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Modeling the Local Political Economy of Adulis: 1000 BCE-700 ACE

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MODELING THE LOCAL POLITICAL ECONOMY OF ADULIS: 1000 BCE – 700 ACE

A Dissertation Presented

by

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Department of Anthropology

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DEDICATION

To my best friend and life companion Helen and my son Ethan

your love has instilled this entire journey with a fantastic sense of possibility.

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Although many helped me through this project, any flaws in this work are my own and mine alone.

ABSTRACT

MODELING THE LOCAL POLITICAL ECONOMY OF ADULIS: 1000 BCE-700 ACE

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This dissertation models the local political economy of Adulis, during Africa's Classical Age (1000 BCE-700 ACE), by evaluating the materiality of Adulis (built forms and artifacts). Thirty-nine built forms are 3D modeled, and their energetics values (labor and time) are inferred to estimate the social power and wealth that was necessary for the construction of such a built-forms. Two political economy models are used to critically evaluate the energetics data from the built-forms combined to another set of data of essential artifacts from the site. The traditional political economy perspective holds that Adulis is a periphery, a port in an Aksum dominated world economy. An alternative theoretical position proposed in this dissertation is that Adulis was an independent state

and a center of its own. The dissertation research shows the archaeological data supports that Adulis was a center of its own.

Moreover, the dissertation successfully establishes the basis of Adulis' political economy by distinctly illustrating its role in interregional trades in aromatics, readiness to train and export war elephants, and its perceived upper-tier rank in governance locally and among other Red Sea ports. Early involvement of Adulis in the aromatics trades of the Red Sea instituted tangible and intangible political economy capital. However, it was a combination of Adulis' capability to export war elephants in wars of local and general interest, its strategic location connecting the Mediterranean and the Indian Ocean worlds, responsible governance, and its favorable climatic conditions all were factors in Adulis' significant position in antiquity.

This dissertation seeks to advance the understanding of the Northern Horn of Africa by such scholars as W.E.B. Du Bois who insist that African history be studied on its own terms and not those imported from or that emphasize the importance of the European experience. Key to building such a perspective is an understanding of the complexities of the exercise of power and the provisioning of past societies in the region. I develop this position for Adulis and its role in the Ancient World by focusing on the long-term, using a broad regional and continuous material culture data of Northern Africa and an inquiry of the political economy of such. This perspective contextualizes the relationship between Europe and Africa in long-term and recent experiences. W.E.B. Du Bois calls for the long-term focus to envelop an era of mutual respect and trade between Africa and Europe distinctive from the painful recent experience. While recent postcolonial studies have made notable contributions regarding the recent past, the long-term focus of this dissertation has pushed the boundaries of these. The dissertation

concludes by pointing out how advancing this perspective improves concurrent social struggles and promotes the development of relevant social theories.

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CHAPTER 1

MODELING THE LOCAL POLITICAL ECONOMY OF ADULIS

1.1 Introduction

W.E.B. Du Bois (1939:471) noted, rightly so, that Europe and Africa had met in legitimate trade and mutual respect for thousands of years in North and Northeast Africa. However, the more recent relationship between Europe and western and southern Africa, which gave rise to the transatlantic slave trade and apartheid, respectively, seems to have overshadowed earlier relations. If Du Bois' observation is to be taken seriously, then three things need to come together: proper disciplinary scholarship into the past, solid grounding in data revealing the past, and a shift in subject focus from a conventional categorization based on political units to one that integrates evident economic units.

First, a discipline capable of retrieving the broad spectrum of humanity's past must be put to work. Archaeology is poised explicitly for this because, while texts from the past are limited, archaeological data is growing exponentially, and it highlights aspects of history that can't be retrieved from texts. Moreover, evidence coming from archaeological data resists fitting conveniently within historical narratives of the recent past. Paradoxically, archaeology as we know it originated in the relatively recent colonial past. Beyond the problem of the chronological emergence of archaeology in the period of colonialism, African archaeology has in particular been conducted by European and European-trained scholars generally supportive of the abstract theories and historical narratives of colonialism. From the Euro-colonial perspective, Africa, Egypt, Abyssinia and African cultures remain not only the ultimate "other" in colonial and postcolonial

discourses, but also to each other. Scholars have noted and critiqued archaeological reproduction of colonial discourse on Africa (Andah and Shaw 1998; Schmidt and Patterson 1995). How can a discipline whose essence and origins were part of colonization be capable of shedding light on the aforementioned pre-colonial relationship? Several specialized methods are suggested to decolonize the broader past from the tight grips of more recent history. Wobst (2005), Halperin (1994:9), Earle (2003:19), Feinman (2004:5), Isaac (1996:331) and Wells (2006:266) suggest the only suitable remedy is to engage in comparative approaches.

Second, if anthropological archaeology is to be tasked with such a responsibility of long-term analysis, with a specific expectation to liberate the full spectrum of human relationships, then North and Northeast Africa's archaeological data related to political economy are needed to enhance Du Bois' observation. Such data would provide an alternative perspective that could probe the scope and extent of the European-African relationship. Doing so would be in effect part of a project to decolonize archaeological practice in Africa and thereby contest recent colonial experience. Archaeological sites in the Southern Red Sea Basin in Northeast Africa in general, and Adulis in particular, provide the data for this dissertation's research.

Third, because of the perspectives mentioned above, my dissertation research takes a different direction than that of the conventional practice of archaeology in the region. The traditional method of archaeology in the area divided a unified territory into small discrete areas based on political units (for instance Egypt, Nubia, and Abyssinia) rather than into economic units. Though good practical reasons and perhaps massive doses of nationalism have driven such perspectives; such choices were instrumental in mystifying the political economy of the region. Moreover, it contributed to the difficulty

of understanding the processes of change through time. As a result, it became challenging to synthesize conclusions drawn from differing genres of evidence.

Moreover, the choices of political units (Egypt, Nubia, and Abyssinia) need to be justified and not taken for granted, as has been the norm.

1.2 Binding the Research Area

I will bind together data from a region that stretches from eastern Egypt to the highlands of Ethiopia (See Figure 1) as a unit of ancient political-economic analysis.

Ehret (1987; 1995b; 1998:8-9) calls this region the Erythraean or Cushitic, agro-pastoral tradition. Adulis, the focus of this study, is located at the center of the Erythraean tradition on the western shores of Red Sea (See Figure 1). Studying this region as a single entity opens new opportunities for anthropological archaeology. Archaeologist Paynter (1981; 1982: 40), studying the Connecticut River Valley of Massachusetts, U.S.A., aptly points out that traditional archaeological study areas have led archaeologists to miss large-scale social processes that have led to stratification in the region. Bounding the region referred to in the Erythraean tradition opens new opportunities for anthropological archaeology of such processes unifying the territory. Anthropological archaeology's unique perspective to understand this data-rich part of Northeast Africa can enhance a long-term process of change.

The Erythraean region is characterized by rapid changes in elevation from the Red Sea coast to the highlands, a gain of 2000 meters in 60 kilometers. Abul-Haggag (1961:3) studying this region notes that in no other part of Africa of equal area has nature brought together such contrasts of ecological conditions so closely as it has done in the Northern Horn of Africa.

By synthesizing archaeological evidence and glottochronological/ lexicostatistical analysis, Ehret (1987; 1995b; Ehret 1998) argues that the Erythraean tradition emerged among people who belonged to the Afro-Asiatic language family. The early archaeological artifacts of Neolithic culture date to around the ninth millennium BCE. Moreover, Ehret (1995b) notes their makers spoke the particular Erythraic language that was ancestral to modern Chadic, later Egyptian, Berber, and Semitic.

The period of roughly 7000 to 5000 BCE marked the spread of another descendant group of the Erythraic people, the Cushites, southward into the northern edges of the Ethiopian highlands (1995b). By the fourth millennium BCE two major long-term transformations had taken place: first, was a Cushitic contribution of a separate, independent African cultivating tradition of two indigenous grains, t'ef (Eragrostis t'eff) and finger millet (alt. African millet, Eleusine coracana Gareth) as early as the 6th millennium BCE in the grasslands in Eritrea (Ambrose 1984; Brandt 1990; Brandt 1987; Ehret 1998; Kimura, et al. 2001). There is no reason to attribute the emergence of this core-cultivating feature to stimulus diffusion from either the Middle Eastern or Saharo-Sudanese center of domestication (de Wet 1979). Perhaps, 6th millennium rainfall decline would only have increased the attractiveness of grain cultivation in this region.

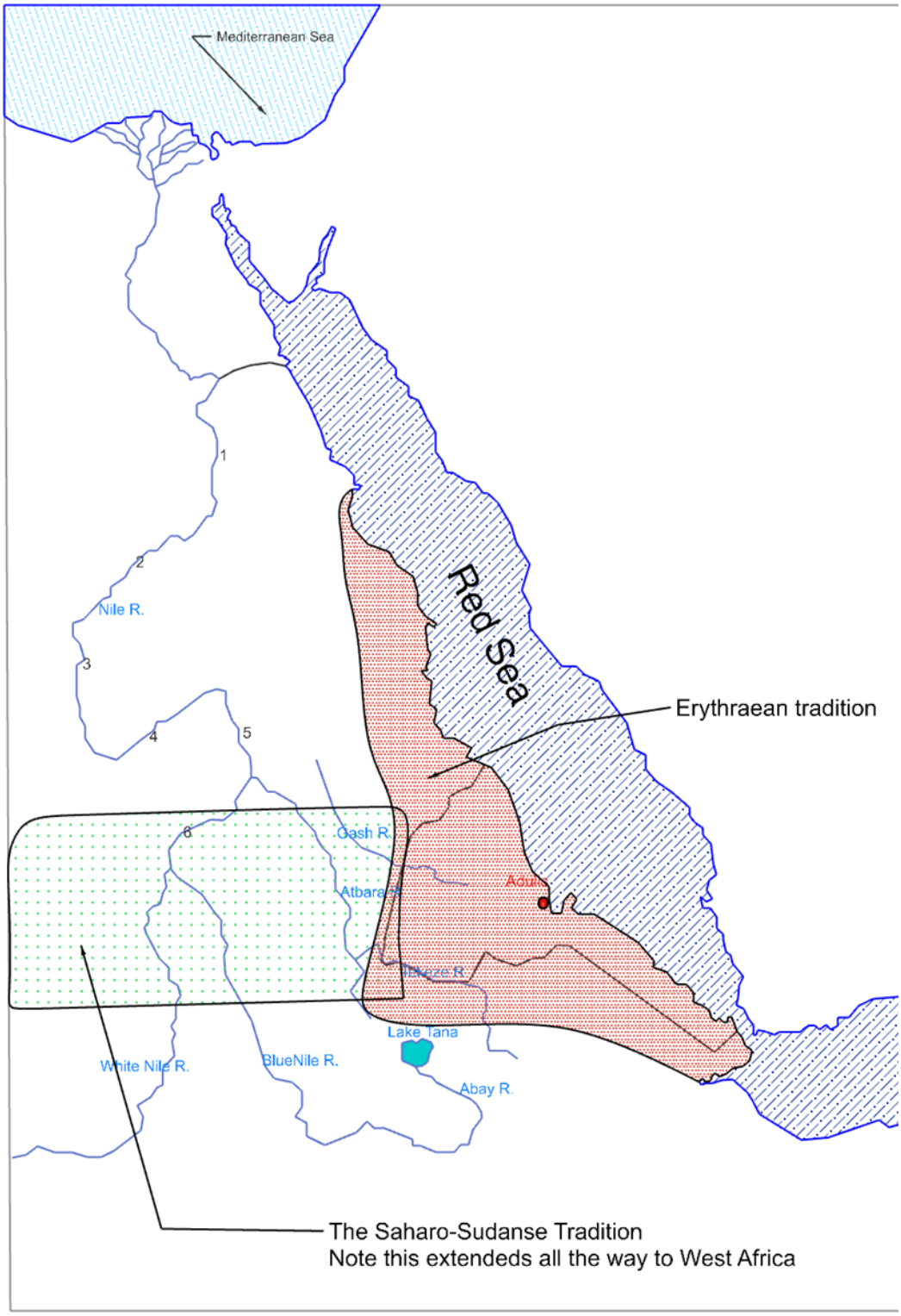

Figure 1 The Erythraean tradition and the Saharo-Sudanese
(Map reproduced from Ehret 1998).

The second major long-term transformation was the expansion of Cushitic societies southwards into all but the southwestern quadrant of the Ethiopian highlands.

Although separate and distinct in their inventions of cultivation, the Cushitic and Saharo-Sudanese worlds did not lack exchange patterns. Wendorf et al. (1992; 1994; 1980; 1997; 1974) argue the domestication of cattle (the African varieties) may have taken place first in this shared tradition. While goats and sheep, Middle Eastern domesticates, expanded southward by the 7th millennium to the Saharo-Sudanese and Erythraean agro-pastoral economies, donkeys were domesticated by Cushites in the southern Red Sea hills, and later spread northward to the Middle East (Ehret 1998).

Wheat, barley, and chickpeas from the Middle East passed the suitably cool highlands of Eritrea and Ethiopia by the 5th or 4th millennium (Close 1992; Harlan 1993; Neumann 2004; Vasiliev 1931; Vasiliev 1962) and the Saharo-Sudanese crops sorghum, pearl millet, cotton, and sesame spread equally in a counter direction reaching India well before 2000 BCE (Close 1992; Fuller 2000; Harlan 1993; Neumann 2004).

Sorghum and sesame spread eastward to become significant crops in northern China. At the Hill 8 site in Oman, evidence for African sorghum in the third millennium BCE has been reported (Cleuziou 1979). Similarly, finger millet, a crop domesticated in the Erythraean tradition (Harlan 1979) became familiar in the Saharo-Sudanese economy as far as northwest Africa. Thus, by the 4th millennium, a trend seen elsewhere in the world towards reliance on more elaborate kinds of food production had become a feature of Saharo-Sudanese and Erythraean economies.

While there is broad agreement among archaeologists about these fundamental features of the economy of the Erythraean tradition, the resolution of many issues awaits the work of future archaeologists. For instance, were the exchanges direct or indirect,

what was the scale and extent of the exchange patterns, and what drove such exchanges? What is clear is that an interaction sphere was well underway by the fourth millennium BCE. The outcomes of such interaction throughout this vast area may have set the stage for later processes of contact by forming early, enduring patterns of exchange.

Yet attacking the problems of tracing the locations in time and space of introduced domesticates in the archaeological record, and then suggesting possible directions of trade, in themselves, offer no insight into the political economy of such exchange (Curtis 2005). Understanding particular ancient economies requires grasping the scope and extent of their relations to other places and economies. This dissertation research on Adulis endeavors to understand the political economy of Adulis within the broader Red Sea and Mediterranean trade networks and political alliances. This initial assessment may shed light on the forces responsible for the transition to a complex society, which in the archaeology of Africa remains understudied. It builds a robust case study inspired by world systems approaches. Situated at the Southern Red Sea basin, a critical juncture between the Mediterranean and Indian Ocean worlds, the ancient port of Adulis provides a critical data set. Theoretically well-informed anthropological archaeology may be able to tease out the broad scope of human experience at this place, and perhaps illustrate, regarding Africa's longstanding pre-colonial mutual influence, that Du Bois may well have been right!

1.3 Statement of the Research Problem

This dissertation is concerned with the political economy of the Northern Horn of Africa during what is known as Africa's Classical Age (Curtis and Habtemichael 2008; Ehret 1998). Africa's Classical Age began about the first millennium BCE and ran through the early first millennium ACE. During this period in the Northern Horn of Africa, archaeologists have documented the expansion of sedentary settlements into fully urban centers with attached urban hinterlands, ceremonial centers with monumental architecture, and the implementation of elaborate bronze and iron metalwork. These centers gradually gave rise to a centralized political economy that dominated substantial areas of Northeast Africa (Curtis and Habtemichael 2008). There are differences of opinions about the nature of the forces responsible for the rise and fall of the various settlements found within this region. This dissertation will shed some light on the nature of these interactions, and through their study, contribute to the more general understanding of ancient political economies.

The port city of Adulis is at the heart of this dissertation. Adulis today is an abandoned archaeological ruin of a port city that occupied about two square kilometers. Though we know little at this stage about the earliest periods of Adulis' settlement, what is more clearly understood from archaeological research and various ancient texts is that Adulis rose to be an important commercial center on the western shores of the Southern Red Sea during the first millennium BCE and fell apart during eighth century ACE. The origins of Adulis are still debated and so is its collapse.

Though there is little but speculation about Adulis' origins, there are ideas about its fall. It has been hypothesized the city was razed by an Arab naval expedition in 640 (Budge 1928:274; Hourani 1995:54; Munro-Hay 1982). But the expedition was described

as an absolute failure by the Caliph who led the expedition, Umar Ibn-al Khattab (Lucy Blue 2008a). Coinage retrieved at the site suggests continued occupation until 700 (Munro-Hay 1982:117). The complete destruction of the site is undeniable based on my archaeological work (Habtemichael 2004) because, unlike many towns of the ancient world, there are no upstanding remains, just mounds of debris marking the location of a destroyed building. Moreover, Sundstrom (1907:179) and Paribeni (1907) document a fierce burning of the site in the archaeological record, although attributing this to a single event is still under investigation.

I have been involved in a number of archaeological projects concerning the history of Adulis and the Northern Horn. These projects have systematically collected archaeological, textual, ethnohistoric and environmental data. Some of the results of these studies have been presented elsewhere (Habtemichael 2004, Peacock D. and Blue 2007b, Lucy Blue et al.2008). This dissertation draws on these previous studies and presents new data and analyses to the end of laying out a more nuanced understanding of the political economy of Adulis and the region.

Undertaking this research is vital for two reasons. First, the vast majority of previous studies have been formulated from the point of view of other disciplines, including Egyptology, Classical Studies, Middle Eastern Studies and Axumite studies. In Egyptology, for instance, Adulis is seen as a part of the land of Punt, the Red Sea port from which aromatics were traded during the Middle and New Kingdoms (Fattovich 1993a; Herzog 1968; Kitchen 2002; Phillips 1997). Classicists view Adulis as a trading port in the southern periphery of the Greco-Roman world (Burstein 1989; Casson 1981; 1989; Cohen 2006; Droysen 1985; Fraser 1972; Tcherikover 1959).

Analogously, in the field of Axumite studies, Adulis is constructed as Axum's major trading port to the Red Sea and Mediterranean (Connah 2001; Munro-Hay 1982; Munro-Hay 1996; Peacock D. and Blue 2007a; Phillipson 2000).

The cumulative result of these approaches is an image of Adulis as a part of everywhere else, but poorly understood regarding its own local culture and economy. A relational approach to social life would posit that spatial divisions of labor, especially ways that impute causality to some places rather than others, should a priori be dynamic, instead of fixed entities frozen into sources and recipients of innovation.

Second, the archaeological and textual evidence that is coming from the site of Adulis does not sit well with the models mentioned above, and especially the Punt model, Classical model, Sabean model, or Aksumite model. These models, which depict Adulis as a periphery of either Egypt, the Greco-Roman world, Ancient Yemen, or Aksum, respectively, do not address the forces responsible for the ancient port to rise and decline. Neither do they discuss its political economy even in a cursory indirect way. Instead, Adulis is described merely as a locale on the Red Sea coast that these ancient polities manage to reach. Thus, in this research, I investigate Adulis itself and its political economy based on archaeological, geographical and textual evidence (Habtemichael 2004; Lucy Blue 2008b; Peacock D. and Blue 2007b).

1.4 My Theoretical Inclinations

Many archaeologists, in an attempt to understand long-term systemic change, have adopted a model of political economy inspired by world systems theory (Wallerstein 1974; Wallerstein 1980a) and dependency theory (Amin 1974; Frank 1967) within long-term historical processes (Braudel 1980). The early application of world systems theory

in archaeology has undergone criticism for only adopting a functionalist view of long-term change, this to the detriment of the economic theories upon which Wallenstein's model was based (Blanton 1984; Kohl 1979; Kohl 1989; McGuire 1991; Upham 1982). These critics argue that this functionalist perspective produced academic works that are not substantially different from economic interaction studies. A few outstanding case examples, however, can be enumerated, although not exhaustively, that moved beyond the functionalist approach in world systems theory and incorporated a critical political economy perspective as a starting place for empirical studies. These are: Philip Kohl's (1979; 1987b; 1989) work on Ancient West Asia that focused on understanding state formation, Lamberg- Karlovsky's (Lamberg-Karlovsky 1973; 1975) work demonstrating shifting centers in the network of economic interaction in the Near East, Robert Paynter's (1981; 1982; 1985) work seeking complex historical understandings of inequality and power in the Connecticut Valley, Massachusetts, Randall McGuire's (1989a; 1991) work that implemented dialectical theory to parse Hohokam culture history, and Blanton and Feinman's (1984) consideration of Mesoamerica as a world system. No similar studies have been published for the Red Sea or the Northern Horn of Africa (Sugerman 2005). These and related theories will inform my research at Adulis.

One central component of the world-systems model is evidence that political economies of different polities are highly interdependent, and thus growth or decline in one polity is likely to result in the growth or decline of another (Chase-Dunn and Hall 1997; Smith and Berdan 2003; Kepecs and Kohl 2003, Masson 2005). Politico- economic networks that bind a region together include staple goods exchange networks, prestige goods networks, military and information exchange networks, and ideological exchange networks (Smith and Berdan 2003, Masson 2005). In a world system, these interactions

result in some regions accumulating surplus at the expense of other areas, creating a regional division of labor applicable to cores, semi peripheries, and peripheries.

Adulis has traditionally been interpreted within a regional paradigm that positions it as a periphery of a single center, either Egypt (Beaujard 2005:424), or the Greco-Roman world (Cohen 2006), or ancient Yemen (Anfray 1974) or Axum (Munro- Hay 1982; 1996). World systems theory offers the important critique that a political-economic perspective should be applied to the relations between the local and global (Wobst 1976, Paynter 1982, Roseberry 1988, and Sugerman 2005). It is a perspective that enables archaeologists to investigate the actual processes that create ethnic groups, state formation, gender inequality, class, and ideologies. If the center remains in the ancient past and what people rendered based on the material evidence, it seems that these tensions between local and global perspectives can be mitigated.

Archaeologists have recently offered one such relationship that may have structured the ancient Red Sea political economy. Locally, in the Northern Horn of Africa, scant archaeological research exists (Brandt 1990; Brandt 1987; Butzer 1981) that has implemented microeconomic or cultural-ecological models or settlement pattern models (Michels 1979) to explain long-term change. However, recently, Schmidt (2001a; 2008b) and Curtis (2005; 2009) conducted long-term regional archaeological research in the highlands of Asmara. They identified settled communities from the first millennium BCE referred to as the "Ona Culture" in Eritrea. After finding Asian Water Buffalo fauna, Schmidt (2008b) suggested the presence of heretofore invisible trade in animals between the Ona Culture and Asia. Schmidt's (2008b) provocative hypothesis needs to be tested from data that comes from Adulis and other ports. If Schmidt is right, the only way this trade in domesticated animals could take place is through Red Sea ports such as Adulis,

which would suggest a trade in bulky materials between the Northern Horn and Asia occurring as early as the first millennium BCE. This research would build on the findings of this dissertation.

1.5 Methods and Specific Research Questions

My objective in this dissertation research on Adulis is to synthesize multiple lines of evidence that include archaeological, textual and environmental data to assess the local political economy as a means to understand its relationship to regional and interregional political-economic relations. This is presented in terms of two more general models for understanding the political economy of the Northern Horn of Africa.

Traditionally an Aksumite model has been suggested to explain anything about Adulis (Anfray 1974; Connah 2001; Munro-Hay 1982; 1996; Peacock D. and Blue 2007b). This model holds that Adulis was a sea outlet of Axum. If this model is to stand, then the archaeological and textual data from Adulis will point to the center, Axum, in ways similar to those found for other peripheral cities in this region, as for peripheral cities in other center-periphery systems. One would expect, for instance, that wealth would have been directed from Adulis to Axum. Such a siphoning process commonly results in starkly contrastive wealth differentials and a relatively simple social structure of proportionately wealthy elites (often manifesting cultural alliances with the distant, accumulative centers) managing the flow of wealth, and relatively poor producers (often displaying a more local cultural tradition) creating the wealth but losing control over it to the elites.

