

The phase 2 remains may include ovens L11 and L12, and "wall" L13. Oven L12 was cut by the placement of oven L11. In the northern end of the trench, a NE-SW line of cobblestones, potsherds, and debris marked a 0.45m wide feature that may be a wall or a wall foundation (L13). The phase 3 remains consist of wall L15 and associated surfaces in the northern half of the trench. This E-W wall was 0.50m wide, and constructed of one to two rows of fieldstones not larger than 0.50m on a side. South of the wall were lenses of ash, clay and brick debris. North of the wall were a pebble floor and at a higher level, a pavement with a large, upturned grindstone resting upon it. The pavement was at a slightly higher level than the stone of L15, and may form a sub-phase that postdates the wall. Alternatively, the pavement abuts the second or third course of (undefined) bricks above the stones of L15 at its eastern end, and represents a later but still associated surface.

The architecture uncovered in the trench did not correspond well to the interpretation of the gradiometry data. Our interpretation prior to excavation suggested that there was a large room formed by thin walls, oriented NE – SW and NW-SE, with a corner just west of Operation 10. The color of these walls in the gradiometry image was gray, suggesting that they were made from materials other than limestone. When we lay the interpretation over the features in

Operation 10, we find a partial correspondence between the expected and the actual features. The NE-SW wall of the interpretation corresponds to L13, both in orientation and thickness. The dark, non-limestone gradiometry signal also matches in part, because L13 was comprised of mixed cobblestones and potsherds. Yet, although L13 matches the gradiometry image, none of the other features in Operation 10 match the NW-SE linear feature in the image. Wall L16 does run NW-SE, but it is not located in the same place as the anomaly in the remote sensing image. This suggests that the correspondence between L13 and the NE – SW gradiometry feature is coincidental. If so, then perhaps the dark linear feature in the gradiometry image corresponded to surface topography not noted during data collection, or to properties of the subtopsoil.

When we compare the gradiometry image against the features of Operation 10, we find a possible white linear feature that corresponds to wall L4. Without the indication provided by L4, the white linear feature in line with it blends into the background of the gradiometry image. Now that we know the types of walls in Area 5, it would be interesting to place test trenches over some of the white linear features that until now we thought derived from plow-scars and irrigation channels. Given that the walls in Operation 10 are oriented in the same direction as the plow scars, it is likely that some of the "plow scars" in the gradiometry image are actually buried walls, and that the walls are obscured by the plow scars.

Ground truthing and the interpretive cycle

The ground truthing trenches reveal that nearly every interpretation of the original data was correct for Area 1. All wall locations, orientations, and widths for Area 1 matched the remote sensing data. In addition, all areas interpreted as containing burned material were confirmed to contain burned mudbrick and ash. A major street was correctly predicted, as confirmed in Operation 5. The only prediction in Area 1 that was not confirmed with ground truthing was the suspected pathway in Operation 1.1. This area, expected to be a street corner filled with burned debris, turned out to be an area of burned, collapsed bricks overlying an earthen surface covered in smashed storage jars. Thus, instead of a street, it is likely that this space is an enclosed room attached to the structures in Operations 1.2 and 6. The success of ground truthing in Area 1 lends weight to interpretations of the gradiometry image from unexcavated contexts in this area.

In contrast to the success of Area 1, Areas 3 and 5 yielded mixed results. What appeared to be a fairly clear, square structure in Area 9 turned out to be a jumble of collapsed or disturbed debris. It is possible that a wider exposure may have uncovered the walls we expected. Without further ground truthing of other features in Area 9, it is difficult to reinterpret the gradiometry image. In a similar fashion, the ground truthing trench Operation 10 failed to confirm the interpretation of the gradiometry data. Although the architecture in this area was indeed thin-walled and oriented NE-SW, as expected, the excavated walls did not match up with the linear features in the gradiometry image. This lack of correspondence is puzzling, but likely derives from surface conditions – denuded plow furrows – which yielded the subtle linear signals that happen to bear some similarity to the excavated structures, while masking other signals from actual buried features.

The reasons for the lack of correspondence between gradiometry features and buried features in Areas 3 and 5 are not clear. It is tempting to conclude that the thicker walls in Area 1 made it easier to interpret this data. Yet, the thin walls uncovered in the southern end of the western structure in Operation 2, the thin walls of the later phase in Operation 6, and the thin walls revealed by Operation 8 are all visible in the remote sensing data. Thus, the reason for the interpretive difficulties in Areas 3 and 5 must relate to surface and soil conditions, and the characteristics of the buried deposits. For example, the architecture in Area 5 was more deeply buried than the thin walls seen in Area 1. The only deep walls seen in the remote sensing data were walls a meter or more thick, such as those in Operation 3 and 7, or the eastern structure of Operation 2. It seems then that only shallow or large features appear clearly in the remote sensing data. The plow scars and other surface features contribute to the difficulty in seeing subtle buried features. If the surface had been flat at the time of data collection, it is likely that we would be able to see more features, and better define the ones we already see.

Other Trenches: J32 and K34

In addition to trenches excavated in remote sensing areas, we excavated other trenches that contribute to the reconstructing the life history of Kazane. We excavated these trenches in 2002 on the tell in sloped areas less suitable for gradiometry survey. Our goal was to determine the size of the early third millennium, pre-urban settlement and its accessibility (depth below the ground surface) for wide exposures of architecture. A previous surface survey of the mound yielded early third millennium ceramics from a two-hectare area on the northern part of the tell (Wattenmaker and Mısır 1994:179). The year 2002 surface inspections revealed little new information about the size of the early third millennium settlement, but did uncover significant remains from the Late Chalcolithic (trench I31), mid to late third millennium (trench J32), late third to early second millennium (trench K34) and possibly additional Late Chalcolithic remains (trench J33).[17] The late third and early second millennium contexts provide comparative data for the contexts excavated in the lower city.

[17] We conducted surface inspections both before and after rainfall that we hoped would improve the visibility of surface artifacts. Dr. Patricia Wattenmaker assisted in the identification of ceramics from these surface inspections.

Prior to placing the trenches, we conducted surface inspections. This effort did not pinpoint any concentrations of early third millennium artifacts, so we placed test pits in areas that were previously untested, and at locations where the slope of the tell permitted reasonably wide expansion if necessary. Early third millennium remains were previously discovered on the northwestern side of the tell in the step trench in Area H (Wattenmaker 1997:82). These contexts were too high on the mound's steep slopes to permit large exposures without removing several meters of remains from later periods.[18] For this reason we concentrated our efforts on the eastern and southern part of the mound where we excavated four test pits: I31, J32, J33, K34[19] (Figure 1.2). Here I only discuss trenches J32 and K34 because I31 dates to the Late Chalcolithic period and J33 is of uncertain date.

Trench J32 (18 square meters): mid to late third millennium domestic contexts.

Trench J32 began as a section cut on the south face of the mound. The initial cut was 6m long, parallel to the hill, set about 3m into the hillside adjacent to the modern dirt road winding to the water storage facility at the top of the tell.[20] Based on ceramic types, the date of the deposits in J32 falls within the middle of the third millennium, possibly extending into the late third millennium (Figure 5.36). After cutting away the eroded surface, creating three rough steps into the slope, we encountered several features. The first was a pit, filled with cobblestones, cutting into contexts at the southwestern end of the trench. The second feature consisted of parts of at least two Karaz ware pots with geometric designs, found on the top step about 0.4m below

[18] I thank Dr. Henry Wright for sharing his findings regarding the Early Bronze Age remains in the step trench.
[19] Trench designations continue the numbering system in place at Kazane since 1992. The trench designation indicates that the trench is in Area I, trench number 31, etc. Trench numbers move sequentially across the site without regard to area. Thus, J32 is the first trench began after I31. Areas are defined morphologically, such that Area I corresponds to the eastern slopes of the tell, area J to the southern slopes, area K to the southwestern slopes. At the end of the season we backfilled all trenches to improve site preservation.
[20] The road cut exposed a 2-3m high section in which walls, surfaces and other features are clearly visible.

the ground surface. The third feature was a burial in the second step. The fourth feature consisted of two walls in the center of the trench that intersected to form a series of rooms (Figure 5.35). The architecture and finds in J32 are consistent with a domestic structure, although they could also be part of the support or service wing of an institutional structure.

The origin of the pit (L10) is unclear, and we did not excavate this feature. The Karaz ware was resting on a hard earthen surface or interface (L9sub1), under an ash layer (L9), beneath mudbrick debris (L8) (Figure 5.38, D-E). The presence of Karaz ware, which comes from the mountains far to the north, is indicative of long distance trade and perhaps accumulation of exotic and prestigious ceramics as well.[21] Notably, much larger exposures of contemporary contexts in the lower town in Operations 1-10, discussed above, failed to recover any Karaz ware,[22] perhaps indicating that residents of the high mound had special access to such pots, that they were stored there, or that immigrants from Karaz regions were living there.

The burial (L5) was oriented west to east, head west, facing north, in the flexed position. We only exposed a portion of the lower body of this individual, but judging from the size of the feet and pelvis, this is a relatively small adult.[23] In the center of the trench, walls L6[24] and

[21] I also noted Karaz ware on the ground surface in the vicinity of trench J33.
[22] The absence of Karaz ware in the lower town excavations, while possibly due to chronological, functional, or site formation differences between the high mound and the lower town, is notable. This issue is discussed in chapter 6.
[23] Burial L5 was inside space 3, but it is not clear if it was intentionally buried inside the room or placed there fortuitously. We reburied the skeleton so we could focus our resources on other contexts.
[24] The southern face of wall L6 had a 2-4cm thick layer of mud and lime plaster (removed as L20). The plaster consisted of multiple layers of thin (a few mm) white lines separated by thin layers (a few centimeters) of reddish brown mud. The multiple layers indicate multiple plastering episodes. Notably, the outermost layer of plaster wrapped from the wall to the floor to form surface L12. As mentioned above, L13 seemed to be founded on surface L15, while L6 may extend a bit lower than L15. The northeastern end of L6 had some burned bricks in it. One possible explanation for these burned bricks is that the entire room burned at one point, but was renovated by rebuilding parts of the walls and plastering over the burned areas. At the corner where wall L6 joins wall L13, we observed an area of mud and broken brick patching as if L6 was built against L13 and the gap filled with brick debris.

L13,[25] combined with other suspected walls, formed at least three separate spaces. *Space 1* is north of wall L6, *space 2* is in between walls L6 and L13, and *space 3* is west of wall L13.[26] Space 1 contained several debris layers. Space 2 also contained several debris layers in between successive surfaces, the first of which was a fill L11 over a thin plastered surface (L12) over debris (L14) over another earthen surface (L15). Wall L6 had deeper foundations than wall L13, possibly indicative of earlier construction or terracing.[27] Beneath L15 we removed a bricky debris layer (L16), over a thin white plastered surface (L17), which formed the top of an ash layer resting on top of brick debris (L19) and smashed pot installations (L21 and L22).

Trench K34 (4 square meters): A late third to early second millennium pyrotechnic installation.

We placed this trench on the southwestern side of the tell in an area where we found a few possible examples of early third millennium vessels (cyma recta cups) on the surface at an elevation where remains from the early third millennium were found in 1995 in the step trench on the northwestern side of the mound. Trench K34 was 2m by 2m, and was laid according to the slope of the tell (Figure 5.37). In this trench we removed about a meter of debris covering an octagonal pyrotechnic installation, probably an oven (L3). The feature had eight sides made of eight bricks laid in a circle that, because the bricks were square, formed an octagon approximately 1 meter across. The feature was about 0.40m deep, and was filled with gray and white ash as well as two large (up to 0.40m) stones and a small donut shaped doorpost or weight. We excavated a 0.20m level below the base of the feature as L5. This material contained

[25] The section beneath L13 revealed that the foundation of this wall leveled some ash deposits at the elevation of surface L15 and may have been founded on top of L15.
[26] The southern wall of space 3 was not given a locus number because its boundaries were difficult to determine with certainty, but its suggested trajectory is indicated on the trench.
[27] Wall L6 was made almost entirely of red crumbly bricks, while wall L13 was made from hard, compact gray bricks.

ceramics (Figure 5.38:A-C), including plain simple ware jars (Figure 5.38:C), dating to the late third to early second millennium transition with parallels at Kurban Höyük (Algaze 1990: Period III) and across northern Mesopotamia (Nigro 1998, van Loon 1985, 1988).

Summary

Although we failed to locate any intact early third millennium remains in our test pits on the tell, we did gain valuable insight into the settlement size during the Late Chalcolithic Period (Trench I31 and possibly J33), and the accessibility of mid to late third millennium remains on the southern (J32) and southwestern (K34) slopes of the mound. Together with the step trench in Area H, these test pits complete a sampling of all sides of the mound. Trench I31 confirms that the Late Chalcolithic remains continue from the western side of the tell all the way across to the eastern side. It is now clear that the early third millennium material on the tell must be confined to the very core. If J33, not discussed here, contains Late Chalcolithic walls cut by mid to late third millennium pits, as suggested by the meager ceramic sample from these contexts, then the early third millennium contexts must be north and west of the road running on the southern and eastern side of J32.[28] Finally, trench K34 indicates that significant late third to early second millennium remains overlie the earlier periods on the upper slopes of the southwestern side of the tell.

Summary and Conclusions

This chapter discussed the results of excavations in three gradiometry areas and introduced other trenches excavated to study the internal organization of Kazane. Trenches in

[28] It is possible that early third millennium contexts extended further south but were removed in part during later third millennium construction work.

gradiometry areas revealed a high degree of correspondence between the expected and the actual characteristics of buried features in Area 1, but not Areas 3 and 5. The lack of correspondence between the gradiometry images and buried features in Areas 3 and 5 indicates that features in these areas are more deeply buried, thinner, and made from less contrastive[29] material. The excavations on the tell in trenches I31, J32, J33 and K34 contribute to our understanding of the size of the site in the fourth and early third millennium, and also provide samples from later third and early second millennium contexts to compare with the lower city contexts.

Aside from the close correspondence between the remote sensing data and the buried features in Area 1, the most striking finds in the excavations are the many monumental buildings in Area 1. In this area, even relatively small structures often have walls over 1m thick, sometimes built from massive stone blocks. Several structures also have very large dimensions, or remarkable finds, such as *in situ* storage jars and burned barley. These finds show that Area 1 is the locus of elite and / or institutional structures and activities. Based on the first impression of massive walls and *in situ* artifacts, it would appear that there are at least two, possibly three elite houses in Area 1 (Building Units 1,2,3), two and possibly three or four storage facilities (Building Units 4, 5, 6, 10), two temple-related structures (Building Units 7, 8), one street (Operation 5), and two early second millennium domestic activity contexts (within Building Units 3, 11), at least one of which (Operation 6) used third millennium wall foundations. In contrast, excavations on the tell revealed mid to late third millennium domestic activity contexts, while excavations in remote sensing Area 5 revealed superimposed late third to early second millennium (possibly in Operation 10, Phase 3), and early second millennium domestic contexts

[29] That is, material with magnetic properties that do not contrast greatly with the magnetic properties of the surrounding soil.

(Operation 10 phases 1-2). The contrast between the excavation areas reveals differences between the organization of space at Kazane from the third into the second millennium. In the following chapter, I build on this outline of Kazane's life history by analyzing architecture and artifacts in greater detail, and examining the distribution of finds in order to determine how people used these spaces

CHAPTER 6

ANALYSIS OF ARTIFACTS AND ARCHITECTURE: THE USE OF SPACE AT KAZANE

Introduction

This chapter explores the chronology and use of the structures and spaces revealed by remote sensing and excavations. In this analysis I address the following questions:

> 1) What is the chronological relationship between the contexts excavated in the various parts of the site?
>
> 2) What kinds of buildings and features do we see in the remote sensing images and excavation trenches? How did the residents of Kazane use specific spaces, such as a room, and general areas, such as Area 1 versus the other areas and the tell?

This analysis breathes life into the city, situating actors in specific contexts within urban space. I begin by establishing which contexts are contemporary by examing chronology via architecture, ceramics, carbon dates and stratigraphy. Next, I examine architecture for clues to the construction and use of space, and social differentiation. Then I explore patterns in the distribution of ceramics, lithics, figurines, and other artifacts. These artifacts mark activities ranging from food production and consumption to craft production and religious ritual.

Dating the contexts: architecture, carbon dates and stratigraphy

Ceramic wares and types, architecture, carbon dates and stratigraphy demonstrate that the Early Bronze Age structures revealed by magnetometry and excavations in Area 1, and those in trench J32, date to the same period, roughly 2550 – 2200 B.C.E. The ceramic assemblage is relatively homogeneous, and contains a range of wares common in Upper Mesopotamia in the mid to late third millennium (see below). The imported Karaz ware[1] in the highest stratigraphic levels of J32 also fits comfortably with a mid third millennium date.[2] Carbon samples from burned barley grains from Building Units 4 and 5 yielded dates with 95.4% confidence in the ranges 2570 – 2290 B.C.E. and 2570 – 2250 B.C.E. (Figure 6.1a-b). A carbon sample from charcoal on the floor of the south storage room in Building Unit 8 yielded a calibrated date with 95.4% probability between 2580-2300 B.C.E. (Figure 6.1c). Although we have just these three samples, they are remarkably consistent, echoing the homogeneity of the ceramic assemblage.

In addition to carbon dates and ceramics, the structural relationships between architecture in Area 1 also indicate that these buildings are contemporary. Carbon-dated Building Unit 8 is located along a street that runs up to Building Unit 1, which shares its eastern wall with Building Unit 2, which was possibly built at the same time (for Building Units, see Figure 4.6). The northern half of Building Unit 2 is parallel to and of similar dimensions to Building Unit 3, indicating that they were built with respect to each other. The carbon-dated storage structures in Building Units 4 and 5 are not perfectly parallel to Building Units 1-3, but appear to be connected to Building Unit 2 by two walls at the southern and western sides of Building Unit 4 (in grid block 28, see Figure 4.5). In addition to their close proximity, similar orientation and shared walls, the foundations of Building Units 1-5, and 8, are very similar in thickness and construction technique (see below). In contrast, Building Unit 6 has a very different constrution technique, which may indicate that it was built at a different time or under different conditions than nearby structures. Yet, this large building is parallel to Building Unit 5, and may have also

[1] Imported from the mountains north of the Tigris.
[2]Per Tony Sagona, personal communication May 2003. I thank Mitchell Rothman, Tony Sagona and Geoff Summers for very helpful discussions regarding the Karaz material from trench J32.

been a storage facility.

In sum, the shared orientations, physical connections, and similar construction techniques suggest that the buildings in Area 1 are contemporary, a view that is reinforced by carbon dates and ceramics. Of course, "contemporary" within such a long period does not necessarily mean that every structure was built and inhabited for the same length of time. Yet, of all the structures in Area 1, only Building Unit 8 shows evidence of major rebuilding. This suggests that most structures were used for a limited period of time or well maintained, while Building Unit 8 may have spanned a longer range of time or required reconstruction. In addition, On the basis of ceramic types, the MBA reuse of Building Unit 3 and Building Unit 11 dates to the period 2000 – 1800 B.C.E., while the architecture in the earliest phase of Operation 10 may range from slightly earlier, or 2050 – 1800 B.C.E. (see below and Appendix 2). Although there would seem to be a gap in occupation in Area 1 in the period 2200 –2000, we cannot say if this gap was site-wide, or limited to areas of the outer city that were abandoned as the city's population shrank. Also, stray finds of suspiciously late third millennium ceramic types may mark limited late third millennium settlement in this area. A finer dating of the occupation periods in both the third and second millennium is desirable, but not possible with the current data.

Architecture

Having established the relative date of the contexts under consideration, I now turn to a summary review of the architecture. In this section I examine the orientation, dimensions, construction techniques and features of architecture at Kazane. Regular dimensions, orientation, shared walls or construction methods may indicate that the same architect and construction crew built a series of structures. In some cases, similarities between building form, layout, or construction technique may simply derive from culturally shared notions about how to build certain types of structures. Variation in architecture may be due to differences in the intended use of buildings, but widespread irregular characteristics may indicate that different groups were responsible for each structure. Architectural features, such as wall width, niches, threshold types, and floor and wall treatments, also indicate the primary purpose of a structure, the social status of its owners, and how this changed over time.

Orientation

For Area 1 at Kazane, every building identified in the gradiometry image shares a NW-SE orientation, indicating that each structure respected the orientation of its neighbor (Figure 6.2). This shared orientation is evident across the entire area, from Operation 8 in the northeast to Operation 4 in the southwest. This orientation may be fixed in part by the street exposed in Operation 5, which runs NW-SE, following the long axis of the site. The shared orientation of structures across Area 1 indicates that they were built with respect to roads and other buildings. Yet, the lack of shared foundation features, such as terracing or common walls (except in the case of Building Units 1 and 2), indicates that the architecture in Area 1 was not layed out according to a grand metric scheme, but was built and grew according to the specific needs of the residents and users of this space.

On the tell, the structures in J32 are oriented NE-SW. The orientation of these and other structures on the sides of the tell were probably influenced by the sloping topography of the hillside, rather than a grand urban plan. Although they date to the early second millennium, the walls of the upper two phases in Operation 10 share the same orientation as those in Area 1, while the earliest phase in Operation 10 runs E-W. The shift in orientation between these phases may mark the transition from the late third to the early second millennium (see Appendix 2).

Structure Dimensions[3]

For the purpose of analysis, I grouped some structures in Area 1 into what appear to be coherent "Building Units," and I also assigned Building Unit numbers to the architecture in older trenches F14 and in Area C. This picture is no doubt incorrect in many respects due to the invisibility of some major and minor connecting walls. Nonetheless, of the 11 suggested Units in Area 1 (Figure 4.6), the dimensions of the most prominent structures are somewhat but not exactly regular (Figure 6.3). Units 1 and 2 share the long wall running between them, indicating that they were probably built at the same time, and they may form one single, large structure. Both Units measure about 40m long and 20m wide. Unit 3, at 17m X 17m, is just slightly smaller than the northern half of Unit 2, partially exposed in Operation 1.2. Unit 6 has a length and width close to the length and combined width of Units 1 and 2. Units 4, 5 and 8 are of similar dimensions, although the few meters difference between Units 4 and 8 results in a 48m^2 area differential. Unit 10 is the length of Units 4, 5, and 8, and about half their width. When

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[3] I estimated structure dimensions from remote sensing, and corrected with excavated data wherever possible. When tracing structures from the gradiometry image, I followed the midpoint of the magnetic signal. Given the width of walls in Area 1, which generally ranges from 1.25 – 2m, structure dimensions are necessarily rough estimates that may vary by as much as a meter. When estimating external or internal dimensions, I added or subtracted the estimated width of the reconstructed wall lines to account for their width. For the structures partially exposed in Operations 1, 2, 3, 4, 6, 7, and Dr. Wattenmaker's 2002 trenches, one or more wall widths were available to 'calibrate' the remote sensing estimates. For example, prior to excavation, I estimated the external width of the eastern structure in Operation 2 as 8.50-9m, and its excavated width is 9.75. I estimated the width of the western structure in Operation 2 as 8.5m, and its average excavated width is 8.17m. Finally, I estimated the width of the structure in Operation 4 as at least 10m and its excavated width measures 10 – 10.20m. These ground truthing examples show that most estimates are very close to the actual measurements, while a few may be off by a meter or more.

considered as length to width ratios, Units 1, 4, and 8 have a ratio around 1.7, Units 2, 5, and 7 have ratios around 2, Units 3 and 6 have ratios around 1, and Units 9 and 10 have unique ratios. The similar dimensions or ratios of several of the Area 1 structures probably indicate nothing more than a shared system of measurement, and the need for similar amounts space within various structures.[4]

Construction techniques and features

Most structures in Area 1 are simply rectilinear buildings. The few exceptions to this rule are a full and partial niche in Building Unit 4 (in Operation 2 walls L41 and 48; see Figure 5.8), the stepped internal widening of the western wall of Bulding Unit 8 (L18) (Figure 5.16), and the mudbrick buttress (?) in the earlier phase of Building Unit 8 (L21). As discussed in the next chapter, niches are common features of storage structures. Thresholds were uncovered in Building Units 4, 8, and possibly 11. In Building Unit 4, thresholds are paved with cobblestones (L78, 79, 81) (Figure 5.8), and there is a possible threshold in Bulding Unit 11 that is formed by a single large stone[5] (Figure 5.29). In contrast, the threshold between the northern and southern rooms in Building Unit 8 is an earthen floor across a simple break in the cross wall. Stone thresholds may provide better security for sealed, stored goods, by tightly fitting the door and impeding excavation beneath the door. Stone thresholds may also channel water away from the door. This may indicate that the possible threshold in Building Unit 11 marks the main entrance to the structure.

[4] It is possible that the imprecision of measuring dimensions from the remote sensing image masks more regularity than is currently apparent.
[5] At the western end of wall L13 (see chapter 5).

The major walls in Building Units 1,2,3,4,5,7 and 8, and the structure excavated in trench F14 in 1994-5 (Wattenmaker 1997: Figure 6) were built from stone foundations with mudbrick superstructure[6] (Figure 6.4). Foundations[7] were built according to a variety of schemes, sometimes mixed within a single struture. In many cases, foundations have two rows of limestone boulders with smaller stone packing to fill the interstices and core, and to level the top course for laying mudbricks (Figure 6.4:Op1.2, L8; Op 6, L16, Op 4, L20, F38, F14, Op 2, L11, and Op 3, L7). In contrast, some walls of Building Unit 4 use a technique in which the largest boulders were laid perpendicular to the wall, serving as single-row headers that run the entire width of the wall (Figure 6.4: Op 2, L49, Op 2, L48). Both construction techniques are found in the large house *Steinbau V* at Tell Chuera (Moortgat and Moortgat-Correns 1975: Plan IV), indicating that these methods were practiced throughout the region. Another technique, also found in Building Unit 4, places large boulders that make up a single, wide course, which is finished or evened up with small stones on one side (Figure 6.4: Op 2, L34). Building Unit 8 shows another variation in which the northern part of the western wall has four rows of medium-sized stones (Figure 6.4: Op 7, L5). In all of the previous examples, the largest dimension of the

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[6] The brick superstructure of the Area 1 walls, where preserved, was too badly damaged to discern the exact brick dimensions or composition. The best cases are Building Unit 5 in Operation 2.1, where bricks are estimated to measure 0.25m X 0.35m X ?, and Building Unit 7 in Operation 3, where bricks are estimated to measure 0.10m tall X 0.17 – 0.22 wide X ? long. In both cases, the bricks were made from orange (munsell 5 YR 5/6 yellowish-red) clay, although those in Building Unit 7 were notably redder, and of smaller dimensions.

[7] Despite soundings next to walls in trench J32 and Operations 1.1, 1.2, 2, 3, 4, and 7, the edges of foundation trenches were not observed along any walls. In the sounding along the northern wall of building Building Unit 2 (Op 1.2, L14), surfaces and Halaf features run right up to and touch the wall (Figure 5.6). This indicates that if a foundation trench was employed, it was cut exceedingly narrow, or the wall was built against one side of the trench. It is also possible that the walls were cut into the sides of a low mound of Halaf ruins. The walls then served to retain the slope while providing a high platform for the buildings. Soundings exposed the foundations of walls in Building Units 5, 6, and 8 (Figure 5.9, 5.27). The western wall (L11) of Building Unit 5 in Operation 2.1, and the western wall (L3) of Building Unit 6 in Operation 7, were both founded on beds of pebbles and limestone chips set about 1m below the top of the foundations. In the case of Building Unit 5, fill layers were built up alongside the wall to provide a bed for the cobblestone subsurface for the plaster floor of the structure. In both Building Units 5 and 6, the foundation trench must have been very wide because our 1m wide soundings failed to locate its edges. In contrast, the earliest phase walls in Building Unit 11, which may date to the third millennium, were simply founded upon the ground without any obvious preparation.

boulders was a meter or more. The most plentiful large boulders are found in Units 1, 2, 3, 4 and 5, while Building Units 7 and 8 contain medium-sized boulders. In contrast, the wide walls of Building Unit 6, exposed in Operation 7, were built from small fieldstones. The rough courses and small stones of these walls leave the impression that they were built from whatever stone was available, rather than the apparently desirable large boulders used in most other buildings in Area 1.

The variety of stone size combinations and stone row techniques suggests that the builders were attempting to build walls of the desired width without cutting or breaking stones. If very large boulders were available, these were made into two rows, unless the wall was meant to be about 1m wide, in which case they were laid as single rows or headers. Additional small stones were packed into the core or along one side to attain the desired width. These same techniques are seen in much thinner walls, using much thinner stones (Figure 6.4: Op 2, L44; Op 8, L12, L13; Op 10, L4, L15; Op 6, L12; Unit A, Phase 3). The massive architecture in Areas C and 1 clearly demonstrate coordinated labor, but differences between the walls Area C, Unit 6, and the rest of Area 1, may indicate very different construction events. Since individuals could carry in their hands all the stones in the walls of Building Unit 6, perhaps the construction process involved a grand event in which all persons – male, female, adult, and youth, contributed by carrying stones and setting them upon the emerging walls. In contrast, constructing the large boulder-based walls of the other structures would require ropes, levers, wheeled carts, and perhaps highly coordinated labor. Although the very thick wall in Area C did contain some larger boulders, it also contained a lot of medium and small field stones. Perhaps this wall, which seems to have served as a fortification for the inner mudbrick structure, was also built in a mass event in which every able-bodied person chipped in to quickly fortify an important building. It is difficult to say whether such an event was a grand occasion for community building, or the product of forced labor.

Wall width may have structural purposes, such as supporting a second story or containing the weight of bulk grain in storage facilities, or "social" purposes, such as indicating the wealth or power of a household or institution. The assumption in this case is that thicker walls made from more substantial materials, such as larger stones, required more resources to construct and outstripped the requirements of the loads they supported. Thus, "overbuilt" walls and structures make particular social statements, and are a kind of conspicuous consumption. At Kazane, the width of major walls in Area 1 varies from 1.10 – 2.0m. Walls in Building Units 1-3 and 6 are 2m wide, while those in Building Units 4, 5, and 7 are 1.10 – 1.25m wide, and those in Building Unit 8 range from 1.4 – 2m wide (Figure 6.3-4). A thinner secondary wall in Building Unit 4 (Operation 2.2, Locus 44) is 0.70m wide and built from 1-2 rows of fieldstones, with larger stones taking up an entire row. The earlier phase in Operation 8, which may date to the third millennium, contains a similar 0.55m – 0.75m wide wall (L13) built from a single row of stones, which articulates with a 0.75m wide wall (L12) built from two rows with a rubble core. These thinner walls use the same construction techniques as the larger walls, but with smaller stones.

Plaster and Floors

Plastered spaces may indicate interior rooms, including the primary living rooms of houses, specialized work areas, or ritual features. Repeated plastering events indicate to some extent how frequently or for how many years a context was in use.[8] Due to the fragmentary nature of most cases of plaster at Kazane it is difficult to interpret contexts from the presence or

[8] Although micro analysis of plaster layers is a valuable tool for analyzing these issues, we did not pursue that technique in the present study (e.g. Matthews et al. 1994).

absence of plaster. Nonetheless, repeated plastering of space 2 in J32 suggests that this was a primary living area or a place for activities, such as food preparation (Figure 5.35). An area of plastered cobblestones (L16) in a small room west of Building Unit 8 in Operation 4 also indicates an activity area possibly associated with food preparation Figure 5.16). Another special structure, Building Unit 5, contained very well preserved plaster on the inside of all exposed walls and the floor. In chapter 7, I argue that this plaster was designed to protect the grain stored in this facility. The adjacent structure, Building Unit 4, had a very coarse, pebble rich, thick plaster floor, suitable to this building's use as a store room for large jars. Other buildings contain only fragments of plaster. For example, in Operation 1.1 we found a thin line of plaster at the base of the eastern face of wall L4 (the eastern wall of Building Unit 2) (Figure 5.3), and in Building Unit 7 in Operation 3, we observed another small area of plaster on the western face of wall L7. Traces of wall plaster are also reported from Building Unit 1 (Creekmore and Wattenmaker n.d.). Next to the tell, the large structure from Area C had plastered walls in both its early and later phases (Wattenmaker 1997).

In almost every case[9] where we identified a living surface, it was situated no lower than the uppermost course of the stone foundations. That is, the foundations protruded above the floors but not by more than a course, and usually by just a few centimeters (as in Building Units 5, 7, and 8). This technique was probably designed to protect the brick superstructure from wicking destructive moisture from the ground surface. In addition to plastered floors in Building Units 4 and 5, and trench J32, floor types in Area 1 include beaten earth, pebble, and cobblestone. Pebbled and cobbled floors tend to indicate outdoor or "rough use" areas, such as

[9] The one exception is the eastern wall of Building Unit 8 (L4), which has several stone courses above the level of the floor. This wall may date to an earlier phase of the structure; perhaps this wall was conserved during rebuilding as an important symbolic or spiritual part of the previous structure.

storage rooms, while beaten earth surfaces may indicate interior rooms or passages for storage or activities. There is a pebble floor between building Units 4 and 5 (Figure 5.8, east of space 6), and in the southern room of Building Unit 4 (Figure 5.8, space 3). Aside from the later phase of Operation 8, a cobblestone floor appears around the tomb in room D of Building Unit 1 (Figure 2.7). In Building Unit 8, an earthen floor was identified on the basis of flat lying pottery within the rooms of the structure.

Conclusions

Common orientation, ceramic assemblage, and carbon dates indicate that the EBA contexts in Area 1 and J32 are contemporary, dating to 2600 – 2200 B.C.E., while ceramic types date the MBA contexts in Operation 6, 8, and 10 to 2050 – 1800 B.C.E. The construction techniques found in Area 1 demonstrate variation in stone size and placement. Although many walls employ fieldstones in two rows with a rubble core, other wide walls use single rows of large stones, or multiple rows of smaller stones. Although it is possible that wider walls supported taller structures with multiple stories, we found no evidence for staircases. The stone foundations, which are buried to 1m depth in Operations 2 and 7, and over 2m in Operation 1, were the bases for mudbrick superstructures. Plaster served to protect or decorate some walls, while floors were plaster, pebble, or earth, according to the use of space. The variation between plastered and unplastered spaces, threshold type, or the presence or absence of features such as niches, indicates differences in the intended use of spaces. Thus, although the structures in Area 1 are nearly all monumental in dimensions or wall thickness, the variation in their sizes, features, and surface and wall treatments shows that they were built and used for different purposes.

Wealth differences are perhaps most evident in architectural differences, with larger, more substantial structures requiring more wealth to obtain the materials and labor for their construction (Smith 1987:301; Wason 194: 137). Since most of the EBA structures at Kazane are monumental, there is little within-site variation with which to evaluate the degree of monumentality. The thickness of the main EBA walls and the dimensions of all the structures in Operations 1-4 and 6-7 are comparable to the walls of unusually large houses, temples, palaces, or 'special use' structures at other cities across upper Mesopotamia (Figure 5.7).[10] With the exception of Building Unit 6, the size of the stones in these walls is as large or larger than the stones in temples and palaces at other sites, such as Tell Chuera or Tell Banat. Based on their suggested plans and their contents, only Building Units 1, 2 and possibly 3 may be houses. All other Building Units are likely special purpose structures, such as storage or cult facilities.

The distribution of artifacts and the use of space

The architectural analysis presented above suggests a range of uses for the structures and spaces at Kazane. By analyzing the artifacts found within these spaces, we can further understand how people used these spaces. Although the use of some spaces, such as the storage facilities in Operation 2, are immediately obvious from their *in situ* contents, discerning the use of other structures requires closer analysis of artifact distributions within and around them. This analysis reveals patterns that contribute to our understanding of the life history of the city. Aside from ceramics and faunal remains, finds from both EBA and MBA contexts are few in number.

[10] Although 1m+ thick walls are reported from a small exposure of a mid-EBA domestic structure at Titris, none of the walls have stone foundations and at least one of the thick walls is comprised of a double-wall thickened during remodeling (Algaze et al. 2001:37, Figure 9 Room XVI-4, east wall). Another mid EBA structure from the lower town at Titris, in trench 40-34, has three walls that are over 1m wide. This structure seems to have had a special, non-domestic function (Algaze et al. 2001: Figure 18).

I examine the evidence for storage, and the distribution of faunal remains in Chapters 7 and 8. Here, I examine the distribution of ceramics in relation to food storage, preparation, presentation and consumption. I also examine the small number of other artifacts in grouped categories related to ritual, administrative, and production activities. After exploring the distribution of EBA artifacts I review the distribution of a small number of MBA artifacts. Before presenting this analysis, I review the artifact recording methodology.

Artifact collection and recording methodology

I assigned all excavated contexts a priority level of 1-3.[11] Priority 1 contexts include material resting on or just above a living surface / floor. Priority 2 contexts include material in fills within defined spaces, such as rooms or pits. Priority 3 contexts include material from wall collapse, fill from undefined spaces (e.g. above walls before they appear), and plowzone.[12] Priority 1 contexts are presumed to relate directly to the use of the structure. Priority 2 contexts contain materials probably deposited after that room or the entire structure went out of use or was in the process of being abandoned. Such materials probably did not travel very far from their point of origin, so they derive from activities conducted in close proximity to the structure.

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[11] All primary or suspected near primary contexts, such as fill above a living surface, were dry sieved with a ¼" mesh. In practice, some primary or near primary contexts were not identified as such until they were partially excavated, so not every bucket of dirt was screened. Secondary or tertiary contexts were screened when deemed necessary, and a 1/8" mesh was used if specific small finds, such as beads, were expected. Soil samples for flotation and other analysis were taken from all primary or near primary contexts. Micro artifact samples were also taken from living surfaces, but these samples were not processed for the present report. The largest recovered class of artifact is ceramics, followed by faunal bones and lithics. Other "small finds," such as sealings, figurines, beads, spindle whorls or other objects appear in much smaller numbers. As part of the daily excavation procedure, all artifacts from a context were grouped by category and assigned a unique Registry Number (RN).

[12] During fall 2004 and 2005, I processed as many of the contexts as possible, beginning with priority 1, then priority 2, and finally some priority 3 contexts in cases where specific questions arose. I processed some priority 3 contexts if I suspected that the plowzone above a shallow structure contained the churned up remains of supra-surface deposits, or to determine if I could detect ephemeral, mostly eroded or plowed away remains from later periods, such as the Middle Bronze Age. Priority 3 contexts may also indicate the location of the source for the bricks in walls based on whether or not they contained material from earlier periods at the site, including the Halaf or Late Chalcolithic.

The relative proportions[13] of ceramic wares, craft materials, etc., may indicate the use of space both within and around a particular context. In this analysis, I consider a range of potential activities including food preparation and consumption, ritual practice, administration, and craft activities such as textile manufacture.

The ceramic recording methodology closely followed that of the Kurban Höyük project (Algaze 1990:213-215).[14] I chose the Kurban approach because it records all material, both body sherds and "diagnostics," within a system that tracks ware, shape, function, size, and other features such as decoration (Figures 6.5, 6.6, 6.7). These variables are the key components for analyzing chronology and use of space.[15] I recorded all sherds by count and weight.[16] Each sherd was assigned to a thickness category: thin, medium and thick.[17] As noted by Algaze (1990:214), thickness is generally equivalent to vessel size and function, such that most thin sherds are bowls or small jars, most medium sherds are 'standard' jars or medium bowls, and

[13] The statistics presented here are the percentages of each variable within a given category. Although volume figures are available for estimating artifact density, proportions are an adequate means of leveling density differences when comparing contexts.

[14] I entered all ceramic data into an integrative Microsoft Access database. I thank Peter Cobb for advice and assistance in the design of the database. In the database, each recorded item is listed independently, whether it is a single rim or a group of 20 body sherds of a particular ware, and linked to other items by context information. The database makes it possible to quickly adjust codes or categories during analysis. For example, if a context assigned to priority 1 is changed to priority 2, a single change in the context table will instantly apply to all items from that context. Through a series of queries, data is extracted from the database for analysis via statistical software including SPSS, JMP, and Microsoft Excel.

[15] The Kurban system is relatively quick and easy to use, and records many essential variables.

[16] Recording weight counterbalances differential breakage rates and the recorder's variable recognition of joins. Recording weight also permits comparisons between screened and unscreened contexts, because the small size of sherds found in the screen will not significantly affect weight (Algaze 1990:215). Sherds that joined were recorded as one item. For example, a whole jar, even if smashed into 100 pieces, was recorded as one 'piece' of ware X, functional category X, and thickness X.

[17] These categories were modeled on the Kurban groups, since the assemblages are very similar (Algaze 1990:312). The thickness categories for wares 1, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 18, 19, 20, 21, 22, 23, 24, 25, 26, and 27 are: thin: 0.25cm – 0.50cm; medium: 0.70cm – 1.30cm; thick: 1.70 – 2.40cm. The categories for ware 13 (metallic ware) are: thin: 0.3cm - 0.4cm; medium: 0.4cm - 0.5cm; thick: not recorded. The categories for cooking pots (wares 2, 3, 4) are: thin: not recorded; medium: 0.7cm – 1.30cm; thick: 1.60 – 1.90cm. I found that some sherds fell between categories 1 and 2, most likely from thinner jars. I recorded these sherds as thickness 1.5. Other sherds were thicker than standard category 2 examples, but not quite as thick as category 3. These sherds were assigned to category 2.5. In the end, the percentages of these additional categories were too small to register in comparative frequencies. In the tables presented here, thickness categories 1.5 and 2.5 were combined with category 2.

most thick sherds are large storage jars (or less often, bowls). Thus, the thickness category makes it possible to estimate functional categories from body sherds. Diagnostic sherds[18] were defined as rims, bases, handles, lids, stands, or spouts. Rims were assigned to functional categories defined by the Kurban system, but with modified numbering[19] (Figure 6.6) (see Algaze 1990:214).

The ceramic assemblage at Kazane belongs to a macro group spanning much of Upper Mesopotamia. In the mid and late third millennium, nearly all ceramics were wheel-made except for cooking pots, which were hand-made, and very large storage jars, which were coil or slab built with thrown rims. This assemblage is dominated by a non-descript ware, called "Plain Simple Ware," which generally lacks surface treatment or exotic temper (Figure 6.6:1,2,4-12). Cooking pot wares (Figure 6.6:13; 6.7:101) are the next most common ware after Plain Simple Ware, and a host of decorated or less common ware varieties round out the assemblage (Figure 6.7). For an extended discussion of the ceramic wares and their relation to chronology and the regional assemblage, see Appendix 2.

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[18] I assigned diagnostic sherds to a type in an emerging typology. Form is the primary determinate of type, with similar forms occurring in multiple wares. Sometimes type is a combination of form and ware, as is the case with cooking pots. Examples of each type were kept aside for comparison to ensure consistency in type assignment. Despite attempts at consistency, some types drifted while others were separated unnecessarily. As I became more familiar with the material processing progressed more quickly with a tendency towards lumping instead of splitting types. The allowable range of variation in diagnostic form was somewhat arbitrary, but informed partly by reference to published forms from Kurban and elsewhere. As noted by Algaze (1990:213) and Rova (2003:413), the mass-produced, wheel-made pottery tends to form distinct groups of shapes, while hand-made cooking pots have a wider range of variation. Nonetheless, some types have fuzzy boundaries that must be negotiated by the pottery processor (Rova 2003:398).

[19] Category 1 is assigned to cups and bowls that can be held in one hand. Category 2 is assigned to bowls for which two hands are necessary. Category 3 is assigned to large, "storage-sized" bowls, which were rare. Category 4 is assigned to small jars that can be handled by one hand. Category 5 is assigned to jars requiring two hands to lift. Category 6 is assigned to large storage jars that probably required two or more persons to handle, even when empty. Category 7 is assigned to diagnostics, including most bases and handles, that could not be assigned to categories 1-6. Category 8 is assigned to miniature vessels, category 9 is assigned to stands of all sizes, categories 10 – 11 are assigned to pierced and unpierced pot discs, category 12 is assigned to strainers, and category 13 is assigned to cooking pots of all sizes.

Ceramics: food storage, preparation, presentation and consumption

Considered as a whole, the primary context functional categories of the EBA *diagnostic* assemblage are dominated by small bowls at 80% (category 1), followed by medium jars (category 5) at 7%, and cooking pots (category 13) at 5% (Figure 6.8, trench 'all').[20] Other functional categories are barely represented at less than 2.2%. These proportions change little when priority 1 and 2 contexts are combined. When all priority 1 contexts sherds are considered by thickness, which is a proxy for functional categories 1+4, 2+5, and 3+6, thin sherds are most numerous at 55%, followed by medium thickness sherds at 39% and thick sherds at 6% (Figures 6.9, 6.10). Categories 1 and 2 even out when Priority 1 and 2 contexts are combined (Figure 6.10). Considered by trench, only Operations 2-5 have enough diagnostics to adequately compare functional categories. Small bowls are the majority in all of these trenches, and dominate in Operations 3, 4, and 5. Medium jars are the second highest category in Operations 2 and 5 and third highest in Operation 3. Cooking pots are minimal except in Operation 5, where they make up 5%, and Operation 7, where they reach 12%. When thickness is considered by trench (Figure 6.9), thin vessels are most numerous in Operations 3, 4, 5, and 7, medium thickness vessels are most common in J32 and Operations 1.2 and 2, and thick vessels are most common in Operation 1.1.[21]

What do these differences in functional category and thickness really mean? If we take the debris in the street in Operation 5 as a baseline for the area, the special function of Building Unit 8 in Operation 4 is highlighted by the relative abundance of small bowls and stands in this context, while the storage function of Building Unit 4 in Operation 2 is hinted at by the higher

[20] Although thinner, smaller vessels may be subject to higher breakage rates than thicker, larger vessels, the latter break into more pieces over time. It is not clear how these breakage rates and vessel size impact sherd counts.
[21] The high proportion of thick vessels in Operation 1.1 is skewed by the large storage jars smashed in one of the few priority 1 or 2 contexts in that trench.

than average amount of medium and large storage jars. The higher than average amount of cooking pots associated with Building Unit 7 may indicate that food preparation took place within or beside this structure. The dominance of small bowls and medium-sized jars throughout Area 1 is indicative of food or liquid consumption and storage, while the relatively small amount of cooking pots in most contexts suggest that cooking was done elsewhere, as also suggested by the lack of hearths in any of these contexts.[22]

In ethnographic cases, cooking ware, storage jars, and "every-day" dishes for food consumption tend to vary little across elite and non-elite contexts (Smith 1987:311). In contrast, higher proportions of decorated or serving wares may indicate greater wealth (Smith 1987:312-314). As discussed in Appendix 2, EBA decorated wares come in two basic forms: painted (wares 8-11, 14) and reserved slip (wares 5-7) (Figure 6.7). Each decoration comes in a few variants or on different wares. In diagnostic forms, reserved slip only occurs on jars at Kazane. In contrast, painted vessels are mainly small bowls and small jars. Thus, reserved slip and painted vessels seem to have different primary uses: reserved slip is mainly for medium-sized storage jars while painted vessels are for serving food. Reserved slip also has a deeper history than band painted, combed wash, and Karababa painted wares. While the latter are hallmarks of the mid to late third millennium, reserved slip first appears in the late fourth millennium and continues across the early to late third millennium. In cultural terms, the two forms of decoration, painted and reserved slip, may have very different origins and meanings. For this reason I will treat them together as decorated wares, but also separately in case they yield different patterns.

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[22] This does not include the andiron context from Building Unit 1/2 (Figure 2.7:F). Data from this context are not included in the present study.

Small bowls dominate functional category proportions for diagnostic painted vessels in priority 1 and 2 contexts at 90%, with medium jars second at 7% (Figure 6.11b). There are just 4 reserved slip diagnostics, all medium jars (Figure 6.11c). Compared to their proportion of all sherds (Figure 6.11a), reserved slip appears underrepresented at the level of diagnostics. This is probably because painted vessels are often painted up to or on the rim while reserved slip rarely rises above the shoulder of the vessel to the neck or rim. Thus, rims of these reserved slip vessels do not always reveal their decoration. When we consider diagnostic painted wares by thickness for priority 1 and 2 contexts, 88% are thin and 12% are medium thickness (Figure 6.11e). When we include body sherds and consider thickness by all priority 1 and 2 contexts, painted sherds are 82% thin and 18% medium thickness, and reserved slip sherds are 53% thin and 46% medium thickness (Figure 6.11d, 6.11f). The surprisingly high proportion of thin sherds in the reserved slip assemblage is due mostly to sherds from one or two unusually thin jars from J32 (32 sherds) and Operation 2.2 (103 sherds). Although I could not definitively determine that these sherd concentrations restored to single or double vessels, they clearly derive from thin, medium-sized jars, not bowls. This raises the possibility that some reserved slip jars were made of finer ware. When we account for the thin jars in J32 and Operation 2.2, the proportions of painted versus reserved slip ware reinforces the observation that reserved slip and painted wares occur in different primary forms.

Painted sherds make up 3.5%, and reserved slip 4.4% of all priority 1 context sherds (Figure 6.11a). These percentages drop to 2.8% and 1.7% in priority 2 contexts.[23] If we restrict the sample to diagnostics, decorated wares make up about 4% of priority 1 or 2 context sherds,

[23] In comparison, at Kurban Hoyuk, reserved slip wares make up 2%, and painted wares 0.6% of all sherds, (Algaze 1990: 351, tables 30a and 30b) (Figure A2.14a). Housing areas at Chuera have 0.5 – 2.5% painted wares, and 0.1 – 0.6% reserved slip wares. Compared to these sites, Kazane has a slightly higher proportion of decorated wares in both priority 1 and 2 contexts.

and 84 of 88 examples are painted (Figure 6.11c). Considered by trench, priority 1 and 2 contexts in J32 (7%), Operation 2.2 (6%) Operation 5 (21%), and Operation 7 (5%) have the highest proportions of decorated sherds (Figure 6.12). In all other trenches, decorated wares occur in proportions of 3.2% or less. The decorated wares in J32 are all reserved slip medium jars, and those in Operation 2.2 are mostly reserved slip medium jars. In contrast, 205 of the 302 decorated sherds in Operation 5 are painted[24] (Figure 6.13). If the debris in the street in Operation 5 is a measure of local access to decorated wares, then structures along this street, including Building Units 1 and 8, had much higher than average access to these wares (Figure 6.13). These decorated wares are also usually in the form of bowls for serving or consuming food. In ethnographic studies, relatively high proportions of decorated and/or serving wares indicate higher wealth (Smith 1987:312-314). In combination with the monumental size of the walls and structures in Area 1, the high percentage of painted wares in the neighboring street emphasizes the presumed elite or institutional use of these contexts, especially Building Units 1 and 8.

Prestige goods: metal items and imported goods

Although we might expect monumental structures like those in Area 1 to be the province of prestige goods, such as precious raw materials or finely crafted objects, these items are conspicuously absent in the finds. Due to their value, such goods, especially recyclable metals, are not likely to be left behind when a structure is abandoned, and if so, scavengers would remove all but the smallest of these items. These items are most likely to survive in tombs or

[24] A similarly high proportion of decorated wares are reported from the later phase levels of the monumental building in Area C (Wattenmaker 1997: 86). This later phase consists of poorer architecture, indicating that the building's primary use changed. Ironically, as the architecture declined, the building's inhabitants seemingly had greater access to painted vessels.

structures that collapsed suddenly in violent fires during a period of conflict when returning to excavate valuables from the rubble was not possible. Aside from some ritual inlays, discussed below, the only potential evidence of prestige goods is a metal pin and a metal furniture tack (Figure 6.14:389, 390). The pin, probably bronze or copper alloy, comes from the street in Operation 5, L11. The furniture tack, likely bronze with a gold foil covered head, comes from fill east of Building Unit 4 in Operation 2.2 (L36). This tack is tantalizing evidence for a piece of fine furniture that may have adorned one of the structures in the area, while the pin held in place common garments of the period (e.g Klein and Orthmann 1995: Abb. 36:16-19; Orthmann and Pruss 1995: Abb. 73: 73).

In addition to prestige goods, we expect elites or institutions to have greater access to exotic goods in general. At Kazane, the only evidence for foreign contacts is in the form of imported ceramics. In contrast to metal goods, exotic ceramics are not recyclable when broken or discarded. This means that they are more likely to show up in the archaeological record, and relative frequencies may highlight wealthier or well-connected sectors of a site. Although chipped stone and "every day" ceramics may have been imported, the vast majority of these items are identical across wide regions, making them common, not exotic. The only clearly exotic items at Kazane are three imported ceramic wares (Figure 6.15). These are ware 14 (Karababa), which comes from the lower Turkish Euphrates Valley a couple days journey to the northwest (Figure 6.15:F-H), ware 15 (Karaz) which comes from much further away in the Trans-Caucasian mountains north of the Tigris River (Figure 6.15 A-D), and ware 27 (plaster-filled impressions) which has an uncertain origin but may also originate from the Karaz region (Figure 6.15:E) (Algaze 1990:333, ware 10; Kühne 1976: 104). Compared to the undecorated surface of most EBA ceramics, or the simple painted or reserved slip stripes or waves on simple wares, the imported wares bear striking decorations in the form of plastic geometric and curvilinear motifs (ware 15), painted designs (ware 14), and plaster-filled geometric impressions (ware 27). All examples come from jars, which provide a relatively large canvas for the decoration.

The distribution of these exotic wares at Kazane is very limited (Figure 6.16). Ware 27 only appears in a single sherd in subtopsoil in Operation 4. Ware 14 is found in fill in Operations 2 (2 examples), 4 (9 examples)[25], and 5 (6 examples). Ware 15 – Karaz ware – is only found on the edge of a surface exposed at the topmost layer of trench J32. Despite the small exposure and lack of any context connecting to the surface, the Karaz ware forms part of at least 3 and possibly 5 vessels, two of which restore enough to indicate that they are probably in their primary context.[26]

The quantity and distribution of metals and exotic wares is remarkably small considering the quantity of excavated material across the site. Although metals and other raw materials may be deposited in tombs, looted, or recycled, we would expect exotic ceramics to remain on-site. The lack of many exotic ceramics is probably indicative of the small role they played in elite exchange relationships. At the household level, it is likely that high quantities of decorated serving wares, such as those discussed above, may have been sufficient to honk the prestige horn at elite and institutional sponsored events. Despite this, it is tempting to view the concentrations

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[25] Although the sample size is small, the relative concentration of Ware 14 in Operation 4 echoes the concentration of terra-cotta wheels and incised stands in this trench, and lends further support to the presumed special nature of the structure in that trench.

[26] For further discussion of this ceramic group, see Sagona 1984; for additional parallels, see Hauptmann: 1982. The designs on these vessels have parallels at Pulur and Güzelova, among other sites. (Figure 6.15A, anchor: van Loon 1978: Plate 120:F; Figure 6.26B, square with hatched panels: Koşay and Váry 1967: Lev. VIII, XI; Figure 6.15C, concentric circles: Koşay and Váry 1964: Lev. XVI – XVIII; Koşay and Váry 1967:Lev. XXXII:3,5; XL). The rail-rimmed, globular shape of these vessels has parallels at the same sites and others, as for example the small knob handle or decoration (Figure 6.15D) that finds a parallel at Korucutepe (van Loon 1978: Plate 114:B). Notably, a very similar pot is known from Titriş Höyük from a potentialy mid EBA context (Algaze et al. 1995:39, 61, and Figure 37). As of August 2005, this pot is on display in the Titriş exhibit at the Şanlıurfa museum.

of Karaz ware in J32, and Karababba ware in Operation 4, as marking the owners or users of these structures as having special access to or uses for exotic goods.

Ritual activities

There are four categories of artifacts from Kazane that are related to ritual activities: 1) Incised, fenestrated stands; 2) Statue or figurine insets; 3) Figurines; 4) Terra-cotta wagon or chariot models. I will treat the distribution of each category in turn.

Stands

Incised, fenestrated stands are a distinctive form in the third millennium assemblage. These stands are generally tall, hollow cylinders open at the base and at the top. In some cases, the top is comprised of an integrated bowl fired to the stand.[27] These objects are often interpreted as offering stands or incense burners. Although third millennium fenestrated stands are found in a variety of contexts, they are often associated with temples. In Southern Mesopotamia, many of these vessels are found in temple contexts where they served as braziers, censors, or pedestals for other vessels, especially bowls (Delougaz 1952:42, 56, plates 17, 45, 65, 69a-b, 173). These objects are also found in cult contexts at the North Mesopotamia city of Tell Chuera (*Steinbau* I, Orthmann 1995b: Abb. 28:80-83; *Kleiner Antentempel*, Moortgat-Correns 1988b: Plan V, and Abb. 5 [*Vorläufiger Berich über die zehnte Grabungskampagne]*), and in later third millennium contexts adjacent to a temple at the site of Tell Halawa (Hempelmann 2004:Abb. 18). Although fenestrated stands are presumed to relate to rituals, there is no reason to assume that such rituals could only take place in temple sanctuaries, or that these objects could

[27] The third millennium fenestrated stands are related to a long tradition of house and tower models with fenestration, incised, excised and molded designs (Bretschneider 1991).

not serve as stands or braziers in the context of non-ritual activities. For example, at Tell Brak, fenestrated stands were found in several extra-sanctuary contexts, including a small processing room containing grinding stones, stone troughs and a drain (Oates and Oates 2001: p30, Figure 30; Figure 462:1594). Although this processing room may be associated with institutional structures, the room itself does not have any obvious ritual function. Fenestrated stands are also not confined to urban centers; they appear at smaller sites including Jerablus Tahtani and Kurban Höyük (Algaze 1990: Plate 74:A-C; Peltenburg et al. 1995: Figure 28:4).

At Kazane we found both simple stands and elaborate incised and fenestrated stands[28] (Figure 5.19, 5.20, 6.17). The simple stands are all variations on a basic, undecorated form under 10cm tall, consisting of a simple, beaded rim and base, with profile shapes ranging from wide to narrowed cylinders (Figure 5.19). Although such stands are quite small they are still suitable for holding medium-sized jars (see for example Moortgat-Correns 2001: Abb. 12). These round-bottomed jars would tip over if not set upon stands or divots in the floor. In contrast, large jars would be unstable sitting atop the tall, narrow, fenestrated stands. These stands probably supported bowls or trays, although some of the shorter, fatter stands could have supported jars if necessary.

Remarkably, of the 58 stands or pieces found during the 2002 and 2004 excavations, all but one[29] are from Operation 4 (Figure 6.18). The 57 examples from this trench include 16

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[28] None of the Kazane fenestrated stands have clear evidence of burning, or internal projections to support bowls that might mark their use as braziers or censors. The incised, fenestrated designs consist of the standard repertoire of impressed, incised and excised lines, circles, rectangles and triangles arranged in registers running around the stand. These designs are not staunchly symmetrical, although the horizontal lines dividing registers seem to be an attempt to establish a basic framework or layout for the larger design. In the simple design, rectangular holes are cut at alternating spaces along the registers and the space above and below them is left blank. In more complex examples, once the registers are defined they are filled in with Xs that connect loosely to form rows of diamond shapes. The triangular spaces between these Xs may be deeply excised, cut through to form holes, or simply impressed with circles.

[29] The lone exception is a small piece from mixed contexts in Operation 9.

simple, small stands and 41 incised or fenestrated stands from Building Unit 8. The northern room of this structure contained 5 incised and 4 simple stands, while the southern room contained 27 incised and 12 simple examples. One incised example was found east of the building, three were above surfaces west of the building, and five incised stands were found among the fill over the structure. Some of the examples in the northern room were found in plowed up surfaces in topsoil (Figure 6.17: 367), indicating that the latest (almost) preserved phase of this structure also contained stands. Most of the stands were found in fill and debris on the surface of the southern room. These include a single large stand nearly 90cm tall and complete except for its top (Figure 5.20).

The concentration of stands, especially fenestrated examples, marks Building Unit 8 as an exceptional structure. This collection of stands is certainly not a "household" assemblage, and likely belongs to a public institution, quite possibly a temple. Yet, without excavating the remainder of the northern room to learn if it contained an altar or shrine, we cannot determine if the building itself was temple or served as a storage facility. Notably, in addition to the stands discussed here, Operation 4 also contained sherds of other incised vessels (Figure 6.14: 419, 268), a variety of bowls (Figure 5.19), and a host of very small cups (Figure 5.19:129, 191, 193, 194, 671). These cups and bowls may be part of the temple ritual in which food is presented to statues of the gods. One can image the small stands serving as presentation pedestals for bowls of offerings, while the tiny cups held portions of special drinks.

Statue insets

We recovered several parts of figurines or statues from debris layers L6, 8, and 9, east of wall L7 in Operation 3 (Figures 5.12, 5.13, 5.14). These include four eye insets made from limestone. These insets (Figure 5:14: 199 – 202) are the pieces that go into the eye sockets of statues or figurines, often votive statues of worshipers, or statues of gods, found in temples. They have a drilled hole on the exterior to receive inset irises, but we did not find the irises, eyebrows or other eye-related pieces. Although the eyes of votive statues are often disproportionately large, the width of these insets, about double natural size, indicates that they come from relatively large, possibly life-size, statues. None of the insets show any evidence of bitumen or other means of adhering them to a statue, or adhering irises to their recesses. This may indicate that the insets were never installed. The eye insets also do not appear to be pairs because their form and profiles are different.

The eye insets were found in debris that contained a host of unremarkable bowls, jars, and cooking pots (Figure 5.14), but also several unusual items, including a button-shaped object with a central hole and radiating incised lines (Figure 5.14:203). This object is probably also an inset for statues, or possibly furniture. Other associated objects include a portion of a limestone disc (L9, RN 11885), an odd stone piece that may be a kind of mace head, or other tool or weapon (Figure 5.14:557) and a square, pierced potsherd (Figure 5.14:204), as well as some incised potsherds (Figure 5.31:336, 431). Notably, insets 200 and 201 were each broken into two pieces, but only half of each inset showed signs of burning. This indicates that these objects were burned or mixed with embers only after they were broken. Votive or divine statues are often disposed of in a ritual manner, through burial or incorporation into the structure of a ritual building, but it is not clear if every part of a damaged statue was considered essential to the object. Perhaps these debris layers were dumped during the cleaning out / scavenging of a nearby burned structure – most probably the structure in Operation 3. Thus, this or another nearby structure is likely a temple or related facility, or a place for the manufacture of ritual objects.

Figurines

Crude, terra-cotta human and animal figurines are common on Near Eastern archaeological sites in the third millennium. These objects filled a range of purposes, from simple toys to personal votives to objects of temple worship, and are found in a range of contexts from common houses to palaces and temples. Human figurines are often decorated and posed according to standard schemes. The standard forms and poses of some female figurines, described in various typologies (Badre 1980; Klein and Hempelmann 1995), are believed to relate to rituals about womanhood and motherhood (Yener 1990). At Kazane, we recovered 1 animal and 4 human figurines from third millennium, secondary fill contexts in Area F (Figure 6.14).

The animal figurine (649), from fill between the storage structures in Area F, consists of the hindquarters of an unidentified animal. The human figurines are somewhat more diagnostic. From Building Unit 4 of Operation 2.2 (392), we have a figurine torso with stub arms, cylindrical body, and impressed dots on the chest area that may indicate a necklace. This female figurine form has many parallels at Upper Mesopotamian sites.[30] A second female figurine torso, this one from Building Unit 5 of Operation 2.2 (391), consists of a rectangular body with two delicate, curving arms, rendered in relief, curving to embrace the chest. This figurine's pose

[30] E.g. Badre 1980: Plate 46:174 (Selenkahiye); van Loon 1988: Plate 176:36 (Hammam et Turkman); McDonald 2001:269 (Brak); Orthmann and Pruss 1995:Abb. 68:31 (Chuera); Moortgat and Moortgat-Correns 1975: Abb. 24 (Chuera) [The fragmentary segment from Kazane (Figure 6.14:392) is nearly identical to the same part of this complete example from Chuera, which has a long neck and elaborate female headdress or hairstyle. The Chuera figurine is especially notable for its clearly modeled legs and buttocks, rather than the more typical simple cylinder or shaft that forms the base of many of these figurines].

– hands clutching the breasts – is believed to relate to personal fertility rituals. This figurine form is a well-know type with a wide distribution.[31]

We found two additional figurines in Operation 4. The first, from fill over the structure (659), is the torso portion with impressed circles around the front of the neck and fingernail impressions in a line across the chest between the arm stubs. These circles and fingernail ticks likely represent necklaces or body decoration (e.g. tattoos, scarification) and are attested in similar examples at many sites.[32] Since the breasts are not emphasized or marked in any clear manner, it is possible that this figurine is male. The second figurine from Operation 4 also comes from fill above the structure (556). This figurine is mold-made, a common technique of the 2nd millennium, and is therefore intrusive or represents the last use or abandonment of the plowed-out uppermost layers of the structure. This figurine consists of the nude lower body – hips and legs but no feet – of a female figurine with a flat back, set against a flat background. Its upper body was probably set in the standard second millennium pose in which the individual's arms are bent and the hands clutch the breasts. Similar figurines appear across Upper Mesopotamia in the second millennium.[33]

The two figurines from Operation 2 were found within the confines of the structure, but in room fill. It is therefore likely that these objects do not belong to the use-phase of the structure, and personal votive artifacts would be more at home in a domestic or public cult context, not a grain or bulk goods storage facility. The figurines from Operation 4 are perhaps closer to their original context, if that structure is a temple or related building. Yet, their location

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[31] E.g. Braidwood and Braidwood 1960: Figure 370 (Amuq); van Loon 1988: Plate 177:52 (Hammam et Turkman); Orthmann and Pruss 1995:Abb. 65:6 (Chuera).

[32] E.g. Badre 1980: Plate 14:79 (Ebla); Braidwood and Braidwood 1960:Figure 368 (Amuq); Fugmann 1958: Figure 64 (Hama); van Loon 1988:Plate 176:41 (Hammam et Turkman); Orthmann 1989:Abb. 26:1, 2, 7 (Halawa).

[33] E.g.: Badre 1980: Plate 8:10-11 (Kamid el-Loz), Plate 36:9, 12 and Plate 37:14-17 (Meskeneh-Emar), 16; van Loon 1988: Plate 177:55 (Hammam MBA).

in high fill levels, and the probable later date for the nude torso (RN 10608), suggests that these figurines are intrusive and/or do not date to the main occupational phase of the building. Nonetheless, these figurines indicate that the residents of Kazane participated in widely shared personal and public religious beliefs and ritual practices.

Terra-cotta Wheels

Terra-cotta wheels are found at Bronze Age sites across the Near East.[34] Although some of these wheels may have served as spindle whorls, those with clear hubs mirror wheels found attached to clay chariot and cart models. Such models may in some cases be toys but they also occur on cult objects, and chariot models that include ritual iconography (Stone 1993). At the city of Mashkan-shapir in Lower Mesopotamia, a high concentration of model chariots was found during surface survey in an administrative area (Stone and Zimansky 2004:375), and many of these wheels or carts were found in the palace and temple areas at Tell Chuera (Orthmann 1995b:Abb. 18:30-41; Orthmann and Pruss 1995: Abb. 73:64-65). The Kazane wheels come from subtopsoil/fill in Operation 4 (Figure 6.14:656) and from the debris in a pathway just east of the structure in Operation 4 (Figure 6.14:655). These two examples of terra-cotta wheels are hardly enough to mark Operation 4 as an administrative or cult structure, but their significance is heightened by the high concentration of fenestrated stands in and around this structure.

Administrative activities

Administrative devices from Kazane include 14 sealings and a counting disc from Operation 2, sealing clay and a possible sealing from J32, and several unpierced pot discs that

[34] E.g.: Delougaz 1952:Plate 82; Fugman 1958: Figure 64 (Hama); van Loon 1988: Plate 181 (Hammam et Turkman); Oates 2001c: 284 (Brak); Yener 1990: Plate 155d-l (Kurban).

may be counting devices (Figure 6.19). The sealings and counting disc from Operation 2 are discussed in chapter 7; here I limit my discussion to the other administrative objects. The objects from J32 include a small piece of a possible sealing with a seal impression that is illegible (Figure 6.19:8318) and a piece of clay squeezed in someone's hand to give the negative shape of a fist (Figure 6.19:8221). The squeezed clay, from a pit full of ash, was low-fired, probably after discard. Its size, shape and the fineness of the clay, which shows fingerprints, are similar to sealing "nuclei,' which are clay balls prepared for making sealings but discarded without being used (Ferioli and Fiandra 1983:472-473).

We do not know the function of unpierced sherd roundels (Figure 6.6:11), but possibilities include gaming pieces, stoppers, or counting devices. Roundels pierced thorough the center are thought to be crude spindle whorls. The roundels at Kazane were all found in fill contexts. Given their highly portable nature, it is likely that pot discs from fill contexts are secondary deposits not necessarily associated with the use of the structure. There are ten unpierced pot discs from secondary contexts at Kazane, five from fill in and around the western structure of Operation 2 (L19a, 36, 50, 51).[35] Given the association of these pot discs with the storage jars in Operation 2, it is possible that they served as counting devices in this context. Yet, these objects were dispersed, rather than cached as we might expect if they were used for counting.

Production Activities

Evidence for production activities includes raw materials, such as flint cores, finished tools, such as grindstones, installations, such as ovens, and production debris, such as lithic

[35] The others are from L12 inside the structure in Operation 1, two from fill contexts in Operation 10, one from the soil around the drain (L13) in Operation 5, and one from the fill of the northern room in Operation 4 (L2).

debitage or ceramic wasters. In 1994-5, Dr. Patricia Wattenmaker uncovered numerous weaving tools associated with a large building in trench F14 (Wattenmaker 1998a:52-53), and in 2004 she uncovered an andiron in space F of building units 1-2 (Wattenmaker, personal communication), but there is little evidence for production in the trenches excavated for this dissertation. We did not recover any ceramic wasters in the new excavations, although a farmer found a cemented stack of mid third millennium bowl wasters just west of the base of the tell in the vicinity of Operation 9. The little production evidence we do have is mostly confined to spindle whorls from scattered contexts, chipped stone, and grindstone fragments.

Textile production tools

Aside from the weaving tools discussed in the previous paragraph, evidence for spinning or weaving at Kazane consists solely of crude spindle whorls made from sherd roundels, and a few limestone weights. Sherd roundels or pottery discs are broken potsherds that are reused for various purposes by roughly or finely rounding the jagged edges. There is just one object from a good context in Area 1/F that could be interpreted as a spindle whorl. This is a pierced potsherd (RN11728) from the smashed remains of a storage jar (L60) in the southern room of Building Unit 4 of Operation 2.2. Given its context, it is safe to assume that this object is intrusive and not indicative of activities taking place in this storage facility. There are three objects from the tell that are possibly related to textile production. The finds from secure contexts in trench J32 include two pierced limestone discs (Figure 6.19:8175, 8215) that likely served as weights or spindle whorls, and a pierced ceramic disc that may be a spindle whorl (Figure 6.19:8268). The limestone discs come from surfaces and indicate production activities in the context, while the possible clay spindle whorl and sealing come from brick debris contexts, and may be intrusive.

chipped stone[36]

Although the third millennium is the first part of the *Bronze* Age, chipped stone tools were still a significant part of the toolbox used in craft production as well as the animal and grain economies (Figure 6.20). A variety of flake tools were used for cutting, scraping, defleshing, drilling and other tasks. Long blades were also used for cutting or set into bone handles to make sickles, while flakes and/or blades were set into boards to make threshing sledges. Individual households made some of these tools locally, but others, such as long, standardized "Canaanean blades," were made in specialized workshops like the one found at Titris Höyük (Algaze et al. 2001: 37-44; Hartenberger, Rosen and Matney 2000). Given the large quantity of cores and other raw materials found at Titris, such workshops clearly supplied a vast market, and blades from Titris may have been exchanged with Kazane. Patterns of chipped stone from Kazane may indicate production contexts, activity areas, or participation in a specialized network of chipped stone procurement.

Dr. Britt Hartenberger analyzed the chipped stone from Kazane, and the present summary is derived from her more detailed report (Hartenberger n.d.). Aside from a few exceptional obsidian examples that may have come from earlier Halaf deposits, all of the EBA chipped stone tools are made from various varieties of flint. Dr. Hartenberger processed a total of 1163 pieces of chipped stone from priority 1 and 2 EBA contexts. Of this sample, 61% were flakes, 15% were tools, 10% were cortical flakes, 7% were chunks, less than 3% each were blades, cores or chips, and less than 1% were core trimming elements (CTEs) (Figure 6.21). This percentage of cortical flakes, and the percentage of core trimming elements, are similar to those found in EBA domestic contexts at Titris Höyük and Kurban Höyük (Hartenberger 2003: 169-173). Of the 34

[36] I thank Dr. Britt Harbenberger for reading a draft of this section and offering valuable corrections and suggestions. Any remaining errors are my own.

cores, 33 were flake cores and 1 was a blade core. Of the 28 blades, just 4 were Canaanean blades, 3 of which were found in Operation 4. Although these numbers are too small to be statistically significant, the concentration of Canaanean blades in Operation 4, which also contained a high concentration of plain as well as incised and fenestrated stands, suggests that these blades were used in ritual contexts.

In general, retouched or backed flakes are the most common tools,[37] although specific contexts have tool proportions that deviate from the overall pattern (e.g. Operations 2.1 and 5 have relatively high proportions of side scrapers) (Figure 6.22). The variety and ad-hoc nature of many of these flake tools reflects the variety of activities conducted across the site, and the proportions of tools at Kazane are similar to those found in domestic areas at Titris Höyük and Kurban Höyük (Hartenberger 2003: Table 6.2a, 6.3). The low amount of manufacturing debris[38] indicates that specialized chipped stone production was not conducted in any of the excavated contexts, but was likely confined to a workshop such as that found at Titris Höyük (Algaze et al. 2001: 37-44; Hartenberger 2003). Ad hoc tools would have been produced in unspecialized contexts throughout the site, perhaps leaving very little debitage in any one context. Although a blade and some raw material were found on the surface of the southern room of Building Unit 8, there are no statistically significant concentrations of tools *in situ* in any context. Thus, the pattern of chipped stone from the contexts described here is indicative of general participation in ad-hoc chipped stone production on site as well as consumption of specialist-produced tools imported from elsewhere on the site or in the region.

[37] Tools are defined as retouched chipped stone pieces (after Hartenberger 2003:171).
[38] It is also possible that finer mesh or wet-sieving would have recovered more lithic debitage.

grindstones

Grindstones are important artifacts because they are essential to many everyday and specialized activities, including food preparation and craft production. Grindstones are also relatively heavy, bulky, non-prestige items that are unlikely to be removed when a site or structure is abandoned, although one can imagine the best examples being scavenged for reuse. In the Kazane region, grindstones are made almost exclusively of coarse, vesicular, gray basalt, which is plentiful within a day's journey to the northeast, in a region of large basalt flows (See Lease and Laurent 1998: Figure 1). The grinding system usually consists of two pieces of stone, one that serves as the base or netherstone and the other as the handstone (Adams 2002: Figure 4.6). The netherstone may be a small or large block of stone, although larger examples are often saddle-shaped with a concave surface, a condition that evolves as they are progressively worn down. The material to be grinded is placed on the quern or netherstone and ground by pushing the handstone back and forth across the netherstone. Although many shapes for handstones are possible, and their final form depends on their use (Adams 2002: Figure 5.12), they are usually oval or circular, and planoconvex in section, with one flat, working side (Jackson 2000). These shapes suggest that these handstones were paired with flat, concave or trough style netherstones (Adams 2002: 103-114). Mortar and pestle tools appear alongside querns and handstones, but in much smaller numbers.

Grindstones are not very common in third millennium contexts at Kazane, only appearing in primary or secondary contexts in Operations 2 and 4. Although these grindstones are fragmentary, they seem to be parts of handstones or small netherstones, rather than large saddlequerns (Figure 6.23). In Operation 2.2, two grindstone fragments[39] occurred in the fill

[39] These are: L50, RN 11084 and L51, RN 11065.

inside and next to Building Unit 4, while one possible pestle was found on the floor of the northern room of the western structure (Figure 6.23: 584). In contrast to the small number of scattered grindstone fragments in Operation 2, where we might expect grinding equipment next to grain storage, there was a concentration of 18 grindstone fragments and one pestle in Operation 4, Building Unit 8. One pestle and one grindstone fragment were found in fill over the exterior surfaces east of the structure,[40] and the rest were found inside the southern room of the structure. Seven pieces of grindstone were found in the fill over the surface in the room (in L19 and L22), while ten pieces were found scattered on the surface of the room (in L29). All of these grindstones were fragmentary pieces of basalt, some quite eroded, while others preserved the full profile of the original object (Figure 6.23: 583, 586, 589, 590). Although these objects were on or near the floor of the room, their fragmentary nature indicates that most of them were probably dumped here rather than used here or stored for later use. Yet, the high concentration of grindstone fragments in this room is remarkable when compared to their near absence in third millennium contexts in other trenches. This concentration may indicate that this structure was located next to or was part of a facility that conducted activities involving grinding. Perhaps spent or damaged stones were 'dumped' into the storage room before making their way to an external garbage area. One clue to such activities may be an activity area found just west of the southwest corner of the structure. Here, we exposed a small room of an adjacent structure that contained an area of cobblestones covered with plaster (L16) (Figure 5.16). Similar features are found at other third millennium sites and may be associated with food processing.

[40] These are: L3, RN 10618 and L6, RN 10656.

Early Second Millennium (MBA) materials

Although the MBA materials are much smaller in number than their EBA counterparts, it is useful to consider their distribution to compare and contrast the two time periods. Changes in the use of space from the third to the second millennium may provide insight into the process of urban reorganization in across these periods.

MBA ceramics

MBA contexts are readily identifiable by distinctive ceramic forms, wares, and decorations. Vessel rims on MBA jars and bowls tend to have more elaborate shapes, including thickened rims with grooves, ridges, and wide ledges (Figure 5.24-25, 5.31-33). MBA assemblages have more medium and large bowls, and jars often have wide necks as holemouth 'barrel' forms become more common. Distinctive MBA decorations include incised combed patterns as well as wavy and horizontal grooves. Other common treatments include applied bands resembling rope, snakes, or simple bands. By sherd count, these decorations make up 1.3 – 2.39% of priority 1 and 2 MBA contexts. In terms of wares, Plain Simple ware continues in a slightly distinctive MBA version, chaff wares, including a mixed temper cooking pot, appear in much greater proportions,[41] and several distinctive EBA wares disappear, including Reserved Slip, Band Painted, Combed Wash, Karababa, or Metallic ware. Where these EBA wares appear, they may be considered extrusive within the context.[42]

Thickness categories show the composition of the MBA assemblage, which has 17% thin, 58% medium, and 25 % thick sherds by count (Figure 6.24a-b). This contrasts with the EBA

[41] For a more extended discussion of the MBA ceramics, see Appendix 2.
[42] It is also possible that such 'extrusive' wares or types are in fact part of the tail of the battleship curve that marks the waning production and consumption of these items.

assemblage, which has more thin vessels (44%) and fewer thick vessels (9%). Although these thickness differences are due in part to differences in context, the relatively small number of thin MBA vessels seems to be a general feature of the assemblage. The functional category proportions of the MBA assemblage support this interpretation (Figure 6.25a-b). For the MBA, category 1 comprises 25%, much lower than the EBA assemblage, which has 75% in this category. The MBA assemblage also has 21% combined categories 2 and 3, while EBA has just 3% in these two categories. Finally, the MBA has higher proportions of medium jars (category 5) at 34% (versus 12% EBA) and large jars (category 6) at 14% (versus 3% EBA). These differences suggest that in the MBA, food was served in larger bowls, or perhaps diners shared large bowls rather than using individual bowls.

The use of space in the different MBA trenches and contexts may be visible in ceramic functional categories and thickness. In Operation 6, cooking pots are poorly represented, but functional categories are similar to the overall MBA distribution, with small bowls at 33%, against 6% medium and 14% large bowls (Figure 6.25b). Large jars are plentiful at 24% against 18% medium and 6% small jars. Thickness of the assemblage is weighted towards medium (44%) and thick (40%) vessels. In Operation 8, thickness categories are dominated by medium at 73%, followed by thick (18%) and thin (13%). Functional categories, for which there are just 37 sherds, are weighted towards medium jars at 41%, with large bowls at 19%, large jars at 15%, medium and small bowls at 11% each and small jars at 5% (Figure 6.25b).

As discussed in Appendix 2, Operation 10 has higher percentages of plain simple ware than the other MBA trenches, and its three phases may span the end of the third to the early second millennium. Yet like the other MBA trenches, at 59 %, medium vessels dominate the thickness of the Operation 10 sample, followed by thin at 26% and thick at 14% (Figure 6.24b).

The highest functional category is medium jars at 47%, followed by small bowls at 31%, small jars at 11% and medium and large bowls at 11% combined (Figure 6.25b).

In sum, distinctive ware proportions, shapes and functional categories distinguish the MBA assemblage from the EBA assemblage. Particularly notable is a preference for larger bowls in the MBA assemblage, perhaps indicating changes in food presentation and consumption. Among the MBA trenches, Operation 8 has a slightly higher concentration of cooking pots, while the earliest phase of Operation 10 contains ware proportions closer to that of the late third millennium, perhaps indicating an earlier date for this context.

MBA chipped stone[43] and grindstones

The MBA chipped stone sample includes just 44 items, so patterns from any single trench are suspect (Figure 6.26). Overall, tools and flakes are the most common items, at 36% and 27%. Cores and chunks together make up 27% of the assemblage. Of the 15 tools, retouched flakes are most common (Figure 6.26). As with the EBA assemblage, the MBA sample shows the continued importance of both formal and ad-hoc tools, and indicates both specialized and in-home production.

The grindstones from the early second millennium are mostly fragments from secondary contexts (Figure 6.23). Two grindstone fragments and one pestle were found in fill in Operation 6, while one grindstone was found in a surface context. The only complete example of a grindstone from these excavations was found in fill near a surface in Operation 6, L19 (Figure 6.23: 587). In contrast, Operation 8 contained a large number of fragmentary grindstones. Three grindstones and one pestle were found in fill, three grindstone fragments were found in debris

[43] As above, the discussion of chipped stone (not grindstones) derives from the work of Dr. Hartenberger.

over the cobblestone surface L8, and 12 grindstones (9 basalt 3 limestone) were incorporated into the cobble surface L8sub1. The high number of grindstone pieces in Operation 8 most likely derives from reuse of available material to build cobblestone surfaces and crude walls. Finally, a single large quern from Operation 10, Locus 14 represents the only saddle quern from Kazane. This quern was found upside down and in association with burned organic material. The exposure of the findspot is too small to interpret with clarity, but the thin walls and ovens in the trench are indicative of domestic architecture and associated activities.

other MBA objects

There are very few objects from priority 1 and 2 MBA contexts. Two unpierced pot discs were found in Operation 10, Loci 7 and 15. A spindle whorl and an unidentified figurine fragment were found in fill in Operation 6 (L3). An unusual incised handle was found in Operation 8, L3 (RN 10508). Notable priority 3 context finds include a crude lion figurine from the ground surface next to Operation 10 (Figure 6.14:398). We found no evidence for administrative objects in MBA contexts.

Summary and Conclusions

In this chapter I attempted to date the contexts discussed here, and describe the use of space at Kazane through analysis of the character of architecture and the distribution of finds. The results of this analysis are summarized in Figures 6.27-28. Through analysis of ceramic wares, artifact distribution, architecture, stratigraphy and carbon dates, I determined that the primary phase of the structures in Area 1 and trench J32 date to the mid third millennium, while the last use of Operations 6 and 8, and the second two phases of Operation 10 date to the early second millennium. The earliest phase in Operation 10 may date to the end of the third millennium. Ceramic ware proportions and votive statues or figurines place the contexts from Kazane within the mid third and early second millennium regional assemblage. The differences between ware proportions, especially the higher percentages of decorated serving wares, may indicate that most of the Area 1 contexts at Kazane are elite or institutional in nature. This interpretation is reinforced by architectural analysis, which shows that the Area 1 structures have mostly very thick walls made from massive boulders. These structures are also larger than typical houses, or contain special groups of artifacts, such as storage jars or fenestrated stands, which mark them as non-residential. Although Building Units 1 and 2 share a central wall, most structures in Area 1 have monumental foundations, and all the structures in Area 1 share a similar orientation, the lack of strict structure dimensions, strictly parallel orientations, identical or shared foundations such as broad terracing, suggest that the buildings in this area were not built all at once, and were not built according to a "master plan" for the entire area.

Regarding finds other than ceramics, evidence for craft production is rare in any context, but a concentration of grindstones in Building Unit 8, combined with concentrations of stands, wagon wheels, bowls and cups, reinforces the special – possibly ritual – use of this or a nearby building for which this structures served as a storage facility. Aside from Building Unit 8, ritual activities are also evidenced next to Building Unit 7, while administrative activities are concentrated in Building Units 4, 5, and 6, evidenced by sealings and architecture. EBA domestic contexts are limited to a single room in Building Unit 2 (Figure 2.7, room F), possibly space 2 in J32 (Figure 5.37) an activity area (L16) next to Building Unit 8 (Figure 5.16), and domestic debris east of Building Unit 7. In contrast to evidence for craft production, ritual and administrative activities in EBA contexts, MBA contexts contain domestic architecture, features and finds. Due to the small exposures from this period, it is not possible to determine if the differences between these two periods are representative of the general trend across time, or derive from contextual differences between the architecture and finds.

CHAPTER 7

PROVISIONING CITIES I: STORAGE AT KAZANE AND OTHER URBANIZED STATES

Introduction

The remarkable storage facilities we discovered in Operation 2 demand further attention. In this chapter, I examine these facilities in the context of household and state storage facilities in the pre-urban and urban periods of third millennium Upper Mesopotamia. My goal is to identify the fundamental features and artifacts associated with such structures, and determine their role within the economy. Changes or differences in storage practices within and between sites may provide clues to socio-political conditions. After a review of several urban-period storage facilities, I discuss the two storage structures excavated in Operation 2 at Kazane. I discuss what the structures contained, who owned the stored goods, how managers controlled access to the goods, what the goods were used for, and how these factors contributed to urban administration.

Storage in Urbanized States

Across the range of social complexity, from small groups of hunter-gatherers to large urban populations, food storage is a key component of sociopolitical complexity. The ability to store food makes it possible for groups to exploit seasonally available resources year-round, remain sedentary for longer periods of time, dedicate labor to non-food producing tasks, and accumulate goods for trade (Ingold 1983). Extra food, or surplus, left over from basic needs, next year's seed, and spoilage while in storage, could be used by aspiring individuals or institutions[1] to acquire trade goods, fund workers for special projects, or cement social relationships and obligations through exchange. Even when surplus is not produced, storage is necessary because the grain harvest produces a large amount of grain that must be stored for use over the course of a year (Hunt 1987:175). Thus, storage, surplus, and the mobilization of stored goods through associated technologies are vital parts of the increasing social complexity that characterizes chiefdoms and urbanized states (Adams 1966:44-47; Child 1965: 30, 100; Earle 1997:70-71; Halstead 1989).

The kind of storage employed depends on the goods involved and the economic system in which they are mobilized. D'Altroy and Earle describe state finance systems as comprised of two key components: *staple finance* and *wealth finance* (D'Altroy and Earle 1985). After Polanyi (1968:321-327), staple finance involves tax, tribute, or produce from forced labor, in the form of "subsistence goods such as grains, livestock, and clothing" (D'Altroy and Earle 1985:188). These goods, which fund attached craft specialists and other state workers, are bulky by nature and require large storage facilities. In contrast, wealth finance is characterized by in-house production and collection, through trade and tribute, of portable items, made from precious materials, that require relatively little storage space when compared to bulk goods (D'Altroy and Earle 1985:188). Wealth finance goods are often used to pay state employees, and exchanged with the leaders of other polities or institutions to cement social relationships and obligations. Non-ruling or non-elite households with limited access to wealth finance goods may be expected to rely mostly on staple finance to support the members of their household.

In third millennium Mesopotamian states, staple and wealth finance systems were both in operation, and leaders pursued a combination of corporate and network strategies (Feinman

[1] State administrators may require households to produce surplus, obtain surplus through military actions, or produce their own surplus through agricultural intensification (Brumfiel 1994:5).

2001) to consolidate and solidify their power. As the larger cities at the center of these states pushed the productive limits of their agricultural and transportation technology, storage of staples was a vital means of protecting against famine in bad years and supporting the workers who were the backbone of the economy (Wilkinson 1994). At the same time, wealth finance was a critical part of maintaining fragile alliances between the many small, competing states throughout Upper Mesopotamia, and projecting elite identities locally. The specialists, attached or unattached,[2] who produced the goods that made up wealth finance, along with other laborers for the state, were paid with staple goods, mostly grain and textiles, from state coffers. These payments were made in the form of rations, which may have functioned as a kind of salary. Rations and independent production or barter filled household storage facilities, which operated alongside state storage systems and fulfilled many of the same needs. Household storage provided food for local consumption and seed for future planting. This storage may also have been a source of wealth for those who could amass a surplus to use in barter or exchange.

The immediate antecedents of mid third millennium urban storage in Upper Mesopotamia

The storage systems in use in the urbanized states of the mid and late third millennium have antecedents in the pre-urban periods. Although storage facilities, from simple pits beneath house floors to large buildings, are known from the Neolithic period onwards (Borowski 1997), I limit this discussion to large or dedicated storage facilities dating to the pre-urban and developmental urban period of the early third millennium. These antecedents are especially clear in the Middle Khabur River area, where several early third millennium sites have examples of storage facilities (Figure 7.1). These facilities take many forms, including silos, grill-plan

[2] That is, working as independent producers (unattached) or as dedicated employees of an institutional patron (attached). In practice, many workers may have worked in both capacities.

structures, and multi-roomed buildings. Silos, which often appear in groups, are distinguished by their height, narrow dimensions, lack of windows or doors, and sometimes vaulted structure, as found at Tell ‘Atij, Al-Raqa’i, and Kerma (Fortin 1998a, 1998b; Saghieh 1989; Schwartz 1994b:23). Grill plan structures consist of grill-like foundations for reed-floors that ventilate stored contents, especially grain. Grill plan structures are found at many sites, including Tell ‘Atij (Fortin 1998a), Tell Ziyadeh[3] (Hole 1999), and Tell Al-Raqa’i (Schwartz and Klucas 1998:199). A unique storage facility from Tell Al-Raqa’i consists of a large, round, thick-walled building with numerous small, disorganized internal subdivisions, including several silos (Schwartz 1994b). The contents of these and other storage structures or rooms are sometimes revealed by burned grain in situ, but usually the contents are not so clear (Fortin 1998a, b; Hole 1998; Schwartz 1994b). Sealings or counting devices are frequently found in association with these structures, further attesting to their use for storage (e.g. Fortin 1998: 19).

The somewhat unexpected finding of so many storage facilities at small villages along the Middle Khabur River, in a relatively marginal (dry) environment for agriculture, sparked debate about whether they stored grain produced and consumed locally, or shipped in from wetter regions to be processed and shipped down river to other polities. Based on their calculations that the storage structures at these sites were of larger scale and capacity than could be locally produced or consumed, Schwartz (1994b) and Fortin (1998a, 1998b) argue that these sites were collection and processing points for grain coming from northern polities, which was then shipped downriver on barges to support the large city of Mari (Fortin 1998a:19; Forgin

[3] Note that the excavators do not interpret this grill plan structure as a *grain* storage facility due to the difficulty of accessing the inner rooms, the lack of wall or floor treatment, and the height of the grill walls, which formed small rooms, not ventilated foundations (Hole 1999: 270).

1998b: 238; Schwartz 1994b:29). Thus, the storage facilaties were integrated into the extended supply network for developing urban centers.

Contra Schwartz and Fortin, Hole (1998) believes that the Middle Khabur storage facilities were for local use, not transhipment to external polities. Hole argues that the seemingly too-high capacity of the Middle Khabur storage facilities was necessary because in the dry climate of the region, crops were unreliable, so the village needed to maintain larger than normal grain supplies to protect against crop failure, drought, or storage losses (from rodents, etc.) (Hole 1998:278). Hole also argues that the grain stored at the Middle Khabur sites came not only from the surrounding fields, but from fields in the steppe west of the river, farmed by mobile herders who maintained important socioeconomic relations with the river-side villages. Thus, the large capacity of the village storage structures resulted from serving a greater population than the local farmland and number of houses in the villages would suggest, not from supplying cities downstream (Hole 1998:279).

In a third approach to the Middle Khabur village storage facilities, Peter Pfälzner (2002) argues that they were not for transshipment to outside polities, nor must they have served pastoral nomads. Using a range of ethnographic comparisons of storage practices, Pfälzner argues convincingly that the capacity of the storage facilities, which must have held other products in addition to grain, did not grossly exceed that necessary to feed the population of the village. Instead, the facilities at the Middle Khabur village sites served as shared, community storage depots. By community storage, Pfälzner means "The agrarian products of a community of a number of households [that] are stored in common, collective storehouses….erected, administered and protected collectively. No central administrative institution is necessary for them to function" (Pfälzner 2002:262). According to Pfälzner, the absence of storage rooms in the houses at Tell Al-Raqa'i implies that household storage was located in the communal facility, whose internal subdivisions were about the size of standard household storage rooms (Pfälzner 2002: 273). Pfälzner also argues that the round storage facility at Tell Al-Raqa'i, does not exhibit the formal architectural plan we would expect if it were built by and / or for the rulers of external polities such as Mari (Pfälzner 2002: 271). Regarding the seals, sealing and counting devices found at the Middle Khabur villages, Pfälzner notes that these items are frequently found in domestic contexts at sites across the region, and should not automatically be interpreted as evidence for centrally administered, redistributive storage (Pfälzner 2002:271-2).

A final comparative case of pre-urban storage systems comes from the small, 0.05 hectare[4] site of Tell Hajji Ibrahim, located about 1km from Tell es-Sweyhat in the western Euphrates valley. Excavations at this site revealed at least three early to mid third millennium buildings interpreted as silos for grain storage. The silos shared a standard internal space of 2.64m^2 and lacked ground-level entrances (Danti 2000:122, 131). One fully excavated example, silo III, was 4.60m X 3.80m with a single room measuring 2.20m X 1.20m. The mudbrick walls were 1.20m thick, had niches on two sides, and were mud plastered inside and out, while the floor was lime plastered (Danti and Zettler 1998:220). Although all of the silos had thick mudbrick walls, just two of the silos had substantial stone foundations, and one had external buttresses (Danti 2000:129). Although no seeds were found in the silos, grains were found on the floor of an associated structure that had grindstones, jars, hearths, cooking pots, and carbonized plant remains, including barley, set into or resting on its floors (Danti 2000:122-123; Danti and Zettler 1998:220). Unlike the Middle Khabur villages, tiny Tell Hajji Ibrahim was not associated with a sedentary village, was too far from the river for it to have reasonably served as

[4] This size corrects an earlier estimate (see Danti and Zettler 1998:Footnote 74).

a transshipment point for grain, and was abandoned just as nearby Tell es-Sweyhat began to urbanize (Danti and Zettler 1998:223). The excavators argue that this small site was a storage depot and processing area for transhument pastoralists farming small fields in wadis[5] in this very dry, marginal environment (Danti and Zettler 1998:223). If so, then these were truly community storage facilities in which grain was collected and processed at special sites near the wadiis, where a small group could guard it while the rest of the group moved with the herds.

Storage in the urban period

The cases discussed above are all examples of bulk storage facilities at rural sites in pre-urban or incipient urban period sites. The concentration of such facilities in the Upper Khabur may be the accident of discovery, or indicative of local adaptive strategies in that region. Nonetheless, these facilities show the range of storage solutions employed in this period. Peter Pfälzner (2002) tracks the development of state and household storage over the transition from pre-urban to urban periods of the third millennium in the Jazira of Upper Mesopotamia. He records that as cities and states developed in the mid third millennium, the communal storage facilities of the early third millennium were replaced by redistributive state storage facilities in cities, and household storage in individual houses (Pfälzner 2002: 281-282). Based on this change, Pfälzner argues that "kinship relations must have ceased to be the basis for community formation and economic organization" (Pfälzner 2002: 282). I believe this statement goes too far because it is conceivable that kinship continued to be the basis for sub-community formation, as in a neighborhood or sector in a city, or total community formation in small villages. The changes in storage practices are no doubt tied to changes in socio-economic organization, but

[5] A wadi is a dry river or stream bed which often retains moisture deposited by seasonal floods.

they may also derive from changes in the organization of space within increasingly larger urban settlements. Within the security of the city walls, protected by the state militia, the *security* of community storage, which Pfälzner (2002:263) cites as the main motivation[6] for such storage, would be diminished. Thus, individual households may be more likely to keep their stores "in-house" instead of in a single facility. The fundamental difference between "community" storage facilities in the early third millennium villages along the Middle Khabur, and later large storage facilities in cities is their function. Based on ethnographic analogies (Pfälzner 2002), in the village storage facilities, everyone contributed their products voluntarily with security as a primary motivation. Personal stores could be withdrawn from the group facilities whenever the owners wished. In contrast, urban, state-run storage facilities were filled with produce from state farms or transactions, or tax and tribute, and redistributed as rations or gifts.

Household storage in the urban period is evidenced by pits, small rooms, shelves, bins, niches in walls, pots sunk into the floor, seals or sealings, pottery vessels or divots in the floor for standing up round-bottomed vessels (Cooper 2006b; Pfälzner 2002). These features may be concentrated in specific rooms, or scattered throughout various rooms, as seen in both excavations and ethnographic studies of houses in the Near East (Kramer 1979: Figure 5.4; Kramer 1982a:105, 116). Even the "empty" or featureless rooms often found in excavations can belie their use at the micro level, where storerooms tend to have higher concentrations of rodent bones (Rainville 2001:74). An absence of these features or finds may indicate an absence of household storage. Alternatively, storage rooms may have been detached from the house and located in other parts of the village or city, as noted in ethnographic studies (Kramer 1982b:668).

[6] Here I do not consider other motivations, including: emphasizing community identity, or providing insurance against goods spoiling in storage (spoilage is shared among the group, so no family suffers more than another).

State storage is evidenced by many of the same features as household storage, but at larger scales and quantities, often within formal structures attached or adjacent to palaces or temples. Peter Pfälzner suggests that the degree to which urban residents depended upon rations for sustenance may be gauged by comparing the capacity of institutional storage facilities with evidence for household storage (Pfälzner 2002). These variables are difficult to estimate because it is seldom possible to determine the capacity or "normal" contents of storage facilities. Nonetheless, evidence for these storage systems comes from excavated structures and in texts excavated at sites across Mesopotamia. In the following sections, I examine both lines of evidence for state and household storage systems.

Textual references relating to state or institutional storage facilities in third millennium centers in Upper Mesopotamia

General accounts of the Mesopotamian political economy suffer from variable preservation of texts concerning different aspects of the economy (Yoffee 1995:282). Thus, hundreds or even thousands of years are generalized, with gaps in one period made up with texts from another period. To avoid this problem, I consider only the most relevant texts, those found at Upper Mesopotamian sites dating to the mid or late third millennium. The most numerous texts are from the major urban center Ebla, and the smaller city Beydar. These texts contain accounts of staple or wealth goods from institutional farms or factories, tribute, or tax, entering and exiting the stores of temples or palaces. It is not clear to what extent these texts are representative of the economic systems in place throughout Upper Mesopotamia, but they provide insight into the internal workings of some cities and states, and by inference, shed light on associated storage systems.

Ebla

Ebla is perhaps the most appropriate site for comparison with Kazane, since it was Kazane's peer as a major urban center. The Ebla texts include thousands of tablets and fragments found in various parts of Royal Palace G, which was destroyed sometime around 2300 B.C.E. (Matthiae 1986), possibly by Mari (Archi and Biga 2003). These texts record vast amounts of textiles, especially clothing, metal objects, raw materials and foodstuffs entering and exiting the palace administrative system and its storehouses. As Archi describes the system, it served to redistribute goods to government staff, including high officials and low-level laborers, but engaged in reciprocal gift exchange relationships with the leaders of other cities and their polities (Archi 1993:54-55).

The metal objects in the Eblaite economy include a wide range of weapons, jewelry, religious objects and miscellaneous equipment, produced by craft specialists attached to the palace. In an example of wealth finance, gifts of single objects, such as bracelets, pendants, earrings, daggers, swords, belts, vases, bridles, and votive statues, or small amounts of special staples, such as olive oil, were given to gods, local or foreign royals or officials and their families (Archi 1991; 1993:49-50). The same range of recipients were given cloth in the form of three-piece garments, while lesser staff received lesser clothing or lots of wool, sometimes listed as "rations" (Archi 1993:50). In return, the palace received similar gifts, each in small quantities, indicating that their primary function was not economic, but for cementing sociopolitical relationships (Archi 1993:50, 54). Notably, silver was the standard of value, with goods often listed in official records by their value in silver. Silver was also used to purchase goods, both high value objects and basic necessities, such as clothing (Archi 1993:52).

Staple finance at Ebla is apparent in the lists of rations given to palace personnel and their dependents or staff, including groups of semi-free laborers, called guruš, as well as gods (Davidović 1987, 1988; Milano 1987:538-539). Food rations, which were calculated daily or monthly, included grain, and processed food such as flour, bread, or a kind of drink (Davidović 1987; Milano 1987: 520, 528). Non-food rations included basic clothing for workers (Archi 1993:50). The relative amount of goods given to various officials or workers provides insight into their rank in the administration (Davidović 1987; Milano 1987:544). The stock for the rations derived from extensive state land holdings broken up into farms and villages where part or all of the produce, reaped by corvée labor, was directed to state coffers (Archi 1982: 214-215). State herds also provided large quantities[7] of animals for sacrifice in the temple, consumption in the palace, and provisions for traveling state officials (Archi 1982:214).

Textual references to specific warehouses at Ebla do not describe the structures or techniques used in their construction. Spaces mentioned include a warehouse for storing metals, including bronze, gold and silver bars, a space for storing oil, and a "wool-house," which contained textiles but also valuable objects, including gold items (Archi 1982: 210-211).

Beydar

In contrast to the thousands of texts from the palace at Ebla, which address a wide range of activities associated with the administration of the state, the provincial city of Beydar has thus far yielded 216 texts or inscribed bullae or other objects, most of which date to about 2400 B.C.E. (Lebeau 2004:1). The largest number of tablets (140) was found in a small building in a residential quarter (Ismail et al. 1996:31-32). The next largest number of tablets (19) was found

[7] According to Archi (1982:214): "The overall totals [of livestock] vary from month to month between 800 and 1,500 head, with some highs of 3,500 and even 4,600 animals slaughtered."

in various parts of the central (palace) complex along with sealings (Lebeau 1996, 2004; Jans 2004). Aside from scattered isolated finds, the remaining epigraphic objects are a large group of 28 inscribed clay bullae, found with 30 sealings and a few tablets at the base of the glacis north of the palace among some enigmatic structures, presumably dumped from the palace above (Milano 2004).

Apparently, warehouses or storage spaces are not specifically mentioned in the Beydar texts, although their existence is implied by the vast quantities of rations given to various persons. The limited assortment of texts from Beydar consists mostly of texts related to the administration of sheep, goat and cow flocks, and lists dealing with grain production and distribution as rations for administrators and workers in a public household, as well as fodder for animals working in agriculture (Sallaberger 1996b; 2004). Although many professions are listed, including shepherds, messengers, gardeners, carpenters and watchmen, there are no references to persons working in grain processing, such as bakers, cooks, or beer brewers (Sallaberger 1996b:93-98). Also missing are craftspersons that create luxury goods from precious materials, for example blacksmiths or jewelers (Sallaberger 1996b:99). These omissions indicate that the archive is incomplete, belongs to just one sector of the administration, or that the economy of Beydar was comprised mainly of agriculture and animal husbandry (Van Lerberghe 1996a:112; 1996b:121).

Archaeological evidence for state or institutional storage facilities in third millennium cities in Upper Mesopotamia

Direct and indirect evidence for state storage is reported from several third millennium cities in Upper Mesopotamia. This brief review focuses on the architecture and technology of storage, as well as evidence for the goods stored. The reason for this review is to determine if there are general patterns of evidence for storage, and to assess the range of architectural forms and features that distinguish storage facilities. In general, wealth finance storage is difficult to 'see' because precious metals and stones are recycled (Postgate 1994a:227), looted during battle or after, and precious textiles decay.[8] Staple goods also decay, but charred botanical remains, residues, or the specialized containers and structures that hold them hint at their presence. Burned staples are not recycled or looted, large storage jars are too heavy to take along when a site is abandoned, and the special architectural form of storage facilities endures. Finally, the remains of clay sealings for doors and containers often identify storage areas, even if evidence in the form of goods or specialized architecture is missing. In the following sections, I discuss evidence for storage facilities at a group of well-published cities from across Upper Mesopotamia, including Tell Leilan, Tell Mozan, Tell Beydar, Tell es-Sweyhat, Ebla, Tell Chuera, and Tell Brak.

Tell Leilan

Located on the Upper Khabur Plain, this city expanded from 15ha to 90ha between 2600-2400 B.C.E. During this time, a circuit wall was added to surround a lower town consisting of planned, wide, straight streets dividing residential housing units (Weiss and Courty 1993:134-6). Urban administration at Leilan was apparently concentrated on the partially walled citadel, located just west of the center of the site (Figure 2.2). Excavations on the citadel uncovered a series of storerooms constructed prior to Akkadian administration in stratum 18 (about 2600-2500 B.C.E.) and rebuilt through stratum 14 (about 2400-2300 B.C.E.) (Weiss 2003:613). The

[8] Despite looting, prestige goods often survive in graves, which are not discussed here.

earliest structure consisted of three burned storerooms adjacent to a mudbrick platform supporting an altar with signs of burning (Weiss et al. 2002:2). Barley was the most common grain found in the storage area, where it was found on the floors of all three rooms, in adjacent hallways, and in large jars found in two of the rooms (Weiss et al. 2002:7). The barley was "semi-clean," containing significant amounts of chaff and weeds (Weiss et al. 2002:8).

The construction method for the storage rooms is not explicitly discussed, but from published photographs they appear to have mudbrick walls at least 0.50m thick, with the short walls of these rectangular rooms significantly wider than the long dividing walls (Weiss 2003:614, Figure 23). The floors appear to be mud or possibly plaster; it is not clear if the walls were plastered. The trenches over these structures cover $200m^2$ and although their volume is not specified, it is said to "represent one harvest," which must be a significant amount (Weiss 2003: 613; Weiss et al. 2002:4). After the city came under Akkadian administration around 2300 B.C.E., barley production increased, as noted from studies of excavated contexts, including a courtyard and kitchen associated with a large unfinished building on the acropolis (Weiss et al. 2002:8-10). The excavators believe that the city was shipping vast amounts of grain to the Akkadian heartland, perhaps via tell Tell Brak (Sommerfeld et al. 2004).

Tell Mozan

Tell Mozan is located in the Upper Khabur Plain, just on the Syrian side of the Turkish-Syrian border. This 135 hectare site consists of an 18 hectare tell, occupied mostly in the third and second millennium, and a lower town dating to the third millennium, when the site became a large city (Buccellati and Kelly-Buccellati 1997:60). Sealings with inscriptions found at the site identify it as Urkesh, well known from texts of the period. Excavations on the high mound uncovered a large structure, identified as a palace on the basis of sealings with royal inscriptions (Buccellati and Kelly-Buccellati 2000:135). One part of this palace, sector AK, part A-B, is interpreted as a storage room on the basis of thousands of sealing fragments found there, which date the structure to about 2200 B.C.E. (Buccellati and Kelly-Buccellati 2003:225).

The storeroom walls of AK, part A-B, are 1m – 1.25m thick,[9] bare (i.e. not plastered) mudbrick over relatively shallow stone foundations, and have an earthen floor (Figure 7.2) (Buccellati and Kelly-Buccellati 1995-96:4-5). The storage area in part A has internal dimensions of approximately 14m X 12m, or $168m^2$, divided into five square and two rectangular rooms.[10] Despite the many sealings found in this area, there is apparently no direct evidence for what was stored, although the excavators note that the frequency of large vessels is higher in this sector than in other parts of the palace (Buccellati and Kelly-Buccellati 2000:183). The other parts of the structure around the storage room include sector C, which is interpreted as an administrative area on the basis of tablets and installations found there, and sector D, interpreted as a kitchen because of a hearth and oven situated in the center of the main room.

Tell Beydar

Located in the Khabur Plains, Beydar is a circular city, with a 7 hectare tell in the center of a 22.5 hectare walled settlement (Lebeau 2006:101). Excavations on summit of the tell revealed an official building, probably a palace, associated with four buildings to the south interpreted as temples. These structures were inhabited for several phases between 2550-2400 B.C.E., (Lebeau 2003:21). Several storage facilities were associated with the temples and the

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[9] These dimensions are estimated from Figure 66 in Buccellati and Kelly-Buccellati 2003.
[10] See previous note.

palace, and a possible granary was found standing alone on the southeastern edge of the tell (Figure 2.3).

In phase 2 of the palace, two banks of rooms were tacked onto the western and eastern sides of the main structure (Figure 7.3). The smaller, eastern rooms (loci 6005, 6006, 6011, 6014), which were an average of 2.6m X 3m, were initially accessed by a single entrance to a middle room, which communicated with the other rooms down the line (Debruyne 2003:50). The external mudbrick walls of the structure were 1.4m – 1.6m wide, while the internal walls, which were gypsum plastered, were 1.2m wide (Debruyne 2003:50). At least one of the rooms had a plastered mudbrick floor (6005), while another room's floor received no special treatment (6006) (Debruyne 2003:50). Despite an absence of artifacts or other indicators of the rooms' function, the excavators suggest that this addition was for food storage (Debruyne 2003:50); the rooms' limited access, modular form, thick walls and lack of any installations may support this interpretation. The rooms' combined storage capacity would be 31.2m^3 if filled to 1m height, and 62.40 m^3 at 2m height. The ground-level entry and passages between rooms may limit the amount of floor space for storage, due to the need to keep an open passage. Notably, in phase 3, several large jars were found smashed in the debris in the room adjacent to the entrance to the eastern room block (Debruyne 2003:45). Although these jars may come from a second story, they may relate to the possible storage in the eastern block.

Another possible storage area associated with the palace consists of a series of four phase 2-3 rooms located on the east side of the street leading to the main entrance of the palace complex (loci 6079, 6080, 32912, 32906) (Figure 7.3). These rooms range in size from 9m^2 to 20m^2. The northernmost room is accessed directly from the street while the other three are interconnected and accessed via a street entrance to the second room from the north (Debruyne

2003:47). The excavators speculate that extra wide entrances (1.5m) of two rooms (32906, 32912), and stones protecting the threshold in another room (6079) were designed to ease the passage of large containers and protect the threshold from damage (Debruyne 2003:47-48). Based on their location along the main street leading to the entrance of the complex, these rooms may have received and processed goods coming into or leaving the palace.

Temple A is located across the street from the four rooms just discussed, but it is not accessible from that street. Instead, access is via a doorway at the end of a long side street. Directly opposite the temple on the south side of the street, and abutting two other temples to the south, are two phases of room blocks consisting of six main units. The earlier structure, 28m X 6.75m, contains six small rooms with an average size of 7.88m^2 and a total area of 47.25m^2 (Figure 7.4) (Lebeau 2006:114). The interconnected rooms, whose mudbrick walls are 1.25m - 1.75m thick, were accessed by a single entrance from the street via one of the center rooms (12549).[11] Although such small rooms with limited access seem to be good candidates for storage, a few of the rooms contained low, bitumen-coated platforms set upon earth floors, suggesting that their use included unknown production activities.

A second row of rooms, 19.7m X 9.0m, were built on top of the six rooms across from the temple. This second group, which was poorly preserved due to later pits, contained six long, narrow rooms, one of which was divided into two smaller rooms (Figure 7.5). With average dimensions of 6.5m X 2m, the rooms have a total area of about 78m^2. The mudbrick walls were 0.75m – 1.25m thick, and only two floors were preserved, one of baked bricks and another of plaster (Lebeau 2006:113). Although later pits destroyed much of the building, no entrances

[11] The thresholds for the easternmost two rooms were not preserved, so it is not clear how these rooms were accessed.

could be identified, and the reconstruction of rooms involves considerable guesswork, it's form and the lack of installations in the surviving parts make it a candidate for storage.

Abutting the southern side of the storerooms just discussed, the Beydar excavators found Temples B and C, which are situated opposite another bank of storage rooms accessed by a street branching from the main avenue to the palace (Figure 7.6). These rooms form several partially interconnected units that continue along the street to the west beyond the excavated area. These units, which have relatively thin walls of a meter or less thick, are divided into rooms, usually 12.5m^2 or smaller, that contained various installations and an average of fifteen storage jars per room (Suleiman 2007:86). Some of the rooms and floors were plastered, while others were beaten earth or paved with bricks or cobblestones. Although the contents of the storerooms are not known, another small building (15005) located west of Temple B contained grinding installations (Suleiman 2007: 87), suggesting that grain was stored nearby.

Another probable storage facility at Beydar is a large structure on the eastern side of the tell, which the excavators interpret as a granary dating to 2500 – 2400 B.C.E. (Figure 7.7). This building is 26.5m X 7.5m, and contains four 5m X 5m rooms in a line, separated by arched passageways (Sténuit 2003:243). The mudbrick walls of the structure are 1.30m wide and covered with mud plaster, while the floors are beaten earth with traces of plaster (Sténuit 2003:243-5). The thresholds between the rooms show no evidence of doors or other means of closure (Sténuit 2003:245). The sub-floor consisted of a grill-plan mudbrick foundation, which would have allowed air to circulate beneath the building to keep the contents ventilated. The building stood isolated from other administrative structures, adjacent to private houses and terrace walls on the slopes of the tell. When it went out of use, the building was filled with debris from elsewhere, rather than destroyed or allowed to collapse in place (Goddeeris 2003).

There were no artifacts or ecofacts in the Area E building to attest to its use. The excavators believe it is a granary, based on the following evidence: 1) The grill plan foundation beneath the floor; 2) The square rooms lacking windows, niches or installations; 3) The lack of built thresholds or doors between rooms; 4) The single entrance at one end, which would enhance security; 5) Its location on the eastern side of the city, on a street where caravans entering the town could deposit their goods or withdraw fodder for their animals (Sténuit 2003:248). The walls are preserved to nearly 3m high, and based on the shape of the arches between the rooms, the excavators estimate that the structure had a height of 5m and a flat roof. If filled with grain in containers, and the space within the thresholds is not counted, the structure could hold 100 m^3 at 1m height, and 500m^3 at the suggested maximum height. If the building contained bulk grain added through the roof, then the thresholds would be filled and add 15 m^2 to the area or 15 m^3 at 1m height, or 75 m^3 at 5m height.

With the exception of the granary in Area E, all of the storage facilities from Beydar discussed here are located in between or beside temples and a palace, leaving little doubt that these institutions managed their contents. Although we lack smoking-gun proof of their contents or in the case of the rooms south of Temple A, and the possible storage rooms surrounding the palace, their use as storage facilities, they clearly have special uses and their architecture strongly suggests that at least some of these rooms were designated for storage.

Tell es-Sweyhat

Tell es-Sweyhat is a 35 – 45 hectare site located on the east bank of the Euphrates in Northern Syria (Zettler et al. 1996:15). The sites consists of a 15m high, multi-period tell and a lower town dating to the later third millennium when the site expanded. Excavations on the tell in Area IV revealed several rooms, presumably associated with a larger institutional complex, set against the inner face of a possible defensive wall circling the tell. The walls of the rooms were "fairly flimsy," about 0.5m thick, plastered, with relatively shallow stone foundations (Holland 1976:49-55). The rooms contained a variety of installations, including plastered benches, niches, and platforms, and yielded evidence for metalworking, food processing (grindstones) and storage of various goods (Figure 7.8) (Holland 1976:50-51; Holland 1977:39).

Among the many rooms in the Area IV complex, rooms four, five, and six are particularly comparable to the storage facilities at Kazane. Room six ($14m^2$) contained numerous large jars, many of which have potters' marks and some of which contained carbonized grain (Holland 1976:55). Room four ($10.5m^2$) was probably used to store a variety of goods. This room contained large and small jars as well as bowls and metal objects (Holland 1976:57). Accessed from room four, room five ($5.25m^2$) served as a grain bin, evidenced by lots of carbonized seeds found on the floor (Holland 1976:58). More recent excavations uncovered a structure next to Area IV that contained many ovens and activity areas, leading the excavators to dub it the "kitchen building" (Danti and Zettler 2007:176).

Tell Chuera

Tell Chuera is a 65 hectare[12] third millennium city located along a tributary of the Euphrates in north Syria about 50km from Harran. Storage rooms at Tell Chuera appear in

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[12] The size of Chuera is reported to be 65, 80, and 90 hectares. From the published maps (Meyer 2006: Abb.2; Pruss 2000b: Figure 1), it measures closer to 65 hectares, and it seems that the larger figures were derived from the diameter without accounting for the actual shape (Meyer 2006:180; Orthmann 1997:491; Pruss 2000b:1431). Alternatively, the larger figures may include unreported extramural settlement considerably larger than the excavated area of the *Aussenbau* and *Stelenstraße* in area L.

palace and ritual contexts. Small storage rooms, marked by storage jars, flank a kitchen in Palace F (Figure 7.9:F). These rooms range in size from about 5 to 13 m^2. Access to these rooms is restricted either to a single entrance, or to navigating multiple adjoining rooms. Another storage area is in the complex of small rooms adjacent to the temple platform *Steinbau* I (Figures 7:9A, 7.10). North of this large stone structure are a series of small mudbrick rooms, one of which contained storage jars built into brick and plaster bases (room 118, 2.5m X 3m, Orthmann 1995b: 29-30, Abb. 9; Tafel 8b). Nearby rooms include an open area interpreted as a goods distribution area (room 111, Orthmann 1995b: 29, Abb. 9). Another small room, just 4m X 4m, contained 6 ovens for producing large quantities of bread (room 115, Orthmann 1995b: 30, Abb. 8, Tafel 9a).

Storage jars and production areas were also found throughout the small, mudbrick rooms adjacent to (but partially predating) *Steinbau* II, a gateway to the ritual area located just southeast of *Steinbau* I (Figures 7:9B, 7.11) (Klein and Orthmann 1995: 73-78, Building plan 13; Pruss 2000b: Figure 12). This area contained a number of storage jars, and an interesting series of small mudbrick rooms that comprised a bread baking operation. One small room, room 11, contained grain inside a pithos and a chute leading to the adjacent room, room 12, which contained a handstone and netherstone (mano and metate), a plastered work surface, and a jar that may contain flour. Both rooms had well-plastered walls and floors, and there was an oven built into the niche between rooms 12 and 13.