If on the other hand there is evidence that the Aksumite model is not the case, then an alternative to consider is a peer polity model (Renfrew and Cherry 1986). In this

model, complex interactions exist between independent socio-political units within a single geographical unit, or in some cases more widely (Renfrew and Cherry 1986:1). A peer polity's political economy could be based on mutually-independent, agrarian-based wealth, or foreign exchange, or some mix of these two strategies. If peer polity relations were the case in Adulis, one would expect wealth to be accumulated in Adulis and a concomitantly more diverse sociocultural form. In this model elites direct the accumulation as well as the exchange of wealth, a middle-class would manage and produce valued products and services, and producers engage in the work of production. Cultural manifestations, especially for the elite, are likely to be quite varied, possibly connoting relations with peers in this larger polity, and also connoting their dependency on their local region for their power base. The middle classes may also be mixed in their adoption of larger scale and local cultural codes. The producers are more likely engaged in interaction through local cultural forms.

An assessment of which model might be applicable requires tools for studying the distribution of wealth within a community. Archaeologists have studied household wealth by looking at residential architecture, and assessing these structures in terms of energetic measures of value (Abrams 1984; Blanton 1984; McGuire 1983; Paynter 1982; Smith 1987). Energetics analysis has enabled archaeologists to compare the labor-time intensities of household architecture so that ancient systems of social power, labor organization, and economic structure can be inferred (Abrams 1984; (1994). For instance, Abrams' (1994) work of architecture energetics of households in Copan, a Maya site, translates the cost and distance of building raw materials, manufacturing the components of the architecture, and building the architecture in the form of labor-time intensity. Based on this, which resulted in twelve-fold differences in energetics, he identifies two

types of residences, Basic and Improved. He then argues that improved type residences needed more organized labor, while for Basic residences familial labor was sufficient.

I use this energetics-based methodology to assess the wealth of household architecture at Adulis. I will also factor in the scarcity of building raw materials, whether there are sumptuary laws, and whether groups have priority of access. To accomplish this, built forms are modeled using Rhino 3D and its add-on Grasshopper software.

Reconstructing models of Adulis residences is crucial to determine a volume for each built form, which I translate into labor-time using experimental archaeology that I conducted at the site. Employing another approach, I assess the built forms of Adulis implementing architectural communication theories. Architectural communication theories maintain that households vary attributes of architecture to send a public message to other people. These messages include messages regarding identity, status, wealth, power, or cultural values (Olson and Smith 2016). At Adulis the message built forms send is acquirable or traceable, although the semantic meaning can be elusive (Diblasi, Michael 2000). The 3D-modeled built forms can serve to contribute to a discussion among community members and archaeologists in the region and elsewhere regarding what messages might have been sent. The models are representations of the actual built forms based on meticulously measured dimensions of the remains of built forms at Adulis by previous archaeologists and by me and my teammates. Some of these built forms are available, while others that have been destroyed after excavation are available from excavation reports.

I implement these methodologies through a number of analytical projects using archaeological data from Adulis, much of which was collected when I co-directed research at Adulis in 2004-5 (Habtemichael 2004b; Lucy Blue 2008a; Peacock D. and

Blue 2007a). Other data will come from the field notes, reports, and collections generated by previous excavations, including projects published by Salt (1814), Lefebvre (1845), Sundstrom (1907) Paribeni (1907) Anfray (1974) and Munro-Hay (1989c).

The pattern for Adulis as a whole and variations from household to household are investigated. I compare these results to expectations for a household in Adulis' regional and interregional relations under the different models. These assessments provide a profile for the city's social organization to be compared with the different model expectations. In the first model expectation, Adulis as a periphery of Aksum would display a bimodal graph of wealthy elites and poor producers that lose wealth to the center. Adulis as a center of its own would display a hierarchy of three or more classes inhabiting differently sized structures.

My previous preliminary research (Habtemichael 2004b) suggests that Adulis was much wealthier, and its households more heterogeneous and hierarchical, than is supposed, especially by those adopting the Aksumite approach to the political economy of the Red Sea basin. This has been confirmed in the studies reported in this dissertation. This discovery led me to consider the basis for Adulis' wealth and heterogeneity. That is, what comprised the return trade from Adulis, and what sustained Adulis as a trading port in the Red Sea?

Addressing this question, this dissertation considers how Adulis was positioned in two critical regional and interregional political-economic networks of the Red Sea and the Mediterranean: the trade in aromatics (Fattovich 1993a; Herzog 1968; Kitchen 1991; Kitchen 2002; Phillips 1997), and war elephants (Kisteler 2006).

Looking at these two trade networks entails assessing many aspects often considered crucial in understanding ancient political economies. One dominant approach

to the generation of interregional wealth and trade in the ancient world stresses the role of high-value, low-bulk items (Davis 2005b; Habtemichael 2004; Schmidt 2008c). Aromatics, such as frankincense, could have been regulated by Adulis because of its location or Adulis households may have been directly involved in the production of it. Elephants represent an interesting source of wealth because they not only produce high-value, medium bulk ivory, but are also a vital source of power, as traction and as tools of war (Kisteler 2006). As such, they were highly valued in many economic spheres and may have been a product of the Adulis region.

Models of ancient political economies also emphasize that they often had qualitatively distinct trading networks. The aromatics trade appears to highlight a manifestation of ideological networks. Trade in war-elephants investigates military networks and forces of domination. This closer assessment of the archaeological resources illuminates the nature of Adulis' involvement in the aromatics and elephant trade networks. Textual data, both local and regional, plays an essential role in assessing these trade relations.

In addition to the household-scale studies of built forms, this dissertation makes use of textual data to make regional scale assessments of Adulis' dependent or independent role in a regional political economy. Theoretical studies of interregional scale political economies operating within larger social fields (Wolf 1982:387) involve stratification or hierarchization of relationships, which crystallize out in characteristics of regional settlement patterns. For instance, archaeologists Sugerman (2005), Paynter (1982), Johnson (1977) used rank-size studies to assess local versus regional versus interregional interactions in various contexts. Though the archaeological data of the Adulis region is not complete enough to support such an investigation at this time,

identifying the sizes, if not the locations, of Adulis region settlements is discoverable in the economic and religious mandates that are the subject (and subtexts) of documentary sources.

1.6 Logistics and Procedures

There are three data sets that I consider to address my research question. These are archaeological data from my fieldwork and previous excavations at Adulis, ethnohistorical and oral traditions, and experimental archaeology.

1.6. 1. Archaeological Data from Fieldwork and Previous Excavations

Eritrea's cultural heritage laws ban excavations of archaeological sites with few exceptions. Thus, no new data from an excavation at Adulis or elsewhere is forthcoming. One of the last fieldwork efforts on the site was my project in 2004-5 (Habtemichael 2004b). The heritage laws of Eritrea make previous excavations all the more important to answer questions of the kind I am investigating in my dissertation research.

Unfortunately, these previous excavations took place a long while ago: Anfray excavated in 1962; Paribeni in 1907; Sundström in 1907; Lefebvre 1845; and Salt in 1814. While the data these excavations retrieved can be useful, the projects were conducted with outdated methods, so upgrading these interpretations with more recent analytical methods is crucial. The artifacts from Paribeni's excavations in 1907 are housed at the Museo Africano in Rome. Paribeni's field notes of these excavations, in Italian, are available and detailed. My Italian language training was useful to use these notes in my research.

Some artifacts from the Anfray excavations at Adulis are also available at the Addis Ababa Museum. It would have been ideal to travel to Addis Ababa and Rome to assess these artifacts. In the absence of such an opportunity, I instead made use of Zazzaro's (2013) work on the museum collection of Addis Ababa and Museo Africano di Roma in Italy for this research. Because these artifacts lack detailed field notes, I used caution when considering them in relation to my fieldwork and other archaeological datasets. Many floor plans of the built forms of Adulis from previous excavations formed a crucial part of this dissertation. These floor plans proved to be quite impressively precise. These previous archaeologists certainly knew "how to pull a tape." The artifacts housed in different museums supplemented my research at Adulis to better reconstruct the architecture of Adulis. The overall result addressed the household level questions about Adulis' political economy.

1.6.2 Ethnohistory and oral traditions

Eritrea is my home. During my school years and archaeological research, I would dialogue with diverse fellow Eritreans about what I was doing, and I learned much from them. These clearly informal oral traditions I was coming into close contact with through my life had their roles in assisting my archaeological research, in particular, political economy research was aided by not only observing the material manifestation but also hearing about the values and meanings connected with these objects. These instances created learning moments, and supplemented my experience in interpreting certain archaeological problems at Adulis.

For instance, no previous researcher could grasp fully the wider significance of Adulis' throne in relation to the bio politics within the region that I discuss in chapter 5 in

detail. Insights to such came from personal experience growing living in the region. In the year 2000 in one of my cousin's wedding, my family was traced up to the 8th generation, inclusive of all members (alive and those who passed away) to see if there was any murder committed that might implicate the other family future prospects. This inquiry is an ordinary and routine practice for a traditional wedding. During this moment, I learned invaluable lesson regarding life ownership and the bio politics of the region. This in turn, has enabled me to situate, Cosmas' characterization of taking life within the region, an observation important for putting at the throne of Adulis in context.

Another example, is an event that created a learning moment was in the year 1997.Three farmers shot three elephants that trampled their agricultural land. This event instigated controversy among postwar reconstitutionists, animal rights advocates, and the traditional Eritrean society. Although predictably postwar reconstitutionists and animal rights advocates took opposing views, the former supporting the farmers' actions, and the latter asking for the heads of the farmers. The reaction of the traditional members of the society was centrist. The response was in the order of "Yes, farmers have a right to deter elephants from their land and homes, but the means these farmers used is wrong. This animal is no stranger to Eritrea and there is a traditional way of deterring elephants than guns." It commenced a data resource regarding elephants that later I pursued when researching Adulis. To learn extensively about the production of aromatics, I partook in tapping, collecting, grading and observe the market around Keren in 2004. These are just some of my personal experiences, and conversations with family members and others also enlightened many sections of the archaeological research at Adulis.

The perspective on oral tradition and ethnohistory within the practice of archaeology that I advocate seeks complementarity and compatibility between different

knowledge bases, and this was applied in the current work. As McNiven and Russell (2009) point out, if epistemological complementarily cannot be achieved, then there would be no need of integrating these within archaeological practice. For instance, I interpreted the meaning of an abstract and choreographed depiction on Adulitan ceramics that was discovered at Adulis, and dated to 1000 BCE, using ethnohistory and oral traditions. The archaeological material evidence was enhanced by oral tradition and ethnohistory. This was further expanded to understand the additional information on the origin of the first state (see chapter 5).

One clear advantage of integrating archaeological data with ethnohistory and oral traditions at Adulis is the way it reinstates indigenous communities as active agents in the reconstruction of the history of the region (McNiven and Russell 2009).

1.6.3 Experimental Archaeology

A primary focus of my fieldwork at Adulis was experimentation on how long it took to build one cubic meter of the different grades of walls. It started as a problem-solution approach to use the data collected from such experimental archaeology as a translating factor in my energetics studies. What I realized during this particular process is how dynamic and engaging experimental archaeology can be to both the archaeologist and the public (Peter and Planel 1999). The very act of reproducing (reconstructing) Adulis' walls revealed a great deal of new information regarding relationships between building components, information not visible from standing walls or standing structures. As noted by many archaeologists, built forms from the past are lifeless, and it is hard to extract information from the very components from which they were built.

At Adulis I experimented to measure the time and labor intensity needed to build the three wall grades identified (see chapter 3). This information was used to translate volumetric data of built forms at Adulis to energetics study data, i.e., labor time intensity needed to build each built form. The latter in turn was used to evaluate the social power and status of each household.

1.7 Significance of the Dissertation Research

Adulis is one of the most referenced ancient ports in ancient texts, both locally and regionally, yet relatively little is known through archaeological research. This dissertation addresses a significant theoretical position in Northeastern African history that concerns the role of Axum, Adulis and other known sites in the region. It provides an initial assessment of whether their relationship was Aksum-centric, or whether it constituted more of a peer-polity model of interaction.

The dissertation develops a political economy framework based on primary archaeological and literary sources. Some of these sources have never been translated, and thus their economic information never teased out, certainly never applied in relation to archaeological findings. This undertaking not only drives forward the archaeology of the Northern Horn, but it also provides a comprehensive comparative case study that can be useful in anthropological literature. My dissertation research incorporates essential socioeconomic and political data from primarily local sources that are not accessible to archaeologists due to linguistic and political barriers that can be useful for other students of the ancient economies of the eastern Mediterranean and northeastern Africa.

My contributions constitute a synthesis of a variety of lines of evidence that include, but are not limited to, archaeological data, textual data, ethnohistorical and experimental archaeology, local ceramics, GIS, and fieldwork.

1.8 Organization of the Dissertation

Each chapter in this dissertation starts with a specific study and then extrapolates to regional or interregional levels based on material evidence. The dissertation is organized as follows:

Chapter One broadly introduces the research and the plan of the dissertation.

Chapter Two is a literature review. It briefly reviews pertinent archaeological literature and places the region and the research goals in their intellectual and historical contexts.

Chapter Three is an investigation of the living standards of the Adulis site between 1000 BCE and 700 ACE. It focuses on an analysis of residential architecture, construction materials, and methods of construction of Adulis households to generate an archaeological wealth index. It employs an energetics study and identifies construction type and materials and their sources. This data of architecture at Adulis is translated into a labor time value via experimental archaeology. Each built form at Adulis is then ranked and compared with the differential wealth index.

Chapter Four assesses critical artifacts, including the presence of tri-metallic coin minting in the region and at Adulis, the biopolitics of the throne Adulis, the presence of two named bishops, as well as many other unknown that other sites do not have. It also

investigates why more than 70% of all the coins discovered in the Northern Horn came from Adulis.

Chapter Five investigates the war elephant/ivory trade based on data retrieved from Adulis. It also assesses how this trade played in Adulis' economy.

Chapter Six analyzes the aromatics trade to determine whether Adulis was able to regulate the aromatics trade or whether households directly participated.

Chapter Seven concludes the dissertation with a summary of the investigation, its main conclusions and recommendations for future works.

CHAPTER 2

LITERATURE REVIEW AND THEORETICAL BACKGROUD

2.1 Reconceiving the Mediterranean

The Mediterranean material culture, recognized for its length of the archaeological record, provides an opportunity to study long-term human interactions (Athanassopoulos and Wandsnider 2004). Unfortunately, opportunities were lost over the last century due to narrow theoretical perspectives that manifested in the form of colonialism and nationalism (Abu El-Haj 2001; Diaz-Andreu and Champion 1996; Kohl and Fawcett 1995; Meskell 1998; Silberman 1982; Silberman 1995). The effect of the former gave rise to a "large but problematic database, honed powerful but somehow narrow methods, and identified fundamental but unresolved problems" (Manning and Morris 2005). The effect of the nationalism advanced excavations of periods of greatest past glory as modern nation-states sought to recreate their pasts in the 19th and 20th century. Thus, fractured theoretical perspectives and desired continuities linking present polities with those of the past placed blinders onto the understanding of ancient economies. Though notable advances have been made in classifying and analyzing the primary sources, how to build new models of political economy and how to relate these models to archaeological evidence and how these models should be compared with archaeological data elsewhere needs more work.

Traditionally, Mediterranean studies have bifurcated the region, based on Aeschylus and Herodotus' writings 2500 years ago. On one side is the Greco- Roman world, and on the other Egypt and the Near East. This delineation provided the basic

structure for studying the ancient Mediterranean for over 250 years. Despite their theoretical differences, Marxist, Weberians, and theorists of the Old World have all found the East-West divisions perfectly compatible with their reconstruction. For instance, Marx and Engels distinguished between Asiatic and Classical Modes of production, seeing the Near East, India, and China as characterized by cyclical history, in contrast with the evolutionary stream of the Greco-Roman descended Europe (Marx 1964[1857/58]). Additionally, Weber argued that before the rise of Calvinism in 16th century Western Europe, market relations were everywhere subordinated to tributary concerns, which prevented the emergence of the "Spirit of Capitalism," posited as unique to Europe. Thus, for Weber, the most fundamental contrast was between modern Western rationality on the one hand and all previous forms of society on the other. Though Weber had few direct followers among the Mediterranean specialists, Polanyi's reformulation of his ideas as substantivism received some traction (Earle 1997:145; Manning and Morris 2005). For instance, the prominent Near Eastern historian Leo Oppenheim (1957; 1977) and Greek historian Moses Finely (1981; 1985a) established Polanyi's substantivism as a leading approach in Near Eastern and classical economic history. On the other hand, Egyptologists found substantivism of little or no use. A context of Polanyi's work in Egypt; in particular, prior works would be valuable here as to why Egyptologists saw his substantivism of limited use.

One of the first comprehensive works to evaluate the economy of ancient Egypt is the work of Wolfgang Helck (1960-1969 in a series of six volumes). He constructed his assessment using a large-scale empirical data gathered from Egypt to surmise that Egyptian economic consciousness was hindered by the centrally commanded economy of

the Old Kingdom (2686-2181 BCE); only from the First Intermediate Period (2181-2055 BCE) onward did private individuals freed themselves from the all-embracing redistributing ancient Egyptian state. Subsequently, for Helck, the First Intermediate Period in Ancient Egypt resembles the Weberian 16th century Europe where individualism was freed by Calvinism and markets and formed the "spirit of Capitalism" that Weber argues is unique to Europe.

Although Helck formulated Egyptian Economy having an individual and centralized economy, it was Jenssen (1975b:137-139) and others such as Eichler (1993:2-4) and Morenz (1969 -a known study of conspicuous consumption) that cemented Ancient Egypt's economy as a redistributive economy. For instance, Janseen (1975b:137139) advanced the lack of individualism in religion and art of Ancient Egypt as evidence of a lack of individualism in Egypt's economy. Consequently, the Egyptian economy, he argued, is a redistributive economy, governed by taxation and tributes. These scholars were part of the movement of the 1940s that was drawn to study a non-capitalist political economy in Eastern Europe and Asia.

Polanyi reformulated the Weberian view as Substantivism. And when this perspective was applied to Egypt (Dalton 1971; Polanyi et al. 1957) as a case example of an embedded economy with three patterns of integration: exchange in commerce, reciprocity in social structures such as kin, and redistribution in the state economy, Egyptologists concluded it is not offering anything new that is not already formulated by the above-discussed authors. Thus, it provided no value for Egyptologists.

As a result, some Egyptologists either have shown skepticism toward Polanyi's inspired view of ancient economies or manifested a sharp protest. An example of the former view, skepticism toward Polanyi, is the work of Liverani (1990:22-24) who studied the Bronze Age's interregional commercial traffic and demonstrated patterns of economic integration (redistribution in the case of Egypt) that did not restrict the actual economic process but were rather an ideological representation of it. While the latter view, a sharp protest to Polanyi's economic perspective is pioneered by the works of Silver (1995) Barry Kemp (2006, 1989) and Malte Romer (1989). For instance, Kemp (2006, 1989) has shown the political and social competition in ancient Egypt is indicative of an economic consciousness no different from that found in a capitalistic economy. Moreover, he shows that the redistributive economy depicted by Polanyi and his followers as insufficient, to meet the demands of an entire population and be a viable political economy, as well as to meet the requirements of the institution's own needs. Kemp concludes his formalist views by pointing an economy being a compromise between state and self-regulating markets in which private demand is a critical component to stimulate markets and sets prices.

Significant shifts of opinions occurred in the 1980's. Some specialists, relying on Ferdinand Braudel's groundbreaking model argued there was one East Mediterranean culture in antiquity, which stretched from Mesopotamia to the Adriatic. Braudel's (1980) work, which appeared in 1949, was unusual in blurring the boundaries between the Christian and Muslim Mediterranean using tripartite levels of temporality. It is noteworthy that it took so long for Braudel's perspective of Pan-Mediterraneanism to take hold in the study of the ancient Mediterranean amongst Classicists and Egyptologists.

One of the available explanations is that unusual rigidity of institutional structures in both the classical and biblical branches of the ancient Mediterranean scholarship protected these experts from having to confront an incompatible thesis in an adjacent field, even when it had become the most celebrated historical work of the 20th century (Manning and Morris 2005:16; Polanyi 1957).

Some scholars asserted that while one East Mediterranean existed in the Bronze Age, the East Mediterranean Koine had fragmented in the 5th century BCE (Manning and Morris 2005:1). Others acknowledged that the classical Greco-Roman and Egyptian-Near Eastern cultures were distinct but believed the former had strong Afro-Asiatic roots in the latter, a position pioneered by a British theorist, Martin Bernal (2001; 1987) and a German theorist Burkert (1992 [1984]). Bernal argued, like Cheikh Anta Diop (1974), that Greek civilization developed from African and Asian influences. The Aryan Model of Greek origins, the dominant version today, according to Bernal was as a result of 19th-century racism and needs to be replaced by the Ancient Model. Black Athena was geared toward reducing cultural arrogance of Europe because, according to Bernal, Europe made the Aryan Model in its image and likeness influenced by politics rather than academic factors. Accordingly, a call was made to Mediterraneanists to replace the Aryan Model by the Ancient Model and place Greece and Rome in their Mediterranean context that includes Africa and Asia (Bernal 1987; Levine 1992b). Bernal's Black Athena stimulated public debate and raised awareness of what was at stake in ancient Mediterranean studies. Neither Bernal nor his critics showed much interest in developing clear theoretical and methodological criteria to address the questions scholars put forward. Scholars raised many questions in this debate such as which areas of the Mediterranean were most important in transmitting ideas to Greece (Egypt? Anatolia, Levant, or North East

Africa), and when did the major transmission take place (Bronze Age, 7th Century BCE, Or continuously)? Whether the crucial issue is Greek borrowing or the development of a common culture through ongoing interactions? In the face of such questions, the under-theorized ancient Mediterranean crumbled, presenting no coherent account of the working of the hypothesized East Mediterranean culture. Thus, the debate of Black Athena degenerated into ideological posturing without considering the interactions between literature, art, social structure and political economy. Throughout 1990's the old dividing line of the Mediterranean, was arguably the most notable academic battlefield (Manning J.G. and Morris 2005).

Finally, some scholars insisted that there was no point in trying to make distinctions within the Mediterranean at all since the entire basin had been tied together in a kaleidoscopic pattern of continually shifting interactions, an argument forwarded by Peregrine Horden and Nicholas Purcell (2000). In brief, Horden and Purcell argued there were many Mediterraneans in one. Horden and Purcell's book, The Corrupting Sea: A Study in the Mediterranean History, identified two distinct features about the Mediterranean that account for the divide; on the one hand, history in it and on the other, history of it. Where Finley (1981; 1985a) saw fixity, boundaries, institution, and cities, Horden and Purcell (2000:523) identified fluidity, connectivity, individual action, and a rural-urban continuum. They emphasize most strongly what they call cabotage, small-scale, individual movements of petty traders and travelers, uncontrolled by the state or any other entity, and they argued these moved in “patterns of interaction too various and detailed to be called routes” (2000:172). The Corrupting Sea forced ancient historians to confront Braudel's challenge, which they ignored for a while and its limitation. Moreover,

it argues for grounding cultural analysis in ecology, economics, and demography-something anthropological archaeologists were implementing for some time.

What is in need is a more complicated history of demography, institutions, and ideologies to answer what generated these episodes of growth and what interrupted them, how different societies unleashed the forces of growth and how standards of living fluctuated. How did their performance and structure compare to that of others? What caused economic growth, and what retarded and eventually undermined it? How far did advanced organic economies spread? Why did expansion stop when and where it did?

Blake and Knapp (2005) point out while the East/West Mediterranean divide is slowly being resolved only to be replaced by another stronger split North/ South. The explanation they offer is, Egypt being the exception, the economic and political conditions have limited the opportunities of North East Africa's indigenous archaeologists to practice archaeology. Thus, what we see is a data-rich North and data poor South continually reproducing itself with every research. This dissertation research at Adulis steps toward resolving the new North/ South divide and attempts to substitute it with a more dynamic understanding of the ancient political economy in its place.

2.2 Reconceiving the Red Sea (The Erythraean Sea)

What curious of the geopolity of the Red Sea in general and that of Southern Red Sea basin in particular regarding archaeological research was influenced by the east/west Mediterranean bifurcation. The ripple effect of this perspective gave rise to archaeological research that was geared toward a location controversy. Researchers just wanted to identify, then find, and then interpret locations. All of these projects were also enmeshed at the interpretative level in models of political geography. Understanding this

explains why it is so important to find a site – not just to systematically understand it and excavate it – but really, to prove whether it was an African or Greek territory or Middle Eastern with heavy implications depending upon the different theories in which the researchers were invested (Euro-centrism vs. Afro-centrism, East-Mediterranean vs. West-Mediterranean, etc.).

The bifurcation of the Mediterranean and looking for locations is no better represented than the Punt controversy in Egyptology ("East Mediterranean") that directly implicates Adulis and its surroundings, and the Adulis location controversy in Classics ("West Mediterranean"). Punt is a textual designation for the place that Egyptians claimed to have imported aromatics and learned mummification, a place they described favorably. Locating Punt was one of the tasks of Egyptologists since the inception of Egyptology (Kitchen 2002).

First, it was located everywhere within the domain of ancient Egypt whenever one tree of Boswellia (Frankincense tree) was found (Fattovich 1993a). This includes regions that range from Syria and Sinai to the Eastern Desert, the Ethio-Sudanese borderland, Eritrea, Northern Somalia, Southern Arabia, East Africa, and as far away as India (Herzog 1968; Kitchen 1991; Kitchen 2002; Phillips 1997). Then a group of influential 19th and early 20th century Egyptologists, including Sir J.G. Wilkinson and Brugsch, located Punt in Yemen based on Herodotus's description that Frankincense grew only in Arabia (Herzog 1968). Then after the discovery of the temple of Dier al Bahri where a graphic description of Punt is found, Egyptologists shifted to an African locus, mostly Somalia (Kitchen 1991; 2002). But recently there seems to be a consensus at least among the scientific community that Punt was a generalized designation for an area within the eastern coastal regions of modern Sudan south of modern Port Sudan, Eritrea, and

northern-most Ethiopia, or somewhat further inland (Phillips 1997). I have referred to this region as an Erythraean tradition. And recently baboon mummy analysis by Jarus (2010) supports the argument for an Eritrean/Ethiopian locus.

But what is curious about this location frenzy, including its 21-century version, is that location is all we know. The location of a Punt, nothing more. Punt is reduced to a geographical spot. What kind of socioeconomic relationship existed between ancient Egypt and Punt and how the data that is used to locate Punt can be used to model the ancient political economy is the subject of this dissertation.

On the other side of the divide of the Mediterranean bifurcation ("west Mediterranean"), Adulis does feature in texts of Ancient Classical writers. Unfortunately, the varied use of nomenclature concerning the western shores of the Red Sea's ports gave rise to another version of the location controversy, without critical archaeological research to support the competing positions. For instance, ancient Greek texts that have provoked debates within the field of Classics about locations are: Agatharchides' historical synthesis written during second century BCE referred as On the Erythraean Sea (Burstein 1989); Pliny's Natural History VI written during the first century A.D; Strabo's Geography Vol.16 written during the first quarter of the first century ACE; anonymously written sailors log book, The Periplus of the Erythraean Sea (Casson 1989) believed to be written in the first century ACE and Ptolemy's Geography written around second century ACE.

Agatharchides, Pliny, Claudius Ptolemy and the anonymous writer of the Periplus specifically address the port of Adulis. Strabo mentions Berenike proper (Myos Hormos, in Egypt) then Berenike near Sabi but does not mention Adulis. Similarly, Pliny mentions Berenike Panchrysos (all-golden) and Berenike Epi Dires (on the neck) and mentions

Adulis. Because of this nomenclature, there has been much dispute among Classicists as to whether Pliny's Berenike Panchrysos and Strabo's Berenike near Sabi were identical and in turn, whether these two were identical with Adulis (Cohen 2006). For instance, Fraser (1972) and Burnstein (1989) asserted Strabo's Berenike near Sabai should be identified with Adulis, while Berenike Panchrysos is Ptolemy Theron (Aqik, Sudan). On the other hand, Droysen (1985) and Tcherikover (1959) believed that Berenike Panchrysos and Berenike near Sabi were the same and in turn, both were identical to Adulis. Cohen (2006:56) parallels this location nomenclature with an experience of Finnish Immigrants in the US citing the work of Kapus (1966), where Kirkasjarvi and Kalajarvi were "official" in-group place name for Clear Lake and Fish Lake in Minnesota. These names never got recognition outside the group, but to the Finnish, they were official (Kaups 1966).

What Classicists do not reflect on in this toponym controversy over the Southern Red Sea basin ancient ports is their willingness to uncritically take ancient writers' place names "as is" without developing appropriate theories to conceptualize the variants. Some of these issues include, but are not limited to, how where and when are foreign names accepted, rejected or modified? What kinds of features are named? In what circumstances are place names used by one ethnic group and not another? And finally, when do place names receive officially accepted designations? Without appropriate theories and methods rushing to locate place names on geographical locales is another "tyranny of texts." In this particular case, a tyranny of ancient Greek texts!

Assessing the previous researches in the region based on standards of logic, their historical context, and archaeological evidentiary grounds, it shows nothing but acute theoretical and methodological deficiency. My dissertation will implement world systems

theory to bound the region and understand social processes that are not conveniently packaged by disciplinary boundaries, emphasizing those of political economy. I intend to focus on the extent of human interactions across political boundaries. The similar or differential effects of various historical political and economic processes in different spaces over time promise a more coherent picture of social interactions than do fractured sets of competing centrisms (Denemark 2000). The attention should be not just on places, but also on the various social units that inhabit those spaces. Rejecting unit based or geographic based centrisms is narrow, particularistic, and makes it easy to ignore historical political and economic processes that are not conveniently packaged. The dissertation keeps a broad temporal and geographical scope in view, one that recognizes the relational qualities of sociopolitical economic processes, but at the same time one that pursues empirically robust case studies that track these processes and contingencies in specific localities through time (Sugerman 2005, Stahl 2004, Junker 2004, Pauketat 2004, Stein 2004, Storey 2004, Paynter 1982).

2.3 Reconceiving Northern Horn

The Northern Horn of Africa (the NHA) has been studied for more than three hundred years, and during this time its meaning and the historical questions surrounding it have changed considerably. In this section, I will explore the origins and evolution of distinct interpretations of the NHA's past at a paradigmatic level. I do so to point out the context in which these distinct interpretations developed, flourished and stalled. Not only are the major contributions made by such distinct interpretations about its past acknowledged within their historical contexts, but also the limitations of these analyses as

projected into the present. It is only then that a way forward to the study of the past of the NHA in particular, and broader Africa in general, can be made evident and relevant.

There are several good reasons why the past of the NHA needs to be revisited in a new theoretical light suitable for the 21st century. First, it has been noted that over the last three decades, African Studies was increasingly consumed with matters of epistemology (Dunton 2011; Miller 2007), where the historical production of knowledge is seen as closely related to the development of power relations in the present. These critiques noticed both the discourses and silences about Africa. However, such an undertaking came short in providing a forward- looking solution. For instance, note the polemic fire drawn by Bernal's (2001; 1987) Black Athena (which disputed the origins of Classical Greece) and by Epprecht's (2008) Heterosexual Africa? (which challenged the perspective that Africa is invariably heterosexual), and Van Wyk Smith's (2009) The First Ethiopians (which disputed the origins of anti-black racism, not in Europe, but in Africa itself). However, more recently a promising shift of perspective has appeared in African studies that have presented a change from objectifying Africa and Africans to a more dynamic approach of thinking and learning with Africans and Africanists (Miller 2007:18).

This review contributes toward such discussion by bringing into fruitful discussion different frameworks of interpretation about the NHA, and by disputing a particular version of Ethiopianism. The term Ethiopianism was coined by Van Wyk Smith (2009). It stands for extreme ethnocentrism responsible for major ethnic conflicts across sub-Saharan Africa. It recommends a proposition that may appear surprising to some – those centuries-long efforts to reconcile Africa's actual past with the concept of Africa in general (and with that of the NHA in particular) rests in the Holocene period. It is in this

period where the NHA, and throughout the continent more generally, rock art provides critical evidence for understanding the rise of complex state-level systems. Such art has been found to be indicative of different themes, styles, and belief systems documented by archaeologists (Van WYK Smith 2009), but has jump- started the research on the rise of complex state-level systems that have failed to integrate essential elements of context fully, and as a result, frequently has created attributions pointing to origins outside of Africa. African rock art extends in a considerable crescent shape from Namibia through Southern and Eastern Africa, the Horn of Africa to Middle and Lower Nile Valley, to the Sahara and into Morocco and West Africa (Coulson 2001). Its study can help to contextualize Africa's early state-level societies, along with studies of food domestication and recent ground-breaking longitudinal ethnographic work on pastoralists that have investigated the bio-social process of adaptation and human-environment dynamics (Fratkin E. and Roth 2005).

The term Ethiopianism mentioned above has nothing to do with the modern state of Ethiopia, or Ethiopians, or for that matter Eritrea. It was only over the last two hundred years that the term was explicitly used to denote a locale earlier known as Abyssinia, or what I refer here to as the NHA. Traditionally the term Ethiopia was invoked to refer to the part of the world south of Egypt. In this review, "Ethiopianism" represents a wider version of ethnocentrism that runs across sub-Saharan Africa. This Ethiopianism has been articulated throughout the retrievable recent past in the form of Meroitic, Kerma or Kushitc civilizations of the Middle Nile; later it's imagined territory shifted up-river to Aksum, which would become Abyssinia and its successive cultures as Europe learned about Aksum. In due course, it came to be identified as "Worthy Ethiopia" as opposed to "Savage Ethiopia," usually attributed to West and South Africa (Van WYK Smith

2009:444). Homer's Iliad and Odyssey invoke these identifications of two Ethiopians south of Egypt, which most scholars of the past adopted either implicitly or explicitly. These discriminatory and inescapable templates of historical assumptions in Africa resulted in a geographical match of "historically relevant Northeast Africa" that is Homer's "worthy Ethiopia," as contrasted to the "Other" West and South Africa. For instance, Ali Mazrui's (1984:3) analysis of Africa is an example of these templates, noting that; "The whole cultural history of Africa is captured in the transition from the triple ancient personality of Abyssinia [Indigenous, Semitic, Greco-Roman] to the triple modern personality of Nigeria [Indigenous, Islamic and Western]." These templates unleashed more complete versions of Ethnocentrisms and ethnic collectivities that served to foment tensions and conflict. For instance, the notorious Rwandan ethnic genocide was brewed along such lines, where the Tutsi were characterized as descendants of the "worthy Ethiopians." Though it might appear simplistic to blame the ethnic genocide in Rwanda for such templates, a closer look at the dialectical relationship between ethnocentrism and xenocentrism would enable us to see the dangers of such templates.

Ethnocentrism corrects itself by xenocentrism. The 18th-century movement of "Primitivism" in Europe and its concept of the "noble savage" was an example of such a dialectical relationship within which the Tutsi were elevated during the colonial encounter. Similar manifestations can be noted in the NHA, with its successive cultural conflict involving the Oromo (Donham 1986b), Somalis of Southern Ethiopia. If modernity is blamed for polarizing Africa (Miller 2007), then an integrated Africanity is needed (Maquet 1967; 1972; Senghore 1971). This review will show how an incremental and integrative approach (rather than a substitutive one) in the NHA's inquiry of the past

can be a valuable perspective to contextualize previous research, identify strengths and shortcomings, and suggest a way forward.

Where broader Africa is concerned, some powerful myths remain active within and outside the continent. The most notorious ones are anti-black racism and more explicit versions of ethnocentrism that I have referred to as Ethiopianism. These myths have retained deplorable longevity. The problem of confusing myth with history and archaeology with ideology is a peril of any systematic investigation. Perhaps one of the main reasons why these myths persist is the lack of an integrative and incremental theoretical perspective to study the past of Africa across the African landmass. This includes addressing how a complex state-level society like ancient Egypt, Nubia, and Abyssinia rose in the context of their relationship with other ancient states and cultures on the continent. In the absence of such a systematic theoretical perspective, existing myths will continue to be the source of prejudices and sometimes fatal consequences.

This review will assess the theoretical foundations of current perspectives surrounding the NHA's past, and how these understandings have proven to be ambiguous and self- perpetuating. I argue that distinct interpretations of the NHA’s past need to be tightly historicized in their specific time and context. Historicizing these interpretations in an integrative and incremental approach will help restrain the silencing of essential variations and new data coming from archaeological studies of Africa’s past. This review will present competing approaches as part of a particularly productive discussion that does not claim to answer all questions, but rather establish a particular moment of clarity, and suggest a way forward.

2.3.1 Method Implemented

Historical inquiry is a problem-solving discipline, and an anthropological archaeologist or a historian is someone who asks open-ended questions about past events and answers them with selected traces or facts which are generally arranged in the form of an explanatory paradigm (Fischer 1970). A complicated process of mutual adjustment fits answers to questions asked. While the resultant explanatory paradigms may use varying forms, almost invariably are articulated in the general form of a reasoned argument. Every historical statement is merely an answer to a specific question which an archaeologist or historian has asked; moreover, every generation of historical writing raises different questions, and these questions and answers are mitigated by selecting specific facts or traces of the past.

Granted, it can be a daunting task to systematically investigate the historical inquiry of the NHA over the last three hundred years (especially given the enthusiasm the area has generated from local and entirely non-local researchers). But, by asking few methodical questions, I will address the issue at the higher level of dominant paradigms. I will follow Fulbrooke's (2002:34) definition of a paradigm as a theoretical framework based on an explicit set of assumptions about how the world works. This includes: naming the parts, the vocabulary or concepts through which to capture reality, assumptions about the relationship of the parts, assumptions about priority, causality, relative importance, and weighting. To systematize the historical inquiry of the Northern Horn into paradigms, I investigated the following fundamental issues: What questions were asked? What evidence or traces were researched? What methods and concepts were used to analyze the evidence? What analytical concepts were used to describe the past of the NHA? How was Africa in general, and the NHA in particular, viewed in the origins

and development of diverse ideas, practices, and technologies generally recognized as being of global significance? Asking these questions results in identifying four dominant paradigms, namely (in chronological order), the Orientalist-Semiticist paradigm, the Aksumite paradigm, the Pan-African paradigm and the Leftist paradigm. While the Orientalist-Semiticist and the Aksumite paradigms can be argued to originate from a hegemonic position, the Leftist and the Pan-African paradigms arose as a counter-hegemonic response.

2.4 The Northern Horn of Africa: Historical Context of Paradigms

The Northern Horn of Africa presents a marked diversity in natural and cultural phenomena that naturalizes a complex interaction (Fattovich R 2000). Out of these complex, physical, and cultural phenomena, traces of the past – both in terms of material culture and written texts – made their slow way to the present and had become the subject matter of historical and archaeological inquiry for centuries. For example, in the NHA about 80,000 archaeological sites are documented that range from Plio-Pleistocene sites to recent historical ones. There are about five thousand Ge'ez manuscripts available in the present (Pankhurst 1999). Most of these manuscripts are housed in museums outside the Northern Horn (See Figure 2).

It is estimated that 100 languages are currently spoken in the Horn of Africa (Ehret 1974; Ehret 1984; Ehret 1995b; Ehret 1998). Historical and archaeological explanations have been widely published in academic publications based on these traces

of the past, predominantly in Middle-Eastern Studies, Biblical Studies, Semitic Philology, Early Christianity Studies, and others dealing with the origin of complex societies.

Dominant paradigms are shaped both by an entire community's cultural background and by the broader context of the historical moment (Kuhn 1970; 1977). To establish the framework within which these historical and the archaeological explanations of the NHA developed, it is necessary to mention two historical incidents in the 19th century.

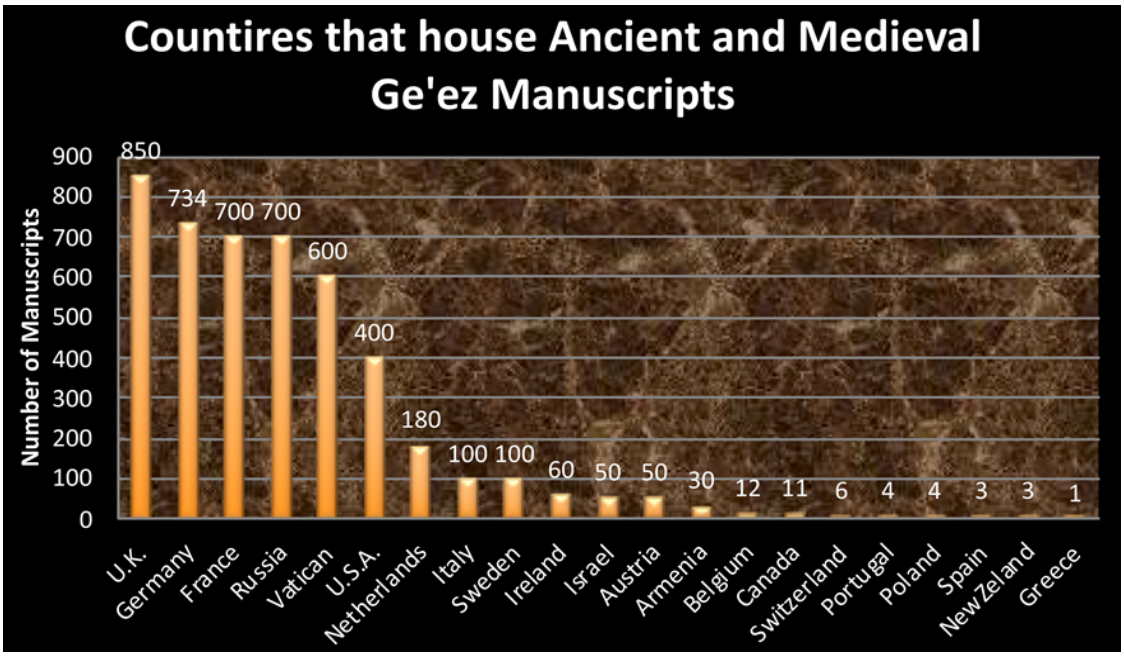

Figure 2 Ge'ez Manuscripts of NHA
(Data source from Pankhurst 1999 and Center for Ethiopian Studies)

First, although there has been considerable research interest in the NHA from the disciplines mentioned above, the consecutive battles between colonial Italy and the Northern Horn call for extensive and detailed explanations. In 1886, at the Battle of Dog'ali, 500 modern armed Italians were killed in Eritrea, and in 1896, at the Battle of Adwa, 26,000 modern armed Italian forces were eventually defeated in Northern Ethiopia. There is a plaza in Rome named "Piazza dei Cinque Centi" (the plaza of the five hundred) to commemorate the battle of Dog'ali.

This military defeat of colonial Europe by NHA forces, besides sending a cold chill to colonial Europe, triggered tremendous research interest and a need for detailed explanations about the real identity of NHA populations. These two battles were described as "the greatest victory of an African over a European army since the time of Hannibal" (Akpan 1985:272) and "the greatest single disaster in European colonial history" (Mockler 1984:41). Thus, outside of Africa, European scholars, mostly based on linguistic affiliations observable on the two sides of the Red Sea, argued that the NHA is the southwestern-outpost of the known civilized world – thus "in" Africa rather "of" Africa. Institutions legitimate paradigms. Within the academic institutionalization of Orientalism, an offshoot grew, first as Semitic philology, and later as Ethiopianist studies, and it articulated what I will address shortly as the Orientalist-Semiticist paradigm.

Second, inside Africa, two different developments took place not long after the battles mentioned above that directly implicate the historical inquiry of the NHA. In 1935 Mussolini invaded Ethiopia, both as retaliation to the earlier military defeat and to expand his East African colonial territory. This invasion became a turning point in the early history of Pan-African consciousness and made the NHA a metaphor for an Africa wronged by the West (Mockler 1984). When Kwame Nkrumah (Ghana's first president) saw a sign reading "Mussolini Invades Ethiopia," in London, he said "… it was as if the whole of London has suddenly declared war on me; personally, my nationalism surged to the fore. I was ready and willing to go to hell itself if need be, to achieve my object [of ending colonialism in Africa]" (quoted in S.K. Asante 1977:201, Tibebu 1995). The UNESCO General History of Africa notes the 1935 Mussolini invasion of Ethiopia as the official beginning of African Nationalism. It claimed that so many Africans in Africa and the Diaspora had never been quite so mobilized over a single issue like this.

The five-year (1935-41) resistance against Mussolini's war in the NHA influenced and was influenced by, empathetic Africans in the Diaspora. It shaped Pan-African consciousness inside and outside Africa and brought Emperor Haile Selassie (Ras-Teferi) of Ethiopia to center stage in African and World politics (Akpan 1985; Mockler 1984). Ras-Teferi became an important religious and political symbol, one which Rastafarians revere as the "new Jesus" of Black Power and Glory, unlike the "old Jesus" of the Western Christian tradition, who symbolized crucifixion and humiliation. Haile Selassie is remembered in part for a famous speech at the League of Nations in 1936 that resonated with African Diaspora thoughts, where he stated: “There would be no peace until the philosophy that holds one race superior and another inferior is finally discredited and abandoned.” (This would later be integrated into the lyrics of the song War by musical legend Bob Marley: “There would be War until the philosophy that holds one race superior and another inferior is discredited.”) The rising Pan African political consciousness created such a stir in global politics that the British helped the Ethiopian emperor get back Ethiopia from the Italians in 1941 as part of WWII politics.

Moreover, as noted by Du Bois (2007:268), the Order of the Garter, the "most distinguished and exclusive of the nine British orders of Knighthood" was awarded to Haile Selassie. Du Bois points out further that Haile Selassie was the second man of color (after the Emperor of Japan) to be honored in this way since the founding of the Order in 1344. Such decisions shed light as to why the Japanese were considered “honorary white” in Apartheid South Africa and not the Chinese, and why Ethiopia's Capital, Addis Ababa, was chosen to be the center of the (then vital) institution, the Organization of African Unity in the 1960’s, during a decade when most African countries abolished direct colonialism.

Haile Selassie's role in the subsequent formation of the Organization of African Unity (AOU) in 1963 in Addis-Abeba, given his prominence in the African Diaspora and among then new African leaders, posits a historical interpretation, which I will address as the Pan-African paradigm. It originated to address the need for political, economic and cultural cooperation between African Nation-states, mostly involving Sub-Saharan Africa, and with the potential of gradually moving toward establishing a united Africa. While the term Pan-African consciousness has long and diverse roots, after 1963-it acquired a more focused political and geographical engagement, at least within Africa, and it acquired an institution, the AOU, to legitimize the paradigm.

The ultimate beneficiary of the decisive battle of Adwa in 1896 was predominantly Menelik II (Ethiopian emperor just before Haile Selassie). He expanded the territory of the modern state of Ethiopia south, legitimizing it as merely being a "reunification" through a complete re-conquest of the formerly loose and confederate tributary kingdoms. For example, Tekle Tsadik Mekouria (1988; 1981) argues that the occupation of the Harrar and Oromo region by Menelik II constituted reunification, claiming that Harrar (in the Ogaden territory claimed by Somalia now) was the land of Emperors AmdeZion, Zerayakob, [medieval kings of the NHA] while the Oromo were outside of "Abyssinian civilization." These groups were "Abyssinianized" (naturalized) through conversions to Orthodox Monophysite Christianity and by linguistic assimilation to speak Amharic (vernacular of Ge'ez).

Historians, perhaps within the "worthy Ethiopia" perspective, argue Menelik II's expansion to the Deep South to establish the present borders of Ethiopia as being remarkably similar to the European Scramble for Africa (Tibebu 1995:40). Colonialism, both old and new, does not necessarily have to be racial. There can be "black-on-black

colonialism" (the NHA- Oromo-Harrar), just as there was "white-on-white colonialism" (England-Ireland), or "yellow- on-yellow colonialism" (Japan-China). Colonialism is based on an unequal relationship of power between the colonizers and colonized. It certainly is not always the rule that the two opposite sides of the power divide are of different "races." Colonial relationships often create racial distinctions after the fact.