Ebla

The Bronze Age city of Ebla is located at the 56 hectare site of Tell Mardikh in western Syria (Matthiae 1981). Thousands of mid third millennium tablets from Palace G reveal details of the city's administration (Matthiae 1986). This same palace, which was destroyed ca. 2300 – 2250 B.C.E. (Matthiae 1986:53), and a second palace dating to the early second millennium (the "western palace") contained numerous storage rooms for raw materials, including foodstuffs and luxury goods, associated with rooms for processing goods (Dolce 1988, 1990). The storerooms occur in four groups: in the southern and central parts of Palace G, and in the northern and eastern parts of the Western Palace. Although the Western Palace postdates the period of this study, I include it here because its storerooms are similar to the hypothesized storage rooms uncovered in Operation 7 at Kazane.

The southern storage rooms of Palace G contained special features and installations, including niches in the walls, benches for jars, and in once case a podium with steps (Dolce 1988:37). This storage unit covered 83m^2 and contained 280 jars with a total capacity of 148 hundredweights of wheat or 175 hundredweights of oil (Dolce 1988:38).[13] Evidence for the goods stored include "vegetal residues, cereal seeds and olive pits" (Dolce 1988:38). The central storage rooms of Palace G contained low benches, clay room dividers, jars, and groups of cavities in the floor. Many grindstones and pestles were found in these rooms in association with carbonized vegetal remains. The medium jars from the central unit held 26 hundredweights of wheat or 30 hundredweights of oil, and the large jars held 94 hundredweights of wheat or 112 hundredweights of oil (Dolce 1988:38 footnote 14). Finally, the four storage rooms at the northern end of the Western Palace were associated with a room with grindstones for processing grains (Figure 7.12). This room contained 16 handstones and netherstones, *in situ*, set into plastered benches in what was clearly a workshop for intensive grinding (Dolce 1988: 43; Plate

[13] The medium sized jars held 46 hundredweigts of wheat or 30 hundredweights of oil, while the large jars held 94 hundredweights of wheat or 112 hundredweights of oil (Dolce 1988:38, footnote 14).

9.2). The eastern side of the Western Palace also contained at least five storage rooms (Figure 7.12).

Tell Brak

Located in the Upper Khabur plains, Tell Brak consists of a 45m tall, 43 hectare tell, where excavations revealed remains dating from the sixth through the second millennium (Matthews 2003; Oates et al. 2001; Schwartz 1997). Storage structures are noted for the fourth millennium (Emberling and McDonald 2001:22) but here I focus on mid and late third millennium storage contexts. The most appropriate comparison for Kazane is the "oval building" in area TC (Figure 7.13). This building dates to Brak phase L, or Early Dynastic III, and was burned down around 2350 B.C.E., presumably by the Akkadians (Emberling and McDonald 2001:21; Emberling and McDonald 2003:38-39). The structure has a room with ovens for making bread, (room 2), and a room with bins, plastered work surfaces, jars, a grinding slab, and a grinding stone for processing grain or other food (room 1) (Emberling et al. 1999:11-12). As of 2002, over 250 sealings had been found throughout the building (Emberling and McDonald 2003:39).

The oval building contained a lot of burned grain, mostly cleaned barley (Hald 2001:42). In one room, barley was found in the process of being cleaned when it burned. Two late additions to the structures, rooms 7 and 8, contained burned barley and are interpreted as storage rooms. Both rooms had mudbrick walls about 0.75m thick, [14] apparently not plastered, and earthen floors. Room 8 is 3m X 2.5m, or 7.5 m^2, and room 7 is 3m X 3m or $9m^2$.[15] A "string" sealing was found in room 7, and four "test strip" sealings were found in room 8 (Emberling and

[14] This figure calculated from Figure 8 in Emberling and McDonald 2001.
[15] See previous note.

McDonald 2003:43). The excavators believe that the cooking, grinding and storage facilities are too extensive for even a large household, and must belong to a temple or palace complex not yet uncovered (Emberling and McDonald 2003:1).

Summary and Conclusions

The combined evidence from the examples discussed above indicates that state and institutional storage facilities are often located in close proximity to temples and palaces, facilities for grain processing and food preparation, and probably ration distribution points as well. The storage facilities discussed here do not have a single common ground plan, but some patterns are apparent. Whether small or large, storage rooms are often windowless and have limited entry or exit points. Storage rooms often have thick walls but can also have thin, even flimsy walls, which may or may not be plastered. In some cases, such as silos, thick walls likely served to contain the weight of the grain, while in other cases thick walls were probably just part of the monumental aesthetic of the institutional architecture. Floors in storage facilities range from stone to plaster to dirt, and rooms often contain installations such as benches, niches in the wall and divots in the floor, but lack hearths. Some storage spaces are 'just rooms,' that contain jars, other containers, or simply bulk goods. These rooms may be modified by the addition of installations to support jars or contain raw materials. In contrast, other storage spaces, such as silos or granaries, are special purpose buildings built specifically for storage. These structures may be especially visible and their contents discernable to persons on the street, including invaders who might want to steal or burn these goods. Perhaps this explains in part why many of these facilities burned, including Building Units 4 – 5 at Kazane, Palace G at Ebla, the storehouses on the tell at Leilan, portions of Area IV at Sweyhat, the oval building at Brak, and the area of *Steinbau* I at Chuera. Finally, we often find jars or the remains of stored goods in every part of storage facilities, including courtyards, entry corridors and passageways. Thus, when we calculate storage volume, we should not exclude exterior or transitional spaces.

Archaeological evidence for household storage in third millennium Upper Mesopotamia

Household storage is somewhat less varied than institutional storage. Thus, I will only examine a few examples of household storage to compare and contrast with state storage. One example is from a city and the other is from small town.

Titriş Höyük (mid to late third millennium)

Titriş Höyük is located on a small plain along a seasonal tributary of the Euphrates River about 45km north of Kazane. In the mid and late third millennium this city grew to 43 hectares around a small earlier settlement mound. Excavations at Titriş focused on domestic housing dating to the late third millennium, and revealed the complete floor plan of numerous houses. Each house had its own storage room or rooms (Figure 7.14) (Rainville 2001: 252). These rooms were generally relatively small, just a few meters wide or long, and had mud floors and mudbrick walls. Storage jars found in a storage room in at least one house have potters' marks (Matney et. al 1997: Figure 17). In addition to household storage rooms, storage pits and at least one possible silo were also found in the late third millennium town. One silo "consisted of a 5 meter wide pit cut into virgin soil with carefully plastered sides and a flimsy stone and mudbrick superstructure" (Algaze et. al 1992:37). The silo contained ashy soil but apparently no seeds of other evidence of its contents.

Tell Bderi (mid to late third millennium)

In the mid third millennium B.C.E., Tell Bderi was a small, 6ha town on the Middle Khabur River (Figure 7.1) (Pfälzner 1986/7, 1988, 1989/90; 1993). Exposures of numerous houses at the site reveal that household storage took place in "proper storage rooms…usually rather small rooms associated with the living room or the courtyard. The only installations in these rooms are shallow depressions or a circle of mud-bricks in the floor designed to hold the round-based storage pots typical of the EBA" (Pfälzner 2002:274). As in the ethnographic examples cited by Pfälzner, these rooms were often completely filled with stacked pots (Pfälzner 2002:274). Households at Bderi also contained storage pits, bins, and shelves (Pfälzner 2002:274). These features probably stored many different goods, but when grain was found, it was uncleaned, suggesting that it did not come from rations, but was gathered independently by the households (Pfälzner 2002:278).

Summary and Conclusions

The two household storage examples discussed here are indicative of the general pattern for this level of storage.[16] Household storage is marked by small rooms without hearths, but with features such as niches in the wall, mudbrick or clay bins, and divots or installations on the floor to support storage jars. Storage jars, rodent bones, or charred cereals provide evidence for the contents of household storage rooms. Although these rooms are often quite small, ethnographic studies show that by stacking jars to the ceiling, (Pfälzner 2002:274) or hanging bags from the ceiling, it is possible to cram quite a lot of goods into these spaces.

[16] See also Lebeau 1993.

Storage at Kazane

The examples discussed above provide a picture of the kinds of storage facilities in state, institutional, and household contexts during the third millennium. In light of these storage examples, I will now examine storage facilities at Kazane. The majority of the evidence for storage at Kazane comes from elite or institutional contexts. The clearest contexts are two adjacent storage structures, Building Units 4 and 5, in Operation 2 in the heart of the southern part of the city. A third possible storage structure is located east of these two structures in Operation 7. Two large storage jars and associated vessels mark a storage room in Operation 4, while similar large jars outside Building Unit 2, in Operation 1.1, point to another storage space. The architectural details of these storage spaces are discussed in chapter 5. Here I expand my discussion of the facilities in Operation 2 (Figure 5.8), taking a closer look at their volume and contents, how they were managed, who controlled access to their contents, and how the distribution of their goods contributed to the urban economy.

Operation 2: The Eastern Structure *(Building Unit 5)*

Building Unit 5 consists of a single room with about 100 m^2 of internal space. The mudbrick walls of this structure are 1.25 – 1.40m thick, and plastered on their inner face. The floor is also plastered, and carefully prepared with a cobblestone subfloor over deliberate fill. The building contained collapsed, burned mudbricks, large quantities of burned barley, and two sealings.

Contents of the storage structure

According to an analysis conducted by Dr. Naomi Miller (Miller n.d.), the barley from this structure is two-row, hulled barley, suitable for animal fodder, or food such as flour or beer (Figure 7.15). The barley was cleaned, did not contain any parts of the stalk, and was not mixed with significant quantities of other weeds or cultigens. Cleaning of grain prior to bulk storage is common in regions with dry summers (Hillman 1981:138). It is not necessary to clean grain for animal consumption, suggesting that the barley in Operation 2 was stored for human consumption (Hald 2001:45), although some ethnographic studies indicate that grain *is* cleaned for animal fodder (Jones 1998). Cleaned grain, while lower in volume, is more difficult to store than unprocessed grain, because the latter has more natural protection from heat, moisture and insect damage (Sigaut 1988:6). Nonetheless, in dry areas, where moisture is less of a concern, grain is often stored clean (Hillman 1981:138). It is possible that the grain was stored in bags, rather than directly on the floor, but aside from one possible bag sealing, (see below), we found no evidence for containers, shelves or installations in the structure.

Besides the barley, other lines of evidence support an interpretation of this building as a storage structure. The thick, plastered walls, deep stone foundations, hard plastered floor, firm cobblestone subfloor set upon well-draining fill layers, and lack of many passageways, would resist the entry of rodents, moisture, and light, and support the tremendous weight and pressure of the grain (Hunt 1987:179). Bulk grain is semi fluid, and exerts extremely high pressure and friction against the walls and floors of storage facilities. Barley exerts a pressure of 689kg/sqm (Gentry 1976:4), and the eastern structure in Operation 2 was designed to withstand such pressure without the walls giving way, the foundations sinking or the floor buckling.

Despite such efforts, rodents apparently managed to infiltrate the structure, as we found several rodent skeletons and droppings among the burned grain.[17] Although rats can eat up to 10% of their weight in food daily, even small mice cause great damage to grain supplies (Harris and Baur 1992:395). Their urine fouls grain, and their droppings, which they leave at a rate of about 50 per day, are about the same size as grain, making them difficult to remove by sieving (Harris and Baur 1992:398). Although mice only fully consume about 70-100 whole grains per day, they nibble and discard considerably more (Harris and Baur 1992:405).

Pfälzner (2002:269) argues that in ethnographic cases from West African villages, grain storage facilities are rarely filled to the roof, and "in any semi-arid region storerooms would be full only in exceptional years with extraordinarily rich harvests." Yet, an institutional, urban storage facility such as Building Unit 5 at Kazane, would have received its grain from a variety of sources, including public and private farms, both from tribute and land rent. Thus, the Kazane granary is perhaps more likely to be filled to the roof than a village granary, which relies solely on the local harvest of resident households. On the other hand, Kemp (1986:130) asserts that state granaries in Egypt were unlikely to be filled to the roof due to the difficulty of doing so, especially if the structures were accessed through a door or window rather than the roof. We do not know the location of the access point for the Kazane storage room, so a working assumption is that it could have been filled to at least 1.5m, which would be 0.5m higher than the height of the surviving walls.

[17] Rodents are represented by 76 bones (NISP) that have an MNI of 16 (see chapter 8 for more details).

The role of barley in Early Bronze Age economy

In antiquity, barley was grown extensively in Mesopotamia because it requires less water than wheat and can be grown in the poor, alkaline soil common in the dryer parts of the region (Oppenheim 1977: 314-315). Barley also has a shorter growing season than other grains, and gives high yields despite inter-annual variability in precipitation (Powel 1985:16; Weiss et al. 2002:9). According to Bronze Age texts from both Upper and Lower Mesopotamia, barley was used for brewing beer, making bread cakes, or animal fodder for sheep, goats and cows (Milano 1987; Postgate 1984, 1994a:179, 193, 218, 236; Sallaberger 1996b:99). Although wheats and pulses were also grown, barley amounts are by far the largest listed and most frequently mentioned in texts from both Upper and Lower Mesopotamia (Davidović 1987; Powell 1984:49; Widell 2003: 726). The importance of barley as seen in texts is confirmed by multiple studies of archaeobotanical remains in Upper Mesopotamia, where barley repeatedly appears as the most important crop, based on its frequency in archaeological deposits from across the region. Barley is reported as the most common crop in the middle Khabur (McCorriston 1998:50); in the Upper Khabur (Charles and Bogaard 2001:308; Weiss and Courty 1993:140; Weiss et al. 2002:6); in the North Syrian Euphrates (van Zeist and Bakker-Heeres 1988:310); in the Balikh Valley (van Zeist et al. 1988); and in the Upper Euphrates (Algaze et al. 1995:29, 31).

Beyond its role in making bread cakes, barely was important for keeping animals healthy year round. Apparently, the high ratio of barley to wheat, even in areas with greater rainfall, is due to its importance for animal fodder in regions where pastorlism is a key part of the economy (Algaze et al. 1995:31). The economy relied on the labor, meat, and secondary products, especially wool, that sheep, goats and cows provided (Zeder 1991). Animals were also important as offerings to the temple, providing food for the gods and the temple staff. Barley-based beer was an important part of social complexity in Mesopotamia, with beer consumption playing an important role in feasts and ceremonies (Joffe 1998:304-5). Finally, the importance of barley is emphasized by its central position in the rationing system of both Upper and Lower Mesopotamia (Archi 1993; Englund 1991; Gelb 1965; Milano 1987; Sallaberger 1996b).

Persons fed by the granary

Estimates of the amount of people who could be fed by the contents of Building Unit 5 vary depending on the height of grain in the room, the amount of grain reserved for seed, the amount of spoilage, and the amount of grain needed per person, per year. In his study of grain storage facilities at an early third millennium village on the middle Khabur River in Syria, Glenn Schwartz (1994b) compiled estimates, from a range of modern and ancient sources, of the variables necessary to calculate the number of persons stored grain could feed. For the Kazane facility, the estimates of Hole (1991) and Hunt (1987) provide a range of 154 – 524 persons that could be fed if the room were filled up to 1.5m high (150 m^3). In Figure 7.16, reproduced and slightly modified from Schwartz (1994b), values for 100 m^3 and 200 m^3 are also given.[18]

The higher figure yielded by Hunt's values is due to his lower requirement for daily calorie needs, and lower spoilage[19] and seed ratio. It might be fair to assume that a facility in the heart of the city would hold grain primarily for human consumption, not for seed, with the latter kept in facilities in villages near the fields. If this assumption is correct, it would increase the

[18] For additional grain conversion factors, see USDA 2005.

[19] There is some disagreement as to whether the spoilage rate in antiquity would be greater or less than rates from modern ethnographic studies. Forbes and Foxhall (1995:73) argue that storage loss rates in ethnographic cases may be higher than in antiquity due to the "introduction of 'modern' storage methods." In cases where traditional storage technology is still in use, greater loss may be greater due to "new (and less pest-resistant) crop varieties…" For more on this issue, see Sigaut 1988:15.

number of persons the grain could feed regardless of the spoilage ratio or accepted caloric needs. Ellison notes that a diet of grain alone would lead to poor health (Ellison: 1981:42). She cites ration lists from Southern Mesopotamia that list cheese, fish, onions, oil, dates and other food that were sometimes distributed in addition to grain. Thus, Hunt's lower calories-from-grain estimate may be more appropriate than that provided by Hole (Schwartz 1994b:25), which, when combined with less grain reserved for seed in an urban facility, would result in a persons-fed estimate higher than Hunt's.

Although persons-fed estimates are necessarily rough approximations, if we give consideration to the figures of Gentry (1976) and Kemp (1986), which fall between those of Hunt and Hole, and take a middle figure, between Hunt's and Hole's, we find enough grain in the Kazane structure to feed 225 persons if the grain reached 1m in height, 339 persons at 1.5m high, and 452 persons at 2m high. In this conservative estimate, even the smallest figure is a significant number of persons, equivalent to the population of a small village. Thus, even a seemingly small structure, such as Building Unit 5, could have provided rations for a large work force, perhaps the staff of a temple or other institution. This figure is also equivalent to approximately 1.3% – 2.2% of the population of the city, if we assume that there were 100 – 200 persons per hectare (Kramer 1980) in this 100-hectare city.

Operation 2: The Western Structure *(Building Unit 4)*

Building Unit 4 consists of several rooms with stone foundations and plaster or pebble floors. Although the entire structure may be as large as $200m^2$, the excavated area revealed an internal space of 43.75 m^2 spread over three rooms, each filled with large storage jars.

Contents of the storage structure

All of the large jars in the western structure are of a common Early Bronze Age type that has a wheel-thrown, thickened, ridged or grooved rim set upon a high neck, a slab-built globular or ovoid body, and a conical base (Figure 5.11:305 [base], 342, 347, 349, 359) (Algaze 1990:317, Jars 16-18). Jars the size of those in the Kazane depot weigh as much as 60-70 kilos or 130-150 pounds when empty.[20] As discussed above, Building Unit 5, and one of the jars in space 6 of Building Unit 4, both contained burned barley, most likely for human consumption or beer manufacture. Jars were commonly used for barley storage in the Near East, and studies indicate that they are a very effective means of grain storage[21] (Dolce 1988; Emberling and McDonald: 2001:31; Mazzoni 1988; Pfalzner 2002:272, 276-277; Reynolds 1974:130). If so, perhaps Building Unit 5 was used for bulk or ready-access storage, whereas Building Unit 4 was designed for longer term storage of measured quantities of grain.

Aside from burned barley in one jar, there is little evidence for the contents of the other jars.[22] In New Kingdom[23] Egypt, jars of a similar size and shape commonly held preserved meat, as evidenced by labels on the jars (Kemp 1994:Figure 14.3). The most likely liquids for storage are oil, beer or wine.[24] None of the recovered sherds showed any signs of the residue or staining commonly associated with red wine storage (Badler 1996:50; Formenti and Duthel 1996:83). The jars also lack waterproofing treatments that may be necessary for wine or beer

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[20] This value was determined by summing the weight of sherds from mostly complete jars from Operations 2 and 4.
[21] At Leilan, a clay grain bin with a capacity similar to the Kazane jars was found in a context dating to the Akkadian Period in the last 300 years of the third millennium (de Lillis Forrest et al. 2007: Figure 5).
[22] We should bear in mind that the largest room, space 2, remains mostly unexcavated. Of the numerous smashed jars in this room, several were exposed rim to base on one side, and in no case were drains observed.
[23] ca. 1540 – 1070 B.C.E. (Kemp 1994: 134).
[24] Oil and wine production are evidenced in the wider region by botanical remains, plastered basins that may be related to wine manufacture, residue in jars, and texts (Archi 1991; Badler 1996; Formenti and Duthel 1996; Kepinski 2007:155-157; Matney et al. 1997; Powell 1996).

storage (Badler 1996:59; Koehler 1996:328). One medium jar excavated *in situ* had a hole for a drain,[25] and we recovered one medium to large jar sherd with a drain from the debris just below the plowzone, suggesting that liquids were stored in at least two vessels (see for example Badler 1996: Figure 4.2). However, there is no evidence for spouted vessels, funnels, or strainers, which we might expect if liquids were being accessed or transferred to other vessels within the building.[26]

Regarding capacity, early second millennium textual references to the wine trade between Carchemish on the Upper Euphrates, and Mari on the Middle Euphrates, indicate that the volume of wine jars should fall between 10L – 30L, although large pithoi containing wine are mentioned in some contexts (Powell 1996:110-111). Other texts regarding olive oil at Ebla, and the jars found in the Ebla Palace, provide a range of 30-45 L for transport jars, and up to 100L for long term storage (Archi 1991:219). There are several smaller jars in the Kazane building, but most of the jars are of much greater capacity (see below), indicating that if they contained wine, oil or beer, these goods would most likely have been manufactured at Kazane and stored in bulk, since we may imagine imported liquids, coming overland, to arrive in smaller, lighter, more manageable vessels.[27]

The jars in the building were generally crushed in place alongside and intersecting other jars, and we only fully excavated the northernmost room, making it difficult to count the exact number of vessels. In the reconstruction in Figure 5.10, I estimate that there were at least 50 large and 11 medium or small jars, and one cooking pot, associated with the structure. The

[25] This sherd is from bag RN11661 (Op 2, L50), and likely mends with RNs 11660, 11662, and 11719.
[26] We did find pieces of small bowls, which may have served as dippers, but none of these were found *in situ* in reconstructable pieces, so we cannot be sure how they relate to the jars.
[27] Of course, smaller jars could be combined to fill larger jars, but this might require mixing separate lots of wine or oil, presumably not an ideal practice.

number of jars from spaces 1, 3, 4 and 6 should be fairly accurate since we could identify most of these jars *in situ*. The number of jars in space 2, especially the medium or small jars, may be less accurate because of some of the crushed jars overlap. The jar total for space 2 is based on a careful study of the smashed remains, which were articulated, cleaned, drawn and photographed. This work made it possible to identify jar rims *in situ* on their crushed bases, and the profile of jars crushed on their side.

Although we cannot be sure of the contents of the storage jars, we can calculate hypothetical amounts of goods based on their volume. Fallen jars, uncovered *in situ* in profile, usually measure 1m tall or larger, but it is not clear how much this reflects the actual height because the broken pieces are splayed. We did not reconstruct any of the jars from Operation 2.2, but I did take measurements from three nearly identical jars from the Upper Euphrates site of Lidar Höyük[28] (Hauptmann 1982, 1983). These jars are on display at the Şanlıurfa Museum. The ware, form, and rim type of these jars are identical to those from Kazane. Although the jars are all large, the ones on display are three different sizes, and I measured each. It was not possible to measure their actual volume via introduction of liquids or other goods, due to the danger of damaging the pots, which were reconstructed from may pieces and stored outside under a shelter for several years. Instead, I measured their rim diameter, total height, mid body circumference, and diameter at the shoulder and mid body. From these figures I calculated their volume using the formula for a prolate ellipsoid, or stretched sphere, the shape closest to these jars[29] (Figure 7.17).

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[28] Their registration numbers identify them as found at Lidar Höyük.

[29] The formula for a prolate ellipsoid is (4/3)(3.14)(semi-major axis length)(semi-minor axis length)^2 To account for the thickness of the walls of the pots in my calculations, I subtracted 2cm from the height and 4cm from the mid-body diameter. Although the ellipsoids laid over the jars in Figure 7.17 extend beyond the upper jar walls, this

Although admittedly rough, the figures taken from the Lidar Höyük jars permit us to make some estimation regarding the amount of goods stored in Building Unit 4. The volumes for the three jar sizes are 223.40L, 144.42L and 97.45L, or an average of 155.09L. From these figures we can estimate maximum, minimum and average volume for all 50 large jars in the Kazane structure. The maximum is 11,170L, the middle is 7221L, the minimum is 4872.5L, and average is 7754.5L. If we convert these values to cubic meters, we have a maximum of 11.17 m^3, middle of 7.22 m^3, and a minimum of 4.87 m^3. Using the middle-ground figure that we used above, which permits 225 persons to be fed per year on $100m^3$ of grain storage space (2.25 persons per cubic meter), we find that if all the jars were filled with grain, they could feed a maximum of 4.96 persons, a middle of 3 persons, or a minimum of 2 persons per year. These values are considerably lower than that for Building Unit 5. These figures reinforce my assertion that Building Unit 5 was for ready access, bulk grain, while Building Unit 4 was for longer-term storage, or storage of apportioned goods, including grain and other goods or materials. Perhaps grain from the eastern structure was measured and stored in jars in the western structure as a middle stage in the rationing process.

The Contents of the Jars: Potters' Marks and storage

A clue to the contents of the storage jars in Building Unit 4 may come from potters' marks on some of the jars. Potters' marks at Early Bronze Age sites are difficult to quantify because they are usually published without reference to their relative frequency. In my experience, marked vessels are always drawn and published because their mark makes them

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overextension is rougly matched by portions of the ellipse that cut inside the lower jar walls, especially in the case of jar 2.

especially notable. Thus, we might expect the frequency of marked vessels to be over-represented in publications, and statistics of marked vessels are rarely provided. Nonetheless, marked vessels are published from many sites, and seem to occur most frequently in storage and administrative contexts. A kiln for producing large storage jars was excavated on the Upper Euphrates at the small town of Lidar Höyük. Potters' marks are reportedly common on the vessels associated with this kiln (Hauptmann 1982: 18, 1984; Mellink 1982:563). It is possible that the extensive potters' workshops at Lidar Höyük exported large jars and other vessels to sites in its region, including the city of Titriş Höyük, or even to Kazane.

In many cases the simple form of potters' marks, such as an 'x', '+', or a few fingernail imprints, may simply reflect potters' whimsy or abstract signatures. Yet, in other cases the marks resemble cuneiform signs for numbers or words, and their repetition at different sites throughout the third millennium across Mesopotamia and the Levant suggests a shared understanding of their meaning (Holland 1977:55). Potters' marks may serve a variety of purposes, including: 1) to identify the maker, whether an individual or a workshop, for purposes of vanity or certifying quality, or to distinguish pots made by different potters who are sharing studio, firing, or marketing space (Donnan 1971:465; Kramer 1985:82); 2) to mark the origin or destination of a vessel, such as a person, workshop, town, household, merchant or institution; 3) to mark the intended use or contents of the vessel; 4) to record the size or volume of the vessel; 5) to record the number of vessels made; 6) to identify matching pieces during production when rims, bases, handles or other pieces are made separately from the body of a vessel and attached after partially dried, as is often the case with very large vessels.

Early Bronze Age potters' marks are generally found inside the rim or on the shoulder of vessels, and occasionally on the base, but not on the rim *and* base or shoulder, suggesting that purpose 6 (see above) is unlikely. Marked vessels are generally not specially treated with bitumen or burnishing or other features that could suggest special uses for specific vessels. In other words, most potential uses of vessels, as well as their size and volume, were probably fairly obvious to the user, so purposes 3 and 4 (above) would be redundant, rather than necessary, marks. Similar potters' marks are also found on large jars and small bowls alike, further complicating their purpose as indicating a given measure (Holland 1977:55).

Given the vast quantity of pots manufactured, the apparently low number and variety of marks, and the generic form of many of the marks, it is also unlikely that pots were marked to identify the maker, owner, origin or destination of a pot. However, ethnographic cases show that potters who share work and sales space may occasionally mark their pots with simple marks to avoid confusing them with their studio mates (Donnan 1971). At the same time, my personal experience in making pots and observing potters, along with ethnographic studies, demonstrate that potters can generally recognize their own pots fairly quickly, due to subtle differences in the form of rims, bases, handles, neck thickness, trimming style, etc., making identifying marks unnecessary (Kramer 1985:82). Thus, pots may be marked so that assistants or third parties can distinguish the work of multiple potters when loading and unloading kilns, or conducting other tasks associated with finishing pots.

Finally, marking vessels to record the number produced may explain the low number of marked pots, assuming that potters only marked every 20th or 50th pot or some other large increment. The lack of clear patterns in the type and distribution of potter's marks makes it difficult to argue for any single explanation for their function or meaning. Probably the marks served several overlapping purposes that varied over space and time, which would explain the lack of clear patterns. Nonetheless, I will argue below that at least some marks appear to reference numerical values, while others appear to reference specific goods.

Potters' Marks at Kazane

A brief review of the number and context of marked jars at Kazane demonstrates their rareity, and contributes to an interpretation of their function or meaning. I processed 16851 potsherds for this study, of which 2356 are 'diagnostic,' meaning that they include part of a rim, base, or handle, while the rest are 'body' sherds. Of the total sherds, only 11 have potters' marks, and all but one of the marked vessels are from Building Unit 4. Thus, at the level of the site, the marked jars are such a small percentage of the total ceramic material that they are almost non-existent. For the entire site, there are 30 type c19c (grooved rim) jars in priority 1 or 2 contexts (Figure 5.11:342, 347, 349, 359). Of these, 9 (30%) are marked, 8 from Building Unit 4, and 1 from the storage room in Building Unit 8 (Figure 7.18). If we narrow the scope of analysis to only priority 1 and 2 contexts from the Building Unit 4, we are left with 3377 sherds, of which 298 are diagnostic. Within this group, marked vessels are 3.4% of the total diagnostic count.[30] At this level of analysis, marked jars comprise 10 of the 88 medium or large jars, or 11.4% of the total, and 8 of the 29 large jars, or 27.6% (Figure 7.18). Thus, the number of marked jars is not significant at the site-level, but becomes significant within the context of Building Unit 4. This suggests that the marks serve a purpose specific to the institutions managing storage. Perhaps potters working for the institution marked their vessels, particularly large jars, as part of workshop protocol, to receive credit for their products, or to indicate volume

[30] Of the diagnostic sherds, 100 were small bowls, 12 were medium bowls, 1 was a large bowl, 10 were small jars, 59 were medium jars, 29 were large jars, and 54 were bases or other parts that could not be assigned to a form with certainty, although most were likely bases for small bowls, medium or large jars.

or intended use. Given the small number of potters' marks from the rest of the site, it seems unlikely that unattached potters' were marking their vessels, unless they were destined for state institutions. This conclusion is reinforced by the evidence that many marked jars published from contemporary cities are from institutional storage contexts. Marked jars in significant numbers are reported from the cities of Tell Brak, Ebla, and Tell es-Sweyhat (Holland 1976, 2006[31]; Mazzoni 1988; Oates et al. 2001).

In total, eleven storage jars at Kazane have marks, ten from Building Unit 4, and one from Building Unit 8. All but two of the marked jars are large, grooved-rim jars, the exceptions being two medium jars in Building Unit 4 (Figure 5.11: 100, 438, 347, 359, 349). All of the large jars were marked on the inside of the rim when the clay was still wet. One medium jar from Building Unit 4 was marked on its shoulder when wet, and the other medium jar was marked on the outside of the rim when the pot was leather-hard or already fired. Notably, the fabric or manufacture of this jar had some deficiently, because it bubbled all over during firing, and the air pockets may have chipped the vessel. Thus, the mark on the bubbly jar may have been made to signal an expected or noted defect.

There are seven different complete marks on the Kazane jars, two of which are repeated on two jars, and two partially preserved marks that may be unique or could be parts of other complete marks (Figure 7.19A). The marks include: 1) two impressed rings or circles, side by side; 2) a horizontal incision with a vertical fingernail tick (short mark) at its right end; 3) three fingernail ticks in a row; 4) a curve with a vertical stroke in the middle, creating a 'three-fingered' look, perhaps related to the *še* (barley) cuneiform sign; 5) four fingertip impressions in

[31] See Holland 2006:295 – 299 for a summary of the potter's marks from Tell es-Sweyhat. The summary and synthesis in the 2006 Sweyhat volume appeared after the present text was written, so my discussion relies on the preliminary reports when citing parallels.

a row, with a vertically incised line just below the middle two impressions; 6) a '+' or cross formed by two incised lines, with the vertical line incised first; (repeated in a slightly different version that has an oblique instead of vertical line); 7) an 'x' that may be a variation of design 6; 8) a vertically incised line that is broken at its base, which may be a remnant of designs 5 or 6;); 9) a horizontally incised line that is broken at one end, which may be a remnant of designs 5 or 6.

Although the Kazane potters' marks have parallels as far back and far away as the Middle Susiana Period (ca. 5500 B.C.E.) at Choga Mish at the southern end of Mesopotamia (Delougaz and Kantor 1996: Plate 203), and in the Bronze Age at Tepe Yahya in Iran (Potts 1981), perhaps indicating the depth and breadth of the Mesopotamian symbolic universe, I will limit my discussion to contemporary sites in Upper Mesopotamia. The potters' marks from Kazane have parallels to other third millennium sites throughout Upper Mesopotamia, including Kurban Höyük, Titriş Höyük and Lidar Höyük to the northwest, Tell Brak, Tell Chuera, and Tell Beydar to the southeast, and Tell es-Sweyhat, Tell Banat, Selenkahiye and Ebla to the southwest. Oates suggests that circles, such as those in Kazane design 1, indicate a measure (Oates 2001b:187) (Figure 7.19A:1, B:1-2, E3). In cuneiform texts, for example those from Tell Beydar, numbers are marked with circles, with each mark apparently representing the value '1,' meaning that two rings mark the value '2' (Sallaberger 1996a:57) (Figure 7.19I). In contrast, some scholars suggest that the circles indicate the value 10, and a vertical slash or tick mark indicates the value 60, but it is not clear how they reach this conclusion (Moortgat and Moortgat-Correns 1978:35). The rings of Kazane design 1 are found on similar jars, inside the rim, at Chuera[32] (Figure 7.19B:1-2) (from the area of the *Kleiner anten-tempel*: Moortgat and Moortgat-Correns 1978:

[32] Another marked jar from the area of the small anten-temple at Chuera consists of a grooved rim jar, identical to those in Building Unit 4 at Kazane, with two finger impressions, one above the other, just inside the rim (Moortgat-Correns 1988b [zehnte Grabungskampagne]: Abb.9a-b). These impressions may have the same meaning as the impressed rings.

Abb. 14-17; Moortgat-Correns 1988b: [*neunte Grabungskampagne*] Abb.16a-b), Kurban Höyük (Algaze 1990: Plates 67J, 70A, and possibly 72N), and Lidar Höyük,[33] and on the shoulders of similar jars at Tell Brak (Figure 7.19E:3) (Oates 2001b:187; Oates et al. 2001:Figure 429:872; Figure 459:1448; Figure 461:1575-80) and Ebla (Mazzoni 1988: Table 3).

Other marks that may designate a measure include Kazane designs 2, 3 and 5, which contain tick marks, or combine vertical tick marks with horizontal or vertical lines. Again, in the Beydar texts, oblique strokes in singles or in groups are used to mark numbers, while cup-shapes, nearly circular, with strokes through them, represent a “capacity measure” (Figure 7.19I) (Sallaberger 1996a:57). A numerical meaning for these tick marks is also suggested by their appearance on small clay balls in mid to late third millennium levels at the upper Khabur River city of Tell Mohammed Diyab (Harrington 1999). While some of these clay balls were marked with cuneiform symbols for animals, persons, or dates, others contained fingernail impressed tick marks just like the Kazane potters’ marks (Harrington 1999). A similar object was also found in mid third millennium contexts at Tell Raqa’i on the middle Khabur River (Curvers and Schwartz 1990: Figure 7). This ‘tablet’ contains circles and tick marks, divided into rows and columns (Figure 7.19:G).

Designs 2 and 5 from Kazane have affinities with a mark on the inside of a jar rim at Kurban Höyük (Algaze 1990: Plate 68B) that consists of five vertical tick marks bracketed by two horizontal slashes. These designs also recall vessels at Ebla that have vertical or horizontal incised lines in groups of three (Mazzoni 1988:Figure 8:4-5), and jars from Tell Brak with various combinations of long and short incised lines (Oates et al. 2001:Figure 457:1520). Kazane design 3 is paralleled by a jar at Kurban Höyük with three vertical tick marks inside its

[33] Observed on a jar on display at the Şanlıurfa Museum.

rim (Algaze 1990:Plate 115L), jars at Sweyhat with three vertical lines on their shoulder (Figure 7.19C:1) (Holland 1976:Figures 10:4, 11:3, and 12:4), jars at Selenkahiye with three vertical lines or ticks on their shoulder (Schwartz 2001: Plate 5A:8c, 5A:19c), small jars at Tell Banat with three vertical ticks or lines on their shoulder (Figure 7.19:J1-2) (Porter 1995a: Figure 21:P25 and P55), and vessels at Ebla with vertical or oblique lines or ticks in groups of one, two or more on jar shoulders or inside the rim (Figure 7.19D:3) (Mazzoni 1988: Figure 5:5; Figure 7:4; Figure 8:1-3).

Oates (2001b:187) suggests that plant-like incisions on jars, consisting of a central stalk with "leaves" or "arms", are meant to be the cuneiform *še* (barley) sign. The *še* sign has a number of variants, but several are made up of two parallel lines of interlocking wedges, whose lines resemble a rachis of wheat or barley with numerous spikelets (Figure 7.19H) (Gelb 1961:230, sign 212). As with the *še* sign, which can be written with a few or many wedges, the incisions on jars at Tell Brak include those with just a few spickelets and those with many (Figure 7.19E:1-2) (Oates et al. 2001:Figure 461:1589; Figure 462:1594). Notably, this *še*-like sign often appears on fenestrated stands (Figure 7.19F) or on the pedestal of pedestaled bowls, which may also have fenestrations (Figure 7.19:J6) (e.g. Porter 1995a: Figure 11:P5). Kazane design 4 is perhaps a shorthand version of the še sign, having only three arms or spikelets and a rounded, rather than v-shaped form, as in a mark from Banat (Figure 7.19:J4) and Ebla (Figure 7.19D1). Alternatively, the Kazane mark is a shortened version of a fork-like mark found at many sites, with the 'handle' left off the fork in the Kazane examples. Fork marks are found on an Early Bronze Age jar at Selenkahiye (Schwartz 2001: Plate 5a:19b) a small jar shoulder at Tell Banat (Figure 7.19:J5,7) (Porter 1995a: Fig22:P44), a jar at Sweyhat (Figure 7.19C:3)

(Holland 1977: Figure 6:11), and small jars at Tawi (Kampschulte and Orthmann 1984: Tafel 31b:1-2).

The fork mark is apparently not as common as the more blatant wheat or plant mark, paralleled at Ebla by inverted versions, v-shaped versions, and crossed versions on jar shoulders (Figure 7.19D:2) (Mazzoni 1988: Table 3; Figure 7:3; Figure 9:1), at Kurban Höyük by an inverted, doubled and crossed version (which may not be related; Algaze 1990: Plate 117D), at Tell es-Sweyhat on the base of a bowl (Zettler 1997b:Appendix 3.1:b), inside a bowl at Banat (Porter 1995b:Figure 19:2), and by an inverted version that has an extra vertical line (Holland 1976:4:5), at Selenkahiye by two examples on a jar and a stand (Schwartz 2001: plate 5A:19d, Plast 5A:22i), and at Tell Brak by an inverted version (Oates 2001b:187). Exact parallels for Kazane design 4 come from a jar shoulder at Tell Banat (Porter 1995a: Fig 20:P88), and the shoulder of a small jar at Tawi (Kampschulte and Orthmann 1984: Tafel 17:14, Tafel 40c).[34] Notably, Kazane design 4 also appears on inscribed (?) clay cylinders from ca. 2500 – 2200 B.C.E. tomb four at Umm el-Marra (Schwartz et al. 2006: Figure 25).

Due to their simple form, Kazane designs 6-9 have many parallels at Chuera (Figure 7.19B:4-5) (Moortgat-Correns 1988b [zehnte Grabungskampagne]: Abb. 10d-e), Kurban Höyük (Algaze 1990: Plate 115E), Tell es-Sweyhat (Holland 1977: Figure 6:17; Zettler 1997b:Appendix 3.3:g), Tawi (Kampschulte and Orthmann 1984: Tafel 4:19, 7:56, 15:34) and Ebla (Mazzoni 1988:Figure 5:7; Figure 6:2; Figure 7:1). Kazane designs 6 and 7 are paralleled at a number of sites, but are not obviously connected to any particular cuneiform signs or common means of accounting. Parallels for these designs are known from jar exteriors (usually the shoulder) at Tell Brak (Oates et al. 2001: Figure 460:1568; Figure 461:1584, 1587), Ebla (Mazzoni 1988:

[34] Kazane design 4 also appears as part of a composite animal (?) figure on the shoulder of a small jar at Tawi (Kampschulte and Orthmann 1984: Tafel 32:c2).

Figure 5:7; Figure 6:2; Figure 7:1), Kurban Höyük (Algaze 1990: Plate 115E) Selenkahiye (Schwartz 2001: Plate 5A:8c [bowl shoulder], 5A:19c [medium jar shoulder]), Tell Banat (Figure 7.19:J) (Porter 1995: Fig 18:P93 [bowl base], Fig 20:P24, P26 and Fig 25:P64 [small jar shoulders]), and Tell es-Sweyhat (Holland 1977:Figure 6:17; Zettler 1997b: Appendix 3:1a [bowl base]; Appendiz 3.3g [bowl bottom half]).

In sum, among other possibilities, the potters' marks from Kazane may indicate the contents of the jar, or some measure associated with it. The measure may be its volume or its number in a sequence of jars manufactured by a workshop. Designs 1-3 and 5 all recall cuneiform signs for numbers or capacities, while design 4 recalls the cuneiform sign for barley. Complicating the interpretation of these signs on jars is their presence on both the outside shoulder (most common) and inside the rim of jars (less common). In contrast to the pattern at Tell Brak, Ebla, Tell es-Sweyhat and most other sites, all of the potters' marks on large jars at Kazane occur on the inside of the jar. Outer marks would be visible to anyone accessing the jar, while interior marks would not be visible if the jar was filled to the rim, covered with a lid, or stacked. Given that such jars were often covered and sealed, an interior mark would prohibit 'reading' the mark as it relates to the contents or volume, without breaking and remaking the seal, a laborious process considering the number of jars. Notably, many of the Potters' marks from Tell Chuera and Lidar Höyük occur inside the rim of large jars with the same type of rim as those at Kazane (Moortgat and Moortgat-Correns 1978: Abb. 14-15). This raises the possibility that these marks are associated with a specific family or workshop of potters that makes those jars, or with goods typically placed in such jars. Regardless of their meaning, the concentration of potters' marks within the storage facility at Kazane may indicate the presence of potters attached to state institutions. In addition, widespread examples of identical or similar marks at sites across Upper Mesopotamia may indicate that the marks evoked a shared meaning, and/or that several groups of potters, for example those at Lidar Höyük, were shipping their wares throughout the region.

Managing the Operation 2 storage facilities: the use of seals to control and record access to goods

Managing storage facilities is a basic part of recording the quantities of goods coming in and out of a household. In the case of grain storage and probably other goods as well, the manager must possess special skills and knowledge, such as methods of keeping grain dry, keeping mold or bacteria-contaminated grain out of the facility, and fighting pests (Hunt 1987:176). Managers may use special tools to help them control and keep records of stores. In the Near East, the process of securing doors and containers[35] with clay impressed with a seal was widespread by the Early Bronze Age (Malamat 1986:162). This practice grew out of earlier accounting methods and developed alongside writing as a means of managing goods storage and distribution (Fiandra 1979:29-30). Sealings, the impressed clay used to seal things, not only controlled and monitored access to goods, but also served as a record or receipt of those activities when they were archived after removal and used in combination with written records (Ferioli and Finadra 1983:460; Fiandra 1979:31). Sealings are a valuable source of information about storage practices. Impressions of seals and sealed objects yield insight into who managed the storage facilities, how goods were administered, what kinds of containers were used, and in

[35] Following Fiandra's description, (1979:30, and footnote 1) seals can be applied to "both movable and immovable containers." "By immovable containers are meant storerooms, warehouses, rooms of the treasuries and any other rooms that can be closed and sealed. By movable containers are meant boxes, chests, coffers, jars, sacks, wineskins, leather bags and any other object that can be closed by tying it with cords to which seals are applied."

which time period the containers were sealed. In the following discussion, I analyze the sealings from Operation 2 to discern what they reveal about storage practices at Kazane.

Although sealings have odd shapes and many sides, we refer to the stamped or rolled surface as the obverse, and the surface that presses against the object as the reverse. The reverse of sealings records the imprint of the item that was sealed. This imprint reveals the shape and texture of the jar rim, basket lid, wooden door, or other item being sealed, as well as the material, such as string, animal skin, or pegs, used to secure the item. Impressions of seals on the obverse show impressed text or motifs as well as the size and shape of the seal, which may identify the individual or institutional owner of the seal, its region of manufacture, and its relative date. The depositional location of the sealings may also reveal administrative practices. In some cases, most famously at Arslantepe in Anatolia, sealings were apparently kept for some time as receipts of opened containers, and discarded in groups (Ferioli and Finadra 1983:460; Fiandra 1979:31). Finally, chemical analysis of sealing clay can reveal if an item was sealed outside the region and imported to the site, or if the sealing originated from local clays (Blackman 2003; Duistermaat and Schneider 1998; Rothman and Blackman 1990).

We found fourteen Early Bronze Age sealings,[36] but no seals, during the 2004 season excavations at Kazane (Figures 5.8; 6.21:574; 7.20). From Building Unit 4, these sealings include those from among the storage jars smashed on the floor of space 1 (seven sealings), near storage jars by a threshold between spaces 2 and 6 (two sealings), among smashed storage jars in space 3 (three pieces that probably mend), and within the topsoil / plowzone above the facility (one sealing). We also recovered sealings from within the room fill and debris in Building Unit 5 (two sealings). Given that the sealings were found in the storage structures themselves and not

[36] The total number of separately recovered pieces of sealings is actually 16, but I believe that three are from the same sealing.

in trash pits or other discard deposits, it is likely that all of them were in the primary or secondary contexts of the life cycle of the sealing, as described by Ferioli and Fiandra (1983). That is, they either dislodged from the items they originally sealed during site formation processes, including building fires, collapse, and normal object decay, or they were removed in antiquity and thrown aside or intentionally kept aside for short-term archiving. The concentration of seven sealings near the southeast corner of space 1 in Building Unit 4 may indicate that they were removed and kept in this location for records management, as may be the case for concentrations of sealings found elsewhere (e.g at Arslantepe, see Ferioli and Fiandra 1983:464; at Beydar see Bretschneider et al. 2007: 43; at Tell Brak, see McDonald 2003:42, 44).

All of the sealings contain rolling impressions from cylinder seals. The rollings were often made twice in two directions, upside down from each other, and frequently overlap. Although we have not yet professionally cleaned the sealings[37], and in most cases their original impressions are faint if not obscured altogether, we can discern enough of the design to describe the general category of some sealings and relate them to relevant parallels. An initial analysis reveals that of the 14 impressions, 10 contain double registers, 2 contain single registers, and two contain an unclear number of registers. The predominance of double registers is consistent with a mid third millennium, pre-Akkadian date for the sealings (Collon 1987:24). This date is also consistent with the period of the ceramics associated with the sealings, and with carbon samples from the two storage facilities.[38] The height of the impressions, and therefore the seals that made them, ranges from two to close to four centimeters. The registers in double register seals

[37] Cleaning the sealings requires carefully removing dirt and debris under high magnification. This process is especially difficult due to the fragile nature of sealings, and the problem of distinguishing dirt from the clay of the sealing, and the impression of the seal. Baking or injecting chemicals can consolidate the sealing, but could also fuse dirt to the object and compromise chemical analysis of clay sources.

[38] The carbon samples from Operation 2 returned calibrated dates with 95.4% confidence in the date ranges 2570 – 2290 B.CE. and 2570 – 2250 B.C.E. (see Figure 6.1).

are divided by single or double horizontal lines, or by a line of chevrons or x's. In one example, the top of the seal is bordered by a line of x's.

Of the seal impressions that I can decipher, there are eight distinct designs:[39]

1) A procession of erect posture lions in a double register, with lions above and below walking in the same direction (left to right) (Figure 7.20:388). The heads of the lions appear to be depicted from above, while the body is in profile.

2) A repetitious curvilinear motif (Figure 7.20:385).

3) A double register seal with a short upper register that contains rows of double dots (drill holes), and a lower, tall register with rows of figures. In the rows of dots, the upper dots are smaller than the lower ones, suggesting that they represent human figures. One part of the lower register seems to have a figure seated next to a box, or a vessel sitting on a curved stand, or a large tray (or stretcher), or other piece of furniture. Standing figures are seen on either side of the seated figure and vessel. Perhaps this is a drinking or presentation scene (this scene is repeated on 4 sealings: Figure 7.20:382, 386, 394, 397).

5) A double register seal with cross-hatching in both registers and a register dividing line consisting of chevrons (RN 10199).

6) Scenes with rampant animals:

6a) A rampant horned animal, presumably pitted against another animal (Figure 6.19: 574).

6b) A scene that contains rampant animals in contest.

[39] Since the impressions are difficult to decipher, they are also difficult to photograph, draw, and reproduce legibly. For this reason I describe the impressions here, acknowledging that these observations are a rough sketch of the designs.

6c) A line of people processing from left to right. First is an upright figure with arms (?), next is an unclear vertical figure (?) or object, then a fairly clear upright figure in a skirt, then a vertical tree-like (fern-like) plant, and finally the legs of two rampant animals, one facing right, the other facing left (Figure 7.20:387).

Sealing design number three appears on four sealings found in close proximity in space 1 of Building Unit 4. Although the total sample size is small, the higher frequency of this design may indicate that the official using this seal was controlling more transactions with the warehouse than the holders of the other seals (see for example Ferioli and Fiandra 1983:468). Most of the sealings are figurative, which studies of sealings from late fourth millennium southern Mesopotamia suggest belonged to higher level officials, while geometric seals with repetitive, schematic designs, likely belonged to lower-level, interchangeable officials (Pollock 1999:111, after Nissen 1977:19). At Brak, geometric impressions were less common, and were found most often on peg sealings, likely for doors (Matthews 1997: 183). Notably, one of the geometric impressed sealings from Kazane (Figure 7.20:385) was found by the doorway leading from space 2 to space 5 in Building Unit 4, and apparently sealed a door or lock. Another sealing (Figure 7.20:384) found near the same doorway may have a peg impression, but its nearly illegible seal impression is probably figurative. Double registers and geometric motifs are generally believed to be key elements of the "Piedmont style," named for the hilly region between the Tigris and the Zagros Mountains, stretching from Susa in southern Iran into Anatolia (Parayre 2003:271). The presence of two geometric sealings at Kazane, one with a double register, may indicate the site's cultural contacts with the region just to the northeast. The non-geometric sealings contain figurative scenes influenced by Southern Mesopotamian designs.

These elements include contest scenes between humans and animals, gods and animals, or animals and animals, and banquet scenes (Parayre 2003:276).

Until we clean and consolidate the sealings, we cannot take impressions of the reverse, which would help identify the objects being sealed. Based on observations of the reverses in their current condition, the sealings sealed a variety of containers, with some showing characteristics of a wicker lid (Figure 7.20:381), while others may have sealed doors (Figure 7.20:381, 396), door locks (Figure 7.20: 385), jars, bags (RN 10314) or other containers. Surprisingly, none of the sealings are obvious jar sealings, which have a smooth, sealed obverse, and a flat, curved or horizontally grooved reverse with multiple string impressions where the sealing was pressed against loops of string encircling a jar neck or rim (e.g. R. Matthews 1993:Figure 28b, c; Matthews 1997:178). Given the high number of jars in the storage facility, the managers may have resorted to sealing doors instead of sealing and resealing every container that was emptied and refilled. The only sealing with multiple string impressions on its reverse is RN 11314 from Building Unit 5, which probably sealed a bag, not a jar.

Most of the sealings take a variety of forms that must conform to multiple containers or door closures. Three of the sealings are conical cylinders with a cord, rope or string impression running through their unbroken center (Figure 7.20: 388, 394, 395). This indicates that these are tag sealings, which sealed a knot of string tied around an object, such as a basket, skin-covered jar, bag, box or possibly even a door. These complete sealings survived in situ after the container they sealed decayed.[40] Three sealings have a single string impression running down their reverse (Figure 7.20: 382, 386, 387). It is not clear what material these sealings were pressed against, and at least one of them is broken on its reverse (387). Nonetheless, these

[40] It is possible that these sealings were pressed against containers in such a way that they could be removed by cutting the string without breaking much of the sealing clay, although this would defeat the purpose of the sealing.

sealings were applied to containers in such a way that it was only necessary to seal one string, rather than a knot or multiple loops of string.

A Possible Accounting Device

Given the large number of sealings found in Operation 2, we would not be surprised to find other accounting devices, such as tokens or discs. We recovered one possible counting device from the burned debris inside Building Unit 5 (Figures 4.6; Figure 6.21:648). The object is a small clay disc, 3.9cm – 4cm in diameter, and 0.9cm thick at its center. The disc is smooth on one side, with a large number of small, overlapping circular impressions on the other side, probably from a hollow reed. The edges of the disc are pinched, the impressed side is relatively flat while the smooth side is slightly rounded and tapers at the edges. Such discs are known from mixed third millennium contexts at Tell Brak (Oates 2001a:138-140; Oates et al. 2001:Figure 491:132-137), and earlier contexts[41] at Arslantepe, the latter in association with sealings (Liverani 1983). Based on their similarity to counting devices from the fourth millennium, such objects are believed to be counters, or clay discs on which divots or holes were made, presumably to count the number of some entity, including animals, containers and objects. If this interpretation is correct, it adds to the evidence for goods management in Operation 2.

The imprints on the counting disc are 2mm – 3mm wide, and just 1mm or less in depth. The marks are sometimes a full circle, but often just a half circle, perhaps indicating that the clay was relatively dry when it was marked, such that it was difficult to push the hollow reed into the disc. As the reed was raised after a mark, it often pulled the clay up a bit, creating a protruding

[41] These objects may also be related to the "tallying slabs" from much earlier contexts at Choga Mish (Delougaz and Kantor 1996:119; Plate 132).

circle or half circle, which gives the surface a peculiar texture. There are a total of 97 marks[42], which seem to spiral from the outer edge towards the center. Given that the marks do not occur in distinct groups, it is most likely that they represent a single tally of one entity, and their total number is the important figure. In contrast, many counting discs at Arslantepe have groups of dots, which Liverani suggests may be a "proto-abacus" designed to record greater numbers in a complex system (Liverani 1983:516).

Who owned the goods in the Operation 1.1, 2, 4 and 7 storage facilities?

The large number of jars in Building Unit 4, the high capacity of Building Unit 5, the massive walls of these buildings, and the multiple sealings found in them all imply that the Operation 2 storage facilities belonged to a wealthy institution, such as the temple or palace. If so, these facilities were probably only a small part of a much larger network of storage facilities belonging to these institutions. Such facilities were likely scattered across the city and in nearby villages. The massive structure of Building Unit 6, if it is a storage structure, is surely too large to have belonged to a non-royal wealthy family, while the unique contents of the storage room in Building Unit 8 suggest that it belongs to a temple. Although the evidence that these storage facilities were institutional is strong, it is not impossible that these facilities belonged to a very wealthy family that was not a member of the royal family.[43] An ethnographic study of storage practices in early 20th century Crete revealed that households capable of maintaining storage facilities with large bulk storage rooms, as in Building Unit 5, and over 30 large pithoi or barrels, as in Building Unit 4, were usually olive oil and wine producers who supplied cities (Christakis

[42] Unfortunately, the drawing of this object only shows 84 marks, while photographs clearly show 97. Apparently, the artist lost count of the number of marks while drawing this counting device!
[43] For example, Frank Hole (1998:274) notes that the Beydar granary, which has a capacity similar to the granary at Kazane, was larger than we would expect for a normal household but cold have belonged to a wealthy household.

1999:7). These households obtained their goods from large farms worked by the family and sharecroppers (Christakis 1999:7). However, it must be emphasized that these households and their storage facilities were located on rural estates, not within cities. It is possible that a wealthy household may have kept considerable stores within the comparably safe confines of an urban warehouse, from which they distributed them to buyers or dependents resident in the city.

If the Operation 2 storage facilities belonged to a wealthy family, a possible candidate for a wealthy household is located just west of Building Unit 4, in Building Units 1 and 2. Building Unit 1 and the southern rooms of adjoining Building Unit 2, excavated by Dr. Wattenmaker in 2002 and 2004, (Creekmore and Wattenmaker n.d.) contain a room with a hearth and several dishes (Figure 2.7:F), and another room with a large subterranean tomb (Figure 2.7:D). The hearth and dishes mark a food preparation area, and sub-floor tombs are usually found in houses in Early Bronze Age Upper Mesopotamia (Creekmore n.d. a). This structure has stone wall foundations almost 2m wide, and the tomb, 6m X 2m and 2.20m deep, was covered with massive boulders (Creekmore and Wattenmaker n.d.). These architectural features indicate that this structure is not an "average" house, but belonged to a wealthy household or institution. The size of the Building Units 1 and 2, if the threshold across their shared wall indicates that they were part of the same structure, is palatial, and any family able to afford such space must have been intimately related to the temple or palace institutions. Alternatively, the storage in Building Units 4 and 5 may have belonged to Building Unit 3, which may also be a wealthy household. In sum, it is not inconceivable that the storage facilities in Building Units 4 and 5 belonged to a wealthy family rather than an institution. Yet, a family with that much wealth was probably a key part of an institution, such as the palace or temple, making it difficult to distinguish between the two.

Summary and Conclusions

My review of contemporary examples of state and household storage at cities and towns across Upper Mesopotamia revealed a variety of storage facilities ranging from large to small, special-purpose to ad-hoc. In terms of its capacity and architecture, the Kazane granary is perhaps most comparable to the granary at Tell Beydar. Although rooms with storage jars are found at every urban site, in many cases large jars appear in small numbers in small rooms associated with activity areas. In contrast, dedicated jar-storage facilities are rare. The only other case of a storage facility filled with many large jars is the southern storage rooms of Palace G at Ebla.

The contents of Building Units 4 and 5 leave little doubt that they served as storage facilities. Building Unit 5 stored bulk barley, and although its architecture was suited to protecting this valuable commodity, rodents contaminated at least part of the store. Based on the structure's volume and estimates of caloric needs, the barley in this structure could have fed a large number of people, possibly the entire staff of an institution or other household. Building Unit 4 contained barley in one jar, and unknown goods in numerous other jars. The presence of impressed sealings in both structures is evidence for goods management, while potters' marks on several jars may reflect the work of attached specialists.

The jar storage facility and granary at Kazane were built for storage, rather than built for general use and adapted for storage. As dedicated storage facilities, it is unlikely that these structures existed in isolation. There are probably additional storage facilities near those in Operation 2, particularly in Building Unit 6, in the long, rectangular structure of Building Unit 10, and in a similar building next to Building Unit 2, just south of Building Unit 4. Although the storage capacity of Building Unit 4 could have belonged to a wealth family, rather than a state institution, if the surrounding buildings also contained storage facilities and belonged to the same entity, then the total capacity of the three adjacent structures in Operations 2 and 7 would appear to exceed that of a non-royal wealthy household and point to temple or palace storage.

In my review of state storage at other sites in Upper Mesopotamia, I found that such facilities are often located next to or within temples or palaces, and are integrated with facilities for processing and distributing grain and other goods, as well as food preparation. At Kazane, such activities may have taken place in the buildings around the storage facilities, in Building Units 1, 2, 3, or 7. Thus, it is possible that the entire group of massive structures from Building Unit 1 eastward to Building Unit 6 were part of a large institutional area in the outer town, similar to the extended complex formed by *Steinbauten* 1-4 in the upper city at Tell Chuera. This location would be ideal for receiving goods from the nearby (hypothesized) city gate to the south, and distributing goods to residents or employees via the main street that runs from Building Unit 1 to Building Unit 8. Although the storage facilities were apparently not situated behind defensive walls, such as city-sector dividers, their massive walls and the use of sealings served to protect, preserve and restrict access to these goods. This outsized architecture, along with that of neighboring buildings, would have formed a conspicuous area of large, impressive buildings on relatively high ground in the southern part of the city.

CHAPTER 8

PROVISIONING CITIES II: THE ANIMAL ECONOMY AT KAZANE IN ITS REGIONAL CONTEXT

Introduction

In the previous chapter I discussed evidence for storage and distribution of cereals and other goods at Kazane. The storage facilities of Building Units 4 and 5, combined with probable storage in Building Unit 10, and possible storage in Building Unit 6, probably belonged to an institution, with many of the stored goods distributed to city residents in exchange for services rendered. A key part of this exchange was barley, which was the backbone of a specialized cultivation system. In this chapter, I discuss evidence for a specialized animal economy at Kazane, through an analysis of the third millennium faunal remains. The resulting patterns contribute to our understanding of the life history of Kazane because they indicate the kinds of socio-economic relationships that underlie a specialized urban economy. Through a variety of analytical methods, I show that the faunal assemblage at Kazane is highly specialized, focusing on a narrow range of mostly sheep and goat, with some cattle. Although these results are not entirely unexpected, in comparison with neighboring regions to the north and south, Kazane has an even greater focus on sheep and goat at the expense of pigs and wild animals. This focus may be due to the context of the sample, or it could represent a local pattern of animal exploitation in the Harran Plain. The pattern at Kazane is consistent across the sample from contexts on the tell to contexts in the lower town. Analysis of skeletal portions suggests that in the contexts considered, animals were distributed on the hoof, butchered and consumed locally.

The animal economy

Urbanized states often have specialized, centralized systems to distribute food to urban residents, who become increasingly removed from direct production (Zeder 1988:13, 48). State and household storage, together with state provisioning systems, mitigate household subsistence risk, permitting food production strategies that maximize and intensify a narrower range of plant and animal products. These storage and provisioning systems allow urban residents to focus their efforts upon specialized tasks that meet urban needs (Zeder 1988:4, 9-10). Cereals and meats are distributed as rations or payments for employment at public institutions. This specialized system leaves particular traces in the archaeological record. Cereals distributed as rations tend to be cleaned and ready for converting to flour, because cleaned grain takes up less space in storage. Meat distributed indirectly through a specialized supply system tends to be from a limited range of specific animals (Zeder 1988:12, 48). Within this system, elites have access to a wider range of animals and higher quality cuts, while workers and the general public receive lower quality cuts from a just a few animals (Zeder 1988:48). Households may supplement the state supply system through independent production and purchase, which may be evidenced by a higher variety of hunted or domesticated animals, such as rabbits or pigs, which can be kept and slaughtered in and around the city. Analysis of faunal remains is thus a key part of examining the household and state economic systems operating in a city.

In the Near East, sheep, goats, cattle and pigs were domesticated early and became the main domestic animals by the end of the Neolithic, when their importance began to outstrip wild animals (Banning 1998:213). Sheep and goat were the earliest and most abundant domestic animals. These core domesticates became essential for meat, but also for secondary products including wool, hair, and milk (Zeder 1991:25). Cattle complemented sheep and goat husbandry by providing additional meat, milk, and hides, but also the traction labor (plough teams) that smaller animals could not undertake (Zeder 1991:28). Pigs are the fourth tier domestic animal present in the ancient Near East. Pigs provide more meat than the top three domestic animals, but do not provide secondary products. Pigs also require special management techniques that contrast greatly with those of sheep, goat and cattle (Zeder 1991:30). A wide range of locally available wild animals, most notably deer, gazelle, wild sheep and goat, fish, and birds, supplemented the four main domestic animals. Equids[1] were mostly used for plough or chariot teams, but were also valued for their skin, and sometimes consumed (van Lerberghe 1996a:112-115; Weber 2001:345).

As states and urban centers developed in Upper Mesopotamia in the mid third millennium, the relative proportions of domestic and hunted animals shifted at sites across the region (Weber 2001: Appenix 8.7; Zeder 1998). This shift may be due to a combination of social, economic, and environmental factors (McCorriston 1997; Zeder 1998). Comparing the local pattern of animal consumption to broader, regional and multi-regional patterns may reveal which factor is most contributing to shifts in the animal economy. In the following discussion, I examine the Kazane faunal assemblage with the goal of highlighting the relative contributions of different animals and parts of animals to the total assemblage. This analysis reveals patterns that I will examine in relation to comparable assemblages from throughout Upper Mesopotamia. In the previous chapters, I determined that most of the contexts excavated in this study contain elite or institutional structures. Thus, I expect that faunal remains from these contexts will be limited to a narrow range of species indicative of integration with the specialized, state animal economy. Patterns of species and animal distribution may highlight differences in how these various

[1] Equid in this context does not include horses, which were rare in the third millennium. Instead, the equids referred to in texts, and those found in excavations, are usually donkeys, onagers, or hybrids (van Lerberghe 1996a).

contexts participated in the state economy, such as a special focus on particular animals or parts in ritual contexts.

For this study we analyzed 1098 bones[2] from priority one and two contexts in six trenches. These contexts include bones resting on surfaces, fill immediately above a surface, and fill within defined spaces. Except for the material from a street in Operation 5, and small samples from Operation 3 and outside Building Unit 8, all of the contexts are from inside structures. Thus, all the contexts are probably secondary rubbish deposits since butchering debris is unlikely to be left to rot indoors for very long. Of the 1098 specimens, 1074 come from contexts dating to the mid to late third millennium, with the remainder from early second millennium deposits in Operation 8. Since the number of processed specimens from Operation 8 is too small to serve as a useful comparative sample, I will exclude that material from my discussion. My analysis is still at the preliminary stage, so this report does not address butchering techniques, or age and sex ratios. Instead, I focus on the gross number of specimens, the distribution of species and body parts, the number of individuals, and the degree of diversity, richness, and equitability in the assemblage.

NISP

In this analysis, I rely heavily on the *Number of Identified Specimens (NISP)*, a simple counting of all bone fragments belonging to a particular species, genus, or other subgroup (Klein and Cruz-Uribe 1984:24). Making the leap from NISP to number of animals is highly

[2] Of the 1098 bones, 568 specimens were processed by Andy Creekmore and not checked by any specialists. The remaining 530 specimens were processed by Andy or zooarchaeologist Dr. Patricia Wattenmaker, and all 530 were checked by Dr. Wattenmaker. Although Dr. Wattenmaker reported few errors in her checks of the specimens processed by Andy, his data is less reliable than it would be if checked by an expert. For these reasons, the results presented here must be considered preliminary, although the broad patterns are unlikely to change even after they are verified by additional checking.

problematic because different animals have different numbers of bones, fragmentation of bones may differ across the site, butchering practices may over-represent small animals while under-representing larger animals, and excavation or collection methods impact the size of recovered bones (Klein and Cruz-Uribe 1984:25; O'Connor 2000:54-57; Reitz and Wing 1999:191-194). Despite these drawbacks, NISP does have the potential to highlight variation in the relative frequency of bone fragments from various animals across a site and over time (Grayson 1984:25). This is especially true in my study, which focuses on a small number of bones from the best contexts. I analyzed all bone samples from a single context together or sequentially, and I attempted to find any mends between fragments. This practice cannot verify which bones belong to the same animal, but can reduce the potential for one highly fragmented bone to be counted multiple times.[3]

Of the 1074 third millennium specimens (NISP) 330 (31%) are mammals identifiable to the level of species[4] (Figure 8.1:a). Of the remaining 744 specimens, 594 (80%) can be assigned to the mammal class, while just 150 (20%) are unidentifiable to class. The range of animals is quite narrow, with most specimens belonging to *Ovis aries* – domestic sheep, *Capra hircus* – domestic goat, and *Bos Taurus* – domestic cattle. Just 20 specimens may be sheep, goat, or *Gazella* – gazelle, 3 specimens are *Equus*. – (ass/onager), and there is 1 human bone. All but one of the possible gazelle bones are from Operation 2, and most are likely sheep or goat. Notably absent from our sample are identifiable pig bones, which make up a significant portion of the faunal assemblage at other urban sites including Tell Brak (15-25% of NISP), and Tell Leilan (Weber 1996:28, 2001:347).

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[3] I also did *not* count teeth in a jaw as separate specimens.
[4] Remarkably, the same figure is reported from Tell Brak (Weber 2001:345).

A large number of *Rodentia* – probably common house mice – were found in Operation 2.1, where 76 specimens (7% of total NISP, 23% of genus NISP) were found both during excavation and among the heavy fractions of flotation samples (Figures 8.1a, 8.3a). Although I processed all flotation samples from the trenches discussed here, and all primary contexts were sieved through a quarter inch or finer screen, rodent bones were found in only two flotation samples beyond Operation 2.1, one from a Halaf layer and another from a second millennium context. Thus, the concentration of rodent samples in Operation 2.1 is truly exceptional, and indicative of the function of Building Unit 5 as a grain storage facility. The minimum number of individuals (MNI) represented by the 76 rodent specimens is 16 (Figure 8.3a). [5]

For the purposes of analyzing meat procurement, we can exclude the human, equid, and rodent bones from our sample. This leaves 250 genus-level specimens for analysis. Of these specimens, 203 (81.2%) are sheep or goat, 20 (8%) are sheep, goat or gazelle, and just 27 (10.8%) are cattle (Figure 8.3b). Even when considered by weight, which may more closely track their meat contribution (O'Connor 2000:57-58) cattle comprise just 18.5% (315.4g) of total bone weight across the Sheep-Goat-Gazelle-Cattle categories (Figure 8.3b). The NISP percentage of cattle at Kazane is comparable to the percentage from contemporary levels at Tell Brak (Weber 2001:346), but the percentage of sheep and goat is much greater than that at Tell Brak. The absence of pig or wild animals at Kazane, excepting 20 bones that may belong to sheep, goat, or gazelle, is filled by the high percentage of sheep and goat specimens. The

[5] Based on a count of 16 right mandibles. For a discussion of MNI calculation methods, see: Klein and Cruz-Uribe 1984: 26-34; O'Connor 2000:59-61; Reitz and Wing 1999:194-202. The remainder of the rodent specimens includes fused, fusing and unfused examples, indicating a range of ages for these animals Modern mice litters average 10-12 pups (Woerpel and Rosskopf 1988: 59, 63), although some historical studies observed lower averages of around 7 (Gates 1925:186; Watt 1934:Table 1). Given that a single mouse litter can number up to 12, and these creatures live up to 4 years, our 16 MNI represents the subset of the population that was caught in the storage facility fire, and then in our excavation screens.

dominance of sheep, goat, and cattle is indicative of a highly specialized animal economy. Specialized animal producers must achieve a significant surplus to permit slaughter while maintaining the herd. It is difficult to obtain a surplus of wild animals, or animals that do not herd well, such as pigs, especially in the midst of the extensively cultivated landscape around large cities (Wattenmaker 1998b:163). The complete absence of pig or wild animals may be due in part to the suspected institutional nature of most of the sampled contexts, and the relatively small sample size.

When we broaden our analysis to the level of class, excluding animals not believed to have been killed for meat (rodent and equid) but including sheep, goat, gazelle, cattle, and the general categories of small, medium or large mammal,[6] we increase our specimen total to 763. Of this number, 89.25% are medium mammals, 10.62% are large mammals, and just 0.13% are small mammals (Figure 8.1c). These figures mirror the percentages discussed above for sheep-goat-gazelle versus cattle. This suggests that most fragments identifiable only as medium mammals are in fact sheep or goat, while large mammals are most likely cattle. Considered by weight, medium mammals comprise 77% of the assemblage, large mammals comprise 23%, and small mammals comprise a negligible percent (Figure 8.1c). Although weight may indicate cattle's actual contribution to meat at the site, sheep and goat are still the overwhelming meat providers.

When we break the NISP percentages into their excavated context by unit (n=763), we find slightly higher percentages of medium mammals in J32 (94%) and Operation 2 (96%), with slightly higher percentages of large mammals in Operations 3 (13%), 4 (11%), and 5 (15%) (Figure 8.2a). These figures indicate that Operations 3, 4 and 5 match the overall pattern of

[6] This calculation excludes the mixed categories of small or medium mammal (SorMM) and medium or large mammal (MorLM).

NISP distribution, while J32 and Operation 2 have very few large mammals. Reducing our dataset to bones identifiable as sheep-goat or cattle, (NISP = 228), we find a lower than average amount of cattle in J32 (7%) and Operation 2 (0%), and a higher than average amount in Operation 3 (25%) (Figure 8.2b). This may indicate that Operation 3 contained an exceptional amount of cattle, but this is unlikely to be the case because, as just discussed, this trench contained NIPS percentages of large mammals – which are probably cattle – comparable to other trenches.

Richness, diversity, equitability

Although we do not have processed comparative data from multiple phases at Kazane, it is useful to calculate species richness, diversity and equitability to complement NISP percentages and serve as a baseline for comparison between the tell and the outer town, and with other sites. Richness describes the number of taxa in a sample, diversity adjusts richness values to account for the relative percentages of taxa in a sample, and evenness or equitability highlights the relative amount of each species in the sample (Reitz and Wing 1999:102). These concepts, borrowed from ecology, are sometimes used interchangeably but there are different formulas for calculating each. A common formula for measuring diversity is the Shannon-Weiner function[7], which we will use here.

When we calculate diversity across all species categories, including Equid, Rodent, Ovis-Capra, Ovis-Capra-Gazelle, Ovis, Capra, and Bos, our diversity value is 1.37 (Figure 8.5). When we exclude Equid and Rodent, which were not used for meat, and combine Ovis-Capra, Ovis-

[7] The Shannon-Weiner function (H') = -(sum[(p_i)(Log p_i)]), where "p_i" is the percentage of the i^{th} taxon in the sample, "Log p_i" is the logarithm of p_i, and "sum" is the sum of the product of (p_i)(Log p_i) for each taxon in the sample (Reitz and Wing 1999:105). In this study I used the natural log, e, (=2.718281828459) as the base.

Capra-Gazelle, Ovis, and Capra, we are left to compare all Ovis-Capra-Gazelle combined against Bos, causing the diversity value to drop to 0.34. Higher diversity values mark higher diversity in the form of more species or similar proportions of each (Cruz-Uribe 1988:179). Lower diversity values indicate fewer species and / or uneven abundance between categories. Excluding the OCG category would only remove 20 specimens, hardly raising the diversity value. The low diversity of this assemblage, which may be due in part to sample size (see Grayson 1984:158-167), is comparable to faunal samples from contexts of presumably elite, massive architecture at pre-town, early third millennium Kurban Höyük (Wattenmaker 1998b:164-166). This diversity value is also comparable to later third millennium samples from Kurban, when diversity dropped in both elite and non-elite contexts as the site became a true town with a more specialized food production system (Wattenmaker 1998b:166).

Cruz-Uribe describes richness as the "'variety component" of general diversity" because it describes the number of taxa that make up an assemblage (Cruz-Uribe 1988:180). This figure can simply refer to the actual number of taxa or species in a sample, or it can be calculated with an equation.[8] Using Odom's equation (1971)[9], we arrive at a very low richness value, 1.04, when we include all seven taxon categories[10] (Figure 8.5). When we narrow the categories to combine Ovis-Capra with Ovis, Capra, and Ovis-Capra-Gazelle, and eliminate Equid and Rodent, the richness value reduces to just 0.18 (Figure 8.5). Calculating richness by SM/MM/LM size categories also results in a low value of 0.30 (Figure 8.5). Considering the small number of taxon or species categories recovered at Kazane, these low richness values are

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[8] The richness formula used here is taken from Odum 1971: Table 6-1:c1. Richness ($d1$) = S – 1 / log$N$, where S = number of species, N refers to MNI or NISP, and the log base is the natural log.
[9] See also Odum and Barrett 2005: 38-41.
[10]The seven categories used in this calculation are: Equid, Rodent, Ovis-Capra, Ovis-Capra-Gazelle, Ovis, Capra, and Bos.

not unexpected. Nonetheless, these values are remarkably low when compared to even the most complex period assemblages at Kurban Höyük, where richness is 2.54 (Wattenmaker 1998b:Table 20, period IV.1). Certainly a larger sample size would increase the richness values for Kazane, but the current sample from very specific, good contexts should be indicative of the specialized animal production taking place in those parts of the site.

Another measure similar to richness, equitability, measures the degree to which a single species dominates the sample. Equitabilty values range between 0 and 1, with 1 indicating perfect equitability. When we calculate equitability[11] for the Kazane assemblage, including all species categories yields a value of 0.71, while limiting the categories to combined OCG versus BOS lowers the value to 0.49 (Figure 8.5). The lower equitability value indicates that one species is predominant, in this case the combined group of OCG. This observation should be obvious from raw NISP figures, but calculating the equitability value provides an index against which to compare this assemblage to other assemblages, both large and small.

Upper versus lower city patterns

Since we believe that trench J32 on the tell is contemporary with the other EBA trenches in outer town Area F, it is useful to compare the diversity, richness and equitability between these two areas to see if there are differences between the tell and the lower town. When we calculate these values for all identifiable species from Area F, excluding J32, both diversity and equitability are essentially unchanged, increasing very slightly, from 1.37 to 1.4, and 0.71 to 0.72 (Figure 8.5). When we narrow the categories to OCG versus BOS, diversity and equitability rise by just 0.01 (Figure 8.5). Excluding J32 does not change richness values at all. When J32 is

[11] Equitability (V') = H'/LogS, where "H'" = the Shannon-Weiner diversity function, "Log" = natural log, and "S"=the number of species in the sample (Reitz and Wing 1999:105).

considered by itself, all species, and OCG versus BOS have much lower diversity (0.46, 0.23) and equitability (0.24, 0.12) values than Area F, while richness decreases for all taxon and increases for OCG-BOS (Figure 8.5). Yet, the number of specimens identifiable to species in J32 is just 16, making these figures suspect. To correct for small sample size, we can consider taxon by animal size categories.

If we broaden our categories to SM/MM/LM, J32 sample size increases to 117 and permits a more reliable comparison. For all EBA specimens in the SM/MM/LM categories, diversity (0.35) is almost equivalent to OCG versus BOS for all specimens (Figure 8.5). Excluding J32 increases diversity slightly to 0.37 (Figure 8.5). Equitability by size category is very low, 0.18, for all specimens, and 0.19 for Area F alone, due to the small number of small mammals (1),and the dominance of medium mammals (Figure 8.5). For J32 alone, diversity by animal size is very small, 0.23, and equitability even lower, 0.12, due to the dominance of medium mammals in the sample. Notably, diversity and equity values for J32 by animal size match the values for OCG versus BOS. Finally, richness values for all units by all species (0.30) or OCG-BOS (0.15) do not change when J32 is excluded (Figure 8.5). Considered alone, J32's richness values are 0.21 for SM/MM/LM or MM/LM, which is lower than Area F with small mammals, and higher when small mammals are excluded.

In sum, when compared to the lower town, the J32 assemblage has lower diversity, equitability and richness in every case except the richness of the MM/LM categories. The lower values result from a lower number of specimens identifiable to the level of Ovis or Capra, which causes more lumping into general categories. Even when compared as lumped OCG groups, J32 values are still lower due to the exteremly high percentage of MM (94%) in the sample. Perhaps a larger sample from J32 would increase the diversity, richness and eqitability of the assemblage, but it is doubtful that it would rise above the current values for the much larger sample from Area F. Although sample size qualifies the results, this data indicates that animal consumption on the tell was even more specialized than in the lower town.

MNI

In the preceeding analysis, I used NISP values, but it is useful to consider how these values would change if we use *Mininum Number of Individuals* (MNI) as the dataset. There are many ways of calculating MNI, and there is no concensus as to whether or not MNI is better or worse than NISP for analyzing assemblages (Klein and Cruz-Uribe 1984: 26-34; Marshall and Pilgram 1993; O'Connor 2000:59-61; Reitz and Wing 1999:194-202). The reasoning behind MNI counts is that different animals have different numbers of bones, and depositional practices affect the grouping of their remains. Thus, by NISP counts, selected parts, such as tibia, of many animals in one context would be outnumbered by just one or two more complete skeletons or the displaced teeth from a single jaw in another context. The MNI count is supposed to level the playing field for all contexts by offsetting the maximum species count provided by NISP with a minimum species count provided by MNI.

For the MNI figures presented here, I counted the most common symmetrical element, such as mandible, tibia, femur, or metapodia, for each species in each separate context (locus) in each unit. Paired elements, such as a left and right tibia that probably belonged to the same animal, were counted as one individual.[12] This common method of calculating MNI is dependent upon how the bones are grouped, and changes in grouping change the MNI (Grayson 1984:28-29). Although it is possible that parts of a single individual were deposited in multiple

[12]I did not attempt to account for fusion scores to match potentially paired bones. If I had "positively" matched bone pairs, then MNI might increase.

contexts or even different units, I did not pool the specimens beyond locus. Pooling all specimens by trench or for the whole area dramatically decreases the MNI. When pooled, the MNI for OCG in Operations 2, 3, 4 and 5 is just 8. For J32 on the tell, pooling reduces MNI for OCG to just 1. When separated by locus, in many cases a single bone resulted in an MNI of 1 for a species in a specific context, but in other cases many bones could only account for 1 or 2 individuals. This discrepancy is evident in the MNI % of NISP[13] figures (Figure 8.4a). In general, MNI counts are 19-26% of NISP counts by unit, but in unit J32, just 16 bones (NISP) accounted for 8 individuals (MNI). When rodents and equids are excluded, Operation 2 has an MNI of 6 from just 10 specimens (Figure 8.4b). The differing contribution of bone numbers to MNI is evident when Species MNI % of total MNI is greater than Species NISP % of total NISP. For example, when equid and rodent are excluded, BOS makes up just 10.8% of NISP, but 17.24% of MNI, while OC makes up 68.80% of NISP but just 44.83% of MNI. Thus, MNI % of NISP varies widely from 15 – 63%. (Figure 8.3b). Nonetheless, even at the MNI level, OCG combined accounts for over 80% of individuals, further highlighting the dominance of the medium mammals in the assemblage.

Although there are still wide differences between percentages of species, the MNI figures for the assemblage have a bit of a leveling effect on the proportions of species by reducing the percentage of OC while raising the percentages of all other categories except rodent. This move towards a more even distribution of species is reflected in the values of diversity, equitability, and richness, which all increase when calculated with MNI instead of NISP. These values increase for all units, and Area F and J32 alone, across all groupings from all species to OCG

[13] I do not explore the MNI to NISP relationship further than that presented here due to the small number of NISP (see Grayson 1984:53).

versus BOS (Figure 8.5).[14] Although these values are what we would expect, the low number of MNIs, just 77, makes these figures unreliable.

Skeletal portions

Analysis of skeletal portions or body part frequencies highlights the relative contribution of different elements to the assemblage (Reitz and Wing 1999:205). A high proportion of meat-bearing bones suggests that butchering took place in another context and only the meat cuts were sent to the vicinity of the findspot. This pattern could indicate local (intra-site) or regional provisioning in which a nearby village or a specific area or neighborhood within the city processes animal products for distrubution throughout the settlement. An even proportion of meat- and non meat-bearing elements indicates local butchering near the findspot of the specimens. If the structures near the findspot are identified as houses, then even proportions of skeletal elements may indicate household processing (Wattenmaker 1998b:178). Other patterns may indicate specific butchering, eating, tribute or sacrifice practices.

Due to the low MNI of the Kazane assemblage, I used NISP to examine element distribution. All elements were assigned to a body region[15]: head, axial, forequarter, hindquarter, forefoot, hindfoot, and foot. I calculated NISP frequencies for these body region categories for OCG and Bos. Since loose teeth preserve better than other bones and are quite common in the assemblage, I calculated body region frequencies both with and without unassociated teeth. In the case of Bos, there are only 20-26 specimens (without and with teeth),

[14] Diversity, equitability, and richness were not calculated for J32 alone because it's MNI is only 8.
[15] These regions were chosen after Reitz and Wing 1999:205-206. Head includes skull, mandible and teeth. Axial includes vertebrae and ribs (caudal vertebrae are assigned to hindquarter). Forequarter includes scapula, humerus, ulna, radius. Hindquarter includes innominate, sacrum, femur, patella, tibia, and caudal vertebrae. Forefoot includes carpals and metacarpals. Hindfoot includes tarsals and metatarsals. Foot includes metapodial and phalanges.

so the patterns of this group are less reliable than those for OCG, which have 188-223 specimens (without and with teeth). For Bos, head, hindquarter and forequarter are the most abundant regions (Figure 8.6a). Although the latter two regions are meat-bearing, the head is not, so its presence either indicates a good deal of primary butchering debris, or a particular fondness for cattle head in meals. The remaining regions of the skeleton are scarcely represented, but again, with such a small sample, this pattern is not reliable.

For OCG, head, foot, hindquarter and forequarter are the most abundant regions (Figure 8.6b). When unassociated teeth are excluded, foot, hindquarter and forequarter are the most abundant regions. Combined, the meat bearing regions (forequarter and hindquarter) comprise about 35 – 40% (with – without teeth) of the assemblage. Non meat-bearing regions, including the foot, forefoot and hindfoot, which are primary butchering remains, also represent 35 – 40% of the assemblage, and the head comprises 13 – 27%. These proportions present a somewhat conflicting picture of butchering practices. Although high meat-bearing regions comprise a high proportion of the assemblage, so do primary butchering remains (foot and head). Considered without the specimes from trench J32, or only by the large assemblage from Operation 4, these patterns do not change appreciably (Figure 8.6c-d). This suggests that the contexts of the primary assemblage had access to prime cuts, but were also butchering animals on the spot. As Wattenmaker (1998b:183) and Zeder (1991) note, animals are easier to move and store when alive. Thus, the patterns at Kazane may indicate a practice of distributing animals to small and institutional households alike, where animals were butchered on-site. If the Area 1/F structures have any association with ritual or adminstrative structures, then the assemblage from this area may contain the remains of animals offered as tribute or sacrifice. These animals could have been butchered at the place of their donation and meat cuts distributed to the gods, the staff, and other households in the city.

If we break the skeletal regions into their individual elements, we can see if specific bones are more responsible than others for the regional patterns. For OCG, elemental analysis reveals that teeth, metapodia, tibia, mandible, first phalanx and radius are the most represented bones, both for all EBA contexts and for Operation 4 alone (Figure 8.7a-b). For all contexts, tibia and radius are almost or more than twice as common as their arcitular bones including femur, ulna and humerus. This raises the possibility that distal portions of these bones, cut away with the forefoot and hindfoot as primary butchering debris, may be elevating the meat-bearing skeletal region proportions. For the tibia, the ratio of proximal to shaft to distal portions is 4:7:11, for the radius, this ratio is 5:5:4. These ratios indicate that distal portions of these bones are impacting the body region ratios, but without a more detailed analysis of butchering marks, it is difficult to quantify the significance of these distal portions, since many also contain a portion of the shaft.[16]

Data from *Steinbau* I at Tell Chuera, a temple platform and adjacent storage and processing facility, provides a good comparative case of skeletal regions for the Kazane material. The Chuera sample is split into the two areas north and south of *Steinbau* I (data derived from Vila 1995:Table 6). In both regions, Head, forequarter and hindquarter comprise the highest proportion of NISP for OC (Figure 8.8a-b). When teeth are excluded, Forequarter and hindquarter are the largest regions. Unlike the Kazane sample, in which foot proportions are

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[16] Differential preservation also impacts survival of elements. When compared to the skeletal survival diagram derived from ethnographic data and presented in Wattenmaker 1998b:Figure 35, the bones of the Kazane assemblage contain higher than expected proportions of the bones of the pelvis, hindfoot and foot. (Note: in this comparison, for the Kazane assemblage I used perscent NISP for each element shown in Wattenmaker 1998b: Figure 35, while that figure and Wattenmaker's comparative data in Figures 36-37 were calculated as a percent of MNI – see Wattenmaker 1998b:180).

very high, at Chuera OC feet range from 7 – 11% of the sample. In the case of cattle, Head, foot and forequarter are the highest proportion for all NISP in both areas (Figure 8.8c-d). In the northern area, feet rise to the top when teeth are excluded, while in the south Head and forequarter remain the highest categories. The contrasting patterns between Kazane and Chuera, in which feet make up relatively lower proportions of the OC assemblage at the latter, may indicate that at Chuera OC were supplied to the sampled contexts, rather than butchered on-site.[17] In contrast, the high proportion of Bos foot bones at Chuera, especially in the northern are, may indicate on-site butchering of Cattle associated with rituals.

Sheep versus Goat

Sheep and goat are complementary herd animals (Winrock 1983:30). Although ethnographic studies show that sheep are generally preferred for their meat and wool, goats have the advantage of more mobility, and a longer lactation period that produces more milk (Redding 1981 in Wattenmaker 1998b:162; Winrock 1983:30-32). The two species' differential susceptibility to disease also makes each an insurance policy against the other falling ill (Redding 1981 in Wattenmaker 1998b:162; Winrock 1983:30). In modern times, sheep and goat are kept together in both large and small scale, sedentary and transhumant herd systems of eastern Anatolia/Upper Mesopotamia (Yalçin 1986:10-11). Similar systems were in place in the Early Bronze Age states of upper Mesopotamia. In the vicinity of Kazane, herds both large and small likely grazed on field stubble in the plain and on the natural vegetation of the highlands surrounding the plain. Tracking the ratio of sheep to goats in the faunal assemblage can elucidate their relative importance at Kazane in the Early Bronze Age.

[17] These differing patterns may also be related to different sampling and recovery techniques.

The NISP identifiable specifically to sheep or goat is just 31. This low number hinders the strength of the comparison, but the pattern is clear: sheep outnumber goats nearly 4:1 (23 sheep, 8 goats) (Figure 8.9). This gap is narrowed at the level of MNI, where sheep outnumber goats 2:1 (11 sheep, 5 goats). Notably, the NISP proportion of sheep to goat from a much larger assemblage at the city of Tell es-Sweyhat is 2:1 (Weber 1997:135), while samples from ritual contexts at Tell Chuera yield varying of ratios of 2.2:1 for *Steinbau* I (Vila 1995:269), and 5:1 (sheep versus goat *and* cattle) for the *Kleiner Antentemple* (Boessneck 1988:83). These ratios are in keeping with the expectation that sheep would be more prevalent due to their use for both meat and the flourishing textile industry. As providers of the raw material for textiles, sheep and goat were a critial part of both the subsistence or staple, and the prestige or wealth finance aspects of the economy.

Comparative Material

Comparative data is available for the cities of Tell Brak, Tell Leilan, Tell Chuera and Tell es-Sweyhat. At Tell Brak, 31% (968) of specimens were identifiable at least to the level of genus (Weber 2001: 345). These specimens derive from several layers dating to the Akkadian and post-Akkadian period (ca. 2300 – 2000 B.C.E.). As at Kazane, sheep and goat comprise the largest NISP of the assemblage in all levels, ranging from 50-60%, with sheep slightly outnumbering goat. Cattle also occur in rates similar to Kazane, comprising 9-12% of all specimens. The third major animal at Brak is pig, which comprises 15-25% of the assemblage. Rounding out the food assemblage are small amounts of gazelle, deer, and other wild animals. Aside from the large percentage of pig, the relative proportion of animals is similar to Kazane. The greater diversity of the Brak assemblage, seen in the range of wild animals and the high percentage of pig, likely derives in part from the larger sample size and the distribution of the sample across many levels and contexts (Weber 2001:349). In contrast, the Kazane assemblage comes from one or two chronological levels, two areas of the site, and similar contexts with each area.

The assemblage from an elite area on the Tell Leilan acropolis is similar to that from Tell Brak, with 62% sheep and goat, 22% pig, 8% cattle, and 7% wild fauna – mostly gazelle and onager (Zeder 1995:29). In contrast, assemblages from residential areas in the lower town had up to 60% pig (Zeder 1995:29). At Tell Chuera, the area north of *Steinbau* I yielded 1548 NISP, of which 91% were sheep/goat, 7% cattle, and 2% other (Vila 1995:267). The area south of *Steinbau* I yielded 484 NISP, of which 84% were sheep/goat, 11% cattle, and 3% equid (ibid). The assemblage also yielded nominal amounts of other animals, including 0.6% gazelle, 0.4% pig, 0.2% dog, 0.2% cat and 0.2% rodent. Bones from the *Kleiner Antentemple* yielded 65% NISP sheep/goat, 15% cattle, 10% dog, 5% gazelle, and 4% equid (Boessneck 1988). These figures indicate the variation between contexts at Chuera, but in each case sheep/goat are dominant, cattle are 15% or less, and with the exception of dog around the *Kleiner Antentemple*, other species contribute very little to the assemblage.

At Tell es-Sweyhat, from a sample of 10,853 specimens, 52% could be identified as mammals. Of the mammal group, 22% were large, 77% medium-sized, and 1% small. This size distribution is not too different from Kazane's range of 11% large, 89% medium-sized, and under 1% small mammals. At Sweyhat, cattle comprised 10% of identifiable food animal specimens, while sheep and goat comprised 75%. The remaining 15% of identifiable food bones belong to gazelle, equid (wild, hunted equid), deer and other animals, 11% of which are wild (Weber 197:141). Echoing the Kazane distribution, but contrasting with the Tell Brak and Tell

Leilan assemblages, pig are absent from the Sweyhat assemblage (just 2 of over 10,000 fragments).

Weber's compilation and comparison of food animal percentages from assemblages spanning the Chalcolithic to Eary Bronze Age at sites in the upper Euphrates (southeast Turkey) and lower Euphrates (north Syria) reveals clear differences between the areas. Turkish sites contain few wild animals, with sheep, goat, cattle and pig comprising most of the food remains (Weber 1997:142). In contrast, Syrian sites have greater percentages of sheep and goat, less cattle, barely any pig, but 10-20% wild animals by NISP (Weber 1997:142). These differences point to different subsistence strategies in the two regions. Whether these differences are rooted in socio-cultural practices or driven by environmental differences between the wetter north and drier south remains to be seen (Weber 1997:142).

A sub-regional pattern appears in the middle Khabur River area, where the transition from the fourth to the third millennium is marked not only by a dramatic drop in the contribution of wild animals, but also by a shift to caprines (sheep and goat), which comprise over 80% of the assemblages from this region (Zeder 1998:58). Zeder argues that this shift, presumably related to exploitation of wool and hair for textiles, occured not because of environmental changes, an influx of outsiders, or the influence of urbanized polities to the south. Instead, this shift was part of a gradual economic change in which the relatively untapped grasslands of the middle Khabur were exploited by an indigenous population for expanded herd grazing as part of the local development of urbanized states in the Khabur region (Zeder 1998:64-66).

Compared to the Turkish versus Syrian pattern cited by Weber (1997), or the local pattern of the middle Khabur presented by Zeder (1998), Kazane presents a complementary example: lots of sheep and goat with little cattle and no pig, consistent with southern sites, but a lack of wild animals, characteristic of northern sites. In terms of latitude and rainfall, Kazane is on the conceptual border between northern and southern sites. This and Kazane's position on the fertile Harran Plain, with plentiful grazing in the adjacent highlands, may explain in part the dominance of sheep and goat in the assemblage. The small amount of wild animals, especially gazelle, may indicate that extensive cultivation had driven most larger wild animals out of the northern part of the Plain, into the south beyond Harran, where herds could run free. This pattern may also derive from the contexts of the assemblage, which so far do not seem to include any non-institutional, domestic debris. Perhaps the pig specimens that would place Kazane firmly into the northern assemblage pattern, or even supplemental wild animals, are to be found in "everyday" households' domestic refuse. Finally, the dominance of sheep and goat in the Kazane assemblage, as with the dominance of caprines in the middle Khabur, may be related to local economic developments, such as intensification of textile production, during the development of urbanized states on the Harran Plain.

Summary and Conclusions

In this chapter I examined the animal economy at Kazane. The results from the tell and the outer town reveal a highly specialized animal economy with a narrow focus on sheep and goat, supplemented by cattle. This distribution lacks the percentages of pigs often found at contemporary sites in the southern parts of the Jazira, and the percentage of wild animals often found at contemporary sites in the Northern Jazira and the Euphrates Valley in Turkey. This pattern may indicate a local pattern of animal exploitation in the Harran Plain, or an intra-site pattern of consumption in the sampled contexts at Kazane. Considered by body parts, the faunal assemblage indicates butchering and consumption of animals in the area of the sample contexts.

This pattern may relate to the presumed institutional nature of many structures in Area 1. The lack of significant differences between the assemblage from the outer town in Area 1, and trench J32, may be due in part to the smaller sample size from the tell, but may also indicate that these two areas were engaged in similar economic practices relative to the animal ecnomy. The specialized animal economy revealed in this chapter, combined with the specialized storage facilities from Area 1, shows that Kazane's cultivated and domesticated economy was highly specialized, and as the city grew, significant parts of the outer city were devoted to storage and distribution of goods. These areas of specialized storage were also supplied with meat through a specialized animal economy.

CHAPTER 9

URBAN PLANNING AND URBAN LIFE HISTORIES IN THIRD MILLENNIUM UPPER MESOPOTAMIA

Introduction

In this chapter I discuss urban planning in ancient cities. After Smith (2003) and Smith (2007), I argue that cities are not planned *or* organic, but somewhere along the sliding scale between less planned and more planned. This distinction is important because it permits us to unpack the urban plan, looking for features that belong to different kinds of planning. These different levels covey different kinds of meanings, and derive from the agency of urban residents acting at different scales, from 'everyday' households to palace households, from the efforts of a single family to the efforts of thousands of workers building large-scale public works. The results of these different projects have different impacts upon the urban plan, and contribute to the life history of the city. In this chapter, I review the life history of several Upper Mesopotamian cities as revealed in their urban plans. Although urban plans often present a static picture of dynamic events, we can mitigate this problem using formal models of urban growth devised by urban geographers, combined with excavated evidence for change in the urban plan. With these tools it is possible to make hypotheses about how urban development took place, and the role of socio-political and economic processes in urbanization and the urban life history.

The Urban Plan and Urban Planning in ancient Cities

The plan of ancient cities shows how the population, institutions, and industry were distributed within the city. From the spatial relationship between these and other urban features, we can infer aspects of socioeconomic and political organization. The urban plan also provides clues to how urbanization took place, the role of the central authority, major institutions, and 'everyday' residents in this process, and how the city changed over time. In this context, 'plan,' refers to the physical, X-Y-Z relationship between structures, streets, and features, such as open areas, within the built environment that comprises a city. The degree to which this plan is the result of deliberate planning is a matter for investigation.

Traditionally, an orthogonal urban plan is considered the hallmark of a planned city, while anything less than orthogonal is deemed 'organic,' or natural, emergent, irregular, and unplanned (Castagnoli 1971:124; Smith 2007: 5). In general, evidence for orthogonal planning is assumed to reflect decision-making and funding at the highest level of city governance. In contrast, "organic," or unplanned urban growth is deemed to reflect the spontaneous activities of multiple households and institutions in the city. Adam Smith argues that this view of urban planning implies that western notions of rectilinear planning are the ideal, when in fact "curvilinear" planning may simply reflect a different aesthetic, or a case when a king or ruler, the "dominant locus of spatial production," does not want to control certain aspects of the urban plan (Smith 2003:225). In practice, cities are rarely, if ever, purely planned or organic. Instead, cities contain both planned and unplanned space, and even highly planned space, such as Pompeii (Lawrence 1994: 19) may be remodeled or redeveloped by its inhabitants according to their specific and changing needs.

Although a household or institution obviously *plan* the construction of their domicile or structure, *planning* in the urban sense means that the builder adheres to certain principles, such as building size, internal division of space, or orientation, which respect these characteristics as found in other structures in the city. In his recent article, Michael Smith draws on the work of Ellis (1995) and Carter (1983), among others, to devise a scheme to analyze levels of urban planning in ancient cities. In Smith's approach, cities can be more or less planned, not simply planned or organic. Smith divides urban planning into two main components: coordination among buildings, and standardization among cities.

Smith's first component, coordination among buildings, is present when "individual architectural features appear to have been arranged and constructed with reference to one another" (Smith 2007:8). Coordination often involves formal arrangements of structures, such as around a plaza, or with respect to other features, such as a temple, palace, street or city wall (Smith 2007: 9-12). Monumental buildings are usually the most formal structures in a city, making bold statements about power and ideology. Monumental structures are often built in ways that limit or control access to certain areas, and with respect to the view or viewshed, both to and from the structure (Smith 2007: 24-25). In defining the coordination of structures, Smith distinguishes between semi-orthogonal and integrated orthogonal plans. Semi-orthogonal plans develop as adjacent buildings are built parallel to existing structures for reasons of convenience rather than formal planning. In contrast, in integrated orthogonal plans the orientation of structures respects the orientation of larger features, such as main streets or canals (Smith 2007:16-17). The highest level of orthogonal planning, which Smith calls a "modular orthogonal plan," occurs in cities with a regular street grid, such as in most classical Greek and Roman cities (Smith 2007:16-17). Finally, coordinated urban architecture may take non-orthogonal geometric forms, such as circular or radial towns.

Smith's second component, standardization among cities, is based on the principle that "the presence of similar buildings, layouts, and other urban features in a series of related cities suggests adherence to a common plan or idea of city planning" (Smith 2007:25). The starting point for examining standardization is to make a list of common urban features and the general spatial relationships between them. A similar list of features and relationships at several sites in a region suggests that they were built with a common idea about how to construct a city (Smith 2007:25-27). Thus, cities that on the surface appear to have very different plans may, upon closer analysis, share basic planning principles, while superficially similar cities may develop from very different processes. Finally, the general plan of features in several cities, or their dimensions, may share a common orientation or unit that reveals shared ideas about cities, common religious ideology, or other beliefs (Smith 2007: 29).

After identifying the degree of urban planning according to Smith's scheme, we face the difficult task of interpreting the meaning of the urban plan. Smith approaches this problem by adopting Rapoport's levels of meaning for built environments (Rapoport 1988, 1990). Rapoport describes his three levels as ideal types that summarize a continuum of ways in which built environments communicate meaning (Rapoport 1988: 325). Rapoport's levels are *high-level*, which refers to cosmic or sacred meanings embedded in aspects of the urban plan, *middle-level*, which applies to statements regarding power, status, wealth and identity, encoded in buildings and the urban plan, and *lower-level*, which refers to "everyday and instrumental meanings" about expected behavior in various contexts in the city, which are conveyed in architecture of the urban plan (Rapoport 1988:325; Smith 2007: 30).

Smith argues that Rapoport's high-level meaning is nearly impossible to discern without textual evidence of the intentions of the builders, because even cities said by their inhabitants to have a cosmic or sacred structure may not exhibit any obvious cosmic or sacred spatial patterns (Smith 2007: 31-33). Other sholars argue that high-level meanings can be inferred or suggested, if not always empirically verified (Benson 1981; Carlson 1981; Wheatley 1971). In contrast, middle-level meanings may be more evident, especially in monumental or formal structures that convey power, wealth, grandeur, or community (Smith 2007: 35-36). Finally, lower-level meanings are evident in patterns of access, visibility, and daily practice (Smith 2007: 36-37). Although identifying levels of meaning according to Rapoport's scheme does not reveal the specific meaning of the urban plan or its aspects, it provides a useful framework for comparing and contrasting urban plans among different cities.

Problems such as the production of similar urban plans through different processes, or change in the urban plan through time, complicate any analysis of cities (Smith 2007: 39-40), but Smith's approach to urban planning is a useful tool for analyzing ancient cities. While Smith's scheme defines criteria for identifying levels of urban planning, it does not provide a means to interpret growth and modification of the urban plan. To examine urban growth and change, we may apply several formal models developed by urban geographers. These ideal models do not fit all cities but they serve as a starting point for identifying patterns in urban form, and are especially suited for analyzing patterns of urban growth – the urbanization process itself. The models considered here include the *concentric*, *sector*, and *multiple nuclei* models. These models, applied to ancient Mesoamerican Cities in one study (Marcus 1983), describe how some cities grow and may be useful for interpreting the spatial organization of third millennium cities in Upper Mesopotamian.

In the *concentric model* developed by Ernest W. Burgess to describe Chicago and other modern cities (Burgess 1925) the business district is located in the heart of the city, which grows outward radially, creating concentric zones with specific characteristics (Figure 9.1). This central district initially contained the entire settlement, which subsequently expanded, and as this happened, the center became a specialized locale for business. After the center, the second zone is a transitional space that contains run-down housing, business and manufacturing facilities.

The residences of the working class characterize the third zone, while the fourth zone contains housing for the higher class. Outside the fourth zone, beyond the official boundary of the city, are suburbs containing residences of commuting workers. According to the model, the city grows by a dual process of organization and disorganization, which Burgess likens to organic growth. As residential zones are 'invaded' by industry, housing may shift to another location. Formerly "good" neighborhoods may decline as wealthier residents relocate and sell their homes to poorer residents, who cannot afford to maintain or improve the property. Decentralized periphery areas and suburbs may be reorganized as they are integrated into the expanding zones of the city.

In practice, concentric zones are traversed and interrupted by landscape features, such as hills, rivers, or lakes that create buffers or transportation corridors within the city. The boundaries of concentric zones are also fuzzy, as features of one zone blend into adjacent areas. Finally, the ringed zones indicated by the model were not homogeneous, but contained a mix of features said to reside in different zones (Bruegmann 2005:40). In recognition of these problems, and on the basis of case studies of the growth of urban neighborhoods, Homer Hoyt proposed the *sector model* (Hoyt 1939). In this model, urban growth is channeled along major transportation routes, creating pie-wedge shaped zones of similar character (Figure 9.1). This linear, rather than radial growth is influenced not only by transportation routes, but also by push and pull forces as some zones gravitate toward or away from other zones. For example, higher status housing areas may grow towards the residences of city leaders, but away from areas of industry or undesirable locations such as flood zones (Hoyt 1939:117).

Hoyt questioned the definition of the "center" of the city, and criticized the concentric zone model for assuming that the center must lie within the financial district. Instead, he argued, the "center" might be measured in terms of pedestrian traffic, a convergence of major roads, or the value of land (Hoyt 1939:18). Accordingly, a third formal model of urban growth expands on the sector model to describe a city based on *multiple nuclei*. This model recognizes that initially, or as a city grows, multiple centers develop based on the specific needs of activities conducted in each center (Figure 9.1). For example, market areas must be accessible to customers, many production facilities must be located near roads or waterways to conveniently move their goods, and some industries profit from close proximity or shared facilities, such as kilns. Other urban features may conflict with each other, prompting separation between housing areas and industries that create noise or environmental pollution (Harris and Ullman 1945:14).

Urban life histories

The three general models of urban form discussed here, in conjunction with Smith's framework for the analysis of ancient cities, will serve as the basis for my analysis of third millennium, Upper Mesopotamian cities. Although these models were developed for modern, industrial, even multi-regional cities, they may help us make sense of the structure and growth of ancient cities as well. The main problem in applying these models is that we usually lack the full plan of an ancient city, data from different cities are not equivalent, and it is difficult to know if the disconnected parts of the city that we uncover in our excavations are contemporary. Despite these problems, there are several cities for which we can attempt to apply the models. To do so, I will examine the life history of several cities over the course of the third millennium as seen in the features of their urban plan.

As discussed in the introduction to this dissertation, the life history of the city is an accounting of its beginning, development, decline and abandonment. Since this life history takes place on the large scale of the city, rather then the small scale of an individual structure, it ranges over longer time periods and loses some of the fine detail typical of a life history. Nonetheless, in the life history accounting, the emphasis is on the major phases in the life of the entity, in this case a city, and the role of inhabitants in creating and modifying the features of the built environment. As we will see in the examples, elements of urban planning impact the life history of the city, some only slightly while others, such as infrastructure, have long-term effects. Changes in specific aspects of the city plan, such as the location, size, or plan of houses, institutions, or burials, yield insight into socio-cultural and economic changes in the city.

The physical layout and life histories of Early Bronze Age cities in Upper Mesopotamia

The layouts of third and early second millennium cities in Mesopotamia are reconstructed from partial exposures, surface collections and remote sensing at a variety of sites. Although these urban plans are necessarily composites, several features are common to nearly every city: temples, palaces, residential areas, transportation routes, burials, city walls, gates, and evidence for craft production. The location and basic form of these features varies between Upper and Lower Mesopotamia for both environmental and cultural reasons.

In Lower Mesopotamia, where the Tigris and Euphrates Rivers were the source for rich irrigation agriculture, walled cities were divided into districts by natural waterways, artificial canals, and streets (Figure 9.2) (Stone 1995:239).[1] These watercourses and roads often separated the key areas of the city: the temple, the administrative, and the residential areas. Temples were built upon prominent platforms, visible throughout the city. These platforms, which rose over the ruins of successive temples, were usually located towards the edge of the

[1] This paragraph summary of the spatial organization of southern Mesopotamian cities is derived from Stone 1995.

city rather than the center. Temples in southern cities predate the cities themselves, and mark a long-standing association between the gods and the city. In contrast, palaces were not located upon platforms, and may not have existed in all cities because secondary cities ruled by governors would not have royal residences (Stone 1995:239). Nonetheless, we would expect these governors to live in large, prominent houses. City residents lived in neighborhoods characterized by narrow, winding streets among tightly packed, adjacent houses. These neighborhoods also contained craft workshops, although it is not clear if craft production was concentrated in certain spaces or spread throughout the city. The dead were buried beneath house floors and in walled cemeteries within the city, while garbage was disposed of in open spaces, abandoned structures, and streets.

In Upper Mesopotamian cities, the most prominent spatial division is between tall, pre-urban settlement tells, and flat, expansive lower cities, surrounded by a city wall. The shape of the city was often oblong, and the tells, which consisted of the mounded ruins of earlier period settlements, often became fortified citadels housing temples, palaces, and elite residences. As with temple platforms in Lower Mesopotamia, the tell of northern cities is located off-center, to one side of the city (Stone 1995:243). The exception to this pattern is in an urban form called *Kranzhügel* after its round shape.[2] *Kranzhügel* cities are found in the relatively marginal (low rainfall) steppe between the Balikh and Khabur Rivers, and in the vicinity of Jebel ‘Abd al-‘Aziz in northeastern Syria (Meyer 2006; Moortgat-Correns 1972). In contrast to other northern cities, which were often shaped like elongated ovals, *Kranzhügel* cities consist of a round settlement with round city walls around both the central, inner tell, and the outer, lower city.[3] In some

[2] *Kranzhügel* is German for “wreath hill.”
[3] As discussed below, the inner and outer walls were not always in use at the same time, as inner walls were built over after outer walls were established.

cases, the lower city was not inhabited, as at Beydar. Examples of *Kranzhügel* cities include Tell Chuera, Tell Beydar and Tell Bati. Based on their location in a marginal environment, some scholars suggests that these cities were built and inhabited by people with some type of shared local culture, such as pastoral nomadism, who thrived, despite their marginal location, through trade with other states in the region (McClellan and Porter 1995: 63).

In the examples of urban plans from Upper Mesopotamia discussed in the next section, uneven data makes it possible to say little about some sites but much about others. Yet, in each case we are able to describe the location and characteristics of at least a few of the four major categories of urban features. These are: 1) Infrastructure, including circuit walls and dividing walls between sectors, city gates, streets, water and sewer systems. 2) Institutions, including palaces, temples, and their associated facilities; 3) Residential areas; and 4) Craft production facilities. Due to the high cost of infrastructure, features such as city walls and streets often become fixed and shape the direction and form of later development (Herman and Ausubel 1988:13). Thus, urban plans may be shaped early in the developmental process, with later development acting within the boundaries set by roads, city walls, and waterworks. Accordingly, realignment or rebuilding of streets, city walls and water works requires major organization of labor and funds. In contrast, institutional, residential and craft production facilities are subject to remodeling and rebuilding by their inhabitants or patrons, because unlike infrastructure, these features may be changed without dramatically affecting the rest of the city.

In the following section I review the life history and urban plans of several cities. The examples discussed here include large and small cities from across Upper Mesopotamia. I chose these examples on the basis on the availability of enough information to provide insight into their urban plan and its change over time. I also attempted to cover large and small cities from across the region. These examples do not include some important cities, such as Mari, which is located at the southeastern edge of the study area. The cities discussed here include: from the Harran Plain, Kazane; from the Khabur region, Tell Mozan and Tell Leilan; the *Kranzhügel* sites Tell Chuera and Tell Beydar; from the Upper Turkish Euphrates, Titriş Höyük; from the Upper Syrian Euphrates, Tell es-Sweyhat and Tell Banat, and from Southern Syria, at the desert margins, Tell Al-Rawda. After reviewing the life history of the cities listed here, I will return to the three urban models, introduced above, and Smith's framework to compare and contrast the production of space in these cities.

Kazane

Since Kazane is discussed at length in this dissertation, here I provide only a brief summary of its development. In the mid third millennium, Kazane grew from a ca. 10 hectare village into a 100 hectare, walled city (Figure 9.3). The city wall was built at once, and not expanded subsequently. Excavations and remote sensing reveal massive, monumental architecture just east of the tell, in the heart of the city in Area C, and throughout Area 1/F in the southern part of the city. The Area C structure is probably a fortified palace, while the Area 1 structures include a monumental tomb within a large structure that is probably a house, at least two large storage facilities (Building Units 4 and 5) with administrative sealings, and a possible temple or temple-related building (Building Unit 8). The dimensions, wall thickness, and contents of most of the structures in Area 1 indicate that they are elite or institutional. These buildings share similar dimensions and dimensional ratios, and a common orientation that parallels a long street (Operation 5), which follows the main axis of the site. Based on a sounding in Operation 1.2, these structures were built directly upon Halaf Period remains, indicating that there was not third millennium settlement in the outer town prior to the mid third millennium expansion. Early second millennium rebuilding/reuse of structures in Operations 6 and probably Operation 8 indicate that the reorganization of the city in this period dramatically changed the use of space in Area 1. In the process, previously monumental buildings were replaced by simple, domestic and industrial structures. In a similar fashion, later third millennium remodeling of portions of the massive structure east of the tell in Area C indicates the original use of these spaces changed.

In reference to Smith's scheme, Area 1 at Kazane shows coordinated arrangement of structures, some of which have similar dimensions or share walls. These structures are oriented with respect to the street in the western part of Area 1. The large dimensions and / or thick walls of many of the structures in Area 1 are markers of monumentality. As with the large structure in Area C, the large structures in Area 1 may convey wealth, power, sacredness or security. These structures were certainly impressive to those passing by on the street, and were probably visible from many parts of the city. In addition, sector walls did not surround the Area 1 structures, and several of these buildings border the main street. This indicates that these structures were not segregated from the rest of the city. In contrast, the extremely massive walls of the Area C give this structure the character of a fort or keep, and imply extremely restricted access.

Mozan

Tell Mozan is a 135 hectare city located in the Upper Khabur Plain. The story of urbanization at Mozan is not as clear as at several other sites discussed here. There is evidence for settlement upon the 18 hectare, 25m high tell and in the lower city in the early third millennium (Figure 7.2). It is likely that the inner city wall and moat around the tell were built in the early third millenium. In the mid third millennium, the inner city moat was filled with debris, and the inner city wall likely went out of use as a new wall was built around the lower city. A small temple, temple BA, was built in the mid third millennium at the top of a long staircase upon an isolated platform on the highest part of the tell, where it looked down upon the rest of the settlement. In the later third millennium, a large palace (building AK) appeared on the western edge of the tell, with residential housing adjacent on one side (Figure 7.2). Also in this period, temple BA was substantially remodeled, although it may have no longer served as a temple. In the later third millennium, the palace was abandoned and used for dumping refuse and as the foundation for scattered residences. Additional residences and several burials with many bronze objects were also found on the tell. (All above information from Buccellati 1998, and Buccellati and Kelly-Buccellati 1997, 2000, 2001).

Although the information from Mozan is fragmentary, it indicates that when the city expanded in the mid third millennium, the inner wall was abandoned and outer fortifications were added. Although the Mozan temple was small, it was located on a prominent platform on the highest spot in the city, was built in the earliest period of the city, and was rebuilt into the middle of the second millennium. In contrast, the third millennium palace was built at the edge of the tell and was abandoned by the end of the third millennium. Regarding Smith's scheme, the exposures at Mozan are not large enough to determine if buildings were coordinated to common features. Formality is evident in both the temple and palace plans, and temple BA's position at the highest point of the tell made it a highly visible focal point for the entire city. The ramped entrance to the temple faces the direction of the palace, but it is not clear if the palace entrance or other features are oriented towards the temple.

Leilan

Leilan is located on the Upper Khabur Plain, and consists of a 15 hectare tell and a 68 hectare lower town (Figure 2.2). During the years 2600 – 2400 B.C.E., Leilan expanded from a small settlement on the tell to a 100 hectare city with a vast, walled lower town and some settlement outside the walls (Weiss 1997). Excavations in the lower town and acropolis provide insight into the city's growth and organization.

The expansion of the city into the lower town was marked by the construction of a city wall. This wall originally consisted of 10m wide earthworks, upon which a 3m wide mudbrick wall was added later (Ristvet et al. 2004; Ristvet 2007:190). Excavation in a residential area on the southern side of the city revealed several phases of carefully planned streets and houses (Figure 2.2, area LTS). The 4.5m wide, straight street built on sterile soil is marked by parallel brick walls with deep foundations (Weiss 1990: 201-203; Abb. 3, 7-9). These walls run uninterrupted for the exposed length of the street, which was reused throughout the life of the settlement. The houses along the street had carefully constructed stone and clay drains that empty into the street (Weiss 1990: Abb. 6). In two of the building phases (phases 6-7) a 20m long wall divided sets of houses on one side of the street (Weiss 1990: 203). This division created two housing sectors that shared the dividing wall as part of their architecture. Some single room houses were found along this street, as were multi-roomed courtyard houses with regular dimensions (Ristvet 2005: Figure 3.11).

Excavations on the northwestern end of the walled citadel revealed administrative structures. These structures include a ritual platform and associated storage rooms, built ca 2500 B.C.E. This ritual area was surrounded by a large wall that separated it, and perhaps the entire north end of the acropolis, from the rest of the acropolis. In the following period, ca. 2300 –

2200 B.C.E, this area contained a multi-room house and a slightly later administrative building. The latter was apparently never completed but had 1.86m thick basalt foundations, and contained fragments of tablets and counting devices, attesting to its administrative function (Ristvet and Weiss 2000). The house had a drain to the 2m wide street, which was paved with potsherds (Ristvet et al. 2004). Next to this house, a single-room structure is interpreted as a school on the basis of over a dozen tablets found in the room, several of which were school texts. The one-room structure was later replaced by a structure containing ovens, grain storage areas, and grindstones. Additional grain storage was found in a large structure, the so-called "Dudu Palace," across the street from the schoolhouse and later storage structure (de Lillis-Forrest et al. 2004, 2007).

Aside from the city walls, the most visible aspects of city planning at Leilan are the straight street in the lower town, coordination of houses along the street, and sector walls dividing housing areas. The formal, monumental buildings on the tell would have been visible from a great distance, and likely conveyed messages about power and wealth. Access to these structures was restricted by their location within the citadel, and in some cases, another walled area within the citadel.

Tell Chuera

Tell Chuera is a *Kranzhügel* site, located just inside the northern border of Syria, in the eastern headwaters of the Balkih River. Chuera is 48.20 km as crow files from Harran, or 51 km on the shortest route that does not cross any high hills. At 65 hectares,[4] after Kazane, Chuera is

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[4] The size of Chuera is reported to be 65, 80, and 90 hectares. From the published maps (Meyer 2006: Abb.2; Pruss 2000b: Figure 1), it measures closer to 65 hectares, and it seems that the larger figures were derived from the diameter without accounting for the actual shape (Meyer 2006:180; Orthman 1997:491; Pruss 2000b:1431).

the second closest large center to Harran. Excavations at Chuera began in 1958 and continue today, but the most fruitful results in terms of understanding urban form and growth have come in the last decade, when most of the city was mapped with magnetometry (Moortgat 1967; Moortgat and Moortgat-Correns 1978; Moortgat-Correns 1988a; Meyer 2007; Orthmann et al. 1995; Pruss 2000b). The combined results of the magnetometry and excavations provide perhaps the most complete picture of the urban plan of a large city in Upper Mesopotamia.