Haile Selassie, who took power over Ethiopia after 1941, was not absorbed with southward territorial expansion as were his predecessor, but northwards, towards Eritrea. However, he needed to reinvent the colonial wheel completely. He accomplished this in two steps. Based on the global sensitivity of the 1960's, and specifically, the desire of unifying Africa to circumvent the damages of colonialism that made Africa divided and impoverished; Haile Selassie became an avid advocate of a united Africa within the pan-African agenda of the AOU. To accomplish this, he saw two unique opportunities. First, he sent a sizeable number of students to the West to study in Schools of Orientalism, with a clear objective to prove that Eritrea is part of the Ancient Kingdom of Aksum – and thus presently part of Ethiopia. Then, he established the French-run Ethiopian Institute of Archaeology to excavate sites in Eritrea to prove that it was the Aksumite area of influence. In his speech of 1952, Haile Selassie said the primary objective was to "protect the monuments and other antiquities which are testimonies of the imperial stories and our inheritance" (Fattovich 1992: 41). The government sponsored the institute and arranged to receive professional support of a French archeological mission provided by the Centere National de la Recherché Scientifique. The government of Ethiopia then supported various excavations since the 1960's financially, logistically, and symbolically. These projects received extensive coverage in the national press, and effectively materialized contemporary national political commitments and visions (Abu El-Haj 2001; Michels

1988; Michels 1990; Michels 1979). As a whole, this undertaking posited a perspective that I will address as an Aksumite paradigm.

What has been problematic is that Pan-African consciousness has struggled to challenge the ideology of nationalism, which is adopted from Europe and North America, and has been ill-suited and ill-adapted to Africa, given it negates the very African roots of the peoples of Africa (Ackah 1999). Most postcolonial African leaders "have been caught in the grip of Westernization to the detriment of their people" (Ackah 1999: vii). It seems the concerns of continental Africans, African political leaders, and the elites of the African Diaspora have not been compatible.

In reaction to the Aksumite and Orientalist-Semitist paradigms and to the disappointments of Pan-Africanism, a body of scholars, radicalized by the global events of the 1960's, posited a scholarship critical to both the Ethiopian establishment and to the Ethiopian government-sponsored western scholarship. These different groups of scholars put forward what I will refer to as the Leftist paradigm.

In the next section, I will, therefore, address the Orientalist-Semitist Paradigm, the Aksumite Paradigm, the Leftist Paradigm, and the Pan African Paradigm consecutively in greater detail.

2.4.1 The Orientalist-Semiticist Paradigm

European scholars, predominantly in Germany, England and Italy of public renown and well versed in Ge'ez-Semitic philology, formulated the Orientalist-Semiticist paradigm. Some of the notable names include: the Germans Hiob Ludlof, the founder of Ethiopianist Studies in Europe in the 17th century (Ullendorff 1965) and August Dillman (1974), the "re-founder of Abyssinian studies", or commonly known as the "Ludolf of the

19th century" (Ullendorff 1965:20); the Britishers, Sir E.A Wallis Budge (1928; 1970), Orientalist, Egyptologist,

Ethiopic-Semiticist-C. F Beckingham (1961a; 1954; 1961b), the British colonial officer G.W.B Huntingford (1961b; 1955), the Swiss-born Edward Ullendorff (1965); and the Italian Carlo Conti Rossini (1900; 1903; 1910; 1928; 1940; 1951). The American Wolf Leslau (1956; 1965; 1990) is an Ethiopic-Semiticist and renowned scholar of the twentieth century who was instrumental in establishing the Department of Near Eastern Studies in UCLA in 1955. There are also Orientalist sociologists like Donald Leirue of the University of Chicago, and traveler- adventurers like the English novelists Evelyn Waugh (1984) and the Herbert Vivian (1969). All were notable scholars who put forth the Orientalist-Semitist paradigm, a school of thought that is well established and has considerable publications and following.

The central argument of the Orientalist-Semiticist paradigm in explaining the cultural history of the NHA is as follows. Sometime during the first millennium B.C, a group of people named Sabeans crossed from South Arabia to the NHA through narrow passes by way of Bab el-Mandeb (=gates of Hell) and made their way to Eritrea first, and eventually to Northern Ethiopia. They are believed to have brought with them "civilization," script, and the knowledge of agriculture. According to this paradigm, the Agaws, Beja, Nilots, and Oromo, who were among the indigenous people of the NHA, were primitive by comparison. Thus, the Sabean origin of NHA history has been a taken for granted in this school of thought.

Though almost all scholars within this framework agree on exogenous stimulus for the rise of complex society in the NHA, there is considerable variation as to how this happened, and an immense silence as to the motive of emigrating from South Arabia to

the NHA. For instance, Hiob Ludolf argued South Arabians called Habashat migrated to (H)abyssinia, giving their name to the land and imposing their culture, stressing cultural domination. Henry Salt (1814) argued that a fusion of South Arabians and Africans gave rise to the ancient complex society in the NHA. Theodore Bent (1893a; 1893b) was the first to employ archaeological data to reach the same conclusion as his colleagues. After comparing archaeological material from ancient sites such as Yeha, Adulis, and Aksum with that of South Arabia, Bent concluded that these sites contain archaeological material that predates Aksum and contended these sites were contemporaneous with the Sabean and Ma'in Polities of South Arabia, and these sites date to the first millennium BCE He argued that Sabean colonists mixed with indigenous populations, creating the ruling Habashat of the NHA. Bent (1893a; 1893b) based his argument on the presence of ancient Sabeans inscriptions available on the NHA and South Arabia.

Glaser is considered the most influential historian and epigraphist (Curtis 2005) for subsequent researchers of the 20th century. Glaser (1895) argued that the Habashat emigrated to the NHA and stayed under the domination of the Sabean state in South Arabia at the initial stage. Then, by the end of the first millennium BCE, they rebelled against their former polity and reasserted power just at the right time to found the Aksumite Kingdom. To support his claim Glaser (1895) established as proof similarities between and the unvocalized ancient Sabean term hbst, found in Sabean inscriptions in the NHA and South Arabia, and the Arabic word al-habasa (Abyssinia), suggesting hbst referred to the NHA. For instance, Carlo Conti Rossini's (1928) major work on the NHA's history elaborated on successive colonization based on Glaser's argument. In Conti Rossini's migrationist model, the Habashat adapted to different indigenous cultural

practices, giving rise to many competing polities. One of these polities, Aksum, seized power by the first century, unifying all.

The period between 1952 -1974 saw extensive archaeological and epigraphic research, mostly due to relative peace in the region, and due to the establishment of the Ethiopian Institute of Archaeology, led by Francis Anfray. The research focused on Aksumite elite residences (Anfray F 1968; Anfray F 1972c; Anfray F 1981; Anfray F 1990) and the epigraphic research of Sabean inscriptions (Bernard 1991; Drewes 1962; Drewes 1970; Drewes 1956; Schneider 1970; Schneider 1976). These researches contributed to the recognition of two macro cultures, pre-Aksumite and Aksumite. For example, Francis Anfray, head of the Ethiopian Archaeological Institute, excavated the ancient sites at Metera (a 20 hectare urban center in Eritrea) and Adulis, and he classified the culture history of the Horn into two: Pre-Aksumite (c. 500 BCE – 100 ACE) and Aksumite (c. 100 ACE – 1000 ACE) (Anfray 1968). He argued that the Pre-Aksumite culture is substantially influenced by South Arabians (Sabeans), while the Aksumite culture is truly unique and indigenous. Thus, the Northern Horn's history starts with Aksum. On the other hand, Drewes (1962) and Schneider (1976) argued Ge'ez (ancient Ethiopic) was well established in the NHA during first millennium B.C or earlier, and claimed that the indigenous Habashat, while interacting with South Arabian cultures, were responsible for the rise of complex polities in the NHA.

The Orientalist-Semiticist paradigm was challenged by Issac and Fedder (1988) by questioning the very foundations and assumptions implemented to formulate it. They noted it was based on several erroneous historical, linguistic and archaeological assumptions, including: that no Semitic language is indigenous to the NHA (which recent studies disprove), that Sabean writing was brought to the NHA, and that no indigenous

high culture developed in Africa. Issac and Fedder (1988), citing the work of archaeologists Drewes (1959) and Schneider (1961), have shown that only in the NHA did the Sinatic-Sabaean script become fully developed and exploited, and over centuries a new script was developed, completely different from Phoenician. Moreover, they have shown that only in the NHA was this Semitic language (Sabean) vocalized, changed the direction of its writing, and was used in manuscripts and literature. On the other hand, Sabean writing never developed beyond its initial stages in South Arabia. Thus, Issac and Fedder (1988:76) conclude "the manner in which the NHA inhabitants used Sabean with freedom and originality, hardly betrays the behavior of simple borrower." Besides, this paradigm was challenged on archaeological grounds (for a review, see Curtis 2004; Habtemichael 2002; Schmidt 2002a)

Despite being challenged on epigraphic, archaeological, and historical grounds, the paradigm of South Arabian inspiration to the rise of NHA complex society has become orthodoxy, specifically among British archaeologists working in the NHA, and even appearing in a prominent and influential recent synthesis of the NHA's archaeology. It suffices to mention the works of Munro-Hay (1991), Phillipson (1998) and Connah (2001).

The geographical isolation framework has been one of the most influential explanatory frameworks in the Orientalist-Semiticist paradigm. In the famous quote of Edward Gibbon (1977): "encompassed on all sides by the enemies of their religion the Abyssinians slept near a thousand years, forgetful of the world by whom they were forgotten." This dictatorship of geography over the past of the NHA caricaturizes Ferdinand Braudel's (1980) dialectics of geography and history. The geographical isolation framework has been cited freely to explain almost anything about of Northern

Horn, including the millennial independence and uniqueness of Ge'ez complexity or the country for that matter. One wonders, though, how a population would be able to "sleep" surrounded by "enemies!"

This geographical isolation framework ignores many historical events that defy this explanation. To mention but a few: the 19th century British expedition of General Napier, which reached Maqdala, the heartland of the geographically "inaccessible" plateau, fought Emperor Tewodros 2nd, defeated him, and pulled out; the fact that the head of the Northern Horn Orthodox Church was a Coptic Egyptian; and the setting ablaze of Gondar by Sudanese Answars. Also, Egyptians across history waged war repeatedly to control the source of Nile waters but were defeated. Northern Horn geography was no insurmountable hurdle. Yet, Western scholars have repeatedly explained the "uniqueness" of the Northern Horn in extra- human terms.

2.4.2 The Aksumite Paradigm

While Westerners and Western-educated locals fundamentally formulated the Orientalist-Semiticist paradigm, an alternative local formulation and paradigm exist, namely, the Aksumite Paradigm. Due to the shortness of the colonial period in the NHA relative to the colonial experience of other African countries (Ethiopia for five years and Eritrea for sixty years by Italy), local educational systems were left less affected, or in some cases intact. The Aksumite paradigm was arguably elaborated by the Orthodox Monophysite Church, the monastic learning centers of the NHA, and their patrons among the ruling class.

Orthodox Christian churches are Eastern churches that broke off from the Church of Rome during the first millennia ACE. Within these broader Eastern Christian churches, the African component, which comprises the Church of Alexandria and that of the NHA, falls into the category of the Monophysite churches. Monophysite churches believe in the human and divine nature of Christ unified in one (mono) nature (physis) at age thirty, unlike Rome-based belief that holds they are kept separate. Such theological squabbles led the Monophysite churches to break from Rome after the Council of Chalcedon 451 A.D.

Western-educated local scholars brought this perspective to life during 1940's and 1950's, mostly sponsored by Emperor Haile Selassie's scholarship (Tibebu 1995). It should be noted that, until recently, the Aksumite paradigm relied less on the archaeology of Aksum than on selected Ge'ez texts, elaborated for specific historical contexts and purposes during the medieval period. The two most popular Ge'ez manuscripts upon which this paradigm heavily relies are the Kibre Negest, ("Glory of Kings") noted by Eike Haberland as a "magna Carta" of the Aksumite paradigm, and the Fetha Negest ("Legal code of the NHA state"), the legal code of the NHA (Tibebu, 1995; Abba Issak, 2000).

The Aksumite paradigm articulates three necessary frameworks that are central to the interpretation of the past. These are the origin of Aksum, historical essentialism, and the religious and cultural supremacy of the Ge'ez civilization.

The first framework provides an answer to the question of the origin of Aksum for which the Aksumite paradigm offers two explanations. Ge'ez texts originating in Eritrea and Tigray, written mostly by Eustatean monastic traditions, argue for indigenous origins, while those originating in the South, mostly in Shewa in Ethiopia written in the

Tecklehaimanot monastic tradition, and argue for exogenous stimulus. The latter links origin to a queen named differently by various sources, including “Saba” (biblical queen Sheba), “Makda,” and“Azieb.” Her visit to biblical King Solomon, the birth of Menelik I, and Menelik I‘s first trip to Jerusalem and his return along with the tablets of the ten commandments and the first-born of the 12 tribes of Israel with him (around twelve thousand in number), the beginning of the Solomonic dynasty (Abba Issak, 2000). For example, Emperor Haile Selassie claimed to be the 225th descendant of this lineage.

The modern educated scholars who advocate for the Aksumite paradigm from the Tecklehaimanot monastic tradition include prominent scholars such as Tadese Tamrat (1984; 1972), Tekle Tsadic Mekouria (1988; 1981), Zewde Ghebre-Selasie (1975), Merid Woldearegay (1971) and Sergew Hable Selasie (1969; 1972a; 1972b). All of them were educated in Oriental institutes in the West, sponsored by Haileselaisse's scholarship in 1940's and 1950's (Tibebu 1995). Alternatively, Getachew Haile (1988), Hailu Habtu (1984), and the playwright Tsegaye Ghebre Medhin argue for endogenous origin, perhaps utilizing the Eustatean monastic tradition.

The second framework of the Aksumite paradigm addresses how the extant Ge’ez texts perceive history. Tadese Tamrat (1972) and Sergew Hable Selassie (1972) contend the narrative of NHA history is an essentialist reproduction, and that the court historian was a professional flatterer of the reigning monarch, elevating him while diminishing preceding rulers.

The third component of the Aksumite paradigm pertains to the religious and cultural supremacy of Ge'ez over “others,” including Muslims, Bete- Israel, and “pagans,” all known by derogatory collective name "aremien"("Unbaptized Heathens") and the superiority of the “Ge'ez script” over “people without writing” (Wolf 1982).

It is worth noting that the Aksumite Paradigm disagrees with the Orientalist-Semitist Paradigm on two fundamental issues: the identity of NHA inhabitants, and the Sabean origin thesis. According to the Aksumite Paradigm, or at least one version of it, Northern Horn inhabitants identify themselves as Africans or implementing a Biblical tern, as descendants of Kam or Ham. This is opposed to the Orientalist-Semiticist Paradigm, which argues for either Shem or Japheth, claimed to be progenitors of Caucasian origin. While the Orientalist Semitist paradigm contends for a Sabean origin for the NHA, the Aksumite Paradigm attributes its complexity to Queen Sheba's visit to Jerusalem, perhaps emphasizing relations with extra local spaces and bringing the Ark of the Covenant and people to Aksum; while less researched texts, but also essential data claim entirely endogenous origins.

2.4.3 The Leftist Paradigm

Marxism in the NHA, however miserable its failure as politics, has become a formidable and critical scholarship associated with the Leftist paradigm. It was pioneered by Leftist paradigm scholars critical of the two previously addressed hegemonic paradigms and radicalized by the global events in the 1960's. The paradigmatic shift of this group of scholars lies in the priority they attributed in their research. Unlike previous studies, which focused only on kings, the Orthodox Christian church, and monumental Aksum, the focus of these scholars was on class formation, nationalism, resistance, and a history of the underrepresented, including women, peasants, occupational minorities, pastoralists as well as peoples 'outside' or on the 'margins' of the Geez complex, such as the Oromo, Muslims, Beta-Israel, Somalis etc.

This group of scholars published a few notable works on NHA's history. Asmarom Legesse (1973; 2000) is a Harvard educated anthropologist who studied the Oromo's social organization, one based on an egalitarian socio-political and cultural institution called Gada. The Gada system was a system of age-grade classes (Luba) that succeed each other every eight years in assuming militaristic, economic, political and ritual responsibilities. Each Gada class remained in power during a specific term (Gada), which began and ended with a formal power transfer ceremony. Asmarom's work on the Oromo, besides challenging the hegemonic paradigms for focusing too much on hierarchy and state formation, contended that the Gada system is a "democratic institution" practiced by the genius of Oromo, and destroyed by an expansionist NHA regime. Asmarom's work set the trend for later scholars who included Oromo history as part and parcel of NHA history. Mohammed Hasen's (1990) The Oromo of Ethiopia; Gebru Tareke's Ethiopia: Power and Protest (1991); Bahru Zewde's A History of Modern Ethiopia (1991) and Ruth Iyob's The Eritrean Struggle for Independence (1995) are a few examples. These works and the like were written by scholars who were part of the 1970's student's movement in the NHA that opened a new era of critical scholarship.

On the other side of the divide were Westerners who challenged the hegemonic ideas put forth by the Orientalist and Aksumite paradigms, using a Leftist theoretical perspective. The works of John Markakis (1974; 1987; 1978), Donald Crummy (1972; 1980; 1981), Charles McClellan (1978; 1984), Richard Caulk (1972; 1978; 1984; 1986) and Donald Donham (1986a; 1986b) are articulated toward that end. In a gray area between the aforementioned hegemonic paradigms and the critical Leftist paradigm lies Richard Pankhurst (1968) work, who wrote on Ethiopian economic history.

2.4.4 The Pan-African Paradigm

The term Pan-Africanism was used for the first time in 1900 at a conference organized in London by Silvestre-Williams. Born in Trinidad, Silvestre-Williams played a crucial role in organizing the Pan-African conference and acted as an advisor to African political leaders from British colonies in Africa. Pan-Africanism was a set of political and philosophical ideas that aimed to guide African peoples in their quest for liberation, independence, and the unity of a continent fragmented by colonialism and poverty. Prominent figures of this school of thought include H. Silvestre-Williams, E.W. Blyden, Marcus Garvey, and, in its initial stages, W.E.B. Du Bois. Their writings and activities were essential milestones and part of an important effort in the cultural and political revival of Black people. Blyden was a Liberian from Togabo who viewed colonialism as a logical step after slavery. Thus he put African history in a perspective that argued that Egyptian history is vital to Africa, and West Africa should unify into one political entity. He is also credited with a conception of Pan-Negrism, his version of Pan- Negrism essentially being more moderate, cultural, and intellectual than that of Garvey.

Garvey's Pan-Negrism was more radical and politically active; he advocated the return of African-Americans to Africa. Garvey was instrumental in popularizing the ideas of Pan- Africanism among African elites and students at Universities in the West. Du Bois reconvened the Pan-African Congress after 20 years of hiatus. Unlike previous congresses held by Blacks from the Diaspora, these meetings were soon dominated by Africans like Nnamdi Azikiwe and Kwame Nkrumah, who would lead their countries, Nigeria and Ghana, respectively, to independence.

These early attempts at African cultural and political revival nurtured Cheikh Anta Diop's (1974; 1987) grand depiction. The following ideas are central to Diop’s

construct, and Pan-Africanism for that matter: (1) the centrality of Egypt to the world and Africa's complex society formation (thus the Black origin of mankind and civilization, and the Black origin of the Greco-Roman world); (2) the need of Africans to study the past as a bond and link for action in the present; (3) the creation of a federal and continental African state without interference of Europe, and the need for the political independence of Africa.

Regarding the Black origins of humanity and civilization, Diop contends dark-skinned people inhabited Egypt, and it was the Black Africans who brought civilization to humankind. He considered ancient Egypt to have been the earliest great civilization and maintained that this was realized by Africans who invented complex forms of social systems, iron metallurgy, kinship, monotheism, mathematics, science, writing, monumental art and architecture, and sophisticated techniques of mummification. Diop makes a case that many of the leading philosophers and scientists of ancient Greek were trained partly by Egyptians: Pythagoras, Thales, Solon, Archimedes, Eratosthenes, and many others who traveled to Egypt. Diop asserted that Black people must honor this glorious past and revive their pride to regain their rightful place in the modern world. These ideas are carried into the modern era by scholars like Mdete Asante (1977) of Temple University and in Bernal's Black Athena.

According to Diop, various nations in Africa need to move toward greater political and economic integration at regional levels, and then, if successful, at sub-continental levels and continental levels. It was this position that was favored by African heads of state who created the Organization for African Unity (OAU) at Addis-Ababa in 1963. This organization has evolved from the OAU to the AU (African Unity), and since 2004 a "United States of Africa" is a hot topic of political debate. However, as impressive

as such a proposal may sound, it has been a discussion topic for African elite mostly absent from input from civil society. Civil society remains alienated from it, making it an elitist endeavor. However, it is not without impact. For instance, Gold Coast was renamed Ghana, after the famous Ghana Empire (800-1200 ACE), in defiance of colonial nomenclature, and French Sudan was renamed Mali after the Mali Empire (1200-1500 ACE).

As opposed to the Orientalist-Semitist paradigm which contended the NHA is outside of Africa, the Pan-Africanism construct of the NHA not only includes it as part of Africa but maintains it was the "quintessence of Africa," the "concentrated expression of Africa," the symbol of "hope and pride" of Africa (Tibebu 1995:14). For Thwaite, the NHA is "the shrine enclosing the last sacred spark of African political freedom, the impregnable rock of black resistance against white invasion, a living symbol, an incarnation of African independence" (cited in Asante 1977:16-17, Tibebu 1995:14). Azikiwe saw the NHA as having a sociopolitical system that "the fathers of Africans established on this continent" (cited in Asante 1977:16). For Jomo Kenyatta (Kenyan first president from 1963-78) the NHA is the "sole remaining pride of Africans and Negros in all parts of the world (cited in Asante 1977:16)."

Pan-Africanism emerged out of the struggle against colonialism and the struggle for autonomy and liberation of the African continent. The movement succeeded in demonstrating the inadequacy of colonialist rhetoric and the self-serving nature of their accounts of African history. However, instead of destroying the methodological and theoretical foundations of colonialist theories and history, it helped to strengthen the current racial and diffusionist models. Archaeology may play an even more pivotal role in revising African history. The colonial apparatus, both outside and inside Africa,

attempted to populate the African past with examples of African backwardness, and, according to Pan-Africanism, it was largely successful. Archaeology has already played a remarkable role in discrediting the colonial myths about Africans and their past. But it will also have to deal with the well-intentioned, but highly imaginative claims of some African researchers and intellectuals. If sufficient data are collected and analyzed rigorously, archaeological findings "have the power to restrain fantasy!" (Trigger 2001). The Africa of Pan-Africanism is an arbitrary and political construct that is modern and needs to be historicized.

2.5 A Way Forward

The generations of philologists who articulated the Orientalist-Semitists Paradigm and the proponents of the Aksumite Paradigm did contribute to the region's history by publishing several manuscripts relating to the NHA's Kings, the Orthodox Monophysite Church, the ruling elite, and general interest, such as Biblical documents and texts of early Christianity. Our knowledge of the NHA's political elites and the church is extensive due to contributions from these scholars. However, the research about how wealth was extracted from farming communities to maintain the state and how the mechanisms and institutions of power functioned remains in its infancy. It is only recently that the center of research attention has shifted towards the topics of class formation, nationalism, resistance, histories of women, peasants, pastoralists, occupational minorities, and other marginalized communities, this shift chiefly owed to the contribution of Marxist scholars.

Regarding the archaeological record, little is known about non-monumental Pre-Aksumite domestic architecture. Few archaeologists have examined the domestic

architecture of Pre-Aksumite communities (Bard 1997a; Bard 1997; Bard 1997; Curtis M. and Habtemichael 2008; Curtis 2002b; Curtis 2005; Curtis 2009; Fattovich R 2000; Habtemichael 2002; Habtemichael 2004b-a; Phillipson 1996; Schmidt 2001a; Schmidt 2008b; Schmidt 2010). The absence of archaeological investigation of non-monumental domestic archaeology in both the northern Horn and the southern Arabian Peninsula makes a systematic and detailed comparative perspective of the Pre-Aksumite and South Arabian architectural traditions impossible. We certainly do not have the comparative databases necessary to distinguish South Arabian vs. Pre-Aksumite African settlement forms and patterns at the scale of the individual household, community, or region. My dissertation research at Adulis attempts to fill in this gap by focusing on household research and trying to understand the political economy of the site.

There is a consensus among proponents of the Aksumite paradigm, the Orientalist- Semitist paradigm, the Leftist, and the Pan-African paradigm that the NHA's history and context is unique. However, that sense of uniqueness is exaggerated. Though the NHA has a distinctive and robust tradition, that tradition resembles the traditions of other countries and peoples and can be fruitfully understood and compared. In the "Sudanic Belt," for example, that stretches from the Red Sea to the Atlantic Ocean, a host of empires and kingdoms have risen and fallen. The current state of knowledge about ancient Africa is unquestionably incomplete. It appears there are only a few islands of information in the study of ancient Africa (Connah 2001). Still, this is not a reason to fill in the gaps between these islands with elegant but unsupportable claims.

The acceptance of a broader regional context without reducing or essentializing ancient societies is critical. If a Pan-African theoretical perspective is to make a case for Africa's contribution, then the Sudanic Belt holds the key toward understanding ancient

African states. These researches, in turn, should not be devoid of the previous context such as the rock art early domestication studies of the continent as a whole. If sufficient archaeological data is collected and analyzed rigorously by well-informed archaeologists well aware of hegemonic traditions, perhaps it is possible to move toward an integrative approach such that a richer understanding of the landmass of Africa becomes a possibility.

If the Aksumite and Orientalist-Semitist paradigms contend that the NHA is unique and outside Africa, then the archaeological data of the NHA upon which the uniqueness is constructed can be compared with the Sudanic Belt data, or archaeological data from other places, to evaluate this thesis. However, anything less will reinforce the parochial "isms" and hegemonic paradigms, which presently inundate Africa and misinform us.

To overcome such problems and learn both about human history and social theory, archaeologists in the NHA and elsewhere need to recognize that every local society is internally varied, and that variation mostly continues beyond its borders and in reference to other locales. There are no essential qualities of societies and their members, and there is a regional and interregional dimension to what lasts locally. The material culture of rock art of continental Africa, that of the Northern Horn, and the Sudanic Belt provide us with an opportunity to understand ancient Africa, and its variation in the present, if anthropocentric and comparative methods are implemented.

The approach taken herein is first to evaluate the applicability of the Aksumite model's insistence of Adulis's peripheral/dependent relationship against the Peer-Polity's expectations of relative autonomy by assessing the class structure of Adulis from a study of its architecture.

CHAPTER 3

ENERGETICS STUDY AT ADULIS

3.1 Introduction

The goal of this chapter is to examine the architecture energetics of households and public structures at Adulis. Energetics studies is a method implemented by archaeologists to deduce labor time intensities of architecture so that ancient systems of social power, labor organization, and economic structure can be understood (Olson and Smith 2016; Abrams 1994). Applying energetics studies of value at Adulis yields information about household wealth by measuring the point of origin, quantity, and associated input labor of building materials. Understanding household wealth at Adulis is important because it is basic to a central research question of this dissertation – whether Adulis is a periphery of the Aksum dominated world economy or a center of its own.

Two scenarios are possible. If Adulis were a periphery of Aksum, the energetics data would be expected to exhibit a starkly contrastive wealth differential among households and a relatively simple social structure. Wealthy elites in Adulis would often manifest cultural alliances with Aksum (the accumulative center) and manage the flow of wealth. Moreover, the other, relatively poor producers would manifest a more local cultural tradition, creating wealth, but losing control over it to the elites. If, on the contrary, Adulis served as a center of its own, an energetics study would be expected to uncover wealth accumulation at Adulis, diverse sociocultural forms, accumulation and exchange directed by elites, a middle class managing and producing valued products and

services, and, equally important, a lower class of producers engaged in the work of production.

The merit of carrying out this analysis lies in providing new research data and analysis to the poorly understood political economy of the region. The next sections address theories, analytical frameworks, definitions, and descriptions needed to arrive at a point of departure for the subsequent empirical discussion.

3.1.2Theoretical and Analytical Frameworks

The material culture of built forms as manifest in architecture at Adulis is produced by investing physical materials (land, stones, wood, clay, water etc.) and labor (physical, *intellectual,* social, and symbolic). Working with Wolf's (1999:288) observation that the political economy of a given culture is rooted in a web of social relations, the first step is to base the analysis in an assessment of the mode of production.

In the case of Adulis, the mode of production is comprised of the means of production that include: 1) the physical raw material needed for a building 2) the relations of production, that is how labor is organized and implemented to produce architecture, and 3) an assessment of the ideological and jural structures to maintain and reproduce these productions. As discussed by Rosenswig and Cunningham (2017:9) understanding the mode of production results in a holistic and dialectically- intertwined model of political economy. Documenting and analyzing the means of production for the built forms at Adulis are accomplished in my fieldwork and is addressed in the introduction. Translating these data into production relations requires a second analytical framework. These are energetics studies and architectural communications of social position via stylistic decorations and forms.

Energetics studies translate a physical building into labor-time-material intensities to surmise social class and wealth (Abrams 1994), architectural communication theories are used to the same end to understand how households vary attributes of architecture to send a message to other people. These messages sent to other people via architectural features include messages regarding identity, status, wealth, power, or cultural values (Olson and Smith 2016). Although the original meaning of Adulis' built forms can be elusive (Diblasi, Michael 2000), they can be deciphered with extensive and meticulous study. Thus, all the built forms discussed and demonstrated at length (there are 188 figures) in this chapter, are detailed studies aimed to trace the material story of Adulis and its class structure. Unquestionably, further discussion and research will be needed in pursuit of original meanings and class relations.

The two analytical frameworks, energetics and architectural communication theory, are needed to address two distinct, albeit related, methodological problems. The first issue has to do with adequately modeling a material data related to wealth differences at Adulis. In particular, how to analytically separate class wealth differences from with-in class wealth difference, as two distinct entities (Olson and Smith 2016).

The second methodological problem that energetics and architectural communication theory can address is explaining the connections between political economy and the local cultural practice in Adulis of house building as performed by the community.

Building a house, private or public, is a community undertaking in the region, not an individual or households' role. This practice has deep ethnohistorical roots to the era of Adulis. Both the Periplus and Christian Topography refer to this practice. It is possible to archaeologically detect this labor allocation in most centrally planned ancient sites in

Eritrea, in particular with regard to how grazing land, farming land, residence building land, ceremonial sites, etc. were allocated.

Whether modern or ancient, central planning in towns and cities is enforced either by force or consensus. Enforcement by force is straight forward. If the regime disagrees with aspects of a given household project, either force is used to bring about compliance, or access to essential building resources is controlled. Central planning by consensus depends upon, and reflects, the status of an individual. It can be conceived as merit-based system, although it is not a clear cut, and it can be subjective.

With no historical documentation of the social relations of house construction from the time of Adulis, I will adopt the direct historical approach as a first approximation and consider the ways that community is drawn together to construct domestic and public structures.

Collective labor marshaled in the building of a house draws upon cultural norms associated with marriage. In Eritrea in general, and Adulis by extension, the transition from a boy/girl to a man/woman through marriage triggers an individual's right, via the family, to access collective labor, presuming the individuals are represented favorably by parents. As a pre-requisite, a young person must demonstrate worthiness to family needs by providing a necessary amount of labor, this is the first social unit in which individual labor is invested. Once the first social unit, the kin, is satisfied, in the next step the family requests access to collective labor on behalf of the young person. This entails the second social unit. The relationship of the requesting family to the other families may necessitate several requirements: that the entire family's labor can be extracted, unpaid loans be addressed, and cultural norms that the requesting family neglected enforced. Thus a

young individual must undergo the discipline to pass several demands before acquiring a house employing central planning without force.

A request for the construction of an independent house for a son/daughter (which we will call for the purposes of explanation the "requesting party") generates a ceremonial council meeting (of a village, town or region) called *Baito* (word for a kind of "town hall meeting") attended by all able families, parents and kin of a young person. The *Baito* is a democratically elected body headed by 3-7 knowledgeable, respected and experienced members assigned to resolve conflicts, allocate resources, and represent the village, town or region. When other family members approve the union, the *Baito* grants permission and schedules the construction. The *Baito* estimates the family size when requesting houses to be built. For instance, this may take the form: "a one-story building for person A, for six souls, and of building Grade (A, B or C) type." Note the size estimate for 6 people, even though the couple may have just gotten married and have no children. This observation is important to avoid confusion archaeologists might face in considering the archaeological record of larger households at sites like Adulis, whose physical size might not indicate actual habitation numbers, nor consequent access to labor. The house size allocation by the *Baito* is done by estimation of how large this particular family might be in the future.

This cultural practice of community-sanctioned house-building presents opportunities and challenges when attempting to understand it in terms of political economy. It does offer an opportunity to detect social class more easily. For example, consider how generally all community members have an obligation to contribute to a king, court or church, for instance, but mid-tier classes typically do not have a duty to contribute to commoners (an exception being when a commoner collects for non-

obligatory labor performed). In this way the reduction of labor as it moves from upper to middle to lower class members of a society serves as a marker traceable via house-building.

The *Baito* also offers an opportunity to estimate the population of Adulis based on the amount of labor spent in building public built forms (such as ceremonial centers, court houses, the king's residence, etc.) that require the participation of all members. At Adulis the archaeological data shows three clear class distinctions based on the grade of the building and its energetics. Distinguishing between the upper commoner and the lower middle class does present a challenge. The archaeological data at Adulis does not show distinctly whether a lower class household had much support from the middle class as the direct return of its labor investment or if it is its class allocation.

3.2 Method

The procedural steps for gridding the Adulis site in absolute and relative coordinates, the type of masonry identified at the site, and the method for constructing the site in three dimensional space are addressed below.

3.2.1 Gridding Adulis

The site is divided into quadrants of 111.32 m x 111.32 m. This division is needed to move between absolute coordinates (latitude and longitude) to relative site coordinates, or quads, which I named A0, A7, C8, etc. Traditionally, a degree of latitude and longitude in this part of the world is 11.32 km long; it is an estimate used by many researchers. Instead of measuring in degrees and minutes, doing so in decimal degrees makes it

possible to move between absolute coordinates and relative site coordinates (quads). A third decimal degree is needed to obtain absolute coordinates for 111.32 m long and 111.32 m wide quads.

The blue lines in Figure 3 represent latitude whereas the pink lines are longitude. The view is a perspective from the SW corner where North is up and East is right. The alphanumeric names were given to the quads while still having the absolute coordinates available. While these steps might seem unnecessary for the purposes of this research, their use is more apparent if more work is needed on the site, for instance, for conserving a given building or for further research. It enables a researcher or conservationist to navigate the site easily. The building footprint was plotted based primarily on my research of the site. Additional data from previous excavations was added when available.

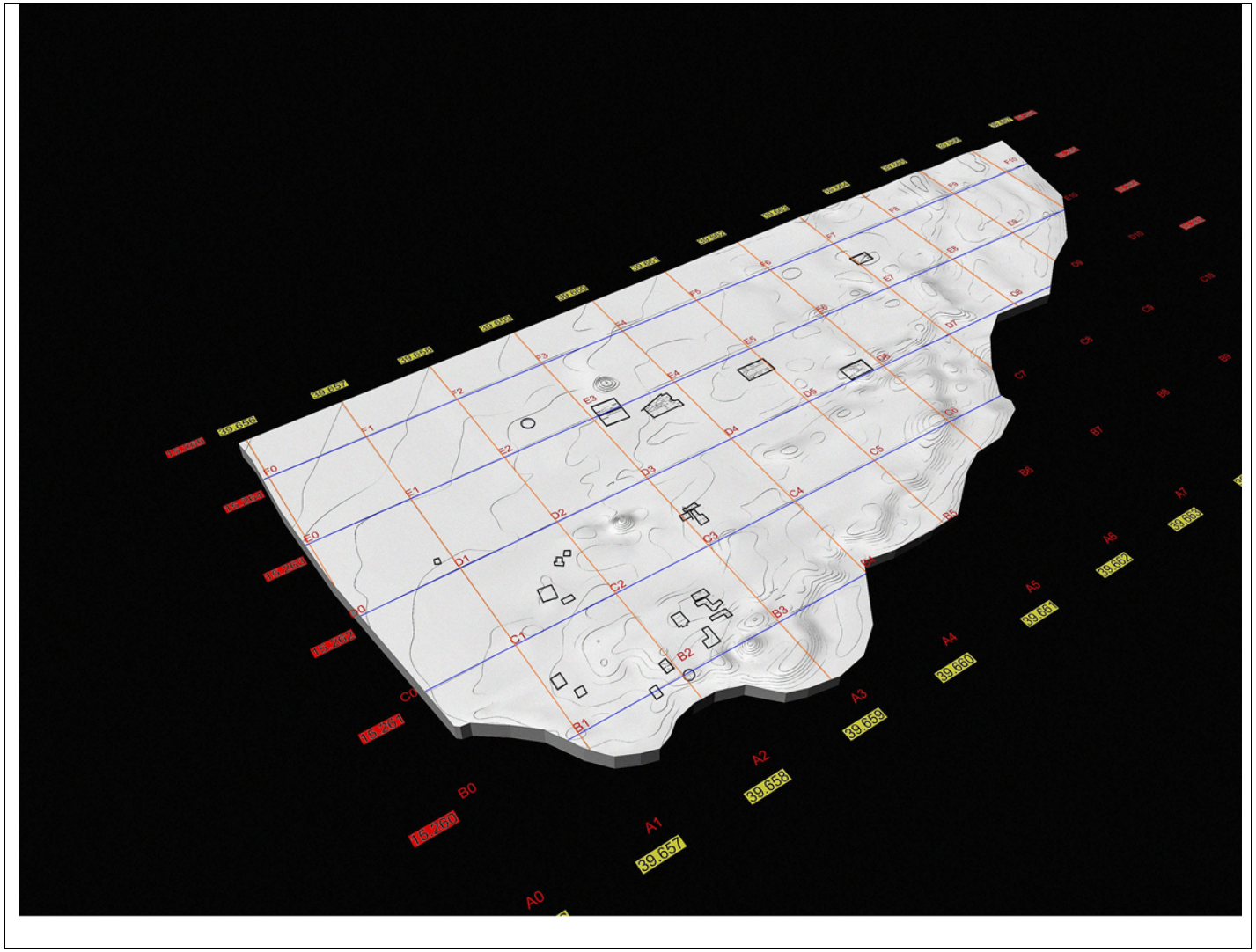

Figure 3 Adulis site gridding with relative and absolute coordinates

3.2.2 Types of Rocks

Two types of stones dominate the architecture at Adulis. These are black vesicular basalt (frothy texture) (see Figure 4) and mica schist. These two are locally available, the basalt within a 4km radius and the mica schist within 10 km radius to the site. Basalt is common extrusive igneous rock while mica schist is metamorphic rock (see Figure 5).

The basalt stones are available in two forms in the architecture; angular unshaped blocks in much of the wall while shaped blocks, in some instances very polished, were used for column drums and capitals. The mica schist is useful in making slabs that can be used to make string courses to keep rubble-building level or even can be used for roofing. During the fieldwork, we were able to identify the probable source of mica schist 10 km north at Gedem massif, it is also available 14 km to the south of the site.

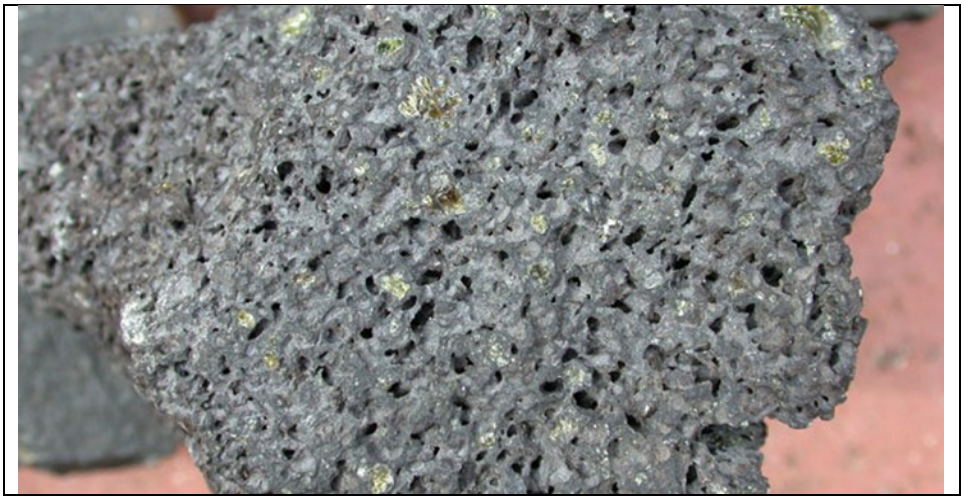

Figure 4 Predominant type of rock at Adulis' built form- Vesicular basalt.

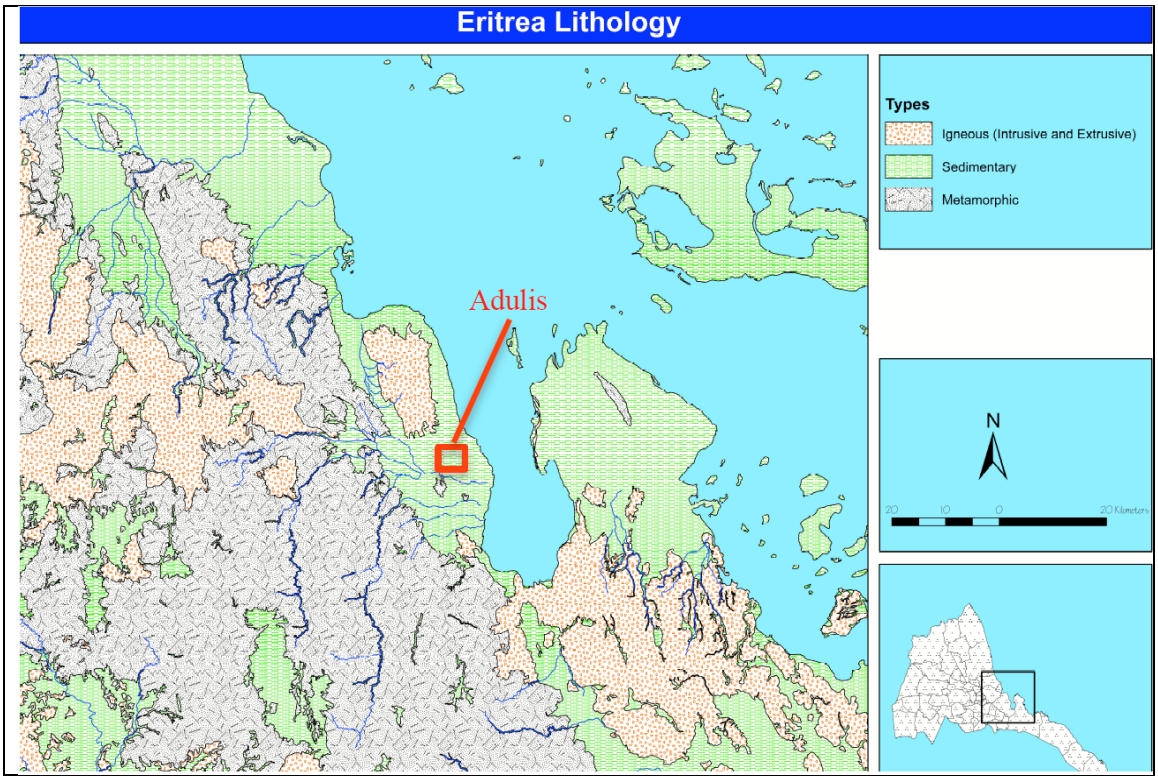

Figure 5 Source of building rocks around Adulis

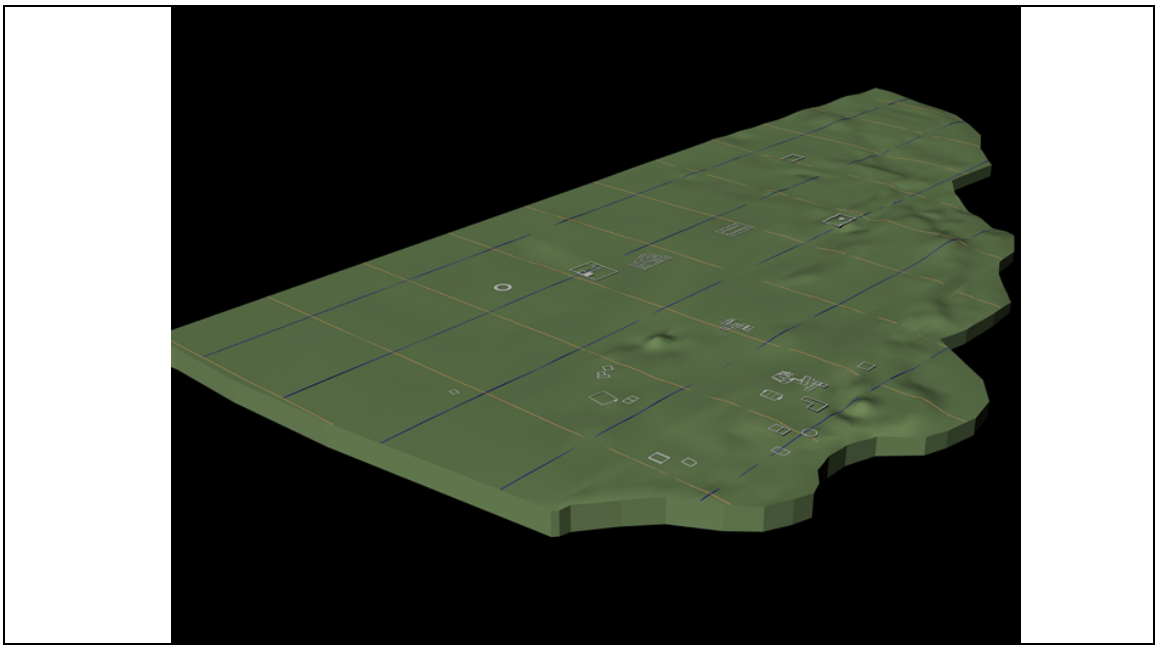

Figure 6 Building footprints at Adulis analyzed in this chapter

3.2.3 Construction Method

The method of construction at Adulis is a unique type called Graduated Masonry. Graduated Masonry is a type wall construction in which walls are built in courses, each course being 0.5 meters in height (or one cubit = the length of an arm elbow to the tip of a finger), stacked one on the other until reaching the desired height of the building.

Moreover, as each new course is added its external face is offset by 0.05 m (or the size of a hand palm) from the face of the lower course. The result is a stepped facade on the external face of the structure, but a smooth facade for the internal face (see Figure 7). For every course there are layers of mica schist slabs at the bottom and top to stabilize the basalt rock building (see Figure 8).