Chuera consists of a walled, 28 hectare inner mound, and a 37 hectare, walled lower town (Figure 7.9, 9.4, 9.5). Recent excavations indicate that the inner city was settled first, in 2800 B.C.E., and expansion into the lower city took place between 2600 – 2450 B.C.E. (Meyer 2006:180). The city was abandoned by the end of the third millennium, but portions of the northern part of the upper city were reinhabited in the later second millennium.

City walls and canal

The inner city wall was presumably built when the city was founded sometime before 2700 B.C.E., while the western portion of the outer city wall is dated to around 2600 B. C. E. (Meyer 2006:182). The inner city wall went out of use and was built over about the time that outer wall was built (Meyer 2006:184). The 3 km long, 8-12m wide lower city wall, where excavated on the western side, has plastered bricks, is 6m wide, and has box-like chambers filled with gravel on its outer face. The excavators suggest that these chambers were designed to protect the wall from erosion from the adjacent drainage. The entire wall is covered by a glacis, and pierced by over a dozen gates (Meyer 2006:184; Pruss 2000b:1434). A possible canal runs along the outside of the city wall from the northeast to the southwest, where it enters the city.

Alternatively, the larger figures may include unreported extramural settlement considerably larger than the excavated area of the *Aussenbau* and *Stelenstraße* in area L.

Streets

The streets described here date to the period 2600 – 2450 B.C.E., and may not follow the original street plan from the first period of the city. Yet, streets tend not to be realigned without major urban planning efforts because changing street paths requires removing and rebuilding the structures that line the streets, as well as the sewer system. The streets at Chuera radiate from the center of the site, forming spokes that are connected by at least three major ring roads. One ring road is in the inner city, another just outside the inner city wall, and another appears towards the outer city wall. Various cross-streets connecting spokes create wedge or rectangular-shaped cells or blocks. Streets in the lower city were regularly repaved (Meyer 2006:184).

Sectors

In the upper city, the major spoke-streets intersect at the center of the city in an open area that was established at the beginning of the city, about 2800 B.C.E. (Pruss n.d.-a:2). Residential areas flanked this open area, and a small temple (the *Kleiner Antentemple*) was nestled among houses to the south (Figure 9.4:K). The open area extended to the west nearly to the edge of the city, where it reached a palace in excavation Area F. To the east of the central open area, a main street ran to large temple area that included a temple associated with monumental gateways and less-monumental buildings that were the locus of short-term storage and processing (Figures 7.9, 9.4:A, B, D). Residential areas were located in the northern and southern parts of the inner city, in excavation areas N, H, and E. Magnetometry indicates that there was more space between structures in the upper city, while structures in the lower city were more tightly packed. Magnetometry also reveals that some structures in the lower city were larger than those in the upper city. The excavators suggest that larger, more tightly packed structures in the outer city may have had more internal storage space, while the open space between structures in the upper city may have provided space for temporary storage (Meyer 2006:184). Finally, there is evidence for a potters' quarter at the southwestern edge of the upper city in Area E (Pruss 2000b).

Institutions

A 3000 m^2 palace lies at the western edge of the upper city in Area F, and is mirrored by the temple complex at the opposite end of the open area and street, on the eastern edge of the upper city in Areas A, B, and D. The temple area was set upon a stone terrace nearly 70m long, which bracketed 4m of fill (Pruss n.d.-a:2; n.d.-c:2). Upon this terrace the monumental portions of the temple complex were comprised of several stone platforms, called *Steinbau* (stone building) I-III by the excavators. These platforms were built from monolithic blocks and accessed by stairs and ramps. *Steinbauten* I and III served as bases for mudbrick temples,[5] while *Steinbau* II served as a gate for entering the complex of storage and production rooms running between *Steinbauten* I, II, and III. (Orthmann 1997; Pruss n.d.-c:1-3). Another small temple, the *Kleiner Antentempel*, was found in the center of the site just north of the open area in Area K, a stone antentemple (*Steinbau* VI), dating to the latest periods of the city was found adjacent to Area K (Orthmann 2002), and the *Nord Tempel* was found on the northern edge of the upper city in Area N. Another ritual area, the *Aussenbau*, was found southeast of the outer city walls. This area is marked by a street running north to south, flanked by several megalithic stelae. To the west of this street, excavations revealed several ritual buildings. Due to the general lack of

[5] But see Meyer 2007:137, where *Steinbau* III is referred to as an "entrance gate."

burials found within the settlement, the excavators suggest that this ritual area outside the city walls, associated with a unique group of stelae, may be a burial ground or funerary complex.

Residences

Residences at Chuera are found all over the site: in the heart of the upper city, throughout the upper city, and in the outer city. Residences are found adjacent to the temple and palace areas on the eastern and western sides of the upper city, and next to the central square and *Kleiner Antentempel* north of the square. An especially large, stone built residence, *Steinbau V*, appears in the southwestern part of the city, next to potters' quarters. The houses in Area K were initially of irregular size and plan, but those after ca. 2450 B.C.E. have more regular dimensions and plans. Peter Pfälzner describes houses with similar plots as parceled houses, and argues that they indicate centralized control over land allotment and construction at Chuera and other sites (Figure 9.12) (Pfälzner 1997; Pruss 2000b:1432). I will address this issue at the end of this chapter.

Urban growth and change

The excavators argue that Chuera "was a town from its very beginning and did not develop from an older village. Its existence is the result of a deliberate town-planning process" (Pruss 2000b: 1432). This bold statement derives from the finding that the large open area at the center of the site overlies mid fourth millennium and earlier remains (Pruss n.d.-a:2-3). What this statement does not consider is that a smaller, early third millennium settlement could be located anywhere on the high mound, not just beneath the central square. Nonetheless, it does appear that the square, main street and probably the basic parameters of housing and sacred areas were defined early in the life of the city. From the beginning, there was a deliberate effort to establish and maintain an open area at the center of the site. Institutions took up prominent positions on platforms or terraces on the eastern and western edges of the inner city, but temples or ritual buildings were not confined to this area. Instead, ritual installations also appeared outside the city in the *Aussenbau* and in the form of small temples amidst residences. Residences were initially of irregular form and size, but changed to a more regular plan over time. Streets radiated from the central square to the upper city wall, and beyond it once the city expanded, creating "natural" spaces for settlement in between spokes. Although the first major ring street falls about midway between the site center and the inner city wall, and the spoke streets are somewhat regularly placed, the plan does not appear to have been strictly implemented according to a master metric design. Instead, the plan appears to revolve around the need to wall off a generous amount of space to protect the inhabitants, maintain a central square for group activities, and establish multiple transportation routes in the form of spoke and ring streets.

The plan at Chuera changed over time. The inner streets were extended as the lower city took form inside a newly constructed lower city wall.[6] Settlement in the lower city was more compact than in the upper city, perhaps in an effort to maximize the use of space inside the larger walled area. Over time, the structures in the palace and temple areas on the eastern and western side of the city were modified or built over with similar structures. In the last century before the city was abandoned, the palace, falling into disrepair, was taken over by potters, perhaps from the nearby potters' quarter, and small structures were built within and on top of the palace walls (Orthmann 1994: 121; Pruss n.d.-c:9-10). Residential areas were also rebuilt over time, although

[6] Some of these inner city streets must have extended beyond the city walls from the time of the earliest settlement.

the regularity of these houses increased in at least one area, Area K at the center of the site. Meanwhile, the central square came to be used as a midden for the housing area to the south. This square eventually filled up with 8m of household garbage, while the adjacent, superimposed houses rose with the garbage, and a wall was built along the street to keep the midden from sliding into the street (Pruss n.d.-a:2). The houses in Area K were abandoned by about 2500 B.C.E., perhaps due to the encroaching midden (Pruss 2000b:1432).

Many aspects of city planning are evident at Tell Chuera. Formal structures, including the palace and several temples, are marked by their architectural plan, monumentality, and / or the use of stone building material, and elevation upon platforms. Notably, several temples are nestled among housing areas, and would not have been highly visible like the *Steinbauten* or the Palace. The placement of the palace and a temple complex at opposite ends of a main avenue made both institutions highly visible and relatively accessible to anyone entering the upper city. This long avenue probably hosted formal processions to or from the palace, temple areas, and the *Aussenbau* outside the city to the east. The formal square along this avenue in the center of the site likely hosted public events, although urban crowding ultimately led to its demise, as it became a garbage dump for adjacent houses.

Tell Beydar

Tell Beydar is a *kranzhügel* located in the Khabur Plains. The site consist of a 7 hectare, 27.5m high, walled tell and a 22.5 hectare walled lower town (Figure 2.3) (Lebeau 2003: 21; 2006:101). This lower town was not inhabited in the third millennium. Unlike Tell Chuera, which expanded from the inner to the outer city, at Beydar both the inner and outer fortifications were built when the city was founded around 2900 B.C.E. The outer wall consists of a 40-80m thick, 20-30m high earthwork with a 4.5m thick brick and pise wall at its core (Bluard 1997). The inner city wall consists of a 5.4m thick mudbrick structure, possibly up to 10m high. The space between the inner and outer city walls was dug to form a moat (Suleiman 2003: 305). The defensive function of the outer city wall may have been compromised in the period 2700 – 2350 B.C.E., when domestic structures were built on top of it. Several burials were found north of the outer wall of the city, perhaps indicating an extramural cemetery in this area (Bluard 1997).

The core of the upper city was formed around a group of official buildings dating to the period 2550 – 2400 B.C.E. The palace lies at the center of the summit of a three-tiered terrace. The palace is bordered by a glacis on its northern and eastern sides and a series of temples[7] and storage facilities to the south. Temple A is adjacent to the palace on the highest level, and three other temples (B, C, and D) and associated storage and possibly market and artisan structures are located on the second terrace to the south of the palace (Figure 7.3). A long street with basalt step treads approaches these upper two terraces and ultimately leads to the palace gate. Streets branching off this street to the west, at least one of which has a drainage canal, provide control points for access to the temples on each terrace (Lebeau 2006:119). The excavators surmise that the multi-tiered approach, ascending terraces to the palace and highest temple was designed to showcase these institutions and also provide security (Lebeau 2006:120). The security of this area was enhanced by a glacis north and east of the palace (Sténuit and Van der Stede 2003).

North of the palace below the glacis, there is an unusual building of uncertain use[8] next to the glacis, bordered to the north by private houses along a street (Sténuit and Van der Stede

[7] It is possible that these are not temples, because the excavators have not yet found any indisputable altars or dedicatory inscriptions to gods. The excavators acknowledge that it is possible to interpret these structures as elite houses, but they are convinced that they are in fact temples (Lebeau 2006:101, 114-117), and cult figurines were recovered from Temple C (Lebeau 2006:101, 114-117; Suleiman 2007: Figures 23-26).

[8] This is the so-called "U"-shaped building. The excavators initially suggested that this structure was a stable, perhaps for royal animals (Sténuit and Van der Stede 2003), but they now reject this hypothesis (Van der Stede 2007:10).

2003). These houses consist of multi-roomed mudbrick structures with typical domestic installations (Bluard et al. 1997). One of these structures contained a small archive of official texts (Lebeau 1996). Excavators also found a 200 m^2 granary[9] on the southeastern edge of the tell in Area E (Sténuit 2003). This structure does not appear to be attached to any official buildings.

The urban plan at Beydar is not orthogonal or strictly radial. Instead, the formal structures at the core of the site, including several temples, are set upon descending terraces that partially ring the palace, which is the focal point at the summit of the city. Additions to the palace, temples, or residential areas respect the orientation of the existing structures and streets, but are not precisely ordered or measured. In the elevated core of the site, the sloping topography made it easier to orient additions to the palace at the summit, or to structures descending the slope, with respect to the slope, or to simply tack them onto existing structures at awkward angles. At the base of the palace glacis, to the north, excavations reveal part of two radial streets (28914 to the west, and an unnamed street to the east) and what may be a ring road (28936) (Van der Stede 2007:10). The latter dead-ends near the eastern street, although I wonder if these two originally intersected and were later blocked by expanding houses.

Titriş Höyük

Titriş Höyük is located along a tributary of the Euphrates in a small plain between limestones hills, 45 km northwest of Kazane. Titris consists of a 3.3 hectare acropolis upon the old settlement mound on the south side of the city, a 35 hectare lower city, divided into an elongated "lower town" and a parallel "outer town" extending to the north of the lower town, and

[9] See chapter 7 for an extended discussion of this granary and other storage areas at Tell Beydar.

11 hectares of suburbs located east, north, and south of the lower and outer towns (Figure 9.6) (Algaze et al. 2001:23). The entire site was occupied ca. 2700 – 2400 B.C.E., but the suburbs were abandoned around 2400 B.C.E. during a period of urban restructuring. The rest of the site was abandoned around 2200 B.C.E. The majority of excavated contexts at Titriş date to the late EBA, or 2400 – 2200 B.C.E.

City wall and moat

The city wall at Titriş covers only the eastern side of the city. Apparently, the city relied on the surrounding hills, drainages, and a small river for natural defenses for the other sides of the settlement. Magnetometry data indicates that the eastern wall is at least 148m long, and excavations show it to be 3m wide. Regular internal buttresses increase the width of the wall to 6m wide in those places. The wall is built from stone foundations at least 1.5m deep and a mudbrick superstructure. A glacis and 3.5m deep moat extends 14m outside the wall. The wall dates to the late EBA period, or 2400 – 2200 B.C.E., and it may have an earlier phase (Algaze et al. 2001:33-34; Matney et al. 1999:189).

Streets

All known streets at Titriş date to the late EBA. Magnetometry shows long, winding main streets crossing the lower town (Figure 9.7:A, B) (Matney and Algaze 1995: Figure 13). Linear branches from these curving streets divide the the city into large blocks of architecture, which are further divided by smaller streets that are less visible in the magnetometry data. A similar pattern is seen in the outer town (Matney and Algaze 1995: Figure 3). Excavations indicate that streets were paved with pebbles, potsherds and cobblestones.

Sectors

In keeping with the project's research focus, most excavated areas at Titriş contain residential architecture. Aside from some evidence of larger houses, there is little differentiation between the general size or organization of houses – that is, there are no obvious sectors of elite or non-elite housing.[10] A mid EBA workshop for large flint blades ("canaanean blades") was excavated in the eastern suburb (Figure 9.6:A) (Hartenberger 2003). This and some surface finds suggest that the suburbs may have been used for industrial activities (Algaze et al. 2001:55).

Institutions

There is little evidence for institutions at Titriş. A small exposure of an unusually massive mid EBA building found in a sounding in the lower town may be part of an administrative building. Burial rituals are evident in extramural tombs dating to the early EBA, and sub-floor tombs beneath late EBA houses.

Residences

As noted above, most of the work at Titriş focused on late EBA residences. Houses in the lower and outer town were found to have similar overall dimensions, suggesting centralized planning in the distribution of lots. Internally, houses have differing internal subdivisions and modifications, indicative of individual family involvement in house construction. House plans consist of several rectangular rooms ranged around a central courtyard, with two longer rooms serving as living areas (Figure 7.14, 9.8:A) (Algaze et al. 2001: Figure 4).

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[10] However, analysis of intramural tombs shows that residents in the lower town generally had richer, and different grave goods than residents of the outer town (Laneri 2007:262).

Urban growth and change

Although little of the mid EBA city is exposed, the available evidence paints a vivid picture of urbanization at Titriş. The city expanded from a small early EBA village into the lower and then outer town and suburbs in the mid EBA. Early EBA structures, where exposed, had wider walls than their later EBA counterparts. This, and a ritual dog burial beneath one large mid EBA structure, led the excavators to suggest that the mid EBA city was comprised mostly of elite houses and public buildings, with poorer residents and specialists living in the suburbs (Algaze and Pournelle 2003:107). In the late EBA, the suburbs were abandoned and the city absorbed an estimated 3800 persons from these areas. As part of the absorption process, the lower and outer towns underwent extensive rebuilding, involving construction of terrace walls, streets, houses, and a defensive wall at the eastern end of the city. Except for the northern and western periphery of the outer town, the lower and outer towns were densely settled. Residential blocks were separted by winding main streets and more linear secondary streets. As the living residents were absorbed into the city, dead residents were also absorbed as the burial practices shifted from extra-mural tombs to family tombs beneath houses (Laneri 2007).

The excavators argue that the late EBA urban reorganization at Titriş was centrally planned. Evidence for centralized planning in the outer town includes: similar house plans in different neighborhoods throughout the site, similar house lots (Figure 9.8:A, B), streets paved in virgin soil before houses were erected, terracing and land-leveling in advance of neighborhood construction, houses sharing terrace walls and subfloor drainage systems, and symmetric placement of walls and entrances across adjacent houses and streets (Algaze and Pournelle 2003:109; Matney 2000:24-27; Matney et al. 1999:193). The residential areas of the outer town and the eastern city wall were built at one time in a huge building effort, estimated to require nearly 500,000 tons of materials (Algaze et al. 2001: Table 8). The excavators argue that although this large restructuring was centrally planned, differences in the internal division of space within otherwise similar houses suggests that mid-level developers worked with families to create spaces to meet their needs (Algaze et al. 2001:69). Based on local changes in late EBA settlement patterns, the construction of the eastern city wall, the abandonment of suburbs and extramural burials, and a mass burial of young men inside the city, the excavators believe that the late EBA rebuilding efforts at Titriş were sparked by regional conflict (Algaze et al. 2001:68).

Sweyhat

Tell es-Sweyhat consists of a 5-6 hectare, 15m high tell, a 30 hectare lower town, and a few hectares of short-term, scattered settlement in a poorly preserved suburb south of the site (Figure 9.9) (Zettler 1997b:3; Zettler 1997a:51). The site was a small village in the early third millennium, grew to 15 hectares in the mid third millennium, reached its maximum extent in the late third millennium when both the lower town and the suburbs were occupied, and declined in the early second millennium. The city's period of greatest growth is thus equivalent to a period of urban decline or collapse at Titris, Leilan, Chuera and Mozan.

The tell

The main urban phase at Sweyhat is marked on the tell by terracing and leveling operations to prepare the area for construction (Armstrong and Zettler 1997:19l; Danti and Zettler 2007: 175-176). Excavations on the western side of the tell uncovered a late third millennium “Kitchen building” containing a large oven and associated processing areas. This structure is contemporary and probably associated with the nearby burned storage and activity areas in Area IV, excavated in the 1970s (Figure 7:8) (Holland 1977: Figure 1). These burned structures were built against the western fortification wall encircling the tell in the late third millennium, enclosing about 5 hectares (Danti and Zettler 2007: 179). Magnetometry data also picked up this wall on the eastern side of the tell (Peregrine et al. 1997:78). This mudbrick wall was generally 2.5m wide, and up to 7m wide where a buttress or tower reinforced a section of the wall (Holland 1977:37). Excavations on the summit of the tell in the last few years uncovered a mid-to late third millennium platform (Danti and Zettler 2007:177), an early to mid third millennium fortification wall enclosing ca. 1 ha (Danti and Zettler 2007:179), and a late third millennium temple (Danti and Zettler 2007).[11]

The lower city

One or two walls dating to the late third millennium surrounded the lower town. Operations 15, 18 and 25 exposed portions of these walls. The best view of this system is in Operation 25, on the eastern side of the city, where the wall consisted of an 18.5m wide earthen rampart, flanked by an inner 1.15m wide brick wall, and an outer stone revetment (Zettler 1997a: 48-51). Magnetometry confirms the paths of these walls in the eastern, northern, western and southern parts of the city (Peregrine et al. 1997). Magnetometry also reveals densely packed housing in the eastern part of the city (Peregrine et al. 78).

An area of 100 – 150 tombs dating to the mid third millennium was found in a roughly 1 hectare area in the northwest part of the lower town. These tombs were built over by structures

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[11] At this time, details of this temple are not yet published, see: http://www.jezireh.org/sweyhat_home.html

and even the city wall in the late third millennium as the city expanded (Zettler 1997a: 51, 56). Excavations near these tombs in the western part of the city revealed domestic architecture dating to the late third millennium. Operation 4 exposed over $100m^2$ of a house consisting of several rectangular rooms around a courtyard with cooking installations (Zettler 1997a:37-43). Operation 9 uncovered a less coherent portion of housing, consisting of stone foundations, ovens and plastered basins, jar installations, and a covered drain (Zettler 1997a: 43-46). In each case, the walls were about 0.7m wide. Although the houses had several phases of modification, sterile soil was found just 0.8m beneath the ground surface in this area, suggesting that the habitation was relatively short-lived (Zettler 1997a: 37, 43).

Excavations in the eastern part of the lower town revealed architecture associated with kilns dating to the late third or early second millennium. Operation 16 uncovered two horseshoe-shaped kilns associated with ceramic wasters, while nearby Operation 23 uncovered a round kiln. Magnetometry data indicates the presence of additional pyrotechnic features in this area, suggesting that it was the locus of specialized pottery production (Peregrine et al. 1997:78).

Sweyhat's development

Although the urbanization process at Sweyhat is somewhat sketchy, we do have an idea of its founding and expansion. In the early to mid third millennium, the site consisted of a 1 hectare, walled settlement on the summit of the tell. This early settlement had platforms and monumental buildings that were replaced by other monumental buildings in the late third millennium when the walled citadel expanded to 5 hectares. Also in that period, the walled lower town settlement grew to 30 hectares, while some habitation developed outside the walls to the south. Given the shallow stratigraphy in all areas excavated in the lower town, it is likely that most, if not all of the lower town, developed in the late third millennium. The growth of the lower town covered burials from the earlier period in the western part of the town. Some time after the end of the third millennium, Sweyhat was abandoned.

Tell Banat

Tell Banat is located on the Upper Syrian Euphrates, less than 20km north of Tell Sweyhat. Banat consists of several components, including a 25 hectare main mound (Tell Banat), a 1.8 hectare funerary mound to the north, a 2.3 hectare mound about 1km to the west (Tell Kabir), and various extramural tombs (Figure 2.4) (Porter 1995b:125). The main tell is bounded by a fortification wall to the north and east and a mountain to the west. The third millennium remains at Tell Banat date to two main periods: Period IV (2700/2600 – 2450 B.C.E.) and Period III (2450 – 2300 B.C.E.). Except for houses in the ceramic production area, designated residential areas were not located. Instead, the remains consist mostly of tombs, public architecture, and a ceramic production area on Tell Banat, and a temple on Tell Kabir.

Area C on the main tell is characterized by several mortuary features. The earliest is a pre-period IV mortuary mound, which was followed by several period IV-III tombs, including Tomb 7, a monumental, multi-chambered, dressed stone tomb that contained rich objects (Porter 2002a:18). Monumental public buildings were built over these tombs in periods IV and III. These buildings incorporated Tomb 7, which was accessible from these structures. Although exposures are too small to be certain, the monumental structures above the tombs may be temples or palaces (McClellan 1999:419). The remaining excavated areas on the main tell at Banat uncovered ca. 2 hectares of pottery production areas associated with dwellings dating to periods IV and III. This production area, situated on higher ground south of the Area C, focused on ceramics in period IV but grew in size and scope by including bead-making and weaving in period III (Porter 2002a:27; 2002b:163). During this period of expansion in the craft area and rebuilding of the monumental buildings in Area C, a temple with monumental walls was built on nearby Tell Kabir (Porter 1995b).

Due to the lack of clear residential areas, the excavators assert that Banat did not have a high resident population. The excavators also argue that the higher topographic position of the craft production area, which was situated above the palace, and the presence of a large temple on Tell Kabir, indicate that Banat does not fit the 'standard' model of spatial organization of third millennium cities, in which institutional structures are segregated behind walls in the citadel, looming over the lower city (McClellan 1999). Regarding the urbanization process, the excavators believe that through the reuse of Tomb 7 and its incorporation into the public buildings, elites at Tell Banat co-opted ancestor cults to assert their claim to power. At the same time, these elites patronized the corporate ethos of the community by rebuilding/ renovating the burial mound (the "White Monument") north of the tell (Porter 2002a).

Al-Rawda

Located about 75km east of Hama in Southern Syria, Al-Rawda is outside the primary region of this study, but I include it because a cesium magnetometer revealed most of its plan (Castel et al. 2004, 2005; Gondet and Castel 2004). Al-Rawda is an 11 hectare[12] town in a very dry area that receives less than 200m of rainfall per year. This well-preserved town was inhabited during the last four centuries of the third millennium. Remote sensing, combined with ground-truthing trenches, revealed that the heart of this round city consists of a core area

[12] The site measures 11 hectares within the city walls, 16 hectares including the city walls (Castel and Peltenburg 2007:605).

surrounded by a ring road (Figure 9.10, 9.11). Main streets radiate from this core, piercing the round city wall at several gates. In addition to the core ring road (C1), two additional ring roads (C2 – C3) run through the city, with less visible secondary streets running between the ring and radial roads. Each of the main ring and radial roads (R1- R4) are 4 – 5m wide, while the secondary streets are perhaps half this width (Gondet and Castal 2004:100, 102). The city was protected by a four-part defensive structure comprised of two stone and mudbrick ramparts and two ditches (Castel and Peltenburg 2007:607). Five strong gates, leading to the main radial roads, pierced the city wall (Castel et al. 2005:60). East of the walled city, remote sensing revealed about 1 hectare of settlement along a main street leaving the core. West of the site, the excavators found 78 extramural burials, including stone cut shaft and cist tombs, while other tombs are scattered throughout the region (Castel et al. 2005: 74, 77 - Figure 10; Castel and Peltenburg 2007:610).

The ring and radial streets are *not* perfectly executed, such that the distance between roads is similar but not exact. The core of the city and the surrounding ring roads are oval, not round, and on the western side of the city, an additional ring emerges between ring roads C1 and C2, while on the eastern side of the city the second ring road is blocked by a building in one place, and the third ring road splits in two for some distance (Gondet and Castel 2004: 101). In the sectors formed by the radial and ring roads, architecture is oriented with respect to the major roads, such that the lines of the buildings converge on the center of the site (with the exception of a small area in the southeast corner of the site) (Gondet and Castel 2004: 103).

Although the remote sensing plan provides a clear picture of the larger segments of the city, the plan of specific structures is more difficult to discern. For example, although the core of the city may contain large buildings, the complexity of the remote sensing signals in this area, due in part to recent disturbance, makes it impossible to discern the details of these structures (Gondet and Castel 2004: 104 – note 25; Castel et al. 2005:72). Excavations in the core of the settlement uncovered two highly disturbed structures that have contrasting orientations (Castel 2005: Figure 8). Excavations in the southwestern quadrant uncovered parts of houses that share a common orientation but have walls and additions that do not follow a strictly orthogonal arrangement (Castel et al. 2005:Figure 7). Two and possibly three ritual areas were identified in the city, one of which is confirmed by excavations. One is two small temples *in antis*, side by side, oriented NE – SW, in the northeastern quadrant of the site (excavation sector 1) (Figure 9.11:1) (Castel et al. 2005: Figure 6a). These temples are situated within a large walled area, enclosing at least 900m^2 that includes open space and a round platform supporting a standing stone (Castel and Peltenburg 2007:606, Figures 7, 8). A second ritual area, revealed by magnetometry in the southeastern quadrant of the site, includes a SE-NW temple *in antis* situated within a large enclosed area (Figure 9.11:2) (Gondet and Castel 2004: Figure 8c). A possible third temple, oriented NW-SE, is located in the northwestern quadrant of the site (Figure 9.11:3) (Gondet and Castel 2004: 104; Figure 8a). Although all three temple areas have different orientations, in each case the inner sanctuary is oriented towards the center of the site.

The researchers at Al-Rawda believe that specialists under the direction of the central authorities built the major infrastructure in the city, including the main streets, city gates, city wall, and central sector, in one single, concerted effort in a conscious attempt to build a city (Castel and Peltenburg 2007:604; Gondet and Castel 2004: 108). As evidence for urban evolution that changed the initial plan, the researchers cite settlement to the east outside the city walls, and areas where the streets or architecture are asymmetrical or interrupt the general pattern. The researchers argue that the plan of Al-Rawda could not have developed without a model, and they cite Tell Chuera in the Upper Jazira, and Tell Sheirat, 32km south of Al-Rawda, as examples of round cities that may have inspired the builders of Al-Rawda. It is quite possible that the architects, builders, and workers at Al-Rawda had visited other round cities before or during the construction of their own settlement. In his study of the texts from Ebla, Archi (1988b:28) notes that attached craft specialists traveled between cities to work for other rulers. For example, smiths or carpenters would travel between Ebla and other nearby cities, or even as far as Mari and Kish, presumably to complete special projects for which their skills were needed. This exchange of specialists undoubtedly spread ideas about technology and style, and may have influenced the design of aspects of many settlements.

Fitting spatial models to life histories

Do the cities discussed above fit any of the three formal models of urban organization introduced earlier in this chapter? Al Rawda is the best candidate for the concentric model, with its inner district from which all main roads radiate. Presumably, the initial settlement began at this core and grew through the addition of ring roads to incorporate expanding settlement. Alternatively, as the excavators argue, a city as small as Al Rawda may have been "built at once," over a short period of time. Chuera also has aspects of the concentric model, with a public square at its core and at least three or four rings of settlement set off by ring roads. The Chuera roads and settlement are less regular than Al Rawda, perhaps reflecting its longer history, which would have contained more episodes of Burgess' (1925) "organization" and "disorganization," in which the primary use of different parts of the city changed over time, and the plan was modified. Although the round roads make it appear that Chuera was entirely planned as a round city (Meyer 2007), it seems more likely that the initial settlement was round and subsequent expansion respected the pattern of the initial streets. This suggests a modification to the concentric model in which we decouple the growth of infrastructure from the development of zones of segregated persons or activities. That is, the streets at Al-Rawda and Chuera may have expanded outward in zones of infrastructure, but within these zones, development was varied, perhaps following aspects of the sector model. An exception could be the three temple compounds at Al-Rawda, which are situated roughly within the second concentric zone (Figure 9.11). The ring road that connects these temples may have created a conceptual concentric ritual zone, even if this zone also contained non-ritual structures.

At Beydar, the road system is less apparent than at other round sites, but the palace and temples at the elevated core of the site were presumably the most visually prominant buildings in the city. According to some readings, the Beydar texts imply that the palace controlled must of the land in the surrounding area (Sallaberger and Ur 2004:57-8; Widell 2003:723), making the palace and related structures in the center of the site the ancient "business district," said by Burgess to be at the center of the concentric city. Thus, at Beydar the innermost zone contains institutions, while the next zone contains houses, followed by additional zones of unknown make-up. This zoning is of course speculative, since we have few exposures of the city beyond the base of the inner zone.

Although the concentric model has interpretive potential for Al-Rawda, Chuera and Beydar, the sector or multiple nuclei models may be a better fit for Chuera and possibly Al-Rawda and Beydar as well. At Chuera, a palace and temple complex at opposite sides of the city bracket the central square. Radial streets further bracket areas of residential housing and ceramic production, creating loosely defined sectors for development. Although there are temples located outside the area of *Steinbauten* I-IV, these stone buildings and associated mudbrick structures seem to have developed in a linear fashion along the main street. Thus, the street system at Chuera defines sectors in which various city features develop. This plan may also be described as the result of multiple nuclei. In this view, the temple (*Steinbauten* I-IV) and palace sectors, along with the residential areas next to the central square, may have begun as three original micro-nuclei for the city, and these sectors grew together through expansion. In a similar fashion, at Kazane the monumental architecture adjacent to the tell and that in the outer town may have been two administrative nuclei that expanded along a main street, in between and around which other sectors of the city developed.

A sector model may also describe the development of Beydar, where temples and associated structures expanded south and west of a central palace while residences expanded to the north of the palace at the base of a glacis barrier. The concentration of ceramic production facilities at Banat and Sweyhat may also indicate growth compatible with the sector or multiple nuclei models. At Al-Rawda, the ring and radial roads form wedges that may be individual sectors, but aside from scattered temples and houses, we do not know the composition of these sectors and it is difficult to identify potential nuclei of development. Given that the main radial roads do not penetrate to the very core of the site, it seems that this core formed the conceptual basis for the city, which developed with reference to the roads emanating from these central buildings. The distribution of temple areas in at least three quadrants at Al-Rawda site may indicate that these sectors were neighborhoods dedicated to specific gods, and possibly associated with specific lineages.

The plans of Titriş, Leilan, Sweyhat and Mozan are shaped differently than those of the round cities. A closer examination of the remote sensing data at Titriş may provide insight into the location of administrative structures and the articulation of streets, but based on the rebuilding of some residential areas in the later third millennium, this city would seem to have grown in sectors defined by streets. The rebuilding, in which the suburbs were abandoned, is an example of substantial change in the urban plan that may, nonetheless, respect the general location of previous sectors or developmental nuclei. At Mozan, the temple at the summit of the site, and the palace lower down on the tell, may be two nuclei of development, but wider exposures of adjacent areas would be helpful to this interpretation. At Leilan, walls dividing housing areas in the lower town suggest the presence of sector development in which residental areas expanded by building along a common wall that served as the anchor for the district.

Regarding Smith's second planning principle, standardization among cities (Smith 2007:25), in all of the cases cited here, urban planning and growth does not appear to have been micro-managed by a heavy-handed central government. In general, each city had planned city walls, gates, streets and drainage systems, palaces and temples, and craft production facilities. Cities also shared architectural features, such as decorative niches on walls or doorways, and architectural plans of houses and formal buildings, such as the antentemple. However, these features are best viewed as part of the broader shared culture, evidenced in ceramics, prestige goods, burial practices, and the use of cylinder seals and cuneiform writing. Also, house and temple plans take a variety of forms, and are situated in various contexts within cities. For example, while some temples are situated upon platforms in high places, as at Chuera and Mozan, temples are also located throughout the city, among residences, at Chuera and Al-Rawda. Thus, formal buildings, such as temples or palaces, could have designated locations upon the citadel or in the heart of the city, as at Mozan, Chuera and Beydar, or they could be placed in seemingly insignificant spots throughout the city. With the exception of some antentemples, structures at different cities do not share common orientations, suggesting that any cosmic or sacred order to the urban plan was related to the high – low contrast between buildings on the tell and the lower town, or the inner-outer relationship between the core and the outer city, rather than specific orientation or X-Y location within the city. Finally, these cities, and other settlements in the region, exhibit a wide variety of burial patterns,[13] which do not correlate to any aspect of city planning (Carter and Parker 1995; see also references to the individual cities).

The patterns of urban form at the cities discussed here indicate that central authorities were most concerned with establishing the basic infrastructure, including the city wall, streets, and drainage systems, and setting aside a large, protected space for the palace. Temples may occupy prominent space, such as at Mozan, Chuera, and Al-Rawda, or inconspicuous space, such as the temples among houses at Chuera. As the city grew and developed, the infrastructure shaped growth into a radial pattern at Al-Rawda, Beydar and Chuera, and a more elongated pattern at other cities. Thus, infrastructure is responsible for what Smith calls semi-orthogonal plans in many of these cities (Smith 2007:13). This form results when adjacent structures are built with the same orientation as their neighbors, or additions to existing structures are added in orthogonal segments, in each case for reasons of convenience and efficiency rather than urban planning. The key exception to this generalization is the mid third millennium rebuilding at Titriş, in which the residents expended massive effort to build new housing, streets, and a defensive wall. In a similar fashion, the expansion from the upper to the lower city at Chuera required building new streets and a new defensive wall. In contrast, the outer defensive walls at Leilan, Mozan, Beydar, Sweyhat, Banat, and Kazane date to the initial period of urban expansion

[13] Burial types include intramural and extramural, with bodies placed inside vessels, stone or earth cut tombs, built tombs, earthen mounds or simple cists.

from pre-urban settlements. This means that from their first period as a city, these settlements had an established perimeter.

Notably, the urban plans at Chuera and Beydar are very different. This is important because *Kranzhügel* sites are presumed to belong to a particular culture or economic group inhabiting the marginal areas of the Jazireh. Yet, despite their similar round appearance, the life histories of Tell Chuera and Tell Beydar are very different. The temple and palace institutions at Chuera are far apart and along a main street – both highly accessible[14] to anyone entering the upper city. In contrast, at Beydar the palace and temples are side by side along restricted avenues. The double circular defensive wall system which gives the two sites their shape also evolved differently. At Beydar, both walls were built at the founding of the city and the lower city was not inhabited. At Chuera, the outer city wall was built during a period of expansion, at which point the lower city was densely settled. With its small population, empty lower town, double defensive walls and centrally located palace protected by a glacis and a single access point via a narrow road, Beydar seems like a fort-town, rather than simply a walled city.

Besides the differences in the development of Chuera and Beydar, double walls at non-*Kranzhügel* cities also have differing developmental histories. At Sweyhat, the wall around the tell was maintained after a wall was added around the lower town, whereas at Mozan, the wall around the tell was built over and the moat filled in when the lower town wall was built. In sum, aside from the shape of their city walls, and their radial streets, the urban plans at Chuera and Beydar have little in common, and certainly are not more similar to each other than they are to non- *Kranzhügel* sites. Although the relative size of these sites – Chuera is a major center,

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[14] Although entrance to these structures was probably restricted, at Chuera one could walk right up to a major wall of the temple and palace structures in the course of crossing the city, whereas approaching the temples or palace at Beydar required a special trip up the terrace, passing choke points in the street where guards could easily turn back visitors.

Beydar is a second or third-tier vassal city (to Nagar / Tell Brak) – may contribute to their growth and form, we still cannot presume that the similar shape of these and other *Kranzhügel* sites automatically reflects a common socio-economic system, or even a common process of urban development. At Al-Rawda, the excavators suggest that the city plan was influenced by other round sites, such as Chuera (Castel and Peltenburg 2007:612). Since this city was built later than Chuera, and follows a more regular form, there may be some truth to the assertion of influence, although Al-Rawda lacks the double defensive walls of its potential models.

Armature[15]

Another concept that might contribute to our understanding of the development of third millennium Upper Mesopotamian cities is "armature," defined by MacDonald (1986:5) as: "main streets, squares, and essential public buildings linked together across cities and towns from gate to gate, with junctions and entranceways prominently articulated." This concept combines aspects of infrastructure, including main streets and gates, public buildings, including temples, palaces, baths, and so on, and public space, including plazas and intersections. MacDonald argues that armature develops independently from city planning and evolves as new parts are added and old parts extended (MacDonald 1986: 30-31). Although this concept was developed with reference to Roman cities, it may be a useful way to consider some aspects of Upper Mesopotamian cities.

In most Upper Mesopotamian cities we lack enough of the urban plan to evaluate a key part of the definition of armature, unimpeded passage across a city. Yet, this concept may illuminate aspects of the city in cases where we have nearly complete plans, as at Al-Rawda and

[15] I thank Michael Smith for bringing this concept to my attention.

Chuera. At Chuera, a main street traverses the upper city southeast to northwest. This street may begin (or end) outside the city to the east, in the ritual precinct of the *Aussenbau* (Figure 9.4:L). In keeping with the armature concept, as the main street passes the temple area on the eastern side of the upper city, the *Steinbau* gates and temple platforms, with their steps and ramps, mark or accent grand entrances to sacred space or a sacred precinct (Figure 9.4: D, B, A). After passing this temple precinct, the street continues west through a public plaza, and on to the palace and adjacent open area on the western side of the upper city. A grand entrance also marks the palace, and perhaps other architectural features mark the intersections of the open areas. It is not clear if this main street continues past the palace into the lower town, but according to the armature concept, it could detour along a different axis that articulates with other public buildings or spaces before exiting the city at a major gate.

At Al-Rawda, it seems that only one main radial street (Figure 9.10-11: R3) passes a temple, and it is not clear if other public buildings articulate with this street or the streets with which it articulates. However, a major ring road, R2, intersects all three temple areas, perhaps marking a ritual circuit through the city. The innermost ring road may also serve as a circuit around the core of the city, with entrances to this core space marked by conspicuous features. At Beydar, the street pattern is mostly unknown, but it is possible that main streets directed traffic to the center of the site, where a ring road passed around the base of the temple and palace complexes, with multiple exits possible through other radial streets. Thus, the innermost ring road below the temples conducted traffic between the temple and palace areas and residential areas. Finally, at Mozan, the placement of a temple at the summit of a stepped and ramped approach to the apex of the site may mark the ‘end’ of a reciprocal armitage route that passes the palace and a related ritual offering pit next to the palace (Kelly-Buccellati 2002).

In sum, the imperial model of Roman armature is not highly evident in Upper Mesopotamian cities, but some aspects of this concept may apply to Tell Chuera, and probably other cities as well. As more city plans become available from excavations and remote sensing, we should pay attention to the possibility of an evolving armature linking and marking major pathways, public buildings and public spaces. Use of similar armature markers, such as gates or monuments at intersections, the placement of plazas, or similar pathways, such as that linking a major temple and palace area at Tell Chuera, may be asymmetrical examples of conceptual standardization among cities.

Defensible space

Throughout the life history of the cities described here, residents asserted control over city space, most notably through the internal division of households, but also through expanding homes into streets to claim additional space, create alleys, and block passage with dead ends. These activities may be part of an effort to create "defensible space," which is:

"a surrogate term for the range of mechanisms – real and symbolic barriers, strongly defined areas of influence, and improved opportunities for surveillance – that combine to bring an environment under the control of its residents…by delineating paths of movement; by defining areas of activity for particular users through their juxtaposition with internal living areas; and by providing for natural opportunities for visual surveillance, architects can create a clear understanding of the function of a space, and who its users are and ought to be." (Newman 1973:3-4).

Defensible space is a conscious effort on the part of residents to define urban space by erecting barriers or markers that indicate ownership, enhance security, and discourage or manage passage. Persons walking through the city would 'read' these markers and understand what kind of space they were entering or passing (de Certeau 1988:98-99). Defensible space probably played an important role in defining neighborhoods in the city (Abu-Lughod 1987). Defensible spaces would seem to be more common in cities with meandering streets and cross-streets that are more difficult to ascertain and navigate. In contrast, round cities with radial and ring roads are more accessible, although even these systems of passage can be blocked, rerouted, or marked with indicators of surveillence and ownership.

Parcelled houses

The infrastructure in the cities discussed in this chapter is rarely of the integrated or modular orthogonal types, but shows a concerted effort to build roads, city walls, gates, and water works in a coordinated fashion. Within specific sectors of the city various features have similar plans due to shared cultural notions of what a house, a temple, or a palace should look like. Simply sharing a similar plan does not necessarily reveal centralized planning, just cultural similarity in conceptions of space. In contrast, similar lot sizes for architecture may demonstrate centralized control over the distribution of space. Since the amount of walled, protected space within a city is limited, and extending city walls, streets and other infrastructure is expensive, it should not be surprising if central institutions – and residents themselves – attempt to control the distribution of space within the city. In the cities discussed here, there is evidence for similar lot sizes in residential areas at Titriş, Chuera, and Leilan, and in Area 1 at Kazane. These similar lots are not seen in all periods, but appear in certain phases, and demonstrate what Peter Pfälzner terms *parzellenhäuser*, or parceled houses (Pfälzner 1997).

The parceled houses identified by Pfälzner come in standard widths of 6, 7.5, 9, 12 or 15m, and have similar ground plans (Figure 9.12). Pfälzner translates these values into the Babylonian measurement unit of the *nindan*, which is believed to equal 6m. Thus, the standard plot widths are 1.25, 1.5, 2, and 2.5 nindan (Pfälzner 1997: Figure 8). At Chuera and the town of

Bderi, these standard plots are limited to a specific time frame, 2600 – 2450 B.C.E. After this period, non-parceled houses replace some parceled lots at Chuera, while and parceled lots disappear altogether at Bderi. Pfälzner argues that parceled lots are evidence for centralized city planning, and their disappearance is due to a thinning of the city population and increasing diversity – presumably ethnic (Pfälzner 1997: 251; 258).

Although the similar lot dimensions identified by Pfälzner do indicate an organized distribution of city land, they do not necessarily reflect city planning. Instead, as Smith argues, it indicates "a level of political control necessary to define and enforce such [measurement] standardization" (Smith 2007:29). That is, the standard units for measuring land were agreed upon and upheld by the government, but the mere fact of their existence does not automatically reflect enactment of a city plan. We might expect land within the city to be quite valuable due to its protection behind walls and proximity to various institutions and markets. Thus, lots are unlikely to be distributed without attention to size, which must be calculated to determine the value of lots and houses as they change owners.

A more convincing case of house lots as evidence of formal planning comes from Titriş, where double walls bound plots of land with regular dimensions (Figure 9.8:B). These plots are not equivalent to individual houses in all periods. Instead, multiple bounded plots are combined to form houses of various sizes. In addition, in some cases the walls within these plots share the same orientation across multiple plots, houses and streets. Thus, although the internal division of space within each house differs, the plots themselves and their main walls were laid according to supra-household spatial principles (Matney 2000:27). In sum, although parceled lots do indicate some level of land-management within the city, they do not necessarily indicate a formal plan designed at the supra-household level, except when combined with shared architectural principles.

Summary and conclusions

From my analysis of the urban plans of several Upper Mesopotamian cities, I derived the following list that I call "Principles and Features of Upper Mesopotamian City Planning."

1) In most cases, there is both a large palace *and* non-elite housing present in the earliest plan of the city; this suggests that both ruling and non-ruling households played an important role in establishing these cities.

2) Although temples are usually small and scattered throughout the city, in some cases, for example at Chuera, Beydar, and possibly Kazane, some temples and their associated storage and processing facilities cluster together into larger complexes. This may indicate that the temple household played a larger economic role in these cities than the size of the individual shrine would suggest.

3) Craft production facilities are found all over these cities, in the suburbs, within the inner, upper city and citadel, and the lower city, among houses and next to the palace. This patterning suggests that craft production, at least in the case of ceramics and lithics, was decentralized and took place in individual households. Yet, it is possible that at Banat and Sweyhat, some potters resided in neighborhoods defined by their profession, which had the effect of focusing ceramic production in a particular area.

4) Centralized planning is mainly evident in urban infrastructure, including streets, city walls, sector walls, and water works.

5) De-centralized or mid-level planning is most evident in residential areas, which were built and rebuilt according to varying codes of space, although in some cases, such as particular phases of Titris and Chuera, centralized planners may have been involved in building houses.

6) The production of space in these cities was conservative: over the course of their life history, streets and city walls tend to be rebuilt in the same places, houses are built over houses, palaces over palaces, and temples over temples. Notably, in some cases, palaces are taken over by everyday housing or craft workshops, but palaces rarely displace residences.

7) When constructing buildings or features in the city, builders usually respect the location and orientation of major streets and city walls.

8) Despite #7, the use of streets and open spaces is not always enforced. Thus, the central plaza at Chuera was allowed to fill with garbage. In other cases, houses expand into a street to create a dead end and associated alley that becomes the defacto property of the adjacent houses. This may be an example of an attempt to create defensible space, and discourage entry by outsiders.

9) Similarly shaped cities do not necessarily have a similar life history.

10) In spatial terms, *Kranzhugeln*, or round cities, are more open and accessible, because ring and radial roads make it easier to navigate the city.

In addition to the items in the preceding list, I find that in many ways these cities are more dissimilar than they are similar. This does not mean that these cities are simply “organic” products that emerged through “natural” processes. An inventory of common features finds that each city contained similar types of infrastructure, palaces, temples, houses and industry. The infrastructure and each class of buildings were often well planned and executed, house lot sizes were sometimes carefully measured, and building efforts often respected the orientation of streets. This developmental history resulted in many semi-orthogonal plans that Smith (2007) would describe as less planned than a city with an integrated orthogonal plan.

In this review, I find aspects of the concentric, sector, and multiple nuclei models in several of these cities. The concentric model may apply to Chuera and Al-Rawda if we limit it to the growth of infrastructure, and allow bracketed zones to vary in their character. In contrast, the sector model seems evident at Chuera and Al-Rawda, and possibly Beydar, Titris and other sites as well. The multiple nuclei model may also produce the appearance of sectors, as different focal points in the city grow into each other. The multiple nuclei model is attractive because it does not assume that growth happens from the center outward, which is often assumed when we speak of the expansion of cities. Instead, as the example of Titriş Höyük shows, it is quite possible that during portions of their life history, these cities grew from the outside-in, as suburbs were incorporated into the settlement by rebuilding neighborhoods or expanding the city wall. It also seems quite possible that cities that built their major lower city wall early in their life history enclosed a not-yet fully urban landscape behind their gates. That is, the walls may have been built to encompass scattered settlement beyond the citadel, settlement that comprised several micro-nuclei which grew together over time according to their individual planning principles. This pattern of growth may explain the meandering main streets and odd-shaped sectors at a city like Titriş.

Despite similar inventories of buildings and infrastructure, the lack of closely similar plans at cities in Upper Mesopotamia suggests that there was not a single, detailed concept of what a city should look like. Instead, there seems to have been more concern that the city provide access to its various features through well laid and maintained streets, access to and protection from water through drainage systems, canals, wells and other means, and protection from threats through city walls, citadel walls, moats, a glacis or rampart, and in some cases, sector walls within the city. Palaces and sometimes temples were especially protected, often by their location on the old settlement tell – turned citadel, adjacent to city walls, or behind their own fortified perimeter walls.

The emphasis on protecting the city, seen in the elaborate and monumental defensive structures in the third millennium cities, is probably due to a need to protect commerce, valuables, food stores, and the lives and political power of citizens. The universal existence of substantial defensive structures at these cities as well as secondary centers and even small villages (e.g. Cooper 2006b:70) indicates that violence was a real threat. Although city walls may serve as symbols of power, they also project power by making it possible for a city to send its army out to confront or threaten others, leaving smaller forces behind to defend the homeland (Pauketat 2007:122, 131). Thus, massive city walls, gates, moats, and citadels, preserve the home city while also threatening other cities. Indeed, violence was clearly a part of life in these societies, especially in the later third millennium (Sallaberger 2007:422-3).[16] The Ebla texts include accounts of conflict between Mari and Ebla, a forced treaty between Ebla and Abarsal, tribute gifts sent to Ebla from threatened cities, and weapons exchanged with allies (Archi and Biga 2003; Marco 2008; Sollberger 1980). Archaeological evidence for violence at these cities is not as plentiful as lists of tribute from subjected polities, but it does exist in the form of destruction layers at several sites, weapons in burials, and victory iconography from Mari and Ebla (Akkermans and Schwartz 2003:269).

Algaze, Matney and Pournelle argue that at Titriş, violence was probably the main motivation behind the rebuilding of the residential areas in the outer town, the construction of the

[16] Adams recently argued that we also underestimate the role of warfare in the development and expansion of southern Mesopotamian states. He views warfare as a very important factor in their development (Adams 2006).

city wall, the abandoning of suburbs, the shift to intramural burials, a mass burial of young men in the city, and a dramatic shift in settlement patterns at nearby second and third order sites in the later third millennium (Algaze et al. 2001:68-70). At Tell Chuera, excavations in the area of *Steinbauten* I – II revealed at least 28 deceased individuals trapped in these structures when they burned to the ground in the mid third millennium (Klein and Orthmann 1995: 75; Orthmann 1995a, plans 6, 13; Orthmann 1995b:32; Pruss n.d.-a:2). Although the excavators do not provide evidence that these individuals were murdered,[17] and just one body was associated with a weapon,[18] they interpret the event as the result of hostilities, rather than accident (Orthmann 1995b:32; Klein and Orthmann 1995:75; Moortgat 1962:35). Whatever the cause, this event burned an area of at least 3400 m^2 across *Steinbauten* I, II, and associated structures. Such destruction must have had a significant impact upon the city's economy and daily religious practice, since these areas were the locus of goods storage and processing, and ritual activities.

Finally, the cities discussed here were constantly changing. Even the central square at Chuera, which endured quite a while before succumbing to garbage, lost its original purpose. Although the general location of houses, palaces or temples may remain steady for long periods, the buildings themselves were modified, subdivided, rebuilt, expanded, destroyed, filled in, and built over. As a result, the urban plan is a mosaic of uneven development as different parts of the city changed at different rates and for different reasons. Thus, the generalized plans of the cities discussed above fail to capture the details of processes of urban growth and change. Yet, these models do provide some idea of how these cities may have developed, how different features changed over time, and the role of city residents in the production and construction of urban space.

[17] The bones were heavily burned, turning some bones blue (Klein and Orthmann 1995:75).
[18] An axe was found near a body in the open area northwest of *Steinbau* II (Klein and Orthmann 1995:75).

CHAPTER 10

KAZANE HÖYÜK AND URBAN LIFE HISTORIES IN THIRD MILLENNIUM UPPER MESOPOTAMIA

Introduction

This chapter summarizes the main points and conclusions from each part of this study, including analysis of settlement patterns, remote sensing, excavations and artifacts, storage practices, faunal remains, and urban planning. Following this summary, I discuss what this study contributes to the models of third millennium urbanized states that I discussed in chapter 2. I also discuss the theoretical and methodological contributions this dissertation makes to the study of ancient cities, and point to some directions for future research on this topic.

Settlement Patterns

The settlement pattern study I conducted, based upon my analysis of the Yardımcı (2004) survey data via GIS and satellite imagery, provides a clear picture of the growth and decline of third millennium states in the Harran Plain. Through Thiessen Polygons and rank-size plots, I determined that Kazane and Harran formed the capitals of two small states in the Plain. For the mid to late third millennium, their settlement system is of the primate type, with the two centers growing to at least three times, and probably four or five times as large as the next largest site, Sultantepe. The third order sites (over 9ha) that make up the secondary centers in the Plain are located exactly where spatial models would expect them to be: evenly spaced in the area between Kazane and Harran. Fourth order sites (over 7ha) neatly follow the perimeter of the sustaining areas of Kazane and Harran. These sites, and most others in the plain, are located on areas of good soils, and closely follow the paths of major and minor waterways.

When I apply Wilkinson and colleagues' (2007) latest model for determining the sustaining areas of Early Bronze Age cities in Upper Mesopotamia, I find little overlap between the sustaining areas of the centers and the second and third order sites, but considerable overlap among these and the smaller sites. The smaller sites were probably not all settled during the roughly 700 year span of this time period, so they are over-represented to some unknown degree. In addition, their location within the sustaining areas of the larger sites may indicate that they were part of an intensive agricultural system in which they worked the land and supplied surplus to first and second order centers. Unfortunately, the lack of clear, third millennium hollow ways in the Plain, combined with a lack of survey data about the extent of sherd scatters around sites, make it impossible to test the diameter and shape of the sustaining areas against the idealized model. As they are, the sustaining areas do not indicate that Kazane and Harran grew beyond the modeled limits of the carrying capacity of their landscape, but it is likely that they maximized production to store goods for difficult times and to fund the activites of state employees.

Theissen Polygons and sustaining areas indicate that the Harran Plain contained all of Harran's primary settlement system, if not its zone of wider political influence or control, which likely extended some distance down the Balikh River towards the next major centers of Chuera, to the southeast, and Bi'a, at the confluence with the Euphrates. In contrast, a substantial portion of Kazane's idealized sustaining area was located outside the northwest corner of the Plain, in the highlands and receeding valleys. Since the northeastern corner of the Plain falls within Kazane's Thiessen Polygon, it is likely that Kazane exploited agriculture in this area via the secondary center located there. Kazane may also have engaged in small-scale irrigation to supplement dry-farming. In addition, Kazane's location near the edge of the Plain may have given it even greater control over or access to herding activities in the adjacent highlands, and placed it at the center of east-west travel routes. Kazane was a gateway for goods moving east-to-west from the Biricik and Gaziantep regions, as well as north-to-south from Titriş to Kazane, and on to Harran, or from Kazane to the Upper Tigris region to the northeast. In a similar fashion, Harran was a gateway for goods moving north from the major east-west transportation route across the Jazira.

Remote Sensing

The remote sensing work I conducted yielded very good results in Area 1/F, and suggestive results in the other areas. Although it is tempting to attribute the most successful data to the massive limestone walls in Area 1/F, closer analysis reveals this to be only part of the explanation. Thin walls, less than a meter thick, are also visible in Area 1/F in Operation 2.2 (the abutting, southernmost walls), Operation 6 (the MBA walls), and Operation 8 (a domestic context). In each case, these thin walls are less than 0.50m from the ground surface, whereas the thin walls excavated in Operation 10 in Area 5 were a meter below the surface. This suggests that the 'blank' areas of Area 1/F may contain thinner walls that are more deeply buried. Such thin walls may have been visible even at a meter depth if not for the plow scars in Area 1/F, which unfortunately have the same orientation as the SW-NE walls in this area.

In Area 2, modern garbage, burning, a fence, and ongoing stone robbing compromised our ability to locate the massive structure previously exposed in this area. In Area 3, the expected walls of a small structure failed to appear in our test trench, Operation 9. Despite this disappointing result, I am still optimistic that the interpreted walls in this area are genuine, but further ground truthing is necessary to substantiate this assertion. In Area 5, the walls exposed in Operation 10 are too thin and too deeply buried to show up clearly in magnetometry data collected by the FM-36. In this and other unsuccessful areas, a cesium magnetometer may provide better results, due to its ability to record magnetic anomalies at depths greater than 1m. In addition, resistivity has the potential to locate smaller walls throughout all the areas, but especially Area 1/F, where architecture is closer to the surface.[1] This method would be especially useful in Area 2 and other parts of the site where metal materials, such as fences or buried pipes, interfere with magnetometers.[2]

In sum, the magnetometry portion of this project was very successful in many respects. In the best case, magnetometry provided a subsurface map of significant architecture and features over a 2 hectare space in the southern part of the city, in Area 1/F. This area is currently under threat, as the fields to the north, south and west of it have lost 2m or more to bulldozing in recent years. Although this loss is tragic, the bulldozed areas may provide an opportunity to explore earlier phases of the urban period, or determine the extent of the Halaf period remains.

Test trenches, artifact analysis, and the use of space

The test trenches in this study provided valuable feedback for reinterpreting the remote sensing data and bringing life to the static plan. In most cases, my interpretations of the gradiometry data were correct, although in some cases, such as the suggested architecture in Area 5, or the suggested street in the space between Building Units 2 and 3, I was proven wrong. The trenches in Area 1 showed that this area hosted several monumental buildings with thick walls, located with respect to each other and to a main street. Analysis of artifacts, carbon dates, and architecture shows that these buildings date to the period 2550 – 2250 B.C.E., except for

[1] Resistivity machines can also be modified to map features deeper than 1m, through the use of wider spacing between the probes.
[2] I planned to test resistivity in these areas in 2005, but unfortunately the research permits were not issued.

Building Unit 11 (Operation 8) and modifications to Building Unit 3 (Operation 6), which date to the early second millennium.

The monumental walls of most buildings in Area 1 indicate that these are elite or institutional structures. Concentrations of plain and fenestrated stands, incised sherds, special vessels, bowls, cups, and grindstone pieces in Building Unit 8 may identify it as a temple or related building. Additional sacred or votive statue inlays and related finds may also identify Building Unit 7 as a temple-related building, while storage jars, charred grain, rodent bones, and architectural plan identify Building Units 4, 5, and possibly 6 as grain storage facilities. The long, narrow plan of Building Unit 10, located between Building Units 4 and 5, may indicate that it too is a storage facility. The monumental tomb excavated by Dr. Wattenmaker in Building Unit 1 identifies it as an elite dwelling, and this structure may extend into Building Unit 2, which contained a kitchen in one of its southernmost rooms. Building Unit 3, although partially obscured by early second millennium reuse of the space, seems to have a plan similar to the northern half of Building Unit 2, and may have a similar purpose. Finally, a concentration of painted vessels in the street exposed in Operation 5 may mark structures in the vicinity, including Building Units 1 and 8 and the space in between, as having higher access to more elaborate serving ware.

The excavated ceramics and small finds place Kazane firmly within the regional pattern of wares and types for the third millennium. In the second millennium, the chaff-rich assemblage at Kazane may have closer affinities down stream towards Hammam-et-Turkman, than towards polities in the north. Exotic ceramics are notably few from both periods, and the handful of examples cluster in J32 (Karaz Ware) and Operation 4 (Karababa Ware). Prestige goods, such as metal or stone objects, are nearly absent from Area 1/F and J32, although the massive architecture in the former attests to the elite or institutional nature of these buildings. There is also little evidence for craft production in Area 1/F or J32, although Dr. Wattenmaker discovered a group of weaving tools southwest of the remote sensing coverage in trench F14. In contrast, the sealing clay and sealing from J32, and sealings from Building Units 4 and 5 are evidence for goods management in these areas. Although it is not clear what was stored in the jars of Building Unit 4, Building Unit 5 was used for barley storage, probably in bulk for distribution as rations. Based on its storage capacity, the grain in the structure could have fed several hundred persons per year.

In addition to the evidence for administered grain storage in Area 1, analysis of the faunal remains from Area 1 and J32 indicates that these contexts participated in a specialized system of animal exploitation, which focused on sheep and goats, supplemented by a small amount of cattle. The lack of pig or wild animals marks Kazane as unique among its peers, although samples from more varied contexts may change this picture. Sheep are especially dominant in the assemblage, probably due to their multiple roles as meat, milk, and wool providers. Based on the distribution of animal parts, the contexts in Area 1 and J32 also seem to have butchered animals within the vicinity. Although we might expect elite areas to be supplied with cuts of meat, animals are easier to transport while alive, and ritual facilities probably slaughtered animals on the spot as part of sacrificial rituals.

An unrealized goal of this project is to identify non-elite, residential housing from the third millennium at Kazane. It is possible that such housing exists in Area 1/F, south of the main monumental structures in Operations 1-3 and 7, but I suspect that instead this area contains additional structures related to those already exposed. This is supported by the thin walls of the southernmost room of Building Unit 4, only partially exposed in excavations but seen in magnetometry. Due to its relatively thin walls, this part of the building is not very evident in the remote sensing images. Despite this, excavation revealed that it is an addition to the monumental portion of the storage facility. There is also a monumental, thick-walled structure abutting the southwestern corner of Building Unit 8. This structure is not clearly visible in the remote sensing image, but excavations show it continuing to the west. These findings suggest that although areas where we do not see clear architecture may contain ‘everyday’ houses, they may also contain less monumental or more deeply buried additions to the monumental structures. For example, the monumental stone structures of *Steinbauten* I-IV at Tell Chuera are integrated with simple, sometimes flimsily constructed, mudbrick walls that form storage and activity areas. It is possible that areas of poor magnetic signals around the monumental buildings at Kazane also contain such ‘service’ structures.[3]   Alternatively, they may contain very simple houses without stone foundations, or with more deeply buried foundations. In addition, third millennium domestic areas may be located beneath early second millennium housing, or they may have been in the southeastern our southwestern quadrants of the site, areas that have been heavily bulldozed in the last decade.

Urban Planning

In my study of urban planning in third millennium Upper Mesopotamia, I examined the plan of several cities. These plans are not entirely comparable since we have complete plans for just a few cities, and fragmentary plans for most others. Nonetheless, it is possible to identify aspects of the infrastructure and key urban features, including ‘everyday’ houses, palaces,

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[3] Notably, Dr. Wattenmaker found the poorly preserved remnants of flimsy mudbrick structures adjacent to a concentration of weaving tools and a monumental architecture in trench F14, just southwest of the space covered by magnetometry in Area 1 (Wattenm
aker 1997).

temples, and craft production areas. When compared in light of Smith's (2007) degrees of urban planning, I find that these cities are less planned than cities with true orthogonal layouts or tight coordination among structures or areas. Yet, these cities are not simply organic entities that emerged without any coordination among their parts. When compared to the concentric, zone, and multiple nuclei models of urban geographers, I find that some cities grew around a defined core, while others expanded from the core in wedge-shaped sectors. We may also interpret some cities as growing around multiple nuclei, including housing, palatial, ritual, and craft areas that expanded from an initial group of structures, eventually intersecting to form a connected cityscape.

The most obvious evidence for urban planning is in the form of infrastructure, including city walls, gates, streets, and water works. These features were the focus of the most intensive, large scale urban planning, and subsequent development generally respected their organizing principles. Yet, over time, streets were blocked as houses expanded, perhaps to create defensible space, gates were added or widened to improve traffic flow, streets were resurfaced or left to fill with debris, garbage overwhelmed abandoned houses or open areas, and even moats and city walls were filled in and built over. Thus, "the" city plan, even when highly planned, often developed an organic appearance due to uneven modification of initial conditions. In some cases, the city government and city residents exerted great effort to modify large portions of the urban plan, such as building a new, larger diameter city wall during times of expansion, as at Mozan and Sweyhat, rebuilding entire neighborhoods, as in the mid to late third millennium at Titriş, measuring house lot sizes within the city, as at Chuera and Titriş, or rebuilding a ritual sector after it was destroyed by fire, as in the *Steinbauten* I-IV area at Chuera. These rebuilding efforts did not always respect the quantitative, geometric aspects of the existing urban plan, but they usually respected the qualitative aspects of the existing plan, by rebuilding houses over houses, streets over streets, temples over temples, and palaces over palaces.

My study of urban planning also revealed significant differences between superficially similar cities. For example, the three *Kranzhügel* cities of Al-Rawda, Beydar, and Chuera have similar round forms but fundamentally different spatial organization. Beydar's plan makes it seem like a fort-city, with its double fortification walls, moat, and low resident population ringed around a palace, temples, and storage facilities protected by a glacis and choke points on the streets. In contrast, Tell Chuera has a large open plaza in the middle of the city, nearly connecting the large temple area to the east with the large palace area to the west.[4] Instead of protected, inaccessible buildings, the ritual buildings of *Steinbauten* I- IV, the plaza and the palace were situated on a main street that articulated with many other streets. The placement of these structures may be instances of armature (MacDonald 1986), in which institutional buildings and features mark major pathways through the city. At both Tell Chuera and Al-Rawda, temples were located throughout the city, among residential housing. Yet, at Al-Rawda these temples were situated within large, walled compounds, while the temples at Beydar were on restricted terraces leading to the palace. These differences in the production and construction of space between cities with similar shapes demonstrate the value in unpacking the life history of each city before making comparisons between cities. This study also shows that initial conditions and locally driven urban development can have very different effects on urban plans throughout the life of a city.

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[4] There is some question as to whether or not these features were all contemporary. As best I can tell from the excavation reports, the latest phase of the Plaza coincides with the earliest phases of the temple and palace areas excavated so far. Yet, these later features clearly have earlier phases, so although the earliest form of each structure was not as we see it in the excavated plan, it seems likely that it marks a spot that hosted a temple or palace since the beginning of the city.

As urban plans and life histories become more accessible to us through remote sensing and excavations, we may begin to extend theories of architectural structuration[5] to entire settlements. In doing so, we can construct spatial maps, such as those described by Hillier and Hanson (1984:100-108) to identify similarities and differences in spatial patterning within and between cities. These spatial patterns show how people constructed and moved through space in the city. [6] For example, the major radial and ring roads at Tell Chuera or Al-Rawda would make it relatively easy to move around these cities by delimiting fairly regular districts.[7] Although such hard lines do not always define districts, readily discernable segments of space may make it easier to grasp the structure of a city, and provide greater access to outsiders (Lawrence and Low 1990: 471; Lynch 1964:67-70). No matter where you go in these round cities, you are never too far from a major spoke or loop road that will rapidly convey you to other parts of the city, including the very center. Of course, over time, some main roads are blocked by expanding buildings, and the visitor must detour through less direct secondary streets. This process of obstruction may arise from conflicting claims to space (see Low 1996:876), as various groups lay claim to the street space adjacent to their houses or workshops, and construct defensible space. In contrast, some of the main streets at Titriş meander through the city, while side branches lead to different areas. These less symmetrical main streets, and the shape of the settlement, probably made it more difficult to quickly navigate through major sectors. At Beydar, there were probably ring roads and spokes like Al-Rawda or Tell Chuera, but the center of the city was apparently less accessible due to its elevation, choke points on roads, and a glacis.

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[5] I favor a kind of soft structuralism, in which structure is highly influential but does not determine behavior (see Trigger 2003: 654).

[6] See for example Scott Branting's computer modeling of pedestrian traffic in an Anatolian city for which the entire street network has been reconstructed with remote sensing techniques (Branting 2004).

[7] In the words of Hillier and Hanson, this structure is more "symmetric" and "distributed," which suggests a "tendency towards the *diffusion of spatial control*" (Hillier and Hanson 1984:97 [italics in original]).

Thus, in contrast to the major public buildings at Tell Chuera or Kazane, the palace and temples at Beydar were more closed and asymmetrical spaces (Hillier and Hanson 1984; see also Matney 2000: 30).

Urban life histories and modeling urbanized states in Upper Mesopotamia

In chapter 2 I reviewed three general models of Mesopotamian states and their cities: 1) coercive centralization; 2) consensual; 3) heterogeneous, dual city. I argued that the heterogeneous model acknowledges the importance of non-elite agency, and is most in tune with current thinking about how these polities worked and the limits of the power of the ruling households. My study of urban planning and urban life histories also supports the heterogeneous model. I found that the central institutions in urban centers were most concerned with establishing and maintaining critical urban infrastructure and the general location of the major categories of urban structures, including palatial, ritual, housing, and sometimes craft production area. At the most basic level, the urban plan indicates that “the city” was about infrastructure, protection, access to resources and specialized activities. Beyond setting these parameters, the central authorities for the most part left the planning of individual houses, craft areas, and the location of some temples, up to the owners and users of these spaces. Even when plots of land were strictly measured, as at later third millennium Titriş Höyük, the builders or owners determined the size and internal subdivisions of the houses. Thus the built environment is defined by heterogeneity within the urban plan, an appearance that is often simply dismissed as ‘organic,’ without unpacking this word or its implications. I argue that this kind of urban plan, in the context of third millennium Upper Mesopotamia, fits with the heterogeneous model, in which elite, non-elite, and other members of society pursue differing socio-economic goals, and the top levels of power are not able to fully control or integrate the polity socially, economically, or politically. These features are seen in the built environment, which expresses these fragmented relationships. In the production of space in the city, we see the give and take between Smith's (2003) "regime," or Mollenkopf's (1992) "ruling coalition," made up of the ruling families and associated factions, and the "grassroots," or "everyday" people.

In stating my support for the heterogeneous model of Upper Mesopotamian states, I also recognize that social organization and leadership in these cities varied along the continuum of corporate to coercive, with some states achieving a more centralized, perhaps more despotic character than others. Thus, power could be highly centralized in one polity, but less so in another. Yet, just as no polity is purely "corporate" or "network," in terms of its ruling strategies (Feinman 2001:156), no Mesopotamian state is purely coercively centralized or purely corporate. Together, these states, based in urban centers, formed a system of peer-polities in which the regional distribution of state power was segmentary and fluid. For example, the Ebla texts imply that Ebla, Nagar, and Mari dominated socio-political relationships across Upper Mesopotamia during at least part of the third millennium. If so, why were these cities dominant at that time?[8] Perhaps these states were wealthier, and able to raise a larger army, which together provided the economic and military pressure necessary to establish favorable treaties and exchange relationships with less powerful cities. Charismatic leaders and perhaps an ideology[9] of conquest and expansion, or divine right (or divinity) of a ruler[10] or a people to rule, may have contributed to aspirations of power in these polities. These polities competed with each other, and became the target of other aspiring, rising powers, such as the Akkadians, who destroyed or

[8] Perhaps the apparent dominance of these polities is due to the selective availability of texts that discuss their activities in a particular period of time (Michalowski 1985).
[9] For example when the ideas of the rulers become an intellectual force in society (see Wolf 1999: 31).
[10] As in the later Ur III polity (Michalowski 1987: 65).

ultimately administered the cities of Ebla, Mari, Brak (Nagar), Beydar, Leilan, Mozan, and Chuera. Although much of the conflict between these polities may have been relegated to cold and warm-war strategies, hot war was also a very real part of their life history. As Adams notes, "concentrations of power in early civilizations were typically fragile and short-lived" (Adams 1988:30). We see this in the ebb and flow of power within ruling dynasties and between cities.

In the long view of human history the urbanized states of the third millennium developed rapidly, but in the view of individual generations, it was not so rapid, unfolding over several hundred years. Within this process, urban infrastructures set parameters and patterns that later generations either followed or attempted to change. Analyzing this process as an aspect of urban life histories highlights the ways in which major events and cultural change are expressed in the built environment, just as individuals are influenced by the stages of development in their lives (Langness and Frank: 1981: 79). For example, late in Chuera's life history, potters from a nearby potters' quarter took over the abandoned palace. This indicates that the palace was no longer a powerful entity, suggesting a dramatic change in the local political order, a change that nonetheless failed to disrupt the production of everyday goods. At Kazane, in the later third millennium, the architecture of the palace in Area C declined in quality, but its inhabitants had high access to the painted pottery that typically appears in higher proportions in elite contexts. This may indicate that the residents of the building were still part of the wealthier portion of society, but they could no longer afford to maintain their building to prior standards.[11] In a similar fashion, the reuse of the foundations of Building Unit 3 at Kazane in the early second millennium indicates that the character of this area changed from monumental and administrative to everyday housing and activity areas. The changes in habitation in this structure may be due to

[11] Perhaps they lacked both the funds and the power to command large labor forces. Or perhaps the excavated portion of the building was simply built and used for a different purpose in the later period.

disruption in leadership roles and the distribution of power in a period of urban decline at the end of the third millennium. At Titriş, significant socio-political events, the excavators suggest warfare, prompted construction of a new city wall, abandoning suburbs, rebuilding an entire neighborhood, and switching from extra-to intra-mural burials. These changes may have been prompted by conflict, but they in turn may have affected notions of landownership, and the treatment of and relationship with ancestors (Laneri 2007). In a contrasting example, the filling of the central square at Chuera with garbage, the appearance and disappearance of parceled house lots at Chuera, and the blocking of streets at Al-Rawda and possibly Beydar, suggest that the central authorities, whether an all powerful king or a citizen's council, were not enforcing pathways and the use of space in the city, such that local residents were able to obstruct or redefine these areas.[12]

Contributions of this dissertation, and future directions

In this dissertation I provide a case study that contributes to our understanding of ancient cities. I combined settlement survey, satellite imagery analysis, remote sensing (magnetometry) targeted excavations, and artifact and ecofact analysis, to study the life history of Kazane. These methods combine standard archaeological practice as well as more recent techniques that make it possible to study cities and states comprehensively despite a limited budget and time constraints. One very significant contribution of this study is the mapping of 2 hectares of urban space at Kazane with remote sensing. This work, combined with excavations, shows that the outer town

[12] Or at the very least, the government did not care what happened to major public spaces or transport routes, an assertion I find difficult to accept. Perhaps a period of conflict made it difficult to dispose of garbage outside the city walls, or perhaps rapid urban population growth created mountains of refuse for which the city was not prepared. Alternatively, the original purpose or idea of the central square at Chuera, whether for public ceremonies or simply part of a particular urban aesthetic, may have been lost or modified over time.

at Kazane contained many monumental structures belonging to elite and probably administrative households. Although Dr. Patricia Wattenmaker's previous excavations identified monumental architecture in Area 1/F, it was not clear if these were part of larger complexes, or were isolated buildings, like the isolated temples or other structures, such as *Steinbau* VI, at Tell Chuera. My remote sensing work clearly establishes that there are many monumental buildings in the outer town and that these structures may form at least one large extended complex of elite housing, storage and ritual facilities. This finding is significant because such structures are generally found on the citadel or upper town in third millennium cities, where they were protected in an elevated, somewhat centralized, often walled location. In contrast, the structures from Kazane Area 1 are near the southern edge of the city and are not set apart by defensive walls or significant differences in topography. This indicates that urban growth at Kazane did not take place around a single, segregated administrative nucleus in the heart of the city, but around multiple nuclei, or expanded by the growth of core features along sectors bracketed by major streets.

In addition to the specific discoveries at Kazane and their relevance for Upper Mesopotamian urbanism, this dissertation makes a theoretical contribution by extending the life history concept to urbanization and the growth of cities. By viewing these processes as aspects of life histories, we are able to recapture some of the agency in cities that gets lost in the grand and general models required to tie together the vast amounts of data that come from studies of cities. The life history concept does not solve the problem of defining cities and states, nor does it answer all the questions we have about urbanization. Yet, this concept forces us to look at the whole city, and how its various parts interact and change over time. This process is not strictly planned or organic, but a combination of both in which past plans and actions impact future plans and actions. In the process, the urban plan shifts and changes, taking new forms and establishing new patterns. Changes in these forms and patterns relate directly to socio-cultural changes within the society, as the built environment is reworked and redirected.

In the future, our studies of ancient cities need to take a holistic, life history approach. This approach is one that attempts to identify patterns in the urban plan, and how this changed over time. In truth, this is what good, modern archaeology is doing every day. Settlement pattern studies, surface surveys, and even remote sensing are increasingly becoming the standard methods for approaching small and large sites alike. Although narrow studies of specific buildings provide the rich detail necessary to fully explain their use and purpose, they leave us wanting more. To begin to grasp the processes of urbanization, we must cast our net widely and explore the life history of cities. We can do this through a combination of standard surface survey and test trenches, remote sensing, and long, narrow trenches that quickly reveal the relationships between structures and features, making it possible to assess degrees of planning, the articulation of city spaces, and the production and construction of urban space. Specifically, I suggest the following agenda that will advance our understanding of ancient cities:

1) We should test the articulation between infrastructure and other aspects of the urban landscape, including streets to houses, houses to the city wall, main streets to secondary streets, streets to drainage systems, institutions to streets and housing areas, and the placement of burials. By exploring how these entities relate, we can unpack the life history of the city and determine if streets were built before houses, creating infrastructure-guided growth, or if houses came first and determined the placement of streets. Especially important are blocked streets, because if these streets were blocked from their inception, it suggests that defensible space was part of the

initial conditions of urban planning, rather than a modification to a presumably more accessible plan.

2) We often assume that cities develop from the inside out, but they may develop from the outside in as suburbs and multiple nuclei grow together and join to form the totality of city space. This distinction between growth through expansion versus growth through integation can be tested through surface survey, remote sensing, and excavations, although the limits of carbon dating and ceramic typologies make it difficult to discern these processes if they happen rapidly.

3) Stratigraphic or deep trenches can test the degree of conservatism in cities by identifying continuity or change in the general use of areas over time. Changes in the character of space, such as replacing houses with streets, a palace with houses, or filling a plaza with garbage, mark significant events and processes in the life history of the city, and set parameters that shape future development.

The relevance of this kind of research cannot be overestimated. The despotic, highly centralized model of Mesopotamian urbanism is still prevalent in popular literature and multi-media, even though our latest theories and data paint a more complex picture of these cities. We need to do a better job of presenting our ideas to the public, who are unfortunately too often presented with visions of past grandeur and power, without consideration of how lives were actually lived in those times and places. The phenomenon of Mesoptamian urbanism fundamentally changed the lives of many people, led to many technological advances, and influenced cultural change well beyond the region. A life history approach to urbanism stands a good chance of discerning and explicating this process.

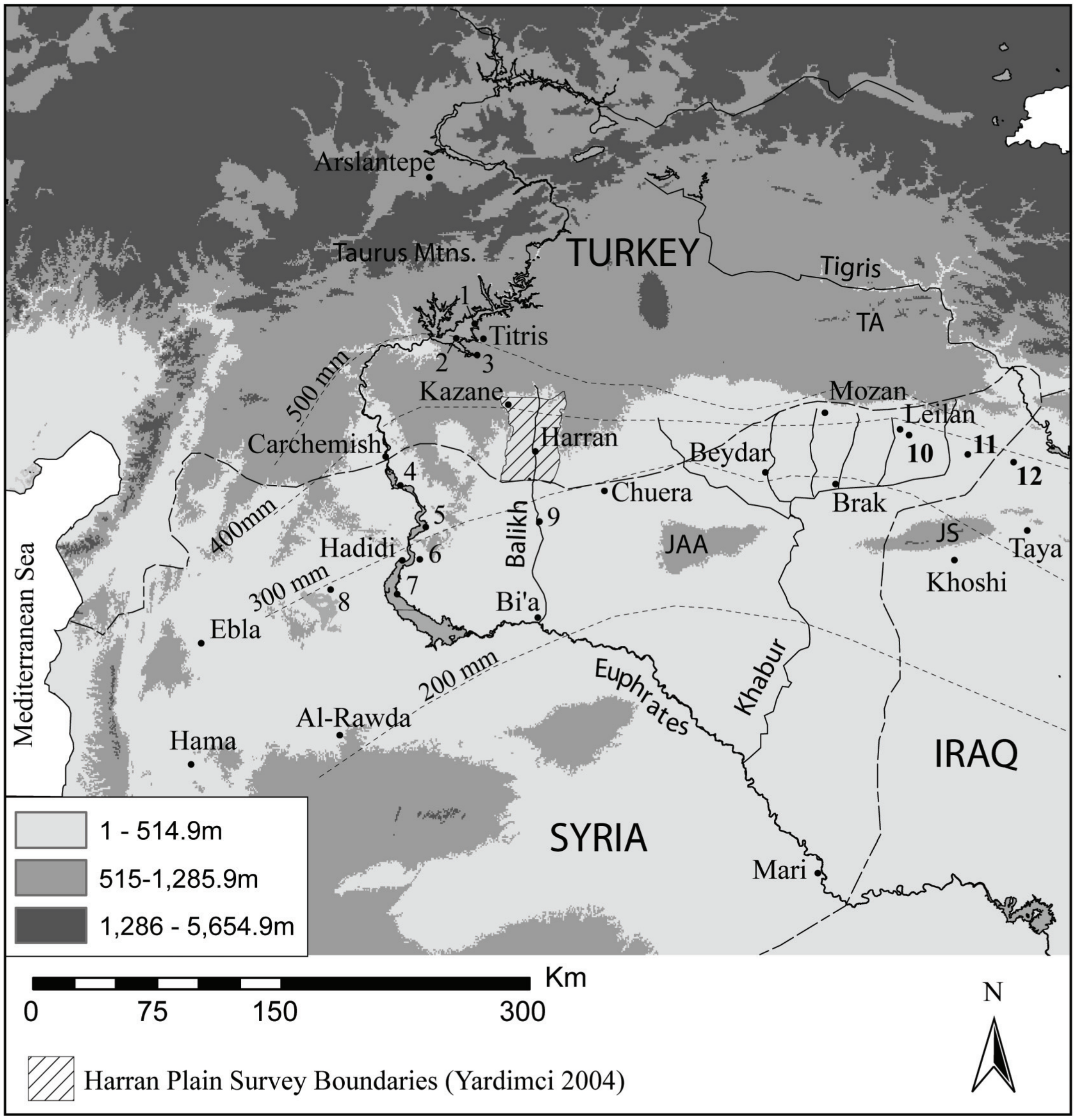


Figure 1.1: Topography, rainfall isohyets, and selected third millennium sites and features in Upper Mesopotamia. 1-Lidar, 2-Kurban, 3-Tatar, 4-Ahmar, 5-Banat, 6-Sweyhat, 7- Halawa, 8-Umm el-Marra, 9-Hammam et Turkman, 10-Muhammad Diyab, 11-Hamoukar, 12-Hawa. TA: Tur Abdin Mountains; JAA: Jebel (mount) Abdul al-Aziz; JS: Jebel (mount) Sinjar. For additional Khabur sites, see Figure 7.1.

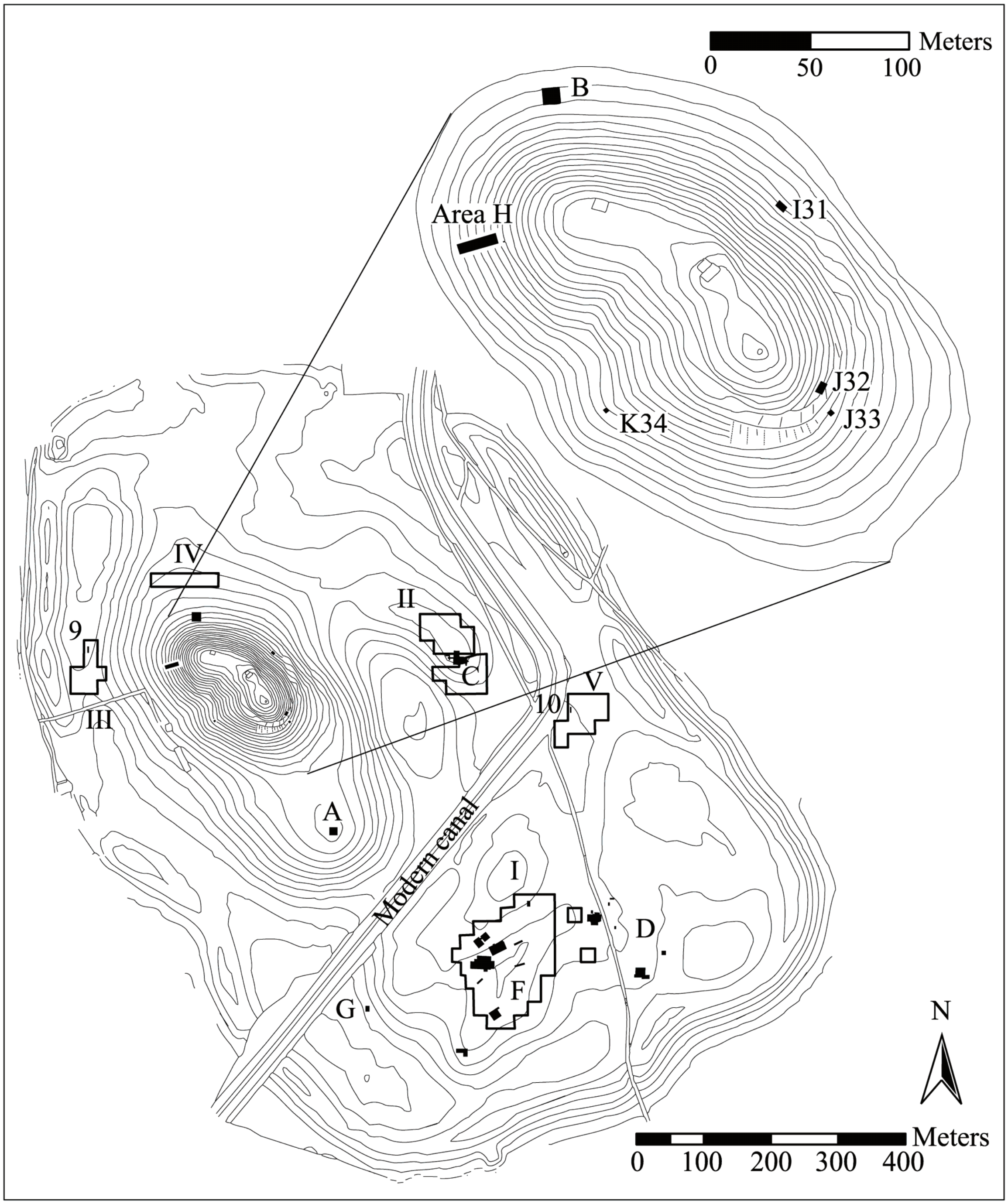


Figure 1.2: Kazane: Trenches and magnetometry areas (Roman numerals), Höyük zoomed. F = Area 1/F (see Figure 1.3); 9-10 = Operations 9-10 (2004). Also depicted: I31, J32, J33, K34, Area H (2002); Area C (1994-95); Areas D and G (Halaf trenches, 1996-97, 2004); Units A + B (1992). Not shown: Units C3-5 (northwestern part of site, 1993) and Area H step trench (1994-1995).

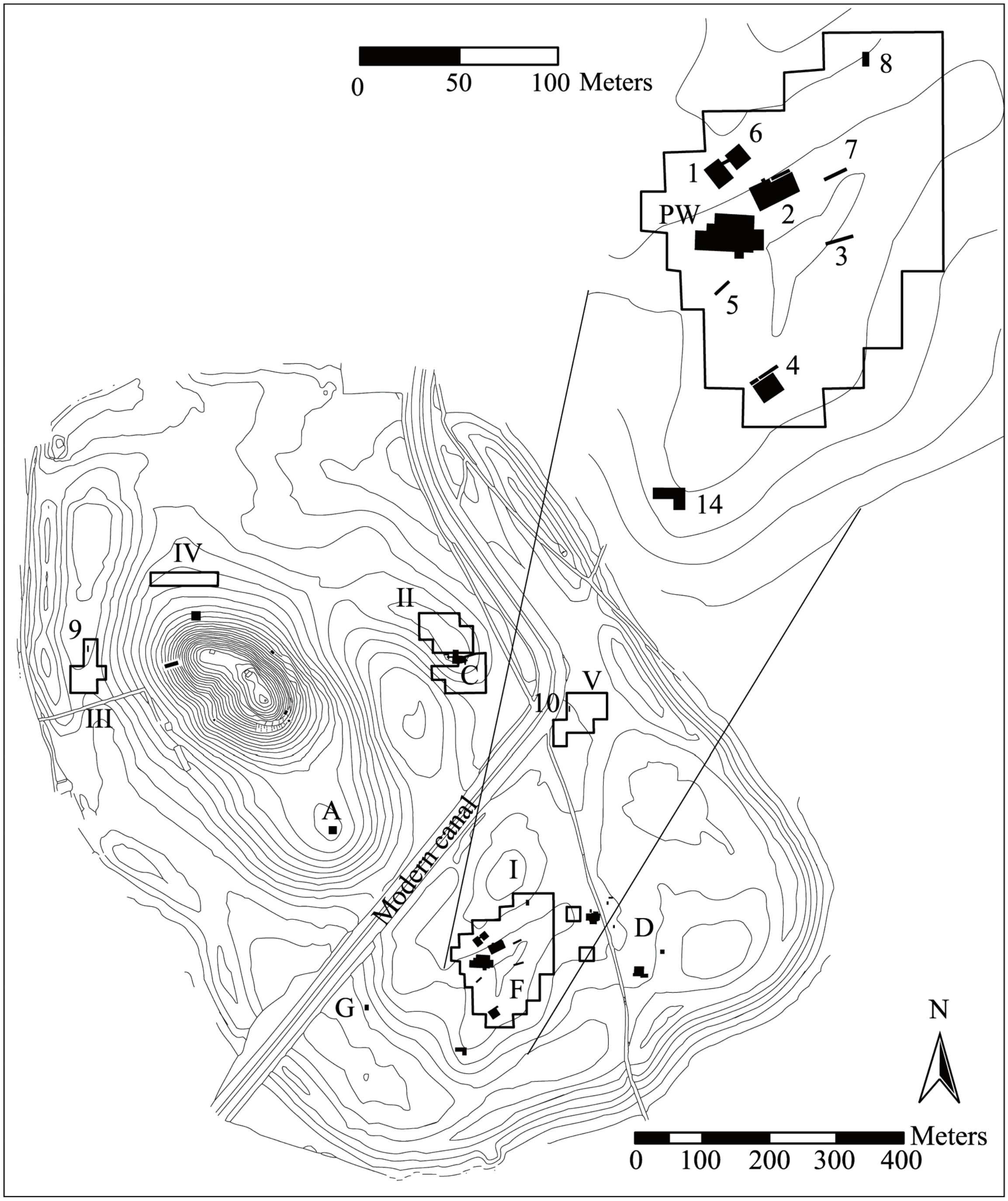


Figure 1.3: Kazane: Trenches and magnetometry areas (Roman numerals), Area 1/F zoomed. 1-10 = Operations 1-10 (2004); 14 = F14 (1993-1994); PW = F37-42 (2002), E700 N550, E690 N540 (2004). Also depicted: Area C (1994-95); Areas D and G (Halaf trenches, 1996-97, 2004); Unit A (1992). Not shown: Units C3-5 (northwestern part of site, 1993) and Area H step trench (1994-1995).

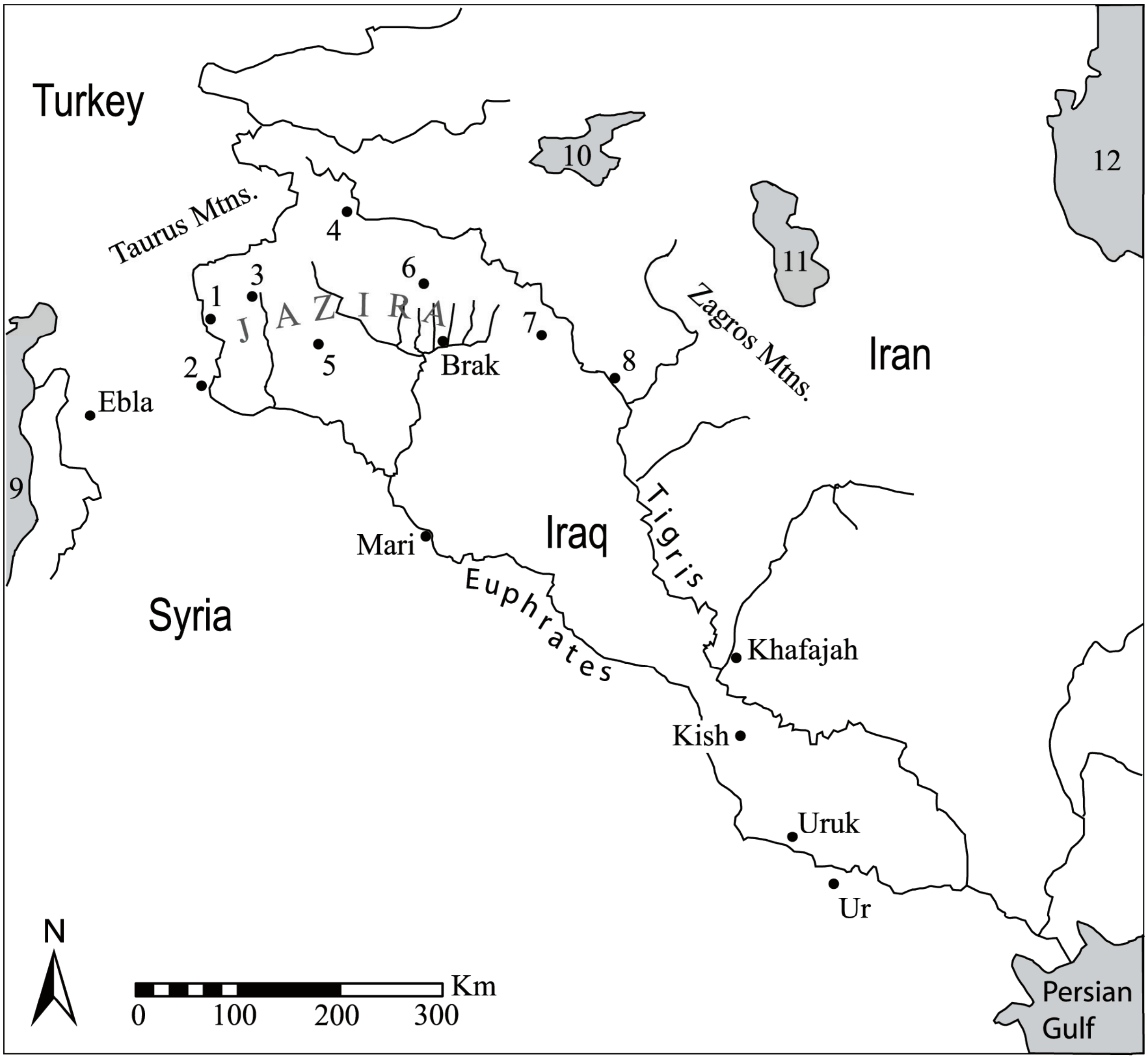


Figure 2.1: Mesopotamia: selected ancient and modern sites mentioned in the text. 1-Hacinebi (modern city of Birecik to the south), 2-Habuba Kabira (Jebel Aruda nearby), 3-Urfa (modern city; Kazane nearby), 4-Diyarbakir (modern city), 5-Chuera, 6-Mardin (modern city), 7-Hawa, 8-Nineveh, 9-Mediterranean Sea, 10-Lake Van, 11-Lake Urmia, 12-Caspian Sea.

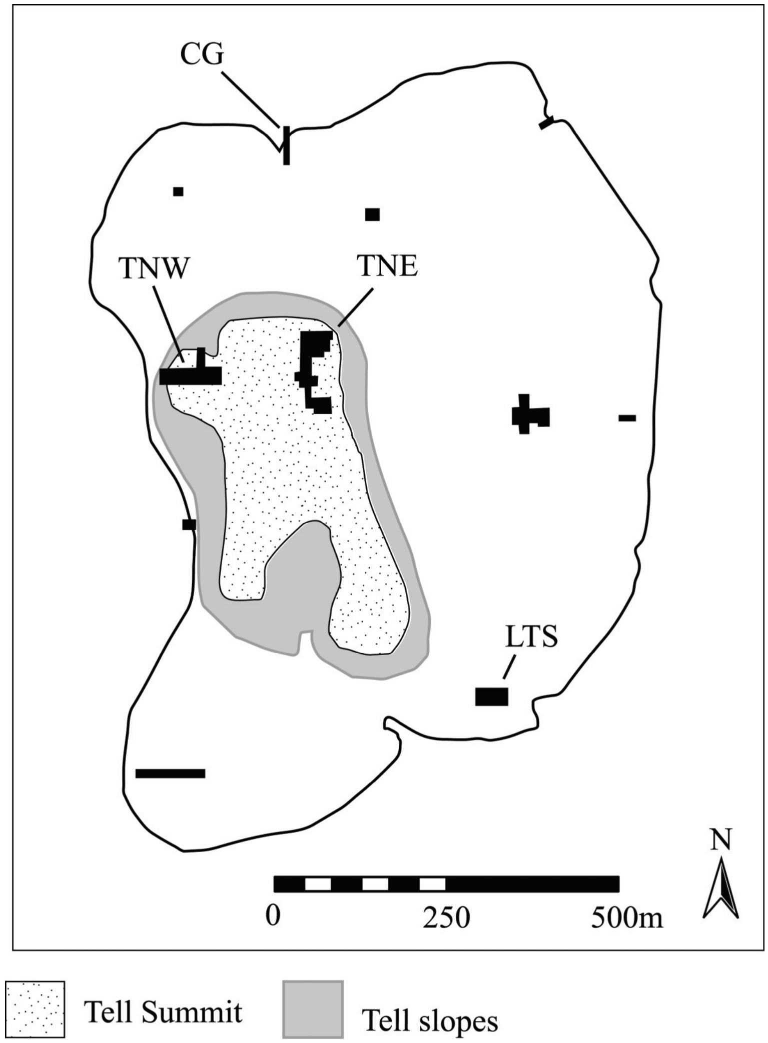


Figure 2.2: Tell Leilan, plan of the city showing the excavation areas. LTS: Lower town south, location of houses along a street; CG: section through the city wall; TNW: Northwest quadrant of the tell, which contained a Pre-Akkadian cultic area and associated storerooms, and from the Akkadian period (late third millennium), a schoolhouse, an unfinished administrative building, and the "Dudu Palace" (an Akkadian administrative building); TNE: Tell Northeast (After Ristvet et al. 2004: Figure 1, and Weiss 1990: Abb. 1).

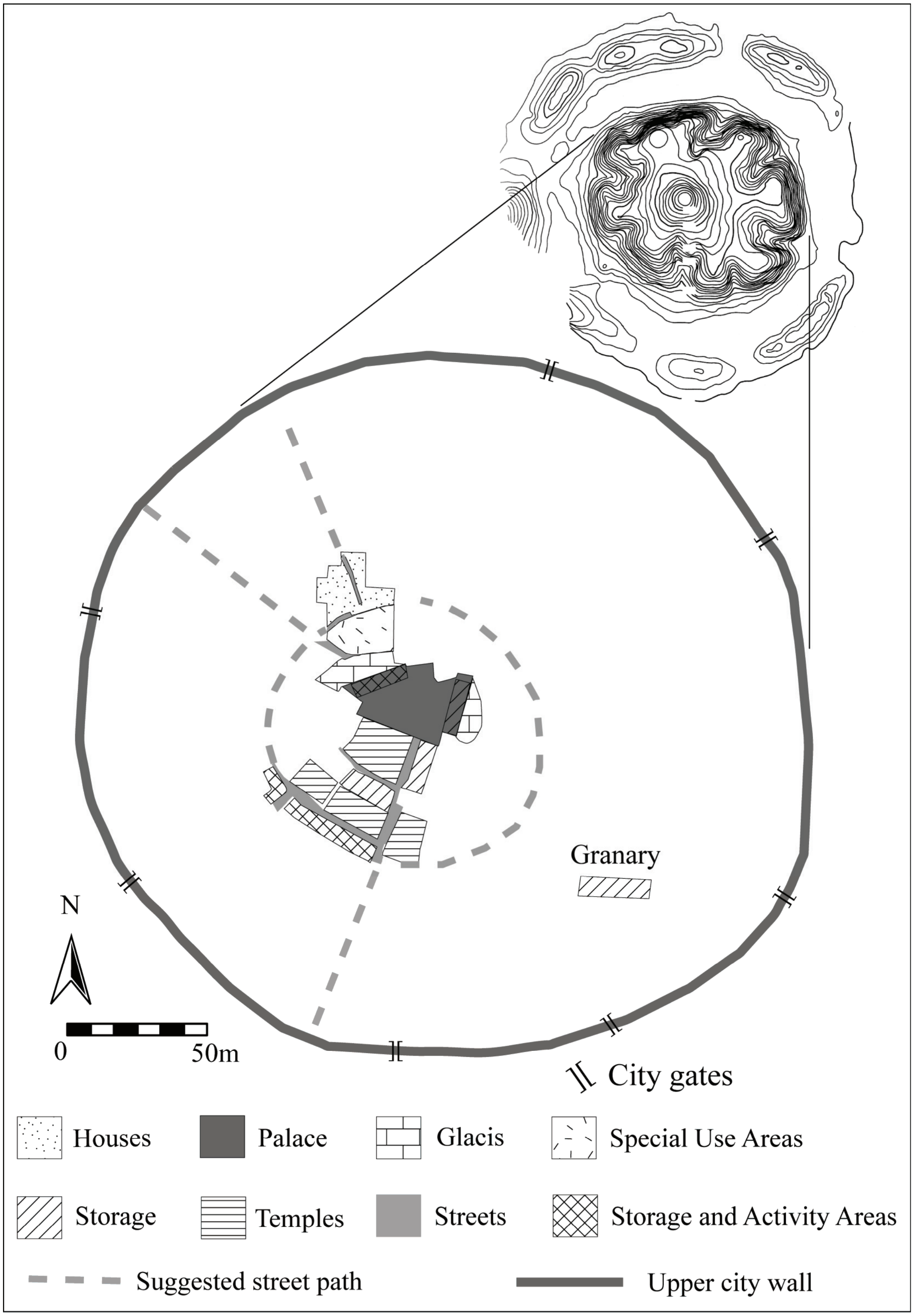


Figure 2.3: Tell Beydar, upper city, schematic plan of infrastructure and the primary use of various areas (Full site topographic map after Lebeau 1997:Figure 6; Use areas derived from Lebeau 2006:Plan 1, and excavation reports; Gates placed after Bluard 1997b:Figure 1).

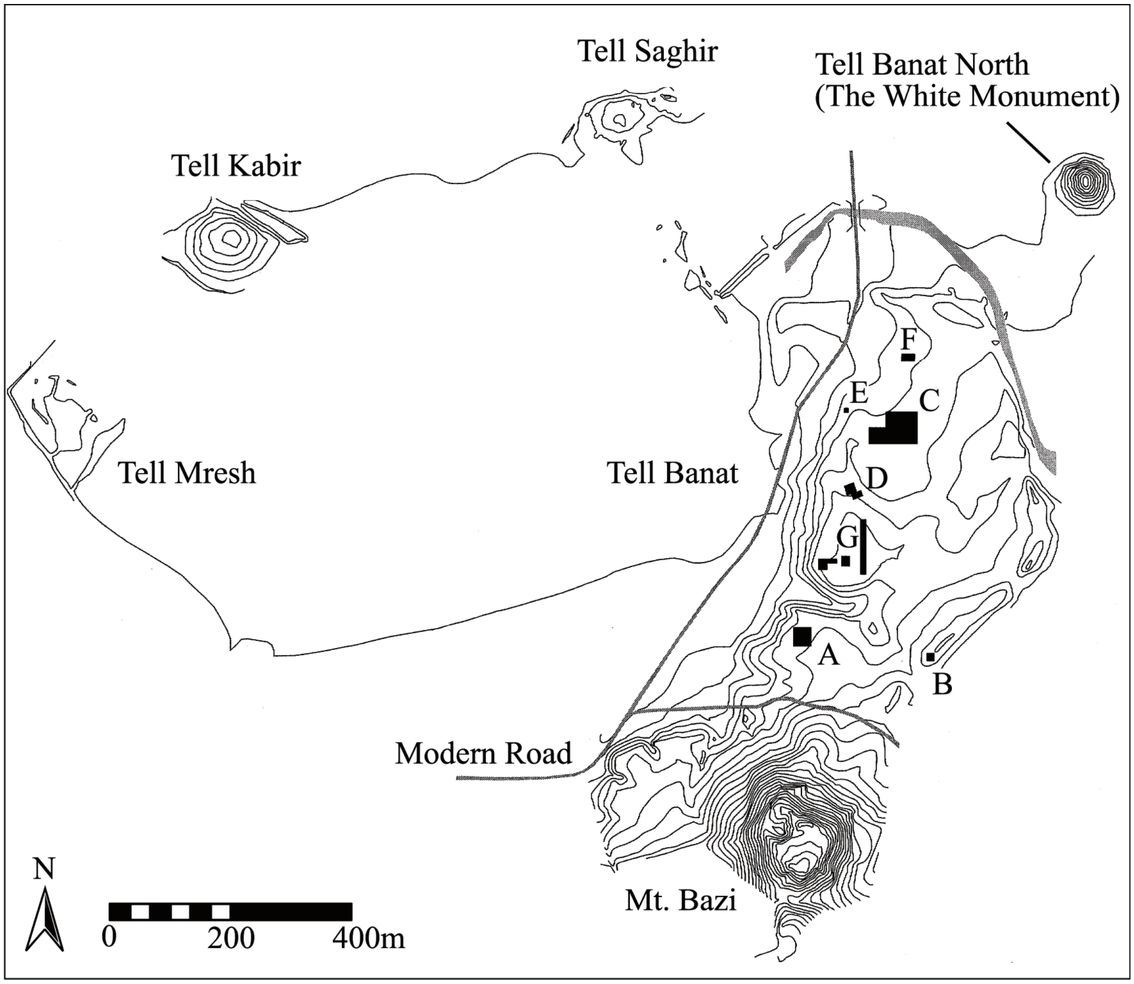


Figure 2.4: Tell Banat and surrounding features. Tell Banat North is the White Monument burial mound, and Tell Kabir hosted a temple and domestic architecture. At Tell Banat, pottery production was found in Areas A and G, while monumental structures (palaces?) and burials were found in Area C (Modified from Porter 2002a:Figure 2).

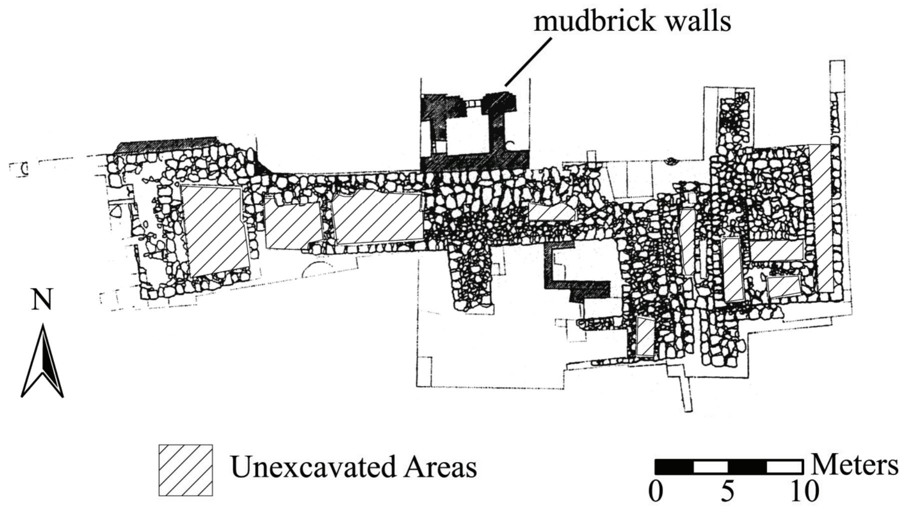


Figure 2.5: Area C: plan of massive wall (After Wattenmaker 1997:Figure 5).

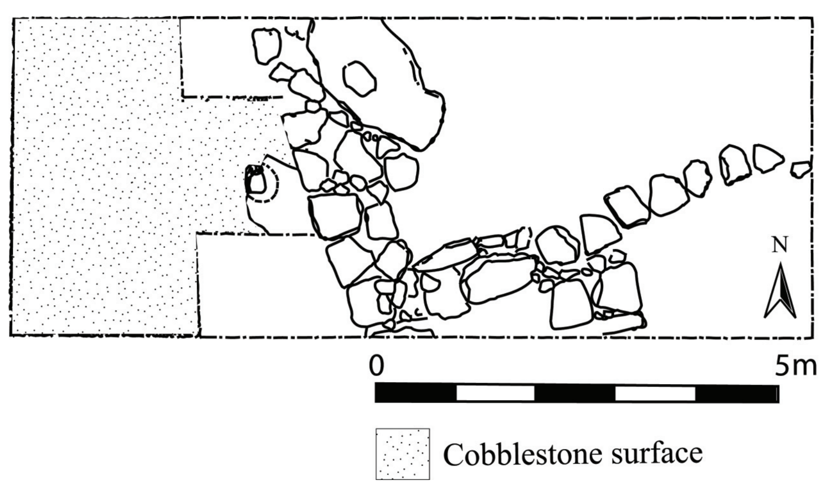


Figure 2.6: Plan of trench F14 architecture (After Wattenmaker 1997:Figure 6).

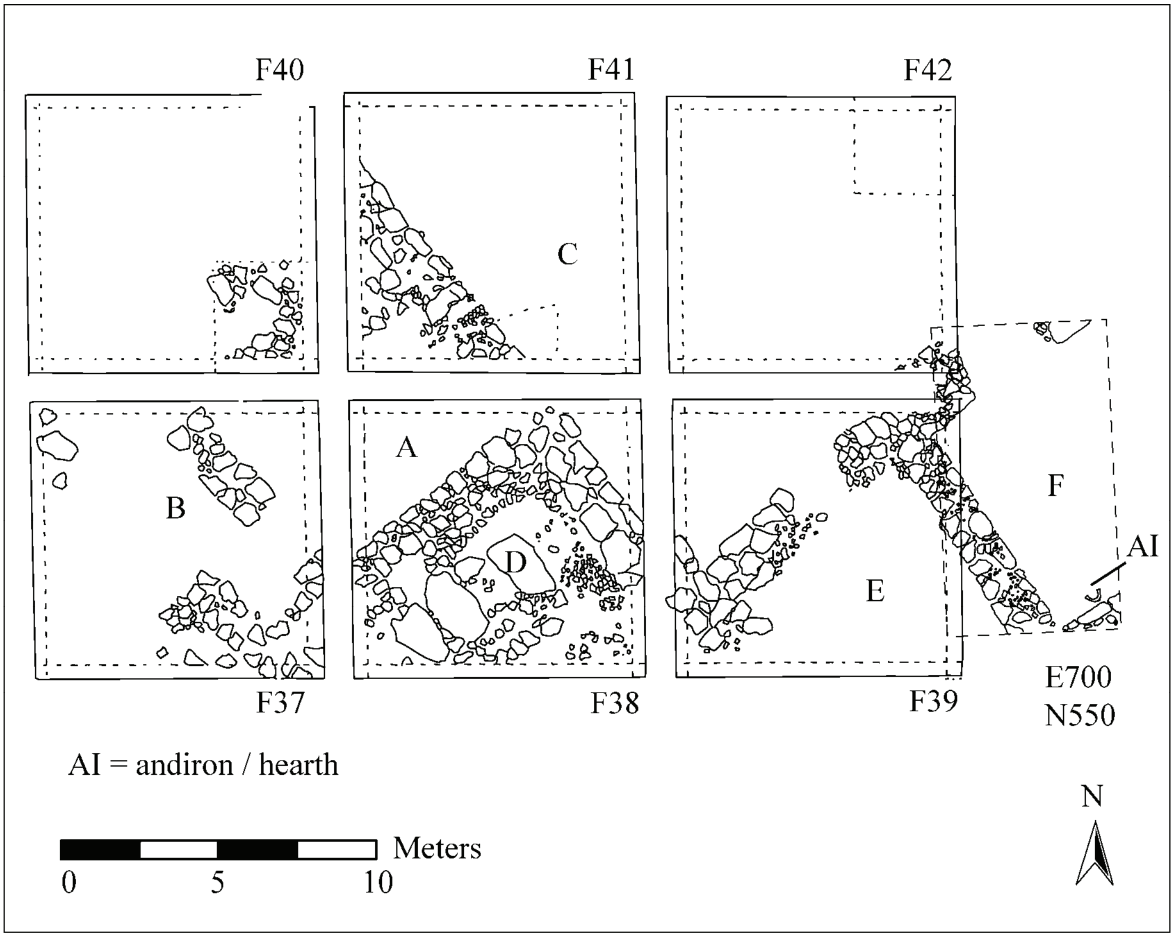


Figure 2.7: Plan of architecture from Dr. Patricia Wattenmaker's Area F excavations in 2002 and 2004 (After original drawings by Sue Ann McCarty and Dilek Düzgün).

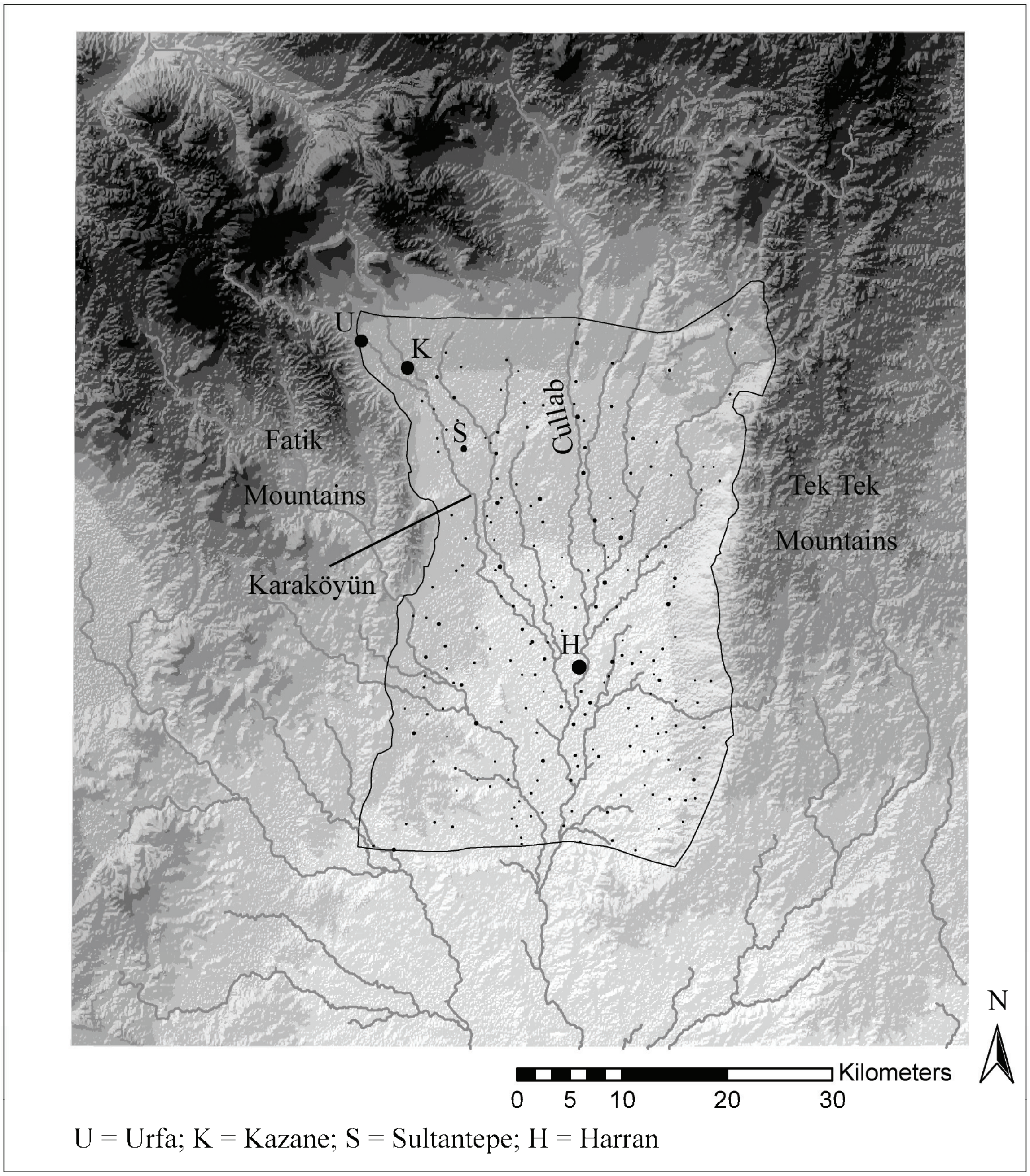


Figure 3.1: Harran Plain shaded relief map with waterways, Yardımcı (2004) survey area outlined, and all sites plotted.

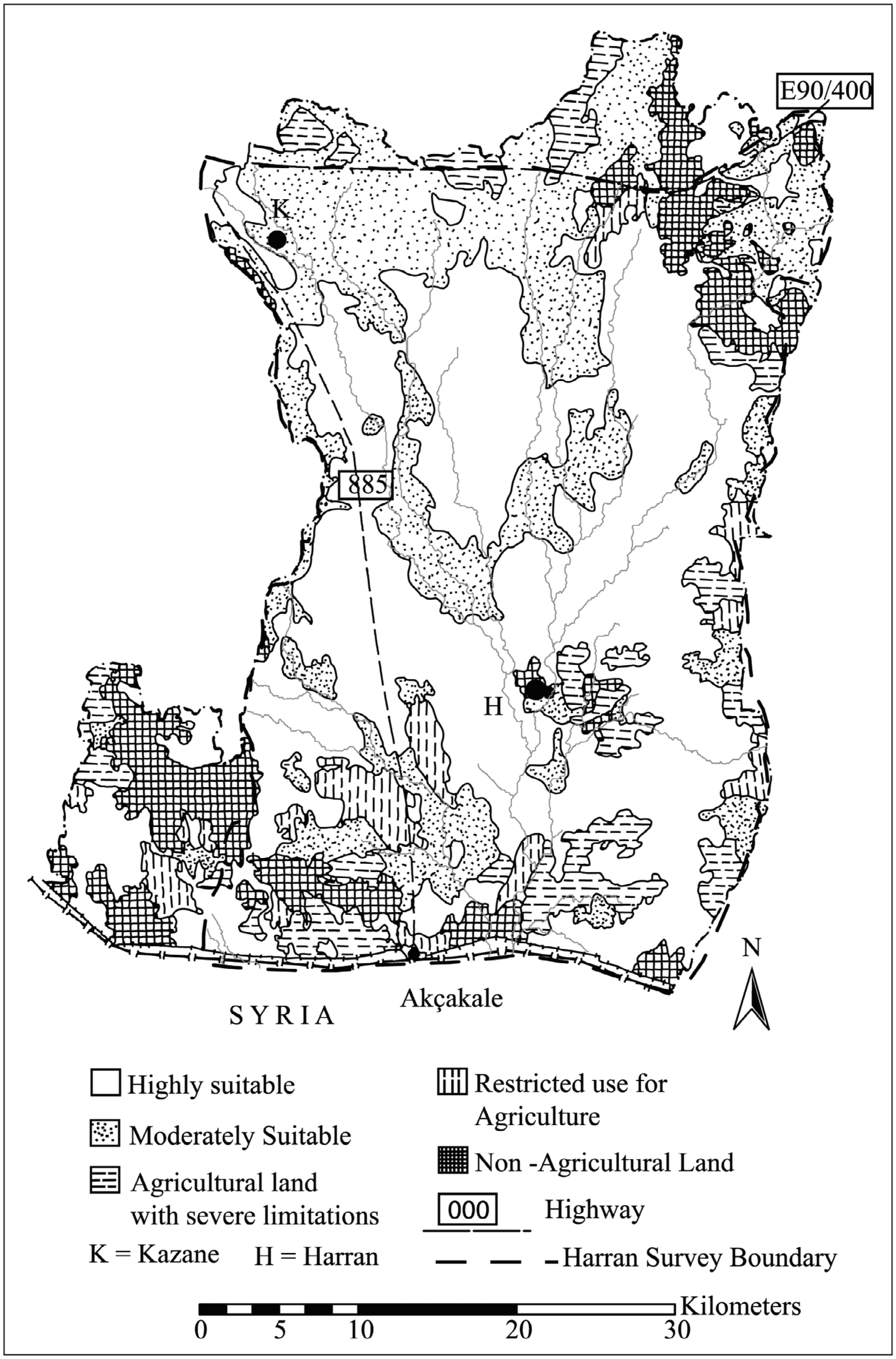


Figure 3.2: Harran Plain Soil Suitability Map, with Yardımcı (2004) survey area outlined (After Şenol et al. 1991:Figure 3).

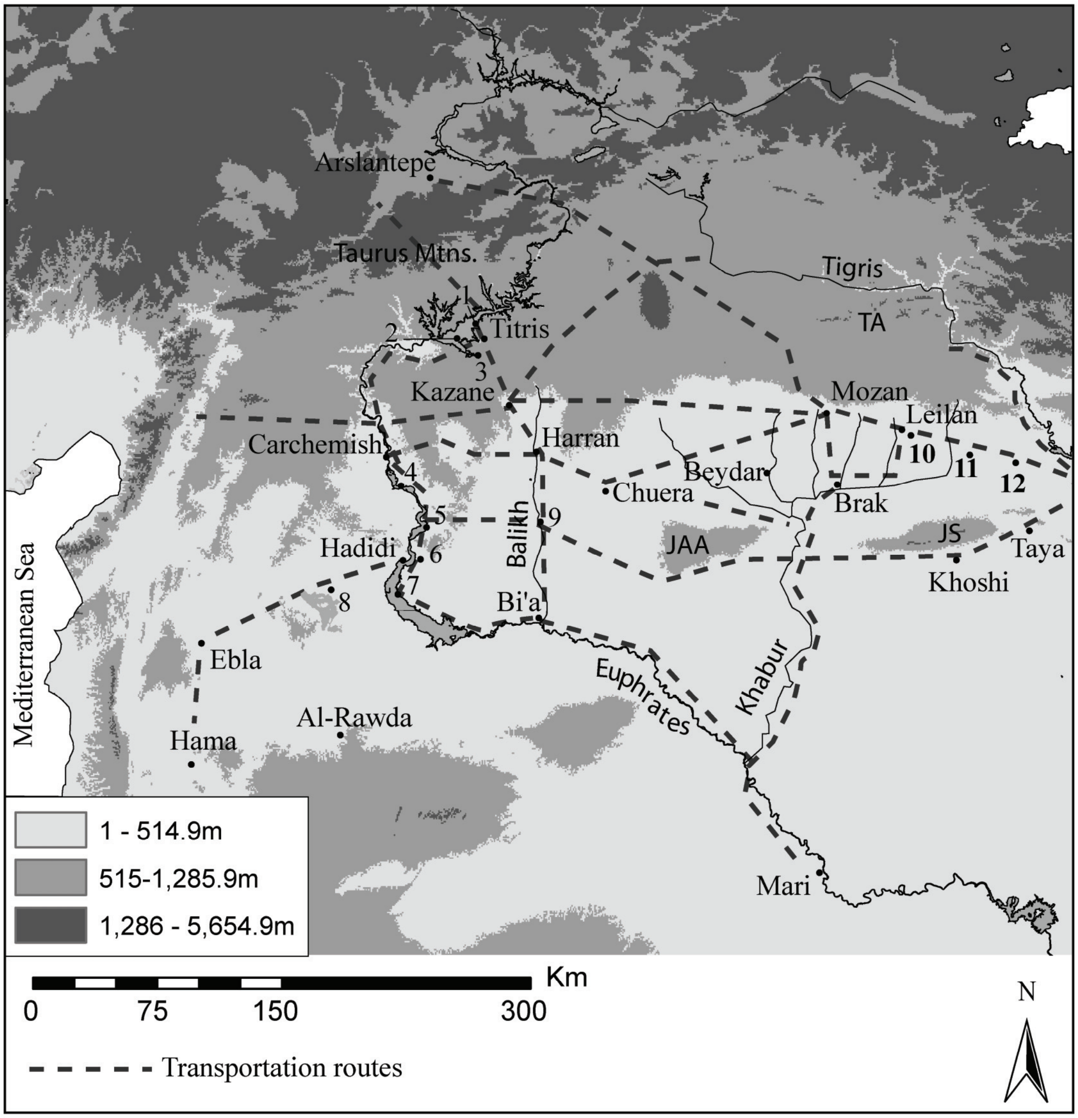


Figure 3.3: Major transportation routes of the 4th and 3rd millennium in Upper Mesopotamia (After Algaze 2005b:Figure 21; and Lebeau 1997:Figure 1). 1-Lidar, 2-Kurban, 3-Tatar, 4-Ahmar, 5-Banat, 6-Sweyhat, 7- Halawa, 8-Umm el-Marra, 9-Hammam et Turkman, 10-Muhammad Diyab, 11-Hamoukar, 12-Hawa. TA: Tur Abdin Mountains; JAA: Jebel (mount) Abdul al-Aziz; JS: Jebel (mount) Sinjar. For additional Khabur sites, see Figure 7.1.

Survey	Area (km²)	Total Sites	Sites / km²	Periods / km²
Harran**	1632.1	208	0.13	0.53
Tell Beydar*	450	82	0.18	0.77
Hamoukar*	125	67	0.54	1.36
North Jazira*	475	184	0.39	1.51

* After Wilkinson, Ur and Casana 2004: Table 14.2
** After Yardımcı 2004

Figure 3.4: Recovery rates: sites and periods / km^2 of the Harran Survey and other surveys in Upper Mesopotamia.

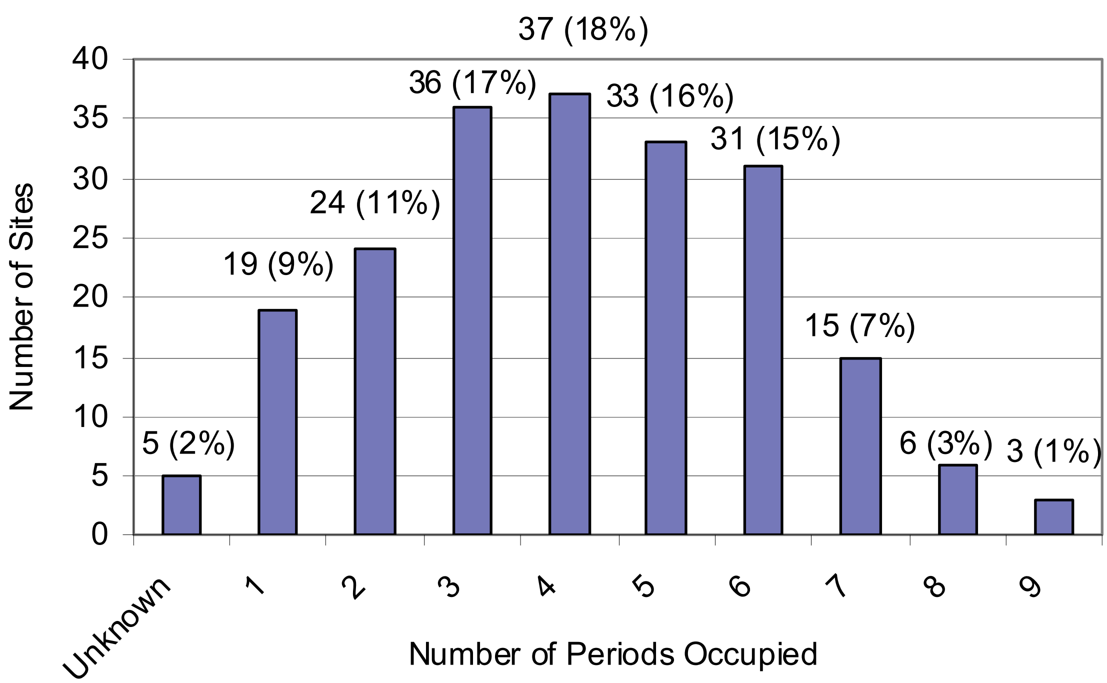


Figure 3.5: Number of time periods during which sites in the Harran Plain were occupied.

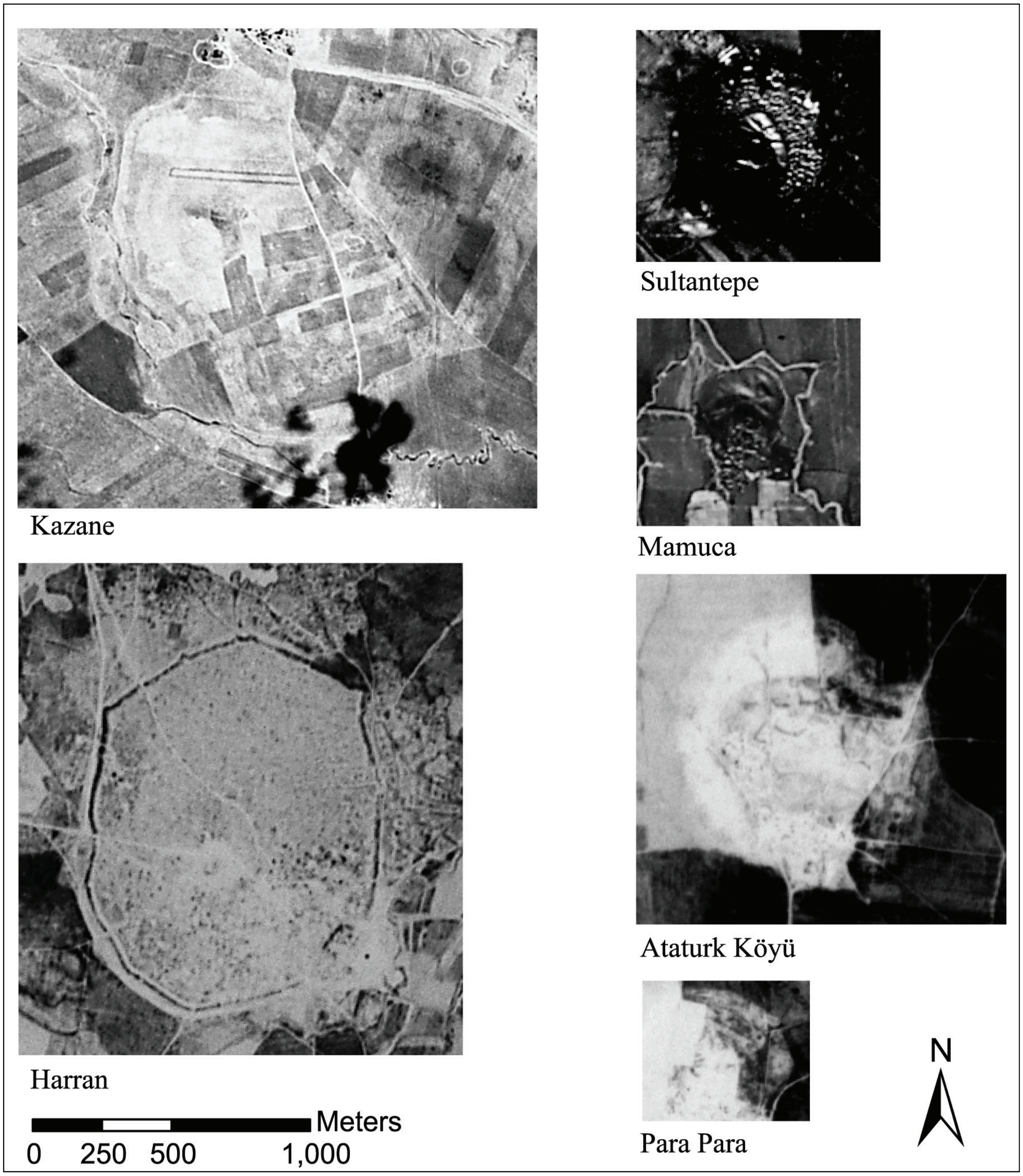


Figure 3.6: Corona images of sites over 9 hectares in the Harran Plain survey area. The dark line around Harran is the late period city wall. Ataturk Köyü and Para Para are difficult to outline due to the poorer quality of the image. Corona images courtesy of U.S. Geological Survey, EROS Data Center, Sioux Falls, SD, and The Center for Middle Eastern Landscapes, Oriental Institute, University of Chicago. Images are: 1) Kazane: D11041009005, August 1968; 2) Harran: D110310090A012, May 1968; 3) Sultantepe: D11051009DA010, November 1968; 4) Mamuca: D11051009DA010, November 1968; 5) Ataturk Köyü and Para Para: D11031009DA011, May 1968.

Period	Time range (BCE / CE) and sub-period
Neolithic	~9000 - 5900
	Pre Pottery Neolithic 9000 - 6000
	Pottery Neolithic 6000 - 5600
Chalcolithic	5900 - 3000
	Halaf 5900 - 4800
	Ubaid 4800 - 3800
	Late Chalcolithic 3800 - 3100
Late Chalcolithic to EBA transition	3100 - 2900
Early Bronze Age	2900 - 2000
Second Millennium	2000 - 1000
	Middle Bronze Age 2000 - 1400
	Late Bronze Age 1400 - 1200
	Old Assyrian 2000 - 1200
	Middle Assyrian 1200 - 1000
First Millennium	1000 - 0
	Iron Age and Late (New) Assyrian 900 - 600
	Hellenistic (Seleucid to Parthian) 400 - 50
Roman	50 BCE - 400 CE
Byzantine / Sassanian	400 - 800
Islamic	800 - 1800

Figure 3.7: Chronology of major periods in Upper Mesopotamia (Based in part on Wilkinson 2003:xviii).

Combined periods	Number of sites occupied in both periods	% site continuity
Neolithic and Halaf	4	80.00
Halaf and Ubaid	29	51.79
LC1 and LC to EBA	19	14.73
LC (no Halaf, no Ubaid) and LC to EBA	7	11.48
LC to EBA and EBA	18	72.00
LC (no Halaf, no Ubaid) and EBA	45	73.77
LC1 and EBA	100	77.52
EBA and MBA	39	30.23
MBA and First Mil	33	66.00
First Mil and Hellenistic	12	9.76
Hellenistic and Roman	15	83.33
Roman and Islamic	98	93.33

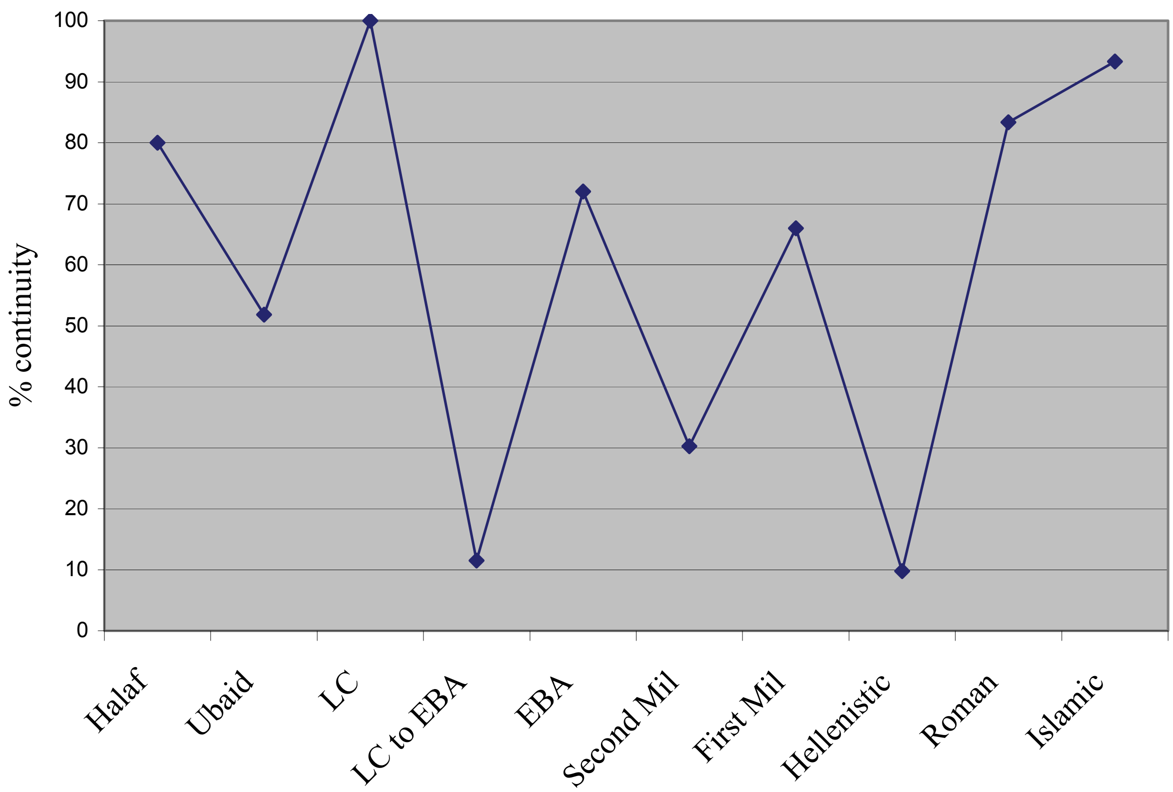


Figure 3.8: Settlement continuity in the Harran Plain. The table contains various interpretations of the number of Late Chalcolithic sites. In the graph, "LC" includes Late Chalcolithic sites *without* any Halaf or Ubaid remains.

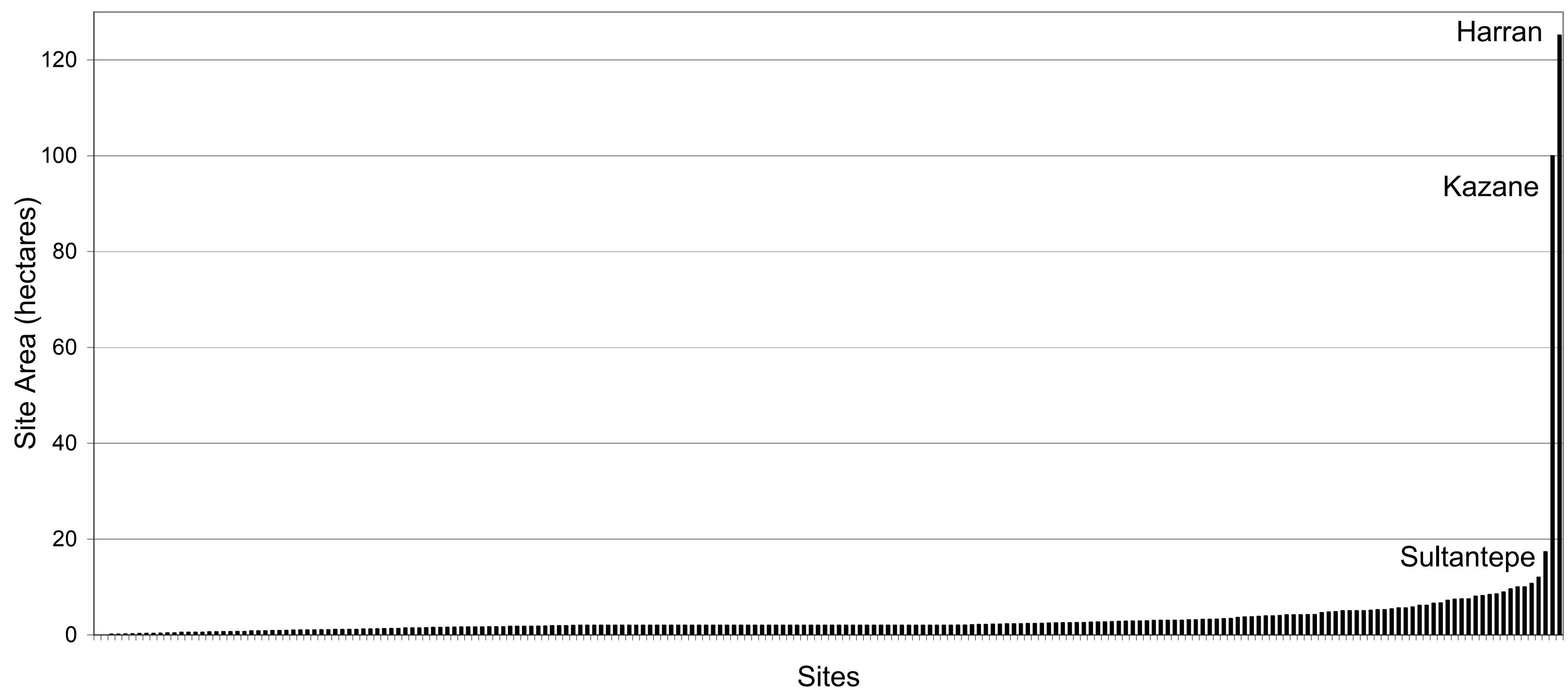


Figure 3.9: Range of site areas in the Harran Plain.

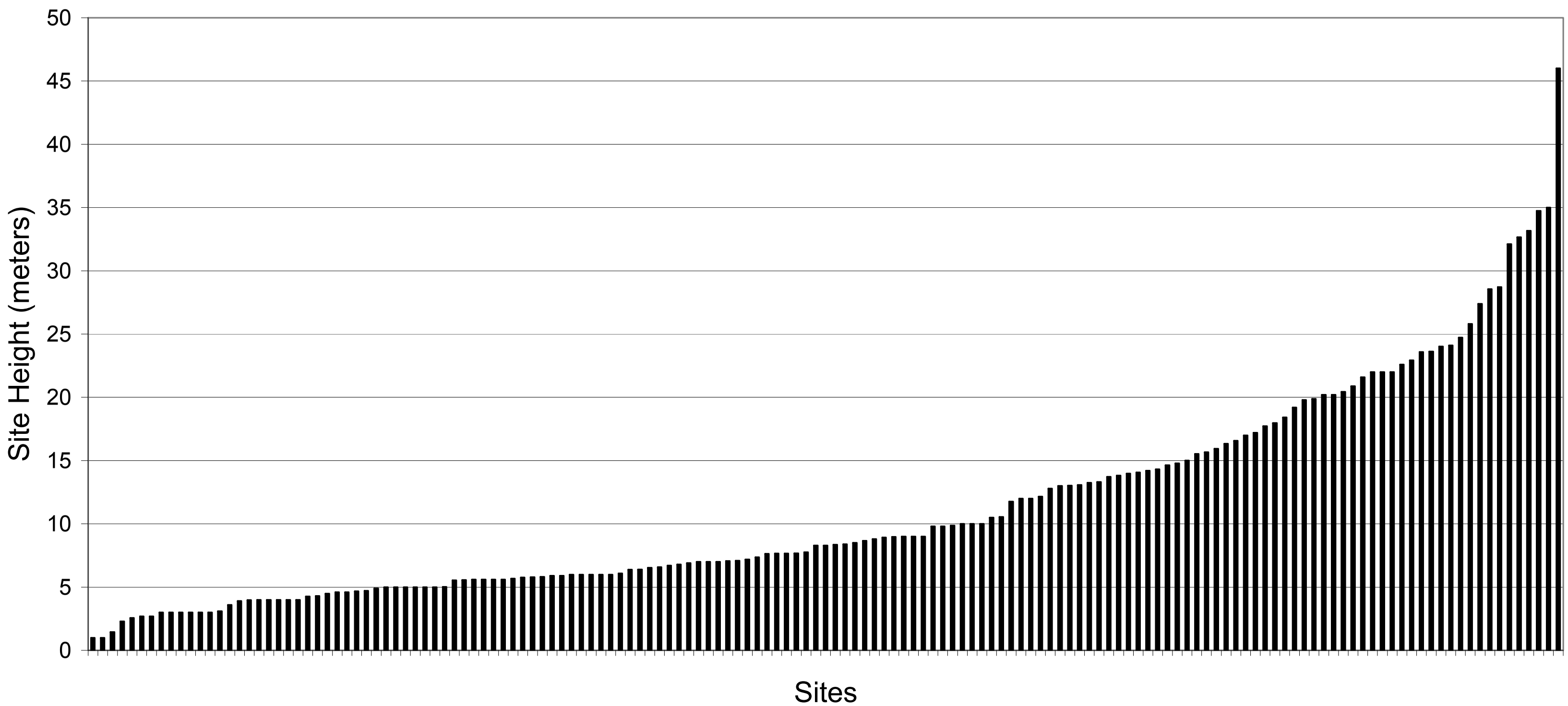


Figure 3.10: Range of site heights in the Harran Plain.

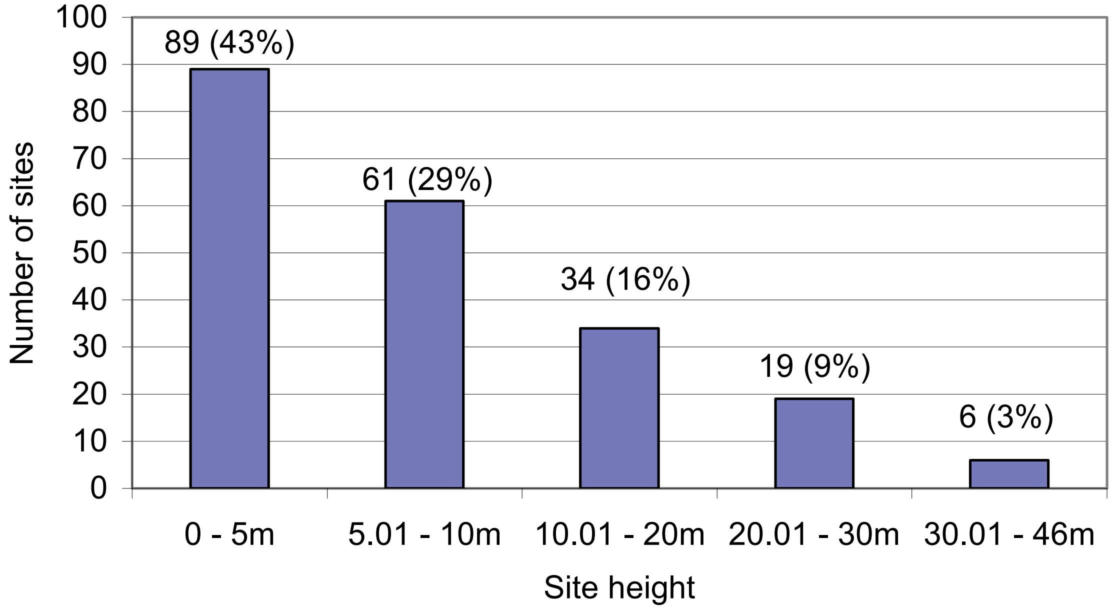


Figure 3.11: Harran Plain sites: site height ranges for all time periods.

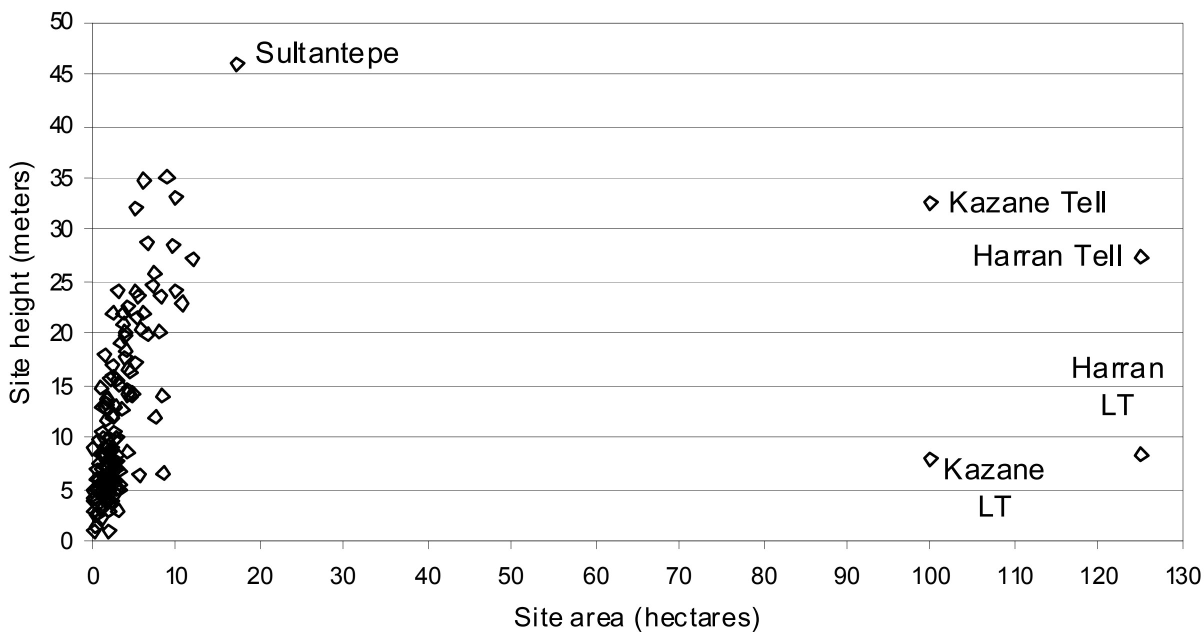


Figure 3.12: Harran Plain, all sites: site area by height (184 sites plotted, including Kazane and Harran lower towns -- LT).

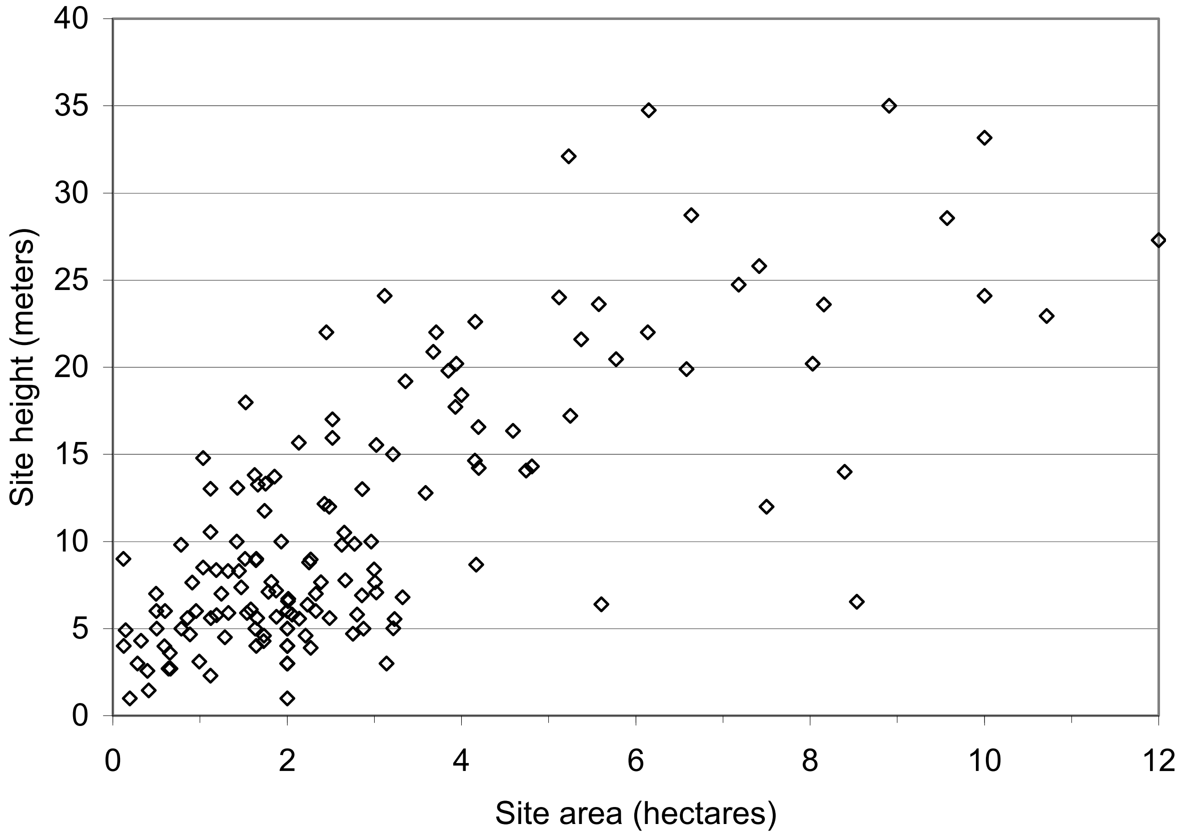


Figure 3.13: Harran Plain, sites under 16 hectares: Site area by height (181 sites plotted).

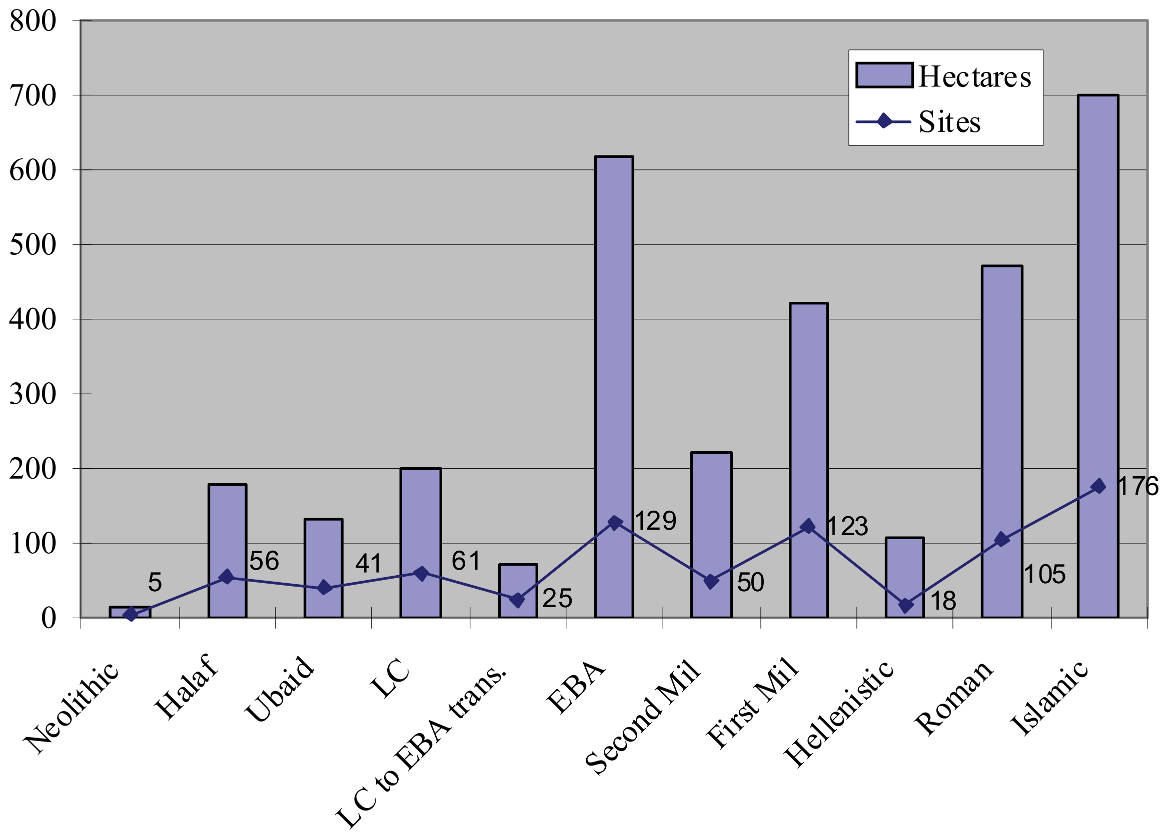


Figure 3.14: Harran Plain: Number of sites and total occupied hectares by Period. Number labels mark the number of sites.

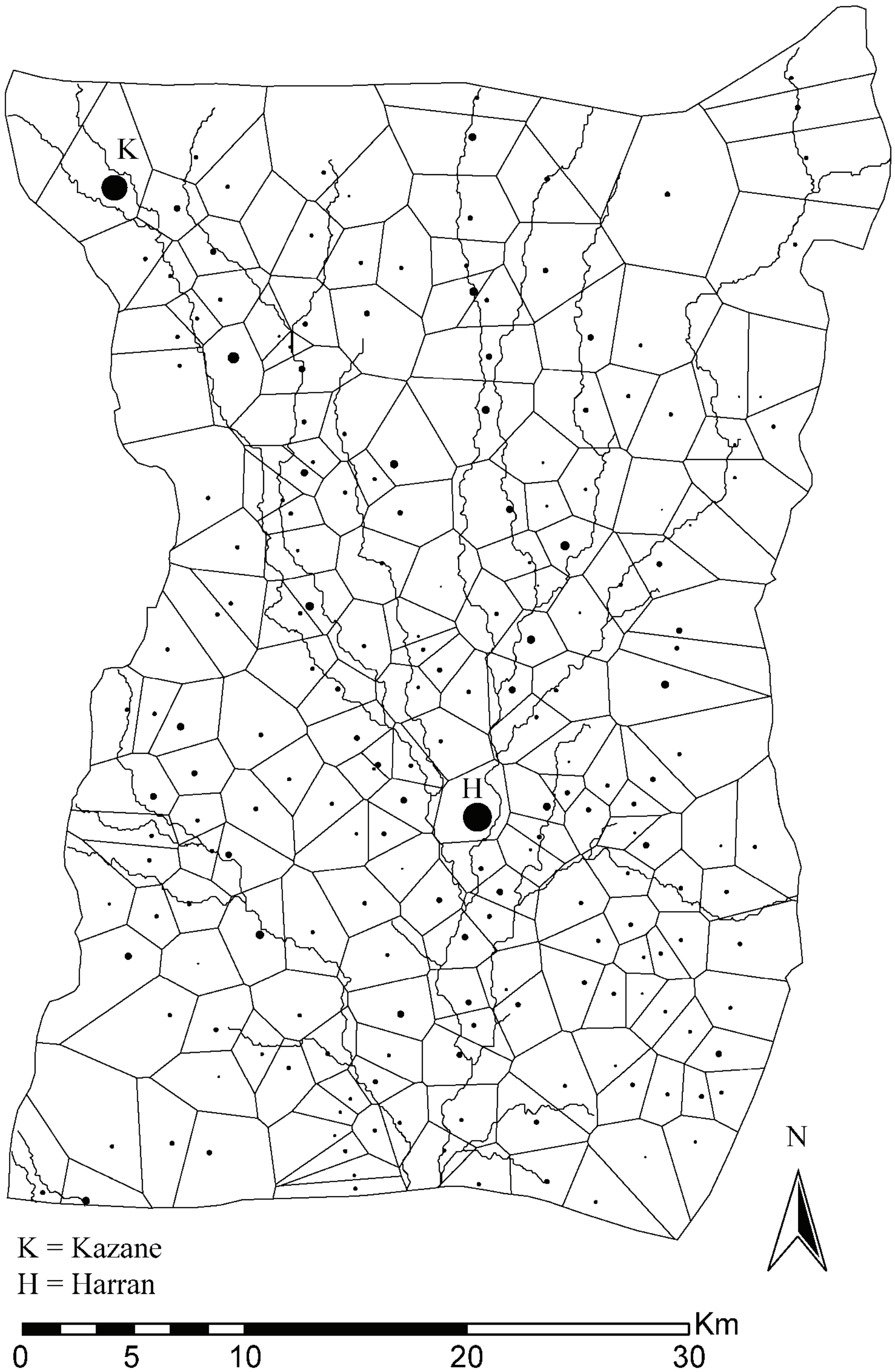


Figure 3.15: Harran Plain, all sites, Thiessen Polygons, and waterways.

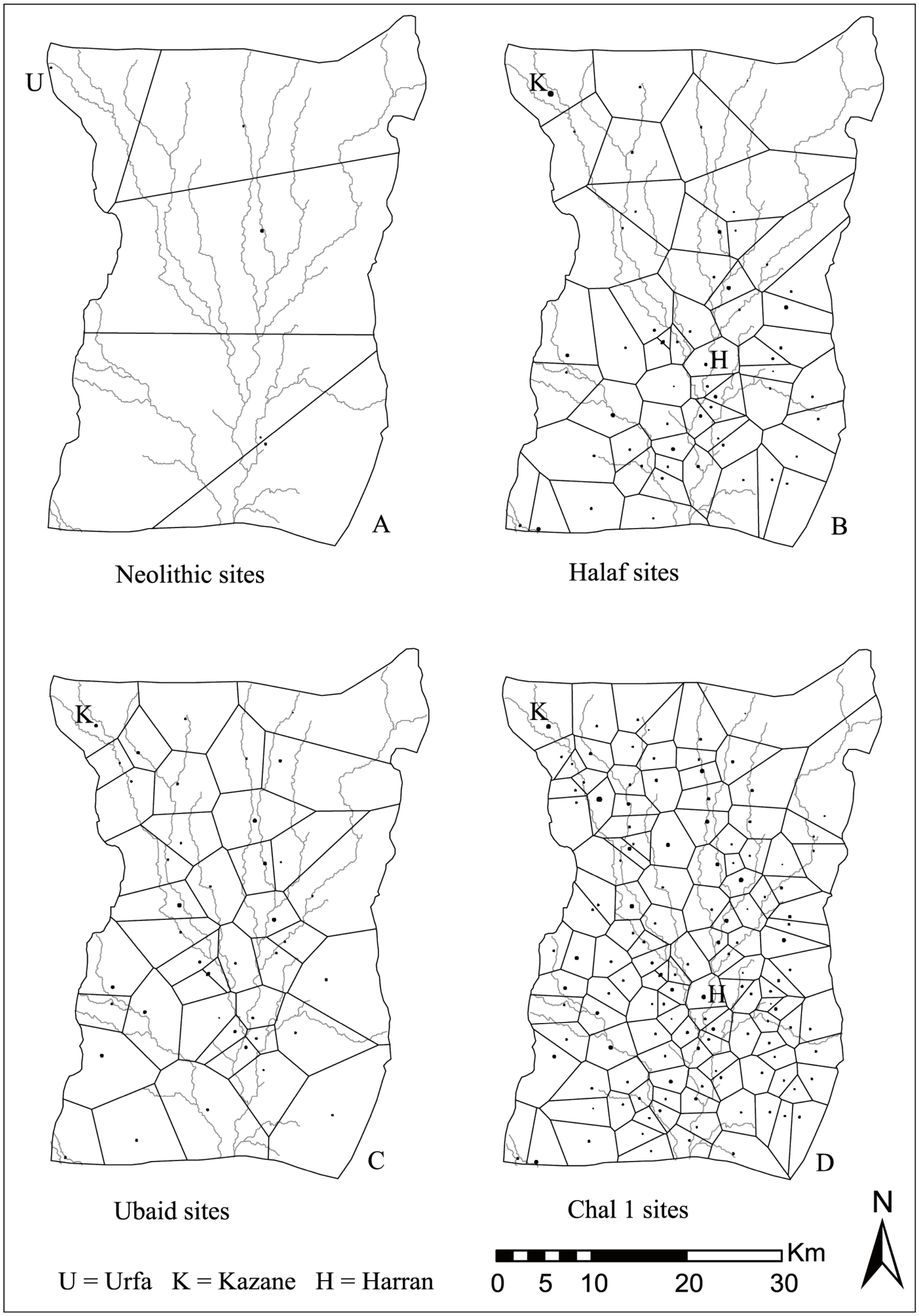


Figure 3.16: Harran Plain: Sites and Thiessen Polygons for selected periods.

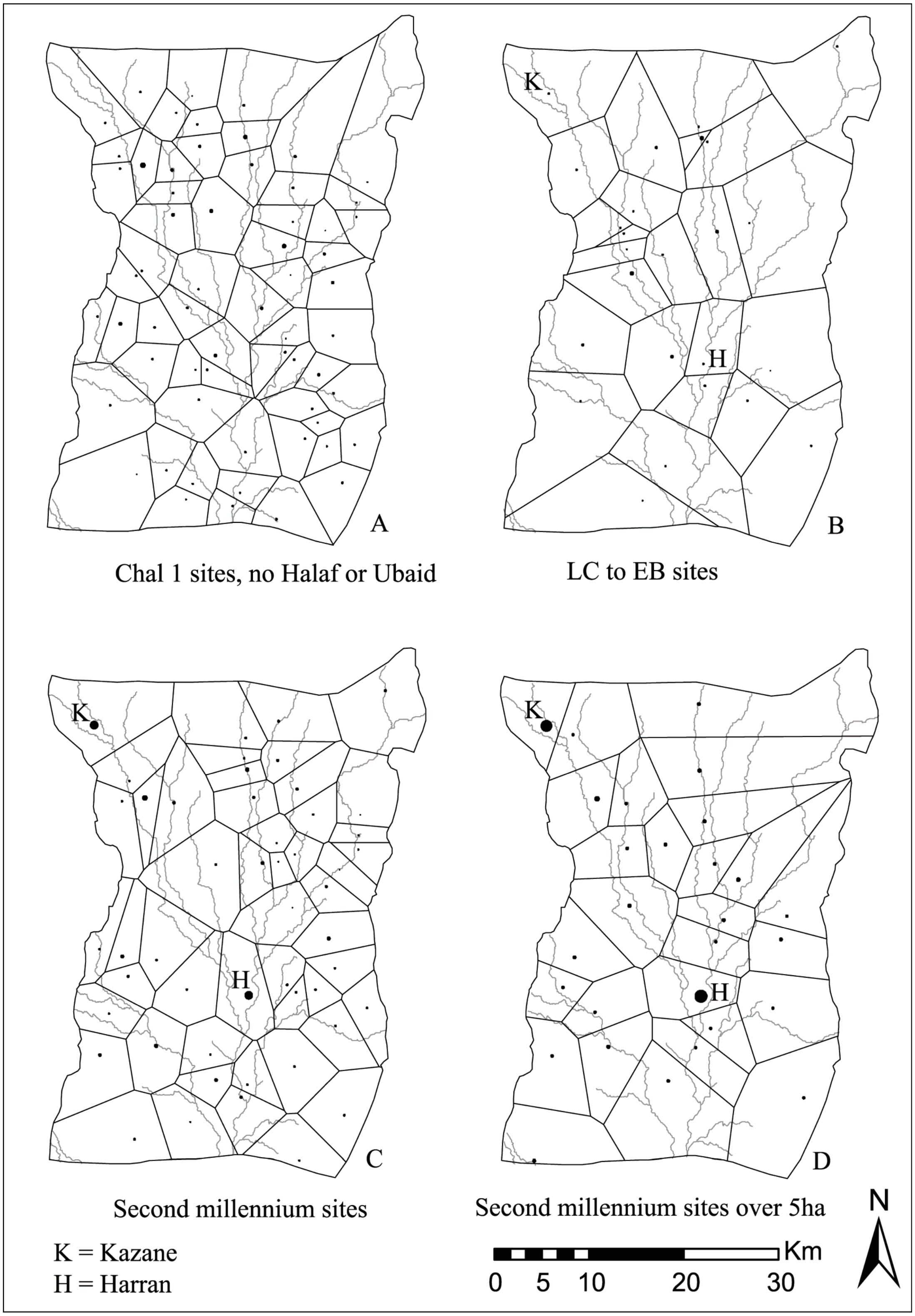


Figure 3.17: Harran Plain: Sites and Thiessen Polygons for selected periods.

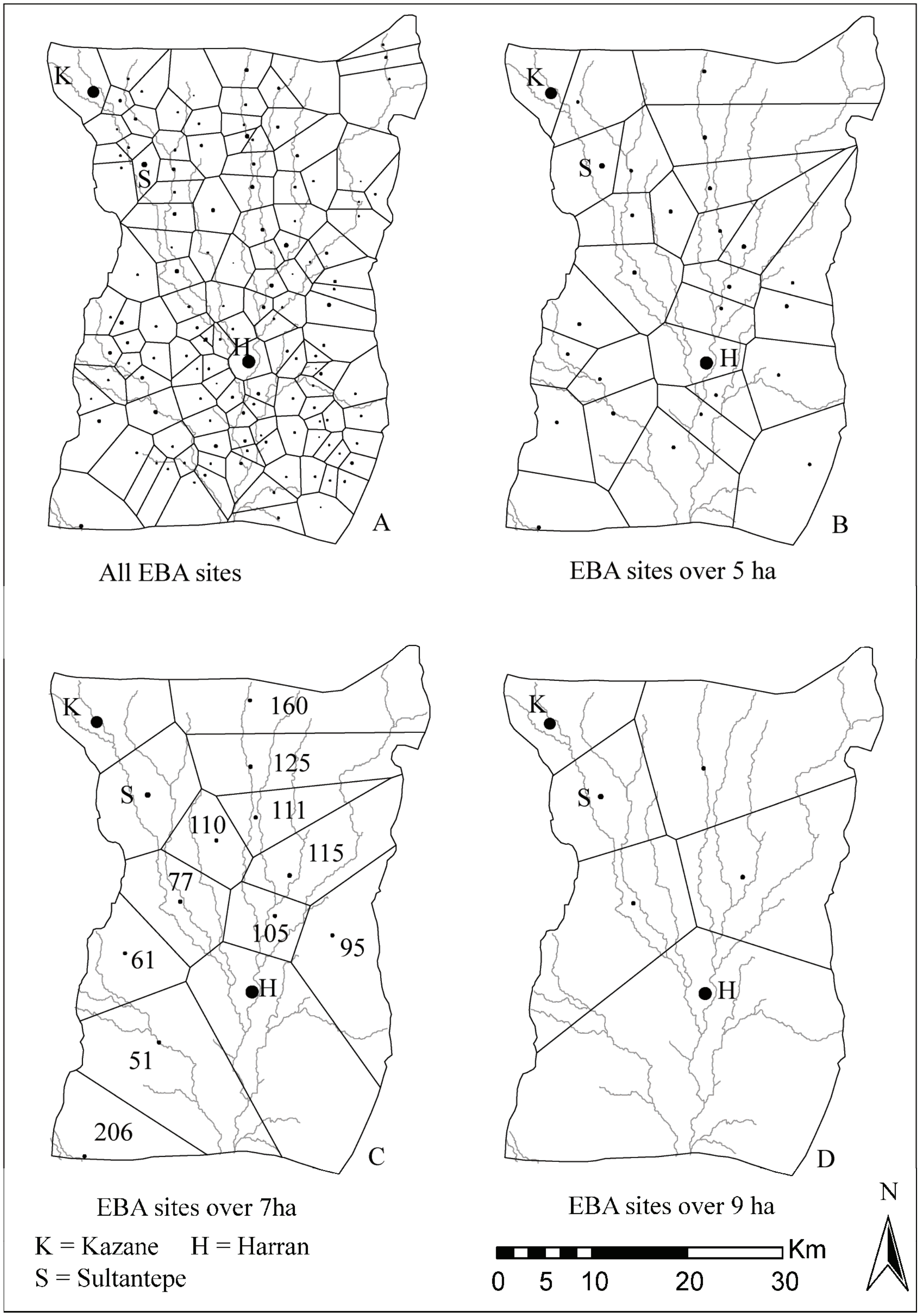


Figure 3.18: Harran Plain: Sites and Thiessen Polygons for the EBA period. Yardımcı survey (2004) site numbers are given for sites over 7 hectares.

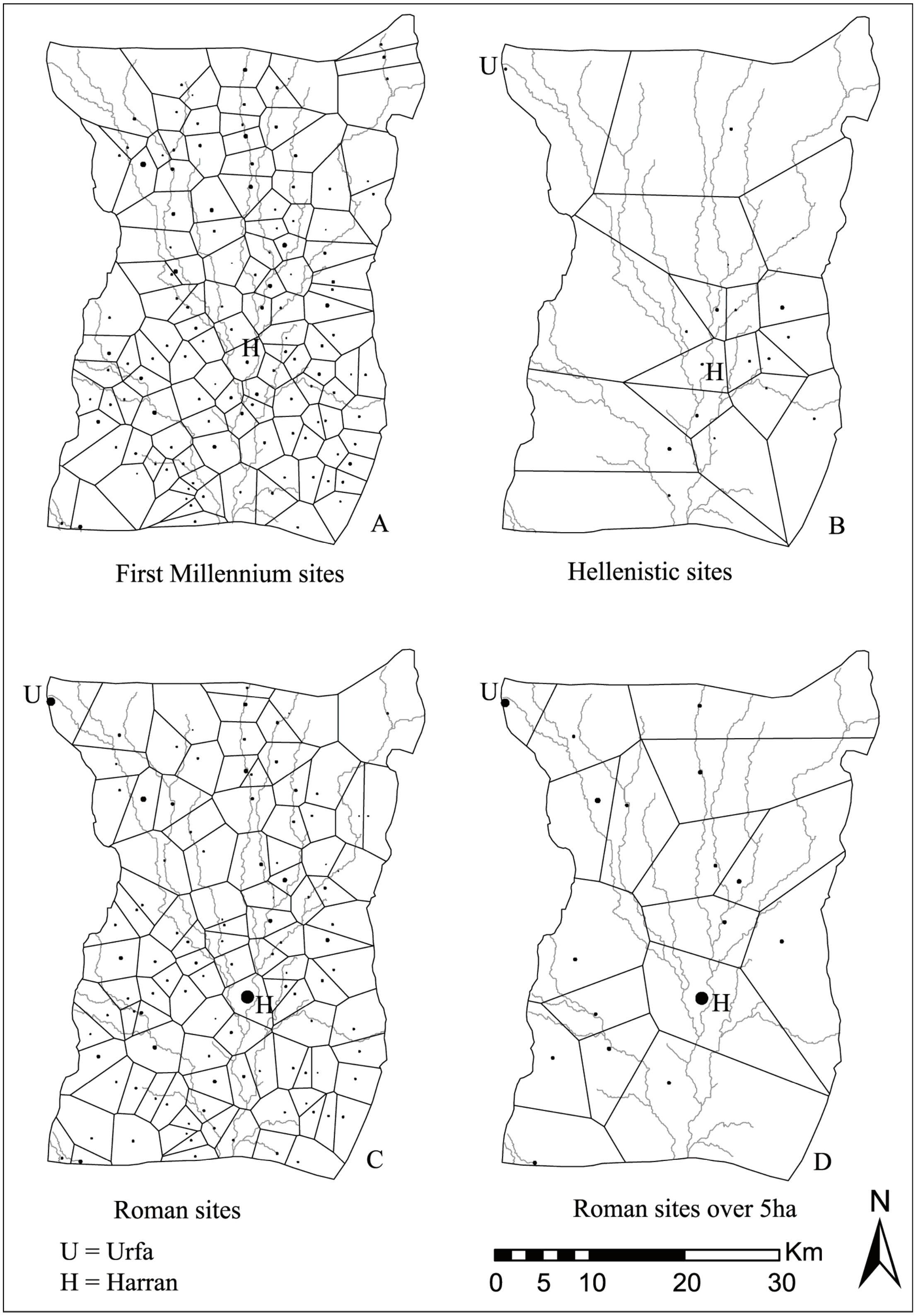


Figure 3.19: Harran Plain: Sites and Thiessen Polygons for selected periods.

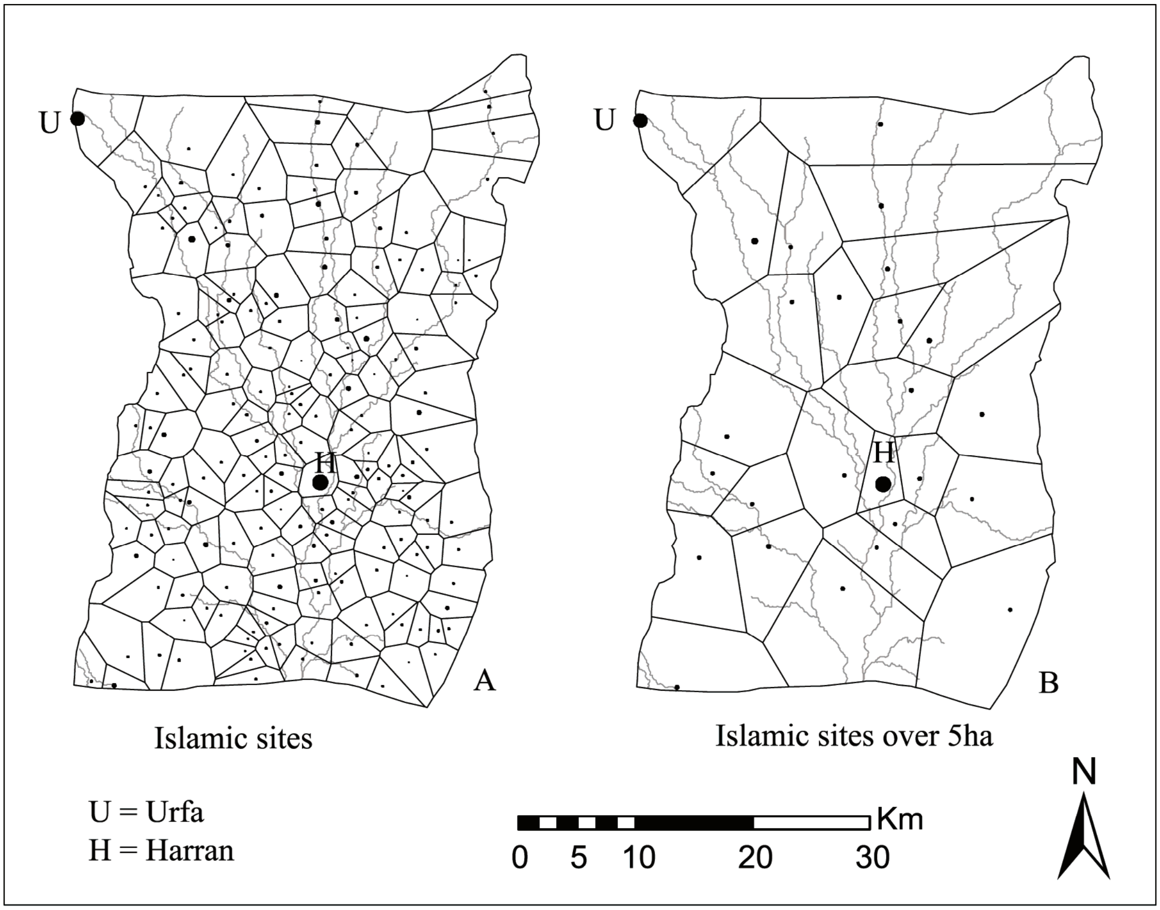


Figure 3.20: Harran Plain: Sites and Thiessen Polygons for the Islamic period.

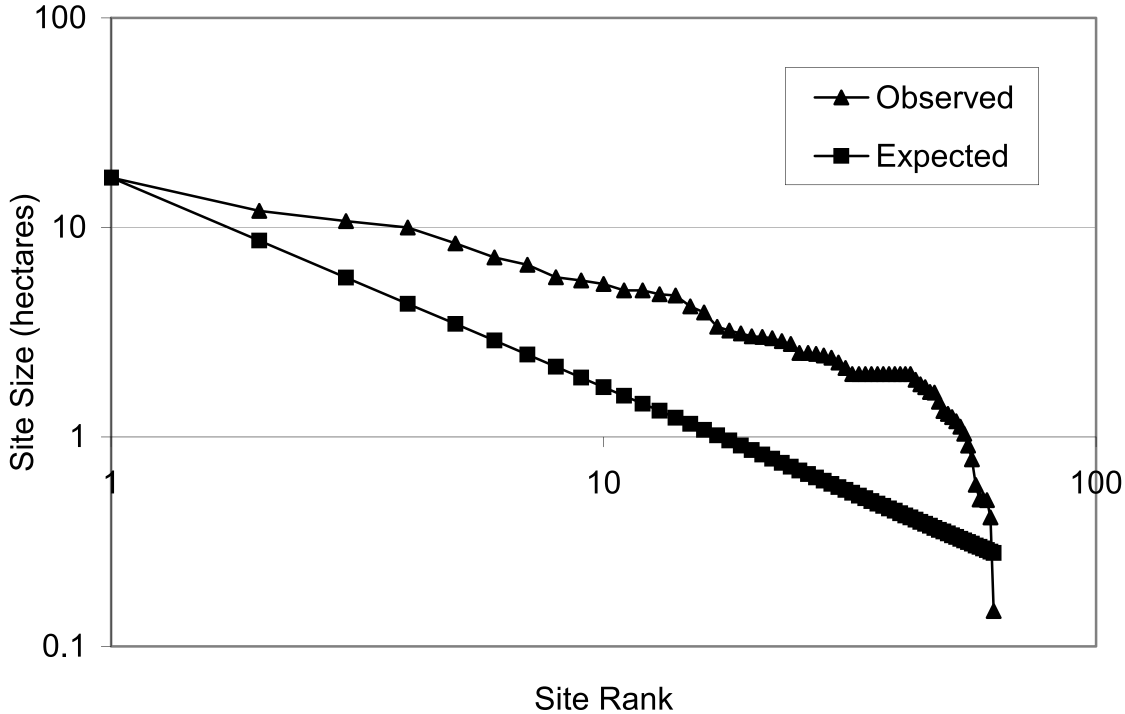


Figure 3.21: Rank size chart for the Chalcolithic period only (sites with Chalcolithic but no Halaf or Ubaid).

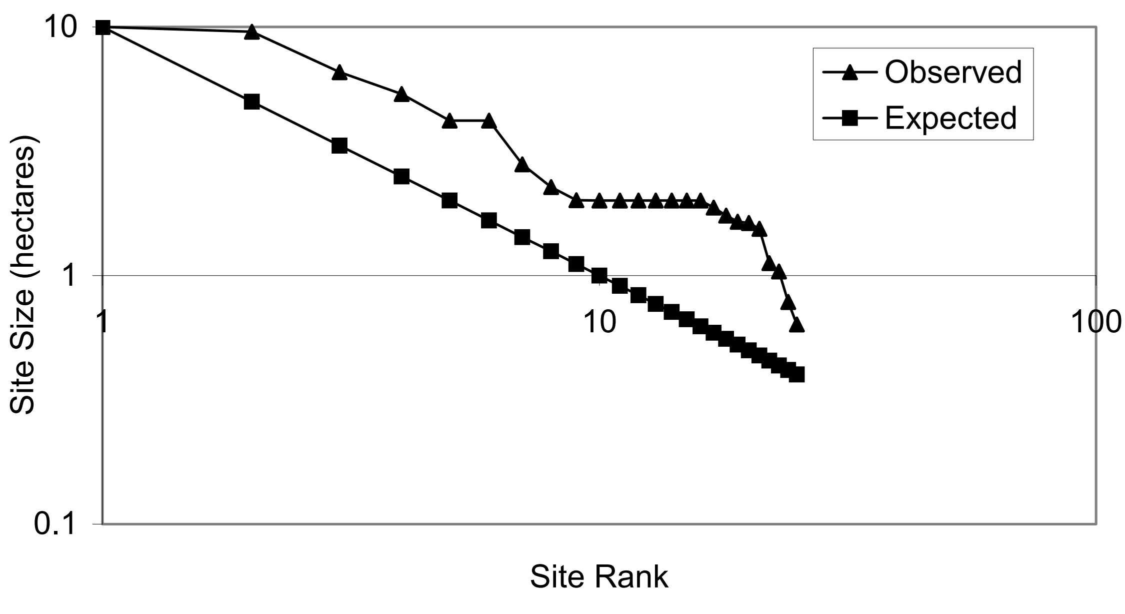


Figure 3.22: Rank size for the Late Chalcolithic to EBA transitional period.

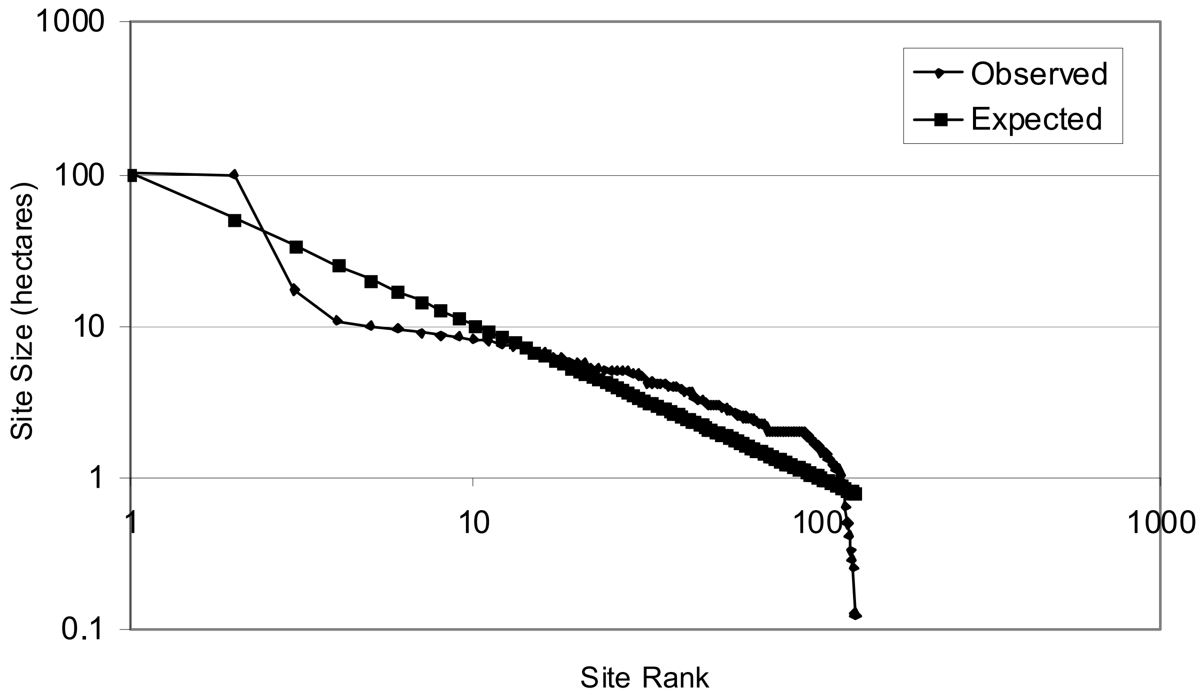


Figure 3.23: Rank size for the EBA, Harran plotted as 100 hectares.

Figure 3.24: Recent satellite photo of Sultantepe. Image courtesy of Google Earth, accessed October 2007. Image dates between 2004 - 2007.

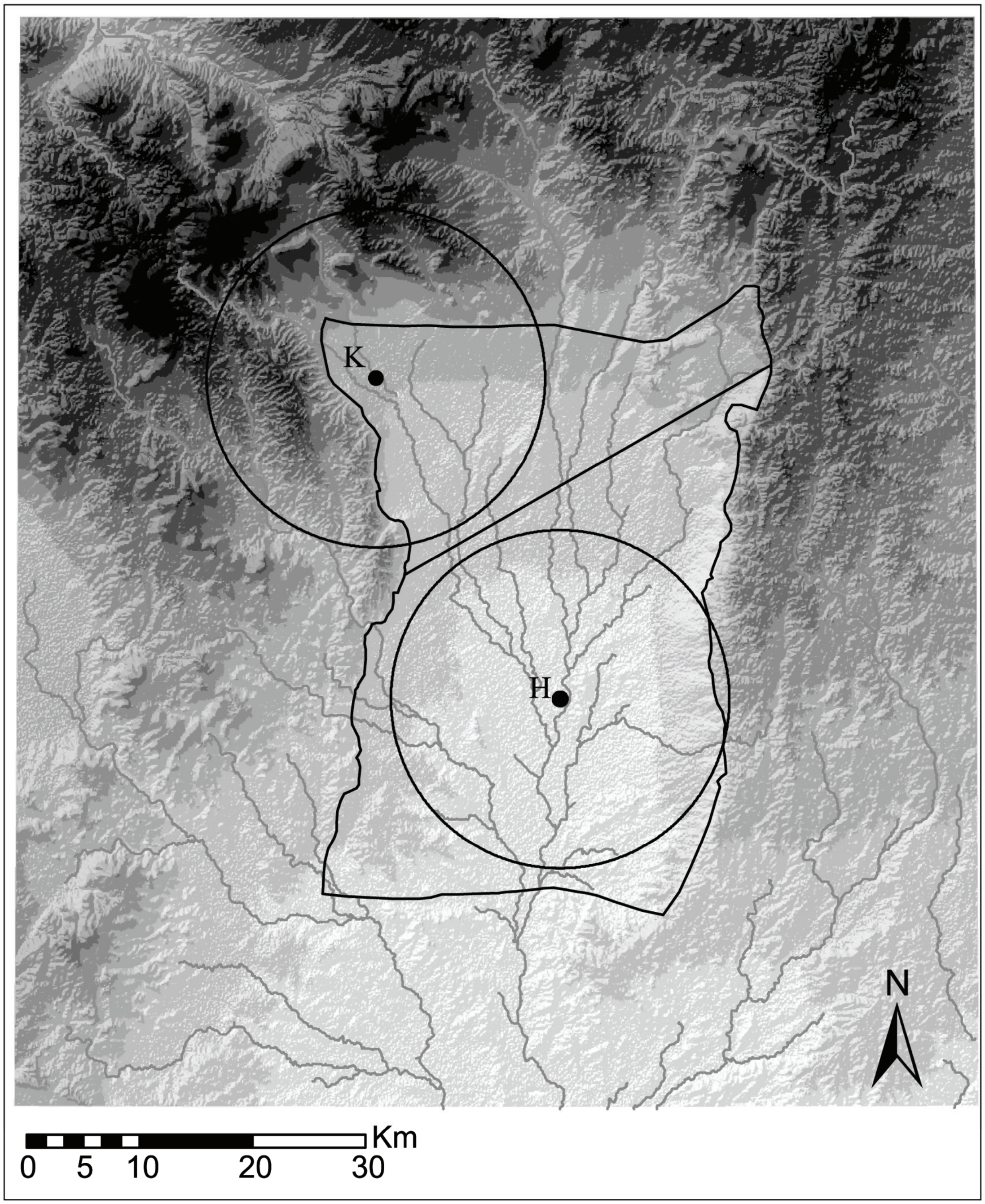


Figure 3.25: Kazane (K) and Harran (H) with Thiessen Polygons and 15km radius buffers. Yardımcı (2004) survey area outlined.

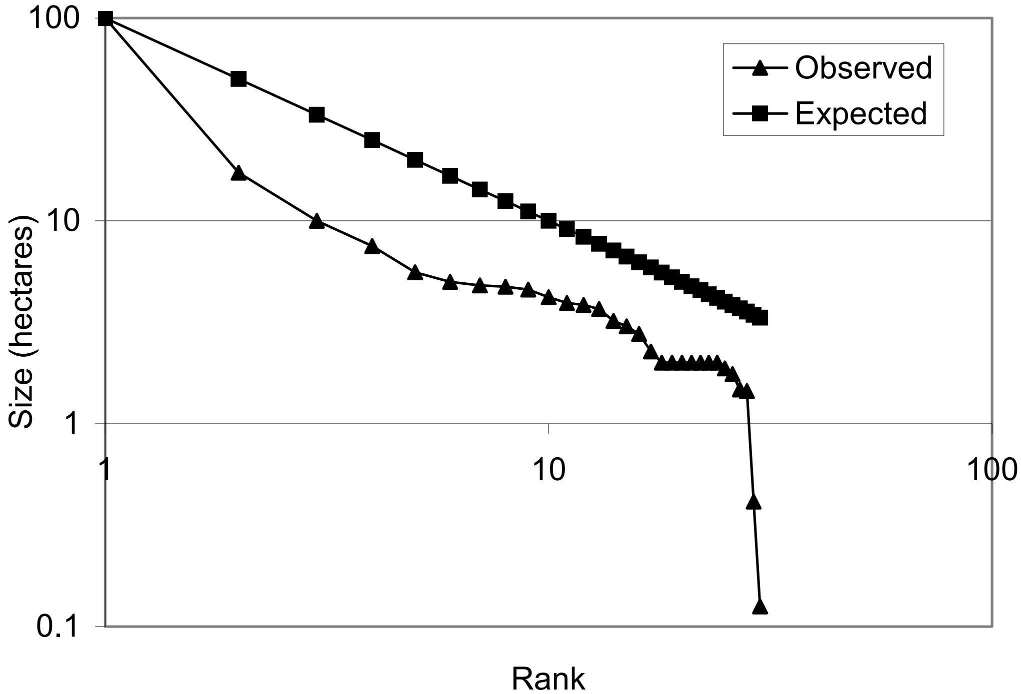


Figure 3.26: Rank size of EBA sites within Kazane's Thiessen polygon.

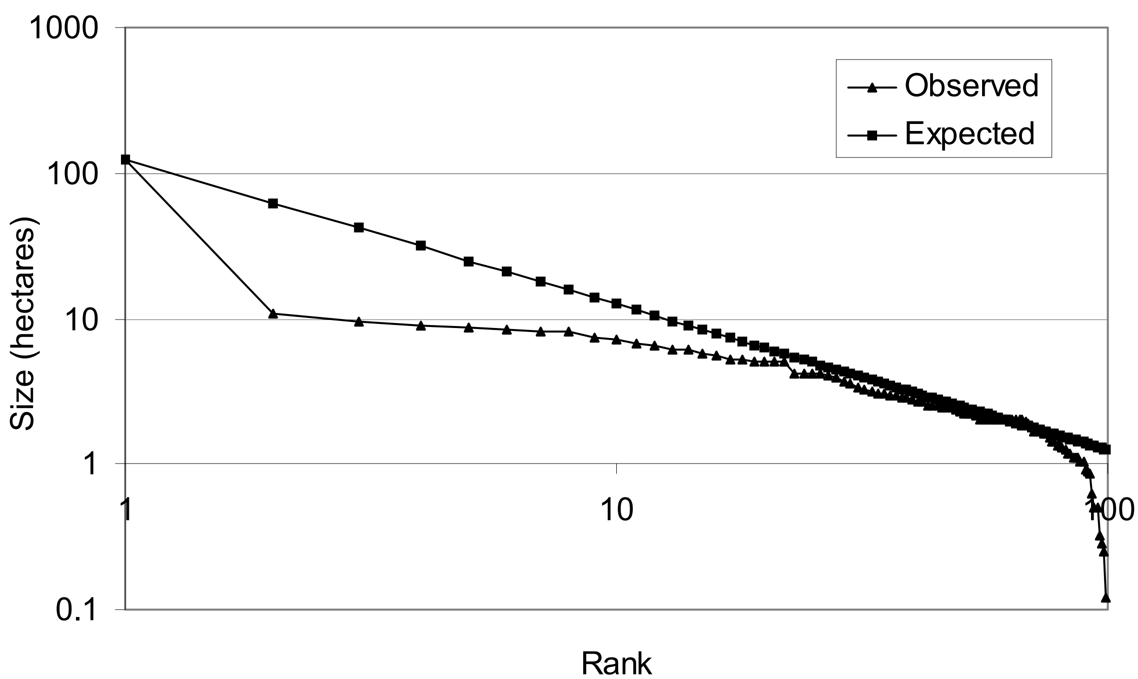


Figure 3.27: Rank size of EBA sites within Harran's Thiessen polygon.

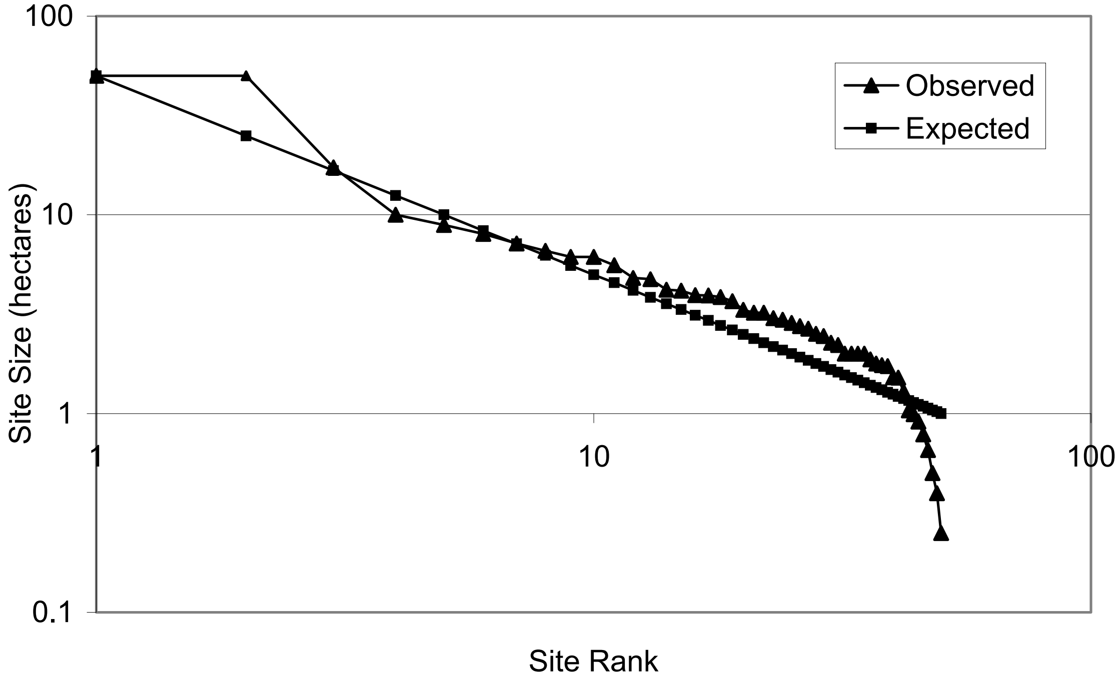


Figure 3.28: Rank size for all second millennium sites.

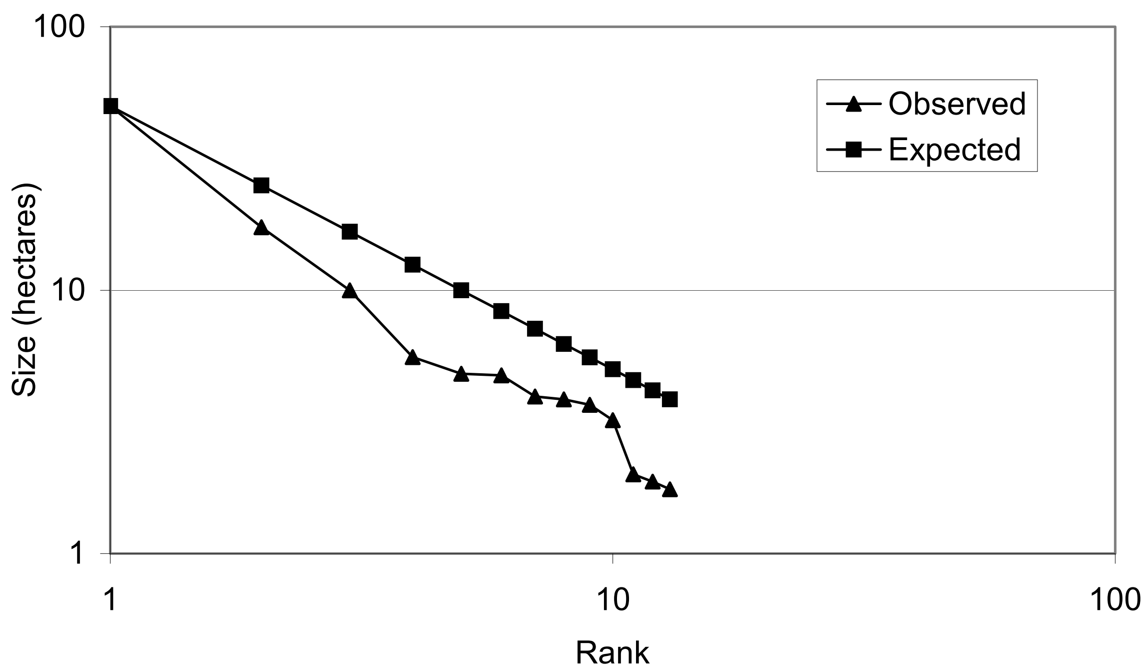


Figure 3.29: Rank size of second millennium sites within Kazane's Thiessen Polygon.

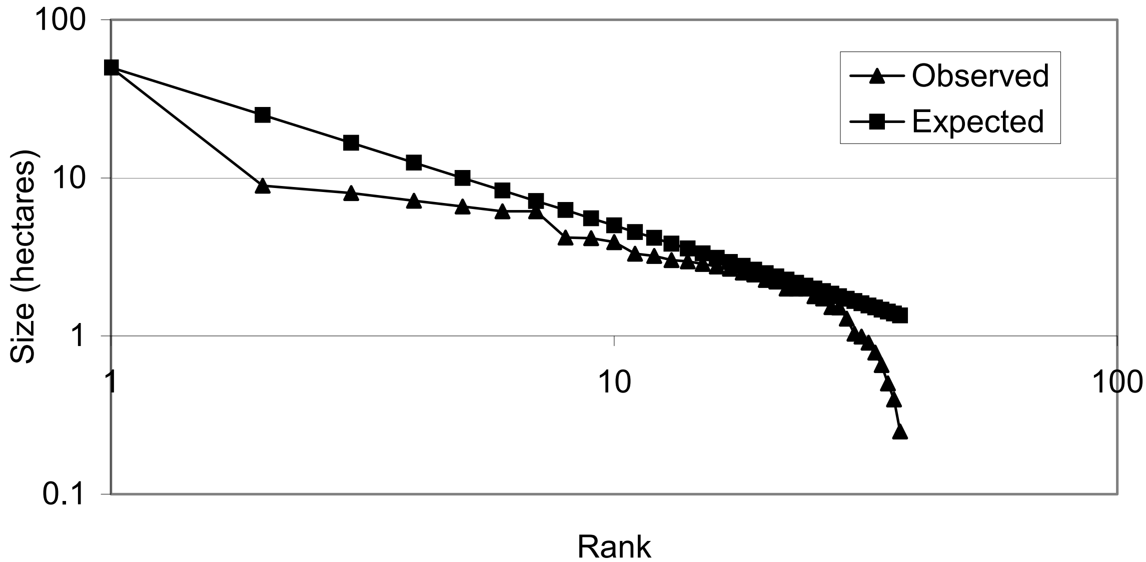


Figure 3.30: Rank size of second millennium sites within Harran’s Thiessen Polygon.

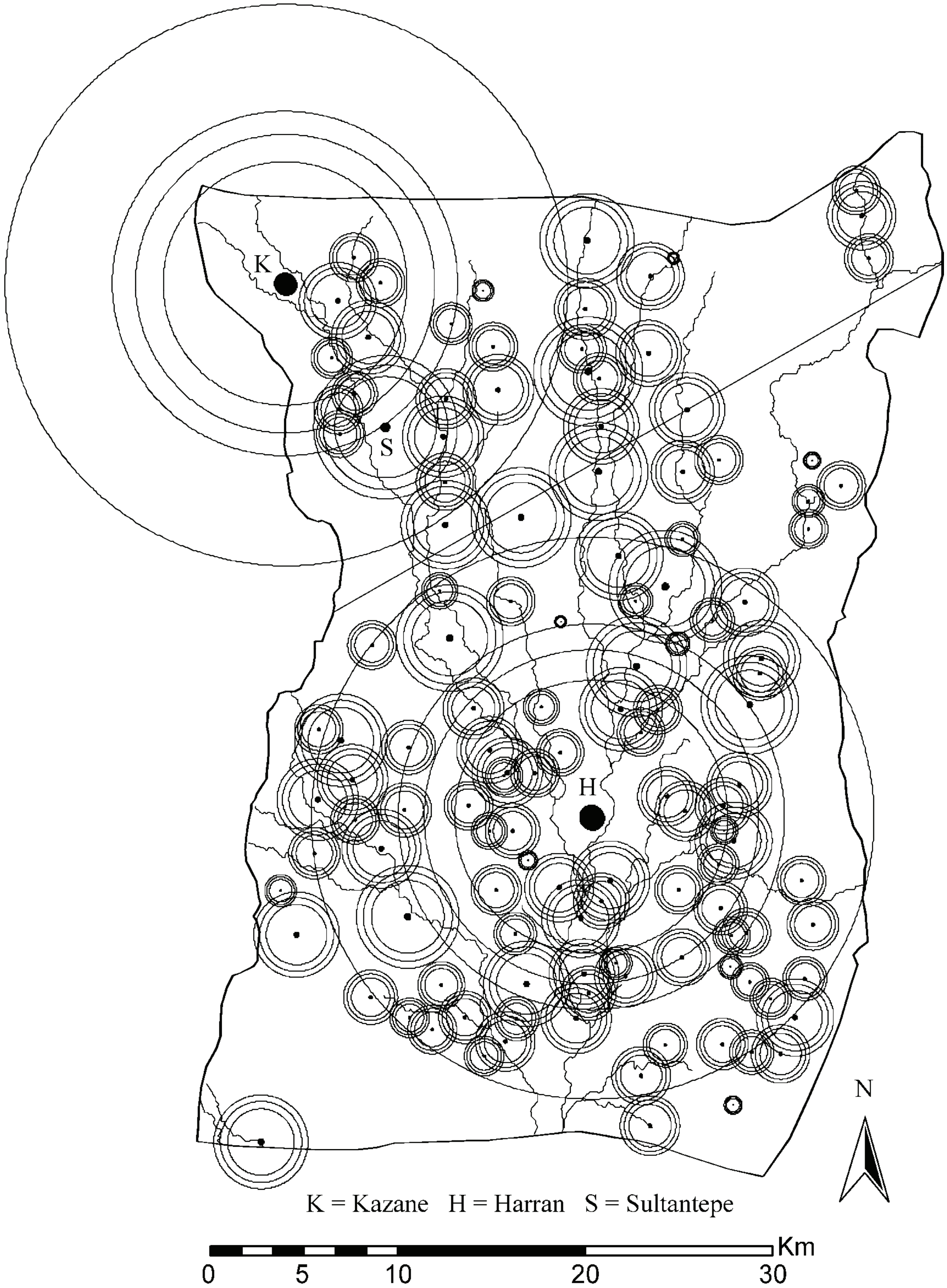


Figure 3.31: Harran Plain: EBA sites, waterways, sustaining areas 1-3, 15km radius buffer around Kazane and Harran, and Thiessen Polygons for Kazane and Harran; survey data from Yardımcı 2004.

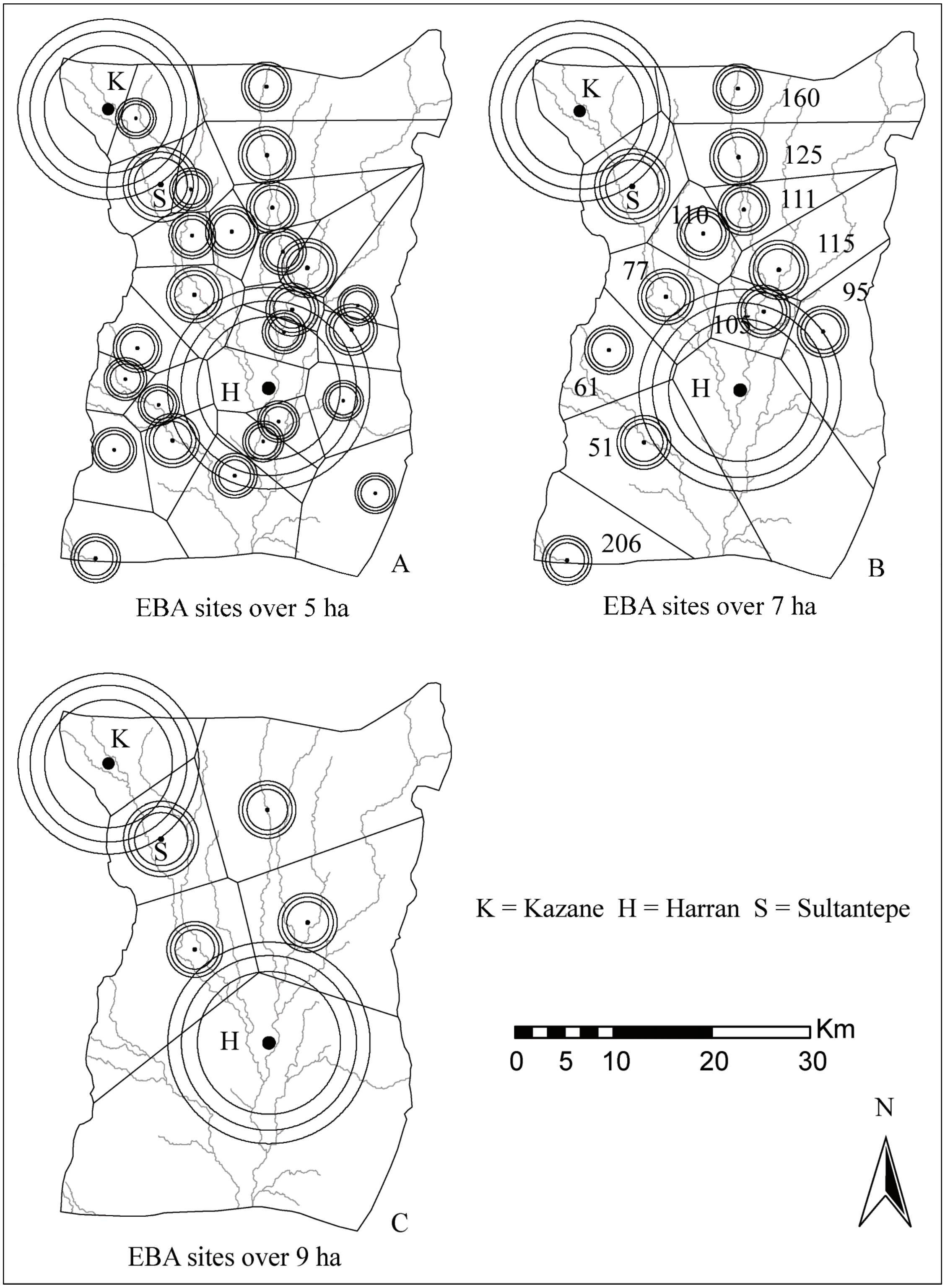


Figure 3.32: EBA sites by size category, with Thiessen Polygons and sustaining areas 1-3. Yardımcı (2004) survey site numbers are given for sites over 7 hectares.

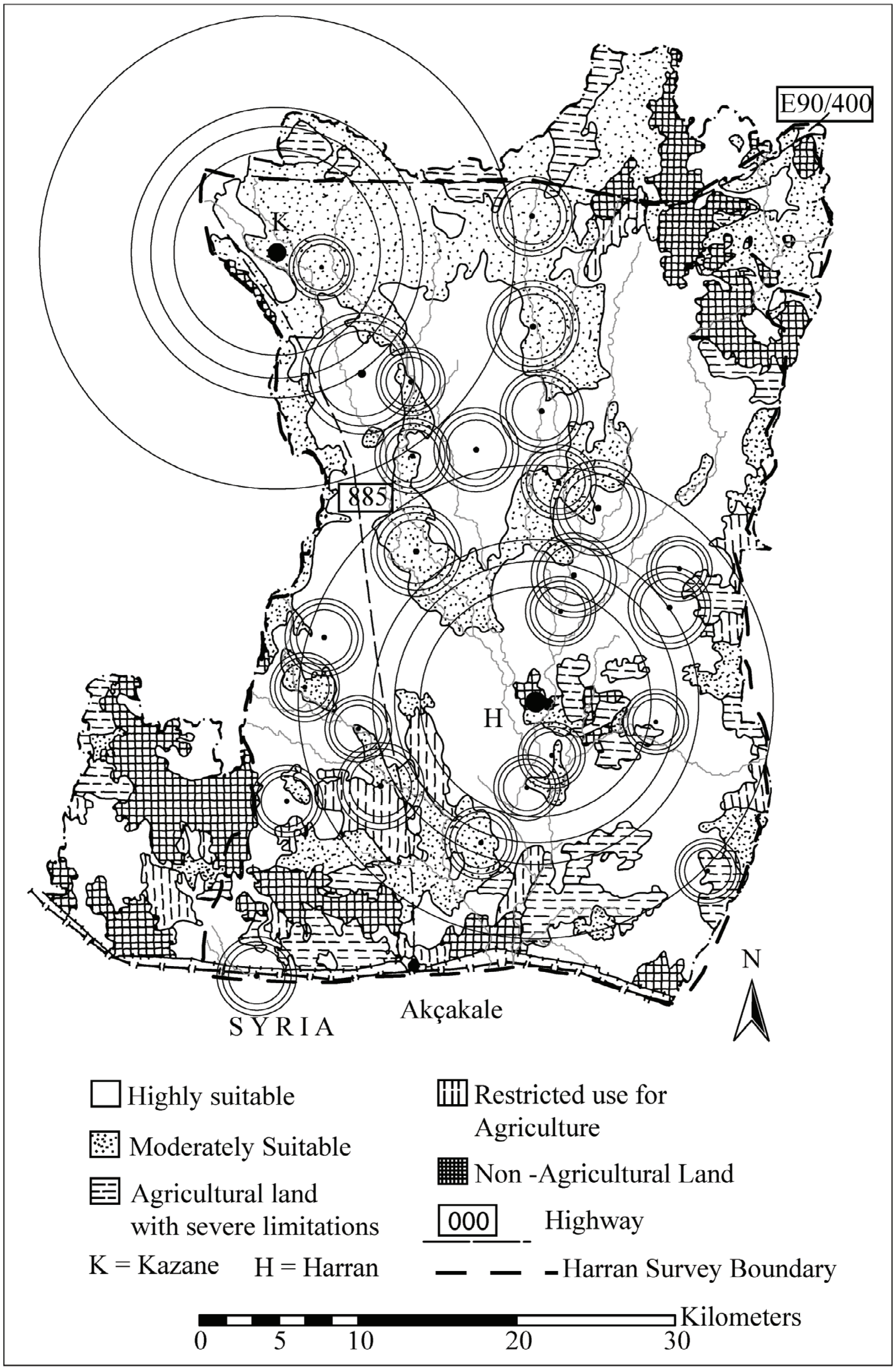


Figure 3.33: Harran Plain Soil Suitability Map (After Şenol et al. 1991: Figure 3) with sustaining areas 1-3 for EBA sites over 5 ha, and 15km radius territories around Kazane and Harran. Yardımcı (2004) survey area boundary is also marked.

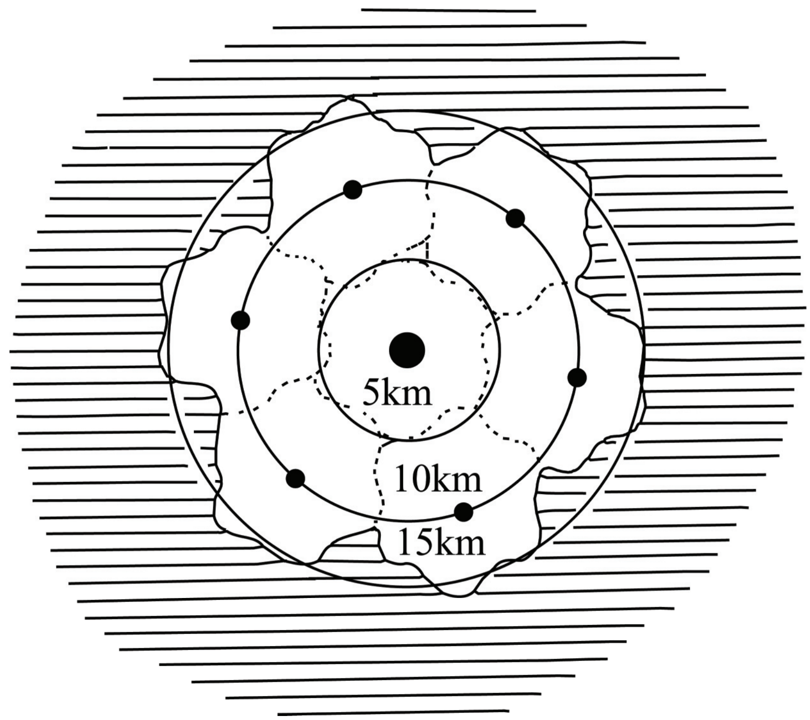


Figure 3.34: Wilkinson's compound catchment model for Upper Mesopotamian urban centers (redrawn after Wilkinson 1994:Figure 17). The circles have 5km, 10km and 15km radii.

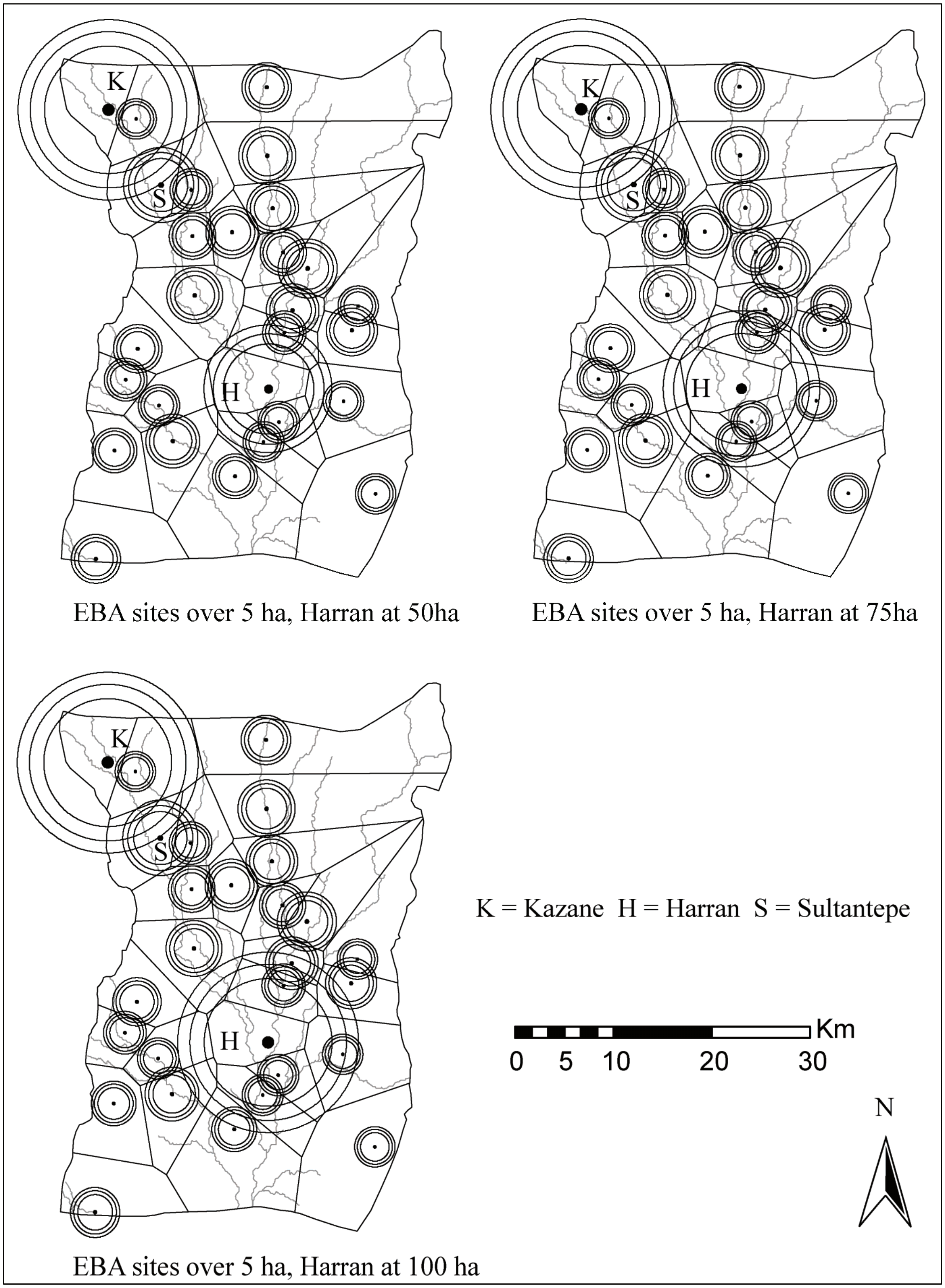


Figure 3.35: EBA sites over 5 ha, with Thiessen Polygons, sustaining areas 1-3, and hypothetical sizes for Harran.

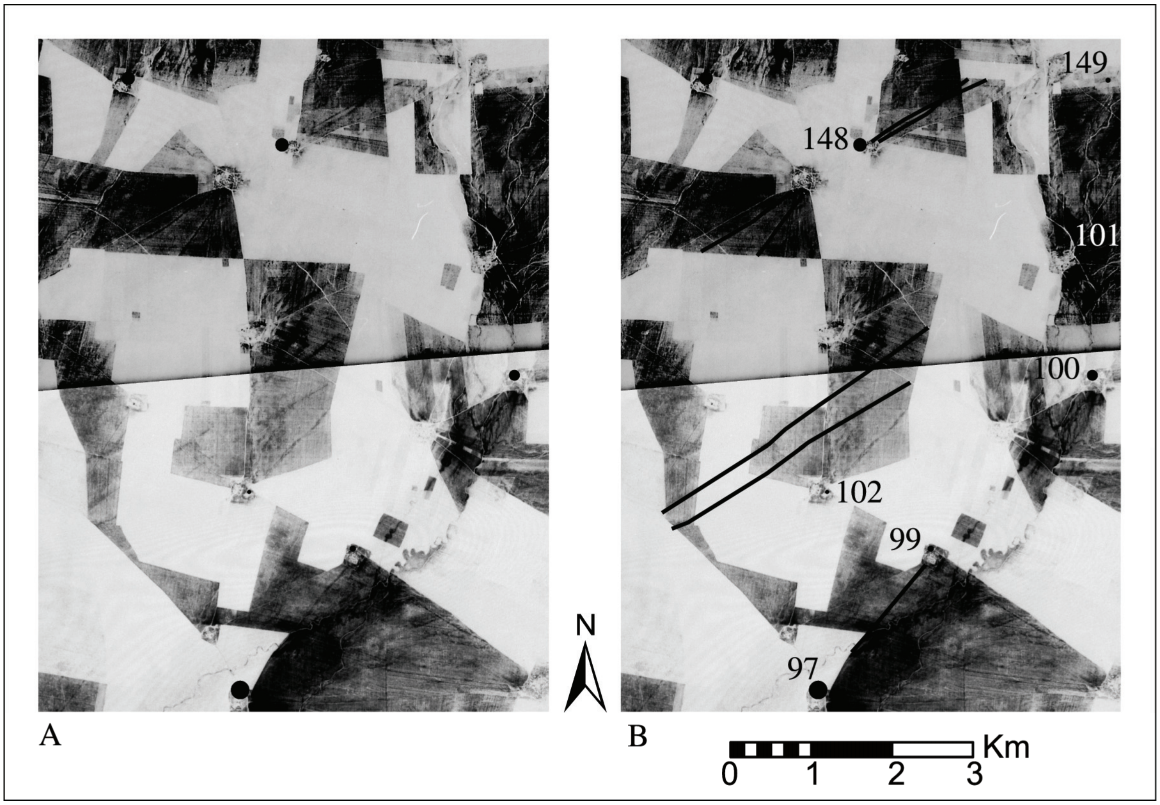


Figure 3.36: Possible hollow ways in the northeastern quadrant of the Harran Plain. A: Not traced. B: Selected examples traced, with site numbers from Yardımcı (2004) survey. Corona images courtesy of U.S. Geological Survey, EROS Data Center, Sioux Falls, SD, and The Center for Middle Eastern Landscapes, Oriental Institute, University of Chicago. Images are: D11031009DA010 (upper) and D11031009DA011 (lower), both from May 1968. Images were enhanced and rectified in Adobe Photoshop and ARCGIS 9.

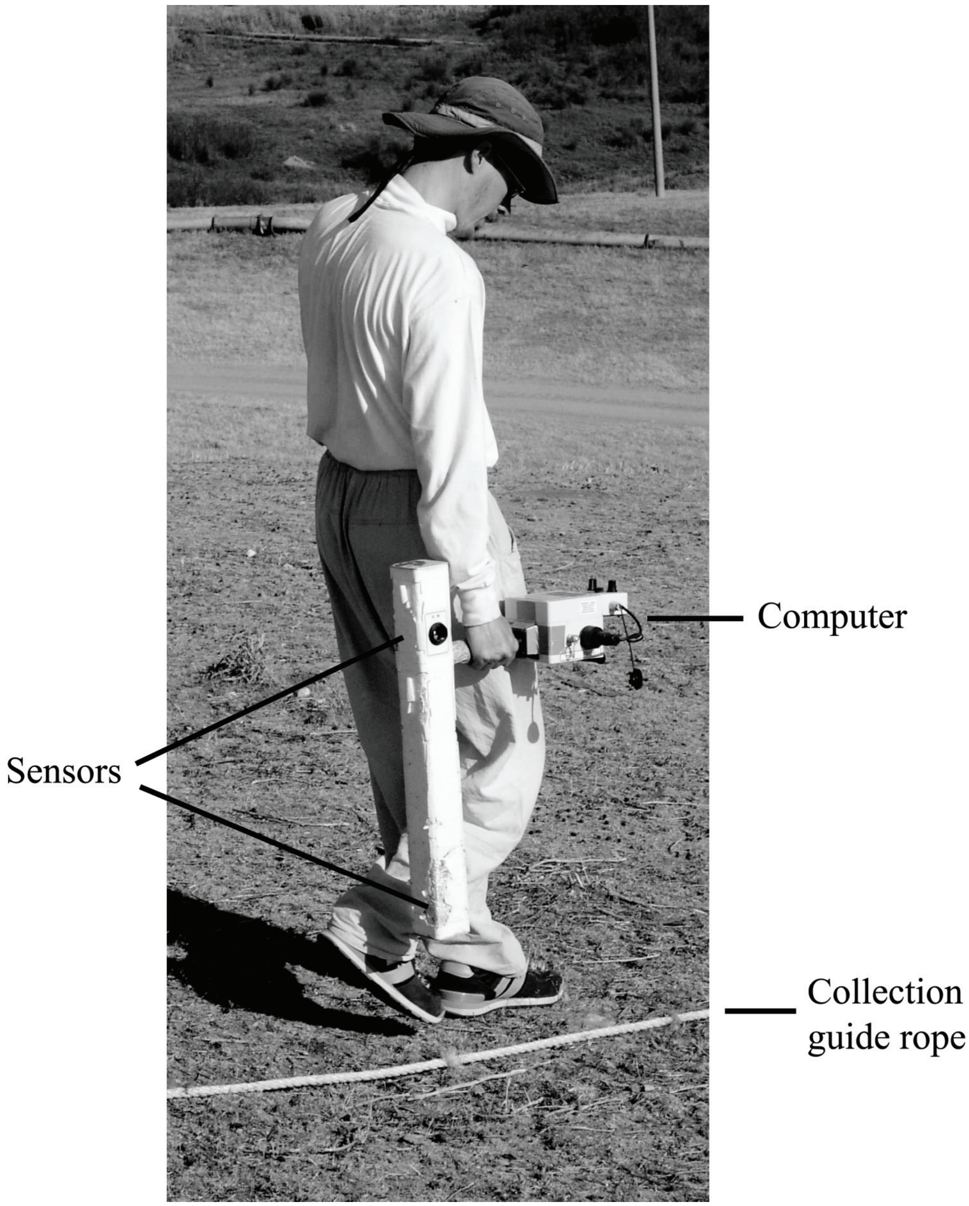


Figure 4.1: The FM 36 Gradiometer in use.

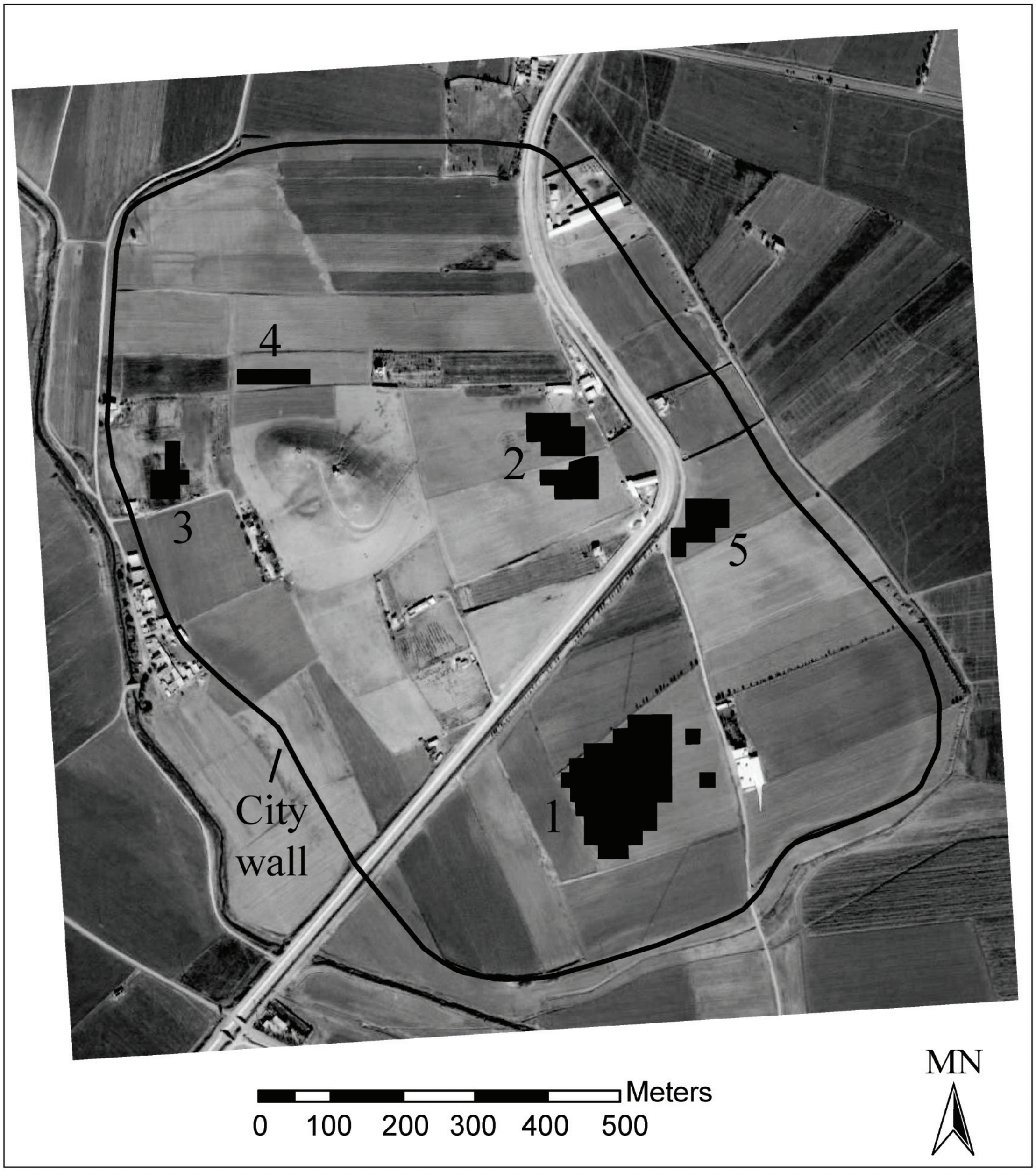


Figure 4.2: Remote sensing areas superimposed upon a satellite image of Kazane. Ground conditions of the collection areas in the photo are similar to conditions when the data was collected, but much of the rest of the site was covered in cotton at the time. Satellite image courtesy of Google Earth, accessed October 2007 (image dates to late fall or winter 2004 - 2007).

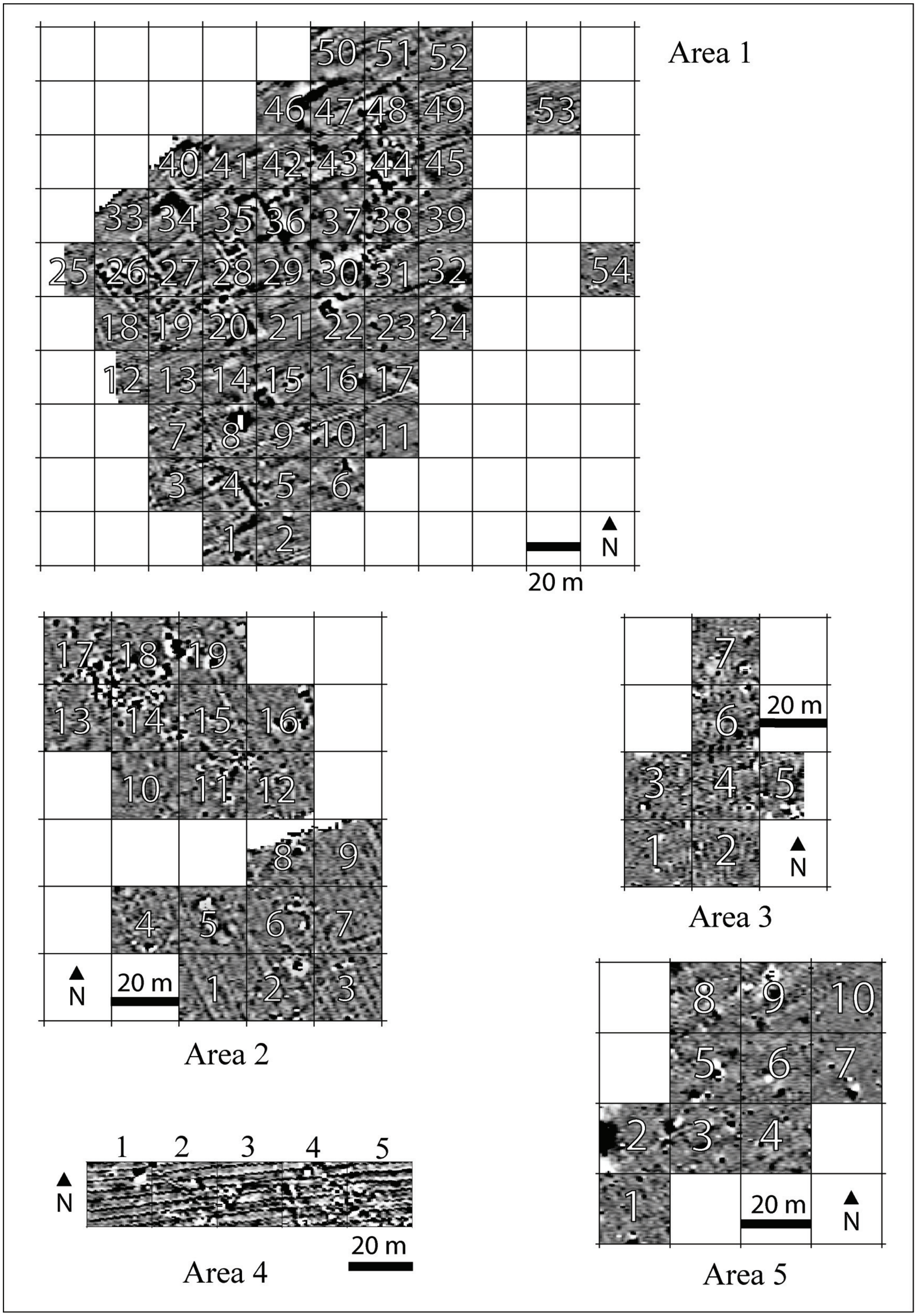


Figure 4.3: Grid numbering schemes for each gradiometry area.

Figure 4.4: Gradiometry image for Area 1.

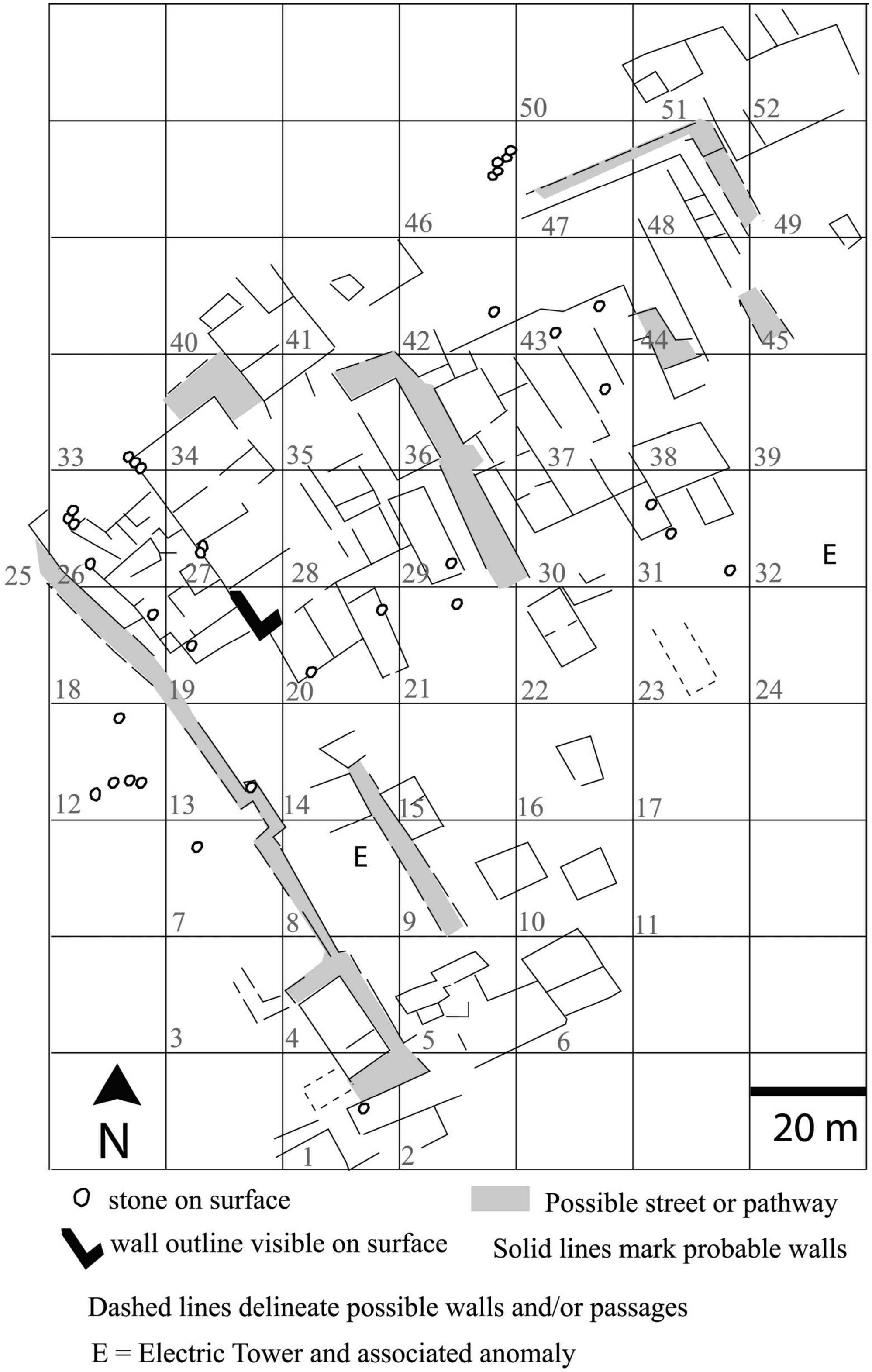


Figure 4.5: Gradiometry interpretation for Area 1.