Figure 7 Graduated Masonry model, front view Temple A

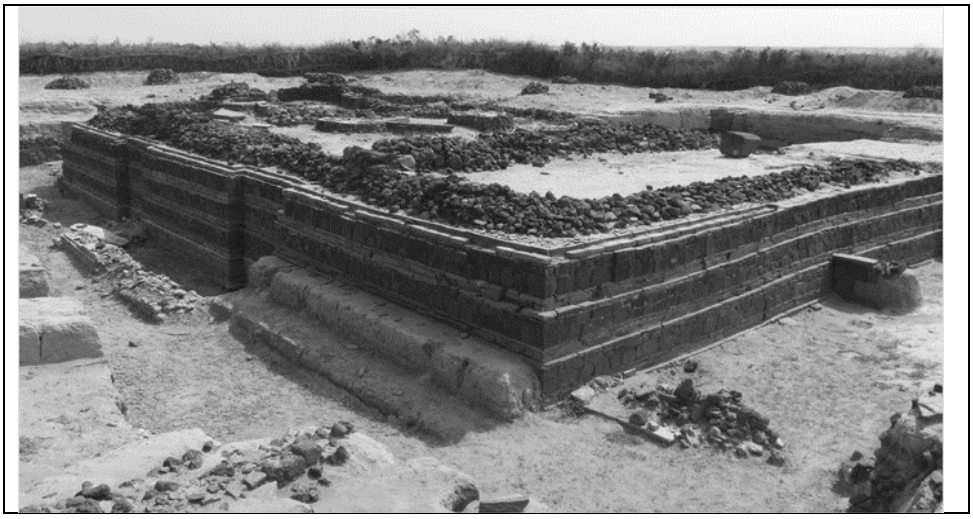

Figure 8 Graduated Masonry at Adulis Temple A

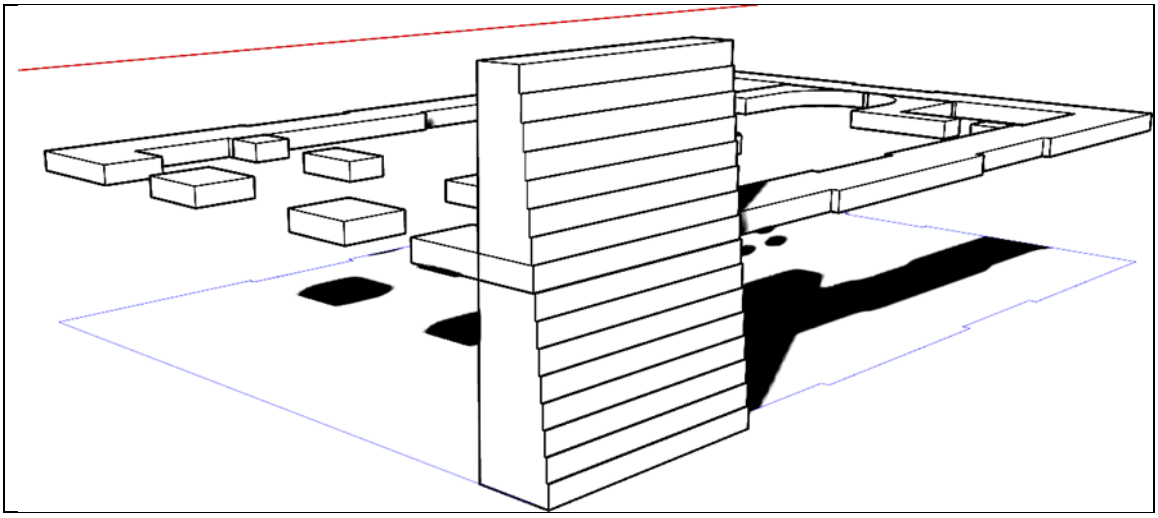

Figure 9 Illustration of Graduated Masonry side view Temple A.
Note the thickness of the wall decreases from ground upwards.

3.2.4 Types of Masonry

There are three grades or styles within the Graduated Masonry that can be detected in the built forms at Adulis. These are grade A, grade B and grade C. Grade A walls have the greatest variety of construction material and require the most labor, some of which may have been skilled labor. Grade C walls have the least amount of construction materials diversity and require the least labor. Grade B walls fall in between Grades A and C for quantity and quality of construction material and the amount of labor needed for their construction. Identifying these grades of walls and conducting an energetics study of these grades are necessary to assess the value and status of a given built form.

3.2.4.1 Grade A Wall.

Grade A wall type is constructed by first layering schist slabs at the bottom up to about 0.01 m. Then porous basalt stones, in the shape of a human head on the top, and at the bottom, are layered for about 0.30 m, to be fastened by another 0.01 m layer of schist slabs (see Figure 10). This type of masonry progresses in half meter course walls that moves horizontal to the plan of the building. Grade A wall type is associated with elite construction or buildings of high importance to the public. It is both labor-intensive and material intensive compared to the other two grades, i.e., Grade B and Grade C wall types.

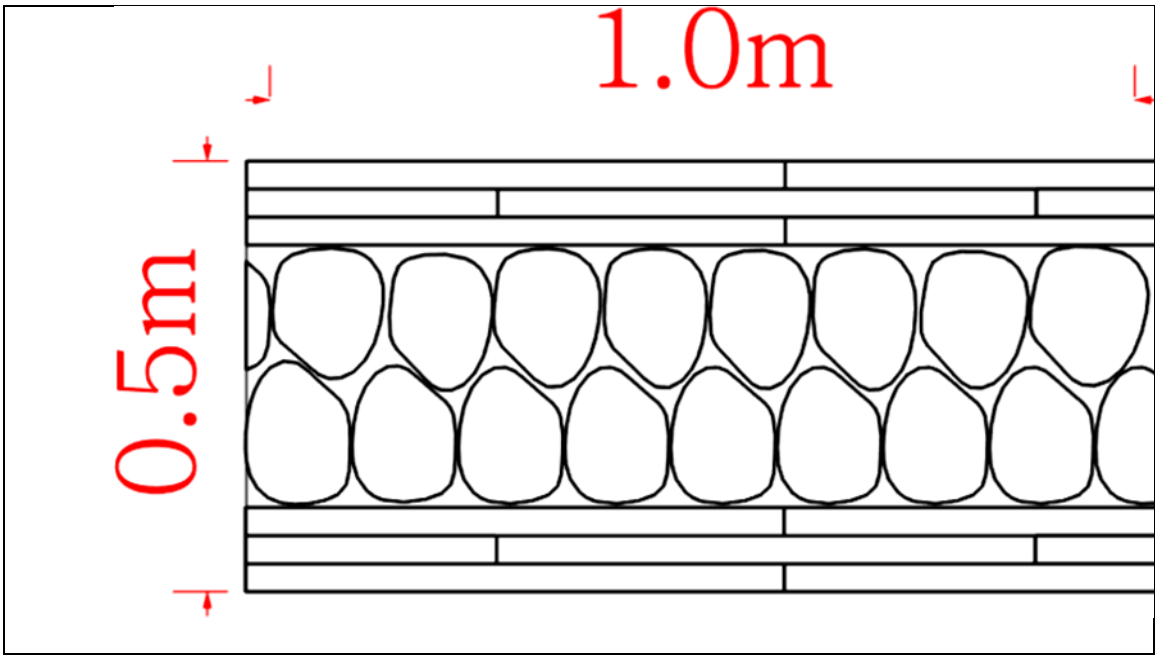

Figure 10 Grade A type of Graduated Masonry

3.2.4.2 Grade B Wall.

Grade B wall type is built similar to Grade A walk type, with regard to its course construction, and the layer of mica schist slabs holding the unshaped basalt stones in place. However, the stones between the upper and lower schist slabs are not as meticulously fitted and curved as with Grade A wall type. Grade B wall type is associated with a middle-status building.

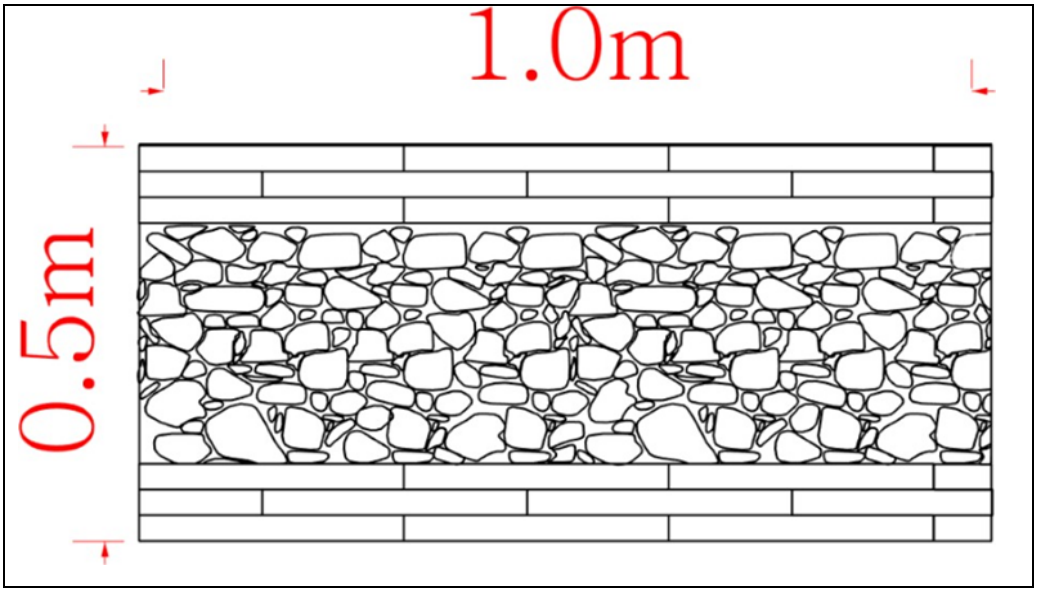

Figure 11 Grade B type of Graduated Masonry

3.2.4.3 Grade C Wall.

Grade C wall type lacks the two slab layers of mica schist that Grade A and B wall type may have, and in some instances, it is omitted altogether. Commonly, Grade C wall type has one layer of schist slabs on the bottom and one at the top. The stones in between slabs are less refined, and frequently rubble. Grade C wall type is associated with a lower status building, because it lacks the external refinement that Grade A wall

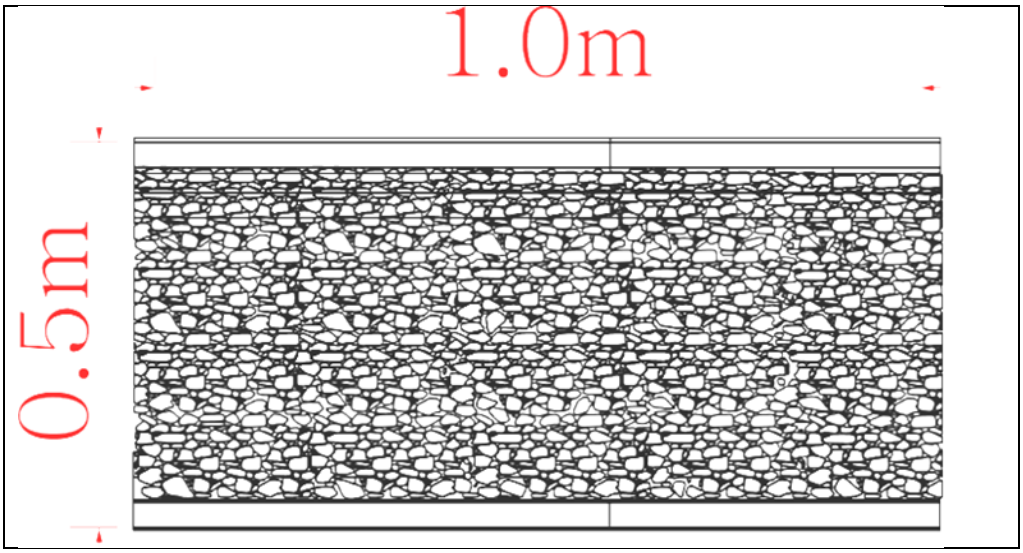

Figure 12 Grade C type of Graduated Masonry

type and to some extent, Grade B wall type brings forth. Moreover, it is less labor intensive, can be created with unskilled labor and less material exhaustive compared to the other two.

3.3 Reconstruction Method

As noted above, the built forms at Adulis used Graduated Masonry. This type of masonry creates walls by stacking courses of offset stone 0.5 m up, offsetting the external facade by 0.05 m toward the inside but keeping the inside facade flush with the other walls. Determining the volume of these Graduated Masonry walls is a complex task which I addressed by using the Rhino 3D drawing program and its Grasshopper add-on. Due to this course structure, each wall has its unique volume, these volumes need to be calculated separately and then added together to arrive at the estimate of the energetics of the structure.

These representations are abstract mathematical models based on the profile plan retrieved by measuring the dimensions of built forms at Adulis that have left some material trace; others have gone for good after excavations but are available from excavation reports. Figures 13-15 exemplify the process used to estimate the volume of construction material at Adulis. Figure 13 is a plan of a sample structure with Graduated Masonry walls on four sides.

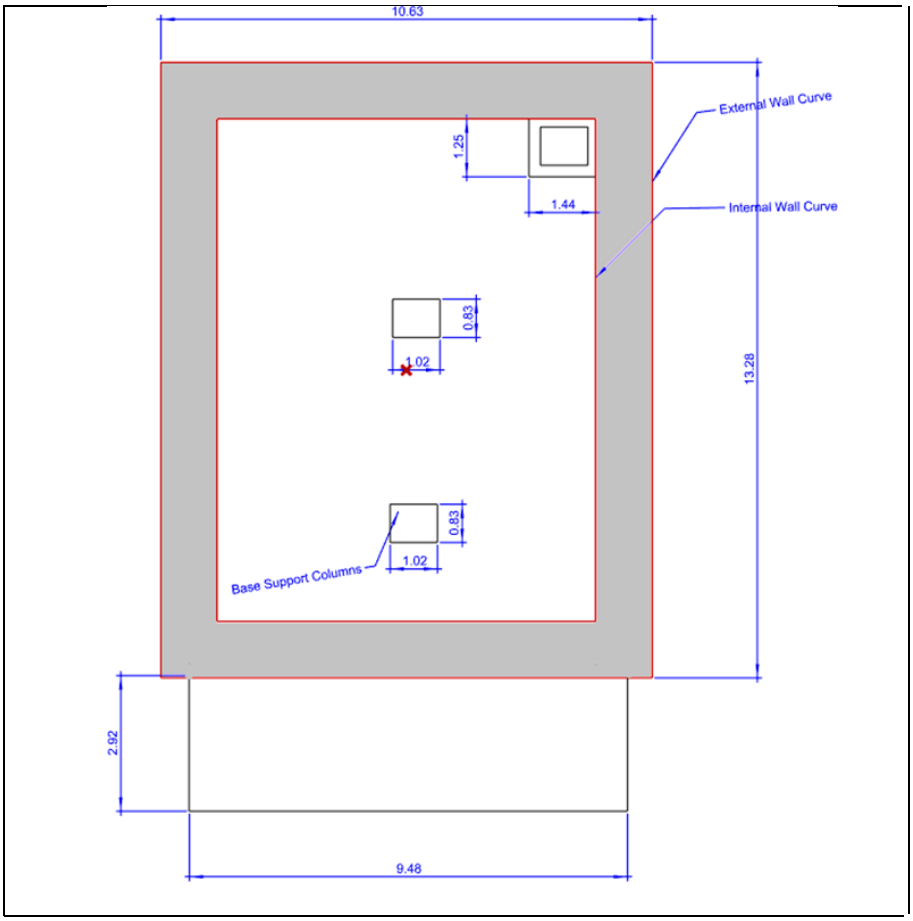

Figure 13 Base lines of built form
. Note the associated dimensions at the center, and one base floor entry door located at the upper- right corner.

The walls are outlined with red lines and the wall itself indicated by the gray area. There are two column bases outlined in blue with associated dimensions at the center, and one base floor entry door located at the upper right corner.

Step 1-Getting the base wall lines of the built form.

The first step is to identify the external wall and internal wall base lines of each wall course (the red lines of in Figure 13). Then calculating the area difference between these two lines gives the surface area (the grey area in Figure 13), 52.39 $m^{2.}$

Step 2- Extruding and Volume Calculation

The previous surface area calculated in step-1 is a starting point for this step. The surface area is 52.39 m^2 is extruded 0.5 m along the Z-axis and the volume is calculated. The volume of the first wall course, wall-1 is 26.19 m^3 (see Figure 14).

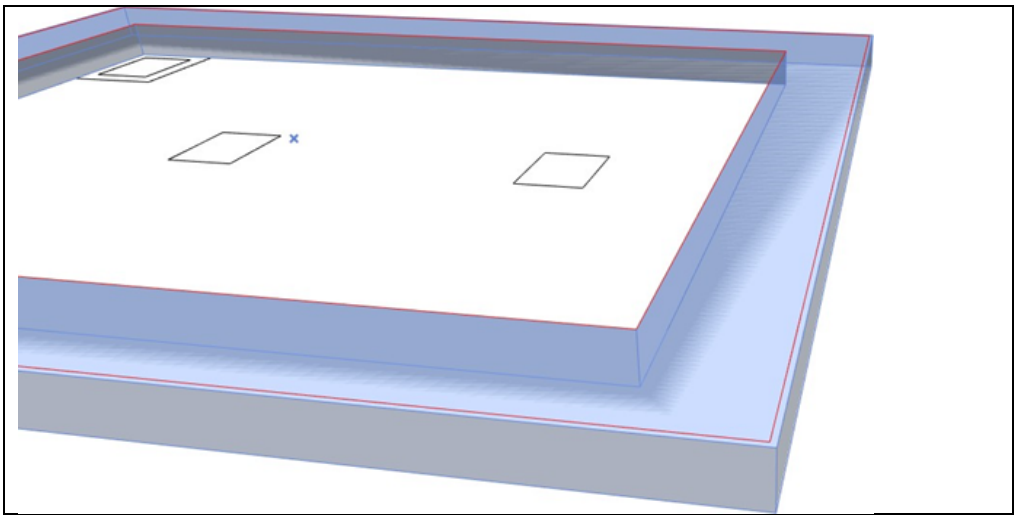

Figure 14 Volume calculation of wall course by extruding surface area

Step 3- Getting Volume of the Second and Third Wall Courses

In this step, the original wall lines are moved 0.5 m in the Z-axis. Then the external wall line is offset by 0.05 (the size of hand palm) to get the second wall's outer

line. The internal line is kept as is. Steps one and two are repeated to get the volume of the subsequent walls. The volume of wall-2, for instance, is 25.0 m3. All walls are numbered 1 to nth, the first wall being the base wall, i.e., the lower wall (see Figure 17). Graduated Masonry decreases in volume as it goes from the bottom up, and vice-versa (see Figure 9, Figure 15). To keep track of all the lines, surfaces, and solids of all building components, a Grasshopper 3D definition was written to assist in the process. Grasshopper 3D is a node-based visual programming tool for the Rhino 3D computer-aided design software.

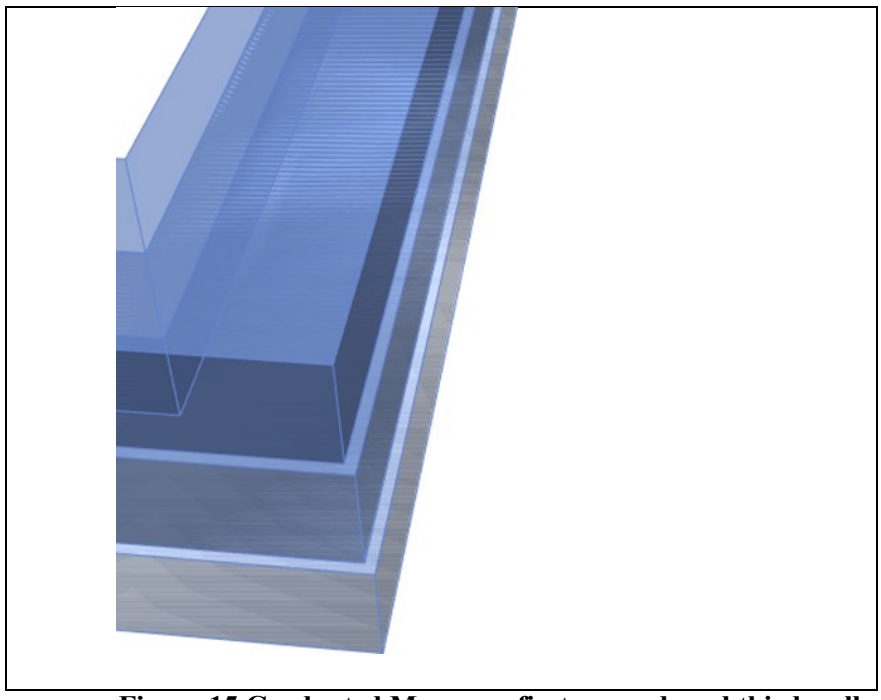

Figure 15 Graduated Masonry, first, second, and third wall courses

Whereas Rhino 3D is used for the visual aspect, the Grasshopper 3D add-on adequately provides the analytical (parametric) and preservation side of this research. With regard to the analytical side of the research, Graduated Masonry can be quite a challenge in both reconstruction and volumetric analysis. The Grasshopper software

contributes in wielding inductive reasoning in the reconstruction of the built forms at Adulis. For instance, the wall base lines can constructively be assigned to move up about 0.5 m (the size of a cubit), then offset the external wall line by 0.05 (the size of palm) toward the center, while keeping the internal wall straight mathematically. Next, these abstract mathematical definitions can be illustrated in Rhino 3D to match the material evidence at Adulis from which these mathematical definitions are abstracted.

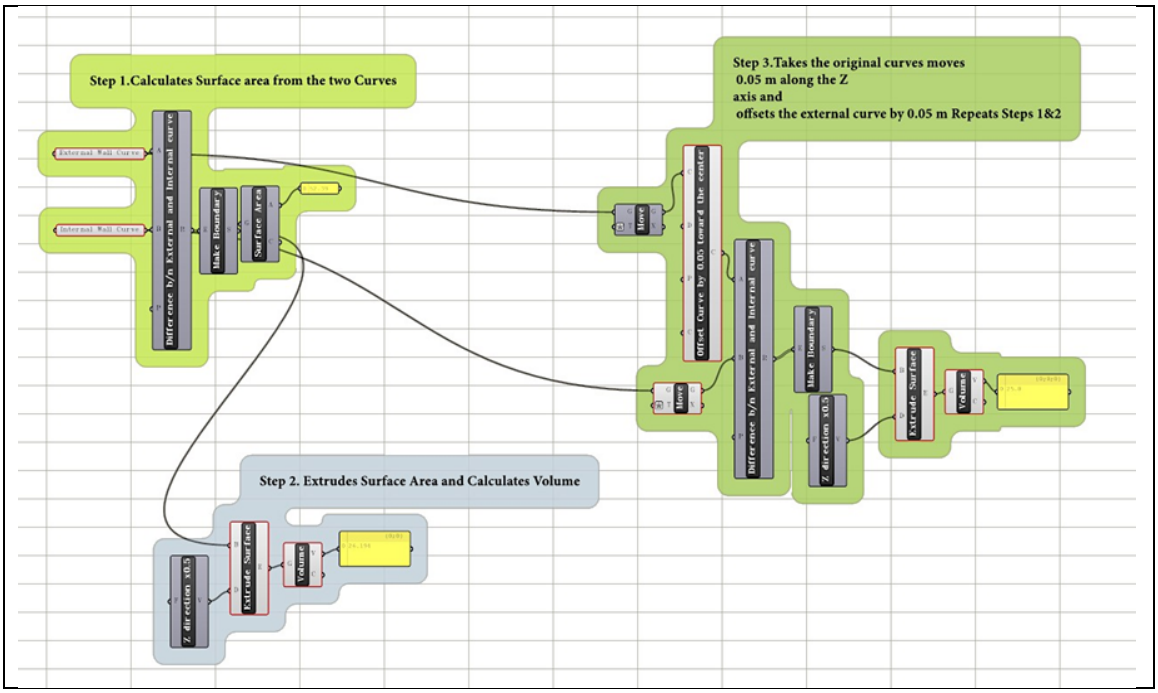

Figure 16 Grasshopper definition to calculate volume of Graduated Masonry

The combination of these two, yields courses of Graduated Masonry not only correct dimensions, but also the correct volume for further energetics analysis. Then these abstract lines and field observation are coded to create 3D graphics in Rhino to match what is observed at Adulis. For instance, Figure 17 illustrates built from 1. Each course of Graduated Masonry is given a designation Wall 1 for the lowest, Wall 2 and Wall 3, etc.

while stairs are named in a similar way. The volume estimates for structure 1 are found in Table 1.