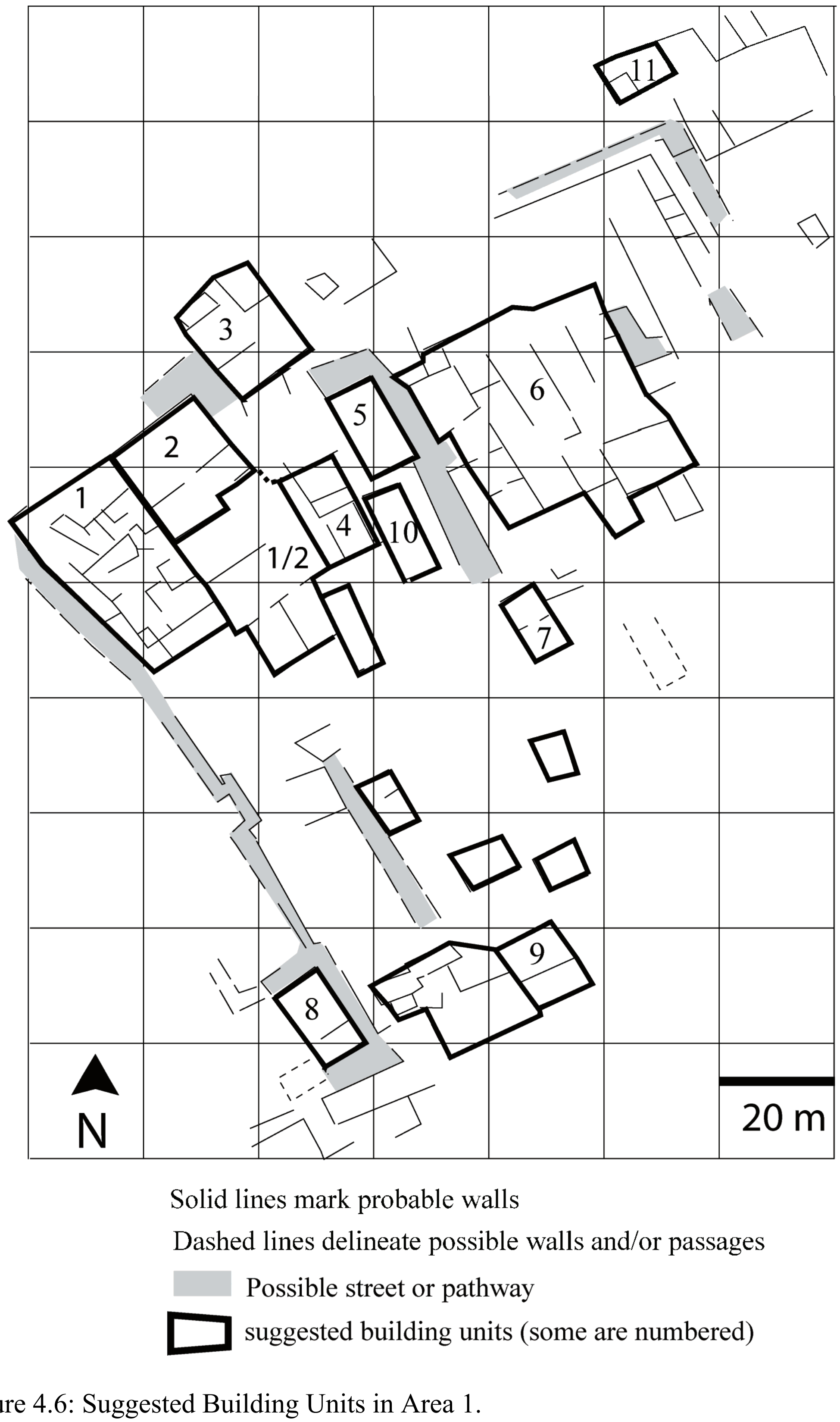


Figure 4.6: Suggested Building Units in Area 1.

Figure 4.7: Area 1 gradiometry interpretation and building unit numbers with areas of high magnetism marked in dark gray. These areas correspond to intensive heating or burning, or possibly to high concentrations of ceramics or refuse.

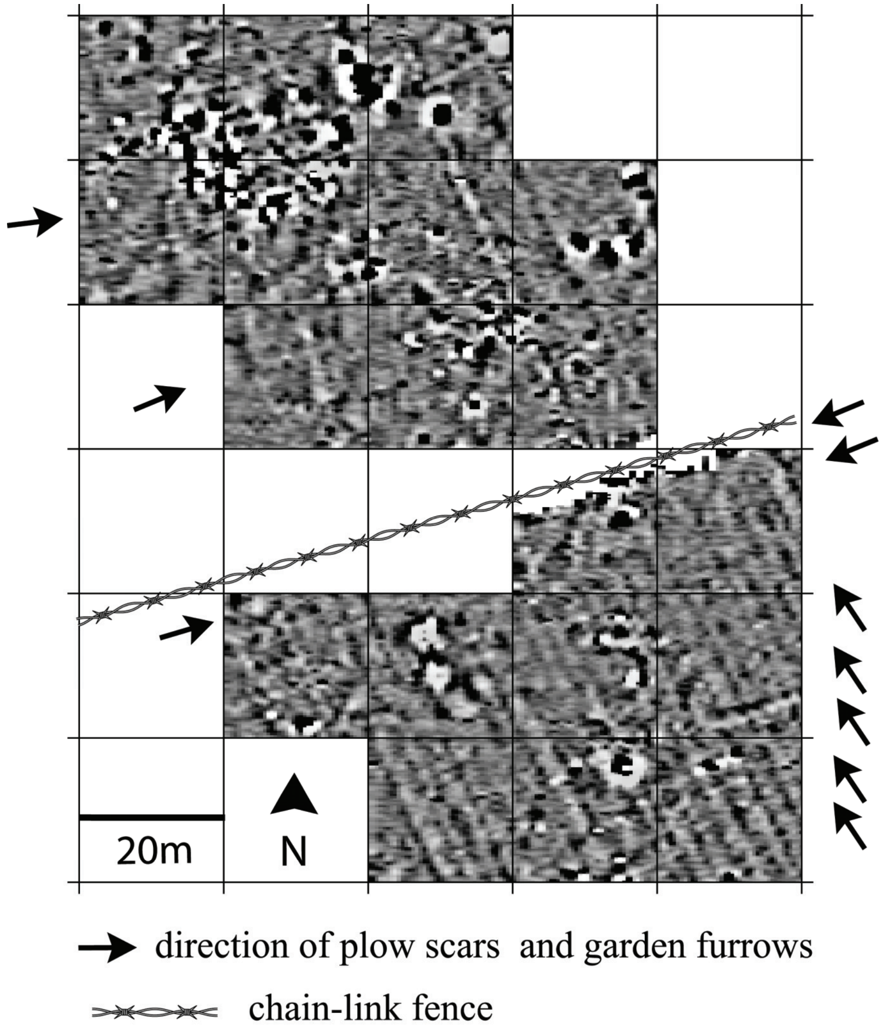


Figure 4.8: Gradiometry image for Area 2.

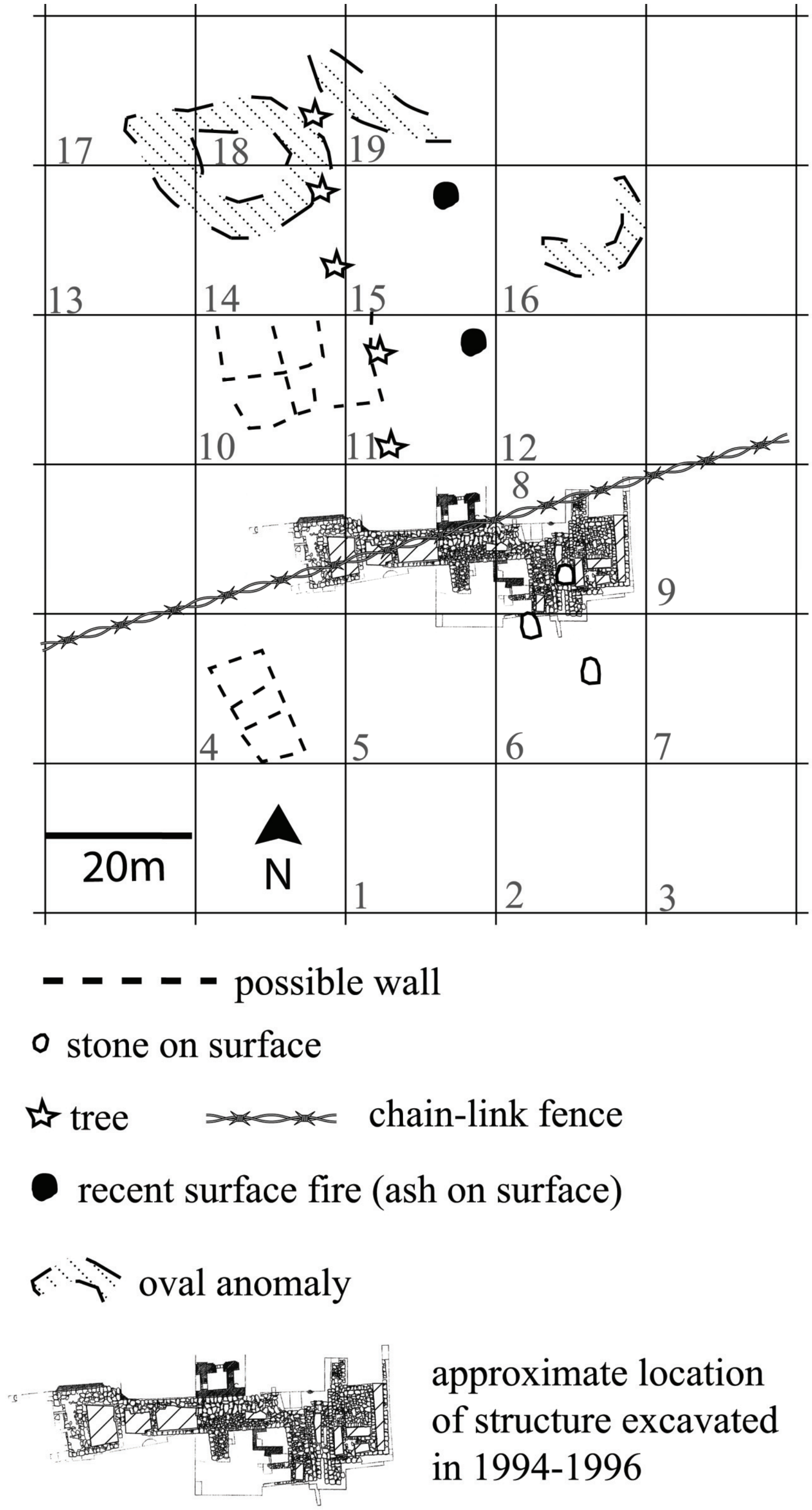


Figure 4.9: Gradiometry interpretation for Area 2 (excavation Area C).

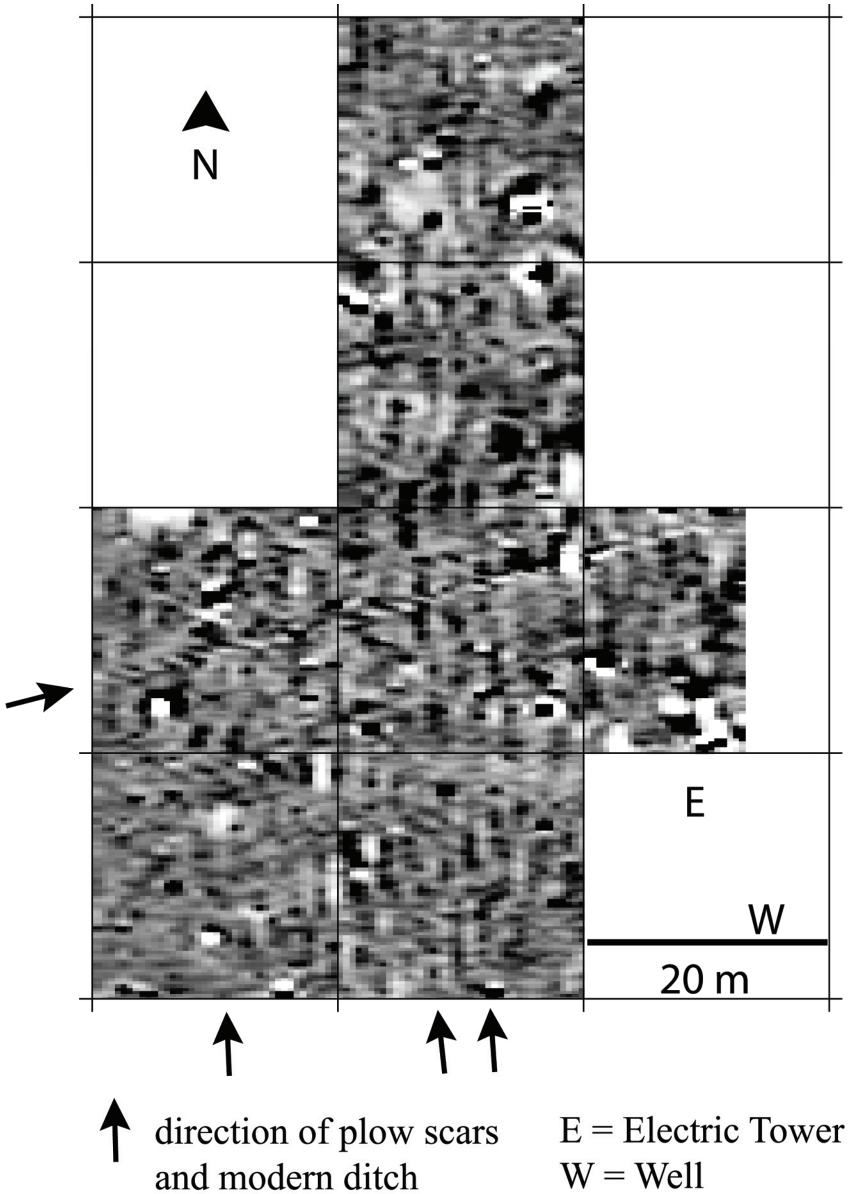


Figure 4.10: Gradiometry image for Area 3.

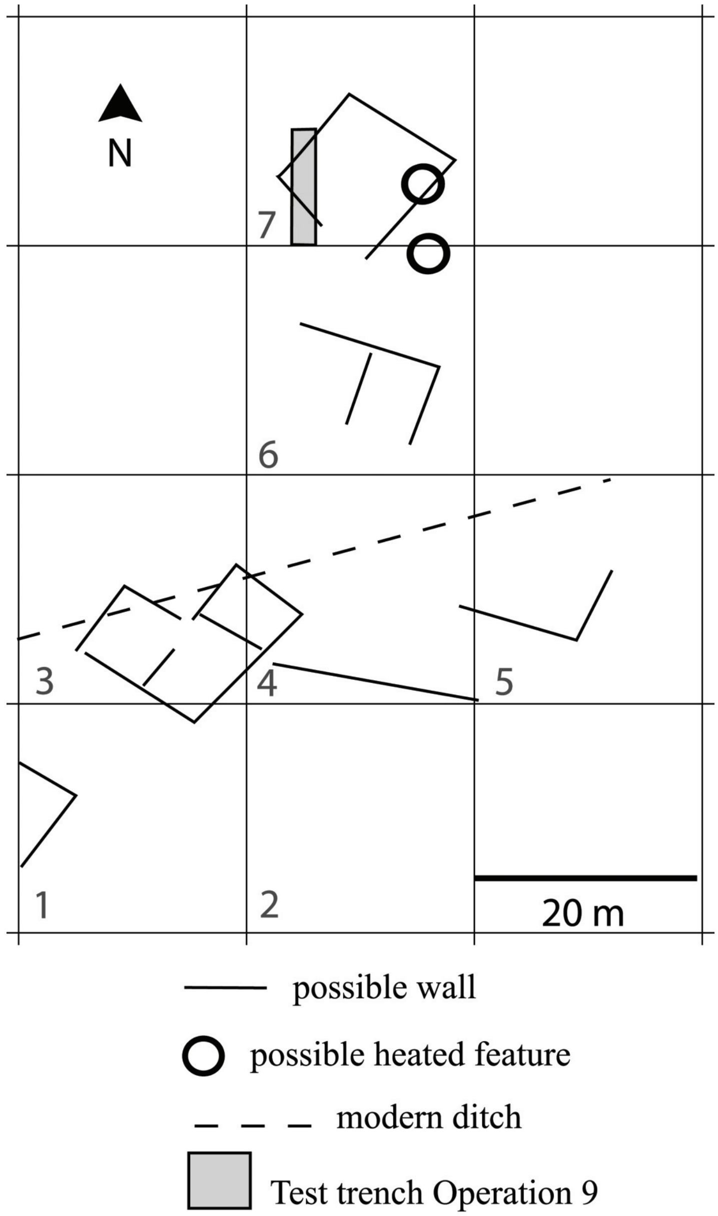


Figure 4.11: Gradiometry interpretation for Area 3.

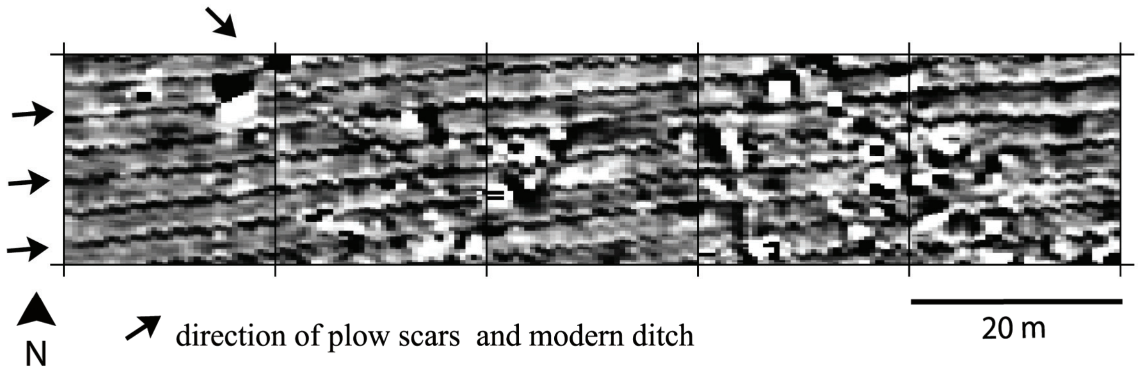


Figure 4.12: Gradiometry image for Area 4.

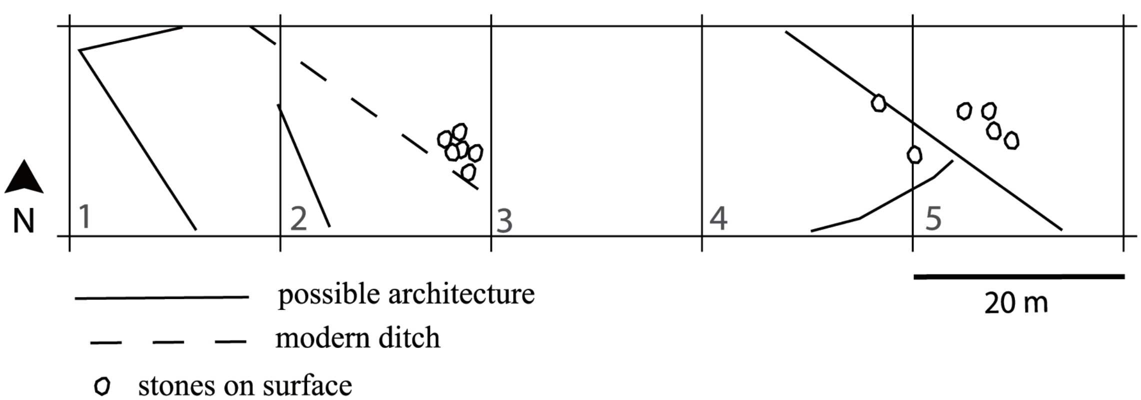


Figure 4.13: Gradiometry interpretation for Area 4.

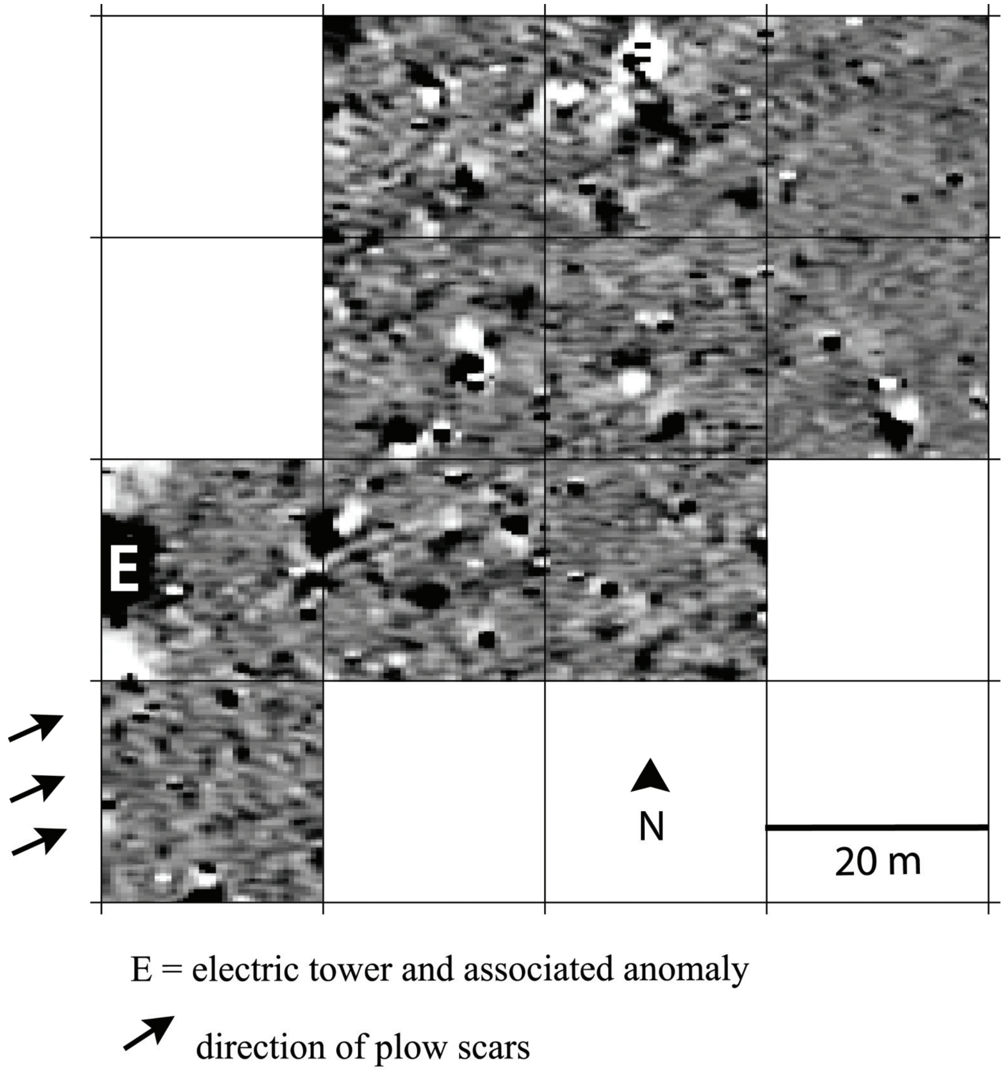


Figure 4.14: Gradiometry image for Area 5.

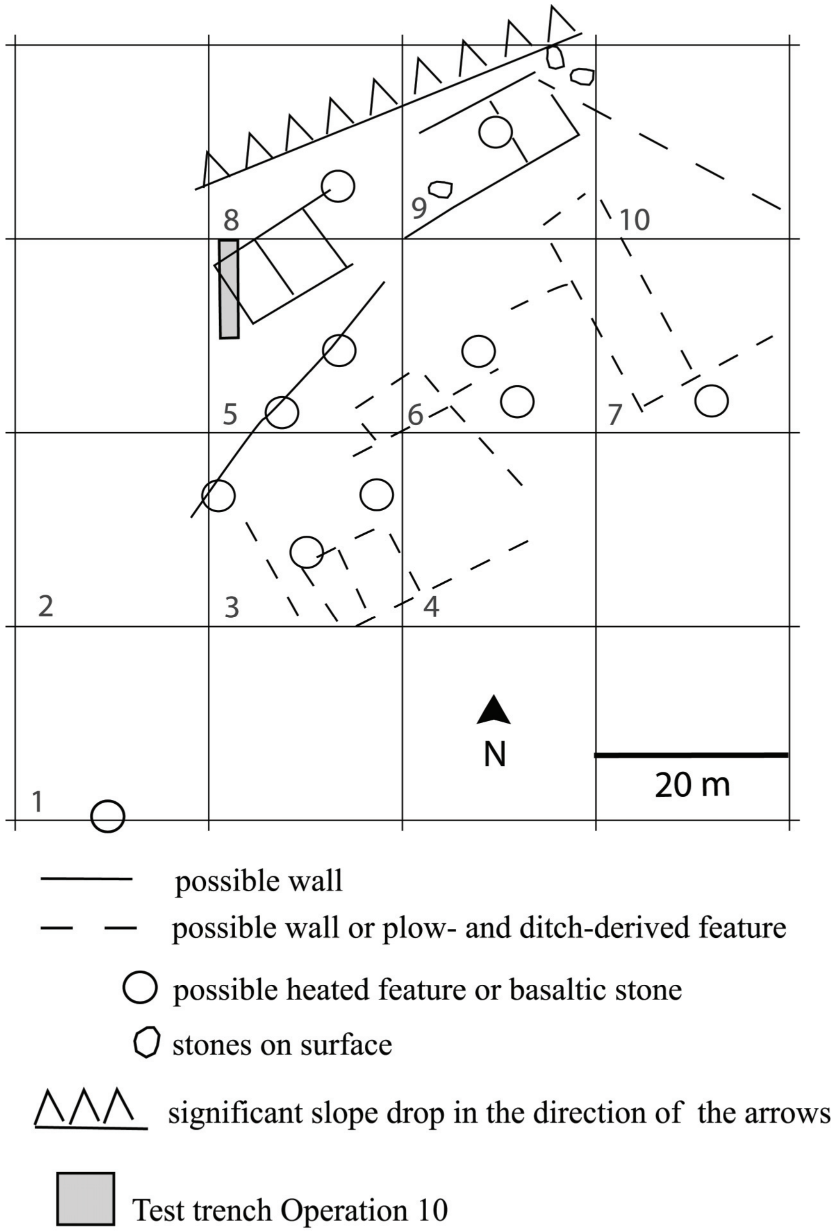


Figure 4.15: Gradiometry interpretation for Area 5.

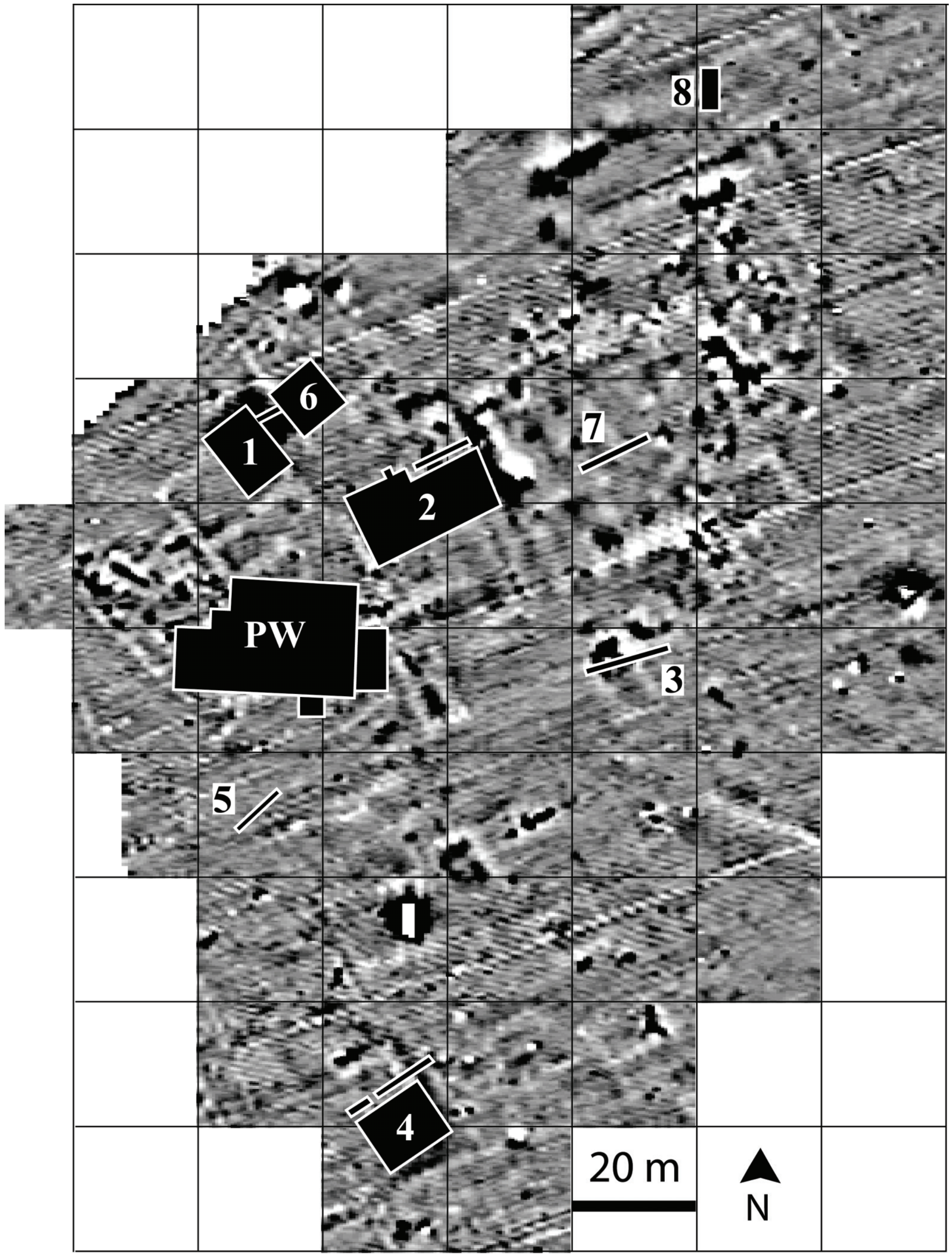


Figure 5.1: Trenches superimposed on magnetometry in Area 1: 1-8 = Operations 1-8, excavated by the author in 2004; PW = trenches excavated by Dr. Patricia Wattenmaker in 2002 (F37 - 42) and 2004 (E700 N550; E690 N540).

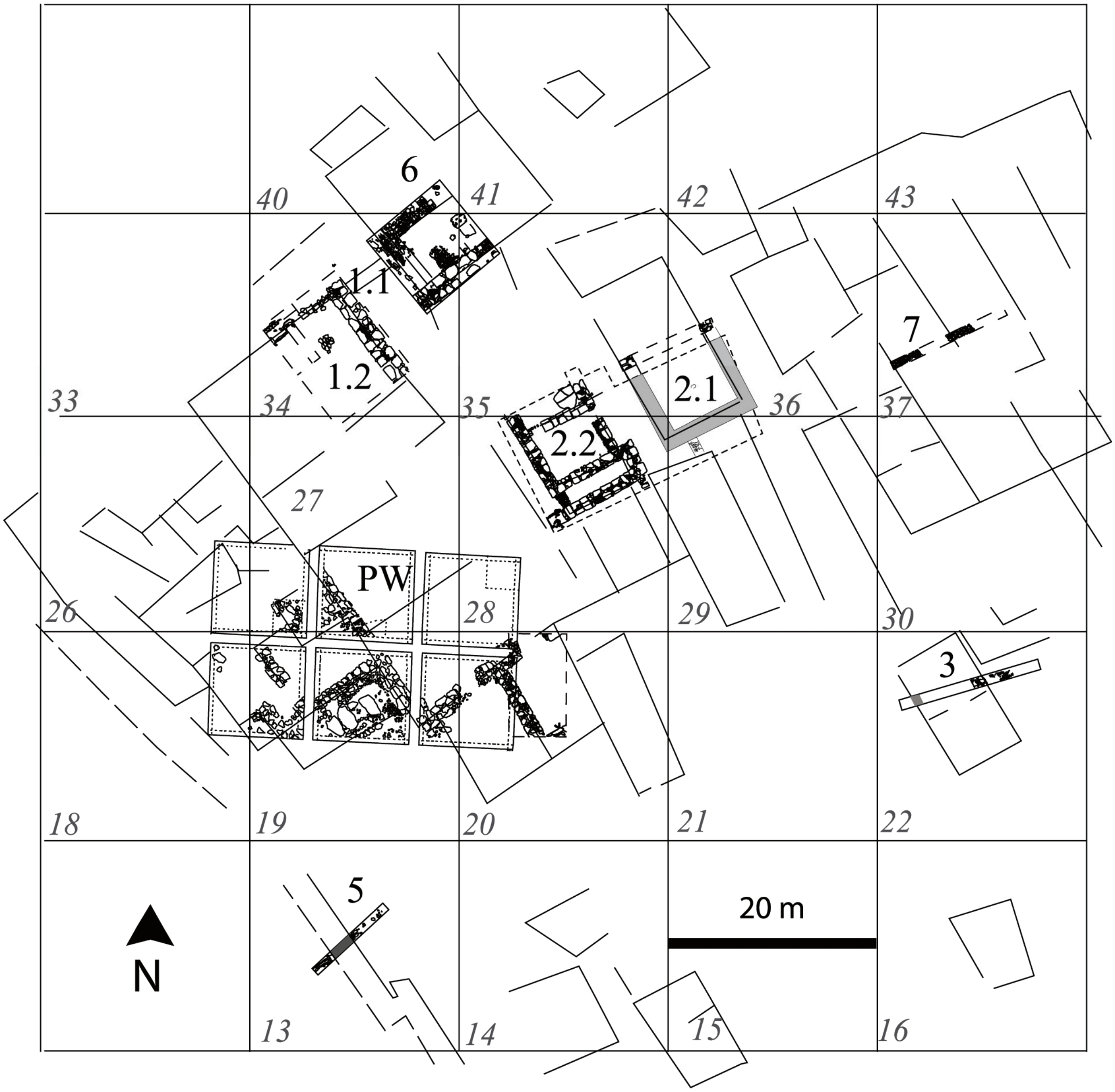


Figure 5.2: Area 1 excavated architecture superimposed over magnetometry interpretation: 1-3, 5-7 = Operations 1-7; PW = trenches excavated by Dr. Patricia Wattenmaker in 2002 and 2004. Gradiometry collection grid blocks range from 13 - 43.

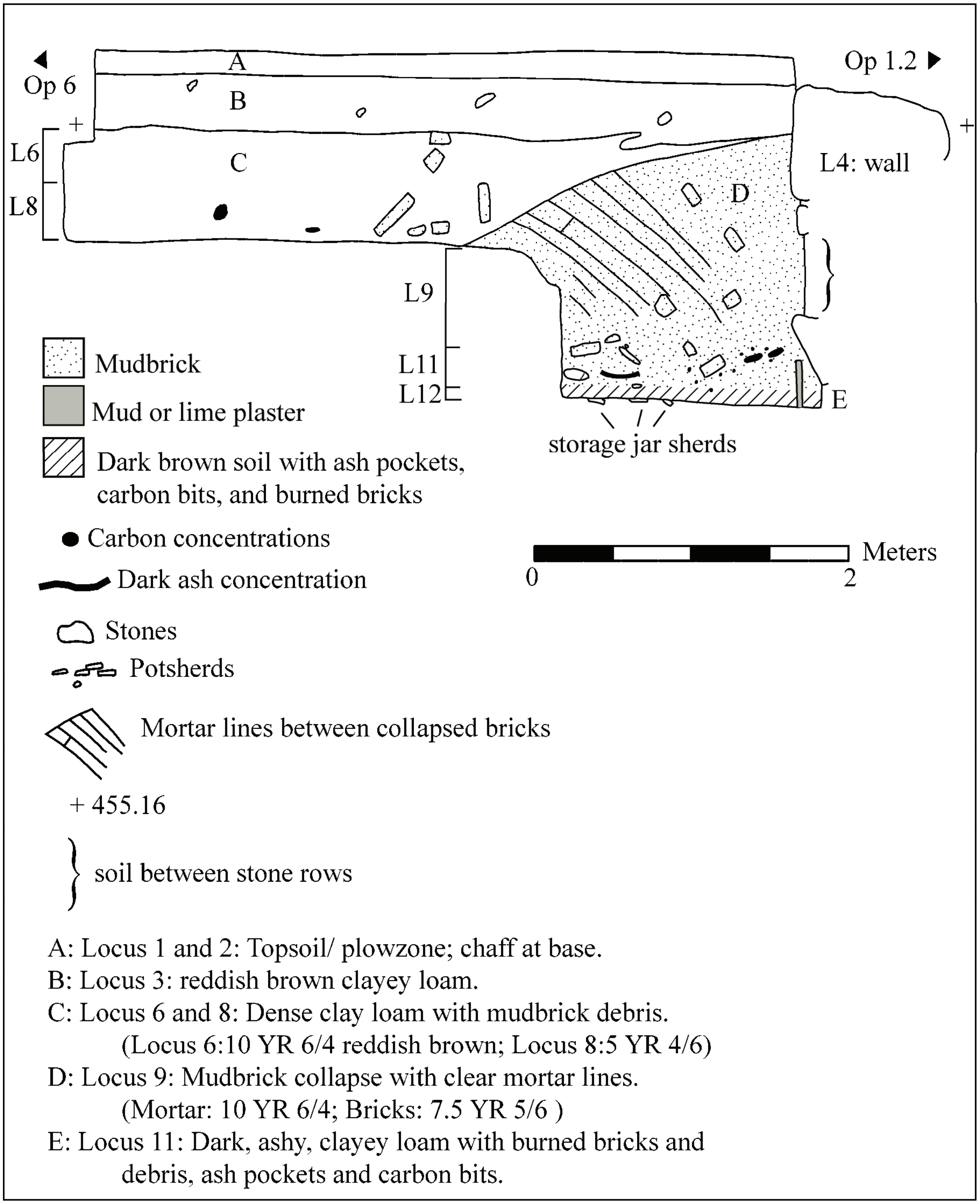
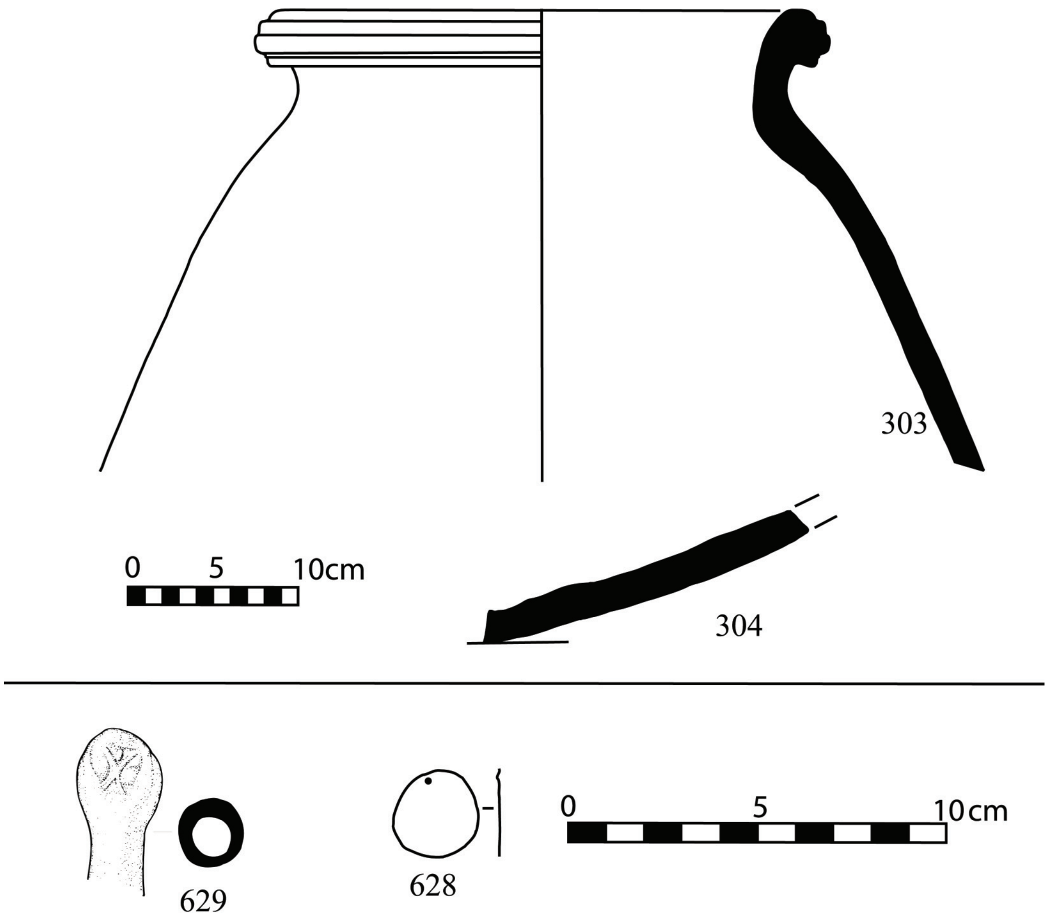


Figure 5.3: Operation 1.1: South section.



303: RN 11846, Op 1.1, L12. Plain Simple Ware grooved rim storage jar. 30 cmd. Int., ext., fabric: 2.5Y 7/2 light gray.

304: RN 11846, Op 1.1, L12. Plain Simple Ware base for storage jar (probably mends with 303). Int., ext., fabric: 2.5Y 7/2 light gray

628: RN 10102, Op1.2, L 1+2+3 (baulk removal). Coin. 2.16 – 2.32 cmd, 0.12cm thick (includes corrosion). Possibly pierced at one end.

629: RN 10906, Op 6.1, L1+2 (baulk removal). Pipe bowl. 14g, 4.65cm long, 1.75 cmd (stem), 0.96cm (hole in stem). Stamped or molded design on base of bowl. 5YR 5/6 yellowish-red. Burnished.

Figure 5.4: Storage jar and base from Operation 1.2, pipe bowl from Operation 6, and coin from Operation 1.2.

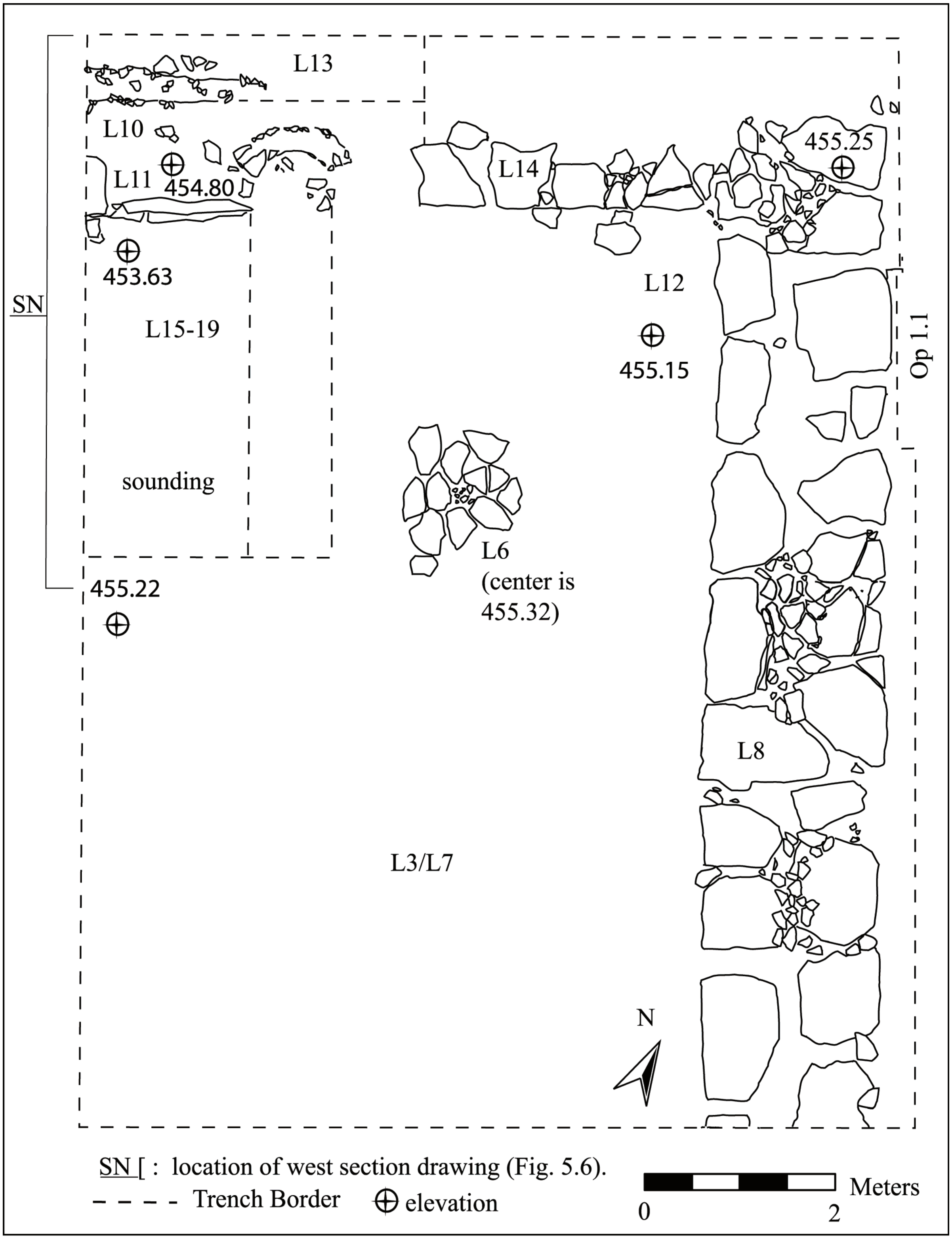
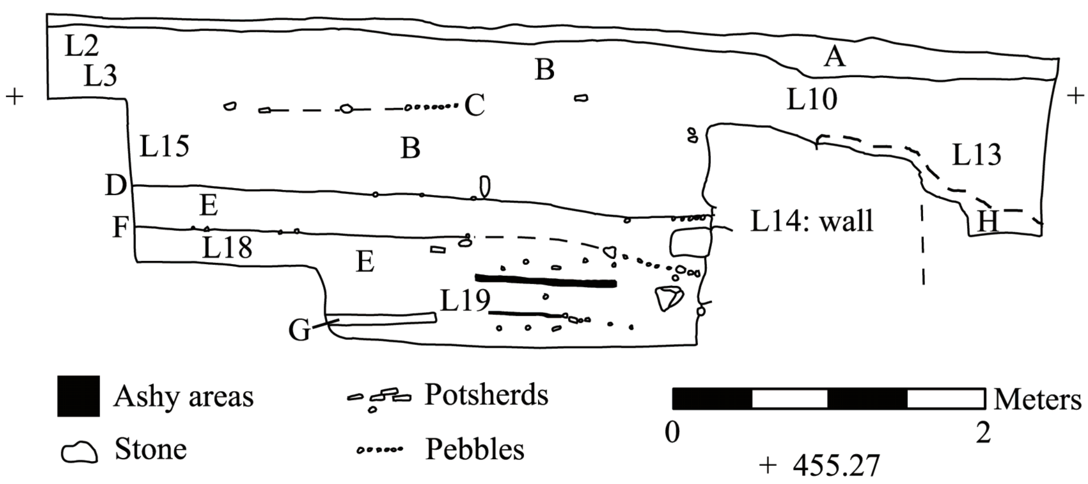


Figure 5.5: Operation 1.2 plan. Note: L8 = Op 1.1 L4. (after original drawing by Işıl Oren).



A: Locus 1: Topsoil/plowzone: chaff at base.
B: Clay loam with white lime flecks, some stones, crumbly when dry; 7.5 YR 4/4 brown silty loam.
C: Discontinuous line of pebbles, sherds; possible surface.
D: Locus 17: Good, clear surface, abuts wall L14 (goes in between 1st and 2nd surviving courses); approx. 1-2cm thick, contains some stones, some plaster.
E: Locus 16: Mixed debris, C-14 bits, stone, bone, lithics, pottery chips. 10 YR 4/4 dark yellow brown clay loam; compact.
F: Probable surface: line of artifacts, pebbles.
G: 10 YR 5/4 yellowish brown clay (brick? pise?).
H: 7/5 YR 4/6 strong brown silt loam; some pottery, some C-14 bits; traces of plaster and some stones.

Figure 5.6: Operation 1.2, West sounding section (for section location, see Figure 5.5).

Structure	Dimensions (m^2)	Source
Kazane Building Unit 1	836	This dissertation
Kazane Building Unit 2	800	This dissertation
Kazane Area C building*	650-2550	Wattenmaker 1997
Chuera Palace F	1125 - 3000	Pruss 2000b; Pruss n.d.-a:4
Mozan Palace AK**	714 - 2800	Buccellati and Buccellati 2001
Beydar Palace***	888	Bretschneider 2003
Banat Building 7****	2544	Porter 2002b:157
Chuera *Steinbau V*	671	Moortgat and Moortgat-Correns 1975: Plan V

*Excavated: 650; my estimate: 2550
**Excavated: 714; Project estimates: 2800
***Not including adjacent temples and streetside storage
****Estimated from incomplete exposures

Figure 5.7: External dimensions of large structures at sites in Upper Mesopotamia.

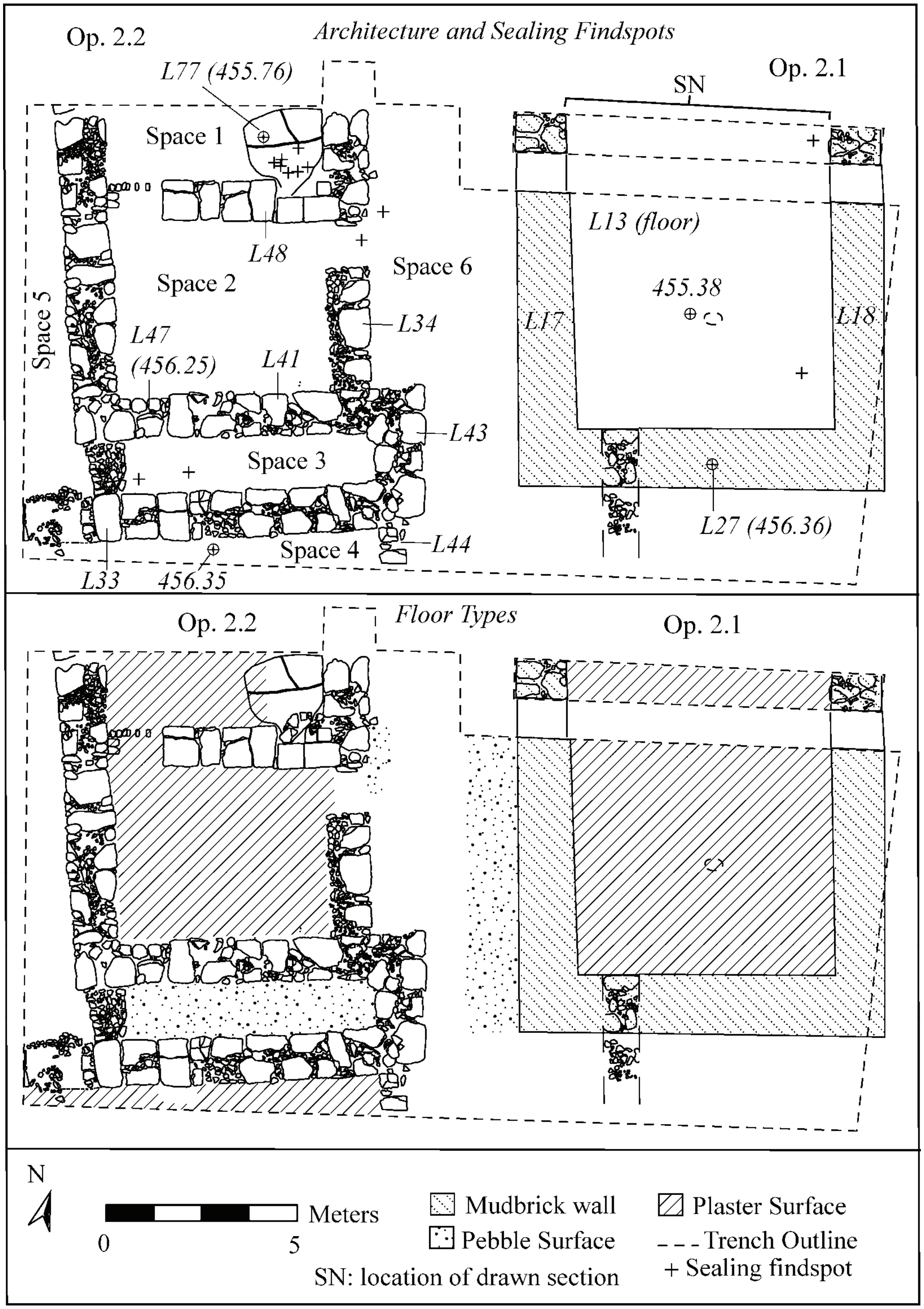
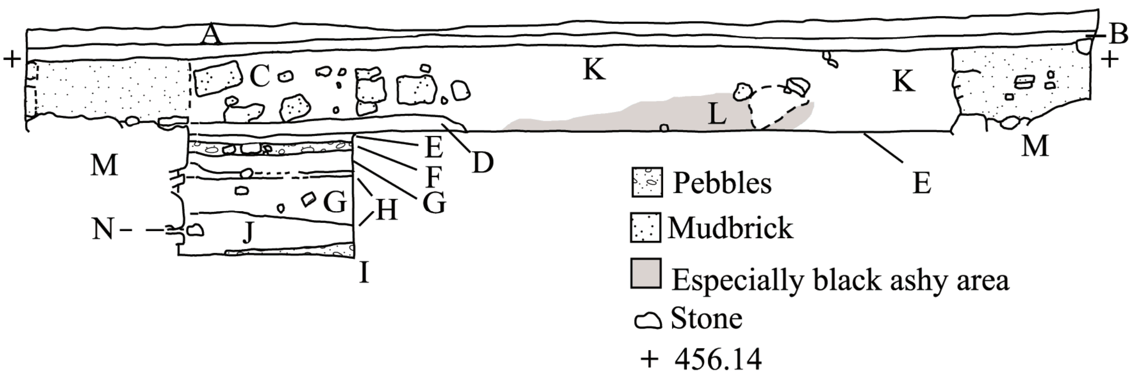


Figure 5.8: Operation 2: architecture, sealing findspots, and floor types; Building Unit 4 (left) and Building Unit 5 (right); (Op. 2.2 architecture after original drawing by Burcu Aydemir and Demet Yıldırım).



A: Topsoil 7.5YR 4/4 brown silt loam.
B: 7.5YR 4/3 brown silt loam; compact, eroded debris.
C: Loose grey-brown ash and silt with brightly burned bricks.
D: White, gritty, powdery, hard pulverized plaster or brick.
E: 7.5 YR 6/4 very hard, compact, baked surface (silt).
F: 5 YR 4/6 yellowish-red sandy loam with 75% pebbles (2-10cm).
G: Mottled 5YR 4/6-5/6 yellowish-red clay loam with brick pieces; mod. compact.
H: Lenses of limestone chips.
I: 7.5 YR 4/6 strong brown silt loam with 2-10cm pebbles at 75% (below foundations).
J: 7.5 YR 4/6 strong brown clay; loose.
K: 7.5 YR 4/4 brown clayey loam (eroded mudbrick).
L: Black ash; loose, grey lenses, brick debris bits.
M: Stone foundations.
N: Base of wall.

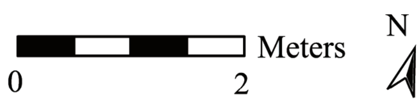


Figure 5.9: Operation 2, North section (for location of section, see Figure 5.8).

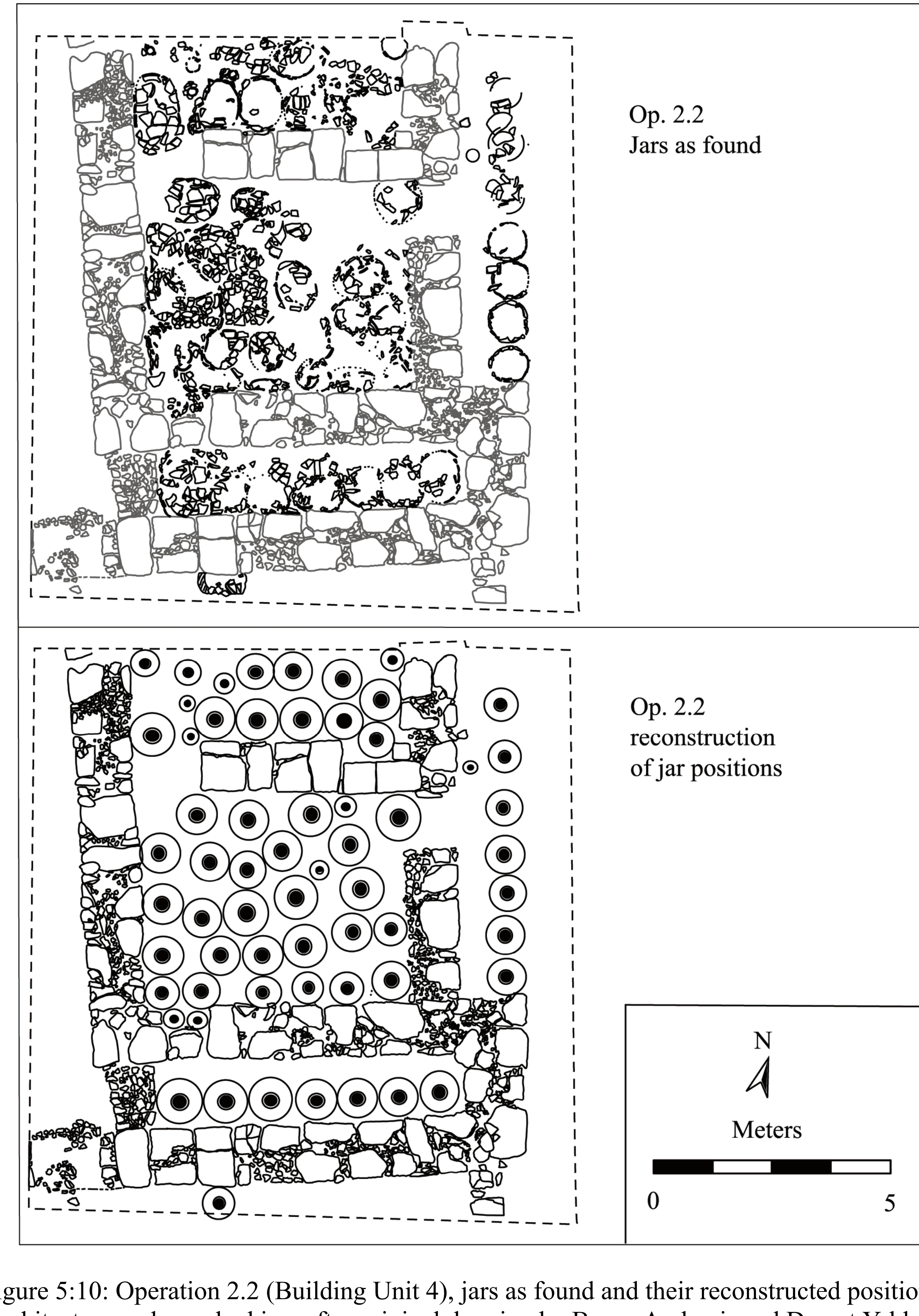


Figure 5:10: Operation 2.2 (Building Unit 4), jars as found and their reconstructed positions (architecture and smashed jars after original drawing by Burcu Aydemir and Demet Yıldırım).

Figure 5.11, Descriptions.

93: RN 11089, Op 2, L50. Plain Simple Ware jar. 6 cmd. Int., ext.: Gley 1 8/10Y light greenish- gray. Fabric: Gley 1 6/10Y greenish gray. Dark grits.

100: RN 11660, Op 2, L50. Plain Simple Ware jar. Has incised "X" on the rim. Firing problem led to numerous bubbles and voids all over the vessel. 16 cmd. Ext, int, fabric: 2.5Y 7/2 light gray. No core.

176: 11096 , Op 2, L46. Plain Simple Ware jar. 16 cmd. Ext., int., fabric: 10 YR 6/3 pale brown. Some white grits, larger lime bits. Some fine chaff.

305: RN 11089, Op 2, L50. Plain Simple Ware jar base. Int., ext., fabric: 2.5Y 7/3 pale yellow.

342: RN 11705, Op 2, L54. Plain Simple Ware grooved-rim jar. 36 cmd. Int., ext., fabric: 5Y 8/2 pale yellow. Red, gray and white grits.

347: RN 11842, Op 2, L46. Plain Simple Ware grooved-rim jar with potter's mark inside the neck. 40 cmd. Int., ext., fabric: 2.5Y 8/2 pale yellow. Red, gray and white grits.

349: RN 11839, Op 2, L46. Plain Simple Ware grooved-rim jar with potter's mark inside the neck. 40 cmd. Int., ext., fabric: 5Y 7/2 pale yellow. Red, gray and white grits.

359: RN 11840, Op 2, L46. Plain Simple Ware grooved-rim jar with potter's mark inside the neck. 33 cmd. Int., ext., fabric: Gley 1 8/10Y light greenish gray.

438: RN 11046, 11698, Op 2, L47. Plain Simple Ware jar from niche in wall. Has an incised line on the shoulder that is possibly a potter's mark. 14 cmd. Int., ext., fabric: 7.5 YR 7/4 pink. Fine dark and white grits.

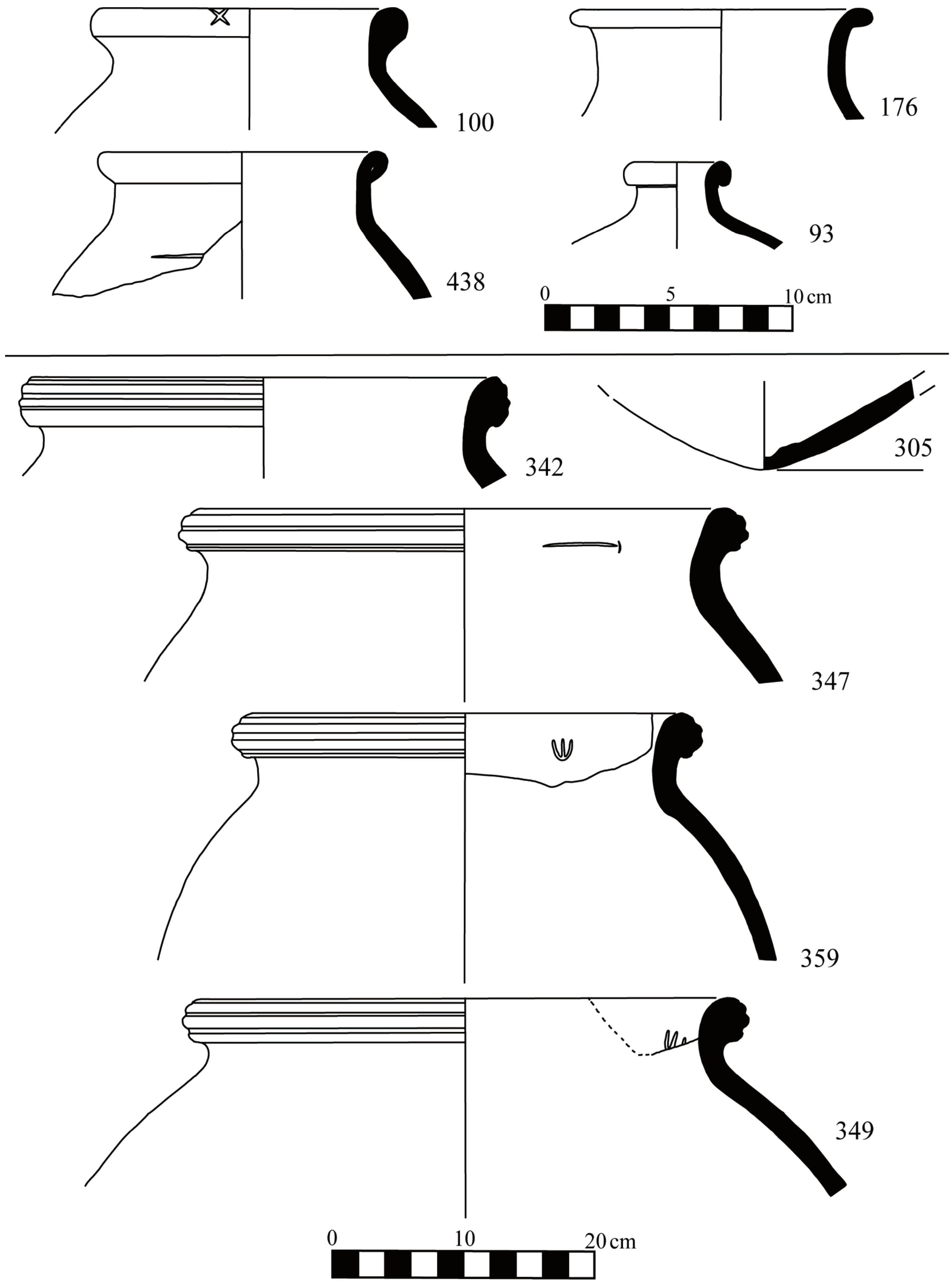
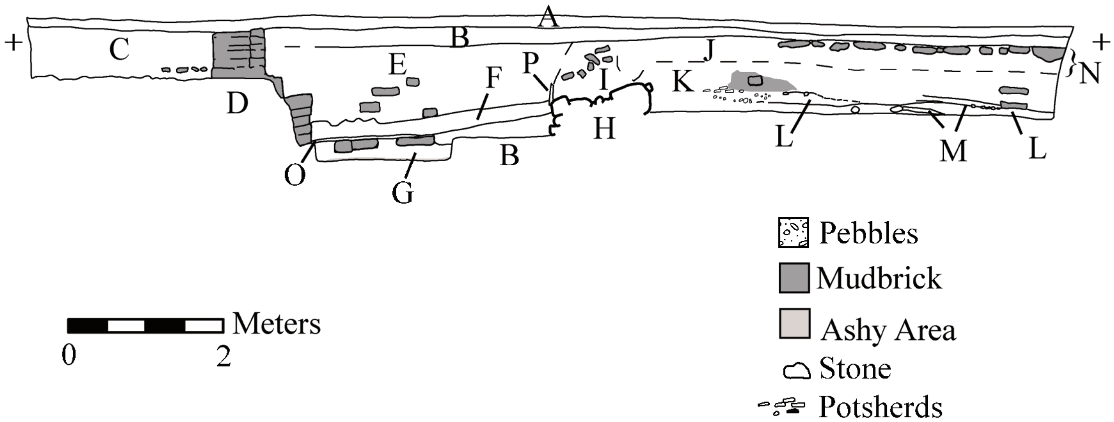


Figure 5:11: Jars from Operation 2.2 (Building Unit 4).



A: Topsoil / plowzone; chaff at base.
B: 7.5YR 4/4 brown clayey loam.
C: 7.5 YR 4/6 strong brown silt loam, compact, cut by root holes (L3).
D: 5YR 5/6 yellowish red, hard, crumbly mudbricks (mudbrick wall L4).
E: Mudbrick debris: some brown, some yellowish red; some hard bricks but most mostly powdery, pulverized brick material, some yellow, some ashy.
F: Loose mudbrick debris, crumblier than E; has burned white plaster (?) at its base to the west.
G: Hard brown bricks over hard brick debris (gray ash just appearing at base).
H: Stone wall L7.
I: Mixed color hard bricks, jumbled, some brick dust.
J: Clay loam: brown, some white bits, some mudbrick.
K: Mottled mudbrick debris, some burned, some ash.
L: 10 YR 4/3 brown clayey loam.
M: 7.5 YR 4/4 brown clay loam lenses/ layers.
N: Orange baked brick collapse / plowed layer.
O: Hard, crunchy, white layer: burned plaster (?). Layers K, L, and M make up Loci 6, 8, 9, and 10. Llayers E, F, G, and O make up L5.
P: Plaster along wall L7 (H).

Figure 5:12: Operation 3: North Section.

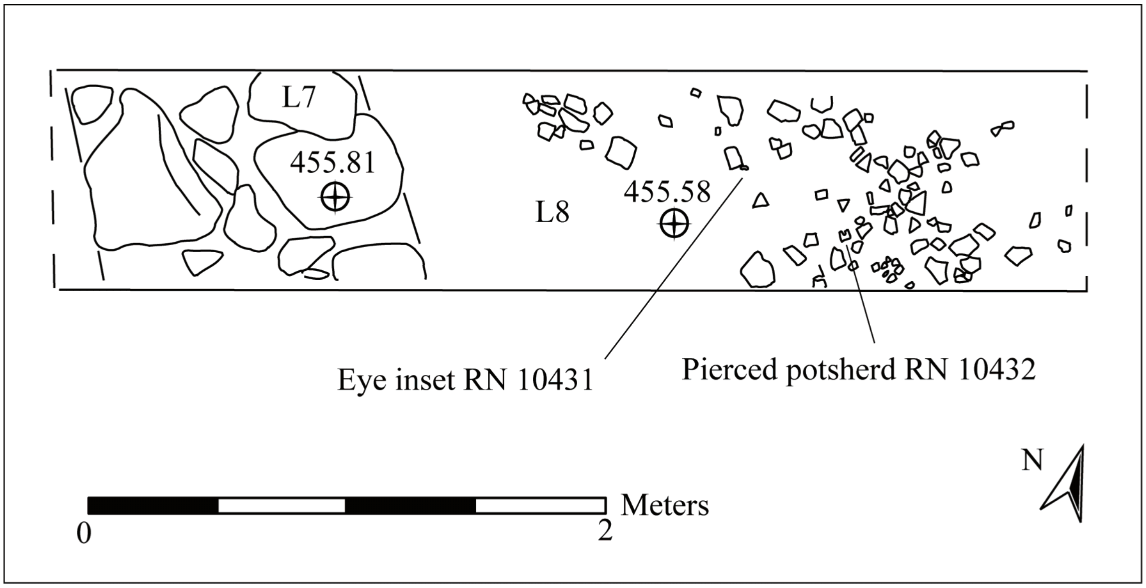


Figure 5:13: Operation 3: Wall L7 and debris on surface L8.

Figure 5.14, Descriptions.

48: RN 10553, Op 3, L9. Plain Simple Ware. 8cmd. Int., ext.: 5 Y 8/2 pale yellow. Fabric: 2.5 Y 7/2 light gray.

74: RN 10562, Op 3, L9. Plain Simple Ware. 12cmd. Ext.: 2.5 Y 8/2 pale yellow. Int., fabric: 10 YR 6/4 light yellowish-brown. White grits.

112: RN 10445, Op 3, L9. Burnished cooking pot. 14cmd (?). Int., ext.: 7.5 YR 6/4 light brown. Fabric: 7.5 YR 5/1 gray. Angular white grits. Burnished inside and out.

113: RN 10445, Op 3, L9. Burnished cooking pot. 10cmd (?). Int., ext., fabric: Mottled 10 YR 6/3 pale brown to 10 YR 3/1 very dark gray. Numerous angular white grits. Burnished inside and out.

167: RN 10448, Op 3, L9. Plain Simple Ware. 12cmd. Int., ext., fabric: 5Y 8/2 pale yellow.

168: RN 10562, Op 3, L9. Plain Simple Ware. 12cmd. Ext.: 10 YR 8/3 very pale brown. Int., fabric: 5 YR 6/6 reddish yellow. Fine white grits.

169:RN 10448, Op 3, L9. Plain Simple Ware. 11.5cmd. Int., ext., fabric: 5 Y 7/2 light gray.

179: RN 10445, 10448, Op 3, L9. Plain Simple Ware. 10cmd. Ext.: 2.5Y 8/2 pale yellow. Int., fabric: 10 YR 7/3 very pale brown. White lime bits.

181: RN 10562, Op 3, L9. Plain Simple Ware. 14cmd. Int., ext., fabric: 10 YR 8/3 very pale brown.

199: RN 10430, Op 3, L6. White limestone eye inset. 20g, 4.27cm X 2.94cm X 1.22cm tall. Perforation is 0.62cmd at the base, and widens to 1.81cmd at the top.

200: RN 10431 (Op 3, L8) and RN 10437 (Op3, L8). White limestone eye inset found in two separate pieces that mend. RN 10431 is clean but RN 10437 is sooted. 15g, 4.64cm X 3.23cm X 0.86cm tall. Perforation is 0.89 at the base, and widens to 1.76cm at the top.

201: RN 10429 (Op 3, L6) and RN 10552a (Op3, L9). White limestone eye inset found in two separate pieces that mend. RN 10552a is clean while RN 10429 is sooted. 11g, 4.5cm X 3.01cm X 0.82cm tall. Perforation is 0.64 at the base, and widens to 1.7cm at the top.

202: RN 10551a, Op 3, L9. White limestone eye inset. 12g, 4.52cm X 2.89cm X 0.86cm tall. Perforation is 0.65cm at the base, and widens to 1.73cm at top.

Figure 5.14, Descriptions (continued).

203: RN 10556a, Op 3, L9. Pierced white limestone disc with two cross incisions radiating from the center. 2g, 2.12cmd, 0.50cm thick, perforation is 0.36cm.

204, RN 10432, Op 3, L8. Plain Simple Ware. Pierced ceramic fragment, made from reused pot sherd. 20g, 4.24cm X 3.96cm X 0.91cm, perforation is 1.45cmd. 10YR 8/3 very pale brown.

206, RN 11885, Op 3, L9. White limestone disc segment (about 25%). 18g, 1.57cm to 0.94cm thick (thickest towards center). No evidence that it was ever pierced. Has some 'incisions' consisting of long thin lines that may be naturally occurring.

225: RN 10562, Op 3, L9. Plain Simple Ware. 10cmd. Int., ext., fabric: Gley 1 8/10Y light greenish gray.

336: RN 10569, Op 3, L9. Plain Simple Ware incised body sherd. Ext.: 10 YR 8/3 very pale brown. Paint: 2.5YR 4/6 red. Int., fabric: 5YR 6/6 reddish yellow.

431: RN 10448, Op 3, L9. Body sherd with impressed design. Ext.: 2.5Y 4/1 dark gray. Int., fabric: 10 YR 5/3 brown. Very fine white grits

557: RN 10574, Op3, L10. Stone object, possibly part of a figurine or statue. Broken on one end. Incised lines, possibly cutting or shaping marks, near the break. Gray, possibly basalt. 74g, 4.6cm X 2.89cmd, but variable. Gley 2 6/1 (5B) bluish-grey.

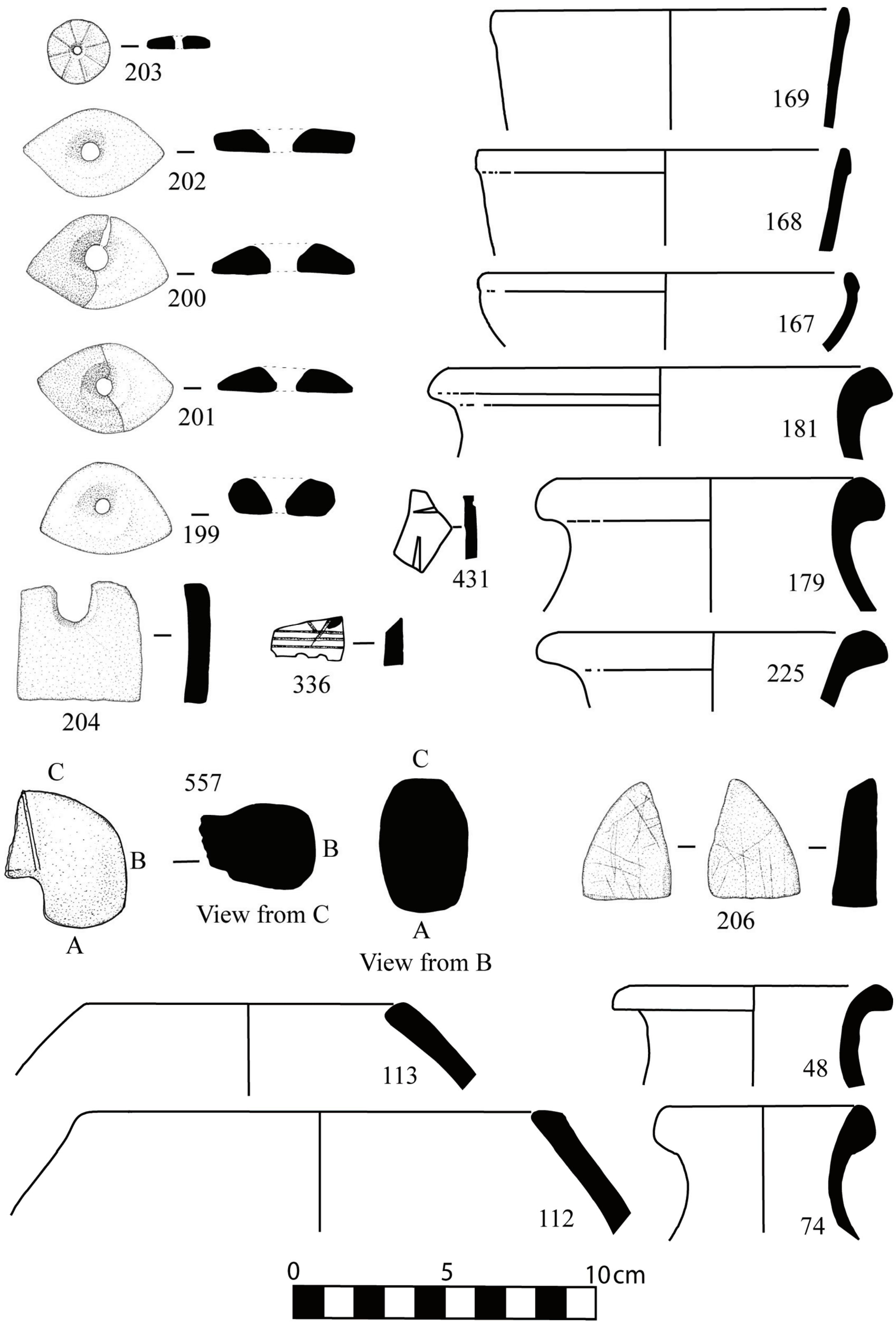


Figure 5.14: Objects and ceramics from Operation 3.

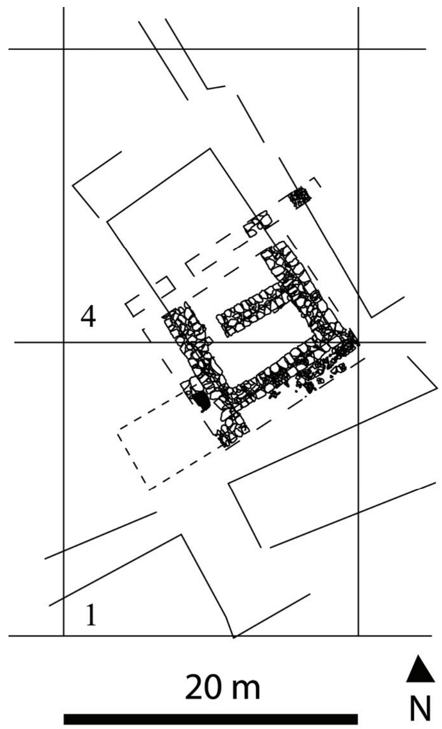


Figure 5.15: Area 1, Operation 4 excavated architecture superimposed upon gradiometry interpretation in collection grid blocks 1, 4.

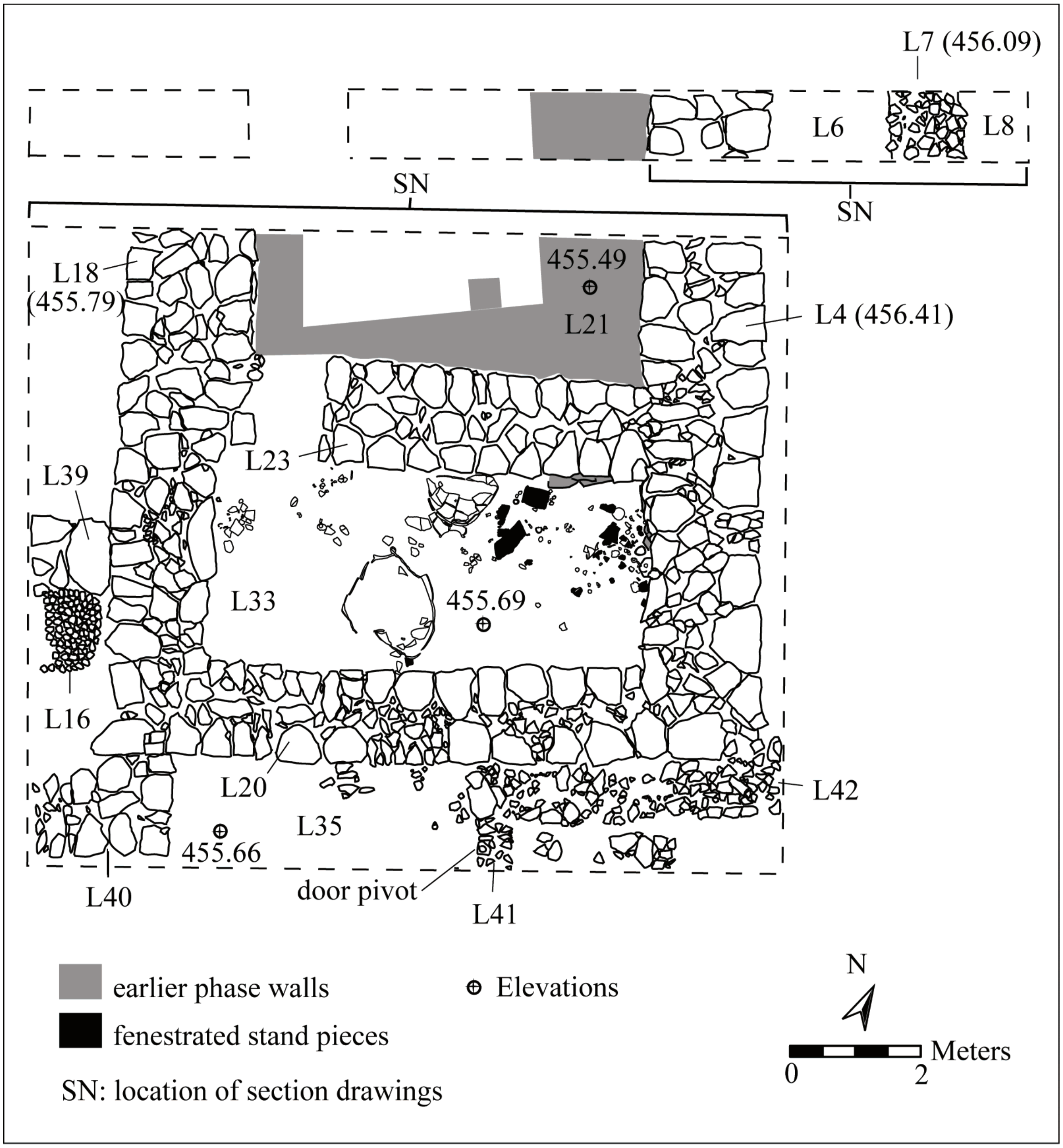


Figure 5.16: Operation 4, plan of architecture and debris on surface (architecture after original drawing by Işıl Oren).

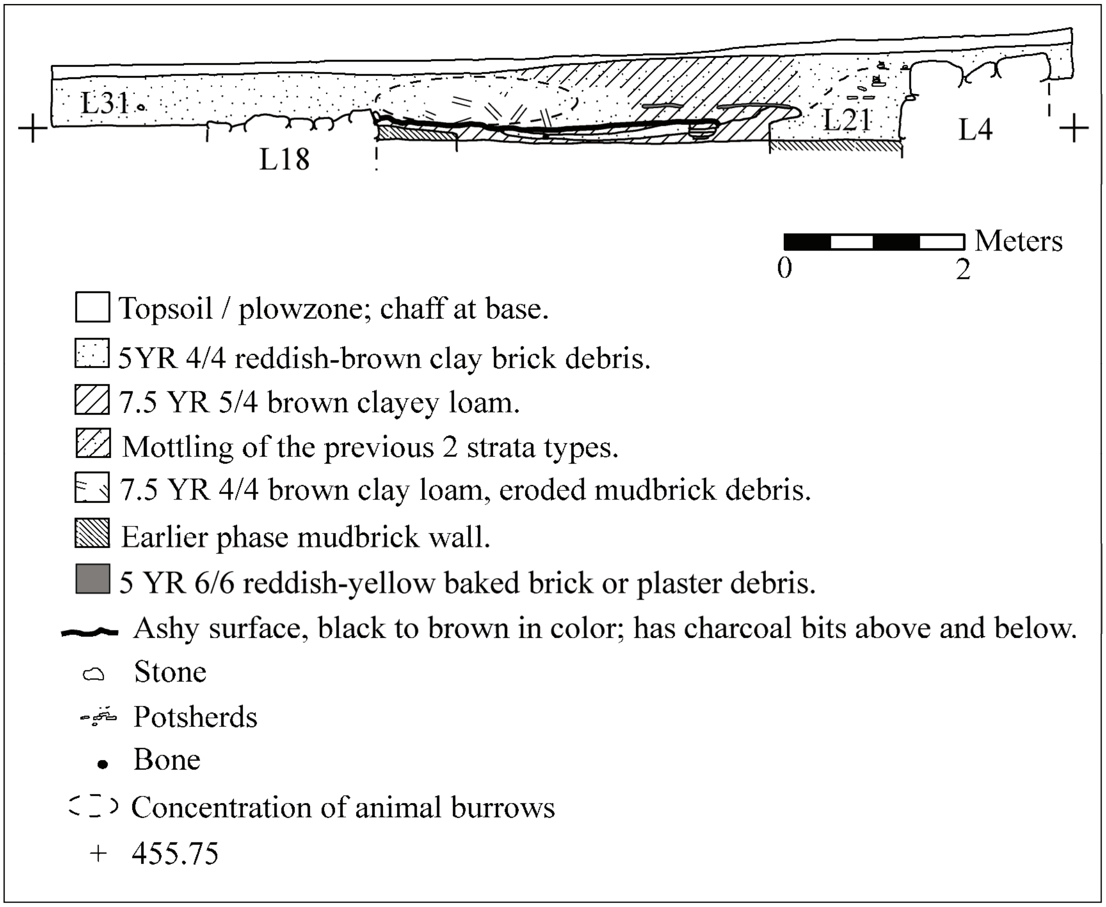


Figure 5.17: Operation 4, north section of southern extension (see Figure 5.16 for location of section).

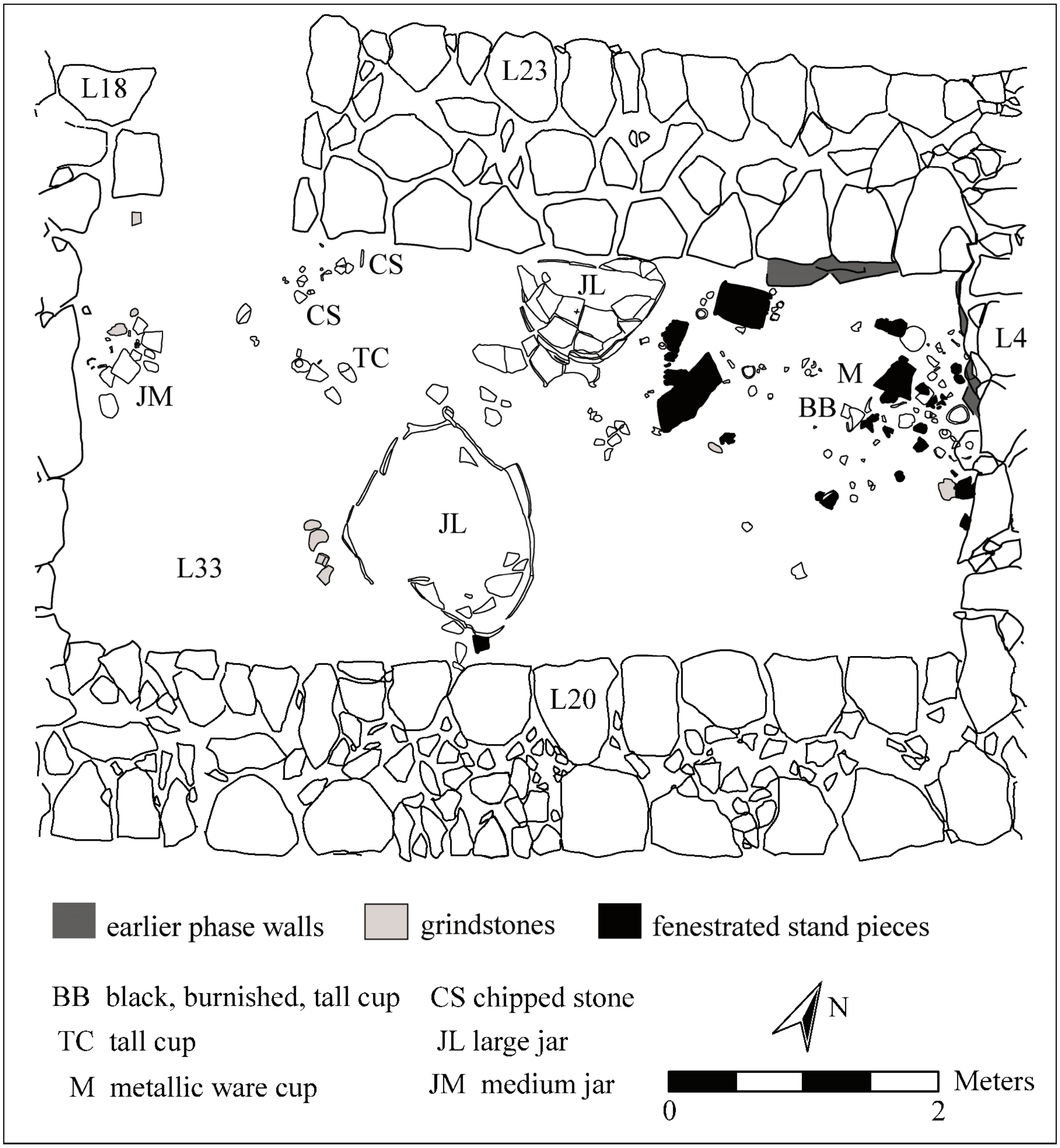


Figure 5.18: Operation 4: close view of debris on surface L33.

Figure 5.19, Descriptions.

99: RN 10797, 11244 and 11259, Op 4, L29. Metallic ware corrugated cup with flat base. 15cmd. Ext, int, fabric: Gley 1 5/N and 6/N gray. No core.

115: RN 10732, 11233, 11234, Op 4, L29. Plain Simple Ware tall cup with ring base and internal scraping marks. 14cmd. Ext., int : 10YR 6/3 pale brown. Fabric: margins 7/5 YR 6/4 light brown, grading to 10YR 7/3 very pale brown core. White grits.

116: RN 10797, 11262, Op 4, L29. Plain Simple Ware bowl with pinched rim. 14cmd. Ext., int, fabric: 10YR 7/3 very pale brown. Micaceous.

117: RN 10797, 11254, Op 4, L29. Plain Simple Ware bowl with simple rim. 11cmd. Int., ext., fabric: 5YR 6/6 reddish-yellow. White grits.

118: RN 10797, Op 4, L29. Plain Simple Ware cup with flat base. 12cmd. Int., ext, fabric: Gley 1 8/10Y light greenish-gray. White grits.

125: RN 10797, Op 4, L29. Plain Simple Ware bowl with ring base. 3.54cmd base. Int, ext., fabric: 10 YR 7/3 very pale brown. White grits.

126: RN 10797, Op 4, L29. Plain Simple Ware jar. Cmd uncertain. Int., ext., fabric: 10 YR 7/2 light gray.

127: RN 10797, Op 4, L29. Plain Simple Ware bowl with beaded rim. 20cmd. Int., ext., fabric: 5Y 7/2 light gray.

128: RN 10797, Op 4, L29. Plain Simple ware bowl with thickened rim. 10cmd. Int., ext., fabric: 5 YR 7/4 pink. No core. White grits.

129: RN 10797, Op 4, L29. Complete Plain simple ware cup. 7cmd. Int., ext., fabric: 2.5Y 8/2 pale yellow.

130: RN 10797, Op 4, L 29. Plain Simple Ware bowl. 14cmd. Int, ext., fabric: 7.5 YR 6/4 light brown.

146: RN 10797, Op 4, L29. Band painted (Plain Simple) Ware bowl. 14cmd. Int., ext., fabric: 2.5Y 7/3 pale yellow. Paint: 7.5YR 4/1 dark gray. (To the naked eye it looks like 'plum'). In the thinner stripe on the rim it is 7.5 YR 6/4 light brown (To the naked eye it looks a bit reddish-brown).

147: RN 10797, Op 4, L29. Band painted (Plain Simple) Ware bowl. 14cmd. Int., ext., fabric: 10 YR 7/4 very pale brown to 6/4 light yellowish-brown. Paint: 5 YR 5/4 reddish-brown. Some white grits.

Figure 5.19, Descriptions (continued).

150: RN 11224, Op 4, L29. Plain Simple Ware bowl. 14cmd. Ext., int., fabric: 5YR 6/6 reddish- yellow.

153: RN 11224, Op 4, L29. Plain Simple Ware bowl. 14cmd. Int., ext., fabric: 10 YR7/3 very pale brown.

155: RN 11224, Op 4, L29. Plain Simple Ware bowl. 11cmd. Ext.: encrusted. Int., 2.5 YR 7/4 light reddish-brown. Fabric: 10 R 6/6 light red. White grits.

166: RN 11241, Op 4, L29. Cooking pot. Burnished on int., ext., rim. 26cmd (?). Ext.: 7.5 YR 7/3 pink. Int.: 5 YR 6/4 light reddish-brown. Fabric: 10 YR 5/4 yellowish-brown. Angular white and gray grits.

191: RN 11224, Op4, L29. Complete Plain Simple Ware cup. 41g, 6.12cmd, flat base 2.38cmd. Int., ext.: 10YR 7/3 very pale brown.

193: RN 11225, Op4, L29. Complete Plain Simple Ware cup. 21g, 4.52cmd, flat base 1.87cmd. Ext.: 10YR 8/2 very pale brown. Int.: 5YR 7/3 pink.

194: RN 11231, Op4, L29. Nearly complete Plain Simple Ware cup. 29g, 6cmd, flat base is 2.31cmd. Int., ext., fabric: 2.5Y 7/4 light reddish-brown.

207: RN 11259, Op 4, L29. Tall cup with flat base. Black, vertically burnished on exterior. 13.5cmd. Int.: wet smoothed, lightly burnished. Int., ext.:black. Fabric: no fresh breaks but looks like: 5Y 5/1 gray.

254: RN 11262, Op4, L29. Cooking pot. Burnished on int., ext., rim. 26cmd. Ext., fabric:10 YR 7/4 very pale brown. Int.: 7.5 YR 6/4 light brown. Coarse white and gray grits.

365: RN 11271. Op 4, L14. Plain Simple Ware grooved rim jar with potter's mark inside the neck. 32cmd. Int.,ext., fabric: 2.5Y 8/2 pale yellow. Red, gray and white grits.

426: RN 11235, Op4, L29. Nearly complete potstand. Plain Simple Ware. Sooted. 57g, 7.8cmd, 8.2cmd, center 2.18cm. Ext., int, fabric: 2.5Y 7/4 pale.

427: RN 11230, Op4, L29. Nearly complete potstand. Plain Simple Ware. 87g, 8.4cmd, center 4.1cm. Int., ext., fabric: 2.5YR 6/6 light red.

653: RN 10581, Op4, L32. Plain Simple Ware stand. 92g, 8.9cmd, center 3.2cm. Int., ext., fabric: 10YR 7/3 very pale brown.

Figure 5.19, Descriptions (continued).

664: RN 11226, Op4, L29. Complete Plain Simple Ware stand. 8.5cmd, 104g. Int., ext., fabric: 5Y 8/4 pale yellow.

669: RN 11245, Op4, L32. Nearly complete potstand. Plain Simple Ware. 85g, 8.7cmd, opening 2.72cm. Int., ext., fabric: 10YR 8/3 very pale brown.

671: RN 11301. Op4, L29. Complete Plain Simple Ware cup. 5.4cmd, 27g. Int., ext., fabric: 10 YR 7/3 very pale brown.

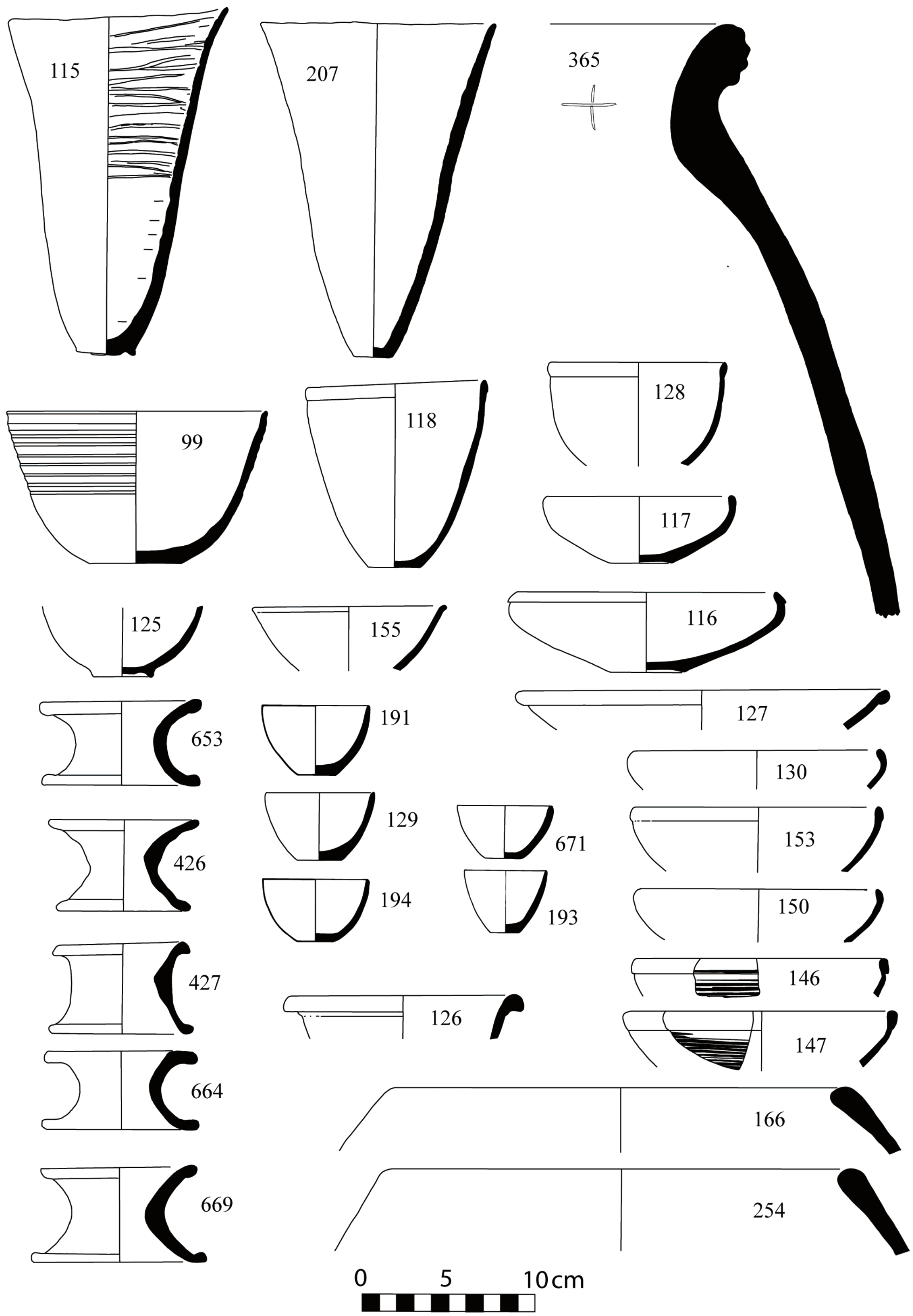


Figure 5.19: Operation 4, vessels from the debris on surface L33.

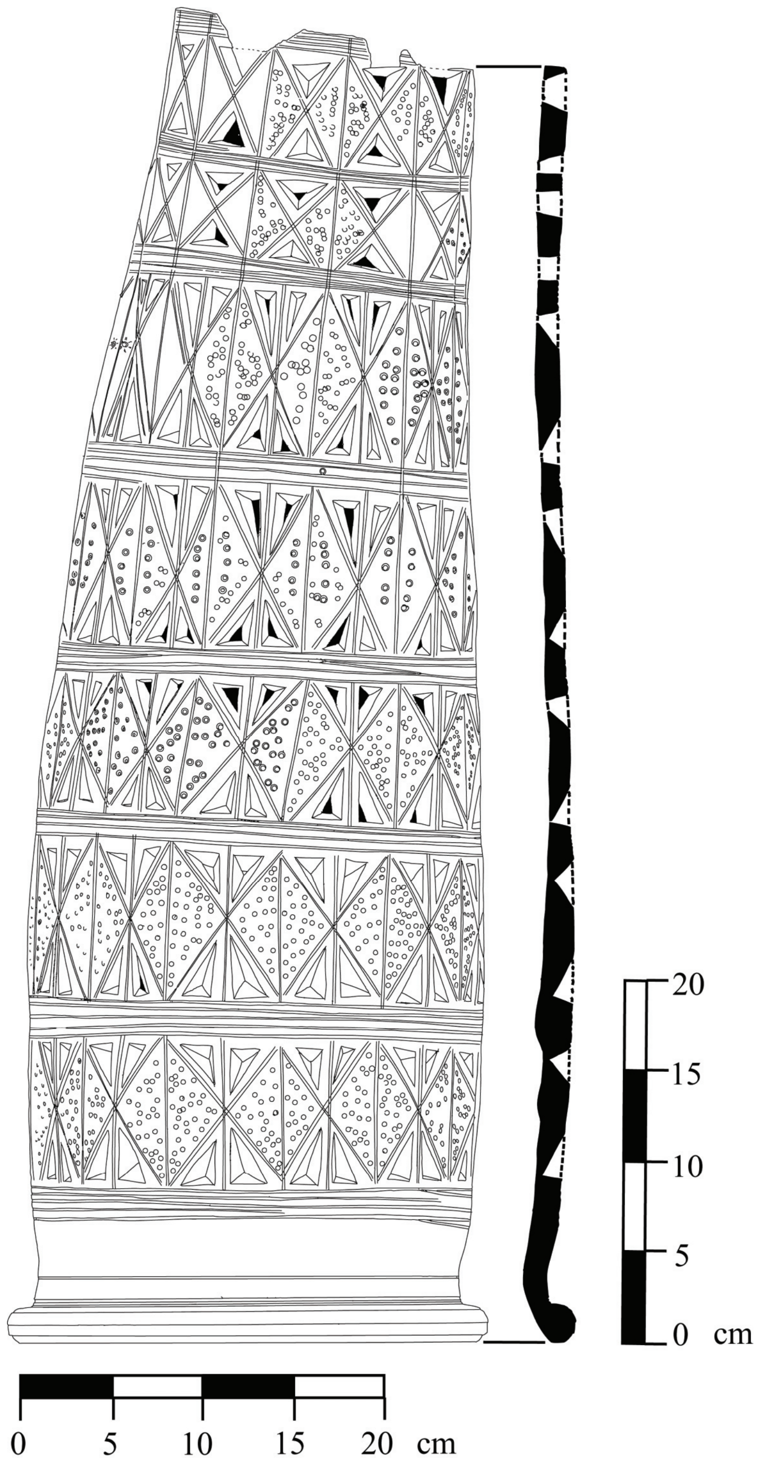


Figure 5.20: Incised, fenestrated stand from Operation 4 (from the surface of the southern room of Building Unit 8). Plain Simple Ware. 5800g. Surface color varies from 7.5 YR 7/4 pink to 2.5Y 8/2 pale yellow. Fabric: 5 YR 7/4 pink. Top is broken and original height is unknown.

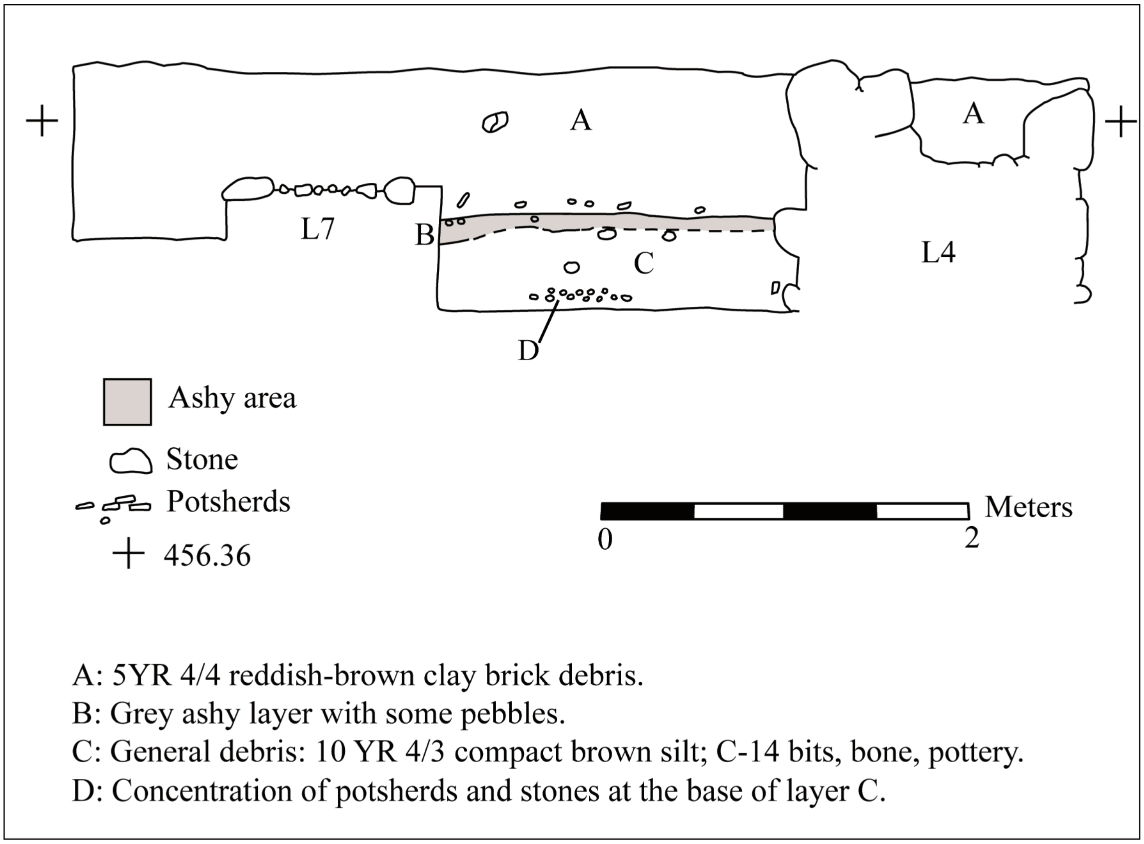


Figure 5.21: Operation 4, south section of northeast extension (for location of section see Figure 5.16).

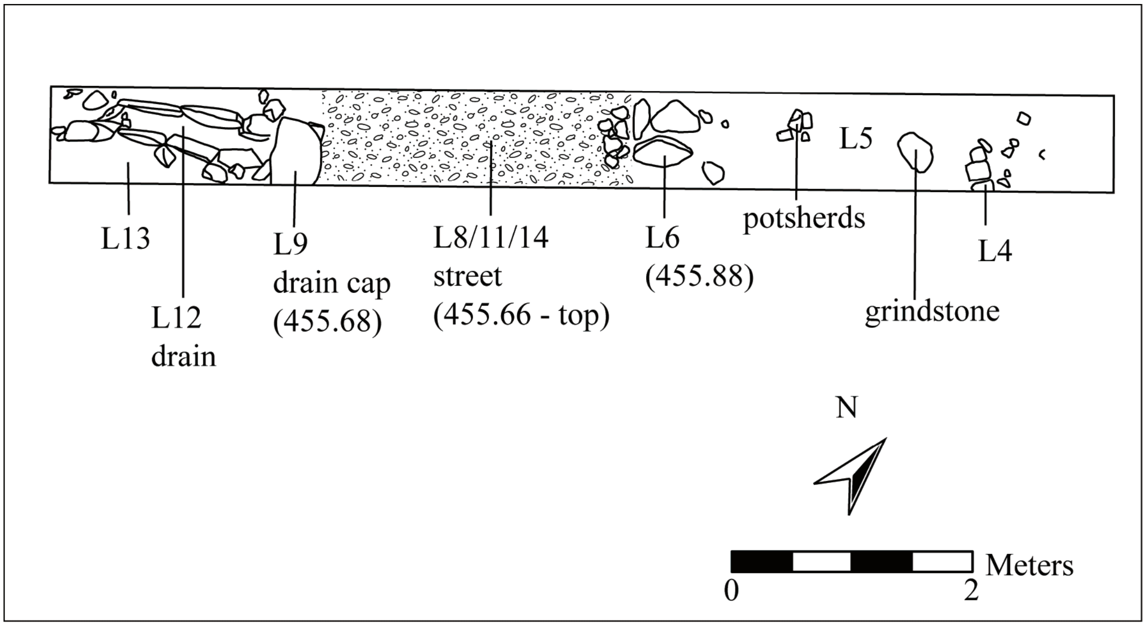


Figure 5.22: Plan of major loci in Operation 5.

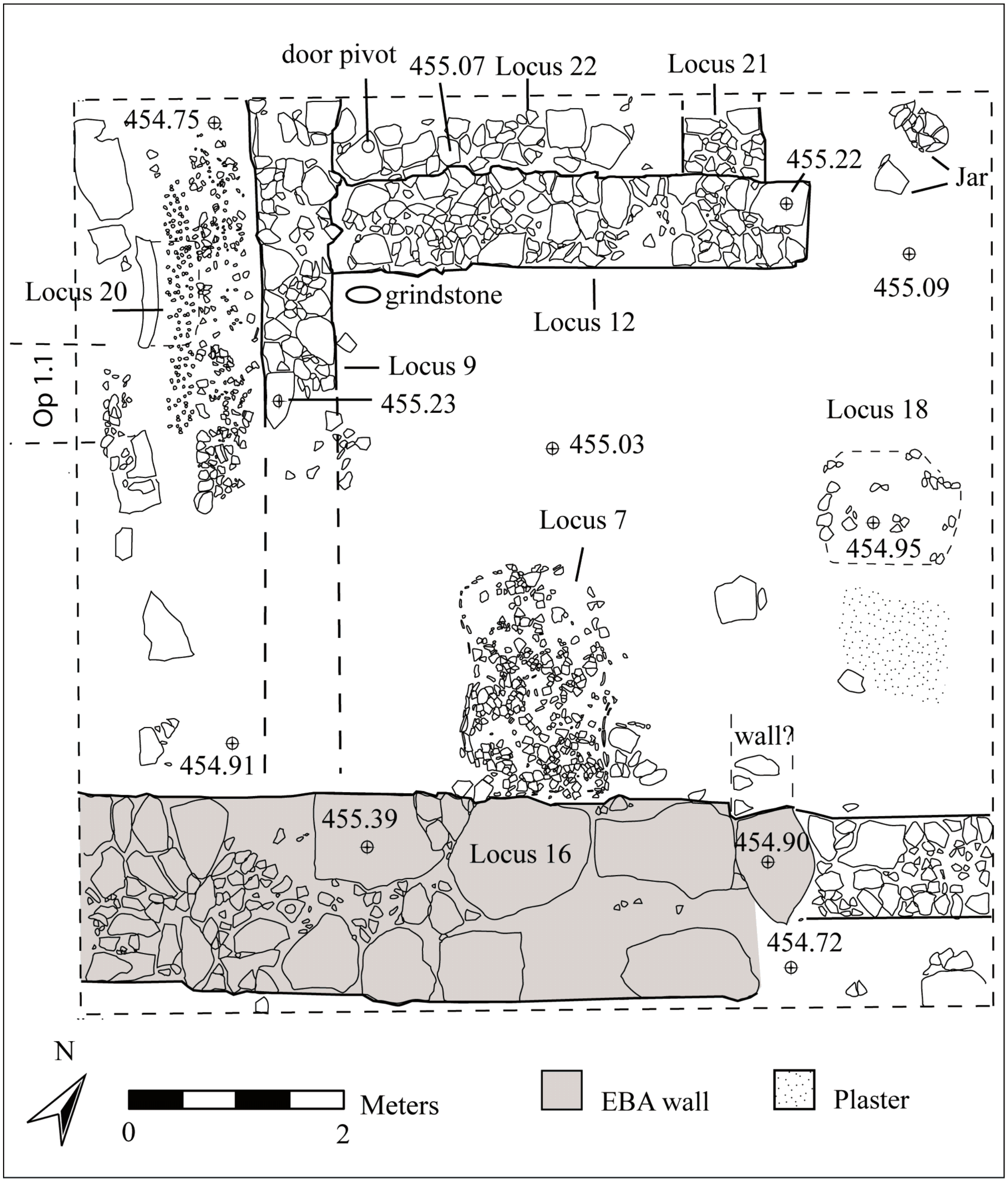


Figure 5.23: Operation 6, plan of key loci (architecture after original drawing by Işıl Oren).

Figure 5.24, Descriptions.

310: RN 11152, Op 6, L20. Body sherd with two rows of combed decoration. Int., ext., fabric: 10 YR 7/3 very pale brown. Grading to 10 YR 6/1 gray core. Fine chaff temper in small amounts. Some fine white grits.

311: RN 11152, Op 6, L20. Ring base. 4cmd. Int., ext., fabric: 10 YR 7/3 very pale brown

312: RN 11152, Op 6, L20. Flared, beaded-rim jar (or possibly a foot/stand?). 15cmd. Int., ext.: 10 YR 7/4 very pale brown. Fabric: grading to 2.5 YR 5/1 gray core. Fine chaff temper in medium amounts with fine white grits.

314: RN 11152, Op 6, L20. 34cmd. Int., ext., fabric: 10 YR 8/2 very pale brown. Grading to 10 YR 5/1 gray core. Fine chaff in medium amounts. White grits.

315: RN 11152, Op 6, L20. 30cmd (?). Int., fabric: 2.5YR 6/6 light red. Ext.: 10 YR 7/2 light gray. Fine chaff in medium amounts and fine white grits.

317: RN 11152, Op 6, L20. 30cmd. Int., ext., fabric: 10 YR 7/2 light gray. Fine chaff in medium amounts. Gray and white grits.

318: RN 11152, Op 6, L20. 34cmd. Int., ext., fabric: 2.5Y 8/2 pale yellow. Fine chaff in medium amounts, fine white and dark grits.

319: RN 11152, Op 6, L20. Body sherd with applied rope band. Int., ext.: 2.5Y 8/2 pale yellow. Fabric: 10 Yr 8/2 very pale brown. Fine white and dark grits with some fine chaff.

321: RN 11152, Op 6, L20. 20cmd. Int., ext.: 7.5 YR 7/3 pink. Grading to thick 10 YR 7/2 light gray core. Fine chaff in small amounts and dark grits.

325: RN 11152, Op 6, L20. Body sherd with oval impressed band. Int., ext., fabric: Gley 1 8/10Y light greenish-gray. Fine chaff in small amounts. Fine light and dark grits.

537: RN 11159, Op 6, L7. 28cmd. Int., ext., fabric: 5YR 6/4 light reddish-brown. Thin margins with abrupt thick light gray core. Fine and medium chaff in large amounts. Fine white grits, lime.

539: N 11159, Op 6, L7. Simple rim bowl. 24cmd. Int., ext., fabric: 2.5Y 4/1 dark gray. Thin margins with abrupt thick black core. Fine and medium chaff in medium amounts. Fine white grits.

540: RN 11159 and 11161, Op 6, L7. 23cmd. Int., ext., fabric: 10 YR 7/3 very pale brown. Fine white grits, lime.

Figure 5.24, Descriptions (continued).

545: RN 11162, Op 6, L7. 40cmd (?). Int., ext., fabric: 5 YR 7/4 pink. Abrupt thick light gray core. Fine chaff in small amounts. Fine white lime grits in large amounts.

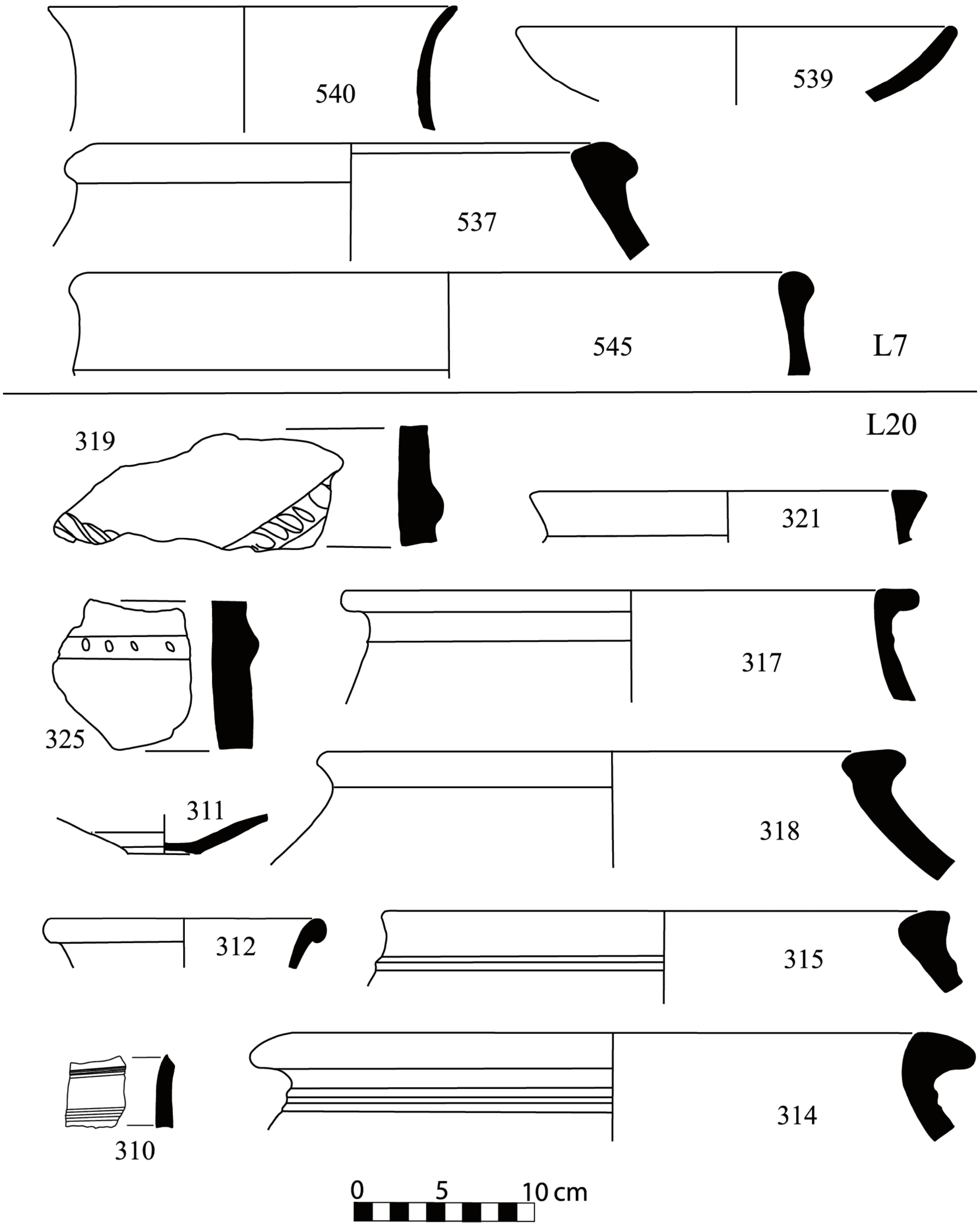


Figure 5.24: Early Second Millennium ceramics from Op 6, L7 (top) and L20 (bottom).

Figure 5.25, Descriptions.

523: RN 11918, Op 10, L7. 36cmd (?). Int., ext.: 2.5Y 8/2 pale yellow. Fabric: 10 YR 7/3 very pale brown. Fine and medium chaff in medium amounts. Some lime bits.

527: RN 11160, Op 6, L7. Black, burnished ring base. 10cmd. Int., ext., fabric: 2.5Y 4/1 dark gray to black. Fine chaff in medium amounts. Some fine white grits. Exterior and base lightly burnished.

529: RN 11159, Op 6, L7. Body sherd with three ridges/ indentations. Int., ext., fabric: 7.5 YR 7/3 pink, grading to light gray core. Fine chaff in large amounts, lime.

530: RN 11160, Op 6, L7. 34cmd. Int., ext., fabric: 10 YR 6/3 pale brown. Abrupt, thick black core. Fine chaff in large amounts, some fine white grits.

531: RN 11160, Op 6, L7. 40cmd. 7.5 YR 7/4 pink. Grading to thick, 7.5 YR 5/1 gray core. Fine white grits. Fine chaff in medium amounts.

532: RN 11160. Op 6, L7. 23cmd. Int., ext., fabric: Gley 1 8/10Y light greenish-gray. Dark grits, some lime grits, fine chaff in medium amounts.

533: RN 11160, Op 6, L7. 34cmd. Int.,ext., fabric (thin margins): 7. 5YR 6/4 light brown. Thick grey to black core. Fine chaff in medium amounts. Fine white grits.

535: RN 11162, Op 6, L7. 18cmd. Int., ext, fabric.: 10 YR 7/4 very pale brown. Grading to diffuse light gray core. Fine chaff in small amounts, white lime grits in medium amounts.

536: RN 11159, Op 6, L7. 16cmd. Int., ext., fabric: 7.5 YR 7/4 pink. Grading to thick 10 YR 5/3 brown core. Fine chaff in large amounts, some white grits, some 4mm large grits.

538: RN 11159, Op 6, L7. 24cmd. Int., ext., fabric: 7.5 YR 6/4 light brown. Grading, thick light to dark gray core. Fine chaff in large amounts. Some grey and white grits. Some 4mm large grits.

541: RN 11161, Op 6, L7. 16cmd (?). Int., ext., fabric: 5YR 7/4 pink. Thin margins around thick 10 YR 7/3 very pale brown core. Fine chaff in small amounts. Fine white grits (lime) in medium amounts.

542: RN 11162, OP 6, L7. 25cmd. Ext.: 7.5 YR 7/3 pink. Int.: 5 Y 5/2 olive-gray. Fabric: thin margins of surface colors with thick light gray core. Fine chaff in large amounts. Fine white grits in large amounts.

543: RN 11162, Op 6, L7. 34cmd (?). Int., ext., fabric: 7.5 YR 6/4 light brown. Grading to diffuse light gray core. Fine and medium chaff in small amounts. Some fine white grits. Exterior and rim lightly burnished.

Figure 5.25, Descriptions (continued).

544: RN 11161, Op6, L7. 29cmd. Int., ext., fabric: 5YR 7/4 pink. Grading to thick, light gray core. Fine and medium chaff in large amounts. Fine white grits.

546: RN 11159, Op 6, L7. 10cmd. Int., ext.,: 7.5 YR 6/4 light brown. Fabric: 10 YR 6/3 pale brown. In thick places near the base there is a thick gray core. Fine chaff in medium amounts, some fine grits.

547: RN 11160, Op 6, L7. 14cmd. Ext. 10 YR 7/3 pale brown. Int.: 2.5YR 6/6 light red. Fabric: exterior/interior colors as thin margins around thick, gray core. Fine chaff in large amounts. Some fine white grits.

548: RN 11161, Op 6, L7. 10cmd. Int., ext., fabric: 10 YR 7/4 very pale brown. Fine white and dark grits, lime.

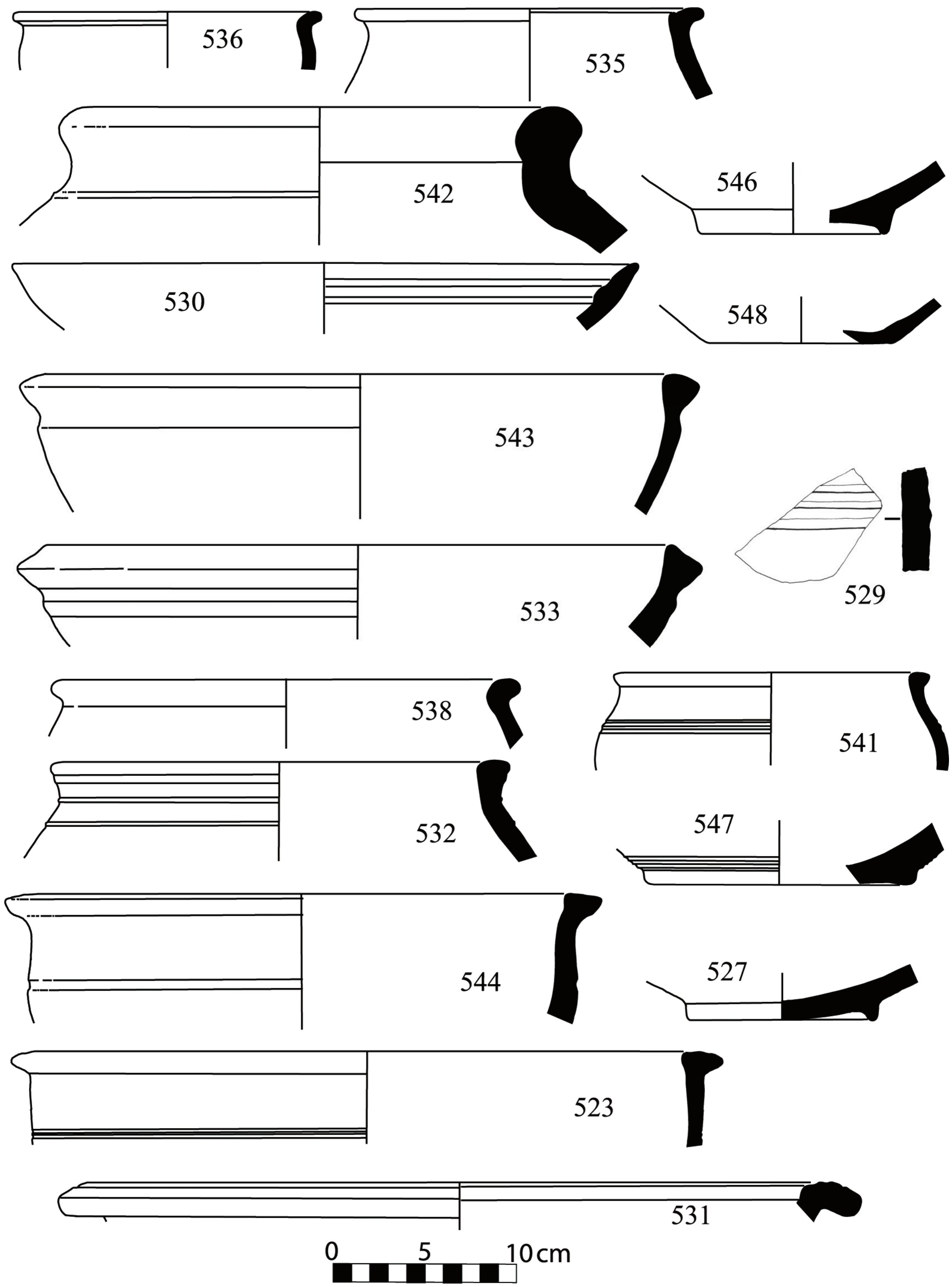


Figure 5.25: Early Second Millennium ceramics from Op 6, L7.

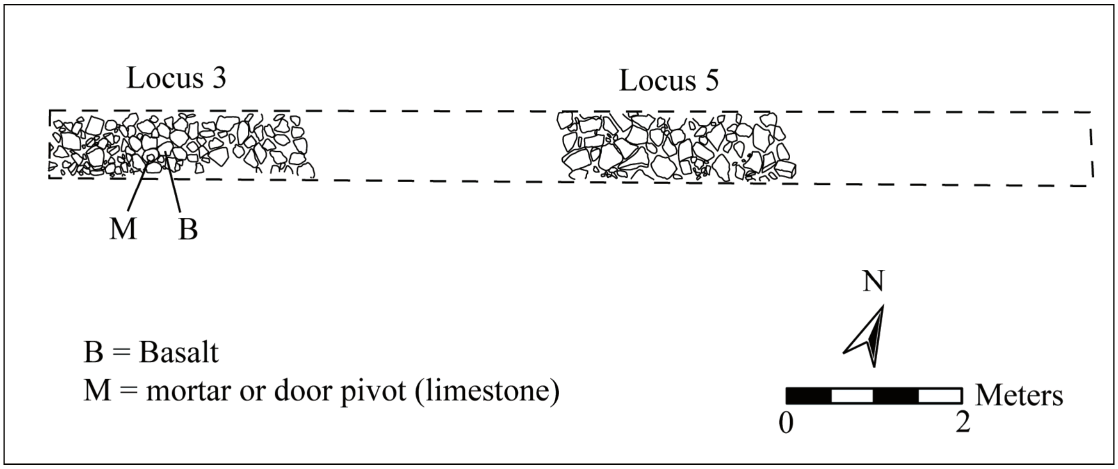
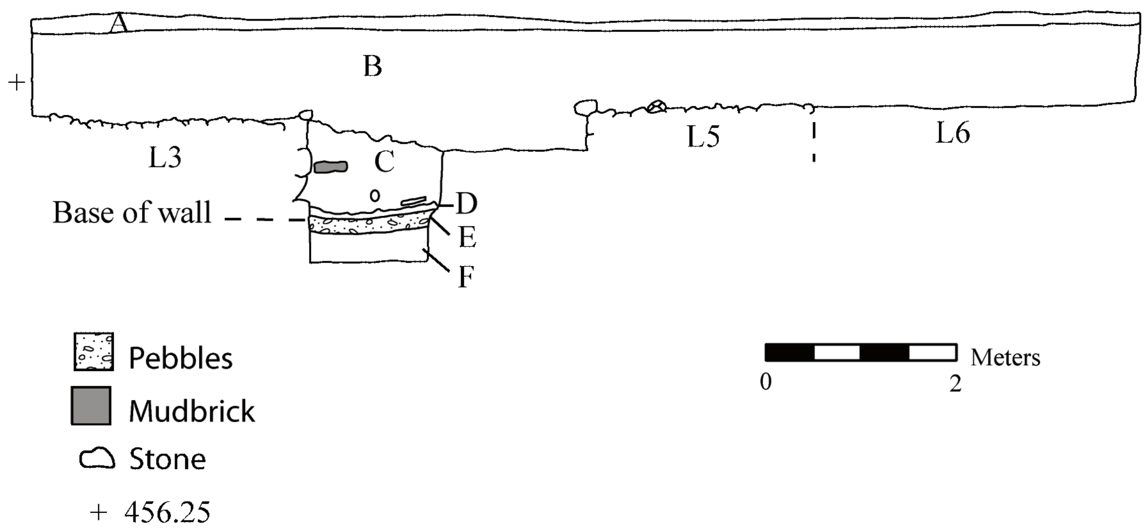


Figure 5.26: Operation 7, plan of key loci.



A: Locus 1: topsoil / plowzone.
B: Locus 2: clayey loam with white lime bits; 7.5 YR 4/3.
Possibly some mudbrick debris. Animal bones are common.
C: Locus 4: mottled brick fill (reddish brown, gray, black - burned):
5YR 6/6 reddish yellow, 5 YR 5/6 yellowish red,
7.5 YR 4/6 strong brown, carbon bits and some grey soil.
D: Crumbly, clayey, grey-brown silty loam.
E: Locus 7: Loose, crumbly layer of white/cream-colored 0.5cm - 4cm pebbles .
F: Locus 8: compact clay loam: 10 YR 5/3 brown; also grey soil and carbon bits.

Figure 5.27: Operation 7, north section.

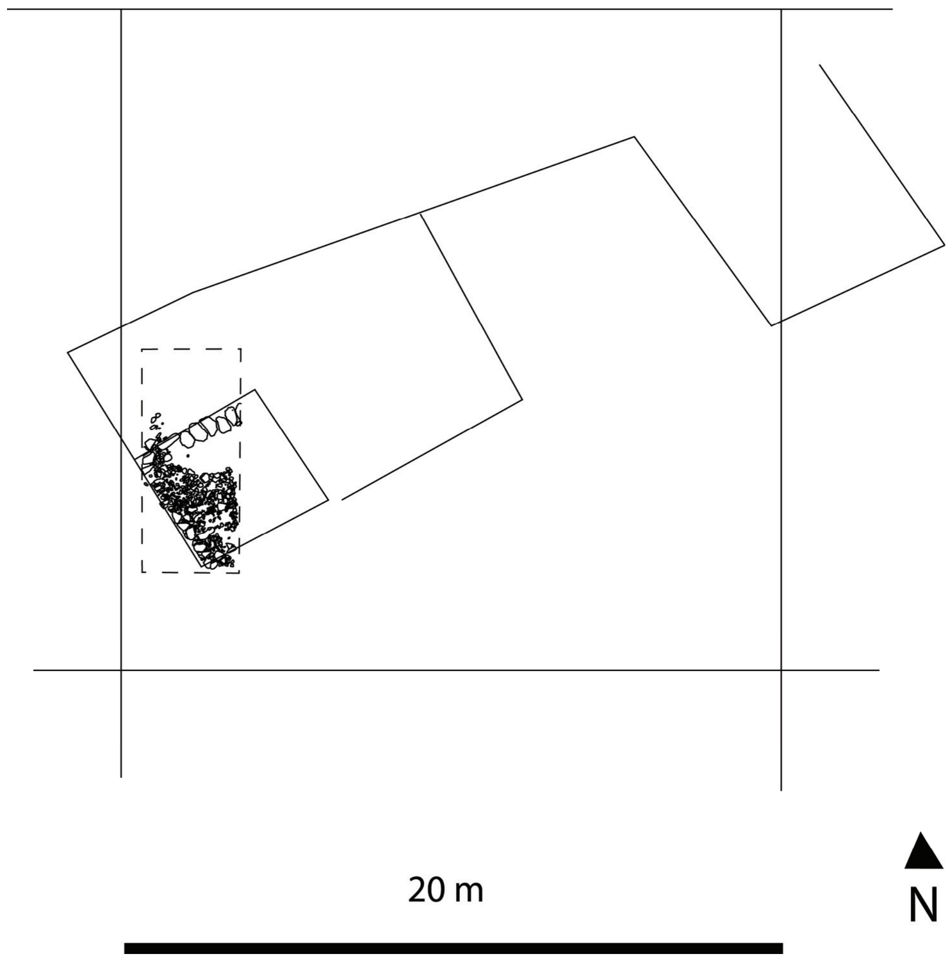


Figure 5.28: Area 1, Operation 8 excavated architecture superimposed upon gradiometry interpretation in collection grid block 51.

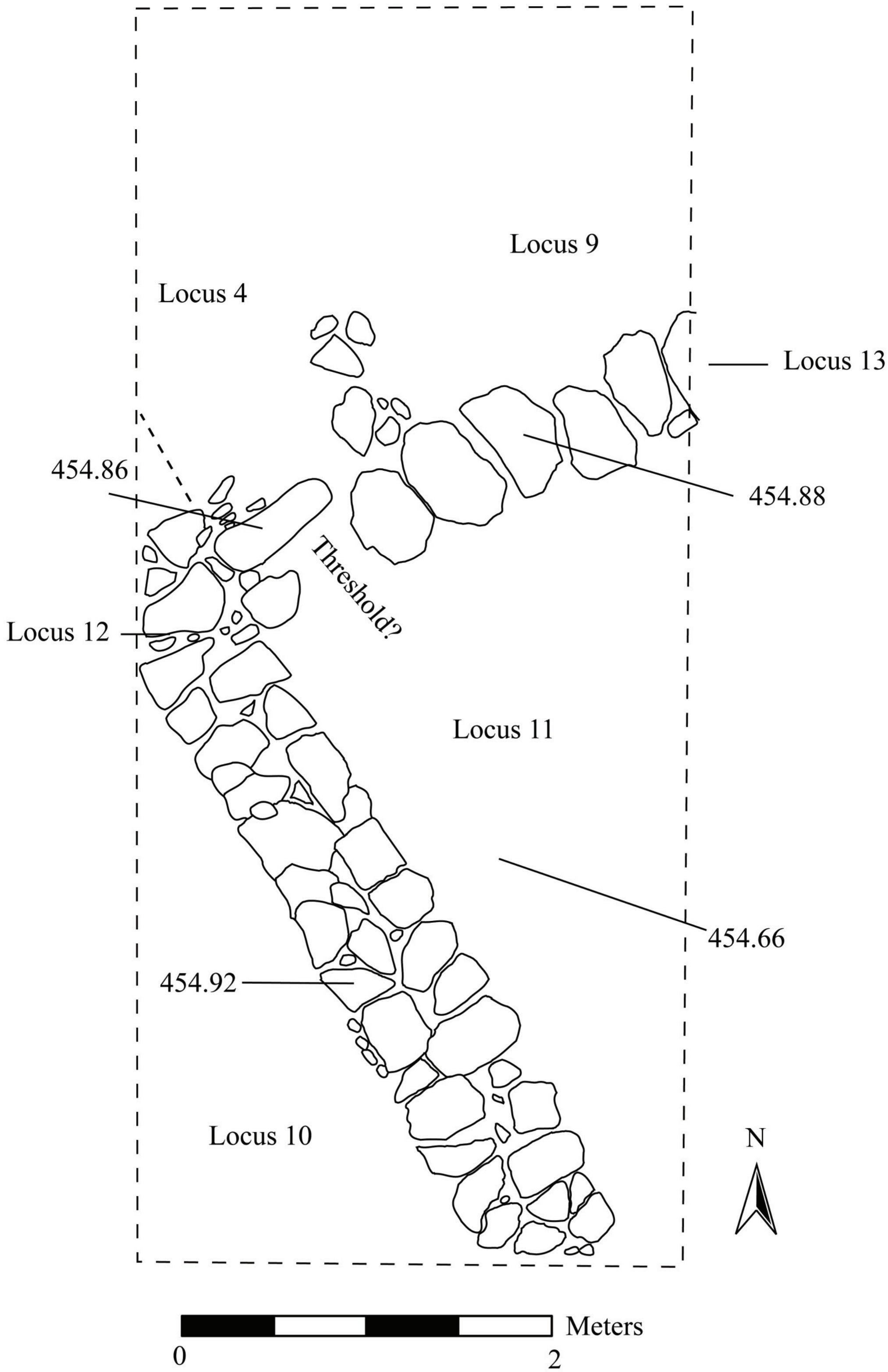


Figure 5.29: Operation 8, Phase I.

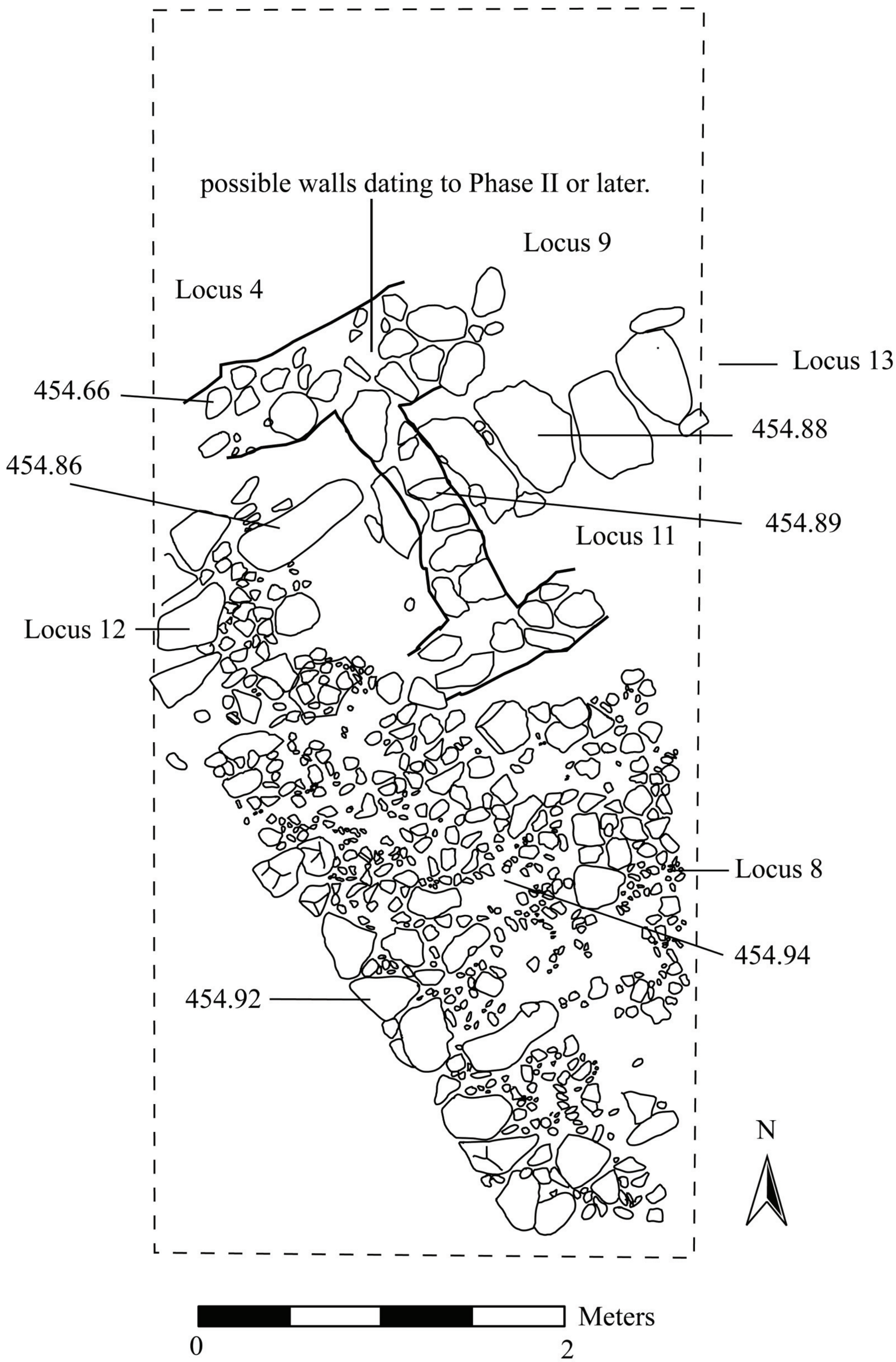


Figure 5.30: Operation 8, Phase II.

Figure 5.31, Descriptions.

84: RN 10537, Op 8, L8. 20cmd. Ext., int., fabric: 10 YR 7/3 very pale brown. Sparse grits, very little fine chaff.

92: RN 10570, Op 8, L11. 16cmd (?). Ext., int., fabric: 10 YR 7/3 very pale brown. Grey, brown and white grits, some fine chaff.

244: RN 10537, Op 8, L8. Plain Simple Ware. 20cmd. Int., ext., fabric: 7.5 YR 7/3 pink. Fine dark and white grits.

246: RN 10554, Op 8, L8. 34cmd (?). Int., ext.: 7.5 YR 6/4 light brown. Fabric: 10 YR 6/4 light yellowish-brown. Fine dark grits. Burnished int., ext., and on rim.

247: RN 10554, Op 8, L8. 30cmd. Int., ext., fabric: 7.5YR 7/3 pink. Grading to light gray core. Fine chaff in small amounts. Fine white grits.

249: RN 10554, Op 8, L8. 36cmd (?). Int., ext.: 10 YR 8/4 very pale brown. Fabric: Mottled pale brown and black, burned out chaff. Fine chaff in medium amounts. White grits.

260: RN 10554, OP 8, L8. 22cmd. Int., ext.: 5 YR 6/6 reddish yellow. Fabric: Mottled pale brown and black, burned out chaff. Fine chaff in medium amounts. White grits.

263: RN 10554, Op 8, L8. Plain Simple Ware. 38cmd. Int., ext., fabric: 10 YR 8/2 very pale brown. Dark grits.

264: RN 10554, Op 8, L8. Plain Simple Ware. 52cmd (?) Int., ext., fabric: 10 YR 8/2 very pale brown. Dark grits. Int., ext., fabric: 10 YR 8/2 very pale brown. Dark grits.

265: RN 10554, Op 8, L8. Plain Simple Ware. 24cmd. Int., ext., fabric: 10 YR 8/3 very pale brown. Fine white grits.

266: RN 10554, Op 8, L8. 32 cmd (?). Int., ext.: 7.5 YR 74 pink. Fabric: Black, burned out chaff. Fine chaff in medium amounts. White grits.

437: RN 10556, Op 8, L8. Plain Simple Ware. 11cmd. Int., ext.: 5Y 8/2 pale yellow. Fabric: 5Y 7/2 light gray. Fine red, gray, white grits.

441: RN 10556, Op 8, L8. 2cmd. Int., ext., fabric: 7.5 YR 7/4 pink. Paint: 2.5YR 5/4 reddish-brown. Small amounts of fine chaff. Medium to small white lime grits.

469: RN 10554, Op 8, L8. Body sherd with applied rope band. Int., ext., fabric: Gley 1 8/10Y light greenish-gray. Red/brown and white grits, fine chaff in medium amounts, lime.

Figure 5.31, Descriptions (continued).

470: RN 10554, Op 8, L8. Body sherd with combing. Ext.: 10 YR 6/3 pale brown
Int.: exterior color blackened. Fabric: 10 YR 4/1 dark gray. Fine white grits, fine chaff in medium amounts, some lime.

551: RN 10543, Op 8, L7. 10cmd. Int., ext., fabric: 10 YR 6/4 light yellowish-brown. Fine white, gray, grits, lime, fine chaff in small amounts.

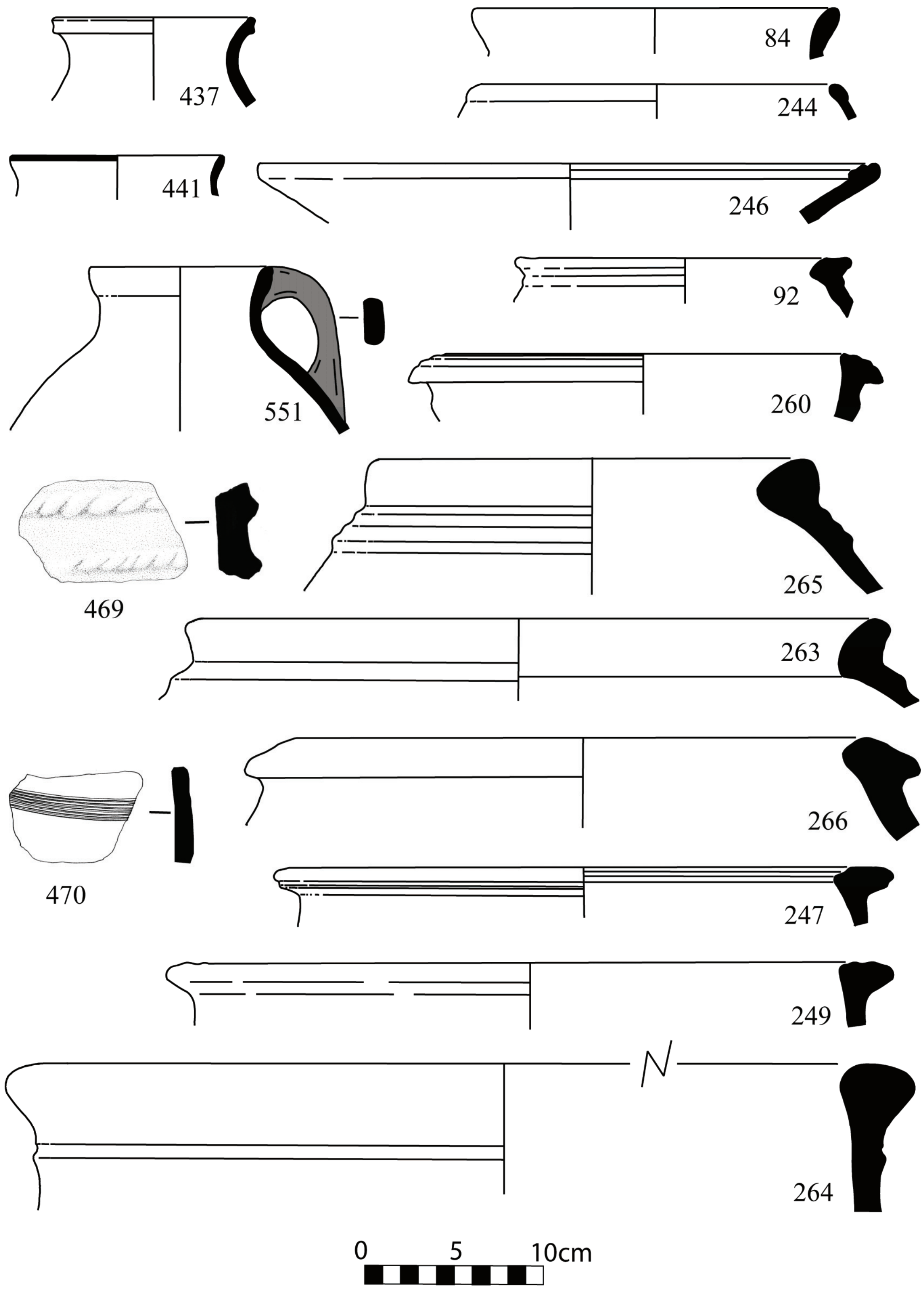


Figure 5.31: Second millennium ceramics from Operation 8.

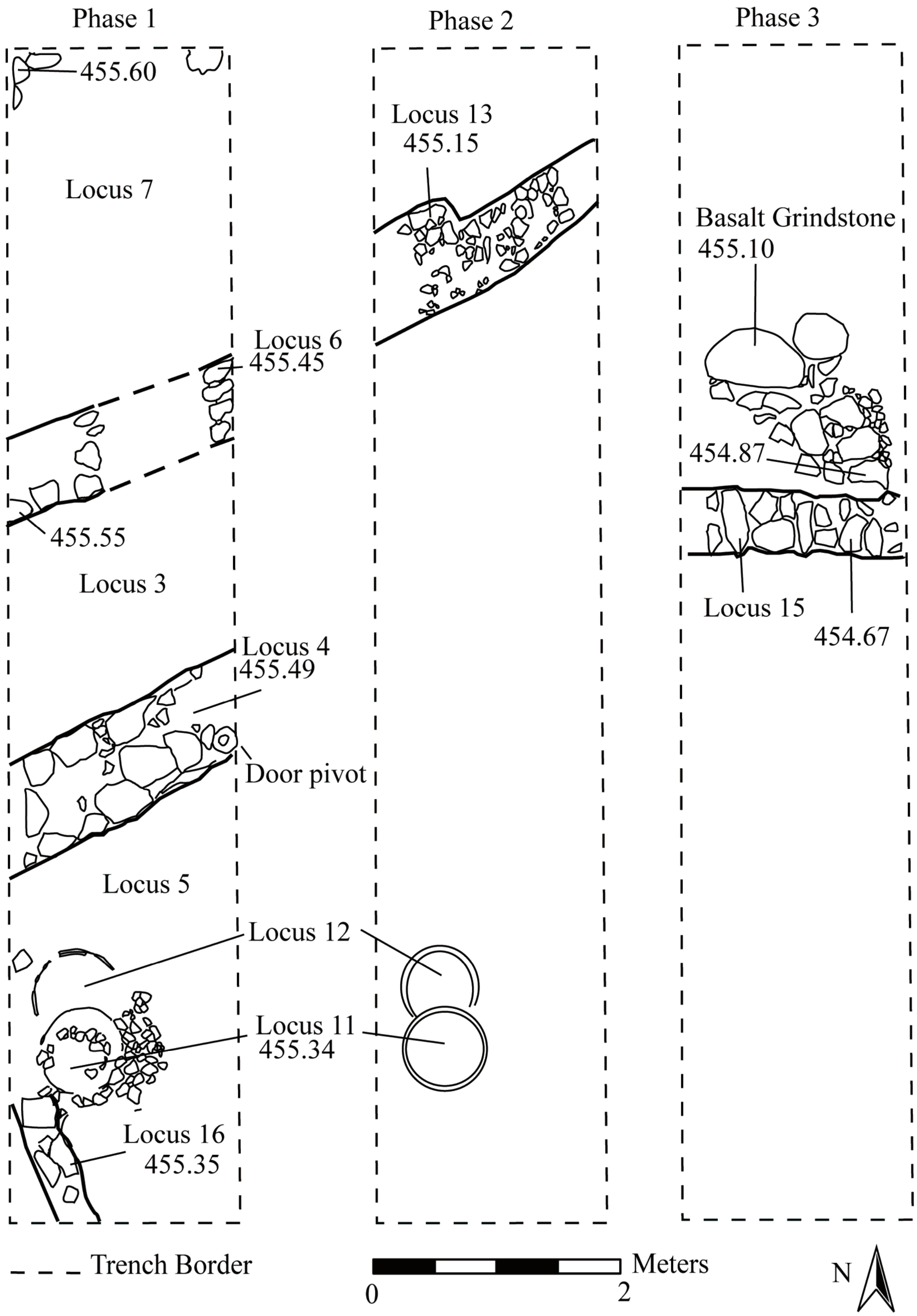


Figure 5.32: Operation 10, phase plans (architecture after original drawing by Işıl Oren).
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Figure 5.33, Descriptions.

490: RN 11949, Op 10, L7. Incised body sherd: triangles in registers with internal vertical slashes. Int., ext., fabric: Gley 1 7/10Y: light greenish-gray (with some brown mottling). Fine grits.

493: RN 11949, Op 10, L7. Plain Simple Ware bowl. 18cmd. Int., ext., fabric: 10 YR 8/2 – 8/3 very pale brown. Fine white grits.

496: RN 11949, Op 10, L7. Bowl. 13cmd. Int., ext., fabric: 2.5Y 8/2 pale yellow. Fine white grits, lime.

497: RN 11949. Op 10, L7. Plain Simple Ware. 13cmd. Int., ext.,10YR 8/2 very pale brown. Fabric: Ext colors grading to 10 YR 7/1 light gray in interior of pot. Fine white grits. Mica.

508: RN 11938, Op 10, L7. Int., ext., fabric: 10 YR 7/3 very pale brown. Fine white lime grits.

510: RN 11938, Op 10, L7. Int.,ext., fabric: 5Y 7/2 light gray. Grey, brown grits and lime.

512: RN 11938, Op 10, L7. 23cmd. Ext. 5Y 8/2 pale yellow. Int., fabric: 5YR 6/6 reddish-yellow. Abrupt 7.5YR 6/4 light brown. Fine dark and light grits.

514: RN 11938, Op 10, L7. 11cmd. Int., ext., fabric: 2.5Y 8/2 pale yellow. Fine chaff in medium amounts. Some dark grits and lime.

515: RN 11918, Op 10, L7. 18cmd. Int., ext., fabric: 2.5Y 6/6 light red. Coarse grey, white grits (some larger than sand) and scattered fine chaff.

518: RN 11918, Op 10, L7. 10cmd (?). Int., ext.: 5YR 7/4 pink. Fabric: 2.5YR 5/6 red with abrupt, thin brown core. Fine white grits.

520: RN 11918, Op 10, L7. 10cmd (?). Int., ext., fabric: Gley 1 1/10Y light greenish-gray. Dark gray grits, some fine chaff.

521: RN 11918, Op 10, L7. 16cmd (?). Int., ext.: 10 YR 8/3 very pale brown. Fabric: 7.5 YR 7/4 pink. Fine and medium chaff in medium amounts, lime grits.

524: RN 11918, Op 10, L7. Body sherd with fingernail-impressed horizontal band. Int., ext.: 7.5YR 7/4 pink. Fabric: 10 YR 6/3 pale brown, grading to slightly darker gray core. Fine chaff in medium amounts.

525: RN 11918, Op 10, L7. Plain Simple Ware body sherd with two ridges. Int., ext., fabric: 2.5Y 8/2 pale yellow. Dark grits, lime, some mica.

Figure 5.33, Descriptions (continued).

526: RN 11929, Op 10, L10. Body sherd with impressed double band. Int., ext.,: 2.5Y 8/2 pale yellow. Fabric: 2.5Y 7/2 light gray. Medium sized grey, white, brown grits, and fine chaff in small amounts.

594: RN 11916, Op 10, L3. 8.2cmd. Int., ext, fabric: 10YR 8/2 very pale brown. Mica, some white lime grits.

595: RN 11934, Op 10, L3. 40cmd. Int., ext., fabric: 10 YR 7/2 light gray. Grading to thin, 10 YR 7/1 light gray core. Fine chaff in medium amounts, lots of lime grits, chaff faced. Some gray grits.

596: RN 11947, Op 10, L3. 42cmd. Int., ext., fabric: 2.5Y 8/2 pale yellow. Fine chaff in medium amounts, fine orange grits (grog?) and some gray grits. Chaff faced.

597: RN 11912, Op 10, L3. 16cmd. Int., ext., fabric: 10 YR 7/3 very pale brown. Abrupt, thick light gray to black core. Fine chaff in large amounts. White lime grits. Chaff faced.

601: RN 11923, Op 10, L6. Plain Simple Ware. 18cmd (?). Int., ext., fabric: 2.5Y 8/2 pale yellow. Mica, some fine dark grits.

604: RN 11923, Op 10, L6. Cooking pot with simple rim. 20cmd. Int., ext., fabric: 5YR 6/4 light reddish brown. Grading to think light gray core. Fine chaff in small amounts, coarse white grits in large amounts.

605: RN 11923, Op 10, L6. 19cmd. Exterior: 7.5YR 7/4 pink. Interior, fabric: 10 YR 7/4 very pale brown. Some white and gray grits.

606: RN 11923, Op 10, L6. Cmd ? Int., ext., fabric: 2.5YR 6/6 light red. Grading to light gray core. Medium chaff in large amounts, chaff faced.

614: RN 11923, Op 10, L6. 20cmd. Plain Simple Ware. Int., ext., fabric: 5Y 8/2 pale yellow. Fine dark grits.

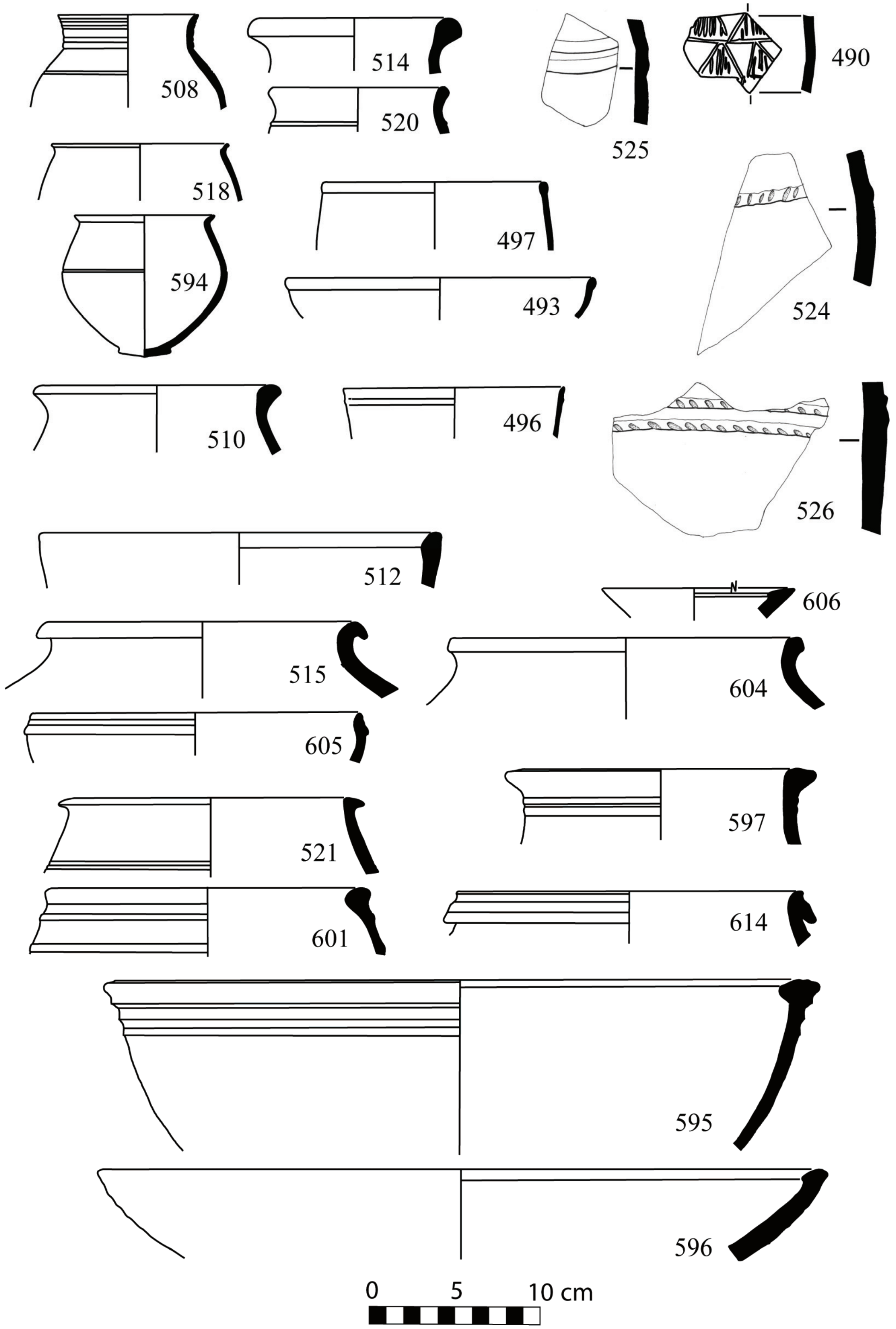
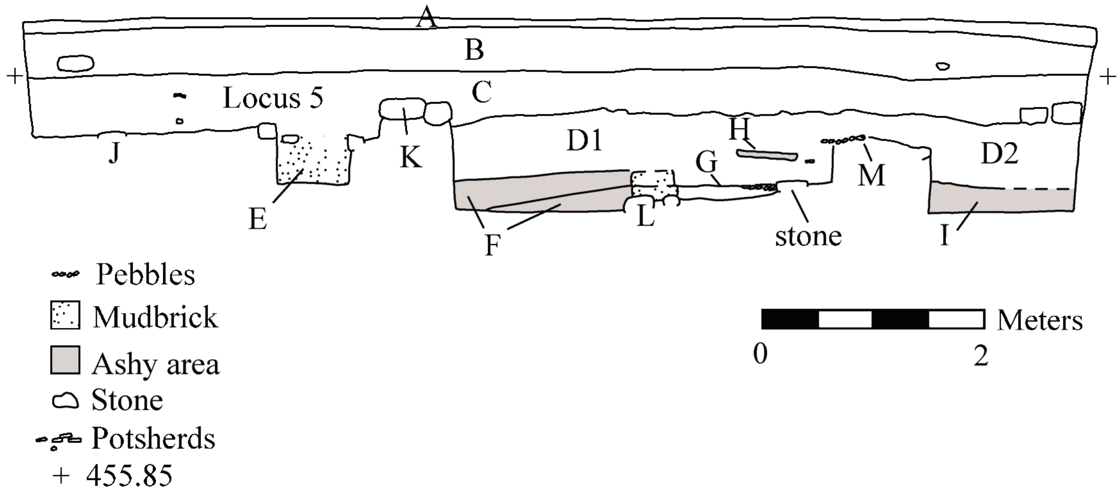


Figure 5.33: Early second millennium ceramics from Operation 10.



A: Locus 1: Topsoil, loose silt loam.
B: Locus 2: subtopsoil, silt loam with mixed artifacts.
C: 7.5 YR 4/4 brown clayey loam.
D: 10 YR 4/3 brown clayey loam mottled with mudbrick debris that is brown and reddish brown (D1 = Locus 3; D2 = Locus 7).
E: Concentration of mudbrick debris.
F: Lenses of reddish brown brick, gray soil, and ash (major lenses marked by dark lines).
G: Thin pebble floor.
H: Grey ash, C-14 bits, some potsherds.
I: Ashy area with C-14 bits, very dark grayish-brown ash -- silt loam.
J: Locus 16: Stone wall.
K: Locus 4: Stone wall.
L: Locus 15: Stone wall with mudbrick superstructure.
M: Locus 13: Pebble and stone surface cap over stone wall.

Figure 5.34: Operation 10: west section.

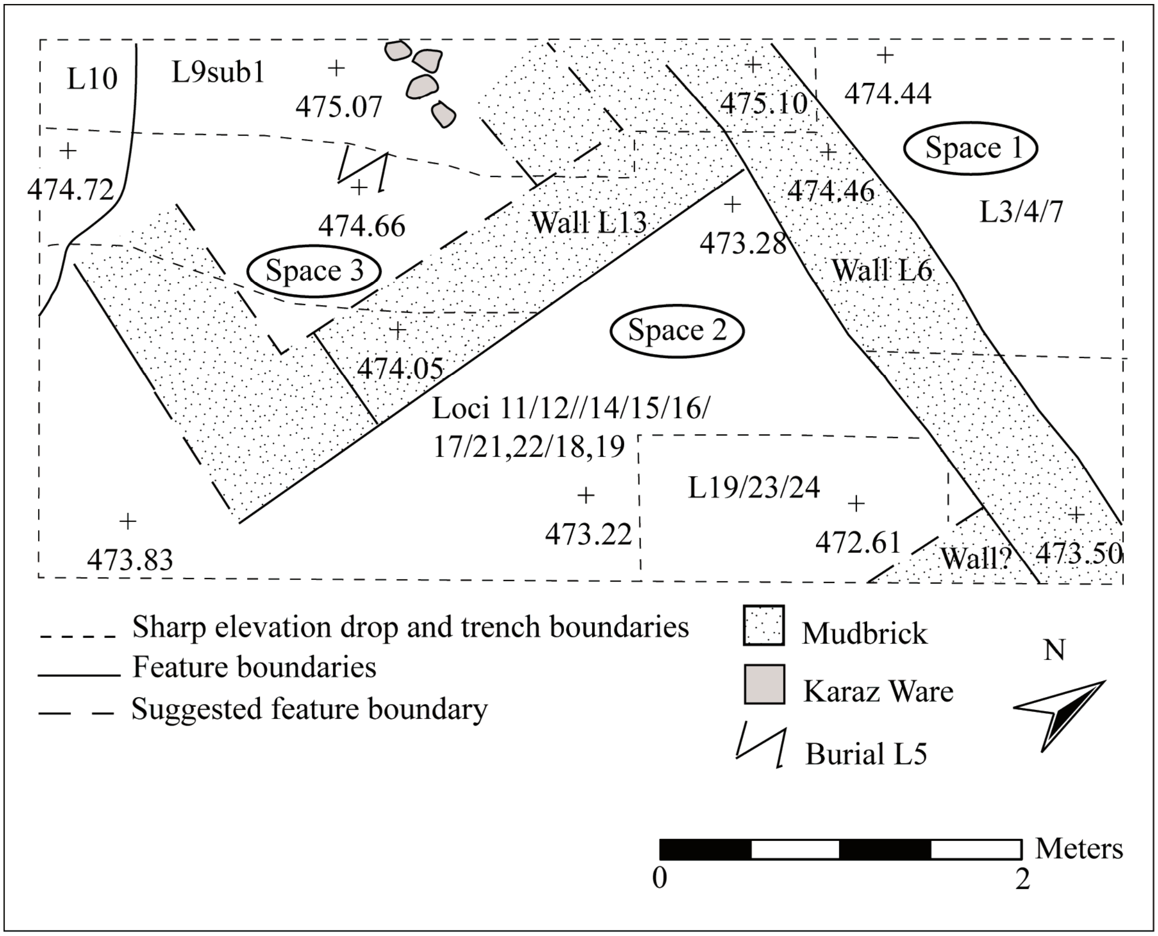


Figure 5.35: Trench J32, plan of key loci.

Figure 5.36, Descriptions: Plain Simple Ware.

A: RN8267-1, J32, L19. Plain Simple Ware. 8cmd, Int., ext.: 2.5Y 7/2 light gray, grading to 2.5 3/2 very dark grayish-brown core, faint paint on outside of rim: 2.5 YR 4/3 reddish-brown, sand temper: red, white, gray grits.

B: RN8243-1, J32, L17. Horizontal Reserved Slip Plain Simple Ware. 15cmd, Int. 7.5 YR 6/6 reddish yellow. Ext. 10 YR 8/4 very pale brown (slip), Fabric 5YR 6/6 reddish-yellow grading to 10 YR 5/2 grayish-brown core, fine grit temper.

C: RN8267-3, J32, L19. Plain Simple Ware. 14cmd, Int., ext.: 10 YR 7/3 very pale brown, Fabric: 10 YR 6/3 pale brown, no core, fine grit temper.

D: RN8186-2, J32, L14. Plain Simple Ware. 13cmd, Int., Ext.: 5Y 7/3 pale yellow, Fabric: 5Y 6/3 pale olive, no core.

E: RN8217-1, J32, L16. Plain Simple Ware. Int. 7.5 YR 7/6 reddish-yellow. Ext. 10 YR 7/4 very pale brown grading to 7.5 YR 6/6 reddish-brown core, fine sand temper.

F: RN8243-5, J32, L17. Cooking Pot Ware. 18cmd, Int., ext.: 5Y 6/6 reddish-yellow, grading to 10 YR 5/4 yellowish-brown core, large, sandy grits: gray, white; exterior burnished, hand made, has pinched out lug handle at rim.

G: RN8208-2, L15sub1. Cooking Pot Ware. 20.5cmd, Int.: 5YR 6/6 reddish-yellow, Ext.: 7.5 YR 6/4 light brown, grading to 10 YR 5/4 yellowish-brown core, sandy grit temper: gray, white; exterior horizontally burnished, handmade, blackened on shoulder.

H: RN8186-1, J32, L14. Cooking Pot Ware. 20 cmd, Int. 7.5 YR 6/4 light brown, Ext. 2.5YR 6/6 light red mottled with Gley 2 6/5PB bluish gray (from firing), grit temper, sandy, multicolored grits, exploded areas where 1-5mm white lime bits popped, well burnished exterior.

I: RN8267-7, J32, L19. Band Painted Plain Simple Ware. Int.: 5 YR 6/3 light reddish-brown, Ext.: 5Y 7/3 pale yellow, Fabric: 7.5 YR 5/3 brown, no core, paint: 5YR 6/4 –5/4 light to reddish- brown, fine grit temper.

J: RN8267-6, J32, L19. Band Painted Plain Simple Ware. Int., fabric: 10 YR 7/2 light gray, Ext.: painted: 2.5Y 2.5/1 black and a bit of 2.5Y 4/4 reddish brown, fine grit temper.

K: RN8267-4, J32, L19. Band Painted Plain Simple Ware. Int., ext.: 2.5 Y 7/2 light gray, Fabric: 2.5Y 6/3 light yellowish-brown, Paint: 2.5 YR 6/6 light red to 2.5 YR 4/4 reddish-brown, fine grit temper.

L: RN8267-5, J32, L19. Band Painted Plain Simple Ware. Int., ext., fabric: 2.5YR 6/8 light red grading to a hint of a 5Y 6/4 pale-olive core, Paint: 10 YR 4/8 red, thin lines: 2.5YR 6/8 light red, fine grit temper.

Figure 5.36, Descriptions (continued):

M: RN82670-2, J32, L19. Plain Simple Ware with thin grooves. Uncertain cmd, Int., ext.: 5Y 7/3 pale yellow, fabric: Gley 1 8/5gy light greenish-gray, no core, fine grit temper.

N: RN8234-1, J32, L17. Plain Simple Ware. 2cmd, Int./ ext.: 5 Y 7/3 pale yellow, Fabric: 5Y 8/3 pale yellow, no core, no visible temper.

O: RN8243-4, J32, L17. Cyma Recta Cup in Plain Simple Ware. 11.5cmd, Int., ext.: 5Y 6/4 pale olive and greener but no matching munsell, fabric: Gley 7/4G light greenish-gray, no visible temper, but some lime popping and 2-3mm grits, heavily weathered/covered with tar/plaque, a bit warped, not truly round.

P: RN8243-2, J32, L17. Plain Simple Ware. 10cmd, Int., ext., fabric: 5Y 6/3 pale olive, no core, no visible temper,

Q: RN8243-3, J32, L17. Plain Simple Ware. Approximately 10cmd, Int., ext.: 5Y 6/2 light gray olive, Fabric: Gley 1 7/5g: light greenish-gray, no core, no visible temper.

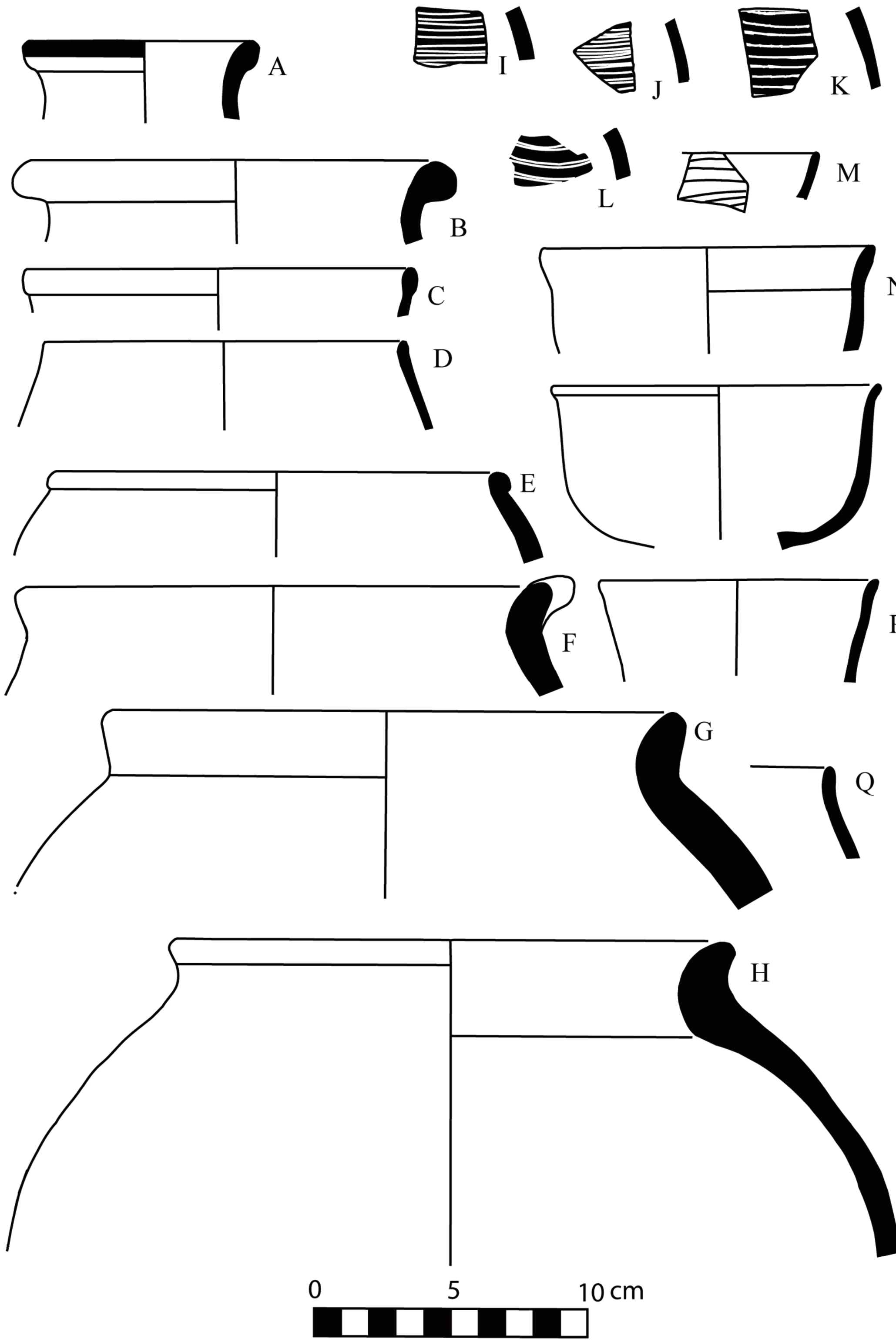


Figure 5.36: Third millennium ceramics from trench J32.

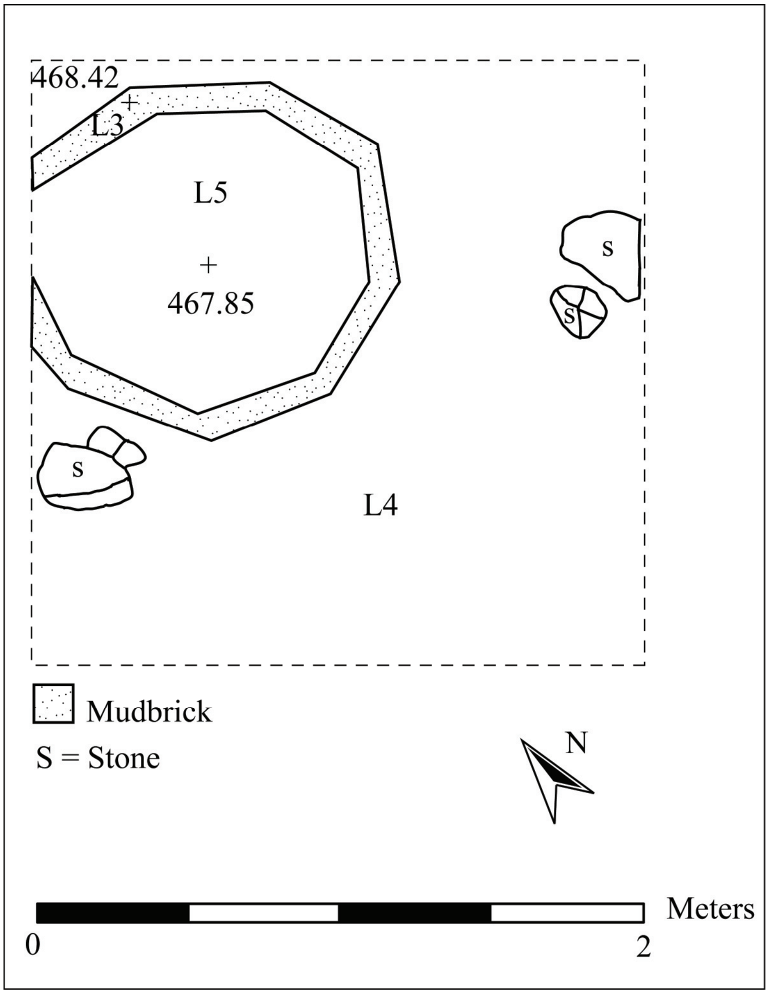


Figure 5.37: Trench K34, plan of key loci.

Figure 5.38, Descriptions:

A: RN9809-4, K34, L5. Plain Simple Ware. 12cmd, Int., ext.: Gley 1 8/10 light greenish-gray, fabric: Gley 1 8/5g or 7/5g, no core, some fine grits.

B: RN9809-3, K34, L5. Plain Simple Ware. 12cmd, Int., 2.5 YR 6/6 light red, Ext.: 10 YR 7/2 light gray, Fabric 10 YR 5/4 yellowish-brown, no core, Fine sand and white grits; some up to 0.7cm.

C: RN9809-5, K34, L5. Plain Simple Ware. Int.: 7.5 YR 6/4 to 6/6 light brown to reddish-yellow, Ext.: gley 1: 8/10y – 5G light greenish-gray, grading to 5 Y 5/2 olive-gray core, sand temper.

D: RN8120/8166, J32, L1/L9. Karaz Ware. 23cmd, Int.:eroded but reddish-brown, Ext.: 5YR 4/4 reddish brown to 7.5 YR 3/1 –3/1 very dark gray/brown, fabric: exterior black, grading to 10 YR 5/2 grayish-brown core towards interior wall of vessel, medium to fine chaff temper, fine grit temper (white grits), Int. of rim and Ext. highly burnished, design nearly burnished away in places.

E: RN8120-1, J32, L1. Karaz ware. Int. surface eroded: 7.5 YR 3/1 very dark gray, Ext. 10 YR 4/4 weak red to 7.5 YR 3/2 dark brown, abrupt black core, chaff temper, burnished exterior, design more prominent than RN 8166/8140.

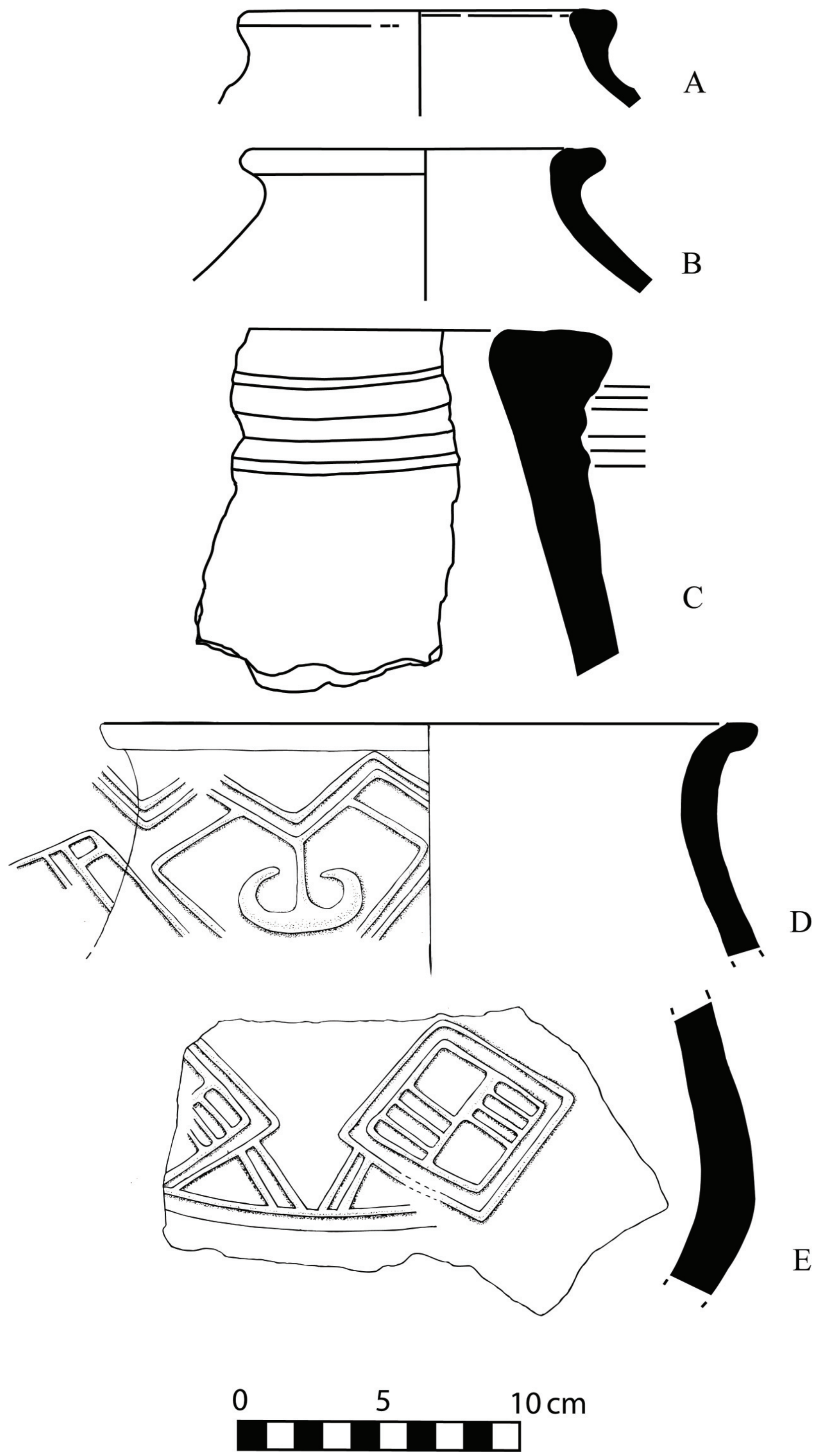
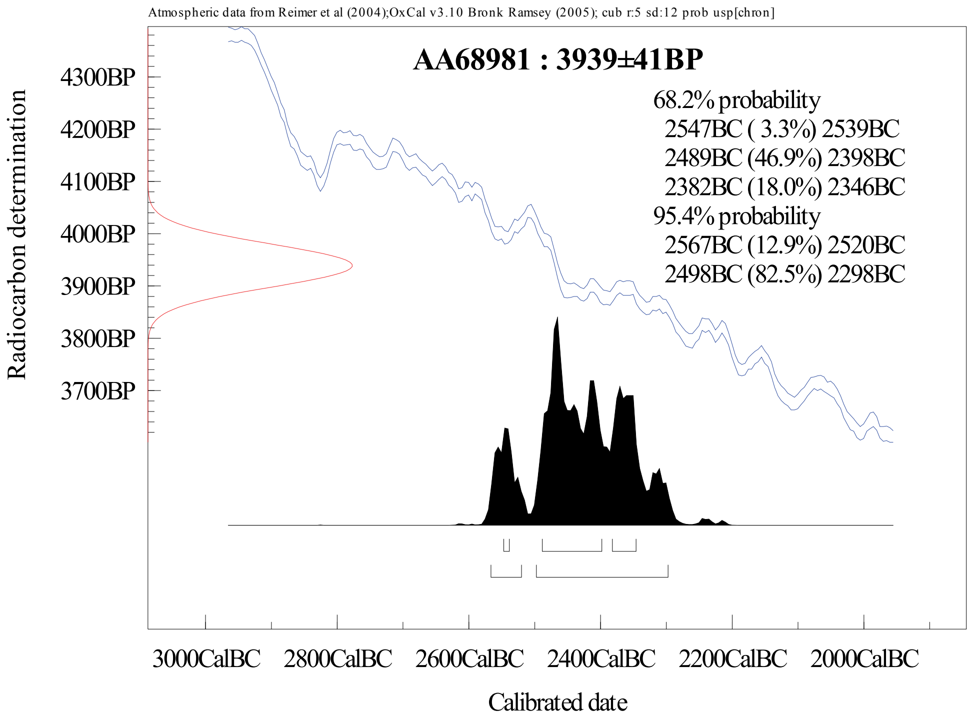


Figure 5.38: late third to early second millennium ceramics from K34 (A, B,C), and mid third millennium Karaz Ware sherds from J32 (D, E).

A.



B.

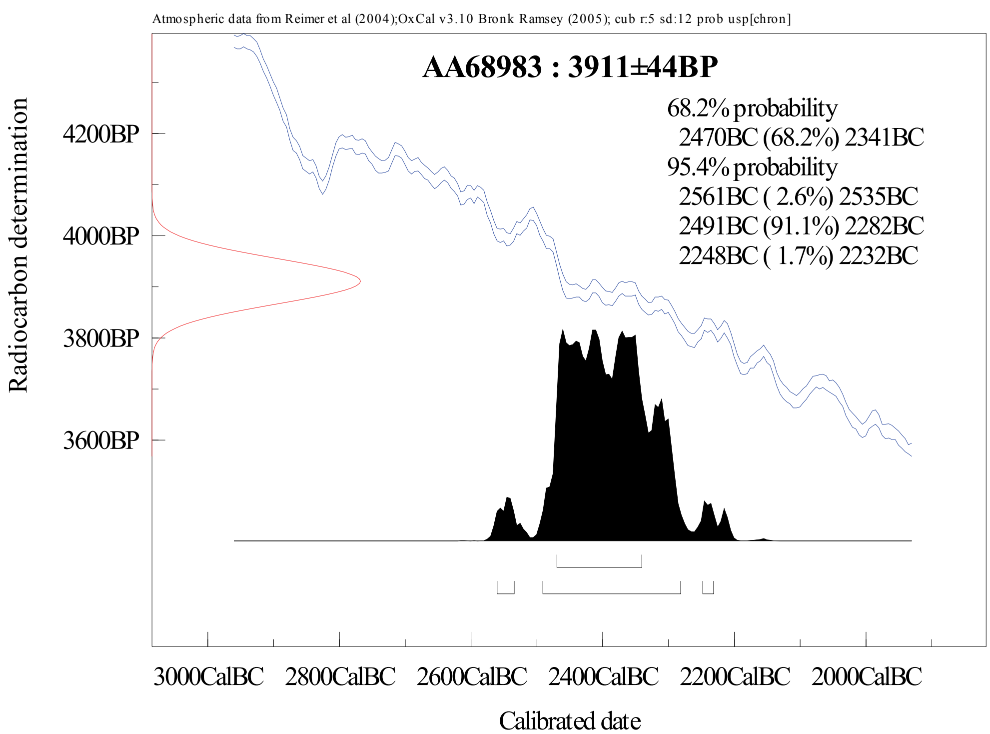


Figure 6.1a-b: Carbon dates for samples from Op 2.1 (A, sample RN 10966, L23, burned barley from depot floor), and Op 2.2 (B, sample RN 11731, L52, burned barley from storage jar east of building).

C.

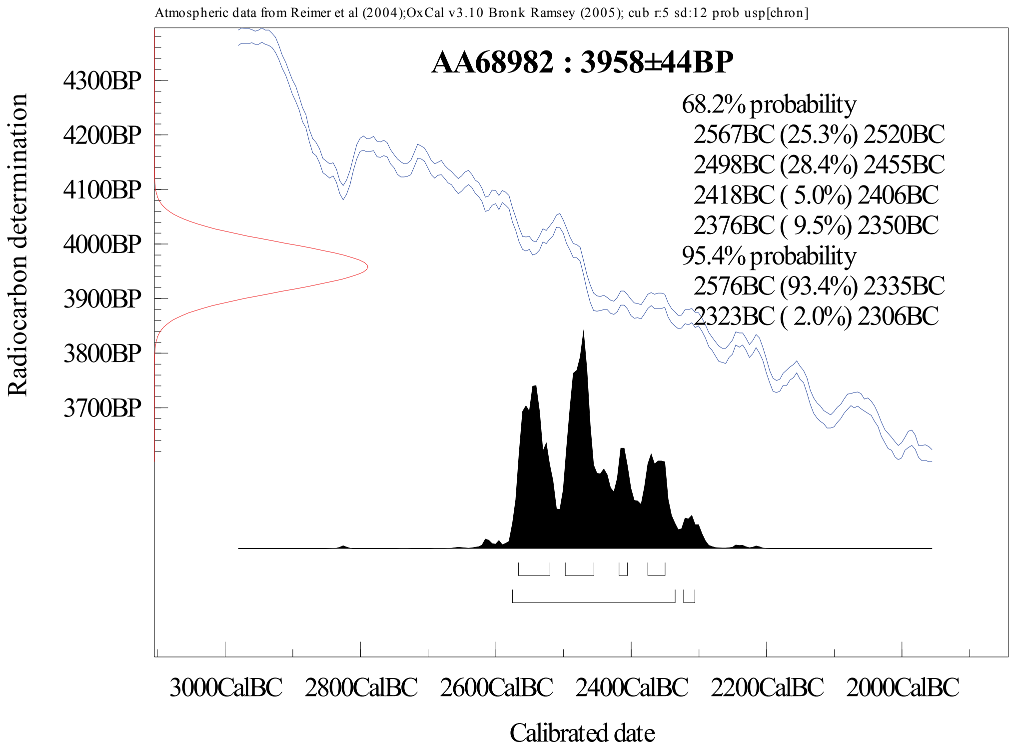


Figure 6.1c: Carbon date for sample from Op. 4 (sample RN 11213, L29, burned material – probably wood – from floor of southern room).

Figure 6.2: Area 1: orientation of structures and features.

Figure 6.3 (key).

"Ratio" is the length to width ratio.

13a: outer stone wall; 13b: inner mudbrick wall

*Full width not determined

*Major stone sizes:

small: can carry in one hand

medium: can carry in two hands

large: need help to carry

massive: need multiple people and mechanical assistance to move

N/A = not exposed / not measurable

Building Unit	External Length (m)	External Width (m)	Area (sqm)	Ratio (L/W)	Wall width (m)	major stone size**	Founda-tions	Checked by trench
1	38	22	836	1.73	2.00	large to massive	N/A	F37-42
2	40	20	800	2.00	2.00	large to massive	N/A	Op 1.1-1.2
3	17	17	289	1.00	2.00	large to massive	N/A	Op6
4	19.5	11.2	218.4	1.74	1.10 - 1.3	large to massive	N/A	Op2
5	18	9	162	2.00	1.24 - 1.4	large to massive	prepared base and fill	Op2
6	37	36	1332	1.03	2.5 - 3+	small to medium	prepared base and fill	Op7
7	12.25	6.3	77.18	1.94	1.25	medium	N/A	Op3
8	17	10	170	1.70	1.4 - 2	medium to large	N/A	Op4
9	13.5	11.5	155.25	1.17	N/A	N/A	N/A	N/A
10	17.5	4.5	78.75	3.89	N/A	N/A	N/A	N/A
11	N/A	NA	N/A	N/A	0.55 - 0.75	small to medium	not prepared	Op 8
12	N/A	NA	N/A	N/A	1	large to massive	N/A	F14
13a*	50	18	900	2.78	5	medium to massive	N/A	Area C
13b	N/A	NA	N/A	N/A	1	N/A	N/A	Area C
J32	N/A	NA	N/A	N/A	0.45 - 0.60	N/A	not prepared	J32
Op 10	N/A	NA	N/A	N/A	0.50 - 0.80	small	not prepared	Op 10

Figure 6.3: Dimensions and characteristics of selected structures.

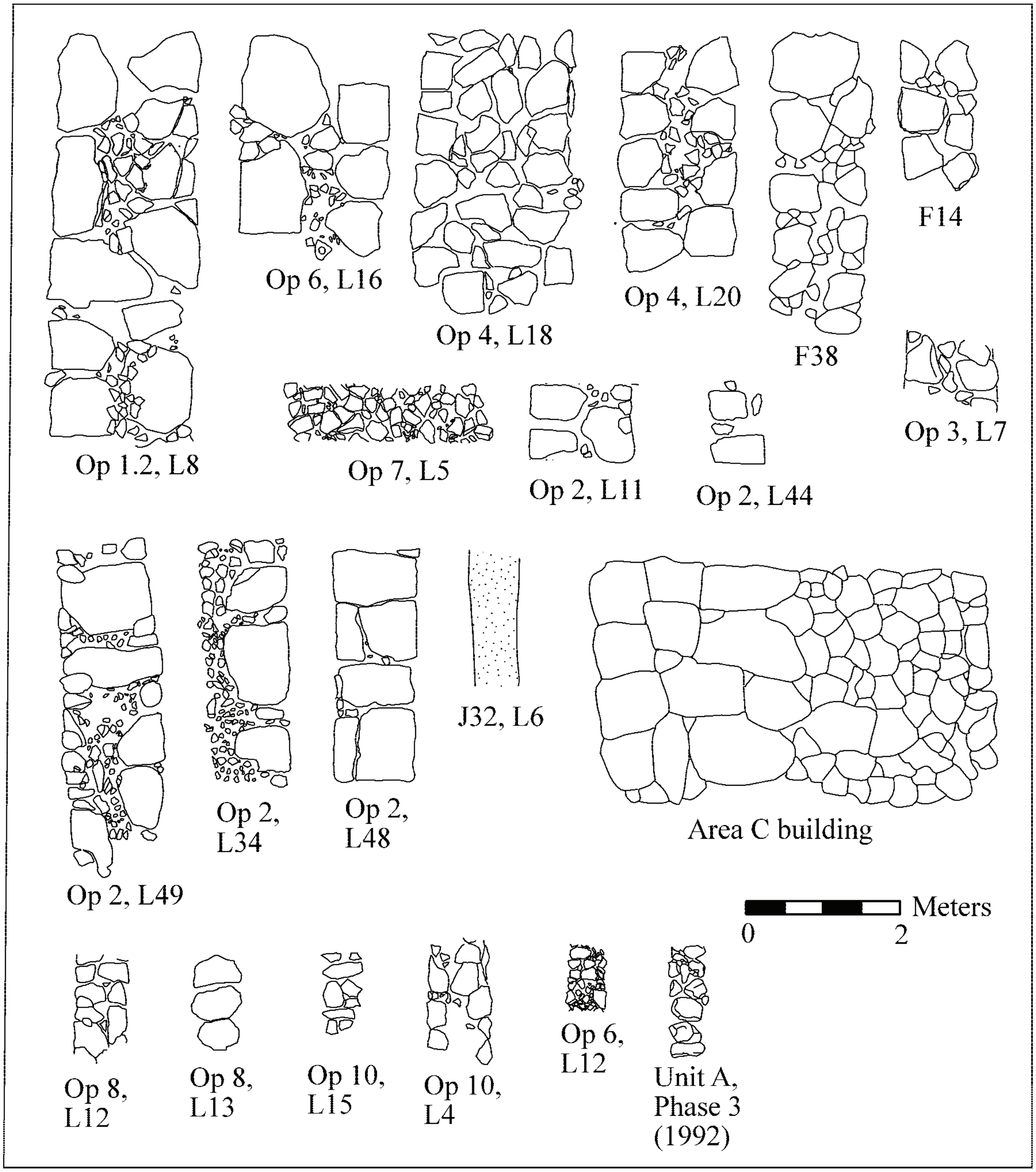


Figure 6.4: Wall segments, reoriented for comparison. Upper rows are the EBA, bottom row is Second Millennium except for Op 8, which may date to the EBA.

Code	Ware	Code	Functional Category	Code	Thickenss
1	Plain Simple Ware	1	Cups, small bowls	1	Thin
2	Cooking pot unburnished	2	Medium bowls	2	Medium
3	Cooking pot burnished	3	Storage-sized open forms	3	Thick
4	Chaff + grit cooking pot	4	Small jars		
5	Horizontal Reserve Slip (thick)	5	Medium jars		
6	Horizontal Reserve Slip (thin)	6	Large Storage Jars		
7	Horizontal Reserve Slip with waves	7	Not sure if open or closed		
8	Combed Wash Ware	8	Miniatures		
9	Band Painted Ware	9	Stand		
10	Combed Wash Stone Ware	10	Pot disc, pierced		
11	Band Painted Stone Ware	11	Pot disc, not pierced		
12	Stone ware	12	Strainer		
13	Metallic Ware	13	Cook pot		
14	Karababa				
15	Karaz				
16	Other / Misc				
17	Chaff, fine grit, burnished, thick				
18	Gritty, grey/tan core				
19	Coarse, chaff tempered.				
20	Fine ware: burnished, red exterior, orange paste, no core				
21	Fine ware: black paste, white specks, ext. brown-reddish				
22	Grey, exterior burnished				
23	Chaff and grit in equal amounts				
24	Fine chaff in small amounts				
25	Fine chaff and grit in small amounts, usually white grits, possibly Late EBA?				
26	Orange paste, burnished grey slip (only from Op2, Op10)				
27	Coarse ware with impressions filled with white material, similar to cooking pot ware.				

Figure 6.5: Pottery recording codes.

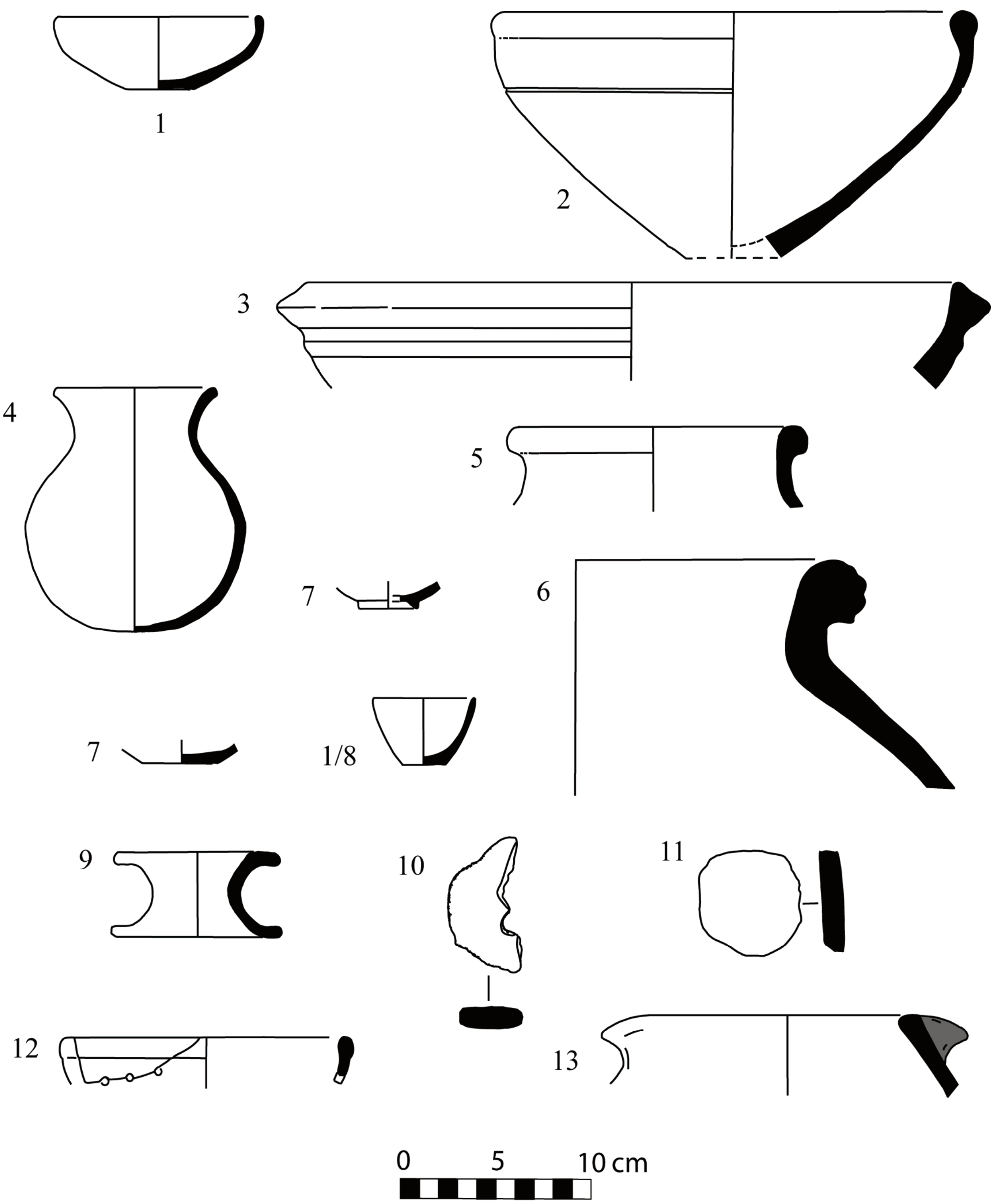


Figure 6.6: Ceramic functional category examples.
1- cups, small bowls; 2- medium bowls; 3 - large open forms; 4 - small jars;
5 - medium jars; 6 - large jars; 7 - not sure if open or closed (bases);
8 - miniatures; 9 - stands; 10 - pierced pot discs; 11- unpierced pot discs;
12 - strainers; 13 - cooking pots.

Figure 6.7, Descriptions:

99: RN 10797, 11244 and 11259, Op 4, L29. Metallic ware corrugated cup with flat base. 15cmd. Ext, int, fabric: Gley 1 5/N and 6/N gray. No core.

101: RN 11748, 11752, Op 2, L42. Burnished cooking pot. 17cmd. Ext., int., fabric: 10 YR 6/4 light yellowish-brown. Coarse angular white and gray grits. Burnished ext. and rim.

103: RN 10732, 10735, Op 4, L19, 21. Karababa Painted Ware. 20 cmd (?). Ext. paint and on rim: 2.5 YR 4/6 red. Faded in places. Ext., int. unpainted: 2.5Y 7/2 light gray. Fabric: 10 YR 6/4 light yellowish-brown. No core. Very gritty, mostly grey and white grits.

147: RN 10797, Op 4, L29. Band Band Painted Plain Simple Ware. 14cmd. Int., ext., fabric: 10 YR 7/4 very pale brown to 6/4 light yellowish-brown. Paint: 5 YR 5/4 reddish brown. Some white grits.

213: RN 11087, Op 2, L46. Band Painted Plain Simple Ware. 16cmd. Int., ext., fabric: 5 Y 8/2 pale yellow. Paint: 5 Y 3/1 very dark gray.

276: RN 10870, Op 5, L12. Band Painted Plain Simple Ware. 2.6cmd. Int., ext., fabric: 5Y 8/2 pale yellow. Paint: 5YR 4/2 dark reddish-gray.

279: RN 10863, Op 5, L11. Combed Wash Ware. 5cmd. Int., ext., fabric: 10 YR 7/2 very pale brown. Paint: 5YR 4/6 yellowish-red.

281: RN 10863, Op 5, L11. Metallic ware cup with ring base. 2.3cmd base. Int., ext.: Gley 1 4/N dark gray. Fabric: 2.5YR 4/4 reddish-brown. Abrupt Gley 1 4/1 dark gray core.

297: RN 10863, Op 5, L11. Ware 21 burnished bowl. 16cmd. Int., ext., fabric: 7.5 YR 4/1 dark gray. Abrupt thin 10 R 4/4 weak red core. Burnished inside and out.

422: RN 11303, Op 4, L35. Metallic ware ring base. 5.5cmd. Int., ext.: 10 YR 6/2 light brownish gray. Fabric: Thin margin and thin core of 10 YR 5/1 gray, bracketing zone of 2.5YR 5/6 red.

425: RN 11313, Op 4, L37. Horizontal and Wavy Reserved Slip body sherd. Int., ext.: 10 YR 6/3 pale brown. Slip: 2.5Y 8/2 pale yellow. Fabric: 2.5Y 4/1 dark gray, grading to 2.5Y 5/2 grayish-brown core. Mica, dark grits.

635: RN 11677, Op 2, L50. Thin Horizontal Reserved Slip body sherd. Int., ext., fabric: 10 YR 7/2 light gray. Slip: 5Y 8/2 pale yellow.

636: RN 11732, Op 2, L62. Thin Horizontal and Diagonal Reserved Slip body sherd. Int., ext., fabric: 10 YR 7/2 light gray. Slip: 5Y 8/2 pale yellow.

Figure 6.7, Descriptions (continued):

646: RN 11278, Op 4, L33. Combed Wash Ware body sherd. Int., ext.: 2.5Y 8/2 pale yellow. Fabric: 2.5Y 7/3 pale yellow. Wash: 5YR 4/2 dark reddish-gray. White grits.

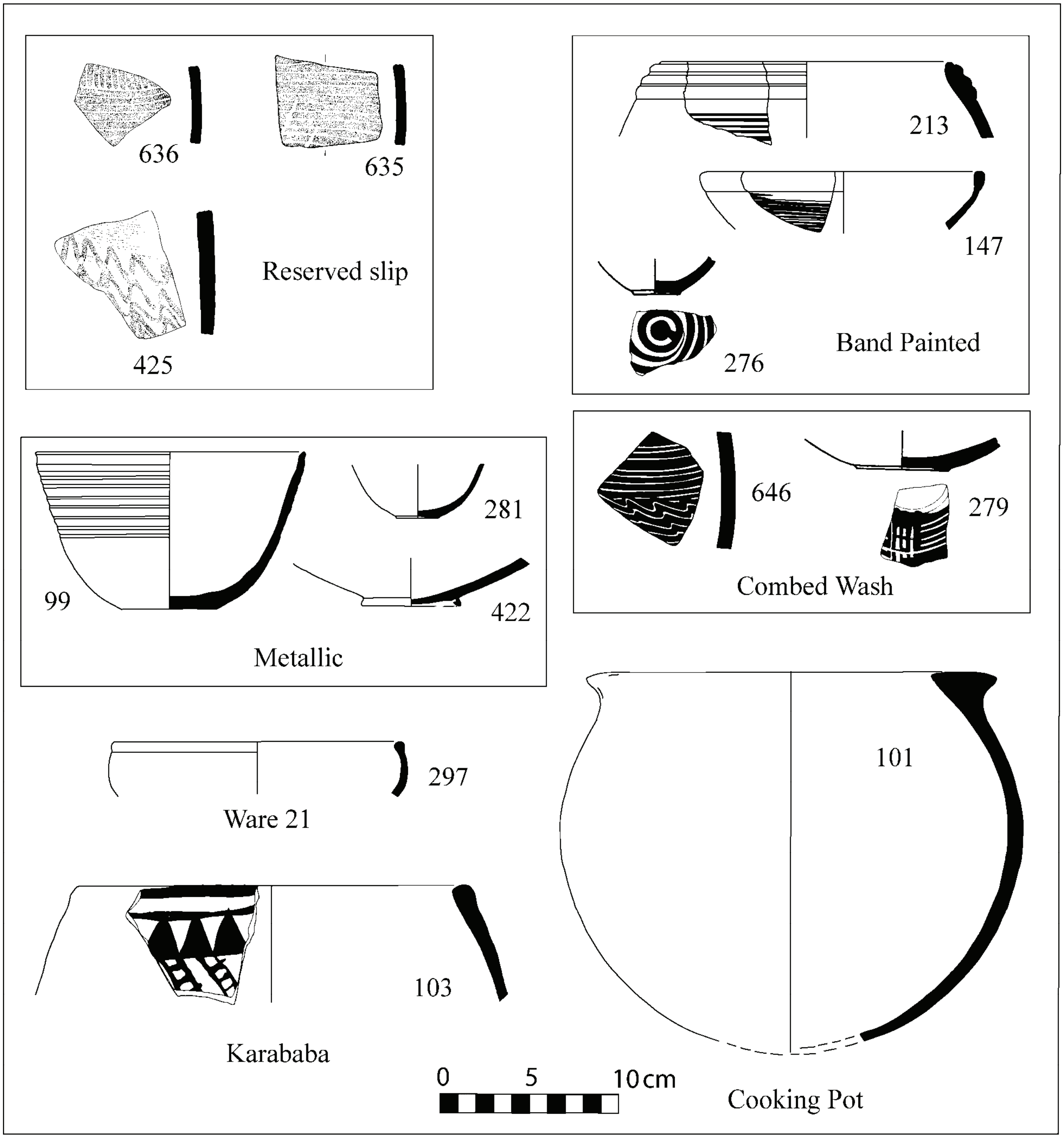


Figure 6.7: EBA ware examples.

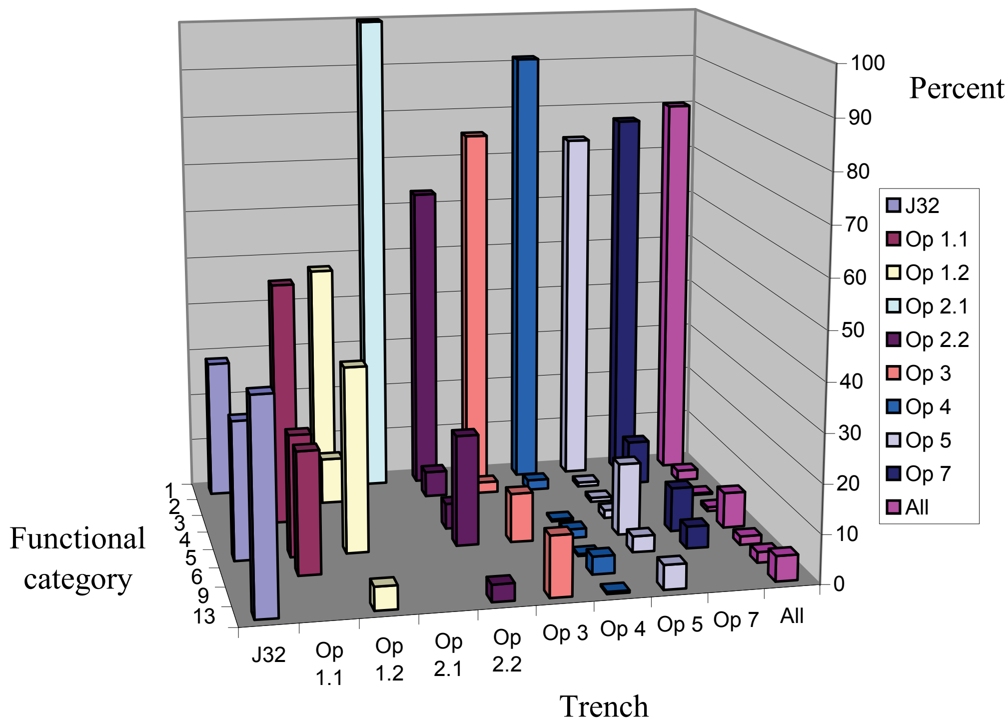


Figure 6.8: EBA diagnostic pottery sherd count proportion by functional category and trench for priority 1 contexts (Op 7 = priority 2).

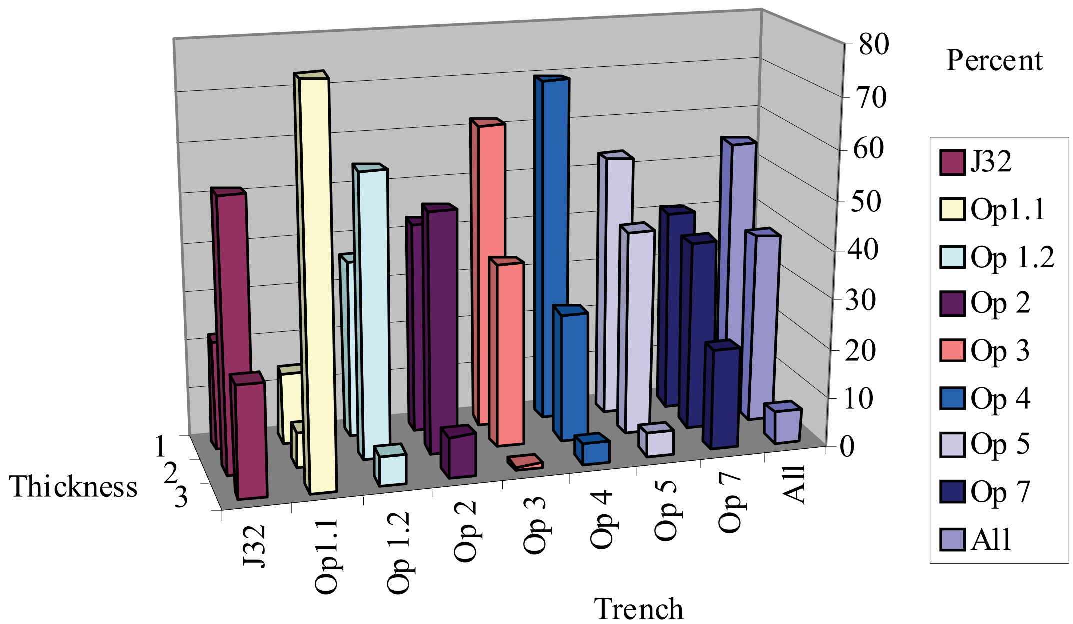


Figure 6.9: EBA pottery sherd count proportion by thickness category and trench for priority 1 contexts (Op 7 = priority 2).

Thickness	P1	%	P2	%	P1+2	%
1	2628	55	2667	38	5295	44.67
2	1866	39	3612	51	5478	46.21
3	312	6	769	11	1081	9.12
Total	**4806**	**100**	**7048**	**100**	**11854**	**100**

Figure 6.10: EBA pottery sherd thickness counts for priority 1 and 2 contexts.

A: EBA Count, all sherds
Decorated (wares 5-11, 14) versus undecorated

	P1	%	P2	%	P1+P2	%
Undecorated	4593	92.06	7021	95.43	11614	94.07
Reserved slip	220	4.41	128	1.74	348	2.82
Painted	176	3.53	208	2.83	384	3.11
Total	4989	100	7357	100	12346	100

C: EBA Diagnostics Count by decoration
Decorated wares (5-11, 14) versus undecorated

	P1	%	P2	%	P1+P2	%
Undecorated	863	95.68	1019	95.41	1882	95.53
Reserved slip	4	0.44			4	0.20
Painted	35	3.88	49	4.59	84	4.26
Total	902	100	1068	100	1970	100

B: EBA Diagnostics Count by functional category
Painted wares (8-11, 14)

FC	P1	%	P2	%	P1+2	%
1	22	88.00	41	91.11	63	90.00
2	1	4.00			1	1.43
4			1	2.22	1	1.43
5	2	8.00	3	6.67	5	7.14
Total	**25**	**100**	**45**	**100**	70	**100**

D: EBA thickness count by painted (wares 8-11, 14)

Thickness	P1	%	P2	%	P1+2	%
1	150	88	155	76	305	81.77
2	20	12	48	24	68	18.23
Total	**170**	**100**	**203**	**100**	**373**	**100**

E: EBA Diag thickness count by painted (wares 8-11, 14)

Thickness	P1	%	P2	%	P1+2	%
1	26	81	45	92	71	87.65
2	6	19	4	8	10	12.35
Total	**32**	**100**	**49**	**100**	**81**	**100**

F: EBA thickness count by reserved slip (wares 5-7)

Thickness	P1	%	P2	%	P1+2	%
1	166	75	18	14	184	52.87
2	54	25	107	84	161	46.26
3			3	2	3	0.86
Total	**220**	**100**	**128**	**100**	**348**	**100**

Figure 6.11: EBA decorated pottery sherd tables.

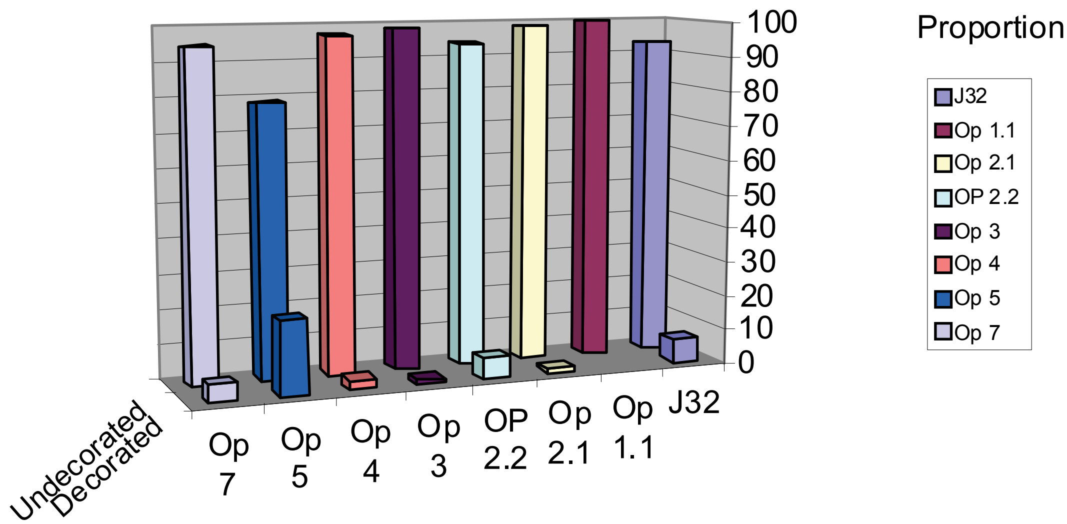


Figure 6.12: EBA, decorated (Wares 5-11, 14) versus undecorated (all other wares) pottery by trench, priority 1 and 2 contexts.

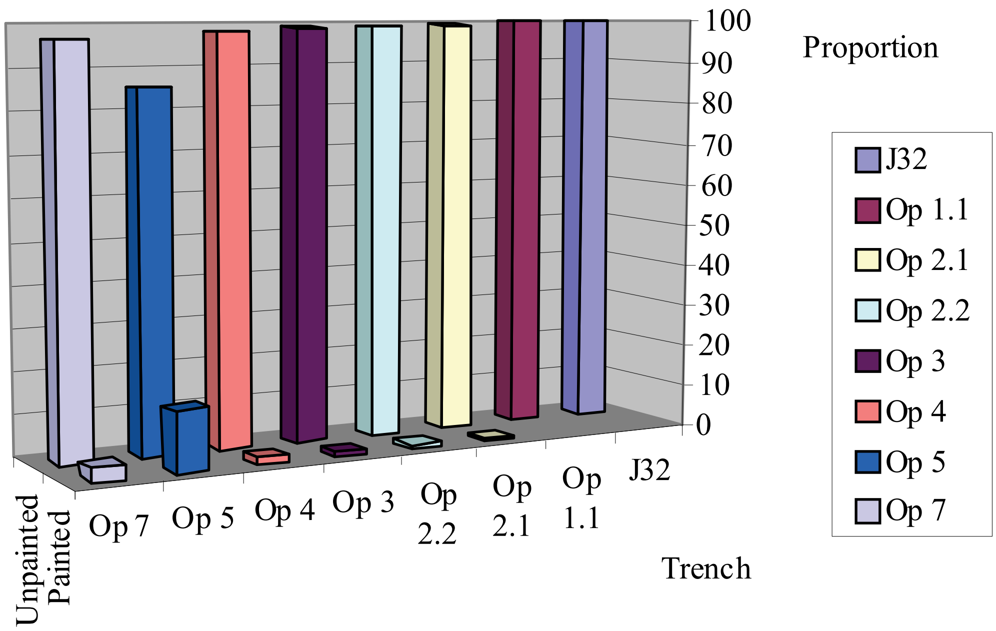


Figure 6.13: EBA, painted (wares 8-11, 14) versus unpainted (all other wares) pottery by trench, priority 1 and 2 contexts.

Figure 6.14: Descriptions.

268: RN 10583, Op 4, L6. Body sherd with incised design (animal feet?). Ext.: 7.5 YR 6/3 light brown. Int., thick fabric/core: black. Medium and large chaff temper in large amounts.

389: RN 10860, Op 5, L11. Pin. Round head, bent neck. 3g. Probably bronze.

390: RN 11641, Op 2, L36. Tack with head wrapped in gold foil. Probably bronze. Less than 1g.

391: RN 10275, Op 2, L16. Female figurine. Plain Simple Ware. Pale yellow. 9g.

392: RN 11607, Op 2, L50. Figurine. Plain Simple Ware. Pale yellow to pale brown. 29g.

398: RN 11958, Op 10, surface find. Ceramic lion head. 10 YR 7/3 very pale brown 365g.

419: RN 10639, Op 4, L6. Plain Simple Ware incised body sherd. Int., ext.: 10 YR 8/2 very pale brown. Fabric: 10 YR 6/3 pale brown.

556: RN 10595, Op 4, L3. Female figurine, legs portion. Flat back. 6g, 2.29cm wide X 1.46cm tall X 2.81 long. Ext.: 2.5Y 7/2 light gray.

649: RN 10339, Op2, L19. Animal figurine, hindquarters. 6cm, 2.18cm long X 1.32cmd. 10YR 7/3 very pale brown .

655: RN 10642, Op4, L6. Wheel. Plain Simple Ware. 46g, 8cmd, 2.35cm thick at 'hub,' pierced hole 0.92cm wide. Ext.: 2.5Y 8/2 pale yellow.

656: RN 10676, Op4, L13. Wheel. Plain Simple Ware. 36g, 6.72cmd, 2.25cm thick (at 'wheel hub'), pierced hole is 0.73cm wide. 2.5Y 8/3 pale yellow.

659: 10725, Op 4, 15. Figurine torso. Probably female. Impressed circles around the presumed front of the neck. Fingernail impressions in a line across the chest between the arm stubs. Plain Simple Ware, pale yellow. 43g.

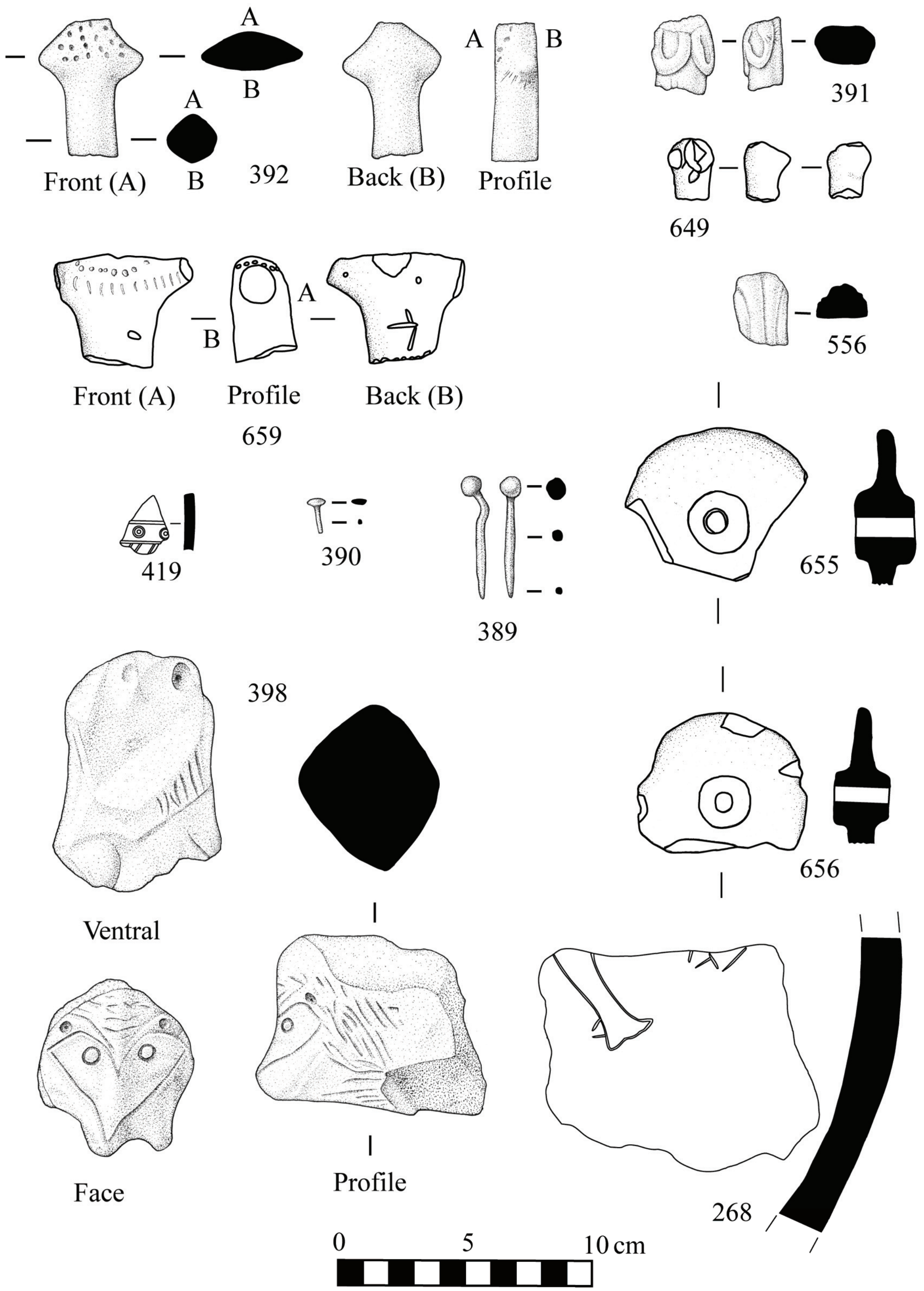


Figure 6.14: Various finds from Kazane.

Figure 6.15: Descriptions.

A: RN8120/8166, J32, L1/L9, 23cmd. Karaz ware. Int.:eroded but reddish-brown, Ext.: 5YR 4/4 reddish-brown to 7.5 YR 3/1 –3/1 very dark gray/brown, fabric: exterior black, grading to 10 YR 5/2 grayish-brown core towards interior wall of vessel, medium to fine chaff temper, fine grit temper (white grits), Int. of rim and Ext. highly burnished, design nearly burnished away in places;

B: RN 8120-1, J32, L1. Karaz Ware. Int. surface eroded: 7.5 YR 3/1 very dark gray, Ext. 10 YR 4/4 weak red to 7.5 YR 3/2 dark brown, abrupt black core, chaff temper, burnished exterior.

C: RN8140/8166, J32, L1. Karaz Ware. Int.: 7.5 YR 6/6 reddish yellow to 7.5 YR 5/3 brown. Ext.: mottled 5YR 3/2 brown to 3/3 brown (towards base of vessel) to 7.5 YR 2.5/1 black (from shoulder to rim), thick, abrupt, black core towards shoulder and base of pot where vessel is thicker; thin, grading black core near rim where vessel is thinner, fine chaff temper, fine grit temper, white and gray grits, some larger 0.5cm grit inclusions, some lime, heavily burnished exterior both vertically and horizontally -- almost polished in some places.

D: RN8120-3, J32, L1. Karaz Ware. Ext. 5YR 4/4 reddish-brown (and inside lip of rim), may be slipped. Int. (eroded) 5YR 3/2 dark reddish-brown, medium to fine chaff temper, fine grit temper (white grits), burnished exterior, tip of rim eroded.

103: RN 10732, 10735, Op 4, L19, 21. Karababa Painted Ware jar. 20 cmd (?). Ext. paint and on rim: 2.5 YR 4/6 red. Faded in places. Ext., int. unpainted: 2.5Y 7/2 light gray. Fabric: 10 YR 6/4 light yellowish-brown. No core. Very gritty, mostly grey and white grits.

104: RN 10863, Op 5, L11. Karababa Painted Ware jar. 18cmd. Ext. paint and internal painted rim: mottled 5YR 4/3 reddish-brown to 5YR 3/2 dark reddish-brown. Int., fabric: 2.5Y 7/3 pale yellow. White grits. Slightly darker core.

105: RN 10360, Op 2, L23. Karababa Painted Ware jar. 14cmd. Ext. paint and internal painted rim: 2.5YR 3/2 dusky red. Ext. and int. unpainted surface, fabric: 2.5Y 5/2 grayish-brown. Some white grits.

234: RN 10698, Op 4, L13. Ware 27; white-filled impressions. Body sherd. 1.25cm thick. Int., ext., fabric: 10 YR 6/3 pale brown. Grading to gray core. Gray and red grits. Similar to cooking pot ware.

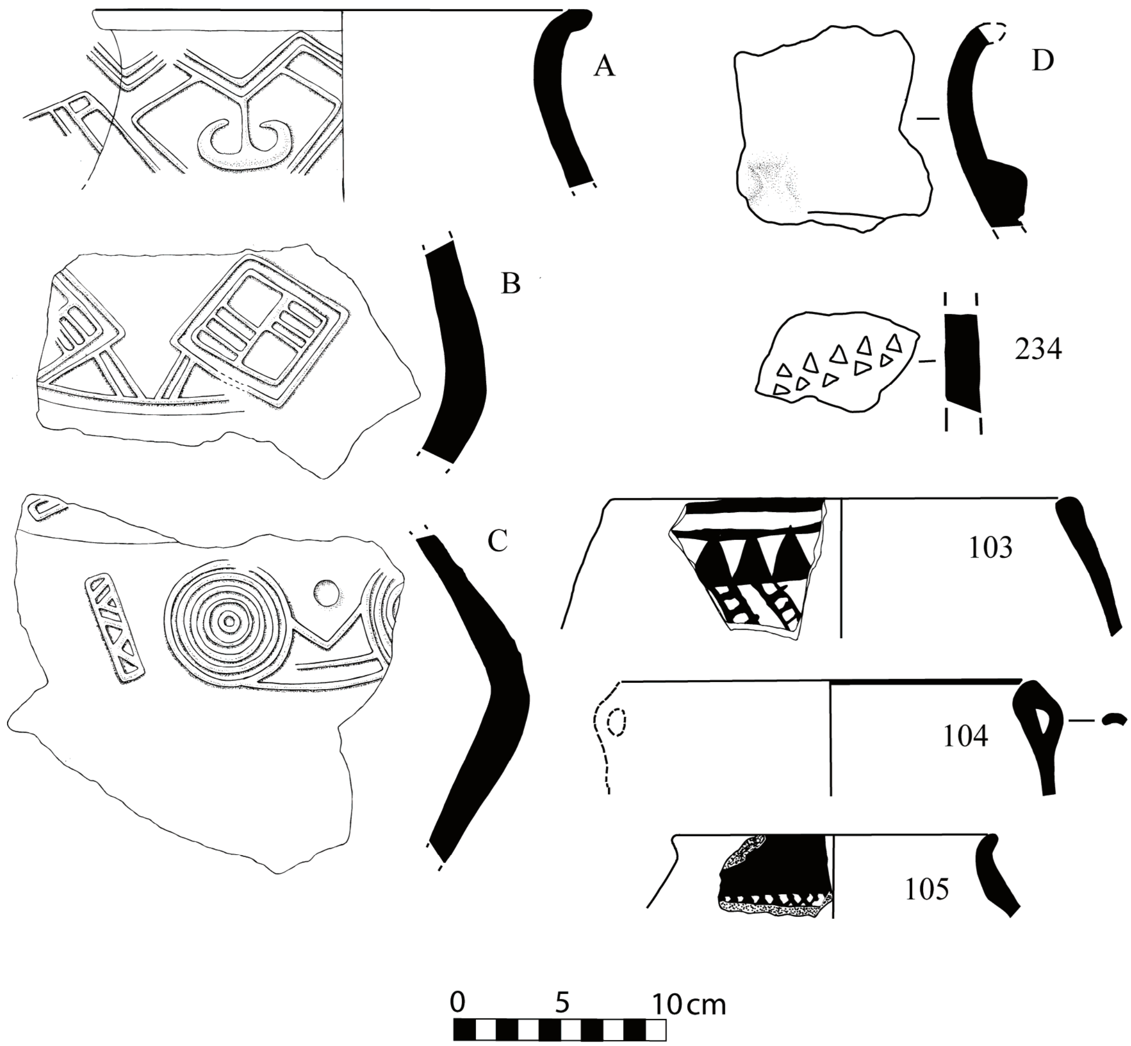


Figure 6.15: Exotic EBA ceramics: A-D: ware 15 (Karaz); 234: ware 27; 103-105: ware 14 (Karababa).

	J32	Op 2	Op 4	Op 5	Total
Ware					
14 (Karababa)		2	9	6	17
15 (Karaz)	5*				
27 (white filled impressions)			1		1
Total	5	2	10	6	23

*This is an estimate of the total number of vessels represented by numerous sherds that mend.

Figure 6.16: EBA imported wares, sherd count by trench.

Figure 6.17: Descriptions:

195: RN 10722, Op 4, L15. Plain Simple Ware stand portion. Int., ext.: mottled 5 Y 7/6 reddish-brown and 7.5YR 6/4 light brown. Fabric: 7.5 YR 6/4 light brown. Fine white grits.

196: RN 11223, Op 4, L29. Rim or base for Plain Simple Ware stand. 26cmd. Ext., int.: 5Y 8/2 pale yellow. Fabric: 7.5 YR 7/3 pink.

197: RN 11223, Op 4, L29. Plain Simple Ware stand section. Ext., int., fabric: Ranging from 5Y 8/2 pale yellow to 10 YR 8/2 very pale brown. Substantially encrusted with calcium in places. Note: although the shape and design of this fragment are identical to the nearly complete stand in Figure 5.20, the two do not mend.

198: RN 10769, Op 4, L22. Plain Simple Ware stand fragment. Int., ext., fabric: 5YR 7/6 reddish-yellow. White grits.

267: RN 11201, Op 4, L17. Plain Simple Ware stand fragment. Int., ext., fabric: 2.5Y 8/2 pale yellow.

367: RN 10600, Op 4, L2. Complete stand with fenestrations. 18cmd at base, 17.5 at top; height 27cm. Int., ext., fabric: mottled 10 YR 7/2 light gray to 7/3 very pale brown to 7.5 YR 7/4 pink. Sooted, but it is not clear if this occurred from use or post-depositional processes. Fine white grits.