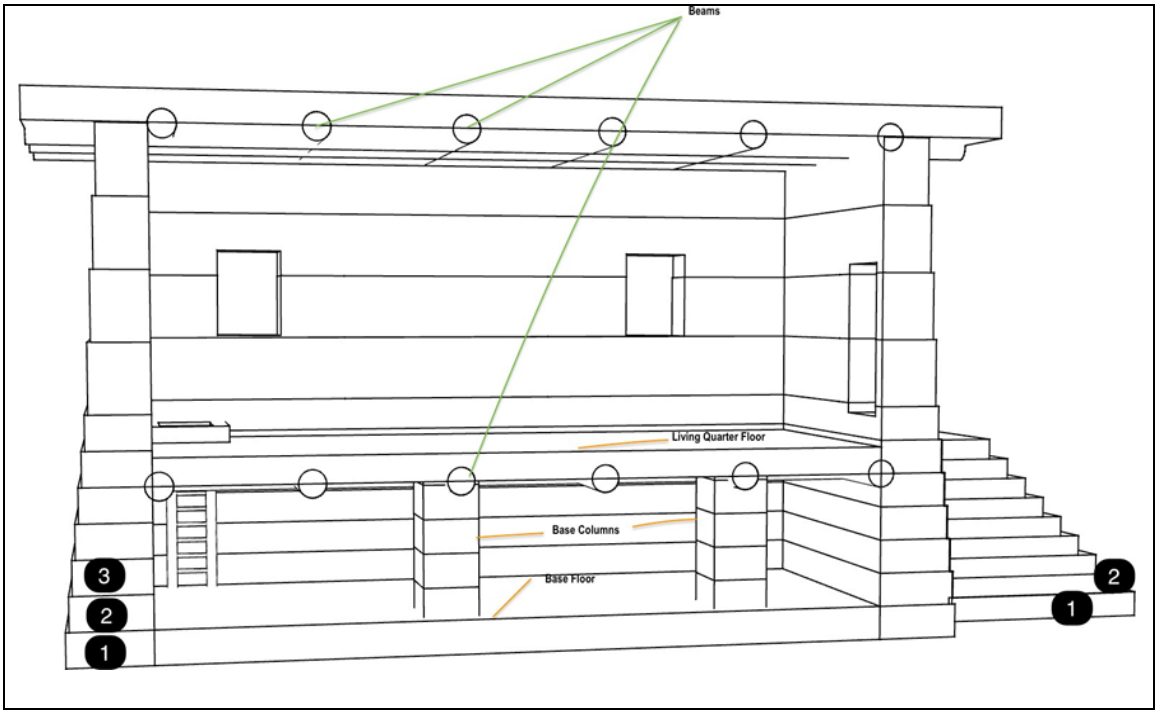

Figure 17 Wall courses numeration, building components naming method

Walls	**Volume in Cubic Meters**	
Wall 1	26.2	
Wall 2	25	
Wall 3	23.82	
Wall 4	22.65	
Wall 5	21.49	
Wall 6	20.34	
Wall 7	19.03	
Wall 8	35.08	
Wall 9	28.8	
Wall 10	29.99	
Wall 11	29.47	
Total	281.87	**281.87**
Stairs		
Stair 1	8.26	
Stair 2	7.12	
Stair 3	5.98	
Stair 4	4.89	
Stair 5	3.98	
Stair 6	3.1	
Stair 7	2.34	
Stair 8	1.68	
Stair 9	1.09	
Total	38.44	**38.44**
Basement Columns		
Column 1	1.86	
Column 2	1.86	
Total	3.72	**3.72**
Floors		
Base Floor	44.39	
Living Quarter Floor	35.17	
Roof Floor	52.88	
Total	132.44	**132.44**
Beams		
Base East-West	7.43	
Base North-South	9.14	
Roof East-West	9.23	
Roof North-South	10.89	
Total	36.69	**36.69**
Basement		
Entry door	0.29	
Ladder	0.9	
Cross	0.1	
Total	1.29	**1.29**
	Grand Total	**494.45**

Table 1 Volumetric data of built form 1

3.4 Description, and Volumetric Data

This section describes built forms. Volumetric data is extracted for further energetics analysis. It starts with a description of a public building, then it moves to the circular building and finally the rectangular buildings at Adulis.

Each built form is described from the ground up based primarily on my fieldwork at Adulis supplemented by previous excavation notes, ethnographic research that I conducted, and textual and ethnohistorical data in the region. All these lines of evidence are calibrated conservatively to produce a tangible 3D model so that its volumetric data can be surmised. Then, based on factors such as the type of wall grade, floor material, earthworks, and roof, experimental data is associated to translate this volumetric data into labor time intensity. This information helps unravel evidence of a hierarchy of built forms. By reflecting differing amounts of labor time intensity, the hierarchy serves as an indicator directly related to a prime research question, i.e., whether Adulis is was a proxy of Aksum or a center of its own.

Admittedly, the images created by 3d modeling are only as good as the data that go into them. And the data is of various qualities from a model to model. This dissertation is in no way the last word on reconstructing the look and feel of ancient Adulis. Undeniably, there are numerous built forms still buried at Adulis as discussed in previous work (Habtemichael 2004b). When these built forms are excavated in the future we might have comprehensive look and feel of Adulis. The 3D models in this dissertation are rather the best models that can be made during this time. And as such are used to provoke an insight and stimulate new lines of research.

3.5 Public Buildings at Adulis

Four built forms at Adulis can be considered as public; these include a Court House and three building for religious functions, later adopted into Christianity as churches. These are Temple A, Temple B, and Temple C (see Figure 18).

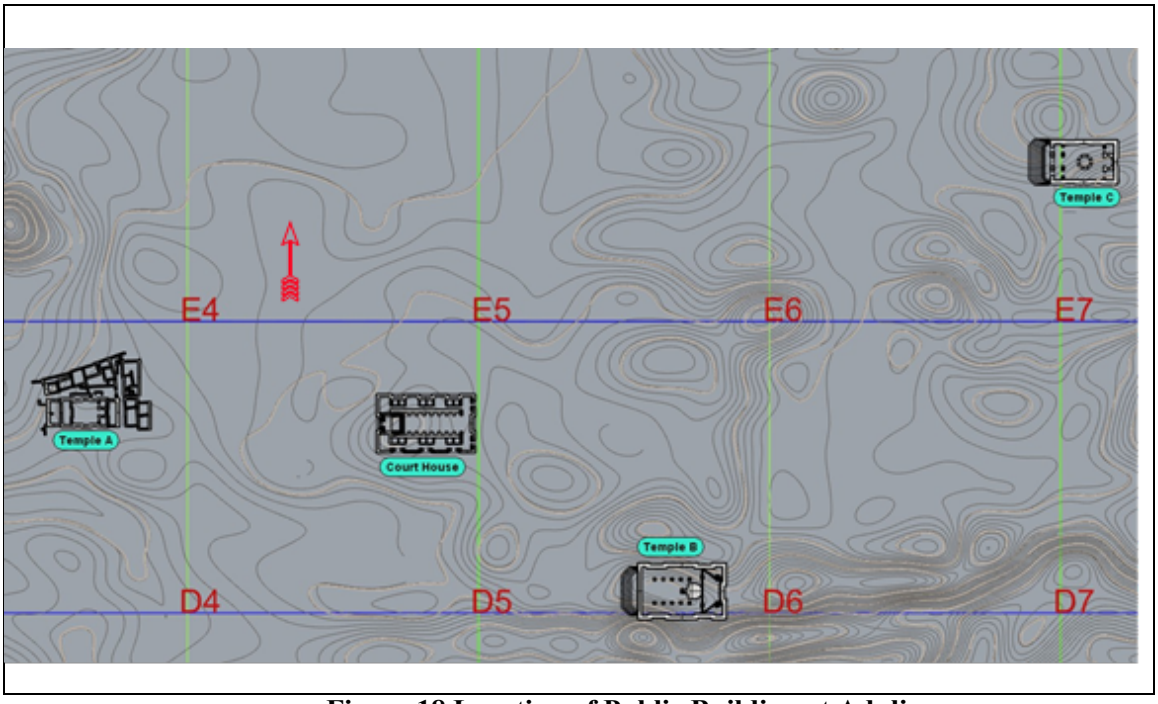

Figure 18 Location of Public Building at Adulis:
From left to right Temple A, Court House, Temple B, and Temple C

3.5.1 Court House

Court House is located in quad D4 in the site map (see Fig III-16). It is a rectangular multi-story building 38 m long and 22.5 m wide. It was initially excavated by Sundström in 1907in a mission organized by Princeton University. Sundström points out he was forced by the colonial administration in power not to excavate more; he left a brief report and floor plan of this excavation. Figure 19 is an improved version of the

floor plan, and incorporated information from both Sundström's excavation report and my fieldwork at Adulis.

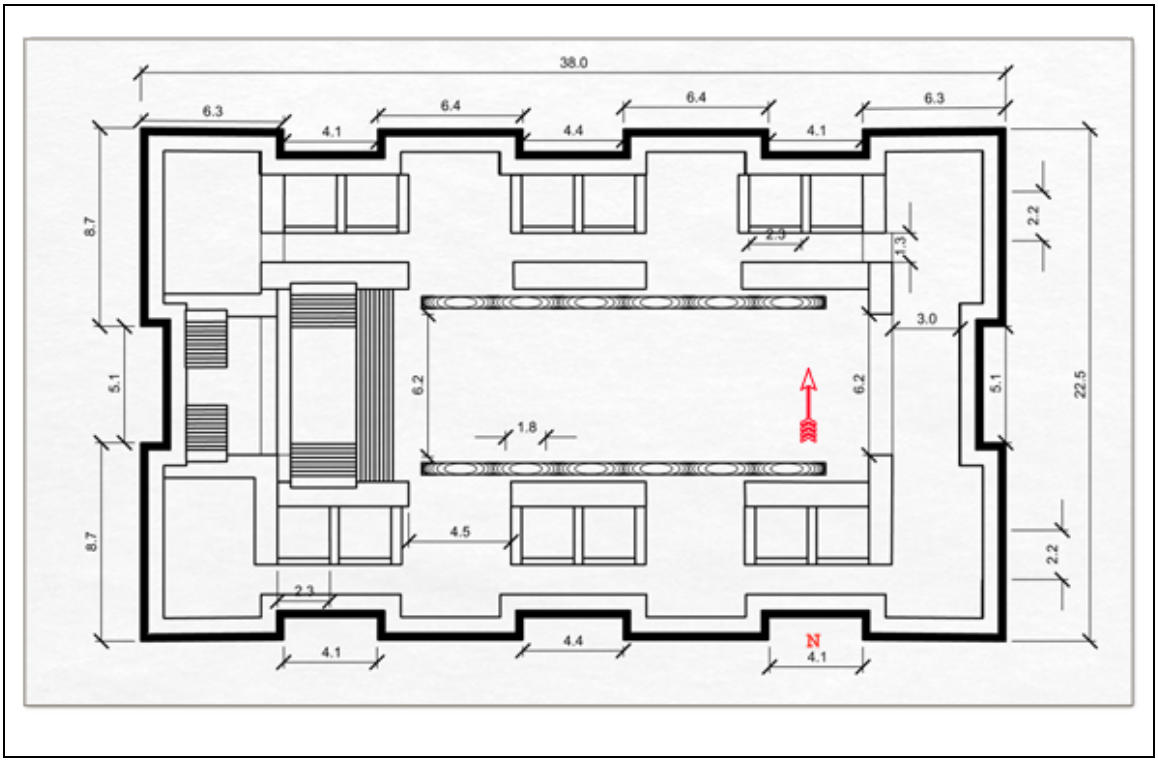

Figure 19 Floor Plan of Court House with respective dimensions

It is important to point out that this building was layered with two layers of tiles cut out of stone. The first layer of tiles were square tiles of 0.26m x 0.26m while the upper ones were rectangular 0.26m x 0.12m (Sundström 1907:179)

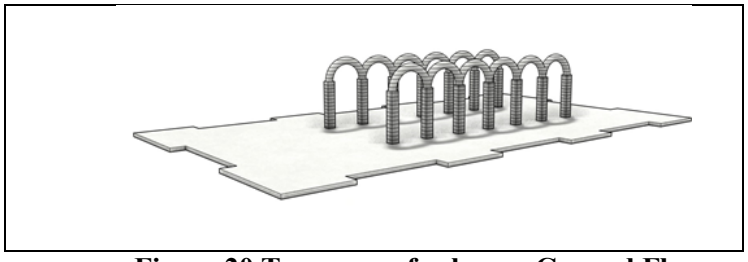

Figure 20 Two rows of columns Ground Floor

In my field research at Adulis, we were not able to confirm this claim. Recently though Zazzaro (2013:32) was able to point out that these tiles are housed in the Museum of Ethnography in Stockholm. The digital archives list catalog 1907.59.0001 floor tiles from the Adulis and catalog 1907.59.0002 various pieces of glass, bronze and other materials. While Adulis has been mined for coins, swords, ivory, and any artifact deemed valuable by foreign visitors, it is hard to imagine a pavement floor for a building of size 38 by 22.5 m being scrapped and transported to Europe.

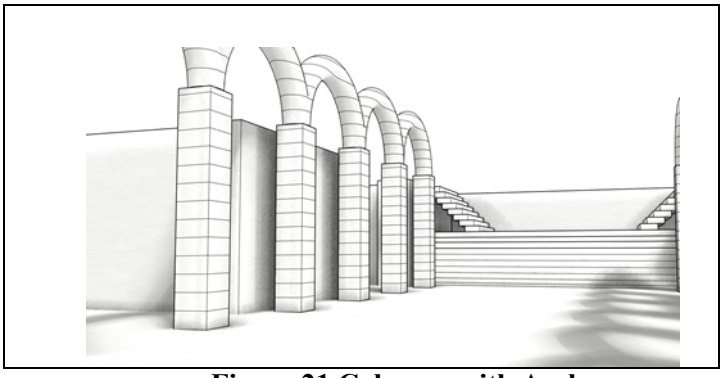

Figure 21 Columns with Arches

In addition to these stated cut stone pavement pieces, there are two rows of seven columns each most likely joined by arches (see Figure 20 and 21) as can be deduced from the material culture at the site. The columns were carved out of porous basalt and their sides grooved mostly for plastering decorative flat marble or alabaster.

Then on the western side of the building, we observed another set of stairs fallen through the roof that connected to floor 1. Given these discoveries, I was able to reconstruct the second floor as well. The details of the first and second floors are strictly constructed based on the load-bearing central walls on the first floor, which are quite thick.

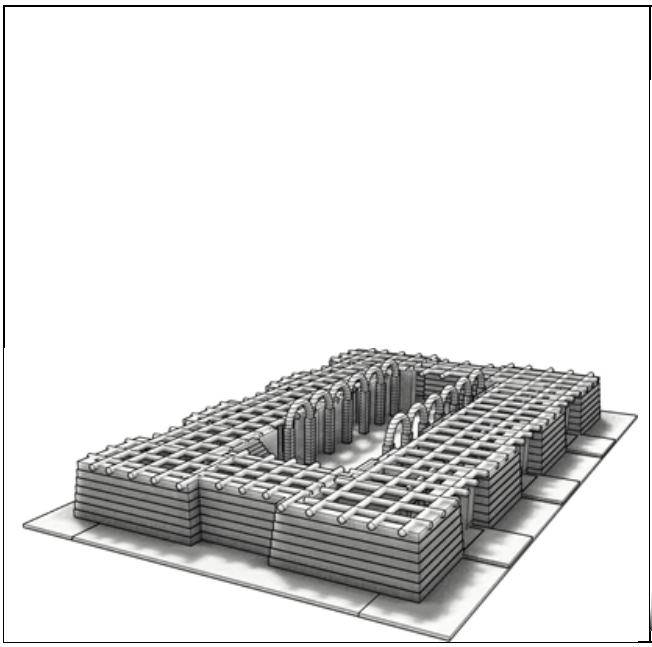

Figure 22 Ground Floor roof

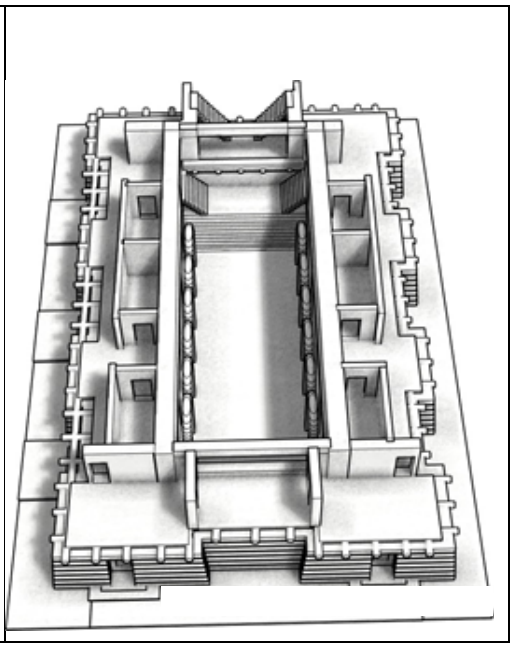

Figure 23 Floor 1 layout and running stairs

The outside walls, built in the Graduated Masonry style, taper space on the first floor, and more on the second floor, physically limiting the availability of usable living space close to the load-bearing interior walls. Windows run on all sides. The type of windows suggested in this building are based on the material culture on the site and in-depth ethnographic accounts. The second floor starts 7 m from the foundation and goes for 3.5 m, the same height as first floor wall.

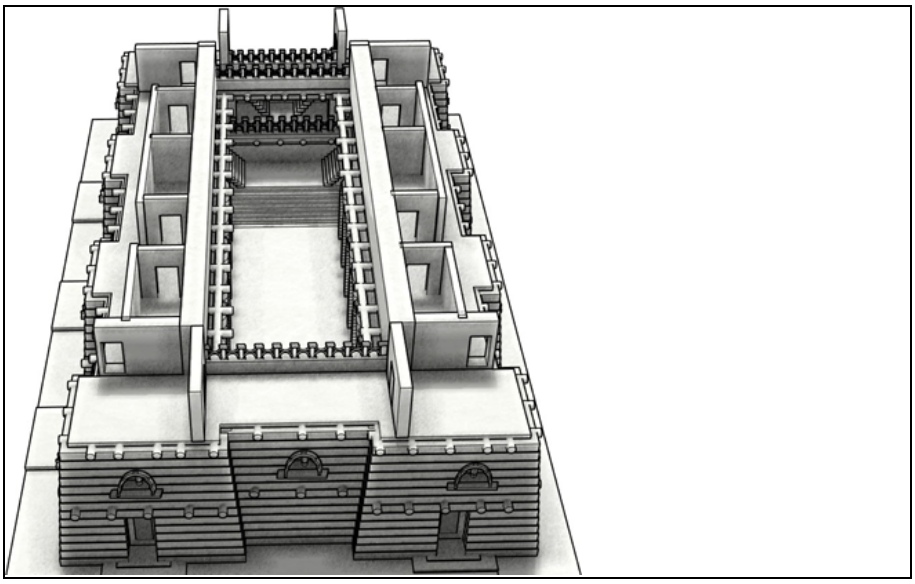

Figure 24 Second Floor Rooms and Arches a View from East

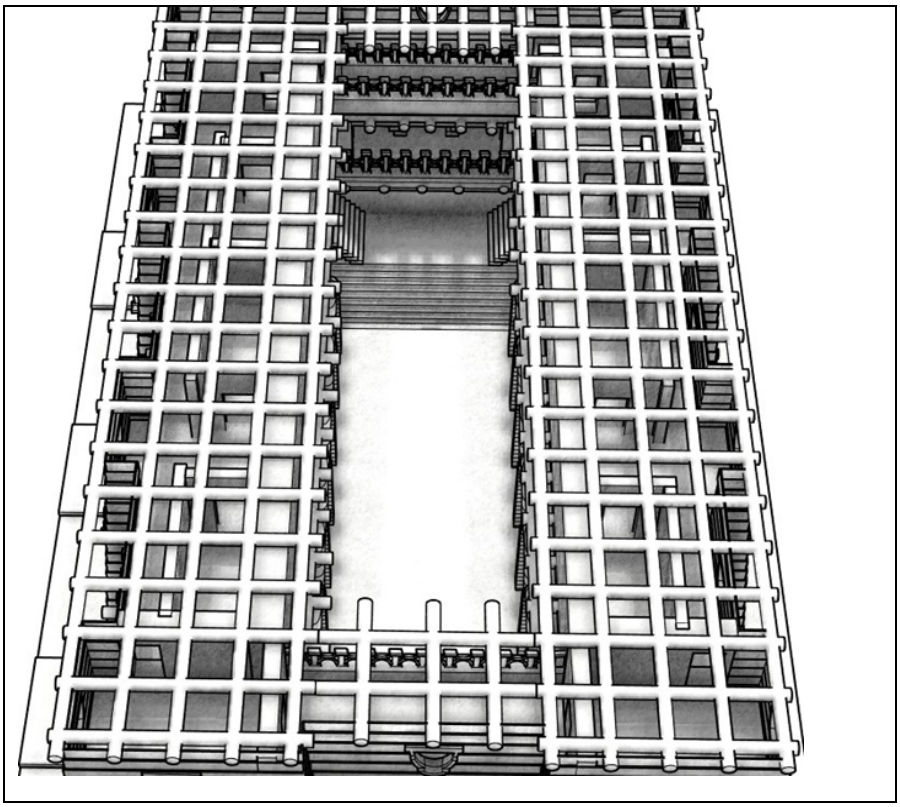

Figure 25 Second Floor layout and Roof beams

At 10.5 m the roof of the building is mounted. The built form of the court could assume many stories more than I was able to reconstruct. For instance, for a comparable building, the German Dutch Axum expedition (Littmann et al 1913) reconstructed the Taeka Mariam to several meters high (see Appendix B) with less evidence than that at Adulis. There is no material to warrant such reconstruction except artistic preference.

There are slightly larger rooms both on the east and west side of the building compared to the small rooms in the center. There is no clear evidence as to the function of the rooms although based on the textual evidence from the *Periplus,* Monumentum Adulitanum it might have served as an office for representatives of different communities. The court in this part of the world is an administrative and deliberative

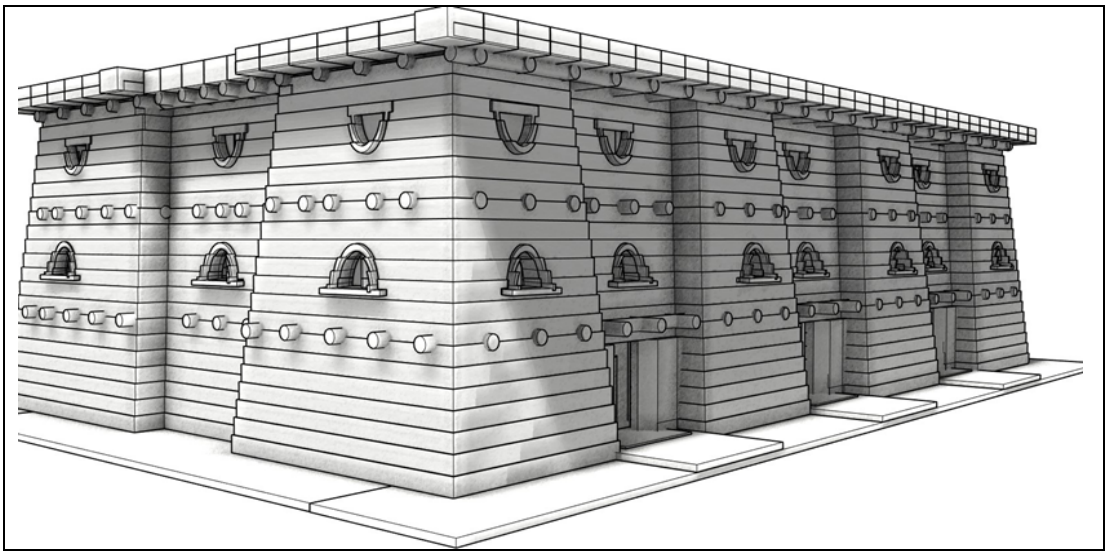

Figure 26 Court Built Form South West Perspective view

body that consults with the king. Thus it is safe to assume this building may have served as either a permanent office of representatives or as a temporary office when in session.