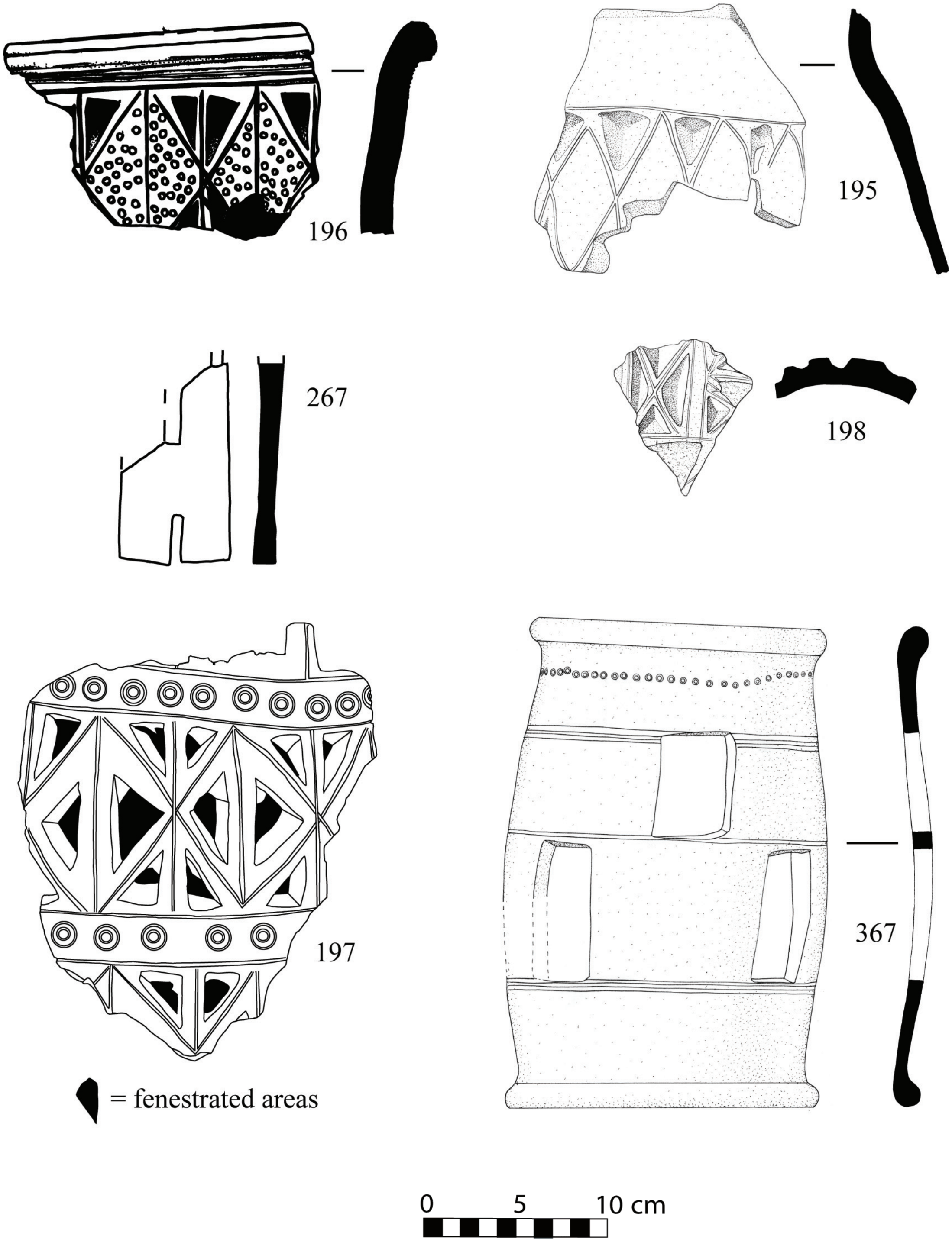


Figure 6.17: Incised and fenestrated stands from Operation 4 (for simple stands, see Figure 5.19).

A: Stands by unit

Unit	count	%	weight	%
Op 4	57	98	11134	100
Op 9	1	2	30	0
Total	**58**	**100**	**11164**	**100**

B: Op4 Stands: Count

subtype	P1	%	P2	%	P1+2	%
Fenestrated	11	52	30	83	41	72
Plain	10	48	6	17	16	28
Total	**21**	**100**	**36**	**100**	**57**	**100**

C: Op4 Stands: Weight

subtype	P1	%	P2	%	P1+2	%
Fenestrated	1303	65	8765	96	10068	90
Plain	704	35	362	4	1066	10
Total	**2007**	**100**	**9127**	**100**	**11134**	**100**

D: Op4 stands by locus

Locus	Fenestrated	plain	Total
2	3		3
3	1		1
5		1	1
14	1		1
15	3		3
17	2		2
21	2		2
22	16	2	18
28		3	3
29	10	5	15
31	3		3
32		5	5
Total	**41**	**16**	**57**

E: Op4 stands by loci

Locus	count	%
22+29	33	58
all other	24	42
Total	**57**	**100**

Locus	weight	%
L22+L29	7867	41
all other	11134	59
Total	19001	100

Figure 6.18: Distribution of stand pieces by trench, and by decoration and locus within Operation 4.

Figure 6.19: Descriptions.

567: RN 10592, Op2, L36. Ceramic disc made from a reused potsherd. Rough edges. 45g, 5.83cmd, 1.12dm thick. 2.5YR 6/3 light reddish-brown

574: RN 10876, Op2, L65. Clay sealing with rolled impression

648: RN 10338, Op 2.1, L16. Clay counting (?) disc. One side smooth, one side filled with small circular impressions. Pinched edges. Only 84 marks appear in the drawing, but there are actually 97 marks. The marks seem to spiral towards the center. 13g. Int., ext.,: 7.5 YR 3/1 very dark gray.

RN8175, J32, L12, White limestone disc, about ¼ complete, 18g, 8cmd, 0.74cm thick in center, tapering to thin edges.

RN8215, J32, L15, Pierced white limestone, 50g, 6.3cmd, 2.43cm thick but tapers to thin edges, pierced hole 1cm to 1.45cm at edge.

RN8221, J32, L18, Squeezed clay – clay squeezed in someone's fist and then low fired, 14g, 6.79cm X 1.84cmd, crumbly, has some chaff, 10 YR 6/3 pale brown. Possibly a sealing 'blank.'

RN8268, J32, L19, Pierced ceramic disc, possibly a spindle whorl, 5g, 5cmd, 0.60cm thick but tapers a bit at the edges, flat sides, pierced hole broken but approx. 0.48cmd. 10 YR 8/3 very pale brown.

RN8318, J32, L24 Level 1, Possible sealing / seal impression (largely illegible), 12g, 5.09cm X 2.4cm X 1.14cm, dark gray and brown, chaff and grit tempered clay.

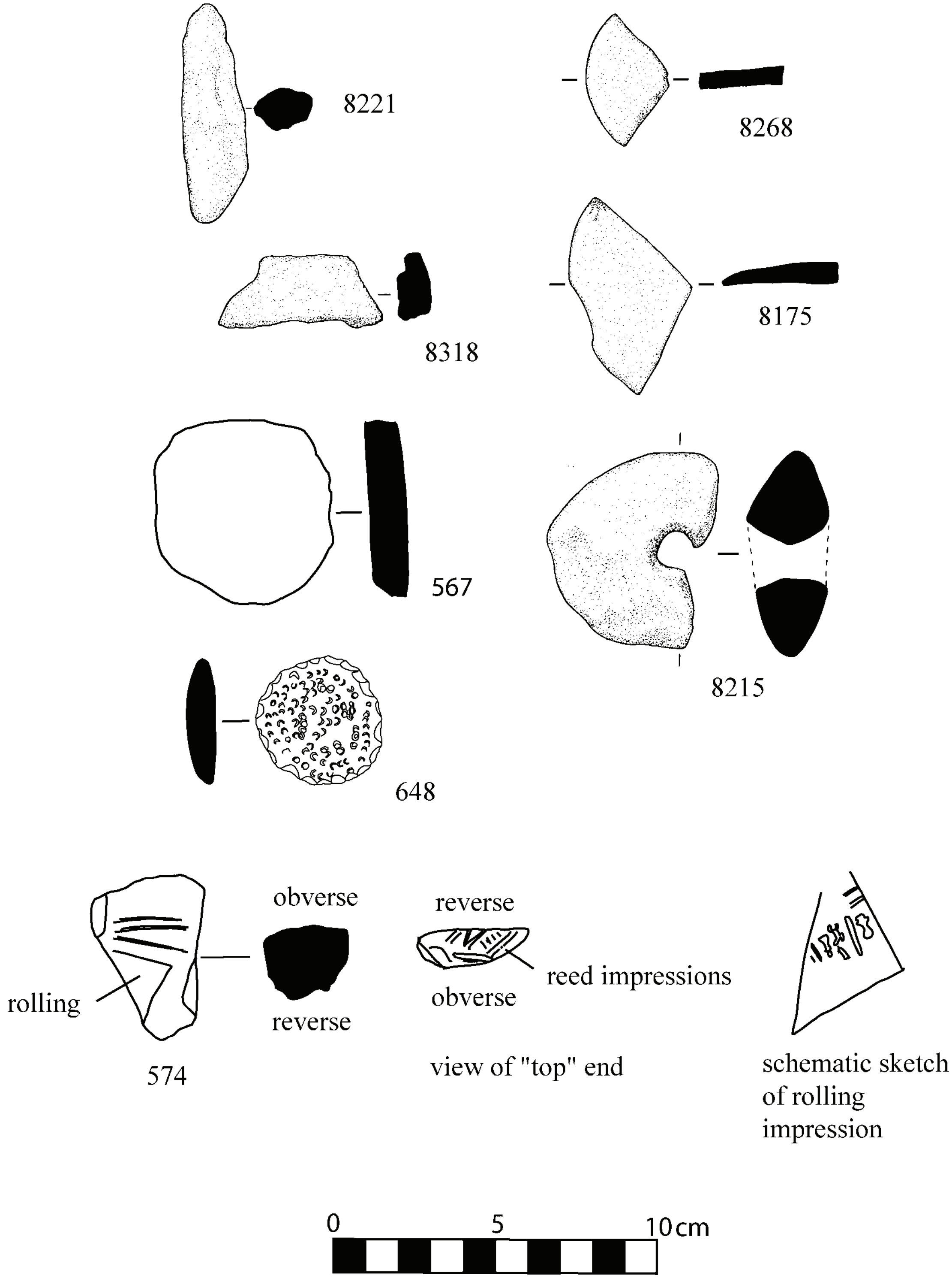


Figure 6.19: administrative objects and craft tools from third millennium contexts.

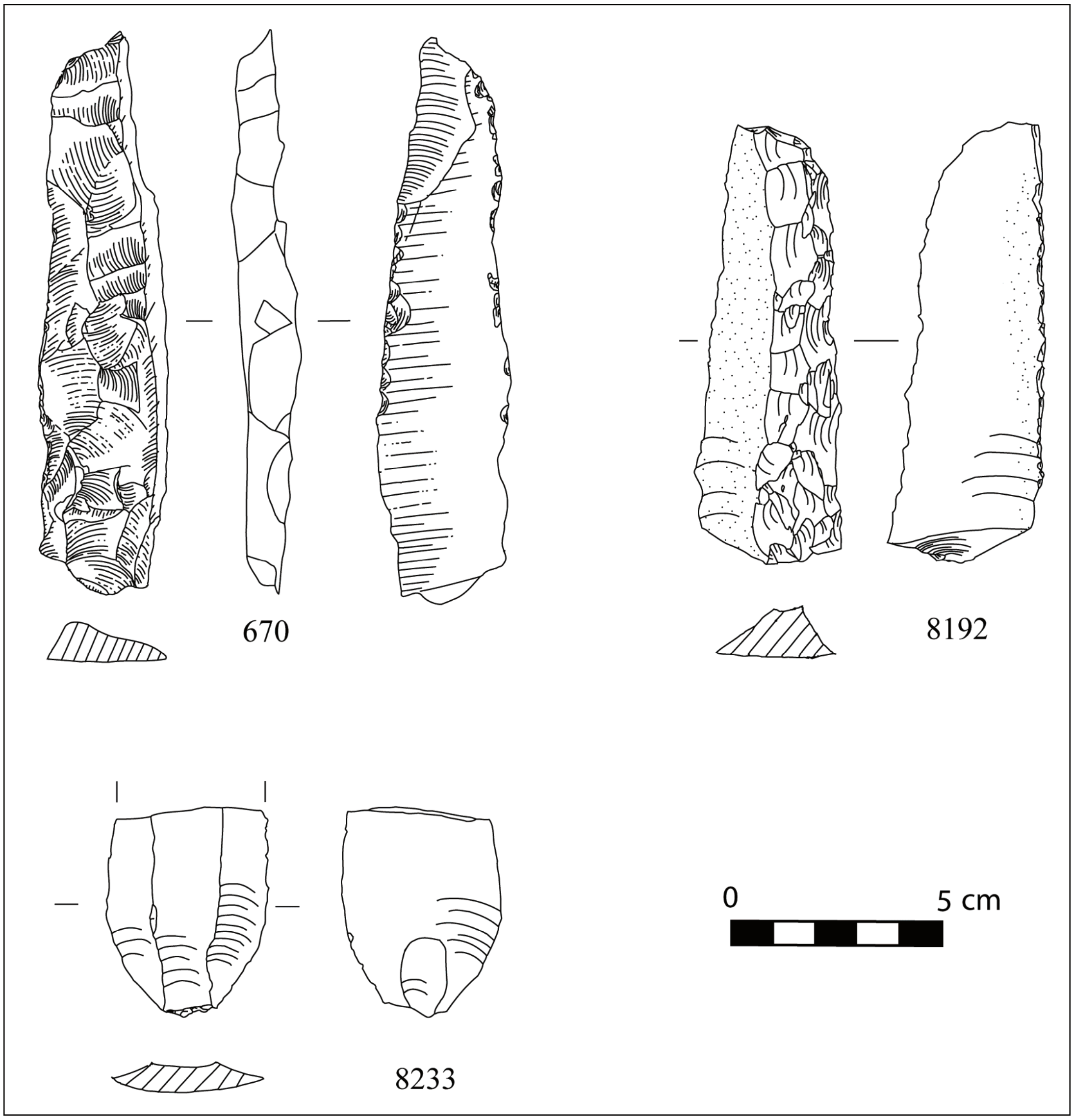


Figure 6.20: Selected chipped stone tools from Operation 4 (670) and J32 (8192 - glossed [stippling] Canaanean blade, 8233 - blade segment). Objects 8192 and 8233 after original drawings by Britt Hartenberger.

	J32	%	Op 1.2	%	Op 2.1	%	Op 2.2	%
Flakes	211	68.73	13	61.90	70	54.26	171	19.04
Blades	11	3.58		0.00	3	2.33	6	0.82
Tools	31	10.10	5	23.81	17	13.18	52	4.62
Cortical Fl	37	12.05	1	4.76	19	14.73	19	5.17
Cores	5	1.63	1	4.76	4	3.10	4	1.09
Chips	5	1.63			3	2.33	7	0.82
Chunks	7	2.28			13	10.08	26	3.54
CTE			1	4.76				
Total	307	100	21	100	129	100	285	35.09

	Op3	%	Op 4	%	Op 5	%	Op 7	%
Flakes	59	59.60	125	56.56	56	56.00	4	50.00
Blades	3	3.03	3	1.36	2	2.00		
Tools	16	16.16	30	13.57	18	18.00	1	12.50
Cortical Fl	8	8.08	25	11.31	11	11.00	1	12.50
Cores	5	5.05	14	6.33			1	12.50
Chips	1	1.01	3	1.36	1	1.00		
Chunks	7	7.07	16	7.24	11	11.00	1	12.50
CTE			5	2.26	1	1.00		
Total	99	100	221	100	100	100	8	100

	All Trenches	%
Flakes	709	60.60
Blades	28	2.39
Tools	170	14.53
Cortical Fl	121	10.34
Cores	34	2.91
Chips	20	1.71
Chunks	81	6.92
CTE	7	0.60
Total	1170	100

Figure 6.21: Third millennium chipped stone assemblage by trench, priority 1 and 2 contexts (CTE = core trimming elements).

Tool type	J32	%	Op 1.2	%	Op 2.1	%	Op 2.2	%
Retouched Fl.	8	25.00			7	33.33	15	37.50
Retouched Bl.	6	18.75	2	40	1	4.76	5	12.50
Notched Fl.	6	18.75	1	20	5	23.81	7	
Side Scraper	2	6.25	1		7	33.33	1	2.50
Piercer	5	15.63	1		1	4.76	3	7.50
Combination								
Tool	3	9.38		0			3	7.50
Scraper	1	3.13					2	5.00
Glossed Bl.	1	3.13				0.00	1	2.50
Denticulate							2	5.00
Heavy Chopper		0.00						0.00
Projectile Point							1	2.50
Knife								
Total	**32**	**100**	**5**	**100**	**21**	**100**	**40**	**100**

Tool type	Op 3	%	Op 4	%	Op 5	%	Op 7	%	total	%
Retouched Fl.	5	33.33	10	34.48	2	13.33	1	100	48	30.38
Retouched Bl.	2		4		4	26.67			24	15.19
Notched Fl.		0.00	2	6.90	2	13.33			23	14.56
Side Scraper	2		4	13.79	5	33.33			22	13.92
Piercer	2	13.33		0.00		0.00			12	7.59
Combination										
Tool		0.00	1		1				8	5.06
Scraper	1		3	10.34		0.00			7	4.43
Glossed Bl.	2	13.33	1	3.45					5	3.16
Denticulate		0.00		0.00	1				3	1.90
Heavy Chopper	1	6.67	2	6.90					3	1.90
Projectile Point		0.00	1	3.45		0.00			2	1.27
Knife		0.00	1	3.45					1	0.63
Total	**15**	**100**	**29**	**100**	**15**	**100**	**1**	**100**	**158**	**100**

Figure 6.22: Third Millennium chipped stone tools by trench, priority 1 and 2 contexts (Retouched blades include truncated blades and backed blades; notched flakes include notched pointed flakes).

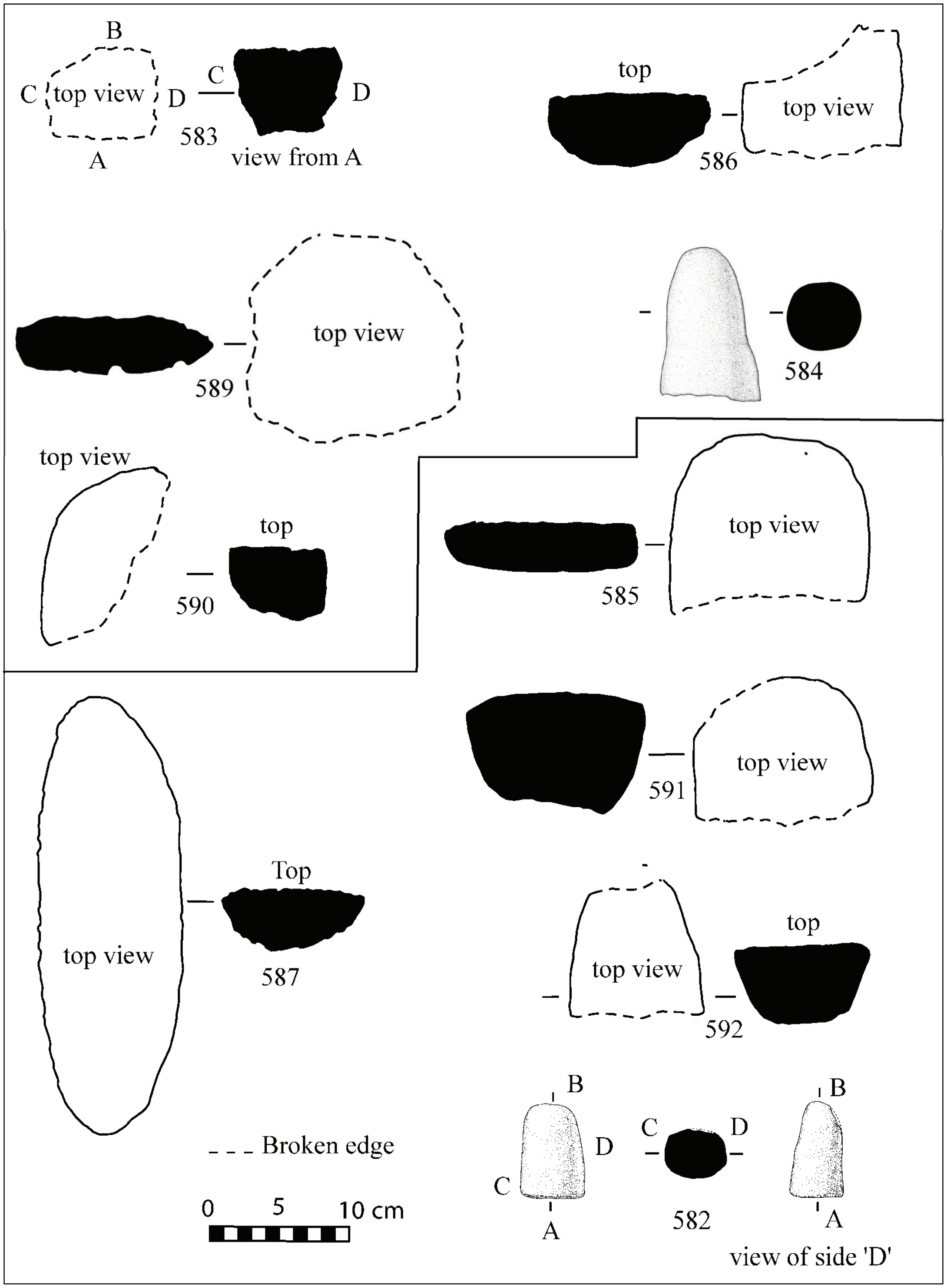


Figure 6.23: Basalt grindstones. EBA (top): Op. 4, L29 (583, 589), and L19 (586, 590), and pestle from Op 2, L66 (584). MBA (bottom): Op. 6, L19 (587), Op. 8, L8 (585, 591, 592), and a pestle from Op. 8, L7 (582).

A

Thickness	count	%	weight	%
1	343	17	2984	3
2	1176	58	41030	43
3	511	25	52391	54
Total	**2030**	**100**	**96405**	**100**

B

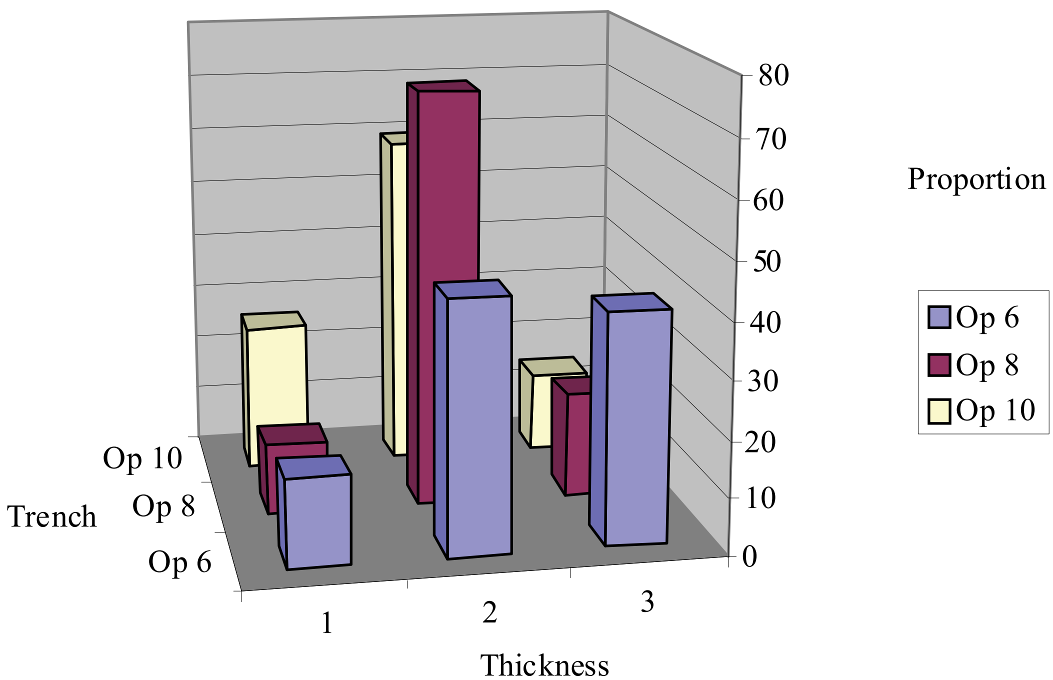


Figure 6.24a-b: A:MBA ceramic count and weight by thickness categories for priority 1 and 2 contexts; B: MBA ceramic thickness count proportion by trench, priority 1 and 2 contexts.

A

FC	P1	%	P2	%	P1+2	%
1	5	11	29	31	34	24
2	5	11	7	7	12	9
3	8	17	10	11	18	13
4			9	9	9	6
5	17	37	31	33	48	34
6	11	24	9	9	20	14
Total	**46**	**100**	**95**	**100**	141	**100**

B

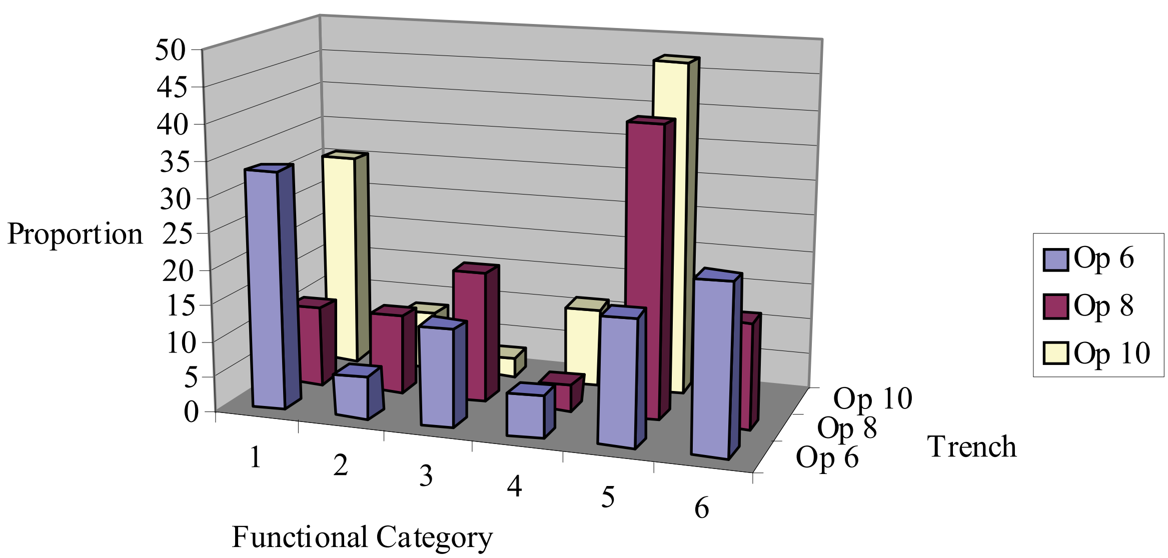


Figure 6.25a-b: A:MBA ceramic diagnostics count by functional categories;
B: MBA ceramic diagnostic count proportions for functional categories by trench, priority 1 and 2 contexts.

	K34	%	Op 6	%	Op 8	%	Op 10	%	Total	%
Tool	1	100	2	33.33	11	52.38	2	12.5	16	36.36
Flakes			3	50.00	6	28.57	3	18.75	12	27.27
Chunk					2	9.52	5	31.25	7	15.91
Core			1	16.67	1	4.76	3	18.75	5	11.36
Blade							2	12.5	2	4.55
Cortical fl					1	4.76	1	6.25	2	4.55
Total	1	100	6	100	21	100	16	100	44	100

Tool type	K34	Op 6	Op 8	Op 10	Total	%
Retouched Fl.		1	3		4	28.57
Notched Fl.			2	1	3	21.43
Glossed Bl.	1		1		2	14.29
Retouched Bl.		1	1		2	14.29
Scraper			1		1	7.14
Heavy Chopper			1		1	7.14
Side Scraper			1		1	7.14
Total	1	2	10	1	14	100

Figure 6.26: MBA chipped stone tools by trench, priority 1 and 2 contexts.

Building Unit	Administrative (sealings)	Ritual	Production Activities	Burial	Storage	Exotic or prestige goods	Monumental (dimensions or wall thickness)	Domestic (installations or wall thickness)	Found in Trench
1	X			X			X		F37-42
2					X (jar in Op 1.1)		X	X (andiron/hearth)	Op 1.1-1.2; E700N550
3			X (MBA installations)				X	X (MBA finds)	Op6
4	X				X (jars)	X (gold	X		Op2
5	X				X (grain)		X		Op2
6					X (architecture)		X		Op7
7		X (objects)				X (out-sized eye insets, other	X	X (domestic refuse)	Op3
8		X (stands, objects)	X (grindstones, installations)			X (Karababa ware)	X	X (cooking installation)	Op4
9									N/A
10									N/A
11								X (walls)	Op 8
12			X (weaving tools)		X (jars)		X		F14
13a*							X		Area C
13b							X		Area C
J32	X			X		X (Karaz ware)		X (walls and cooking installations)	J32
Op 10								X (walls and installations)	Op 10
K34			X (oven)					X (installation)	

*13a: outer stone wall; 13b: inner mudbrick wall.

Grey fill marks MBA contexts.

Figure 6.27: Building Unit uses based on characteristics of architecture and the distribution of artifacts.

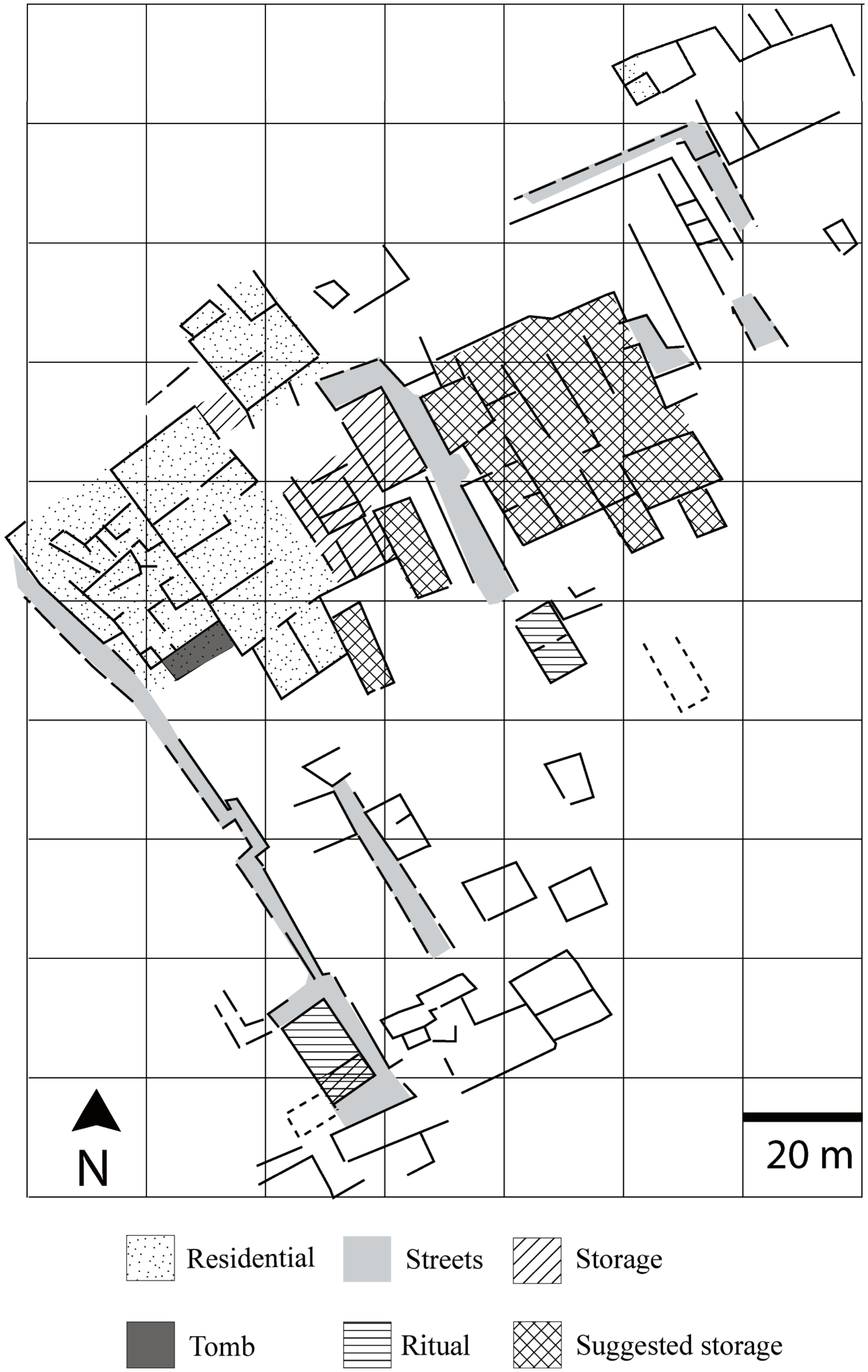


Figure 6.28: Use of space in Area 1, based on architecture, artifacts, and features.

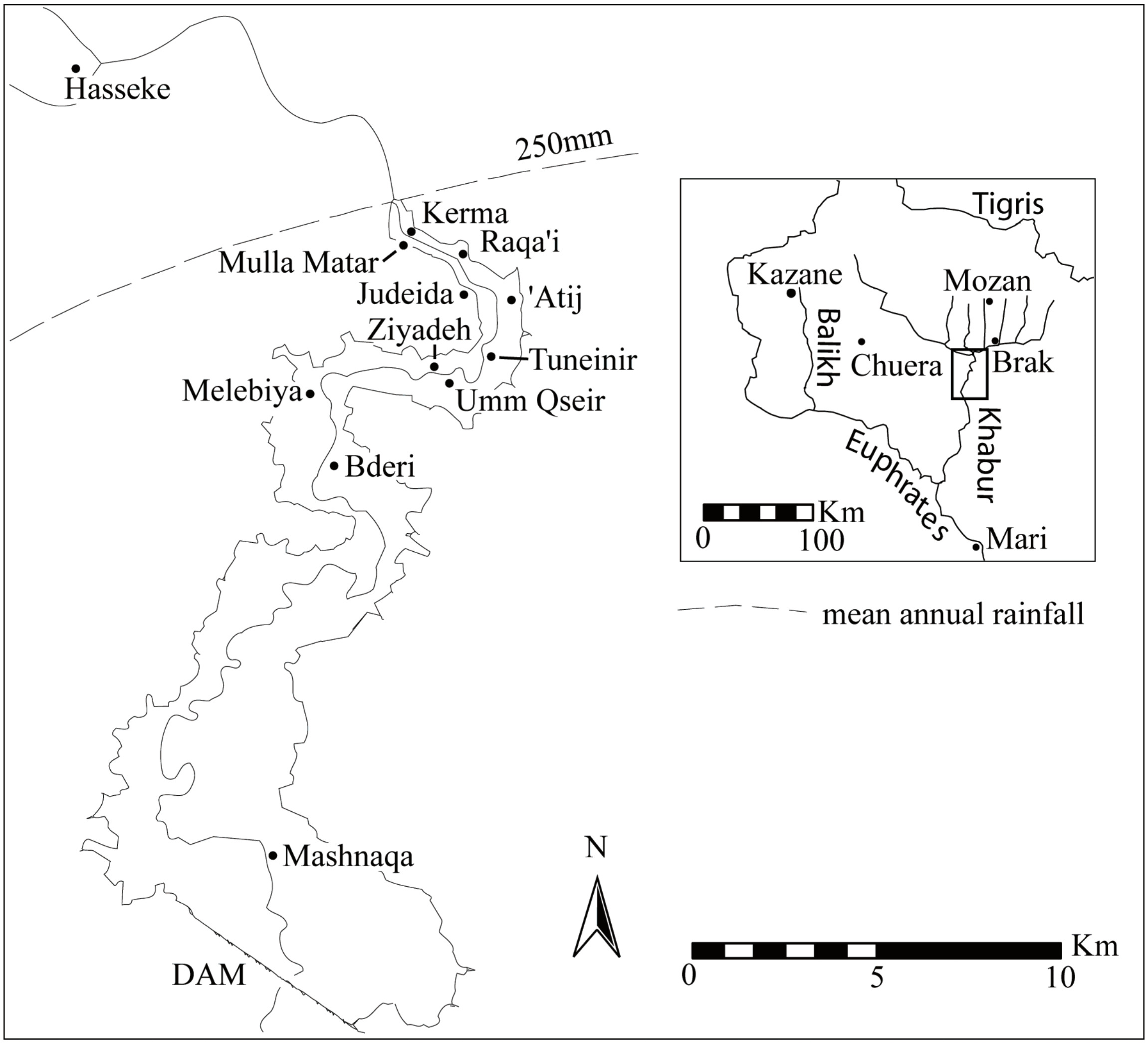
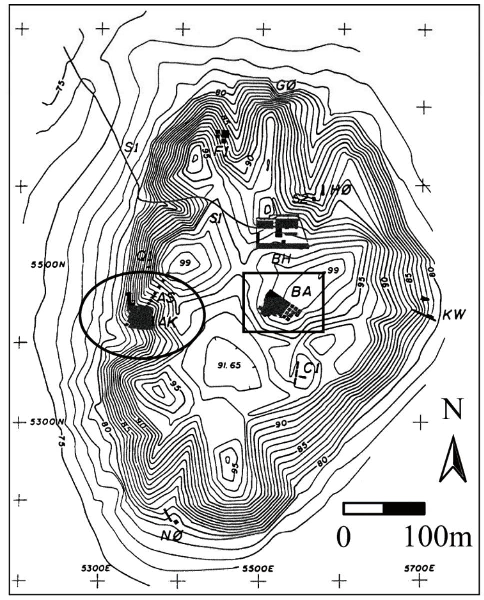


Figure 7.1: Early third millennium sites along the Upper Khabur River (After Schwartz and Curvers 1992: Figure 1).

The palace is located in Area AK (circled), and the temple is located in Area BA (boxed).



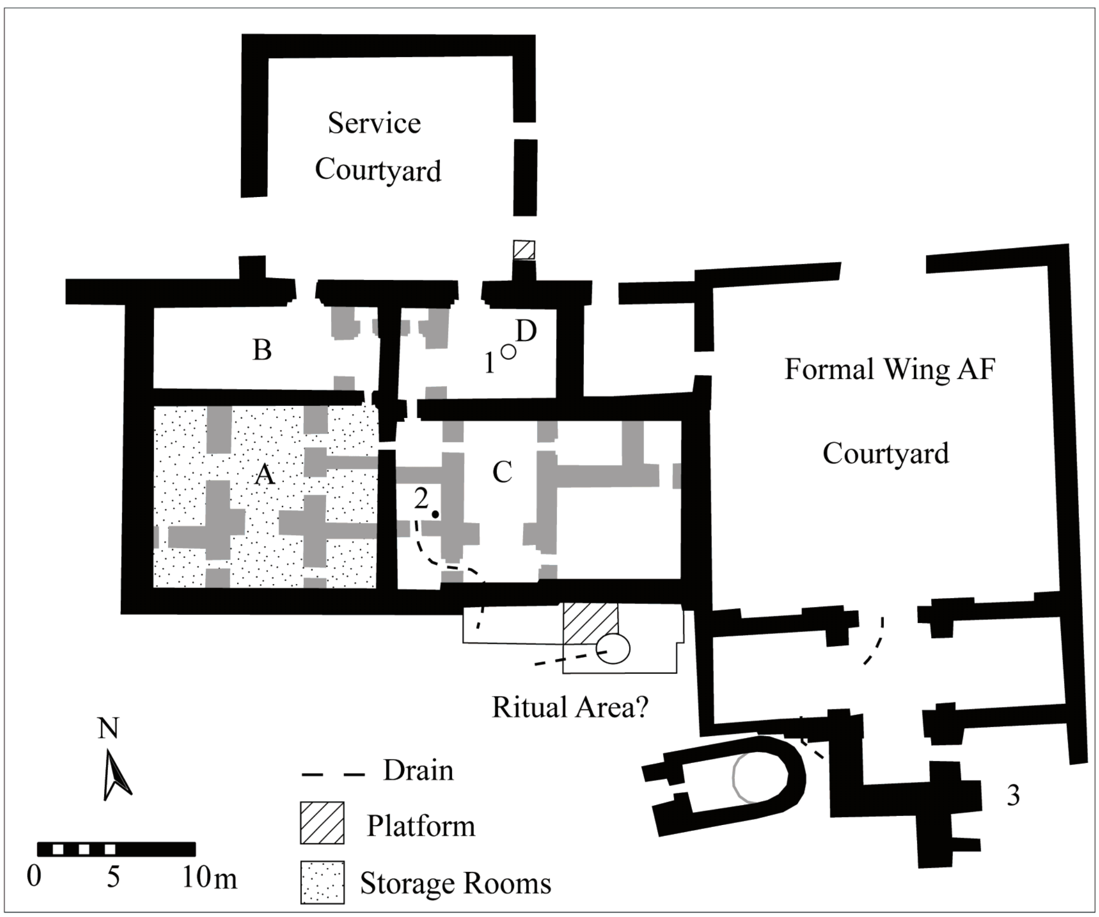


Figure 7.2: Mozan Palace, plan as of 2002; 1 = oven; 2 = toilet; 3 = main entrance (?) (Redrawn from Buccellati and Buccellati 2003:Figure 66; topo from Buccellati 1998: Figure 3).

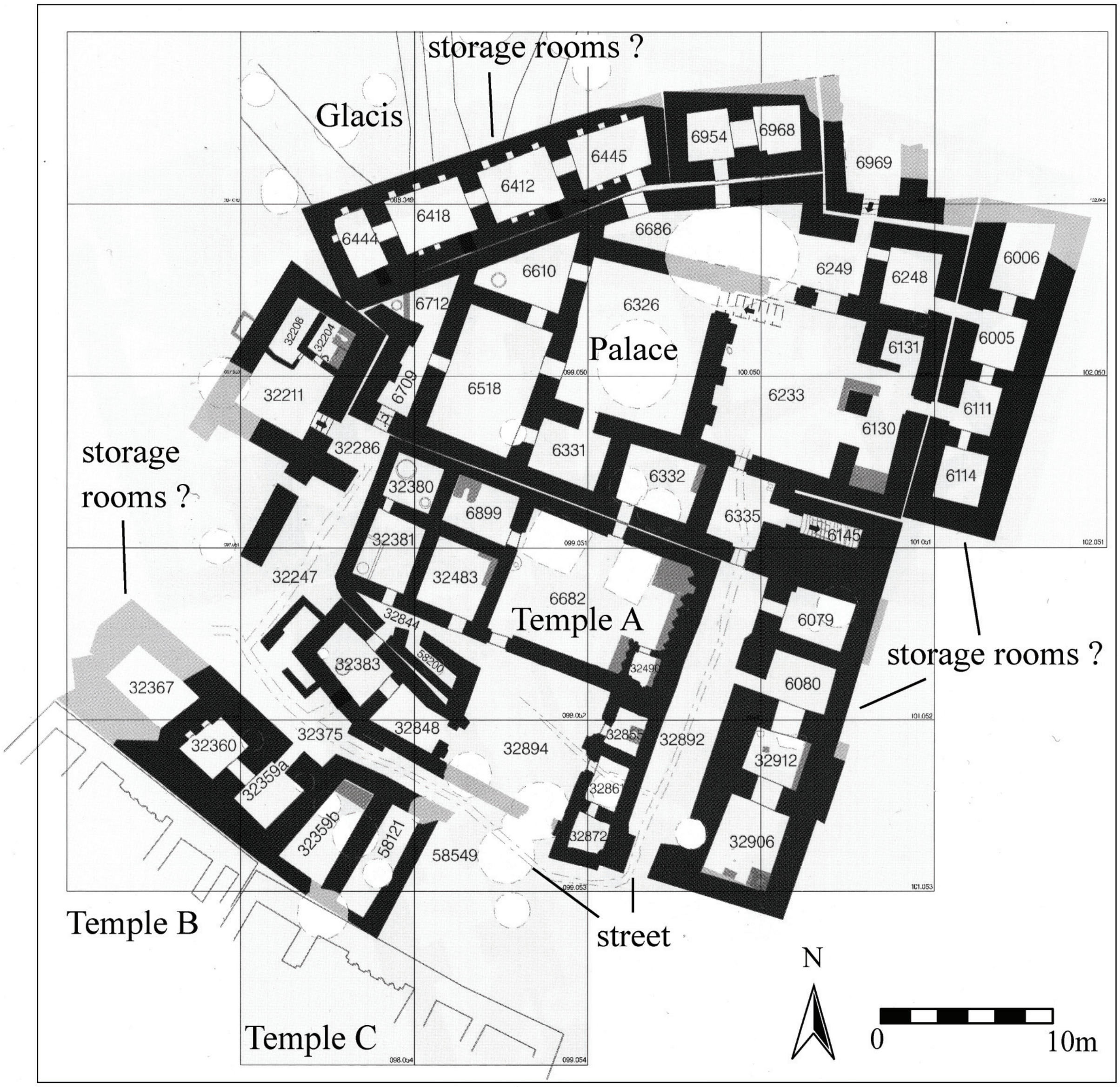


Figure 7.3: Tell Beydar, plan of Area F, Phase 3a, with possible storage rooms marked (Edited from Lebeau and Suleiman 2003: Plan 6).

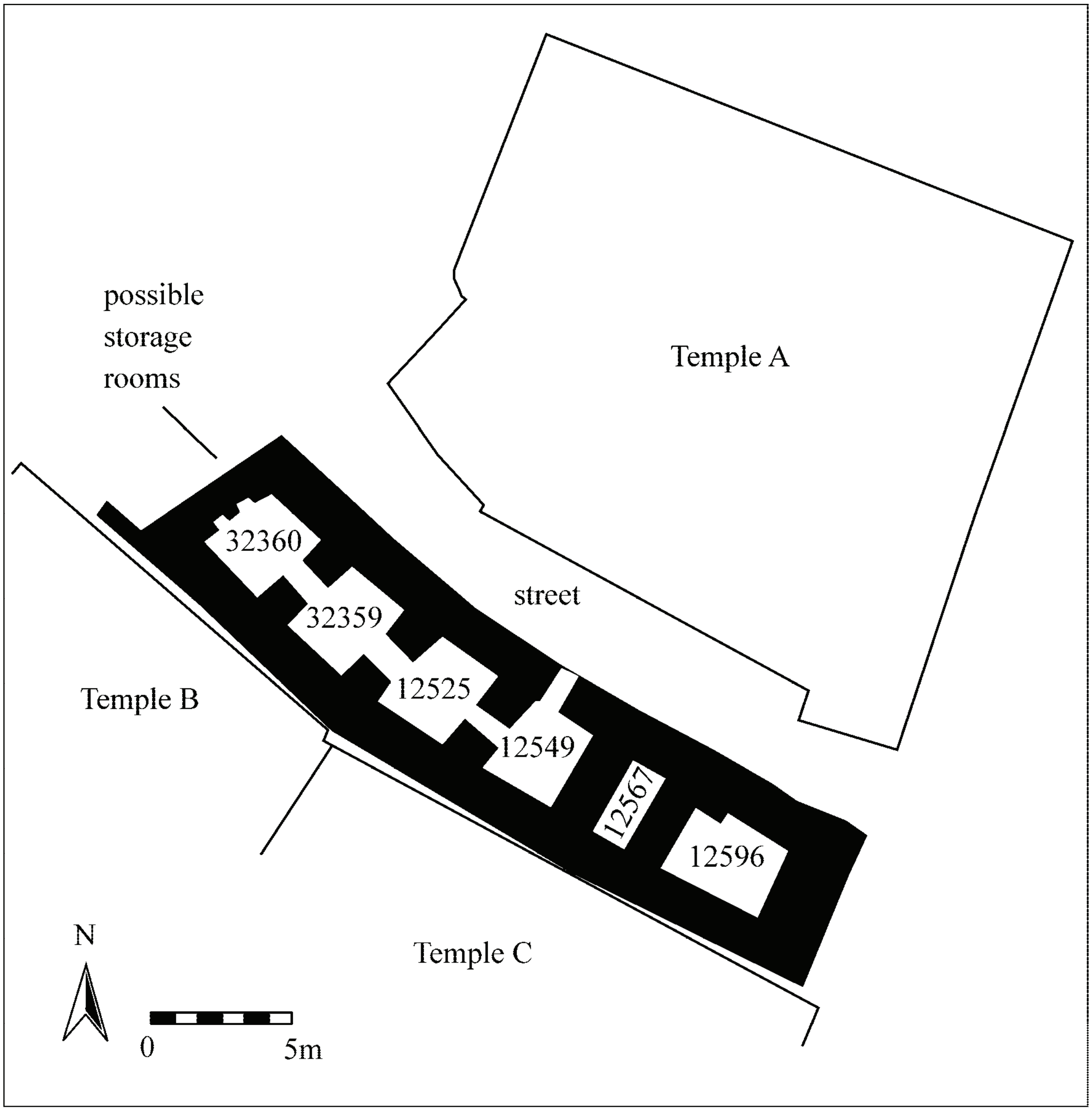


Figure 7.4: Tell Beydar, Area L, Temples A and associated structures, phases 1-2, with possible storage rooms marked (Redrawn from Bardeschi and Stenuit 2007: Plan 2).

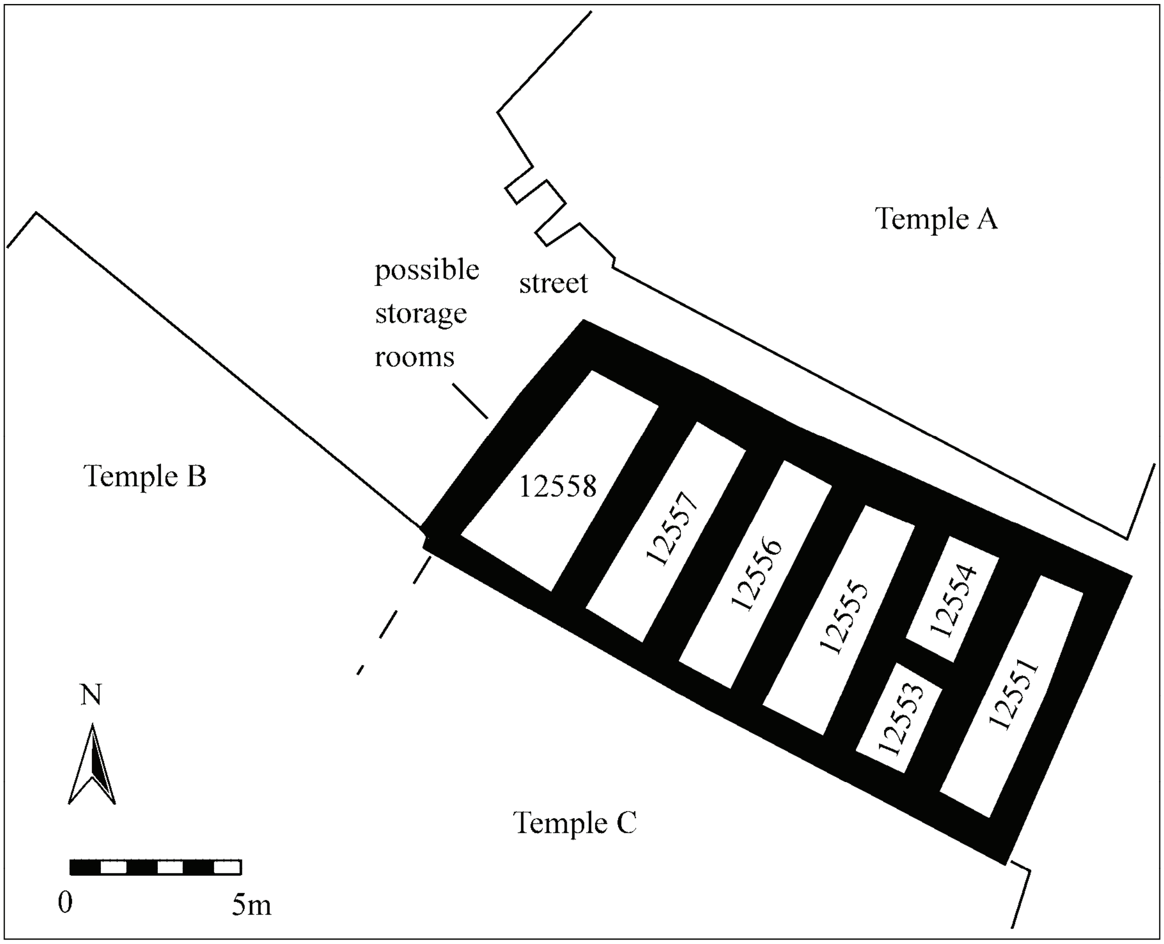


Figure 7.5: Tell Beydar, Area L, Temple A and associated structures, phase 3, with possible storage rooms marked (Redrawn from Bardeschi and Stenuit 2007: Plan 4).

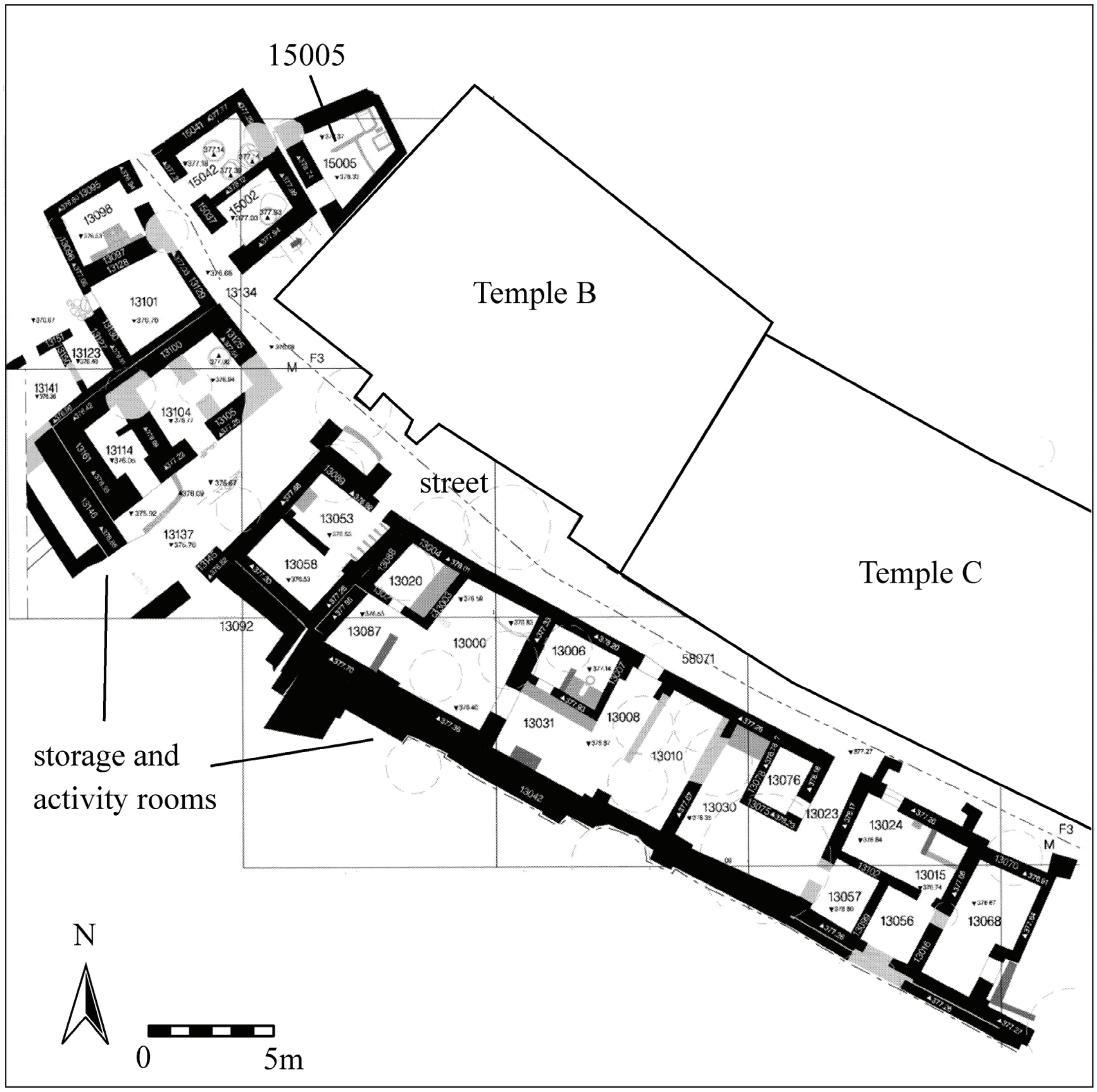


Figure 7.6: Tell Beydar, Areas F3 - M - O: Temple B, C, and associated storage and activity buildings (Modified from Suleiman 2007: Plan 2).

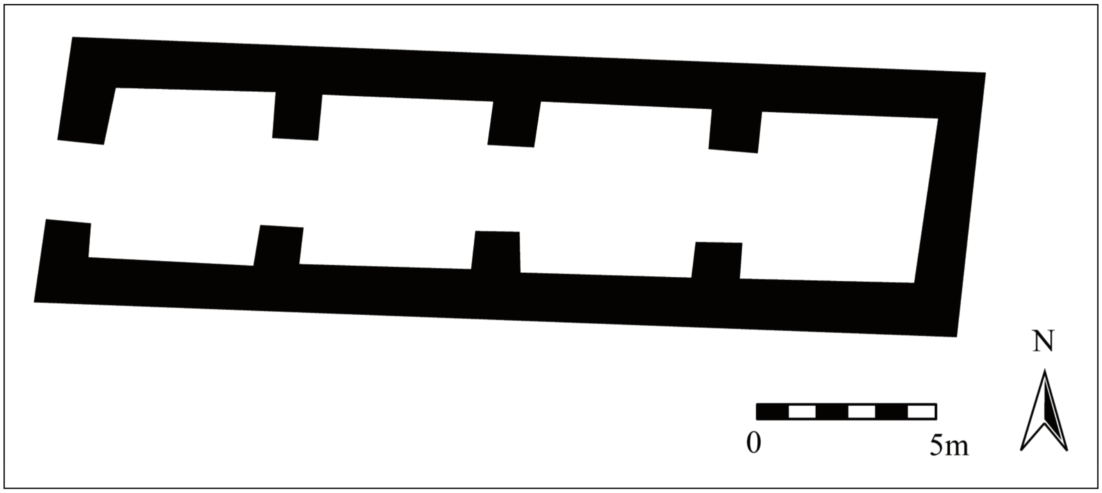


Figure 7.7: Tell Beydar, Area E granary (Redrawn from Lebeau and Suleiman 2003: Plan 23).

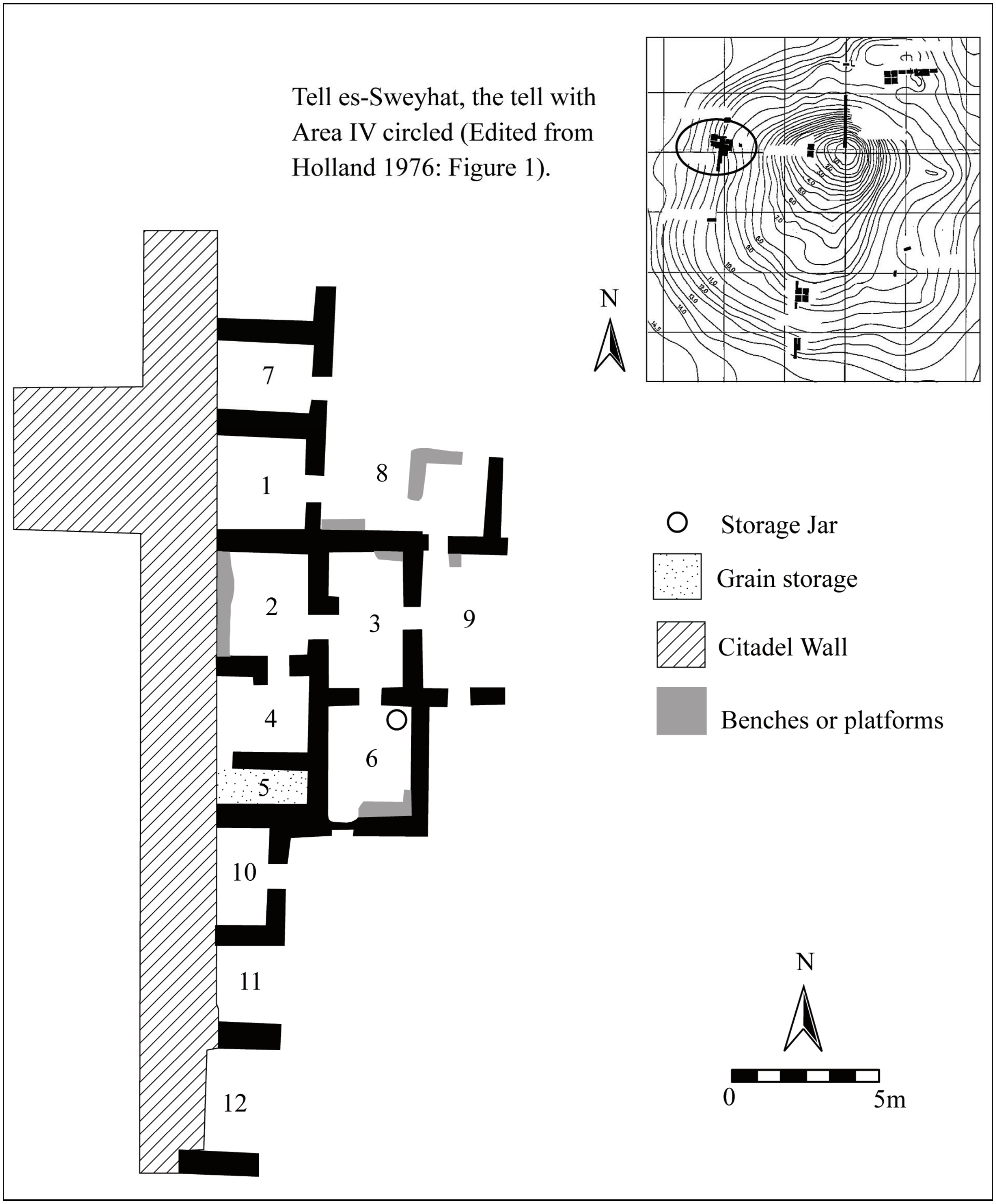


Figure 7.8: Tell es-Sweyhat, Area IV, storage and activity rooms (redrawn from Holland 1977: Figure 1).

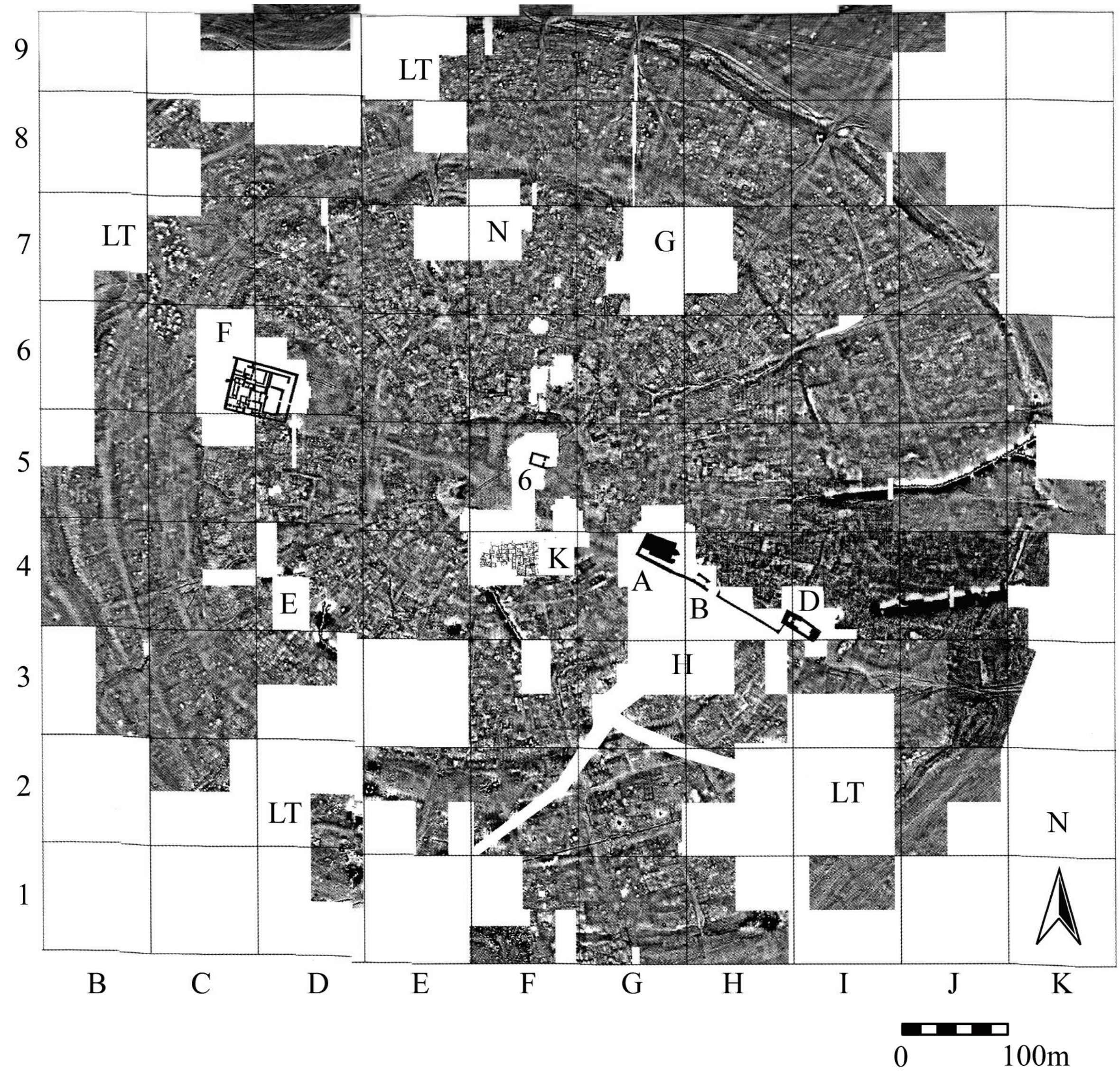


Figure 7.9: Tell Chuera, magnetometry plan, excavation areas, and selected feature plans. A = Steinbau I; B = Steinbau 2 & 4; D = Steinbau 3; E = Steinbau 5 and Potter's Quarter; 6 = Steinbau 6; F = Palace; G = Middle Assyrian period mound; H = Housing Quarter; K = Kleiner Antentempel and adjacent houses; N = North Tempel; LT = Lower town. Not shown: Area L (Aussenbau, east of grid block K2). (Edited from Meyer 2006: Abb 2.; Pruss 2000b: Figure 1).

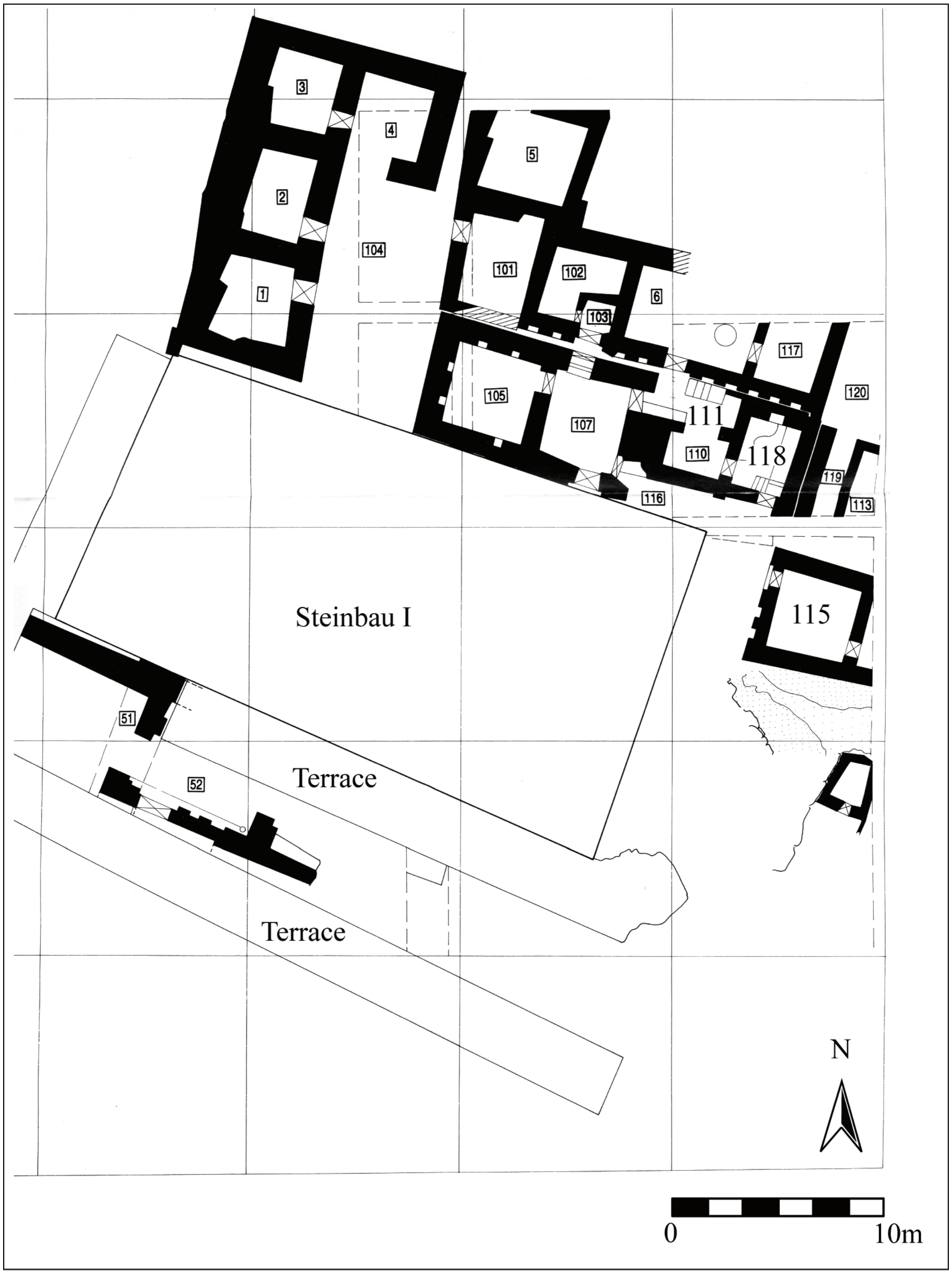


Figure 7.10: Tell Chuera, *Steinbau* I and associated storage and activity rooms, phase 7b (Edited from Orthmann 1995a: Plan 3).

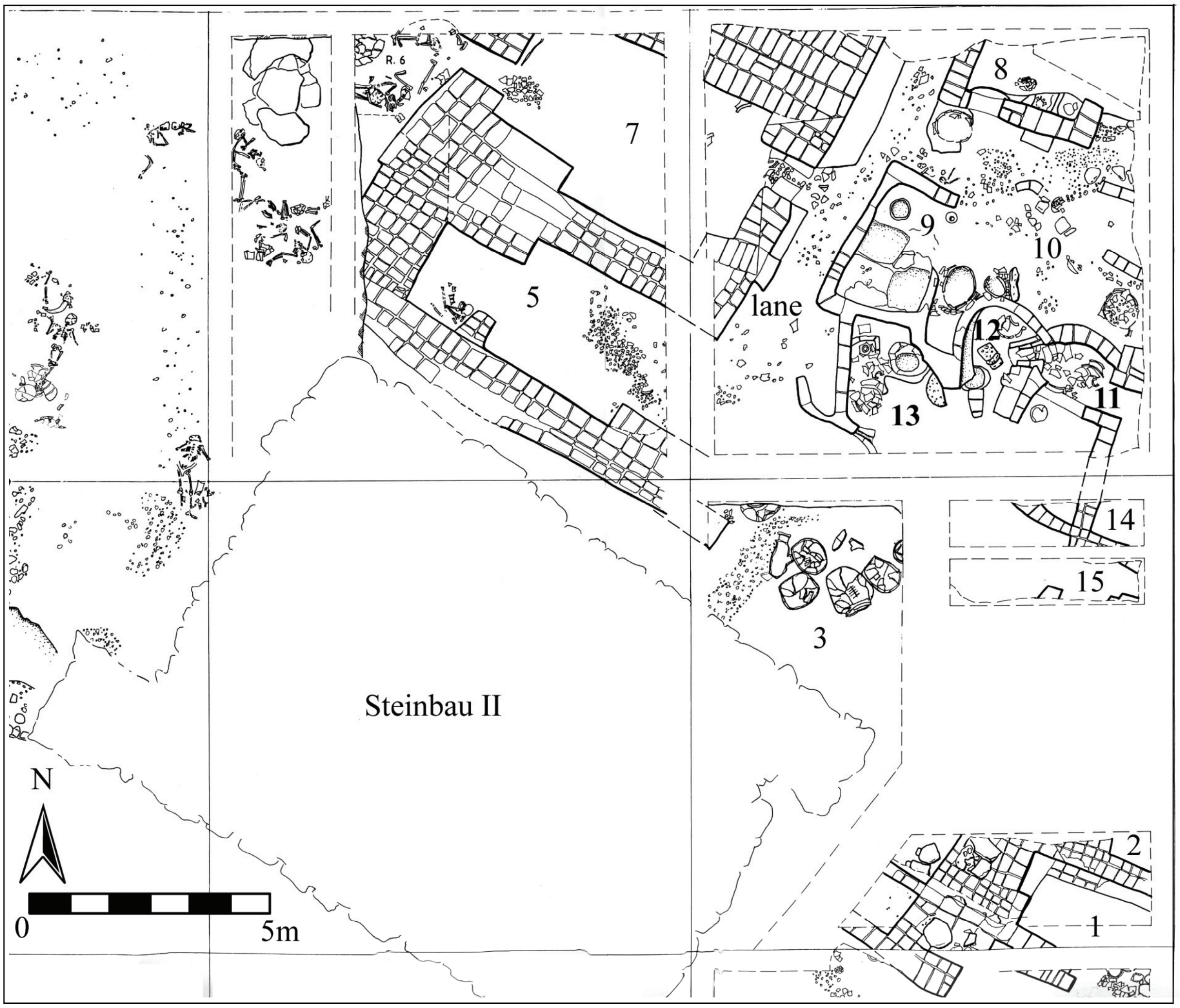


Figure 7.11: Tell Chuera, *Steinbau* II and associated storage and activity rooms (Edited from Orthmann 1995a: Plan 13) .

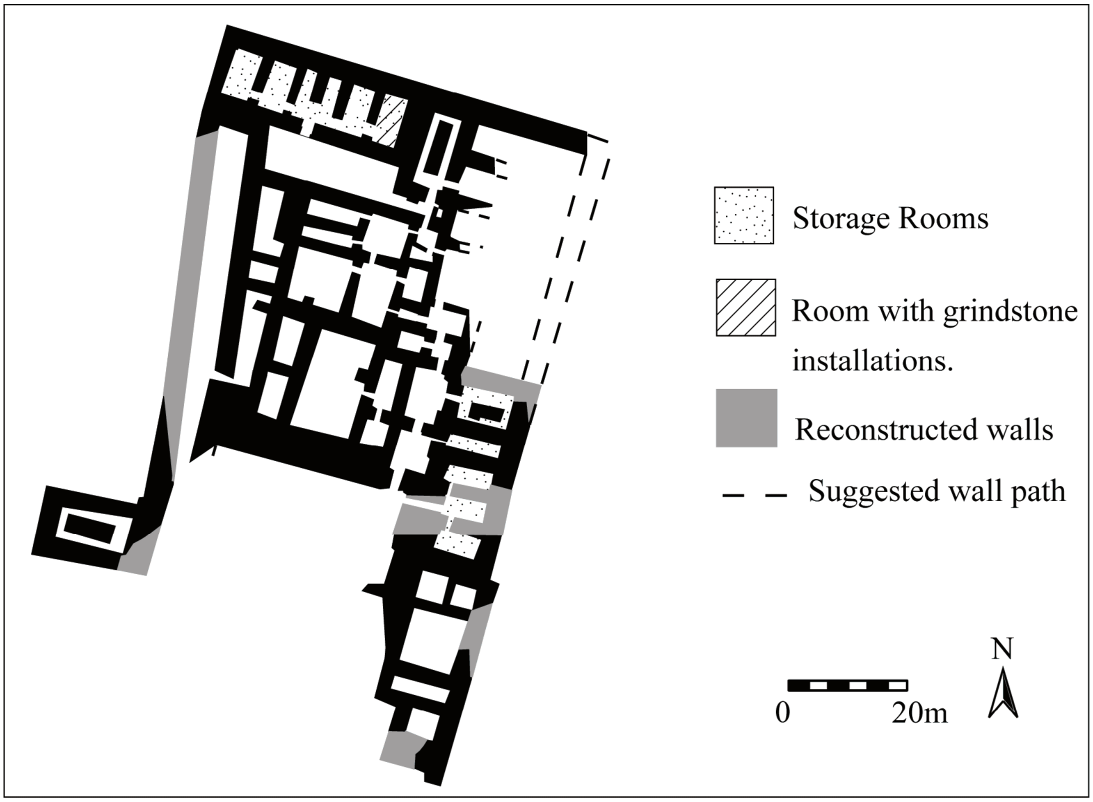
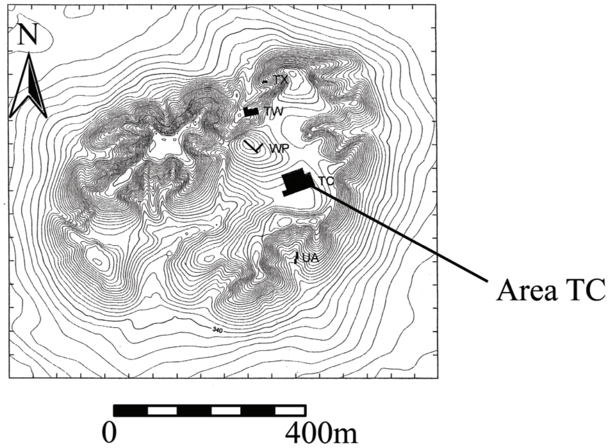


Figure 7.12: Ebla, Western Palace, storage rooms marked (redrawn from Dolce 1988: Plate 9:3, 10:1).



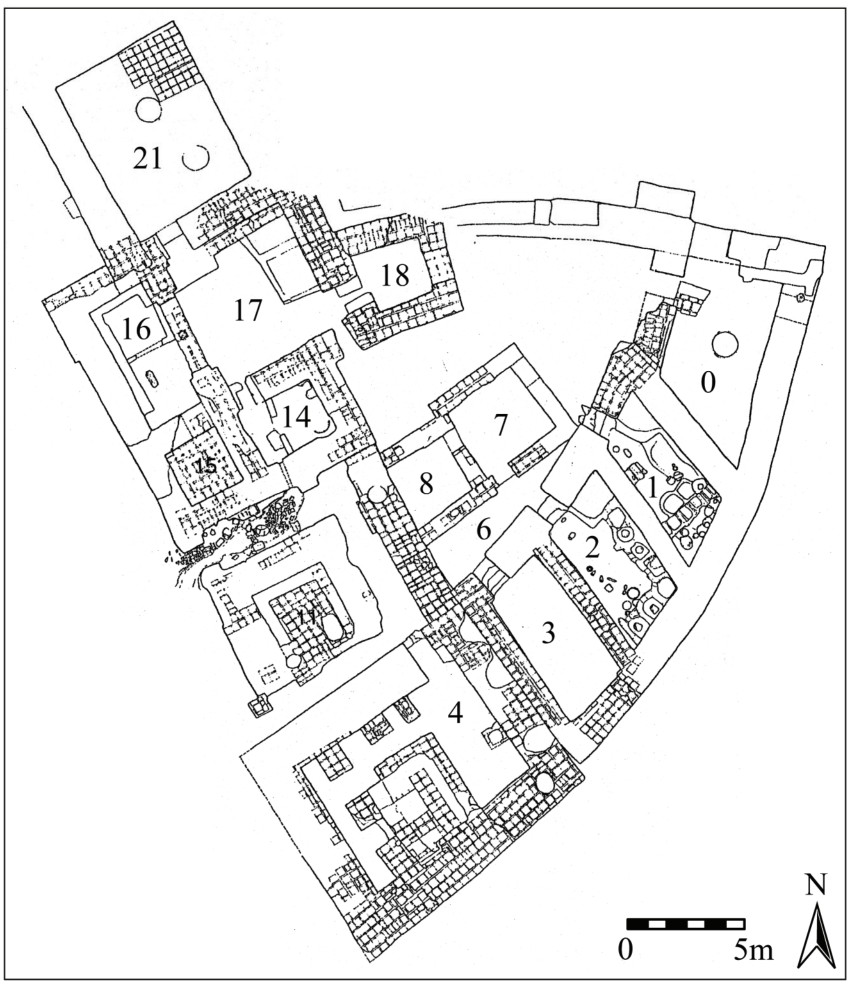


Figure 7.13: Tell Brak, topo map showing Area TC (above), and oval building in Area TC (below) (Edited from Emberling and McDonald 2003: Figures 1, 43).

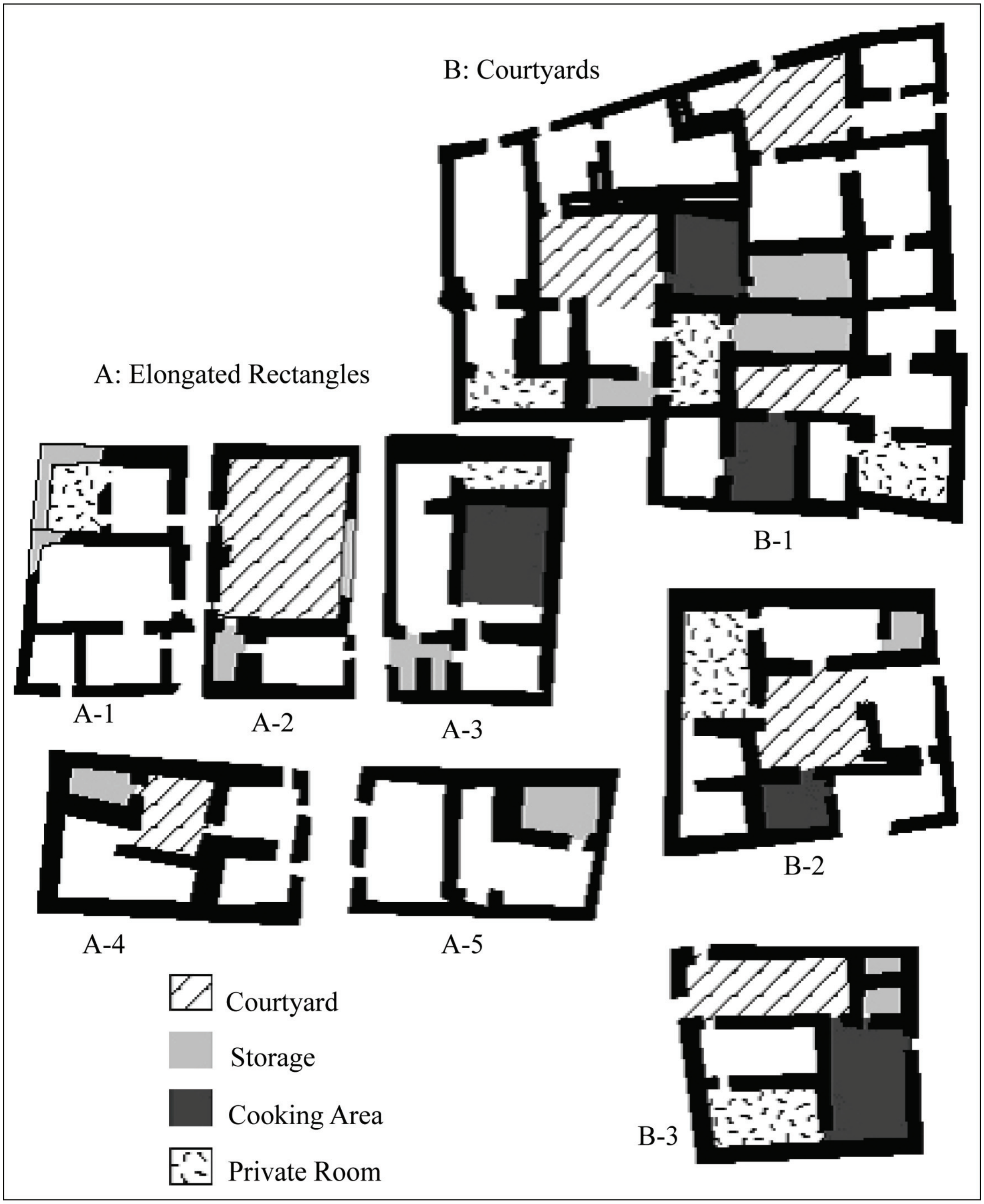


Figure 7.14: Titris Höyük, house forms in the 80s neighborhood, with storage areas marked (Edited from Rainville 2001: Figure 6.6).

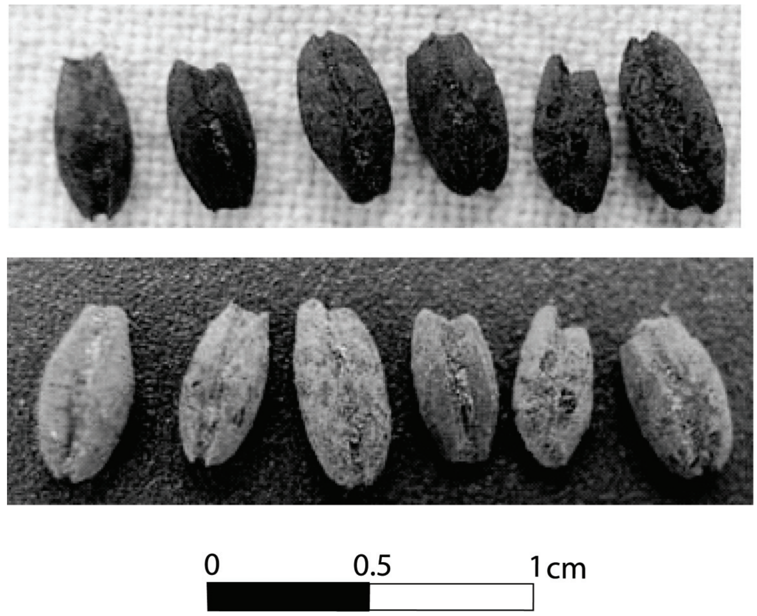


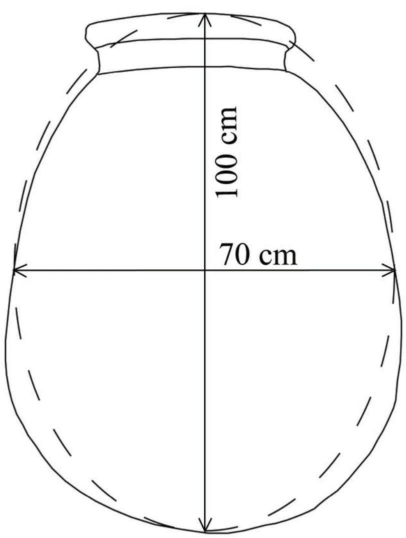
Figure 7.15: Charred barley from Operation 2 (Locus 23, 52).

Source	Calories needed per person per day	Calories per kg grain	Spoilage ratio	Seed ratio	kg grain needed per person per year	Storage space needed for 1,000 kg grain (m3)	Persons fed by grain stored in 100 m3 storage space per year	Persons fed by grain stored in 150 m3 storage space per year	Persons fed by grain stored in 200 m3 storage space per year	
Hole (1991)	2,500	3510	20%	20%	433	2.25	102	154	205	
Hunt (1987:165)	1,000 from grain (2,000 from all foods)	3400	15%	10%	143		349 (given 2 m3 storage per 1000 kg grain)	524 (given 2 m3 storage per 1000 kg grain)	699 (given 2 m3 storage per 1000 kg grain)	
Halstead (1981:198)					200	1.5-2.0	250-333	375-500	500-666	
Gentry (1976:23-25)					365 (from Roman military records)	1.3 (wheat), 1.4 barley)	210 (wheat); 195 (barley)	316 (wheat); 293 (barley)	421 (wheat); 391 (barley)	
Kemp (1986:132)					219-365 (from Egyptian ration records)	1.3 (wheat)1.4 barley)	210-351(wheat); 195-326 (barley)	316-526 (wheat); 293-489 (barley)	421-702 (wheat); 391-652 (barley)	
Broshi (1979:7)					200-250					
Clark and Haswell (1967:54)					190-235					
Ellison (1981):38	3000 (adult male); 2200 (adult female);	3600 (barley)			A wide range: e.g., 279-558 (from Mesopotamian ration records)					Calories actually received varies, but is about 3000 a day (p42-43).
Hassan (1981:18)	2140 (!Kung Bushmen average intake); 2354 (FAO recommended figure)									
Kühne (1990:20)				25-33% average (data from middle Assyrian texts)						
Kramer (1982)				17% average	150-250 (average)					
H. T. Wright (1969:21)			25%	11% (+16% for animals)						
Johnson (1973:97, 137)	1976 from bread (3000 from all foods)	3500 (barley)	25%		278					
Wilkinson 1994:495; 487			5%	60kg / ha	250		200 (if 2m3 / 1,000 kg)	300 (if 2m3 / 1,000 kg)	400 (if 2m3 / 1,000 kg)	
Kazane Estimates					222	2	225	339	452	
Average of Hunt and Hole					288	2.25	154	231	308	

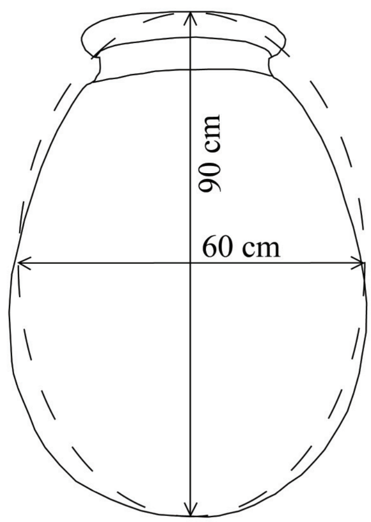
Figure 7.16: Estimated grain requirements per person per year, with reference to storage capacity. The estimates for the capacity of the Operation 2.1 storage facility at Kazane are listed in the final row (Modified from Schwartz 1994b, Table 2).

Lidar Jar 1

Lidar Jar 2



Lidar Jar 1



Lidar Jar 2

Figure 7.17: Photographs and dimensions of two restored Early Bronze Age storage jars from Lidar Höyük, displayed in the Urfa Museum. The author photographed and measured these jars in fall 2005.

All sherds	count	%
Marked	11	0.07
Unmarked	16840	99.93
Diagnostic sherds		
Marked	11	0.47
Unmarked	2345	99.53
Grooved rim Jars (P1 +2 only)		
Marked	9	0.30
Unmarked	21	0.70
Building Unit 4 Diagnostics		
Marked	10	3.36
Unmarked	288	96.64
Building Unit 4 Jars (P1 +2 only)		
Marked	10	11.36
Unmarked	78	88.64
Building Unit 4 large jars (P1+2 only)		
Marked	8	27.59
Unmarked	21	72.41

Figure 7.18: Potters' marks sherd count proportions by various sub-groups.

Figure 7.19: Descriptions.

A: Kazane Potters' marks, labels are design numbers.

B: Chuera Potters' marks (redrawn from Moortgat-Correns 1988b: Abb. 10, *Kleiner Antentemple*).

C: Sweyhat Potters' marks (redrawn from Holland 1977: Figures 7:2, 2:16, 6:11).

D: Ebla Potters' marks (redrawn from Mazzoni 1988: 7:3, 9:1, 8:3).

E: Brak Potters' marks (redrawn from Oates et al 2001: Figures 461:1589, 459:1544, 461:1580).

F: Brak incised, fenestrated stand with possible Še sign (after Oates et al. 2001: Figure 462:1594).

G: Raqa'i mid third millennium tablet (after Curvers and Schwartz 1990: Figure 7).

H: Ways of writing Še in Cuneiform during the third millennium (after Gelb 1961:96 and 230 - item 212).

I: Beydar texts, cuneiform signs for numbers (after Sallaberger 1996a:57).

J: Banat Potters' marks and related decorations (design 6 is from the pedestal of a pedestaled bowl) (redrawn from Porter 1995a: Figure 11, P11, P5; Figure 20: P24, P88; Figure 21: P25, P55; Figure 22: P44).

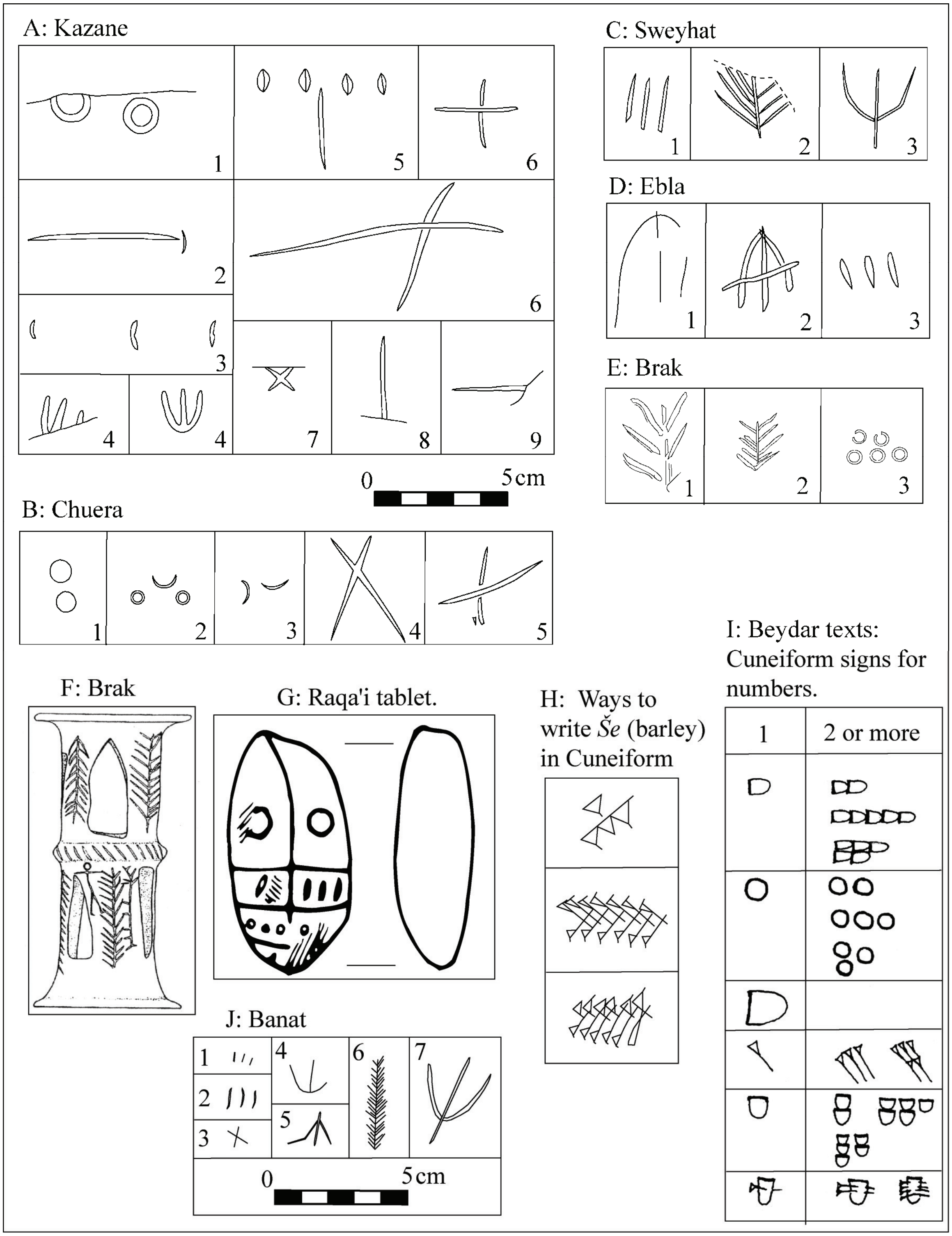


Figure 7.19: Potters' marks and related markings on vessels and tablets (Note: scale applies only to Kazane, Chuera, and Banat Potters' marks.

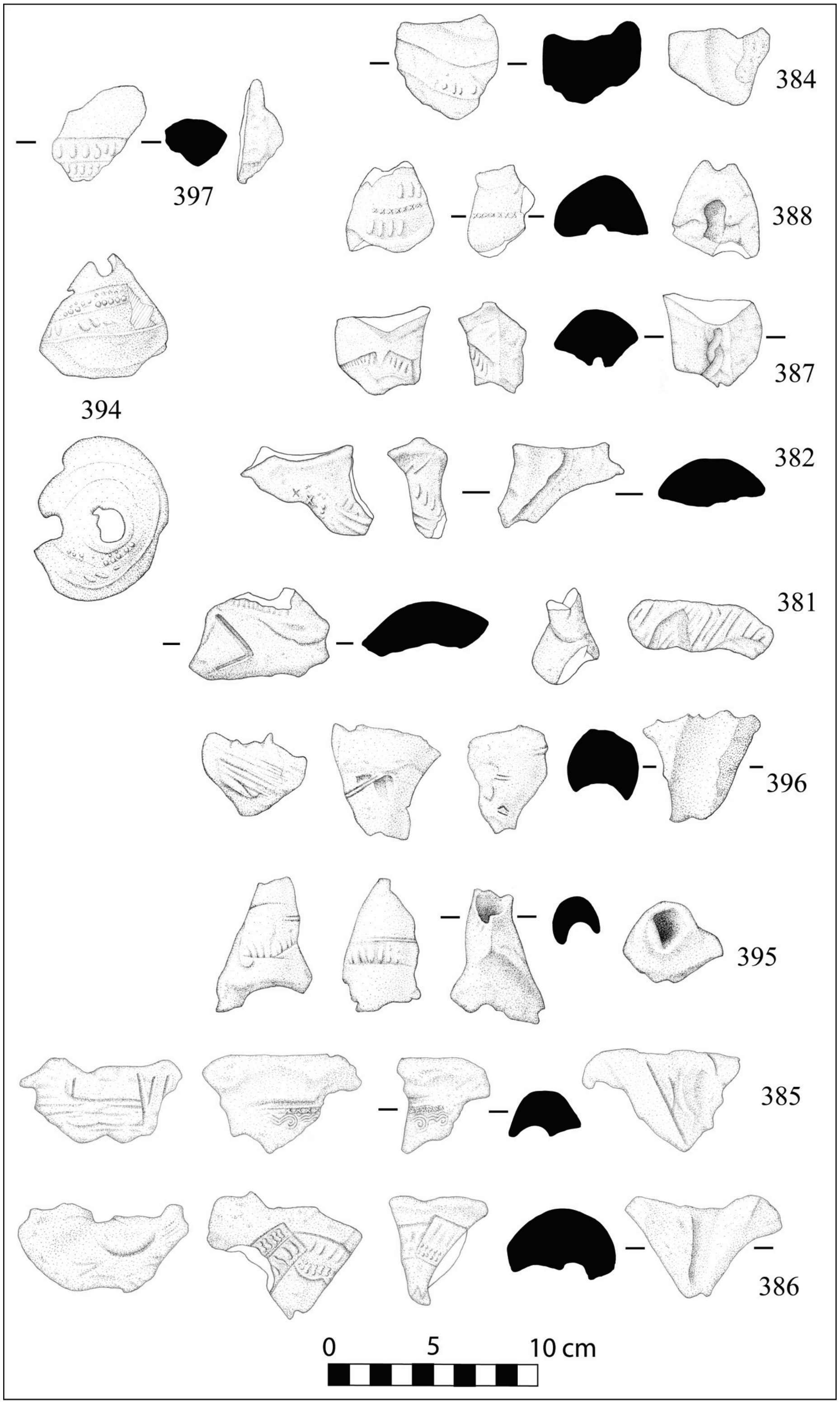


Figure 7.20: Sealings from Operation 2.2 (Building Unit 4).

A: All specimens: NISP and weight

Category*	NISP	Weight (gm)
SM	1	0.8
SorMM	20	19.1
MM	458	680.9
MorLM	61	153.1
LM	54	311.2
Rodent	76	15.2
Ovis	23	196.8
Capra	8	39.6
OC	172	1055.8
OCG	20	101.3
Bos	27	315.4
Equid	3	119.8
Human	1	13
Unid	150	102.9
total	**1074**	**3124.9**

*Category abbreviations:
SM = small mammal
SorMM = small or medium mammal
MM = medium mammal
MorLM = medium or large mammal
LM = large mammal
OC = ovis or capra
OCG = ovis, capra or gazella
Unid = unidentifiable to class

B: Mammal size by NISP: all mammals

Category**	NISP	%	Weight (gm)	%
SM	77	9.14	16	0.56
MM	681	80.88	2074.4	73.12
LM	84	9.98	746.4	26.31
total	**842**	**100**	**2836.8**	**100**

C: Mammal size by NISP: (equid and rodent excluded)

Category **	NISP	%	Weight (gm)	%
SM	1	0.13	0.8	0.03
MM	681	89.25	2074.4	76.78
LM	81	10.62	626.6	23.19
total	**763**	**100**	**2701.8**	**100**

**These categories do NOT include the categories SorMM, MorLM

Figure 8.1: Animal size category NISP figures for the Kazane faunal sample.

A: Mammal size by NISP

	SM	%	MM	%	LM	%	Total
J32			110	94.02	7	5.98	117
Operation 2	1	3.70	26	96.30			27
Operation 3			102	87.18	15	12.82	117
Operation 4			371	88.97	46	11.03	417
Operation 5			72	84.71	13	15.29	85
Total	**1**	**3.70**	**681**	**89.25**	**81**	**10.62**	**763**

B: OCG versus BOS by NISP

	OCG	%	BOS	%	Total
J32	14	93.33	1	6.67	15
Operation 2	8	100.00			8
Operation 3	15	75.00	5	25.00	20
Operation 4	134	88.16	18	11.84	152
Operation 5	30	90.91	3	9.09	33
Total	**201**	**88.16**	**27**	**11.84**	**228**

Figure 8.2: Animal size and species by trench.

A

Species	NISP	Species NISP % of total NISP	MNI	Species MNI % of total MNI	MNI % of NISP	weight (grams)	Species wt. % of total wt.
RODENT	76	23.10	16	20.78	21.05	15.20	0.82
OC	172	52.28	26	33.77	15.12	1055.80	57.26
OCG	20	6.08	6	7.79	30.00	101.30	5.49
OVIS	23	6.99	11	14.29	47.83	196.80	10.67
CAPRA	8	2.43	5	6.49	62.50	39.60	2.15
BOS	27	8.21	10	12.99	37.04	315.40	17.11
EQUID	3	0.91	3	3.90	100.00	119.80	6.50
total	329	100.00	77	100.00	23.40	1843.90	100

B

Species - No Rodent, No Equid	NISP	Species NISP % of total NISP	MNI	Species MNI % of total MNI	MNI % of NISP	weight (grams)	Species wt. % of total wt.
OC	172	68.80	26	44.83	15.12	1055.80	61.78
OCG	20	8.00	6	10.34	30.00	101.30	5.93
OVIS	23	9.20	11	18.97	47.83	196.80	11.52
CAPRA	8	3.20	5	8.62	62.50	39.60	2.32
BOS	27	10.80	10	17.24	37.04	315.40	18.46
total	250	100.00	58	100.00	23.20	1708.90	100

Figure 8.3a-b: Species distribution; A: all; B: excluding rodent or equid.

A

Unit	NISP - All fragments	NISP - All Species	NISP Species % of NISP All fragments	MNI	MNI % of NISP Species
J32	215	16	7.44	8	50.00
Op2	112	87	77.68	23	26.44
Op3	163	20	12.27	4	20.00
Op4	461	172	37.31	33	19.19
Op5	123	34	27.64	9	26.47
total	1074	329	30.63	77	23.40

B

Unit	NISP - All fragments. No Equid, No Rodent	NISP - Species. No Equid, No Rodent	NISP Species % of NISP All fragments	MNI	MNI % of NISP Species
J32	215	16	7.44	8	50.00
Op2	35	10	28.57	6	60.00
Op3	163	20	12.27	4	20.00
Op4	460	171	37.17	32	18.71
Op5	122	33	27.05	8	24.24
total	995	250	25.13	58	23.20

Figure 8.4a-b: Specimen distribution by trench.

EBA Units	Categories	NISP Diversity (H')	MNI Diversity (H')	NISP Equitability (V')	MNI Equitability (V')	NISP Richness (d1)	MNI Richness (d1)
All	All species (n=329, s=7, MNI = 77)	1.37	1.74	0.71	0.89	1.04	1.38
All but J32	All species (n=313, s=7, MNI = 69)	1.40	1.77	0.72	0.91	1.04	1.42
J32	All species (n= 16, s=3)	0.46	N/A	0.24	N/A	0.72	N/A
All	OCG vs BOS (n=250, s=2, MNI = 58)	0.34	0.46	0.49	0.66	0.18	0.25
All but J32	OCG vs BOS (n=235, s=2, MNI = 50)	0.35	0.47	0.50	0.69	0.18	0.26
J32	OCG vs BOS (n=16, s=2; MNI = 8)*	0.23	N/A	0.12	N/A	0.36	N/A
All	SM/MM/LM (n=763, s=3)	0.35	N/A	0.18	N/A	0.30	N/A
All but J32	SM/MM/LM (n=646, s=3)	0.37	N/A	0.19	N/A	0.31	N/A
J32	SM/MM/LM (n=117, s=2)**	0.23	N/A	0.12	N/A	0.21	N/A
All	MM/LM (n=762, s=2)	0.34	N/A	0.17	N/A	0.15	N/A
All but J32	MM/LM (n=645, s=2)	0.36	N/A	0.18	N/A	0.15	N/A
J32	MM/LM (n=117, s=2)	0.23	N/A	0.12	N/A	0.21	N/A

n=NISP
s=number of species/taxon
MNI = minimum # of individuals
NISP - number of specimens (all taxon)
*Diversity, equitability, and richness were not calculated for J32 because it's MNI is only 8
**J32 has no SM specimens, so s=2 for this unit

Figure 8.5: Diversity, Richness and Equitability of the Kazane faunal sample.

A

All EBA:
BOS Combined Element Distributions

Element region	NISP	Percent
Head	15	57.69
Axial	1	3.85
Forequarter	2	7.69
Hindquarter	5	19.23
Forefoot	1	3.85
Hindfoot	0	0.00
Foot	2	7.69
total	**26**	100

All EBA:
BOS Combined Element Distributions: teeth excluded

Element region	NISP	Percent
Head (no teeth)	9	45.00
Axial	1	5.00
Forequarter	2	10.00
Hindquarter	5	25.00
Forefoot	1	5.00
Hindfoot	0	0.00
Foot	2	10.00
total	**20**	100

B

All EBA:
OCG Combined Element Distributions

Element region	NISP	Percent
Head	59	26.46
Axial	6	2.69
Forequarter	34	15.25
Hindquarter	45	20.18
Forefoot	9	4.04
Hindfoot	18	8.07
Foot	52	23.32
total	**223**	100

All EBA:
OCG Combined Element Distributions: teeth excluded

Element region	NISP	Percent
Head (no teeth)	24	12.77
Axial	6	3.19
Forequarter	34	18.09
Hindquarter	45	23.94
Forefoot	9	4.79
Hindfoot	18	9.57
Foot	52	27.66
total	**188**	100

Figure 8.6a-b: OCG and BOS body regions by ALL trenches. head: skull, mandible, teeth; axial: vertebrae and ribs; forequarter: scapula, humerus, ulna, radius; hindquarter: innominate, sacrum, femur, patella, tibia; forefoot: carpals and metacarpal; hindfoot: tarsals and metatarsals; foot: metapodial and phalanges.

C

Op 4:
OCG Combined Element Distributions

Element region	NISP	Percent
Head	42	27.45
Axial	5	3.27
Forequarter	25	16.34
Hindquarter	25	16.34
Forefoot	7	4.58
Hindfoot	16	10.46
Foot	33	21.57
total	**153**	100

Op 4:
OCG Combined Element Distributions: teeth excluded

Element region	NISP	Percent
Head (no teeth)	20	15.27
Axial	5	3.82
Forequarter	25	19.08
Hindquarter	25	19.08
Forefoot	7	5.34
Hindfoot	16	12.21
Foot	33	25.19
total	**131**	100

D

All EBA (J32 excluded):
OCG Combined Element Distributions

Element group	Count	Percent
Head	53	25.48
Axial	6	2.88
Forequarter	33	15.87
Hindquarter	39	18.75
Forefoot	9	4.33
Hindfoot	18	8.65
Foot	50	24.04
total	**208**	100

All EBA (J32 excluded):
OCG Combined Element Distributions: teeth excluded

Element group	Count	Percent
Head (no teeth)	23	12.92
Axial	6	3.37
Forequarter	33	18.54
Hindquarter	39	21.91
Forefoot	9	5.06
Hindfoot	18	10.11
Foot	50	28.09
total	**178**	100

Figure 8.6c-d: OCG body regions by Op4, and without trench J32. head: skull, mandible, teeth; axial: vertebrae and ribs; forequarter: scapula, humerus, ulna, radius; hindquarter: innominate, sacrum, femur, patella, tibia; forefoot: carpals and metacarpal; hindfoot: tarsals and metatarsals; foot: metapodial and phalanges.

A.
All EBA: OCG by element

Element	NISP	% NISP
Carpals	1	0.45
CaudalVert	1	0.45
Cranial	1	0.45
Ilium	1	0.45
LumbVert	1	0.45
Maxilla	1	0.45
Pelvis	1	0.45
PetrousTemporal	1	0.45
Phalanx3	1	0.45
Rib	1	0.45
Tarsal	1	0.45
Zygomaticus	1	0.45
Axis	2	0.90
Vert	2	0.90
Pubis	3	1.35
Skull	3	1.35
Astragalus	4	1.79
Metatarsal	4	1.79
Ulna	4	1.79
Femur	8	3.59
Humerus	8	3.59
Metacarpal	8	3.59
Phalanx2	8	3.59
Scapula	8	3.59
Calcaneum	9	4.04
Ischium	9	4.04
Radius	14	6.28
Phalanx1	16	7.17
Mandible	17	7.62
Tibia	22	9.87
Metapodial	27	12.11
Teeth	35	15.70
total	**223**	100.00

B.
Op 4: OCG by element

Element	NISP	% NISP
CaudalVert	0	
Pelvis	0	
Phalanx3	0	
Rib	0	
Carpals	1	0.65
Cranial	1	0.65
Ilium	1	0.65
LumbVert	1	0.65
Maxilla	1	0.65
PetrousTemporal	1	0.65
Tarsal	1	0.65
Zygomaticus	1	0.65
Axis	2	1.31
Pubis	2	1.31
Skull	2	1.31
Vert	2	1.31
Astragalus	4	2.61
Metatarsal	4	2.61
Scapula	4	2.61
Ulna	4	2.61
Femur	5	3.27
Ischium	5	3.27
Metacarpal	6	3.92
Phalanx2	6	3.92
Calcaneum	7	4.58
Humerus	7	4.58
Radius	10	6.54
Phalanx1	11	7.19
Tibia	12	7.84
Mandible	14	9.15
Metapodial	16	10.46
Teeth	22	14.38
total	**153**	100

Figure 8.7: Distribution of OCG elements for all specimens and Op. 4.

A. OC - north with teeth

Element region	NISP	Percent
Head	384	27.29
Axial	163	11.58
Forequarter	312	22.17
Hindquarter	212	15.07
Forefoot	89	6.33
Hindfoot	110	7.82
Foot	137	9.74
total	**1407**	100

OC - north without teeth

Element region	NISP	Percent
Head (no teeth)	193	15.87
Axial	163	13.40
Forequarter	312	25.66
Hindquarter	212	17.43
Forefoot	89	7.32
Hindfoot	110	9.05
Foot	137	11.27
total	**1216**	100

B. OC - south with teeth

Element region	NISP	Percent
Head	135	33.50
Axial	46	11.41
Forequarter	73	18.11
Hindquarter	51	12.66
Forefoot	32	7.94
Hindfoot	39	9.68
Foot	27	6.70
total	**403**	100

OC - south without teeth

Element region	NISP	Percent
Head (no teeth)	50	15.72
Axial	46	14.47
Forequarter	73	22.96
Hindquarter	51	16.04
Forefoot	32	10.06
Hindfoot	39	12.26
Foot	27	8.49
total	**318**	100

head: skull, mandible, teeth
axial: vertebrae and ribs
forequarter: scapula, humerus, ulna, radius
hindquarter: innominate, sacrum, femur, patella, tibia
forefoot: carpals and metacarpal
hindfoot: tarsals and metatarsals
foot: metapodial and phalanges

Figure 8.8a-b: Tell Chuera OC element distributions for the areas north and south of *Steinbau I* (source: Vila 1995: Table 6).

C. Bos - north with teeth

Element region	NISP	Percent
Head	45	40.18
Axial	3	2.68
Forequarter	16	14.29
Hindquarter	7	6.25
Forefoot	8	7.14
Hindfoot	5	4.46
Foot	28	25.00
total	**112**	100

Bos - north without teeth

Element region	NISP	Percent
Head (no teeth)	22	24.72
Axial	3	3.37
Forequarter	16	17.98
Hindquarter	7	7.87
Forefoot	8	8.99
Hindfoot	5	5.62
Foot	28	31.46
total	**89**	100

D. Bos - south with teeth

Element region	NISP	Percent
Head	24	46.15
Axial	2	3.85
Forequarter	13	25.00
Hindquarter	5	9.62
Forefoot	1	1.92
Hindfoot	0	0.00
Foot	7	13.46
total	**52**	100

Bos - south without teeth

Element region	NISP	Percent
Head (no teeth)	9	24.32
Axial	2	5.41
Forequarter	13	35.14
Hindquarter	5	13.51
Forefoot	1	2.70
Hindfoot	0	0.00
Foot	7	18.92
total	**37**	100

head: skull, mandible, teeth
axial: vertebrae and ribs
forequarter: scapula, humerus, ulna, radius
hindquarter: innominate, sacrum, femur, patella, tibia
forefoot: carpals and metacarpal
hindfoot: tarsals and metatarsals
foot: metapodial and phalanges

Figure 8.8c-d: Tell Chuera BOS element distributions for the areas north and south of *Steinbau I* (source: Vila 1995: Table 6).

	Kazane		Sweyhat*	Chuera Steinbau I**	Chuera Kleiner Antentemple***
	NISP	MNI	NISP	NISP	NISP
Sheep:Goat	23:8	11:5	2:1	2.2:1	5:1

*Weber 1997:135
**Vila 1995:269
***Boessneck 1988:83

Figure 8.9: Sheep:Goat ratios at selected sites. Chuera *Kleiner Antentemple* ratio is sheep: goat and cattle.

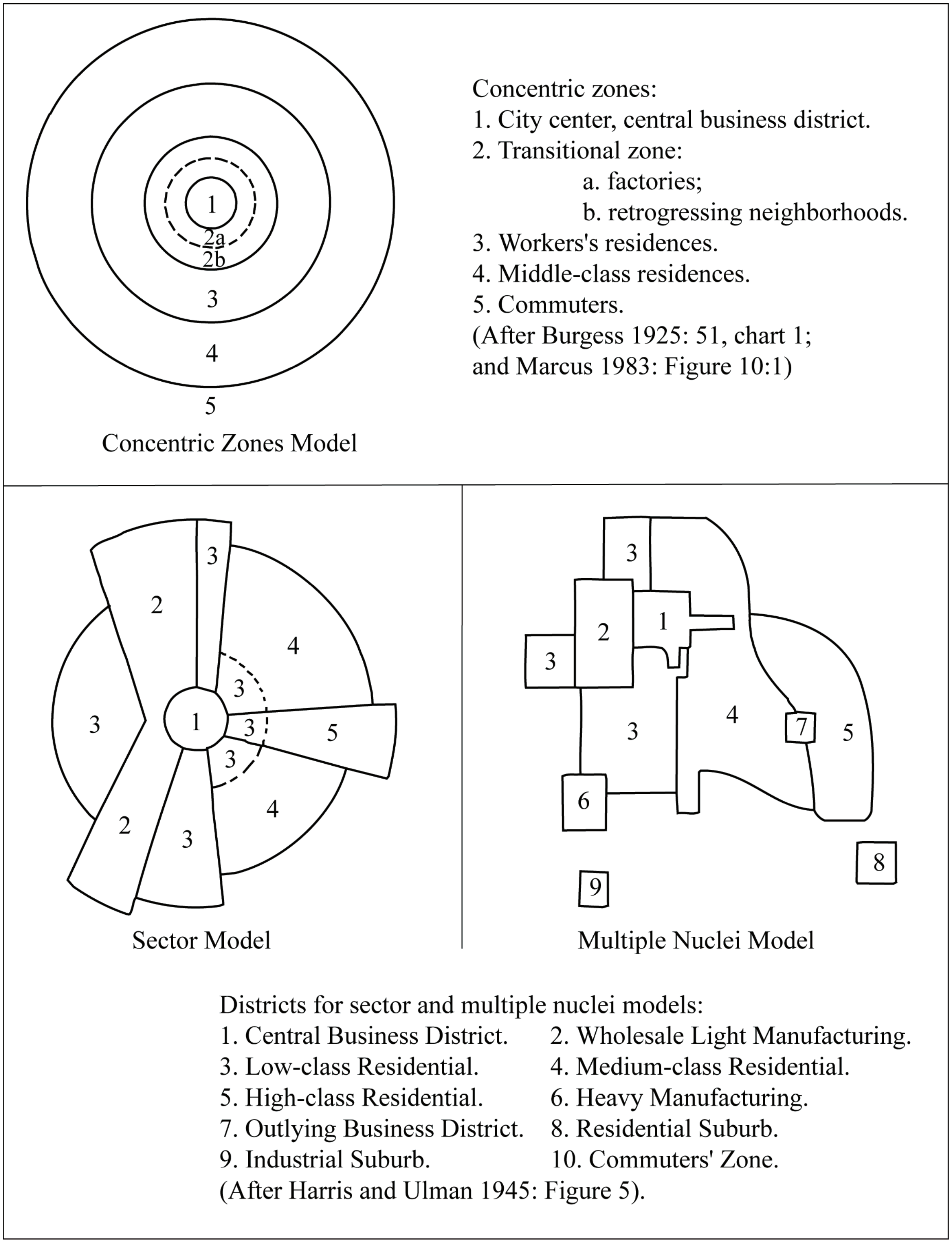


Figure 9.1: Theoretical models of cities. Each plan is generalized from multiple examples.

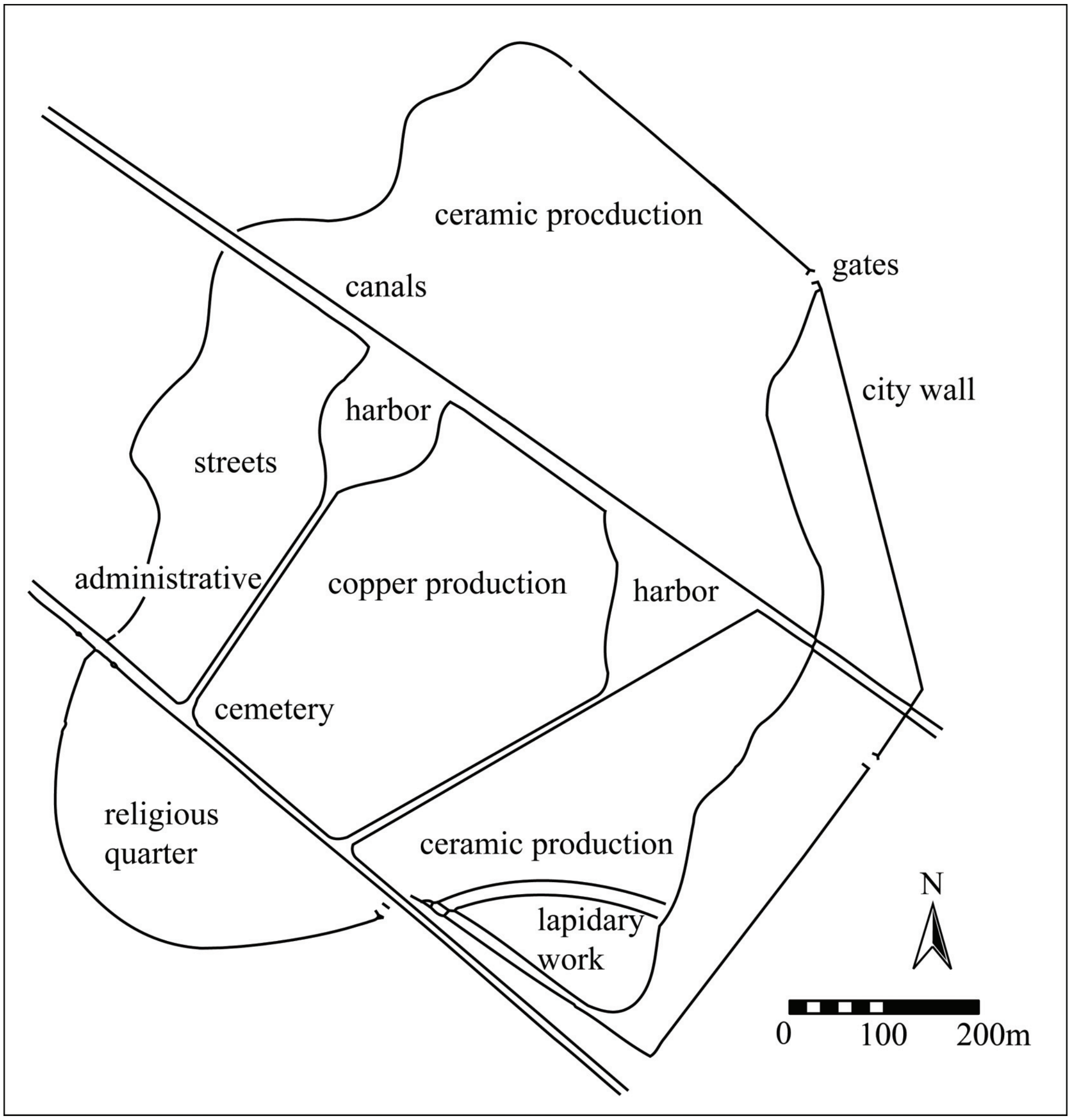


Figure 9.2: Plan of the general features of the southern Mesopotamian city of Mashkan - shapir, in the early second millennium B.C.E. (Redrawn after Stone 1995:240).

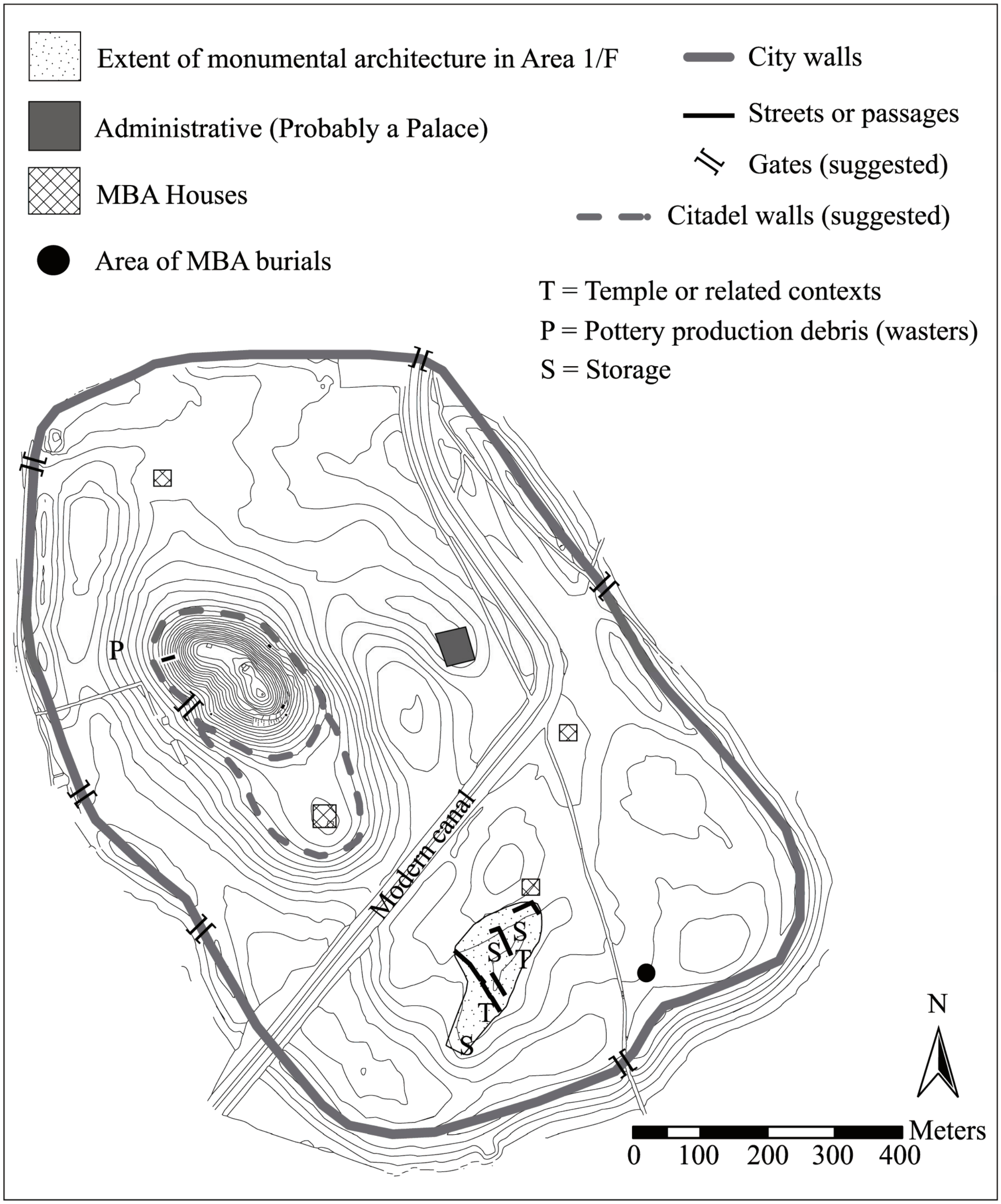


Figure 9.3: Kazane: schematic plan of EBA infrastructure and the general use of various areas. MBA housing and burials are also marked. Note: the location of the citadel walls and city gates are suggestions, and are not based on any excavated evidence. The Palace and MBA housing areas are shown larger than the actual exposures to enhance visibility.

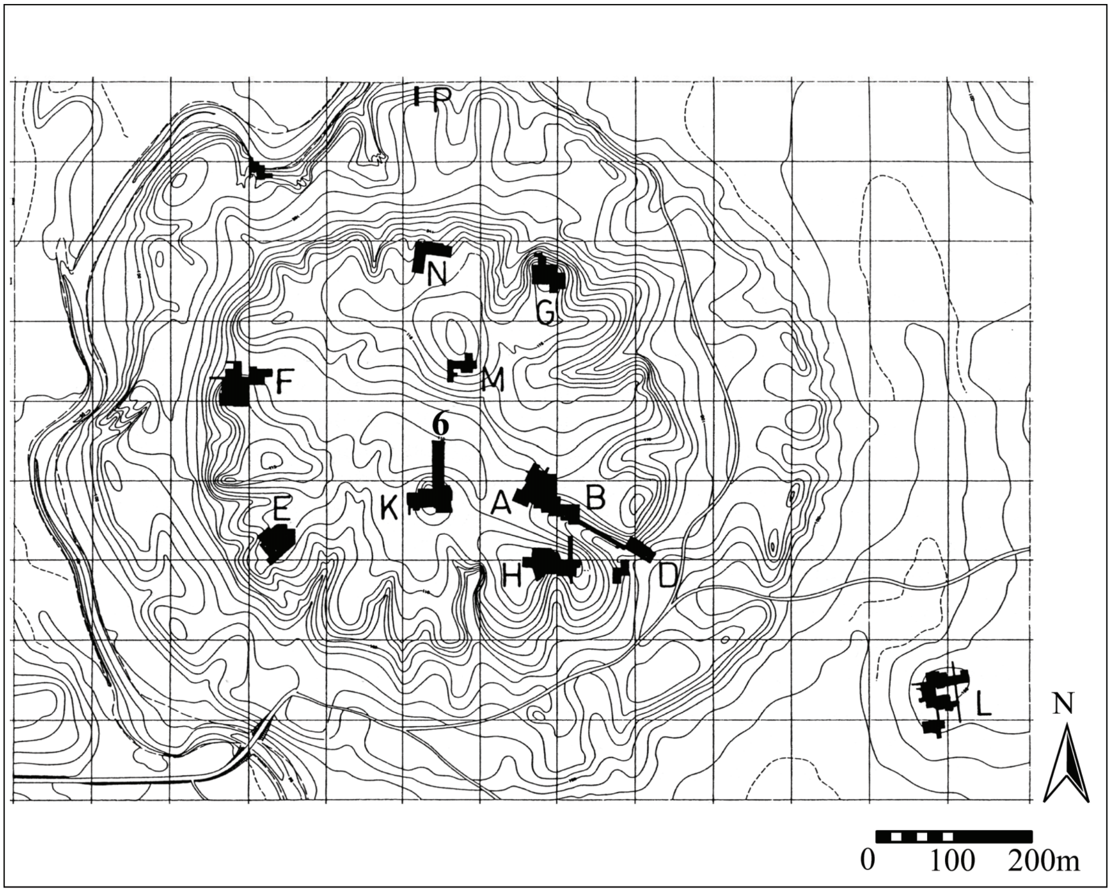


Figure 9.4: Tell Chuera, topographic map and excavation areas. A = *Steinbau* I; B = *Steinbau* 2 & 4; D = *Steinbau* 3; E = *Steinbau* 5 and Potter's Quarter; 6 = *Steinbau* 6; F = Palace; G = Middle Assyrian period mound; H = Housing Quarter; K = *Kleiner Antentempel* and adjacent houses; L = *Aussenbau*; M = Mitanni Building; N = North Tempel; P = Lower town section in city wall. (Modified from Meyer 2006: Abb 2.; Pruss 2000b: Figure 1).

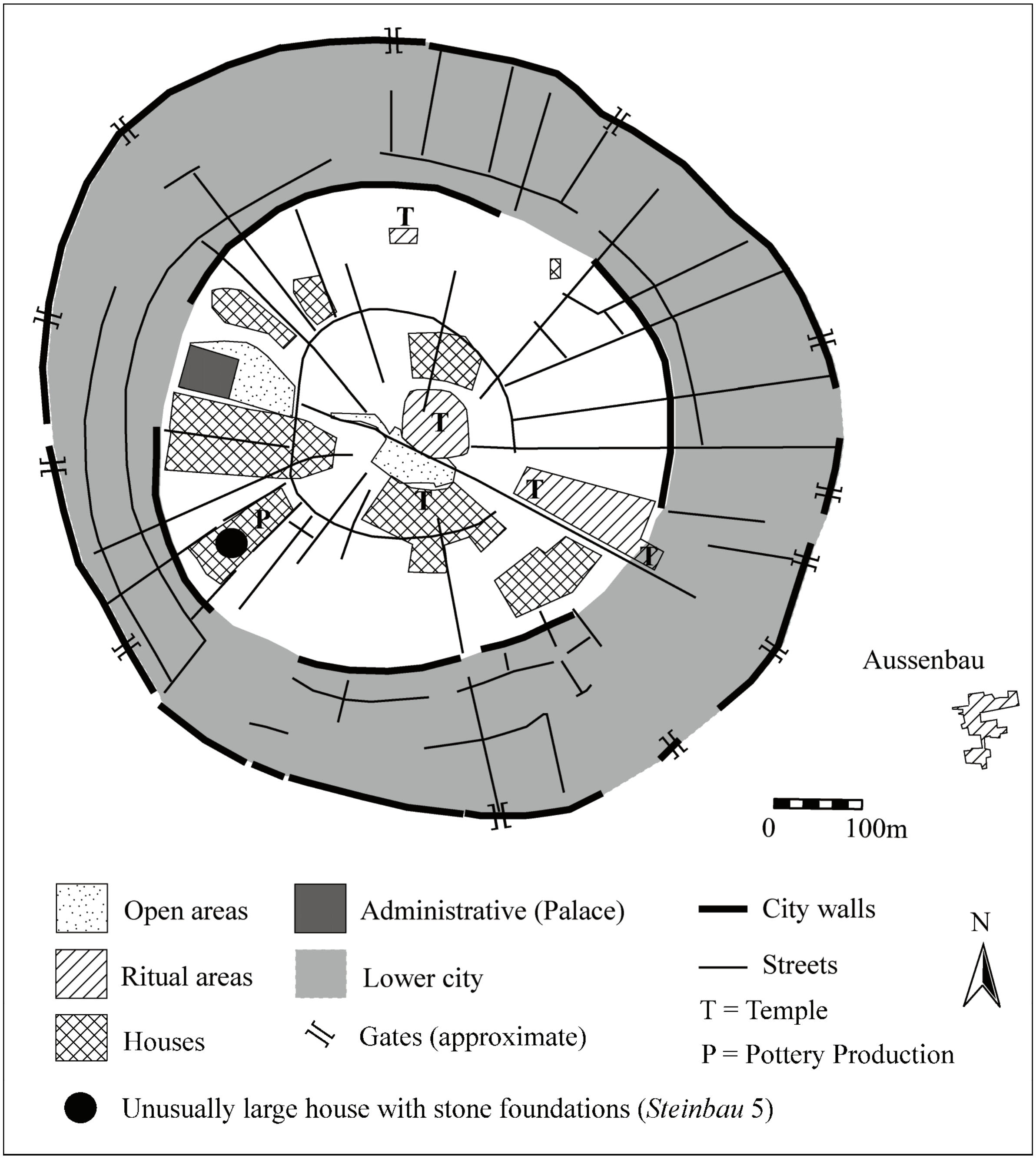


Figure 9.5: Tell Chuera, schematic plan of infrastructure and the primary use of various areas (redrawn and modified from Meyer 2006: Abb. 2; Pruss 2000b: Figure 1; Pruss n.d. –c , and No Author, n.d. Figure "*Funktionsplan des Telles*." Some use information was also derived from Tell Chuera reports).

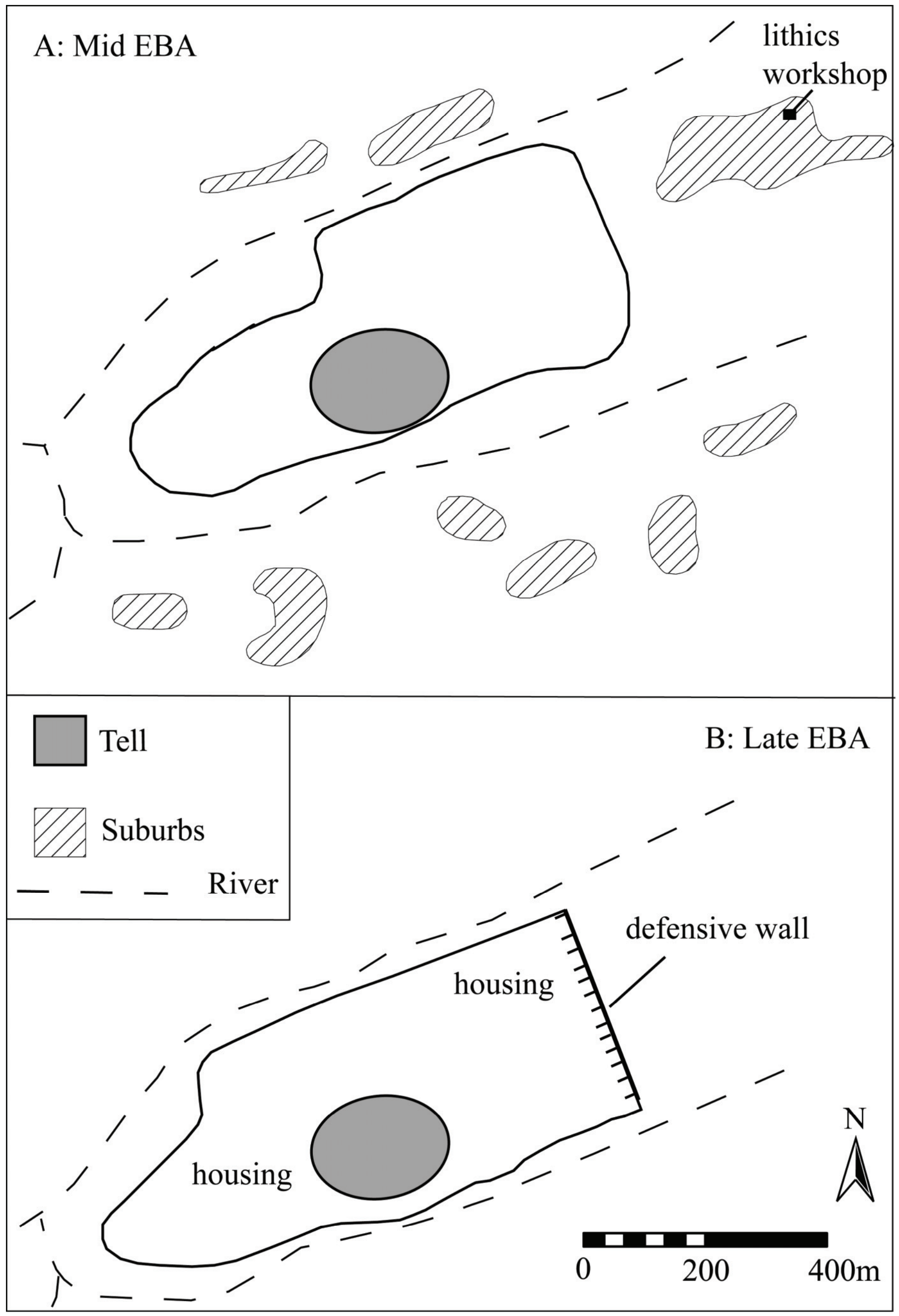
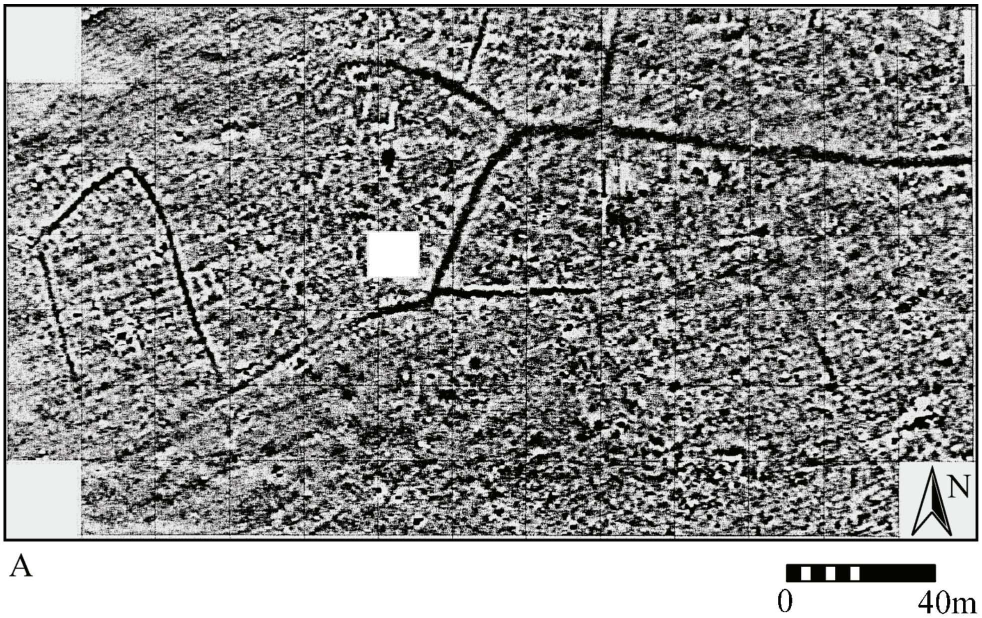


Figure 9.6: Titriş Höyük, general site plan in the mid and late third millennium (Redrawn / derived from Algaze et al. 2001: Figures 22-23; Matney et al. 1999: Figure 1).



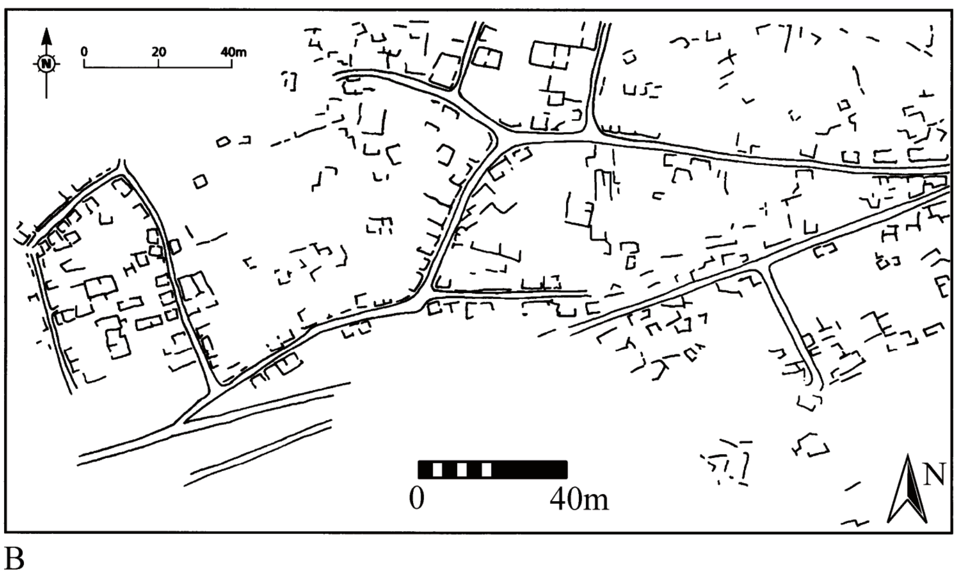
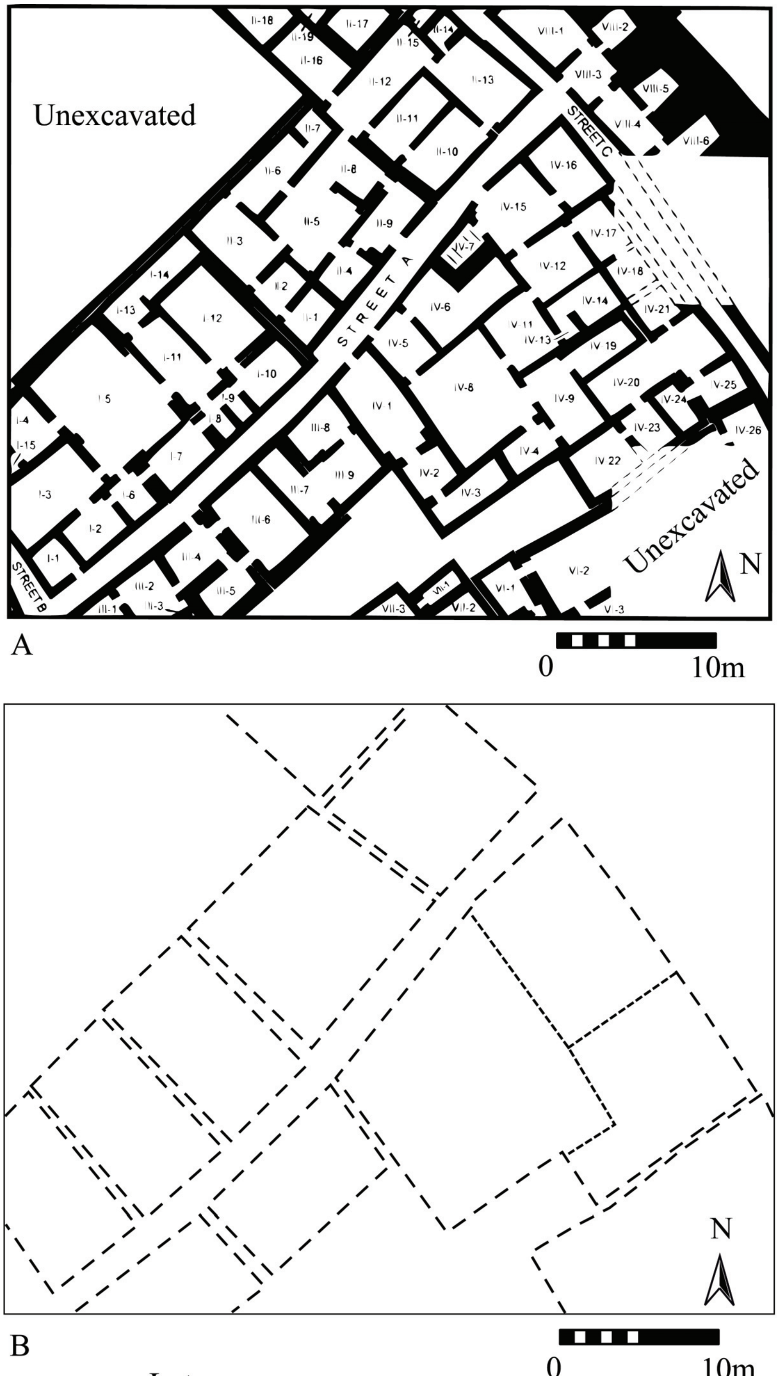


Figure 9.7: A: Titriş Höyük, magnetometry map of the western portion of the lower town. The dark, winding lines (positive signals) are streets (Modified from Algaze et al. 1995: Figure 27). B:Titris Höyük, tracing of features from the magnetometry image (Modified from Matney 2000: Figure 23).



– – – – Lots

-------------- Possible subdivision of large lot.

Figure 9.8:A: Titriş Höyük, plan of streets and houses in the outer town, with Building Unit numbers (Modified from Algaze et al. 2001: Figure 2); B: Titriş Höyük, building lots in the outer town, traced from the plan above (A) (redrawn and extended from Matney 2000:26, to include subsequent exposures).

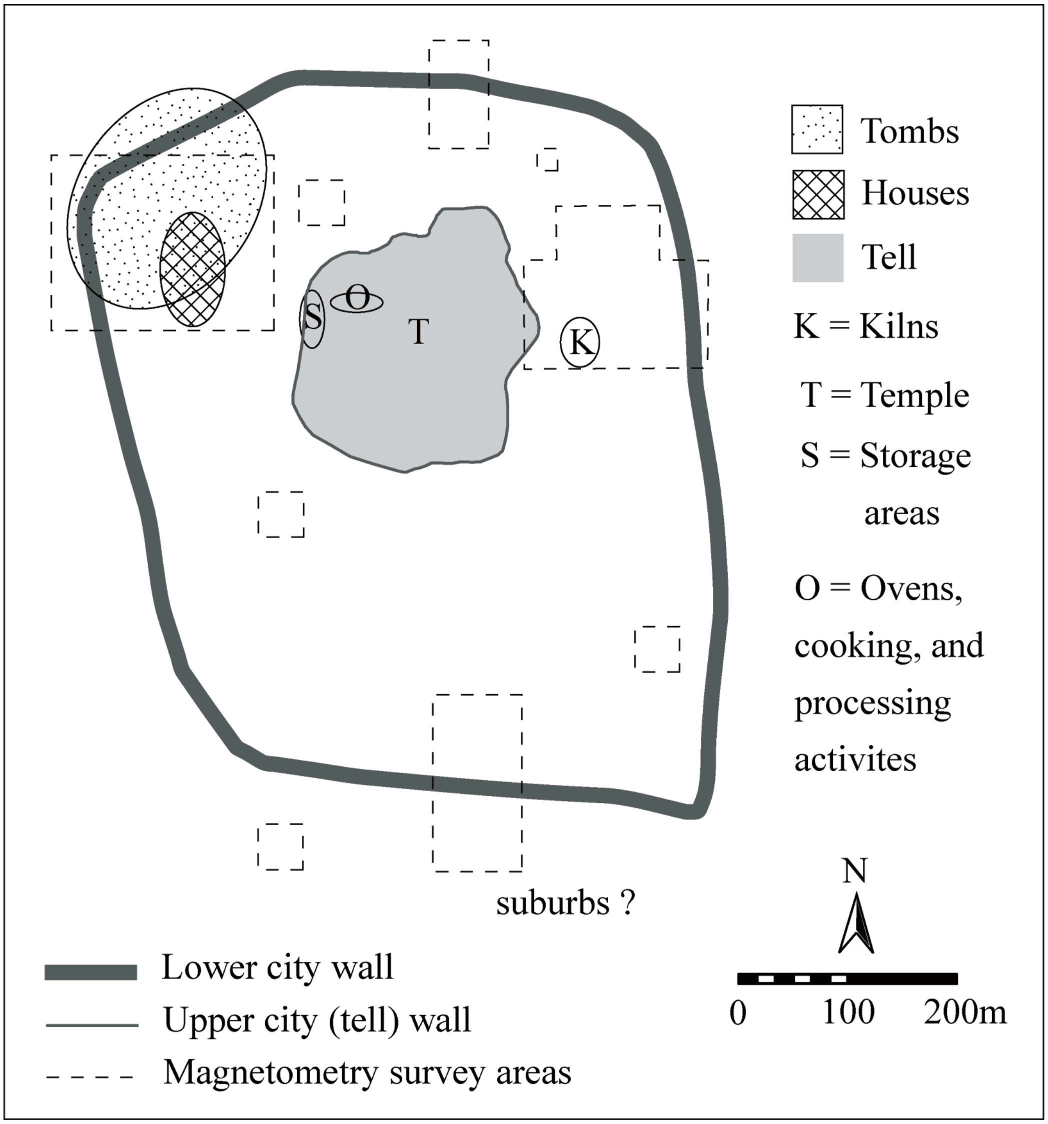


Figure 9.9: Tell es-Sweyhat, site plan showing major features, magnetometry survey areas, and the location of various activities or facilities (After Danti and Zettler 2007: Figure 11.4; and Zettler 1996b: Figure 1.4).

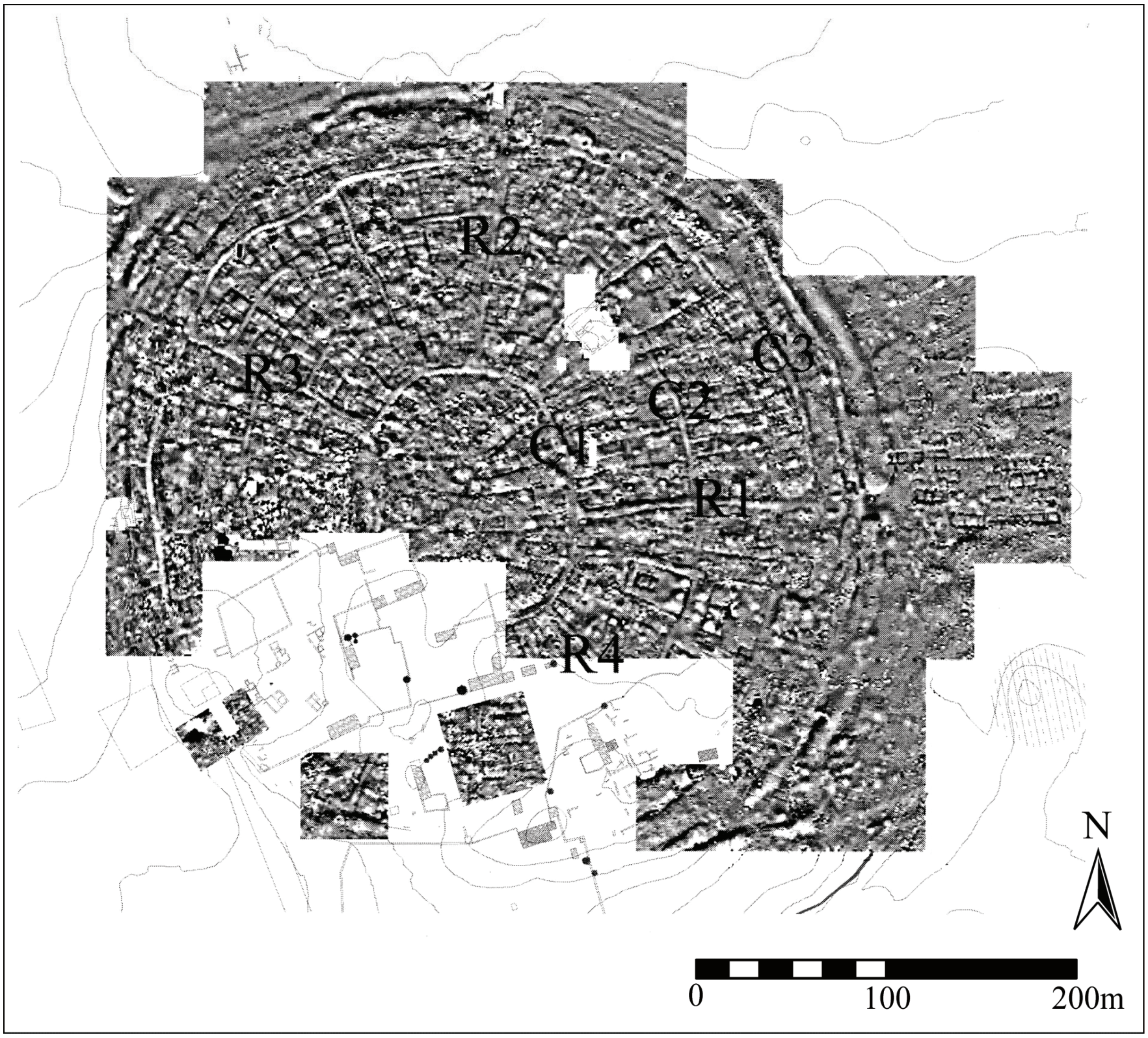


Figure 9.10: Tell Al-Rawda, magnetometry plan with major streets labeled (Edited from Castel et al. 2005: Figure 3).

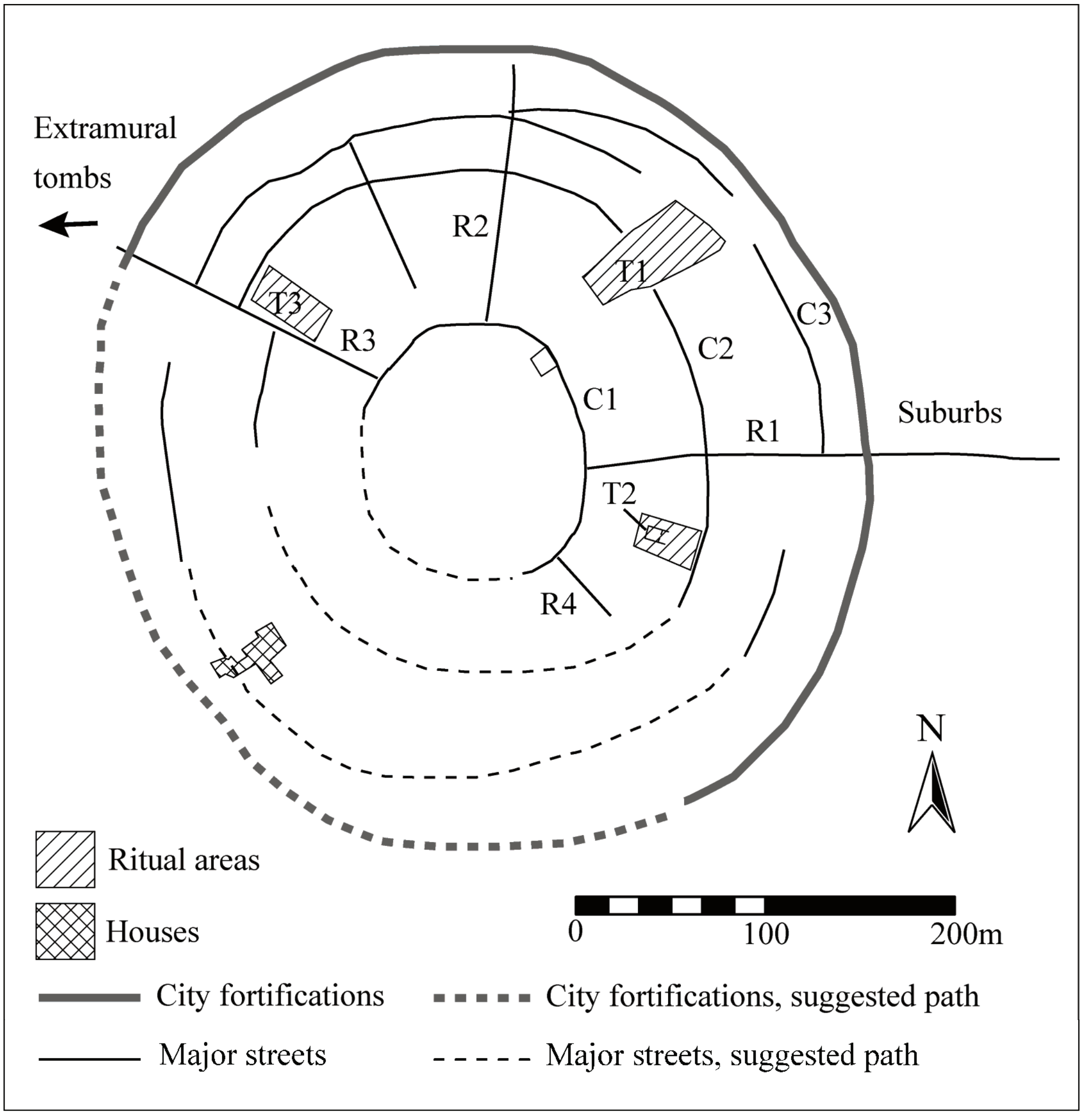


Figure 9.11: Tell Al-Rawda, schematic plan showing city wall, major streets (labeled), and the character of some ritual and housing areas (Derived from Castel and Peltenburg 2007: Figure 5; Castel et al. 2005: Figures 2a, 3; and Gondet and Castel 2004: Figure 8).

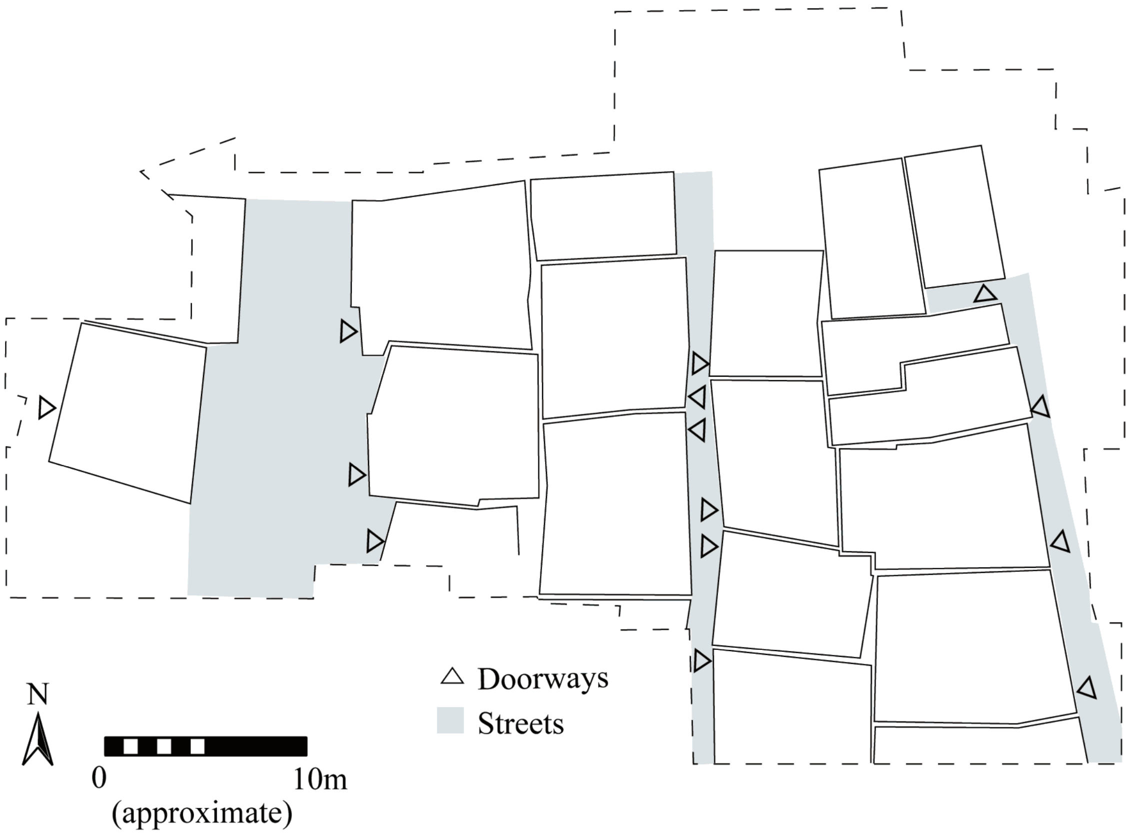


Figure 9.12: Tell Chuera: EJ IIIa (2600 - 2450 B.C.E.) house plots in Area K (Redrawn after Pfälzner 1996:Abb. 3).

Ware	P1	%	P2	%	P3	%	Total	%	P1+2	%
1	3529	70.74	5688	77.31	1625	79.11	10842	75.29	9217	74.66
2	15	0.30	45	0.61	85	4.14	145	1.01	60	0.49
3	468	9.38	335	4.55	23	1.12	826	5.74	803	6.50
4	48	0.96	14	0.19	6	0.29	68	0.47	62	0.50
5	2	0.04	10	0.14		0.00	12	0.08	12	0.10
6	215	4.31	116	1.58	8	0.39	339	2.35	331	2.68
7	3	0.06	2	0.03			5	0.03	5	0.04
8	25	0.50	40	0.54	3	0.15	68	0.47	65	0.53
9	136	2.73	161	2.19	15	0.73	312	2.17	297	2.41
10	3	0.06	1	0.01			4	0.03	4	0.03
11	1	0.02		0.00	1	0.05	2	0.01	1	0.01
12	4	0.08	6	0.08			10	0.07	10	0.08
13	41	0.82	36	0.49	3	0.15	80	0.56	77	0.62
14	11	0.22	6	0.08			17	0.12	17	0.14
15				0.00			0	0.00	0	0.00
16	236	4.73	450	6.12	84	4.09	770	5.35	686	5.56
17	30	0.60	44	0.60			74	0.51	74	0.60
18			1	0.01			1	0.01	1	0.01
19	137	2.75	327	4.44	193	9.40	657	4.56	464	3.76
20	2	0.04	2	0.03			4	0.03	4	0.03
21	9	0.18	2	0.03			11	0.08	11	0.09
22	7	0.14	12	0.16	6	0.29	25	0.17	19	0.15
23			2	0.03			2	0.01	2	0.02
24	19	0.38	10	0.14			29	0.20	29	0.23
25	12	0.24	10	0.14	1	0.05	23	0.16	22	0.18
26	36	0.72	37	0.50			73	0.51	73	0.59
27					1	0.05	1	0.01		
Total	**4989**	**100**	**7357**	**100**	**2054**	**100**	**14400**	**100**	**12346**	**100**

Figure A2.1: All EBA sherds, count. This table contains all EBA contexts from Operations 1-5, 7, and J32, excluding the Halaf loci from Op. 1.1. P1/2/3 = Priority 1/2/3 contexts as defined in the text.

Ware	P1	%	P2	%	P3	%	Total	%	P1+2	%
1	402227	93	404090	91	97576	84	903893	91	806317	92
2	155	0	953	0	3299	3	4407	0	1108	0
3	14381	3	12244	3	551	0	27176	3	26625	3
4	1155	0	556	0	186	0	1897	0	1711	0
5	30	0	175	0			205	0	205	0
6	1800	0	1552	0	92	0	3444	0	3352	0
7	70	0	37	0			107	0	107	0
8	235	0	371	0	24	0	630	0	606	0
9	730	0	1256	0	143	0	2129	0	1986	0
10	70	0	15	0			85	0	85	0
11	10	0			21	0	31	0	10	0
12	160	0	81	0			241	0	241	0
13	396	0	425	0	46	0	867	0	821	0
14	300	0	116	0			416	0	416	0
15										
16	4274	1	7620	2	5768	5	17662	2	11894	1
17	2020	0	4200	1			6220	1	6220	1
18			10	0			10	0	10	0
19	2603	1	9351	2	8052	7	20006	2	11954	1
20	35	0	10	0			45	0	45	0
21	80	0	13	0			93	0	93	0
22	47	0	67	0	65	0	179	0	114	0
23			204	0			204	0	204	0
24	245	0	154	0			399	0	399	0
25	260	0	255	0	7	0	522	0	515	0
26	750	0	1667	0			2417	0	2417	0
27					42	0	42	0		
Total	**432033**	**100**	**445422**	**100**	**115872**	**100**	**993327**	**100**	**877455**	**100**

Figure A2.2: All EBA sherds, weight. This table contains all EBA contexts from Operations 1-5, 7, and J32, excluding the Halaf loci from Op. 1.1. P1/2/3 = Priority 1/2/3 contexts as defined in the text.

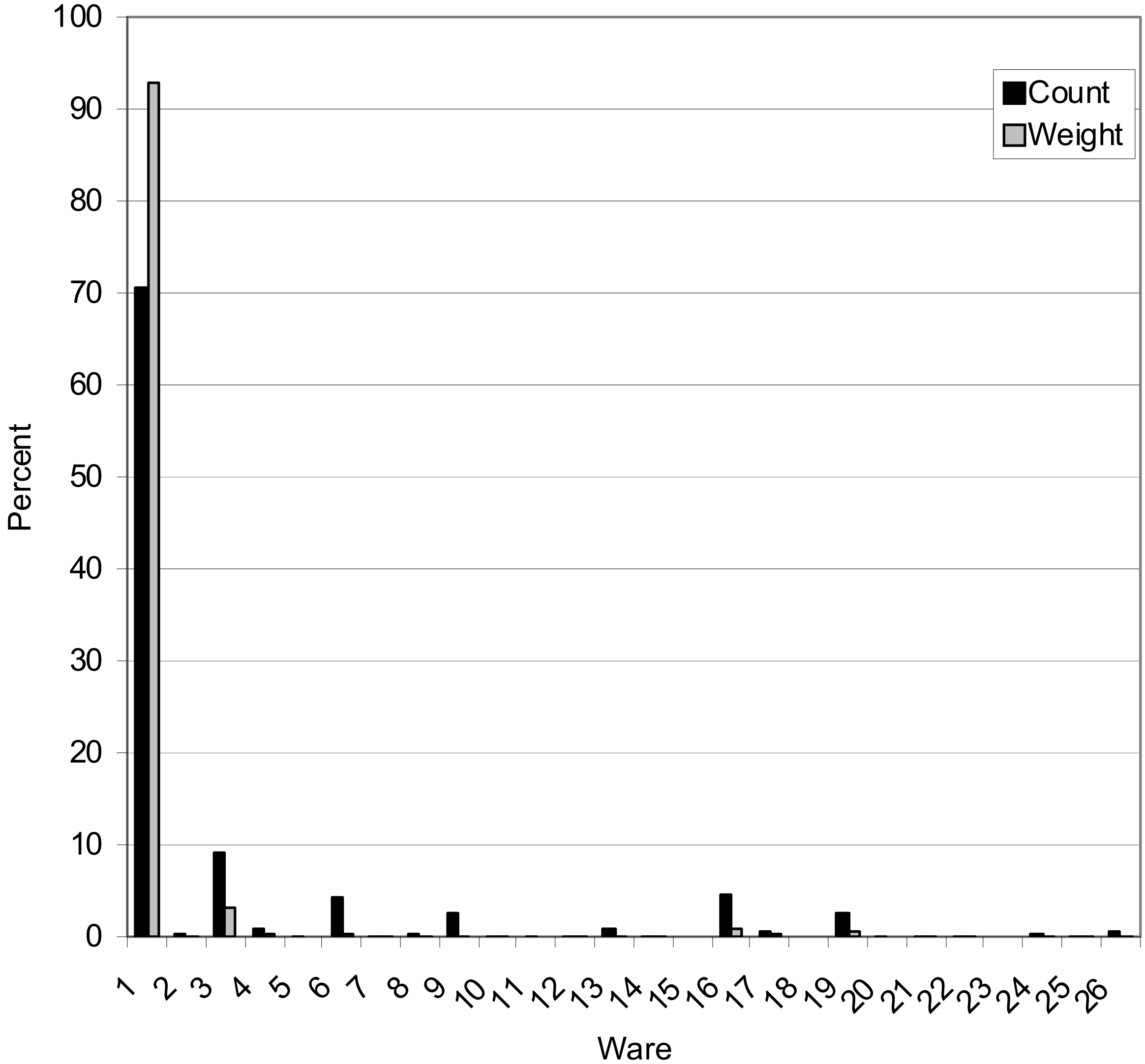


Figure A2.3: All EBA priority 1 contexts: pottery sherd count % and weight % by ware.

Ware	Count	%	Weight	%
1	1720	87.53	289987	96.17
2	2	0.10	35	0.01
3	74	3.77	4866	1.61
4	5	0.25	530	0.18
6	4	0.20	60	0.02
8	6	0.31	140	0.05
9	74	3.77	596	0.20
10	1	0.05	30	0.01
12	1	0.05	10	0.00
13	15	0.76	378	0.13
14	3	0.15	126	0.04
16	16	0.81	1210	0.40
17	5	0.25	850	0.28
19	27	1.37	1580	0.52
20	2	0.10	20	0.01
21	4	0.20	55	0.02
22	1	0.05	5	0.00
23	1	0.05	40	0.01
24	2	0.10	39	0.01
25	1	0.05	47	0.02
26	1	0.05	930	0.31
Total	**1965**	**100.00**	**301534**	**100.00**

Figure A2.4: Count and weight of EBA priority 1 and 2 context diagnostic pottery sherds.

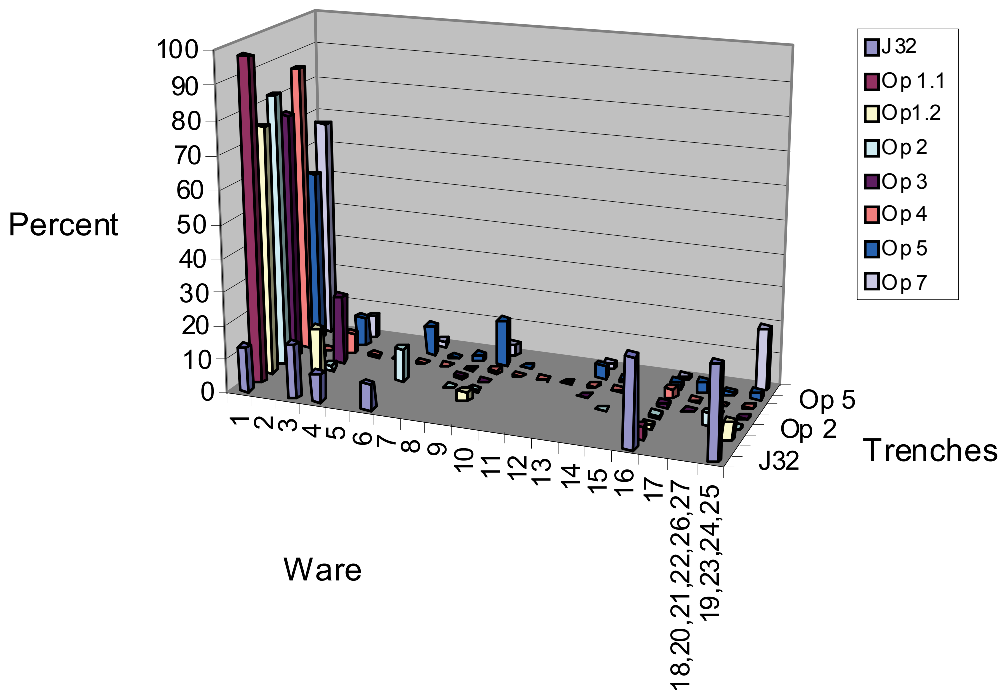


Figure A2.5 Pottery sherd ware count proportions by trench, priority 1 contexts only (Op. 7 is priority 2).

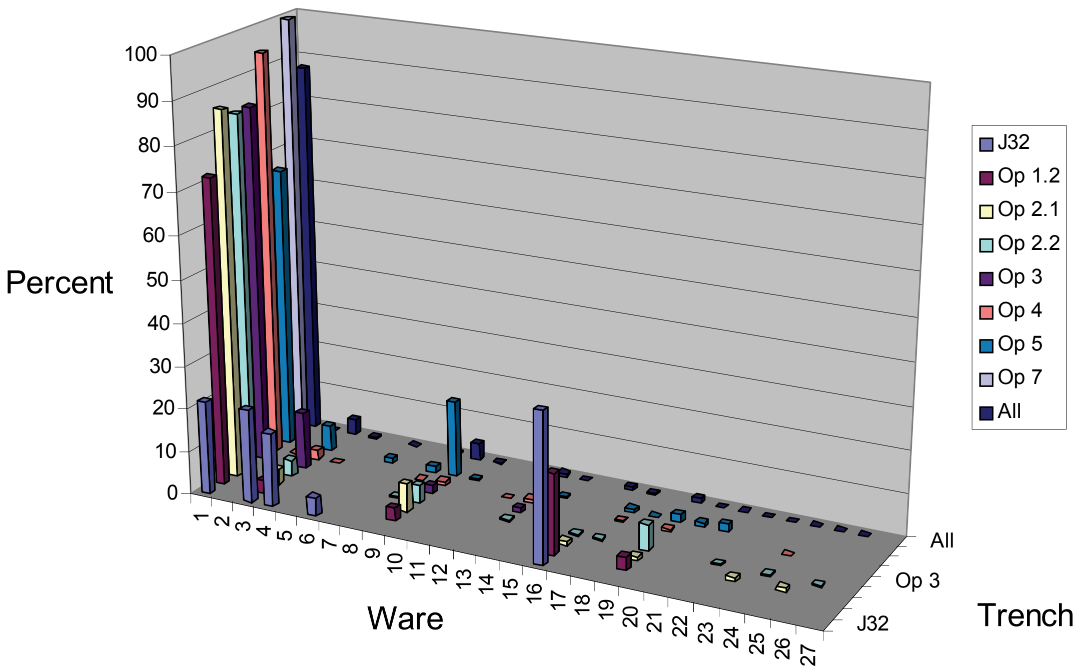


Figure A2.6: Pottery sherd diagnostic ware count proportions by trench, priority 1 and 2 contexts.

Ware	P1	%	P2	%	P3	%	Total	%	P1+2	%
1	213	30	713	50	49	38	975	43	926	43
2	10	1	64	4	9	7	83	4	74	3
3	10	1	30	2	3	2	43	2	40	2
4	43	6					43	2	43	2
5										0
6			4	0			4	0	4	0
7			2	0			2	0	2	0
8	1	0	5	0			6	0	6	0
9	5	1	7	0	2	2	14	1	12	1
10										
11										
12										
13			9	1			9	0	9	0
14										
15										
16	173	24	12	1	3	2	188	8	185	9
17	2	0	1	0			3	0	3	0
18										
19	109	15	342	24	4	3	455	20	451	21
20										
21			1	0			1	0	1	0
22	1	0	10	1			11	0	11	1
23										
24	85	12	58	4	53	41	196	9	143	7
25	59	8	178	12	6	5	243	11	237	11
26			3	0			3	0	3	0
Total	**711**	**100**	**1439**	**100**	**129**	**100**	**2279**	**100**	**2150**	**100**

Figure A2.7: All Second Millennium sherds, count. This table contains second millennium contexts from Operations 6, 8, and 10. P1/2/3 = Priority 1/2/3 contexts as defined in the text.

Ware	P1	%	P2	%	P3	%	Total	%	P1+2	%
1	10610	43	30511	41	1206	44	42327	42	41121	42
2	175	1	2040	3	190	7	2405	2	2215	2
3	140	1	716	1	70	3	926	1	856	1
4	840	3					840	1	840	1
5										
6			59	0			59	0	59	0
7			53	0			53	0	53	0
8	5	0	80	0			85	0	85	0
9	50	0	195	0	20	1	265	0	245	0
10										
11										
12										
13			125	0			125	0	125	0
14										
15										
16	4130	17	396	1	70	3	4596	5	4526	5
17	240	1	100	0			340	0	340	0
18										
19	4820	20	30652	41	120	4	35592	35	35472	36
20										
21			10	0			10	0	10	0
22	10	0	120	0			130	0	130	0
23										
24	1350	5	1790	2	925	34	4065	4	3140	3
25	2235	9	7213	10	160	6	9608	9	9448	10
26			270	0			270	0	270	0
Total	**24605**	**100**	**74330**	**100**	**2761**	**100**	**101696**	**100**	**98935**	**100**

Figure A2.8: All Second Millennium sherds, weight. This table contains second millennium contexts from Operations 6, 8, and 10. P1/2/3 = Priority 1/2/3 contexts as defined in the text.

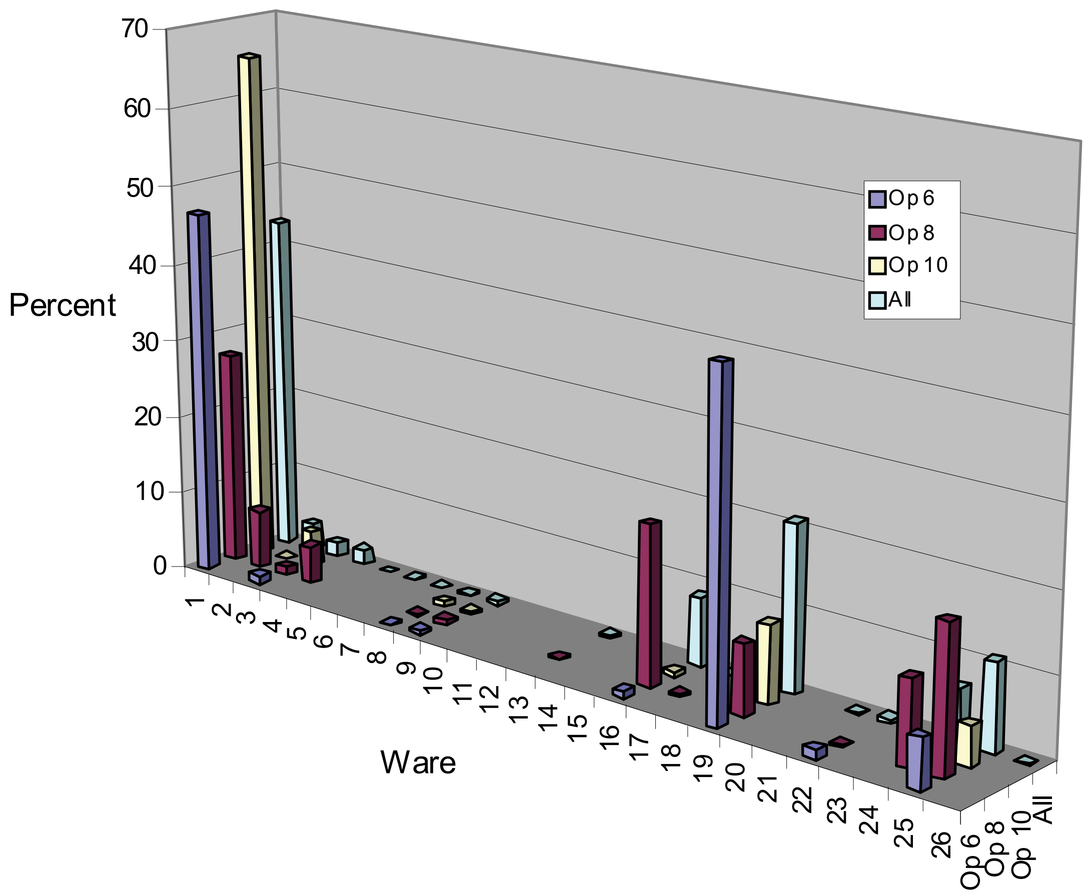


Figure A2.9: Second Millennium pottery count proportions, priority 1 and 2 contexts, by trench.

Count

Ware	P1	%	P2	%	P1+P2	%
1	29	46	69	0	98	48
2	1	2	8	0	9	4
3			3	0	3	1
8			1	0	1	0
9			2	0	2	1
13			3	0	3	1
16			1	0	1	0
17	1	2	1	0	2	1
19	1	2	4	0	5	2
22			4	0	4	2
24	3	5	6	0	9	4
25	28	44	38	0	66	32
26			2	0	2	1
Total	**63**	**100**	**142**	**1**	205	100

Weight

Ware	P1	%	P2	%	P1+P2	%
1	2030	52	1644	15	3674	25
2	30	1	290	3	320	2
3			100	1	100	1
8			10	0	10	0
9			30	0	30	0
13			35	0	35	0
16			50	0	50	0
17	180	5	100	1	280	2
19	40	1	5275	48	5315	36
22			40	0	40	0
24	60	2	260	2	320	2
25	1530	40	2980	27	4510	30
26			180	2	180	1
Total	**3870**	**100**	**10994**	**100**	14864	100

Figure A2.10: Second Millennium pottery diagnostics, priority 1+2 contexts, count and weight.

Count

Ware	P1	%	P2	%	P3	%	P1+2	%
1	5	56	330	65	48	38	335	65
2		0	7	1	9	7		0
3	2	22	21	4	3	2	23	4
6			4	1				
7			2	0				
8			3	1			3	1
9			2	0	2	2	2	0
13			7	1				
16			3	1	3	2	3	1
19			51	10	4	3	51	10
21			1	0				
24			47	9	53	41		
25	2	22	23	5	6	5	25	5
26			3	1				
Total	**9**	**100**	**504**	**100**	**128**	**100**	**513**	**100**

Weight

Ware	P1	%	P2	%	P3	%	P1+2	%
1	380	844	8769	58	1190	43	9149	59
2			340	2	190	7		0
3	20	44	515	3	70	3	535	3
6			59	0				
7			53	0				
8			50	0		0	50	0
9			50	0	20	1	50	0
13			100	1				
16			80	1	70	3	80	1
19			2725	18	120	4	2725	17
21			10	0				
24			1460	10	925	34		
25	50	111	705	5	160	6	755	5
26			270	2				
Total	**450**	**1000**	**15186**	**100**	**2745**	**100**	**15636**	**100**

Figure A2.11: Operation 10, pottery sherd count and weight.

Ware	count	%	weight	%
1	29	58	510	38
2	2	4	110	8
3	2	4	70	5
9	1	2	20	1
13	3	6	35	3
16	1	2	50	4
19	1	2	100	7
24	4	8	170	13
25	5	10	105	8
26	2	4	180	13
Total	**50**	**100**	**1350**	**100**

Figure A2.12: Operation 10, count and weight of diagnostic pottery sherds from priority 1 and 2 contexts.

	Locus									
Ware	5	%	7	%	10	%	15	%	**Total**	%
1	18	52.94	281	72.24	5	71.43	31	86.11	**304**	65.24
13	3	8.82	4	1.03				0.00	**7**	1.50
19	1	2.94	45	11.57			5	13.89	**46**	9.87
21	1	2.94		0.00					**1**	0.21
24			47	12.08					**47**	10.09
25	11	32.35	12	3.08	2	28.57			**25**	5.36
Total	**34**	**100**	**389**	**100**	**7**	**100**	**36**	**100**	**466**	**100**

Figure A2.13 Operation 10, pottery sherd count by ware and locus.

Kurban Area A, Period IV, all phases

Kazane Ware	Kurban Ware	Count	%	Weight	%
1	4	6951	57.17	241,225	57.73
3	9	4035	33.19	145350	34.78
17, 19, 23, 24, 25	13, 14**	330	2.71	12945	3.10
5, 6, 7	5	242	1.99	6335	1.52
13	2	225	1.85	4205	1.01
14	8	162	1.33	4755	1.14
9	1	58	0.48	565	0.14
16	17*	43	0.35	1210	0.29
N/A	4*	24	0.20	N/A	N/A
N/A	13/14"	24	0.20	N/A	N/A
N/A	4**	23	0.19	N/A	N/A
8	7	14	0.12	440	0.11
16	32, 38*	12	0.10	210	0.05
11	12	4	0.03	60	0.01
16	3**	4	0.03	20	0.00
4	40	3	0.02	385	0.09
none	42	2	0.02	110	0.03
none	21	1	0.01	20	0.00
15	37	1	0.01	20	0.00
	Total	**12158**	**100.00**	**417,855**	**100.00**

* = "intrusive"
** = "extrusive"

B.
Kurban Period IV: All phases , all areas

	Handmade		Wheel-made		Total
Subperiod	count	%	count	%	Sherds
IV.4	547	45.62	652	54.38	1199
IV.3	1807	42.97	2398	57.03	4205
IV.2	10073	37.48	16804	62.52	26877
IV.1	3287	31.59	7118	68.41	10405
Total	**15714**	**36.81**	**26972**	**63.19**	**42686**

Figure A2.14: EBA pottery ware proportions at Kurban Höyük (Sources: A: Algaze 1990: 351 [Tables 31a and 31b]; B: Wattenmaker 1998: 133 [Table 4, handmade versus wheelmade vessels by period]).

Ware	Low %	High %
Plain simple	70	80
Cooking pot	1	11
Metallic	0	2
Decorated	0	3

Figure A2.15: Tell Chuera: ware count proportions from phases 7 to 3 housing in the SE area of the upper city (data from Klein 1995:110-114).

	Lidar	Hammam
Chaff	negligable	55 - 95
Gritt	over 70	

Figure A2.16: MBA ware count proportions for chaff and gritt-tempered wares at Lidar Höyük (data from Kaschau 1999:99) and Hammam et Turkman (data from van Loon 1988).

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APPENDIX 1

THE 2003 GRADIOMETER SURVEY AT KAZANE HÖYÜK

Archaeological Geophysics

A recent publication defines archaeological geophysics as: "The examination of the Earth's physical properties using non-invasive ground survey techniques to reveal buried archaeological features, sites and landscapes" (Gaffney and Gater 2003:12). This type of research, which began in the United States and Britain, was used sporadically in the first half of the twentieth century but gained momentum in the 1950s and 1960s due to a number of breakthroughs in data collection, recording and interpretation (Clark 2000:1-26). The frequency of geophysical surveys greatly increased after the mid 1970s due to four key factors (Clark 2000:1-26; Kvamme 2003:436-437; Kvamme 2001:353-355; Gaffney and Gater 2003:19-24):

1) The passage of laws requiring archaeological study in advance of development.
2) Increasing computer processing power and memory, which automated the collection and storage of increasingly larger amounts of data. This permitted surveys of larger areas at a higher resolution, and presentation of data in a visual form interpretable by non-specialists.
3) Improved equipment with better sensitivity, and the greater availability of prepackaged geophysics machines through private vendors (previously, such machines were often created or modified 'in-house' by each research group to meet their needs).
4) Increasing incorporation of geophysics topics within the curriculum of higher education, especially in England.

The geophysics methods used most frequently in archaeology include magnetometry, resistivity, and ground penetrating radar (Nishimura 2001). Each method measures a different physical property of soil and buried features. Ideal conditions for each method vary, and the researcher must carefully choose and test each method before embarking on a large-scale survey.

Archaeological geophysics is often perceived as an effort to find and chase walls or other features in order to make it easier to excavate them (Kvamme 2003:436; Spoerry 1992:2 [in Gaffney and Gater 2003:21]). In reality, geophysics holds much promise as a dataset in its own right. When combined with targeted test trenches to verify interpretations, geophysics data is useful for large-scale spatial analysis of settlements and landscapes. In addition to analyzing specific archaeological features, geophysics methods can also analyze stratigraphy as well as ancient and modern pathways, ditches and earthworks, locate relic streambeds or borrow pits for brick manufacture or mound and house construction, and even identify the sources of soils and materials found in archaeological contexts (Bevan 1998:43-44; Conyers and Cameron 1998; Dalan and Bevan 2002; Dalan and Banerjee 1998; Dalan et al. 2003: 49-53; Hargrave et al. 2002:96; Heron and Gaffney 1987:74; Weston 2001; Wilkinson 2003:40). As a non-invasive technique, geophysics is also very useful for assessing site integrity (the degree of natural and modern disturbances) and devising a site management plan, which is especially useful for national parks or protected sites (Hargrave et al. 2002: 90).

Gradiometry

I chose gradiometry for initial testing at Kazane because it is a relatively quick, inexpensive magnetometry method with a design that minimizes the need for extensive data processing (Gaffney and Gater 2003:40). I expected that the site conditions at Kazane would be suitable for this method due to the good results at sites with similar soil and archaeological characteristics.[1] Also, instead of importing a machine into Turkey, I was able to obtain a Geoscan Instruments FM-36 fluxgate gradiometer[2] and Geoplot 2.1 downloading and processing software from the British Institute of Archaeology in Ankara.[3] Following the field season, I reprocessed all data with Geoplot 3.0 in the Kerkenes Dağ computer lab at Middle East Technical University.[4]

The Geoscan Instruments FM-36 fluxgate gradiometer consists of a long, narrow aluminum casing with a computer attached to the top via a handle (Figure 4.1). There are two sensors, one at each end of the aluminum tube, separated by 0.5m. The upper sensor measures the general background magnetic field of the earth while the lower sensor records the earth's general background magnetic field and anomalies to it caused by buried features up to about a meter below the ground surface. The computer subtracts the top reading from the bottom reading, leaving the value of the near surface soil and buried features. By walking along parallel lines in measured grids, holding the machine just above the ground surface in vertical

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[1] See for example the results from Titris Hoyuk: Algaze et al. 1995: 22-23.

[2] A GeoScan FM-36 fluxgate gradiometer has "a nominal sensitivity of 0.1 nT [nanotesla, also known as gamma] at 10 samples/second" (Somers in Algaze et al. 1995:22-23; see also Clark 2000:70-71). The FM-36 is user-friendly and it is fairly easy to quickly obtain good results using its specially designed software. I processed and filtered all data with Geoplot 2.01 and 3.0 software.

[3] I thank Hugh Elton and the staff of the British Institute of Archaeology at Ankara for the loan of their FM-36 Fluxgate gradiometer.

[4] It is often noted that geophysical surveys are much more common in Europe than in the Americas, in part because of greater access to training, more private geophysics firms, and deeper historical integration between geophysics and general archaeological practice (Hargrave et al. 2002:1; Kvamme 2003:436). This project's geophysics lineage runs through American and British archaeologists working in Turkey at Kerkenes Dağ and Titriş Höyük. It was training and advice from the directors of these projects, as well as ready access to a gradiometer in Turkey that made my research possible. I would like to thank: Dr. Lewis Summers of Geoscan Research, who conducted the initial gradiometry work at Kerkenes Dağ and Titriş Höyük, and is thus indirectly responsible for my opportunity to learn how to use the FM-36 and conduct my own survey; Drs. Geoff and Françoise Summers and the 2003 Kerkenes Dağ spring season team for training me in remote sensing, and for permitting me to use the Kerkenes Dağ lab at Middle East Technical University to reprocess the Kazane data with the latest software; Nurdan Çayırezmez for assistance in collecting initial data in the field and processing the data; Dr. Tim Matney and Ann Donkin for advice on data collection and processing methodologies and the loan of a copy of Geoplot 3.0 to reprocess and reevaluate this project's data in fall 2006; and Dr. Roger Walker for advice on processing data.

orientation[5] while taking continual readings at measured intervals,[6] one can fairly quickly record data for mapping the magnetism of buried features across a large area (Clark 2000:77-79).

Recent surveys in the Near East using the FM-36 include Titriş Höyük (Matney and Algaze 1995:36-37), Ziyaret Tepe (Matney and Rainville 2005:40-42, 65), Kerkenes Dağ[7] (Aydin et al. 2002; Summers et al. 2002; Summers snd Summers 1998), Sweyhat[8] (Peregrine 1996; Peregrine et al. 1997) Çatalhöyük (Shell 1996), Burgaz (Drahor et al. 2001) Kenan Tepe (Creekmore 2006, 2008), and various sites in Egypt (Herbich 2001), among many others. The results from Titriş Höyük are especially relevant because its site formation processes and field conditions are very similar to those at Kazane. Both sites have stone (often limestone) architecture just below the ground surface, filled in with collapsed and weathered mudbrick superstructure and occupational debris (Algaze et al. 1995:23). Both sites are located in areas of steppe vegetation (van Zeist and Bottema 1991:24-25) with similar soils[9] (Dewdney 1971:46). At each site, the upper 0.2m – 0.5m were plowed in modern times, and data collection took place in hot, dry summers. Other surveys of sites in the Near East using a different type of gradiometer or magnetometer include the work in Turkey at Kyme[10] (Ciminale 2003), Troy[11] (Becker, Fassbinder, and Jansen 1993; Becker and Jansen 1994), Demircihöyük (Becker 1977/78, 1979), and Hassek Höyük (Becker 1981, 1992), in Iraq at Assur (Becker 1991), and in

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[5] Keeping the machine perfectly vertical while walking the traverses is difficult. Fortunately, processing tools in Geoplot and other software packages can eliminate or smooth errors introduced by subtle tilting of the machine.
[6] The machine beeps in a steady rhythm when it records data. The operator must walk such that the beeps occur directly over the collection points along the traverse, in our case each meter. The operator can speed up or slow down the rhythm of the data collecting beeps to match a comfortable walking speed. On flat surfaces, the operator can walk more quickly, while plow furrows, ditches, brush and other surface irregularities require a slower pace.
[7] See also: http://www.metu.edu.tr/home/wwwkerk/kerk1/05remote/geophyss/index.html. For the 2005 season report, see: http://www.metu.edu.tr/home/wwwkerk/kerk2/17downlds/reportPdf/05repengebo.pdf.
[8] This project used an FM-18, which is an earlier version of the FM-36 with less memory.
[9] The hills around the Harran Plain were once covered with red-brown terra rossa soils that have long since eroded away. The valley and Plain consist of dark brown clayey loams (Rosen 1998:217).
[10] A "high sensitivity (0.05nT) Geometrics G858 optical pumping magnetometer in gradiometer configuration" was used in this survey (Ciminale 2003:120-121).
[11] A cesium magnetometer was used in this survey to detect features buried up to 10 feet.

Syria at Mumbaqa[12] (Becker, Fassbinder, and Chouker 1993), Al Rawda[13] (Gondet and Castel 2004; Castel et al. 2005), Palmyra,[14] Chuera[15] (Buthmann et al. 2001; Meyer 2006: Abb. 2; Pruss 2000b:1432), and nearby Kharab Sayyar[16] (Posselt 2002 and 2003). The compelling results of these and other surveys encouraged the use of magnetometry at Kazane.

Gradiometry is a "passive" geophysical method because unlike "active" methods, including resistivity, sonar and ground penetrating radar, it does not send an electric charge, sound waves, or other signals into the ground (Heimmer and De Vore 1995:7-10). A fluxgate gradiometer is a magnetometer that measures the vertical magnetic properties of soil and buried features with two or more sensors set one above the other (Clark 2000:69-70).[17] The use of two sensors minimizes or eliminates several potential intervening variables.[18] Gradiometers are highly sensitive to subtle differences in magnetism (Kvamme 2001:357). The sensors measure the variations in magnetic susceptibility of soil and other materials buried beneath the ground surface. Susceptibility is the degree to which materials, such as soil, to take on a magnetic charge, in this case from the earth's magnetic field (Dalan and Banerjee 1998:6).

Human activites are known to increase the susceptibility of the areas they inhabit (Tite and Mullins 1971:219; Clark 2000:65-66,99). Susceptibility is enhanced by a higher

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[12] This survey used a cesium magnetometer V101, as well as electrical survey devices (Becker, Fassbinder, and Chouker 1993:65).
[13] A cesium magnetometer was used in this survey. Both cesium and proton magnetometers measure the total intensity of the magnetic field, rather than just its vertical component (as in a fluxgate gradiometer) (Nishimura 2001:46).
[14] This survey used a caesium magnetometry and resistivity survey (Schmidt-Colinet and Plattner 2001).
[15] This survey used a "four-channel gradiometer with 0.65m vertical distance" (Buthmann et al. 2001:78).
[16] This survey used "a multiprobe fluxgate-gradiometer with four probes (vertical distance 0.65m)" (Posselt 2003:3)
[17] For a detailed explanation of how the sensors in a gradiometer work, see Scollar et al. 1990:456-461.
[18] These variables include interference from solar storms, and nearby large metal objects such as cars and structures (see Bevan 1998:27; Heimmer and De Vore 1995:12-14).

concentration of iron oxides or organic matter[19] (as found in topsoil or garbage), or by intentional or accidental heating and burning of soils above the Curie point, which varies for different iron oxides but is around 600 degrees Celcius (Gaffney and Gater 2003:37). Heating induces stronger magnetism by resetting the magnetic field such that the magnetic poles of atoms of the effected material, previously oriented in random directions, are oriented in the same direction as the earth's magnetic field – magnetic north – at the time. Once the heated material cools, the changed magnetism remains fixed despite changes in the earth's magnetic field,[20] a phenomenon known as "thermoremant magnetism" (Kvamme 2003:441; Weymouth 1986:342).

Conveniently for archaeologists, topsoil is more magnetically susceptible than deeper soils, and human occupation moves topsoil around (Clark 2000:100-101). When soils, stones, and other materials with different susceptibility are mixed together, for example in a pit or ditch, the feature appears as an anomaly against the general background susceptibility of the surrounding soil (Kvamme 2001:356). The remnant magnetism of heated features, including hearths, kilns, burned brick structures, or even concentrations of fired pottery, makes these features especially visible due to their strong contrast with the magnetism of the surrounding soil. Also, materials with very little magnetic susceptibility, especially limestone, appear as features with extremely low magnetism (Kvamme 2001:356).[21]

Many non-archaeological factors influence the signals that the gradiometer records (Heimmer and De Vore 1995:12-13). Natural features include differences in soil moisture content, and near surface geology, including bedrock, which can create signals that mask the

[19] It is not entirely understood why topsoil is more magnetically susceptible than other soils. It is thought that the organic matter in topsoil and the activity of bacteria within topsoil, especially fermentation, increase susceptibility (Clark 2000:100-101; Gaffney and Gater 2003: 40).

[20] For a brief review of the reasons why these materials or activities increase susceptibility, see Dalan and Banerjee 1998:1-5.

[21] See Weymouth 1986:342, Table 6.3 for a listing of the general susceptibility of limestone, subsoil, topsoil and heated materials.

archaeological remains. Recent human activity also impacts the readings. Modern features commonly encountered during survey include electric towers, plow furrows, roads, ditches, fences, structures, modern metal debris on the surface or in the operator's[22] clothing, shoes or pockets[23] (Bevan 1998:21; Weymouth 1986:349), and buried pipelines, which overwhelm the subtle signal of archaeological features. For these reasons, the surveyor must carefully record the field conditions at the time of data collection, including the weather, which team member carried the machine[24] through each grid, and any surface features that could cause anomalies.[25]

Depth of visible data

It is important to consider the expected depth of buried features when choosing a geophysics method. Different equipment and data collection set-ups have different depth sensitivities. A fluxgate gradiometer is very sensitive to anomalies within the first meter below the surface, but sensitivity rapidly decreases below one meter depth and ceases altogether around three meters depth (Clark 2000:78-80). Thus, a fluxgate gradiometer is an ideal method for detection of features buried within the first meter below the ground surface, but is not likely to

[22] In addition to the operator, any persons assisting with the rope guides or otherwise working nearby should also be metal-free.

[23] Keys, zippers, studs in jeans, bra underwires or even grommets in shoes can interfere with the sensors. For collecting this data, I wore shoes without metal grommets, and sweat pants without zippers. I wear glasses but after testing by collecting data with contact lenses or glasses, I found that glasses did not interfere with the data collection. Other studies also find that glasses do not interfere with the data (Gaffney and Gater 2003:64). This is most likely because glasses are at the far end of the upper sensor's range, out of the range of the lower sensor, and not highly metallic. Also, while walking the traverses, the glasses remain in a constant relationship with the sensors, unlike shoe grommets, which would be constantly moving, or zippers, belt buckles, or jeans studs, which are directly adjacent to the upper sensor. I did not wear glasses during balancing because this procedure requires raising the machine up next to one's head and inverting it, placing the glasses directly in the sensor's path.

[24] I carried the machine for all the data presented here. Another team member carried the machine for a few test grids but the results were less pleasing. The difference may be that the other team member had difficulty keeping the machine in a vertical position during the traverse, and was taller, placing the machine higher above the ground surface.

[25] Prior to collecting a grid, the survey team should scan each grid and adjacent areas for metal objects (Bevan 1998:20), especially large or dense items including wheelbarrows, buckets, discarded tools and bolts. If possible these items should be removed from the area. If an object is too large to move or is permanent (like a fence), its position should be carefully and precisely noted on the data collection notes and plans.

detect deeper features unless they have particularly strong positive or negative magnetic properties that can outshine instrument noise and the magnetism of shallower anomalies. At Kazane, excavations across the site nearly always encounter architecture and other features within the first meter below the surface, so this method is a good fit for the site. Resistivity in a twin electrode configuration (Clark 2000: 44-46; Gaffney and Gater 2003:32-33) would also be a good method to try at Kazane, but dry summer conditions during our field seasons make it difficult to use this method.[26]

Fieldwork at Kazane

Our survey goals were to test at least five 20m X 20m grids in five different parts of the site to see if gradiometry and the FM-36 would be able to detect buried features, especially architecture, streets, and kilns. To the extent that time and funding permitted, I planned to expand the areas with the best results. I decided not to test more areas with fewer than five grids because it can be difficult to interpret the results from just a few grids over a small area. This is because faint anomalies are often only decipherable when there is enough context around them to make them stand out, and the pattern of larger cultural features is only apparent over larger coverage areas (Kvamme 2001:355). For example, in Area 1 I collected two single, non-contiguous grids in the eastern part of the area where Halaf architecture has been found directly below the surface in excavations. There are hints of architecture in these two grids, but without data from a larger contiguous area it is nearly impossible to be certain about any interpretation of this data.

[26] A planned test of resistivity in fall 2005 was not carried out because the necessary research permits were not issued.

I chose to make my initial tests in five widely separated parts of the site in order to obtain information that would enable me to identify similarities or differences in the urban plan among the areas (Figure 1.3, 4.2).[27] The boundaries of each area were determined in part by modern obstacles, including roads, pipelines, canals, substantially bulldozed fields, structures, fences, irrigated cotton and other mature crops. I placed the initial grids in Areas 1 and 2 over architecture excavated in previous seasons in order to check the gradiometry data against the orientation and characteristics of known architecture. Area 3 was placed west of the tell to locate a kiln whose presence was suggested by wasters found in the vicinity by a farmer. Area 4, north of the tell, was placed to see what we could locate north of the tell. Finally, Area 5 was located on the eastern part of the city in an apparently undisturbed area far from any previous excavations at the site.

For the survey, I found it most convenient to collect data in 20m X 20m blocks,[28] in a zig-zag pattern[29] with 1m increments between traverses with an initial direction of magnetic north.[30] I tested the machine at various levels of resolution, and settled on 8 samples per square

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[27] I thank the landowners and renters for allowing us to work on their property.
[28] Using smaller grid blocks (the machine can accommodate grids as large as 40m X40m) requires setting out more corner stakes. With the "stake point," "stake line," "stake line and offset," and "find point" features of the TDS survey pro CE software on the TDS survey works data logger used with our total station, we did not find it very time consuming to stake additional points or lines. In addition, smaller grids are easier to fit into non-linear spaces where the edges of grids cannot be completed. Finally, smaller grids require smaller rope guides, which are easier to manage, maintain, and keep straight along a sloping or undulating landscape.
[29] The "zig-zag" pattern is time efficient because the operator walks to the end of a traverse, shifts right the width of the chosen spacing, in this case 1m, and then walks back to the starting line. This method is quicker than returning to the starting line for each traverse, but introduces error between the lines due to the surveyor's gait and stance. Although the machine is balanced it is best to keep it facing the same direction throughout the grid. Thus, on the return trip in a zig-zag traverse, the operator must grip the machine differently, creating a subtle difference between the position of the machine when walking down a line and returning. This error, which shows up as "striping" in the data (uneven match between traverse lines), can be smoothed or minimized during processing using the zero mean traverse action in Geoplot (see section titled "Processing Regime," below).
[30] We collected all data with the machine facing magnetic north. We chose to face magnetic north because this direction was at roughly a 45-degree angle to known architecture in Area 1. Except for Area 2, we did not know the orientation of architecture in any of the other collection areas, so we kept magnetic north as our orientation. Data collection in each grid block began in the lower left corner and proceeded south to north, with the machine facing magnetic north during each traverse. At the end of each northbound traverse we changed our grip so that the

meter as the most time and results-efficient for our purposes.[31] The FM-36 has a memory capacity of 16000 readings,[32] permitting collection of 5 grids at the chosen dimensions and resolution before downloading.[33] Depending on the number of operator errors[34] and the condition of the ground surface,[35] three team members[36] could collect one grid, from setting the ropes to removing them, in twenty to thirty minutes. During data collection[37] the weather (and

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machine still faced north even when walking south on the tail end of a zig-zag traverse. We used wooden stakes, marked with lime, for grid corners, and rope marked with tape or colored twine for the traverse guides. The lime 'saved' the corner when children or animals removed our stakes. Dr. Geoff Summers suggested the use of lime and it worked well, except in one case where a farmer plowed up all of the stakes – and the lime! Although all of our data collection areas were generally flat, even in the flattest spaces there is some error between the mathematic horizontal distance between the sides of the grid (in our case 20m) and the slope distance covered by the rope guides followed on traverse. In addition, despite using a total station to lay our corners, inevitably there are a few centimeters of error in the placement of each corner stake. To spread this slope error, we stretched the ropes slightly to make them 'fit' the endpoint of the traverses, or we split the extra centimeters between each end. This procedure introduces some small error and could be minimized by using stretching ropes or some other method of adjustment. It is our feeling that such errors are mostly eliminated or smoothed by processing. In cases of significant slope, which we did not encounter in our survey, Geoplot software offers a desloping function aimed at correcting or smoothing slope error.

[31] Although initial testing in Area 1 showed little difference between data collected at 4 or 8 samples per meter, this area apparently had very large stone walls near the ground surface. In contrast, the initial results from other areas revealed few obvious features and I felt that continuing at 8 samples per meter provided the best chance of identifying smaller features. Collecting more samples per square meter, and walking a narrower traverse, for example 0.5m, increases the chances of locating very small features, but fills up the machine's memory faster, requiring more frequent breaks to download and backup the data. We also found that narrower traverses increased the effect of "striping" (see note 29).

[32] According to the FM-36 Instruction Manual (Geoscan Research 1987:5 – Figure 1-6).

[33] Because we do not own the most recent edition of Geoplot, version 3.0, we downloaded and conducted initial processing on raw data using the DOS-based Geoplot 2.0 software supplied with the FM-36 rental. Despite available software patches, we found that Geoplot 2.0 did not work well consistently with a Pentium 4, 32 bit IBM PC with Windows 2000 or XP operating systems. Instead we used a Pentium 1, 16 bit IBM PC running Windows 95. Geoplot 2.0 cannot combine large numbers of grids into composites due to the limitations of DOS memory. Nevertheless, we found Geoplot 2.0 sufficient for downloading and initial processing.

[34] We encountered the following errors during data collection: 1) Mistakenly switching the machine's orientation during a zig-zag (i.e. turning it to face grid south instead of keeping it facing grid north); 2) Improper placement of the rope guides (e.g. skipping a mark on one of the horizontal axes and therefore creating a diagonal traverse; 3) Slippage of the meter markers on the ropes, or stretching of the rope itself. 4) Failure to remove metal objects from the ground surface (e.g. encountering several pieces of large metal garbage during the traverse). All errors were corrected by recollecting data for a traverse or an entire grid if necessary.

[35] In flat areas, such as Areas 2, 3 and 5, the operator could walk quickly. In areas with deep or wide plow furrows, including Areas 1 and 4, the operator moved more slowly to avoid jostling the machine while walking over such obstacles.

[36] The team members for data collection included the author, with Lohman Ildeniz and Şerif Camci (August 19 – 26) and with Cuma Saçaklı and Faik Karaşahin (August 27 – September 6).

[37] We collected data on 11 days: August 19 – September 6 2003.

the ground surface) was hot and dry,[38] with temperatures in the 70°F during the start of work in the morning, rising to over 100°F by 1pm and falling again in the late afternoon. I found that after five grids, and sometimes less than that, it was necessary to rebalance the machine.[39] In total we collected 119 whole or partial grid blocks, including blocks collected two or more times to test resolution or fix errors, resulting in 95 unique grids totaling 37,520m^2.[40]

Data Processing regime

The goal of data processing in remote sensing is to remove readings that derive from natural features (geology, topography), modern disturbances (metal, buried pipes, etc.) and operator error (instrument tilt, uneven traverses or mismatched grid edges). Once interference from these variables is removed, smoothed or minimized, it becomes easier to see potential archaeological anomalies that require interpretation. At a certain point, data processing becomes image processing, or an attempt to create a pleasing image that best shows selected anomalies or all the features. Modern software dissolves the line between data and image processing, and this work involves trial and error (Gaffney and Gater 2003:103), but it is important to consider one's goals at each stage. For example, the interpolation function of data processing programs makes the image look better by stretching or shrinking the data to fill gaps and achieve an equal sample

[38] The most recent rainfall in the area was likely in late May or possibly early June, at least 10 weeks prior to the start of our work.

[39] Typically we balanced the machine twice in the morning and once or twice in the afternoon or evening. The balancing routine involves adjusting the upper and lower sensors such that, ideally, there is no difference in the readings when the machine is facing any direction or inverted. In practice it is nearly impossible to perfectly balance the machine, and we generally balanced to a resolution of 1nt. The balancing procedure is described in the FM-36 Instruction Manual (Geoscan Research 1987).

[40] Over the 11 days of data collection we averaged nearly 11 grids collected per day. The most grids we collected in a day were 15. We averaged less than 15 a day because we were laying the grid corners as we progressed. We might spend a day laying grid corners and the next two days collecting 15 grids each day before stopping to lay corners again. Twice we attempted to work straight through the day in order to collect 20 grids, but the heat was too much for the team, so instead we worked from 6am – 1pm and 4pm to 7pm, using the hours of 1-4 for lunch, a nap, and preliminary data processing.

density in all four cardinal directions (Somers et al. 2003:71). This method does not create new data but it can significantly alter the image of the data. The new image may be easier to interpret, but it can potentially exaggerate the shape of features or suggest connections between features that do not actually exist.

I processed the data presented in this dissertation with Geoplot 3.0 according to the scheme outlined by Somers et al. (2003:71-73) for the Geoscan instruments FM-36 and other gradiometers,[41] but I attempted variations in the order of each step.[42] The approach of Somers et al. (2003) begins with a broad analysis and increasingly narrows the view of the data in order to isolate and enhance more subtle anomalies and categorize them by their strength.[43] Each of the

[41] The general processing scheme for magnetometry data from the FM-36 is summarized in a flow chart in Gaffney and Gater 2003:105 – Figure 50.

[42] For example, it is sometimes effective to clip immediately to +/-15nT prior to applying Zero Mean Traverse, Despiking and Interpolation, and clipping down to +/-10nT or lower can be beneficial. I also tried isolating positive or negative data at various thresholds, and Low Pass Filtering at various stages. In the field, I processed the data with Geoplot 2.0, an earlier, DOS based version of Geoplot 3.0. Geoplot 2.0 lacks sufficient memory to combine all the grids from large areas, or perform certain high-memory functions on large data sets, but it is sufficient to identify whether or not the machine is working properly, and what kinds of anomalies are visible. After the fieldwork, I reprocessed the data with Geoplot 3.0 in the Kerkenes Dağ computer lab of Drs. Geoff and Françoise Summers at Middle Eastern Technical University in Ankara, Turkey. With the initial assistance of Nurdan Çayırezmez, I processed the data according to the general scheme used for FM-36 data at Kerkenes Dağ, which is as follows: 1) Clip (to a value 3X the standard deviation); 2) Zero Mean Traverse (Mean fit: off, Grid #: All); 3) Interpolation (Dir: Y, Method: Sin X/X, Mode: Expand) and Interpolation (Dir:X, Method: Sin X/X, Mode: Shrink; 4) Clip again. In addition, we tried various other filters and processing procedures, such as despiking, zero mean grid, low pass filter and destagger in an attempt to bring out certain features. Subsequently I tried other processing schemes, most notably in October 2006 when I used a loaned copy of Geoplot 3.0 to attempt variations on the scheme in Somers et al. (2003).

[43] This scheme, which applies in general to all kinds of magnetometry data collected with different machines, but which specifically applies to data collected with Geoscan gradiometers, and the functions available in Geoplot 3.0, can be summarized as follows:

Stage I: "Strong Magnetic Anomaly Processing"

This processing stage results in an image in which strong anomalies, including iron objects, fired materials such as kilns and burned buildings, are readily visible, while weak anomalies are often more difficult to see. 1) Combine raw data from various contiguous grids. 2) "Edit or remove defective data." In this step, the Zero Mean Grid feature is used to match adjacent grids with significantly different means, the Zero Mean Traverse feature is used to correct for striping introduced by zig-zag traverses, and the Search and Replace feature is used to remove spikes (also see Ciminale and Loddo 2001 for a discussion of how to remove spikes, stripes and other effects of zig-zag traverses). 3) Interpolate to achieve "equal sample density in the north-south and east-west directions," display and interpret the data.

Stage II: "Weak Magnetic Anomaly Processing " many processing procedures I applied resulted in a different final image, but in Chapter 4 I present only the most pleasing results or versions that clarify a specific observation about the data.[44] In each area, observable features of the ground surface, such as plow furrows, structures and garbage, are carefully considered as potential sources of anomalies. In this study, the initial grids of Areas 1 and 2 covered previously excavated trenches, which permitted an instant comparison of the data to the archaeological remains. Alternatively, ground truthing trenches placed over specific anomalies will provide a check against the interpretation, yielding concrete information about the materials involved, their depth and organization. At Kazane, extensive ground truthing took place a year after the remote sensing work. These trenches are discussed in chapter 5.

After completing steps 1 and 2 from stage I, use the Search and Replace or clip feature to replace all data above or below +/-15 nT with a 'dummy' or blank value. This action eliminates strong signals, making weak signals, including pits and hearths, more apparent.

Stage III: "Separating Positive and Negative Magnetic Anomalies"

After completing steps one and two of stage I, positive or negative data are isolated by clipping all the positive or negative data between 0 to 99999, or 0 to –99999, to view positive or negative anomalies on their own.

Stage IV: "Improving Anomaly Visibility"

After completing steps one and two of stage I, the data is clipped to a desirable level, such as +/-15nT, and then the low pass filter is applied to improve the definition of very weak anomalies of +/-1.5nT.

Stage V: "Statistically Significant Anomalies"

After completing steps one and two of state I, the data is clipped to various levels of standard deviation, making it possible to examine anomalies in separate statistical threshold categories.

[44] I applied the full range (25) of standard Geoplot 3.0 palates, regular and inverted, to processed images from each area, to see if any one highlighted particular anomalies better than another. I also created dot density, trace, and pattern plots of each area. In most cases, the standard Geoplot 3.0 grey55 greyscale shade plots provide the best view of the data.

APPENDIX 2

CERAMIC WARE CHRONOLOGY AND COMPARATIVE ASSEMBLAGES

In this appendix I discuss the relative proportion of ceramic wares at Kazane from the EBA to the MBA. I also examine potential chronological distinctions marked by differences in ware proportions within MBA contexts. Finally, I compare the assemblage from Kazane with the assemblages from sites in neighboring regions, including Kurban Höyük, Lidar Höyük, Hammam et-Turkman, and Tell Chuera.

As described in Chapter 6, the third millennium ceramics at Kazane are part of a largely wheel-made assemblage that is widely distributed across Upper Mesopotamia. The wheel-made pots[1] are consistent in form and ware, and were produced by specialists. Although the inconsistent metrics of cooking pots, which were hand-made, may indicate non-specialist production, their consistent form, ware, and surface treatment (burnishing) suggests that they were produced by specialists.[2] The dominant simple ware and many of its forms, and the distinctive triangular-lug handled cooking pots (Figure 6.6:13; 6.7:101) are found as far west as the Amuq Plain (Amuq Phase I: Braidwood and Braidwood 1960:403-413), to the east beyond the Balikh Valley (Kühne 1976), as far north as the Upper Euphrates Valley in Turkey (Algaze 1990; Algaze et al. 1996: Figures 7-8; Gerber 2000), and as far south as the Orontes River Valley in Southwestern Syria (Fugman 1958). Within this broad ceramic group, the Kazane material is closest to an assemblage found along the axis of the Balikh River from the Upper Euphrates in Turkey to the confluence of the Balikh and the Euphrates in Syria (Prag 1970; Thissen 1989;

[1] In this discussion, wheel-made also includes large hand-made storage jars with thrown rims.

[2] In my view, metric inconsistencies in cooking pots are due to hand versus wheel production, not specialized versus unspecialized production. As an ethnographic comparison, today in Southeast Turkey clay ovens are still made by hand by specialists, even though ceramic vessels are no longer used in cooking or serving. These ovens have a consistent form, ware and surface treatment, but their metrics differ due to hand production by multiple workshops (observation of the author, 1999, 2004).

Yardımcı 2004; Wattenmaker and Mısır 1994). Although ceramic macro and micro regions are sometimes said to mark ethnic or socio-political groups, a study of burial types, which should more closely track ethnic and social identity, found that the distribution of burial types did not correlate with ceramic assemblages (Carter and Parker1995). This indicates that the distribution of ceramic assemblages marks economic and technological interactions, although chronological and contextual explanations are also possible.[3]

The two dominant wares[4] of the Kazane assemblage (Figure A2.1 – A2.4) are Plain Simple ware (Figure 6.6:1, 2, 4, 5, 6, 7, 8, 9, 12) and Cooking Pot ware. Plain Simple ware is by far the most common ware in the assemblage. All but the largest storage jars in this ware are wheel-made, grit-tempered, evenly fired, rarely decorated, and usually buff in color. Plain simple ware comes in a variety of relatively standardized forms, most with simple rims and bases. Small to medium cups and bowls are especially common, as are small, medium and large jars with short necks, simple handles, and beaded, thickened, grooved or ledged rims. Large bowls, spouts, and complex forms are not common. Cooking Pot ware is the second most common ware, occurring in both burnished and unburnished varieties. This ware is hand-made,

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[3] Anne Porter (1999) argues that burial variability reflects different stages in multi-stage burial rituals that include temporary burial, exhumation, reburial, moving bodies around, etc. She argues that the failure of ceramic regions to match burial regions is an illusion, because burial variability is not equivalent to ethnic differences but stages in burial rites. She argues that sub-regional ceramic variability is due not to ethnic, political or social differences, but to chronological and contextual differences (e.g. tombs contain different proportions of wares and forms than domestic, storage, or public building contexts) (Porter 1999:316). Peltenburg (2007:10) recently seconded Porter's call for contextual analysis of ceramics.

[4] The list of wares for this study received a head start from the Kurban ware list, and the list of Kazane wares compiled by Dr. Patricia Wattenmaker during processing of material from previous excavations. Most sherds belong to one of six wares or their variants, although the total number of ware codes reached 27, covering the third and second millennium contexts. Decorations on body or diagnostic sherds were recorded from a list of codes that includes potter's marks, burnishing, incising, paint, excising, burning, bitumen adhering, impressed, combed, romp impressions, and shoulder ridges. In the case of some wares, including reserved-slip, band painted, combed wash, and cooking pots, decorations such as painting, slipping, or burnishing, were built into the definition of the ware. Thus, for the ware "reserved slip simple ware," "karababa ware," or "band painted simple ware," their slip or paint were *not* recorded separately under "decoration." I initially recorded diameter and percent of rim for rims and bases, but quickly abandoned this extra measurement because it is a redundant measure of functional category. Percent of rim may provide a more accurate accounting of the actual number of vessels in a context, but I felt that weight and count would suffice for comparing contexts.

mostly grit-tempered, and often sooted from use. Cooking pots are generally ovoid or bag-shaped, with rounded bases, slightly everted, thickened rims, and triangular lug handles at the rim.

After Plain Simple and Cooking Pot wares, a handful of wares occurring in small percentages round out the assemblage (Figure A2.1 – A2.4). These include Metallic Ware, Reserved Slip ware, Combed Wash ware, Band Painted ware, Karababa Painted ware, and a coarse, chaff-tempered ware (Ware 19). Metallic or Stone Ware[5] generally has no visible temper, is high fired and comes in a range of forms including cups, bowls, and jars.[6] Metallic ware fabric is a distinctive gray[7] or reddish-brown color, often with a laminated, reddish core. Metallic ware is sometimes burnished or painted with horizontal bands. Reserved Slip ware is Plain Simple ware with a buff-colored slip that is rubbed-off to leave horizontal lines. Sometimes the horizontal slip lines are mixed with wavy or diagonal lines, and the reserved pattern may produce thick or thin slip lines.[8] Reserved Slip ware comes in the same range of forms as Plain Simple ware, but so far only jars are known from Kazane.[9]

Combed Wash and Band Painted ware are similar to Plain Simple ware, but have slightly more refined fabric, generally better firing, and a more restricted range of forms. Band Painted ware is created by painting horizontal lines on a pot, or by first painting all but the neck and base of a buff-colored vessel with a dark red, purple, black, or brown paint which is then wiped away

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[5] Stone ware is similar to Metallic ware, sometimes treated as its equivalent, or as an attempted copy. Historically, metallic ware, stone ware, and related wares are defined and grouped differently at different sites. Pruss (2000a) attempted to clear up this confusion, but I am not sure he succeeded. I found it difficult to distinguish between Metallic and Stone Ware at Kazane, although I recorded them separately whenever possible.
[6] These forms are similar to those of Plain Simple ware, but bowls often have corrugated sides.
[7] Metallic ware clinks like metal when knocked together, but was originally named because its color and some forms were said to resemble metal vessels (Pruss 2000a).
[8] In my analysis of the Kazane data, I recorded Simple Reserved Slip ware (horizontal lines) with thin and thick lines, and Complex Reserved Slip ware (wavy or diagonal lines) separately because these varieties may be chronologically distinctive (Algaze 1990:312).
[9] A preference for jars is also noted at Kurban (Algaze 1990:312).

in the manner of reserved slip to leave horizontal bands (Prag 1970:83). Combed Wash ware is identical to Band Painted ware, but the paint is wiped both horizontally and vertically or in wavy lines.[10] Karababa Painted ware is the last of the decorated ceramics. This ware is named after the region in which it is most common, the lower Turkish Euphrates or Karababa Basin (Thissen 1985:93-95). The ware has a fabric similar to Plain Simple ware, but its exterior is painted with dark bands and geometric designs.[11] Aside from its unique decoration, this ware also comes in a restricted range of forms, some unique to the ware (Algaze 1990:323).

Among the primarily grit-tempered assemblage, there are also some chaff-tempered wares occurring in a limited range of forms, usually storage jars. The best example is Ware 19, which occurs at Kazane in forms that have parallels in the Balikh Valley (Thissen 1989: Figure 4:21-22). Other examples of chaff-tempered wares include wares 17, 23, 24, and 25, which are somewhat poorly defined and occur mostly in the second millennium assemblage. Finally, several wares occur in very small amounts and specific contexts, including wares 15, 20, 21, 22, 26, 27. These wares include imports (wares 15 and 27), and possibly unrecognized variants of existing wares, such as metallic or stone ware. Ware 16 is a category for intrusive wares from the Halaf and Late Chalcolithic Periods, or small pieces that cannot be assigned to a ware group. This ware is a measure of the amount of extrusive, intrusive, or pulverized ceramics in the context.

[10] Although a fragment of a Combed Wash ware vessel without any vertical or wavy combing would be recorded as Band Painted ware, I recorded these two wares separately because at Kurban, these two wares have a different range of types (Algaze 1990:320).

[11] Some versions of this ware are completely covered in a white or cream slip before they are painted (Algaze 1990:323).

chronological distinctions

Aside from obvious differences in the diagnostic types, the division between mid third and early second millennium contexts is immediately apparent in the ware proportions. Contexts with second millennium diagnostic types, including the upper phase of thin walls in Operation 6, the latest surface in Operation 8, and phases 1-2 in Operation 10, have a much higher proportion of chaff-tempered wares than contexts with third millennium type diagnostics. Considered together, the combined assemblage from all priority 1 EBA contexts, including Operation 1-5, 7, and J32[12] is dominated by Plain Simple ware (ware 1), which comprises over 71% by count for all priority categories (Figure A2.1). The second most common ware in priority 1 contexts is Burnished Cooking Pot Ware at 9% (ware 3), followed by Horizontal Reserved slip (ware 6) at 4%, Band Painted (ware 9) and Chaff (ware 19) at 3% each.[13] Considered by weight, the dominance of plain simple ware is even greater (Figure A2.2).[14] If we narrow the sample to priority 1 context diagnostics only (Figure A2.4), Plain Simple (ware 1) is still dominant with 88% of count, followed by Burnished Cooking Pot (ware 3) and Band Painted (ware 9) at 4% each.[15] Considered by trench (Figure A2.5-A2.6) chaff wares (wares 19, 23, 24, 25) only rise above minimal proportions in EBA contexts in Operation 7, which includes only priority 2 fills,

[12] All EBA sherds includes all EBA contexts from Operations 1-5, 7, and J32, excluding the Halaf loci from Operation 1.1.

[13] Ware 16 stands at 5%, but this category is not considered here because it contains Halaf wares, Late Chalcolithic Wares, and bits and pieces of unidentifiable wares or ware 'crumbs.' Thus, this category essentially represents the amount of extrusive or pulverized pottery in the context.

[14] Considered by weight, Plain Simple (ware 1) rises to over 90% for all but priority 3 contexts, while Burnished Cooking Pot (ware 3) drops to just 3% of Priority 1 and 2 contexts, and all other wares drop to 1% or less. The unusually high weight percentage of Ware 1 is likely due to the influence of the many heavy Ware 1 storage jars from Operation 2, as discussed in Chapter 7.

[15] Note that diagnostic counts may underestimate the amount of Reserved slip, Band Painted and Combed wash wares, since diagnostic portions of these vessels may not include the decorated part that defined the ware, in which case the item would appear to be Plain Simple Ware.

and J32, which contains a high amount of fourth millennium chaff-tempered wares mixed in its contexts.

In contrast to the ware distribution seen in EBA contexts, early second millennium contexts contain much higher proportions of chaff-tempered wares, and few painted or slipped wares (Figure A2.7 – A2.10). Considered by count of all priority 1 contexts, this assemblage contains 30% Plain Simple (ware 1), 35% chaff (wares 19, 24, 25) and 6% Mixed Temper Cooking Pot (ware 4). Considered by priority 1 and 2 context diagnostics,[16] Plain Simple (ware 1) climbs to 48%, Chaff (wares 19, 24, 25) to 38%, with Burnished Cooking Pot (ware 2) at 4% (Figure A2.10). Thus, high percentages of chaff-tempered wares correspond to contexts with MBA diagnostics.

The wares in MBA contexts in Operation 6 are relatively evenly split between Plain Simple (ware 1) at 47% and chaff ware (wares 19, 25) at 49%. These proportions continue at the level of diagnostics, with 44% Plain Simple (ware 1) and 48% chaff (wares 19 and 25). In contrast to Operation 6, Operation 8 has less Plain Simple Ware (27%, ware 1), similar amounts of chaff (38%, wares 19, 24, 25), and higher amounts of cooking pot ware (7% ware 2, 5% ware 4). At the level of diagnostics, Plain Simple (ware 1) rises to 45%, chaff (wares 17, 19, 24, 25) rises to 46%, and Unburnished Cooking Pot (ware 2) holds steady at 9%.

The ware proportions for Operation 10 contrast with the general MBA ware distribution pattern and indicate that the date of its three phases may range from the end of the third millennium (phase 3) through the early second millennium (phase 1). When all three phases are considered together by priority 1 and 2 contexts (Figure A2.11), Plain Simple (ware 1) dominates at 65%, with chaff (wares 19 and 25) at 15% and Burnished Cooking Pot (ware 3) at 3%. For

[16] We combined these contexts here because of the low number of priority 1 context diagnostics.

priority 1 and 2 diagnostics (Figure A2.12), which number just 50, Plain Simple (ware 1) is still the high value at 58%, with chaff (wares 19, 24, 25) at 20%, and a host of wares between 4% and 8%. The wide variety of diagnostic wares, and perhaps the higher percentages of Plain Simple ware, may be due in part to the nature of the fills in Operation 10, which include rebuilding efforts that would have mixed earlier and later material. Yet these differences may also be due to chronological differences between the earliest and latest architectural phases.

To examine the chronology of the phases in Operation 10, we can calculate the ware proportions by individual loci. Locus 5 and 10, the fill and oven in the south end of the trench are the most recent, while Locus 7, the deeper fill in the northern part of the trench, is earlier, and Locus 15, the fill in the middle of the trench beneath Loci 3 and 7, is the earliest context. Although the sample sizes for the upper and lower loci are small, there is a trend of increasing percentages of Plain Simple (ware 1) and decreasing percentages of chaff wares (ware 19, 24, 25) as we move deeper from Loci 5 and 10 to Locus 15 (Figure A2.13). Although sample size precludes any definitive assertion, the higher proportion of Plain Simple ware in the earliest architectural levels of Op 10, which contain architecture that is oriented differently than the later levels, may indicate that these levels date to the late third to early second millennium transition rather than the early second millennium. This possibility is reinforced by the 36 diagnostics from Op 10, L15, nearly all of which occur in the late third to early second millennium assemblage at Kurban Höyük (period III).[17]

[17] These diagnostics may also belong to the early second millennium proper, but since these forms begin in the transitional period between the late third and early second millennium, the lack of clearly later forms, combined with the ware proportions, may indicate that the samples from Operation 10 belong to the earlier period.

comparative assemblages

To place Kazane within its ceramic region, and to examine the contrast between the predominance of grit-tempered wares in the EBA and chaff-tempered wares in the MBA assemblage, it is useful to consider contemporary EBA assemblages from Kurban Höyük[18] and Tell Chuera, and MBA assemblages from Lidar Höyük and Hammam et-Turkman (Figure 1.1). These are the closest settlements to Kazane with well-published ceramic assemblages from the EBA and MBA periods. Kurban and Lidar are located on the Upper Euphrates west of Titris Höyük, while Hammam is located on the Balikh south of Harran, and Chuera is located between the Balikh and Khabur Rivers east of Hammam. Chuera is a large city but the other three sites are small towns less than 12 hectares in size.

Although the ware categories at Kazane and Kurban are not exactly the same, there is enough similarity to compare the assemblages. The total number of sherds (12158) from the Kurban step trench for all phases[19] of Period IV, mid to late third millennium, is almost the same as the total number of sherds from Kazane priority 1 and 2 contexts combined (12346), so I will compare the assemblages at that level. At Kurban, Plain Simple ware (Kazane Ware 1) comprises 58% of all sherds by count and weight, followed by Burnished Cooking Pot Ware (Kazane Ware 3) at about 34%, chaff ware (Kazane wares 17, 19, 23, 24, and 25) at about 3%, Reserved Slip ware (Kazane Wares 5, 6, 7) and Metallic Ware (Kazane Ware 13) at about 2 % each, and Karababa Ware (Kazane Ware 14) at just over 1% (Figure A2.14a). The remaining Kurban wares comprise less than 1% of the assemblage.

[18] Kurban is an especially appropriate comparative site because its assemblage is similar to Kazane's, it is contemporary with Kazane, and I processed the Kazane assemblage with the Kurban system.
[19] This analysis combines all the subphases of Period IV, which includes phases that are probably not exactly contemporary with the Kazane assemblage.

Considered by count, the major difference between the two assemblages lies in the top two wares, Plain Simple and Burnished Cooking Pot. Kazane contains much more Plain Simple Ware, and much less Burnished Cooking Pot Ware. Thereafter, the ware percentages between the two assemblages are essentially the same, with the notable exceptions of Karababa and Band Painted wares. Kurban has over 1% Karababa Ware while Kazane has just 0.14% of this ware. In contrast, Kazane has over 2% Band Painted while Kurban has under 0.05% of this ware. Finally, Kazane has a higher percentage of miscellaneous wares (Ware 16) than Kurban, which lists under 1% "extrusive" or "intrusive" wares. Although the ware count frequencies at Kurban fluctuate across phases, with Plain Simple Ware comprising as much as 65%, Burnished Cooking Pot Ware as little as 25%, and Chaff Wares (Kurban Wares 13/14) as much as 8% or 11% of the assemblage (Algaze 1990: Table 31b), Plain Simple Ware never rises as high and Burnished Cooking Pot Ware never drops as low as in their frequencies in the Kazane assemblage. Also, chaff wares at Kurban never rise to the high levels of MBA contexts at Kazane.

Summary ware proportions are not available for the areas outside the step trench at Kurban, but some figures do exist to compare these areas with Kazane. Perhaps most useful is a table listing the relative proportions of hand-made wares (cooking pot wares) to wheel-made wares (plain simple, band painted, combed wash, reserved slip, and metallic wares) (Wattenmaker 1998b: Table 4) (Figure A2.14b). This table indicates that at their apogee in period IV.1, wheel-made wares accounted for 68% of sherds by count (n=42686). At Kazane, wheel-made wares make up 88% of the assemblage by count.[20] Based on the figures from the

[20] This includes large, slab-built storage jars with thrown rims.

Kurban step trench, it is likely that the greater percentage of wheel-made wares at Kazane is comprised largely of Plain Simple Ware.

Without comparable contexts from both sites, it is difficult to gauge the significance of the ware differences between Kurban and Kazane. Although the differences between the major ware frequencies at Kazane and Kurban may be due to differences between a rural and an urban site, it is more likely that they are due to differences in the excavation contexts and chronology. At Kurban, most contexts contain "average" household refuse, while many of the Kazane samples appear to belong to institutional or elite contexts. At Kurban, areas with more substantial architecture have up to 74% wheel-made pottery (Wattenmaker 1998b: 134, Table 5), still less than Kazane but closer than the average context at Kurban.

Complete ceramic ware percentages from Chuera are only available for an area of typical EBA houses in the southeast part of the inner city. These houses were rebuilt in several phases over the course of the third millennium. In phases 7-3, contemporary with Kazane Area 1, Plain Simple Ware comprises 70-80% of the assemblage, Cooking Pot ware comprises 1 – 11%, Metallic Ware 0-2%, and decorated wares combined[21] comprise 0-3% (Figure A2.15) (Klein 1995: 110-114).[22] The high ends of these distribution ranges are very close to Kazane's proportions of the same wares, which are 75% Plain Simple, 8% Cooking pot, 6% decorated combined[23] and 1% Metallic Ware by count for all priority 1 and 2 contexts combined. The higher percentage of decorated wares at Kazane may be due to differences in the wealth of the 'standard' houses at Chuera, and the monumental buildings at Kazane, although these differences

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[21] Includes smeared wash (=Kazane combed wash), reserved slip, and painted (=Kazane band painted?).

[22] The Chuera material also includes "pithos ware" and "handmade standard ware." Pithos ware is probably equivalent to thick Plain Simple Ware at Kazane, and hand-made standard ware is equivalent to hand-made Plain Simple Ware at Kazane, although we did not record any aside from very large jars and stands.

[23] Includes wares 5-11, 14.

could also be due to the regional distribution of the decorated wares, with certain varieties more common in some areas than others. Notably, a relatively high percentage of Metallic ware, 8%, is reported from a food production area next to cult building *Steinbau* IV at Tell Chuera, but other ware percentages are not available from this area (Pruss n.d.-a:2).

For the second millennium contexts at Lidar and Hammam, I will only examine the relative proportion of chaff to grit-tempered wares. During the first part of the second millennium (ca. 2000 – 1600 B.C.E.), chaff-tempered wares make up 55 – 95% of ware counts from Hammam et-Turkman (van Loon 1988). In contrast, the early second millennium assemblage at Lidar Höyük is dominated by Plain Simple ware at over 70% in each phase, while chaff tempered wares comprise statistically insignificant amounts (Figure A2.16) (Kaschau 1999:99). The second millennium assemblage from Kazane has shape parallels at both Lidar and Hammam et-Turkman, and at this stage it is not possible to explain the differences in the ware proportions from each site. Although context may be one possible explanation, Kazane may simply have more technological affinities with Hamman than Lidar. This could reflect a shift in ceramic prodution exchange from the EBA to the MBA. In the EBA Lidar hosted numerous large kilns in an extensive ceramic quarter (Hauptmann 1982: 18, 1984; Mellink 1982:563). The wares produced at Lidar were those in use at Kazane and across the region, suggesting that Lidar may have supplied pots across a wide area along the Turkish Euphrates. Perhaps these supply chains broke down or shifted at the end of the third millennium, such that while shapes are widespread in the MBA, wares are less consistent.

Summary

In sum, diagnostic types and ware proportions distinguish the EBA and MBA ceramic assemblages at Kazane. EBA contexts contain exceedingly high proportions of Plain Simple ware, while MBA contexts contain high proportions of chaff-tempered wares. The ceramics from Kazane are very similar to those at four sites in the same or neighboring regions dating to the mid third millennium (Kurban and Chuera) and the early second millennium (Lidar and Hammam et Turkman). Differences in ware proportions between these sites may be due to find-spot context, relative chronology, and the regional distribution of certain wares. At Kazane, ceramics from Area 1 and trench J32 indicate that these areas date to the mid third millennium, while ceramics from Operations 6, 8, and 10 date these trenches to the early second millennium. A high proportion of plain simple ware, along with some potentially early diagnostic forms, indicates that the earliest phase in Operation 10 may date to the very late third millennium.