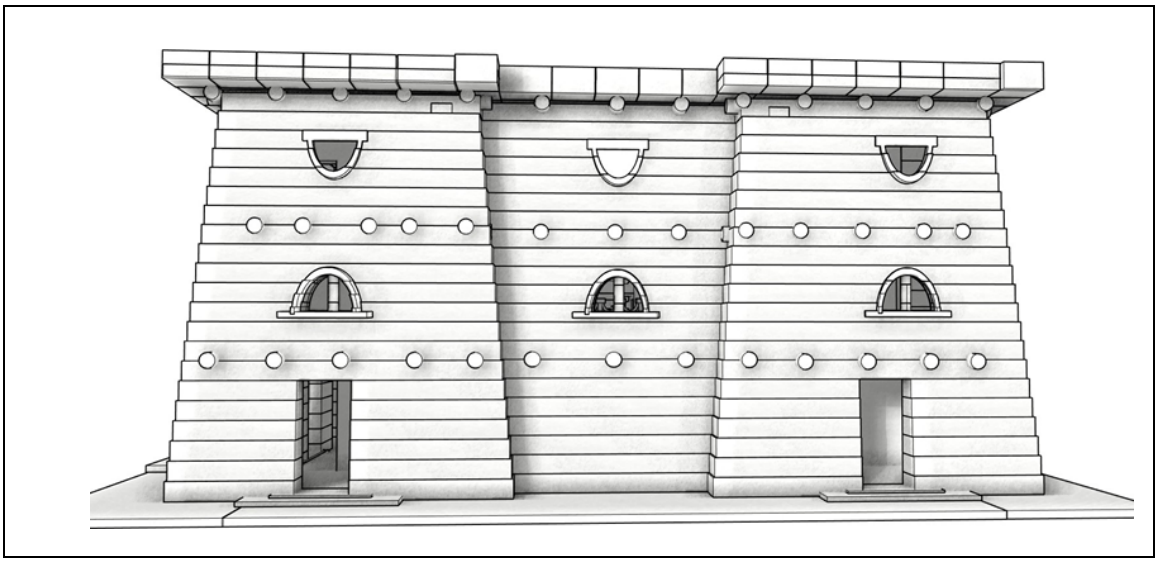

Figure 27 Court Built Form Eastern View

The Monumentum Adulitanum II (MA-II) or as commonly known Adulis Throne is a marble throne cut out from one block of marble that stood at the gate of Adulis (Wolska-Conus,W. 1968-73).MA-II provides the most comprehensive document available so far to list all the ethnicities that were made into tribute-paying communities to Adulis and its king.

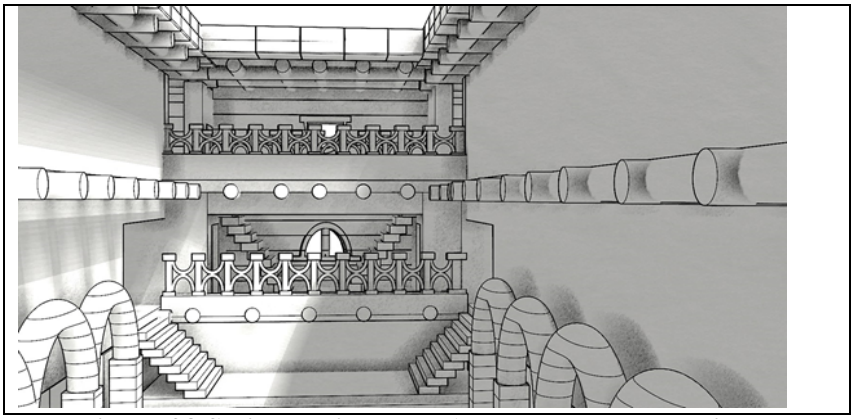

Figure 28 Stairs Podium and Arches, Internal detail

These tribute-paying polities include the regions of Aksum, and other areas. MA-II makes it possible to see if there is a match between the number ethnicities it mentions and the number of rooms. There are 23 polities/ethnicities in MA-II. The match for the 12 rooms per level is closest to the number of ethnicities using a 1 to 2 ratio of rooms to ethnicities. Thus two individuals may have served in a representative office per locale.

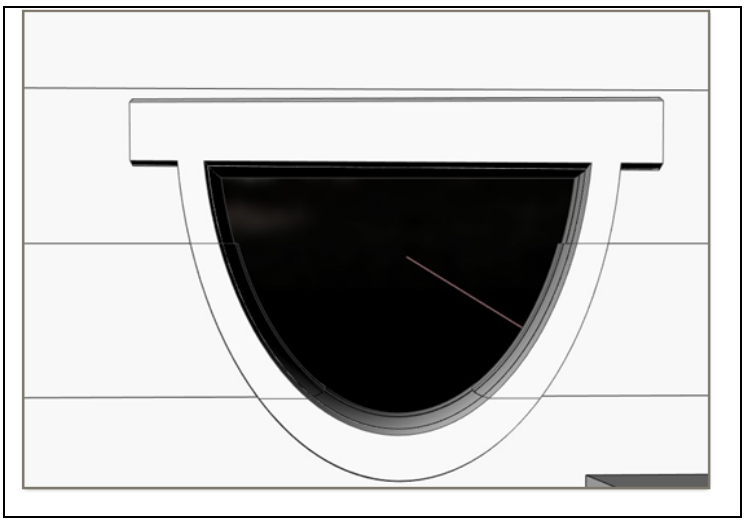

Figure 29 Floor 2 windows detail

The symbolism that can be observed from the building is similar to that discussed in Chapter 5, where both the windows and the wall layout represent bowing to the ground and rising hands all the way to the sky, a religious/ ideological symbolism expressed in architecture and other media.

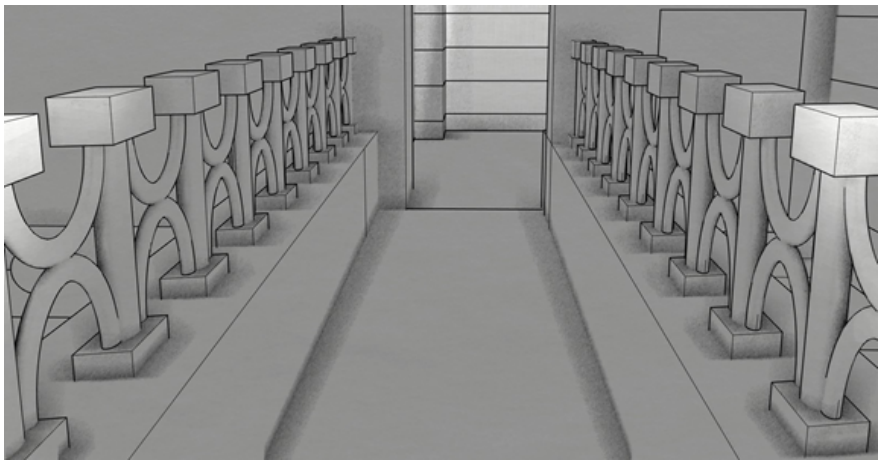

Figure 30 Corridor of Arches in Floor 2, Internal detail

There are three gates on the southern part of the building, and there are two gates on the eastern part of the building. All the doors have door recesses made of Ashlars that are 2.5 m tall. It is not clear why these Ashlar stones are needed just as you enter the door- whether these were used for defense by restricting entry or for the aesthetics of the building or both.

According to Sundström, the beams that are used in the building may be mostly cypress wood or wild olive (1907:179). The minimum number of beams to support the structure are used in this reconstruction, although more wood material may have been implemented in the actual building.

The landing after the first stairs may have been used as a podium; as well as the two balconies in Floor 1 and Floor 2.

Court House Volumetric Data

Base Walls	Volume in Cubic Meters	
Wall 1	55.11	
Wall 2	52.37	
Wall 3	49.34	
Wall 4	46.62	
Wall 5	43.73	
Wall 6	40.91	
Wall 7	43.91	
Wall 8	40.7	
Total	372.69	372.69
Floor 1 External Walls		
Wall 9	37.51	
Wall 10	33.4	
Wall 11	16.81	
Wall 12	12.21	
Wall 13	18.01	
Wall 14	21.14	
Wall 15	18.5	
Total	157.58	157.58
Floor 2 External Walls		
Wall 16	45.61	
Wall 17	42.49	
Wall 18	39.38	
Wall 19	36.28	
Wall 20	33.19	
Wall 21	30.11	
Wall 22	27.04	
Wall 23	23.99	
Total	278.09	278.09
Beams		
East West base beams	36.68	
North South base beams	34.59	
East West Floor 1 beams	38.77	
North South Floor 1 beams	46.71	
East West roof beams	39.02	
North South roof beams	45.85	
Total	241.62	241.62
Floors		
Base Floor	176.18	
Floor 1	124.23	
Floor 2	135.18	
Floor 3 South	95.91	
Floor 3 North	95.91	
Floor 3 East	11.44	
Floor 3 West	11.44	
Roof Retainers	147.22	
Total	797.51	797.51
Other components		
Internal Stairs	115.31	
External Stairs	76.41	
Internal Walls Floor 0	320.03	
Internal Rooms Walls	62.65	
Door Recesses	57.26	
Columns	13.47	
Column Archs	10.57	
Floor 1 Internal Walls	207.39	
Floor 1 Internal Rooms Walls	64.71	
Floor 2 Mid Walls	288.54	
Total	1216.34	1216.34
	GrandTotal	*3063.83*

Table 2 Volumetric data of the Court House

3.5.2 Temple B

Temple B is located at quad C5 (see Figure 18). It is 34.02 m long by 21.70 m wide on the ground floor (see Figure 31) which is 4m lower than the living quarter floor.

This built form was excavated in 1868 by British soldiers during the Napier Expedition. The Napier Expedition was a military mission by the British Empire against Emperor Tedros II over political disagreements. The invading British soldiers were stationed close to Adulis to prepare for the highland mission, and the British Museum

sent a cultural attaché, Holmes, to bring cultural material from Abyssinia. The notes and excavation reports from this expedition are housed at the British Museum (Munro-Hey 1989). This reconstruction is based on these reports and my fieldwork at Adulis.

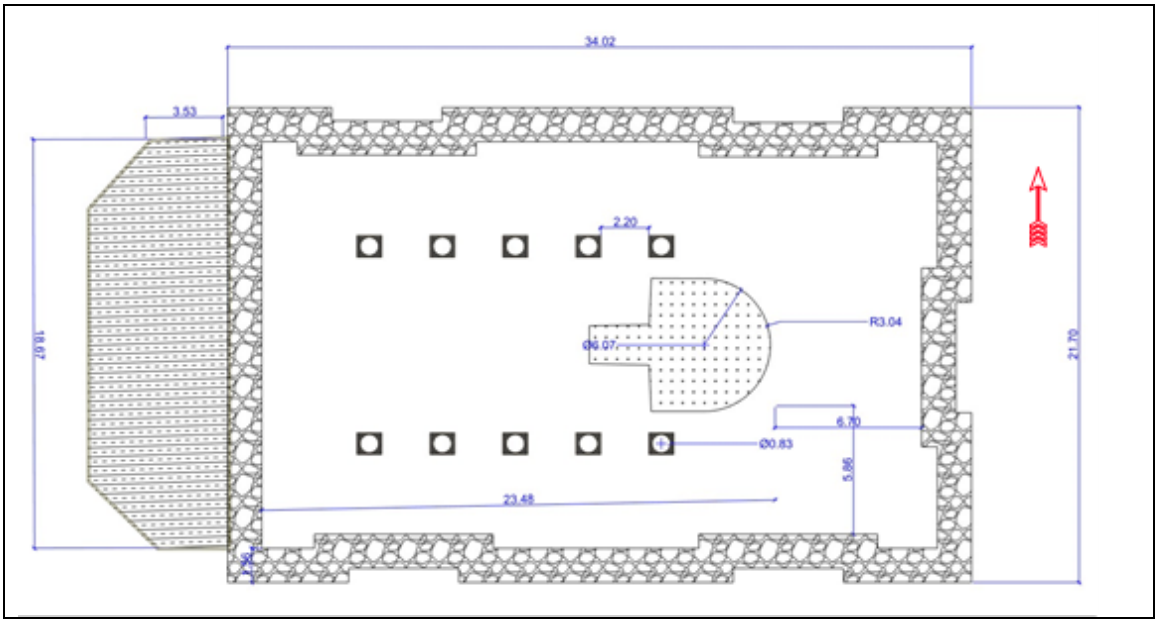

Figure 31 Floor Plan of Temple B

The same type of building style is implemented here, namely Graduated Masonry. While Temples A and C have clear evidence of pre- Christian building underneath, this built form dates from the Christian era. It has two rows of five columns and a baptismal apse (see Figure 32) with two sacristies on the east side with stairs.

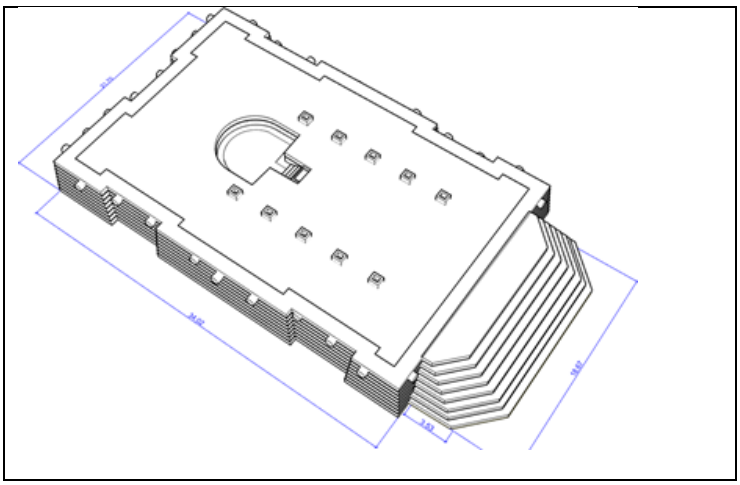

Figure 32 First Floor Temple B

There is compelling evidence from my fieldwork for base doors that are located at the sacristy that go to down to the floor and up most likely to the pulpit (see Figure 33).

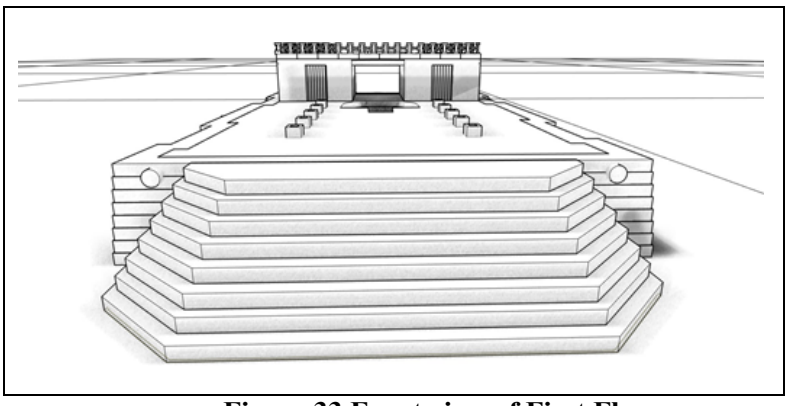

Figure 33 Front view of First Floor

Constructing stairs in narrow spaces usually is implemented with a single pole or column, blocks of wood with one side attached to the pole or column and the other side is dented into the wall (see Figure 35).

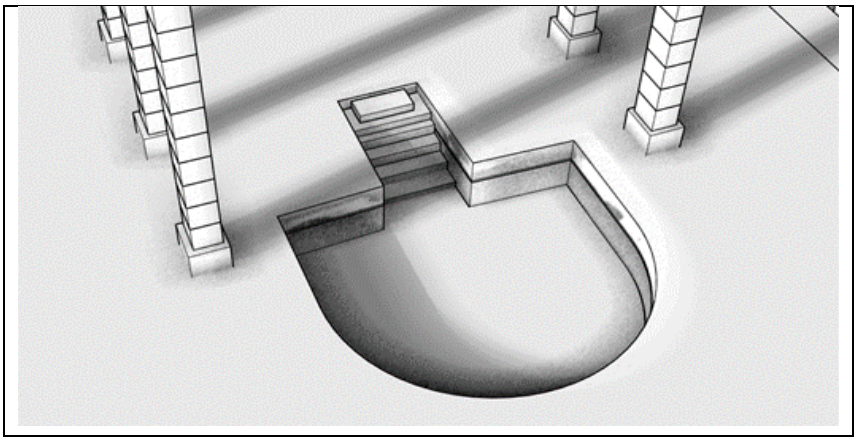

Figure 34 Baptismal tub with stairs

Hexagonally cut slabs for stairs on the western side of the building give this built form an impressive look. While the Court House and Temple A were positioned along the North-South axis, suggesting pre-Christian religion/ideology the above building and Temple C were lined toward an East-West axis consistent with early Christian churches practices.

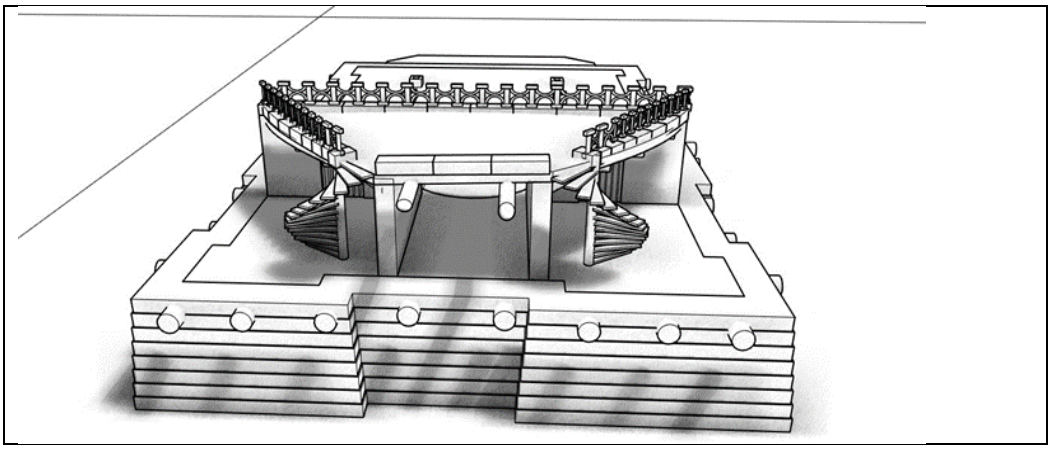

Figure 35 Pulpit Stairs and pulpit decoration with curved stones

For instance, the earliest Christian churches in Rome Christians prayed facing east the same as Jews in the West did facing Jerusalem. These two churches at Adulis that are consistent with such early practices of Christianity point out the early arrival of Christianity, evidence contradicting the traditional view of 325 ACE, which was based on a single numismatics study King Ezana in 325 ACE. The evidence from Adulis suggest the need for additional studies on this matter.

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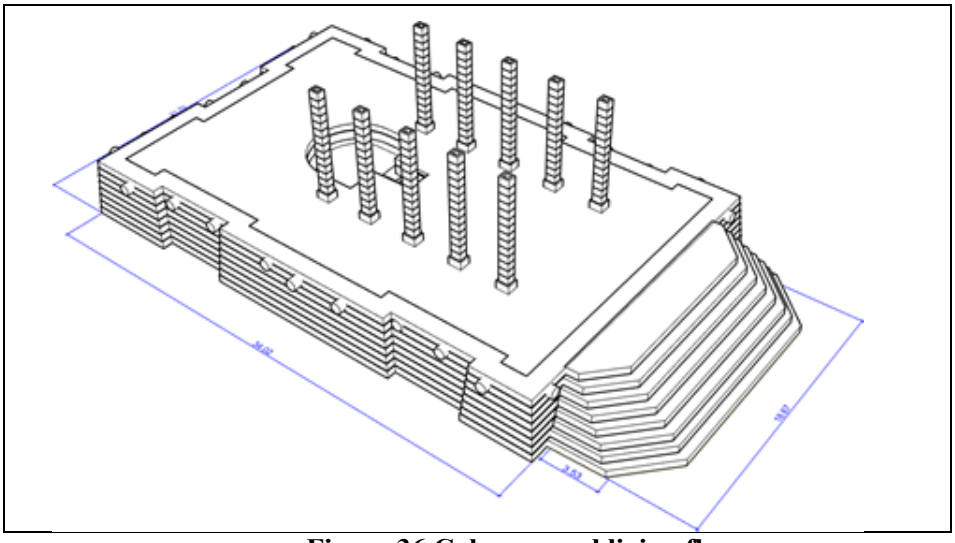

Figure 36 Columns and living floor

The stairs at the sacristy imply the presence of a pulpit with a number of curved decorating stones that were documented during my fieldwork (see Figure 35). A closer investigation of this built form reveals a basement that was accessed through the same stairs that go up to the pulpit. The Sacristy walls also continue on the base floor, and all these are supported by columns of stones and beams (see Figure 37).

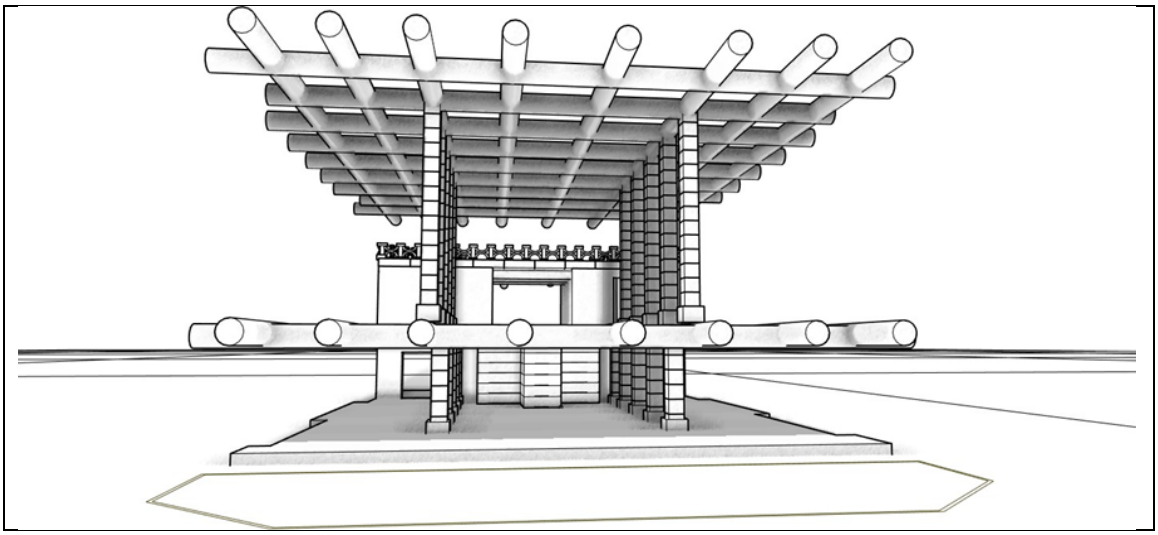

Figure 37 Internal detail of Temple B

The columns and walls support the beams that hold the living floor and roof. There are five stairs that descend to the baptismal tub (see Figure 34). It is not clear what mechanisms were used to hold water on this tub, most likely one giant cut stone or perhaps a hole in the ground plastered with water retaining plasters.

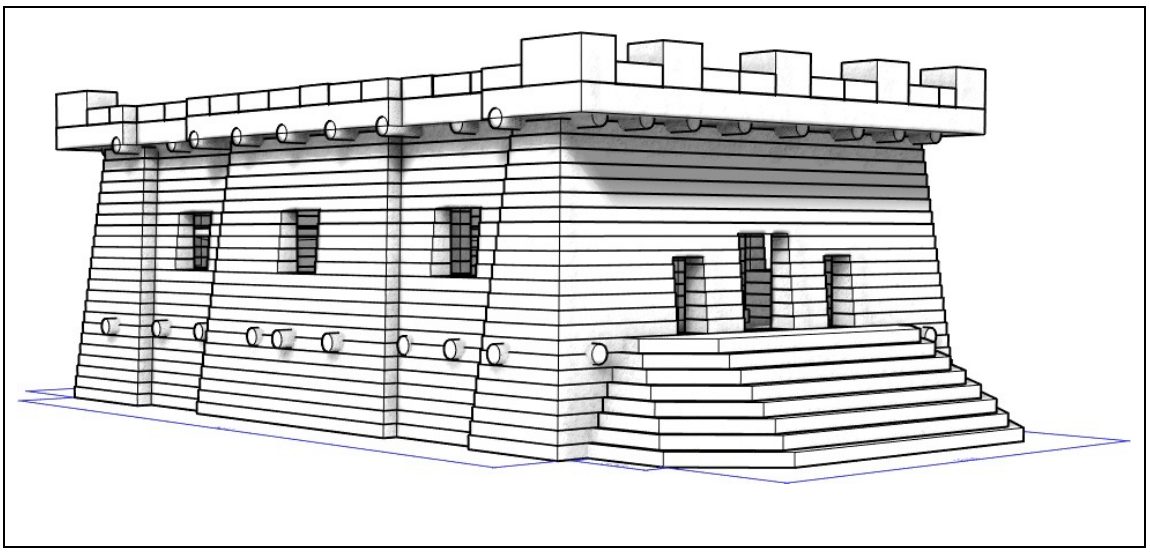

Figure 38 Exterior view, perspective North West corner

Although there is an alignment difference between Temple B and other public buildings in Adulis the masonry type and the symbology is consistent with other buildings at the site. Three doors are accommodated at the top of the stairs. This built form has thick walls. Structural detail suggests a second floor. More research is needed on this building.

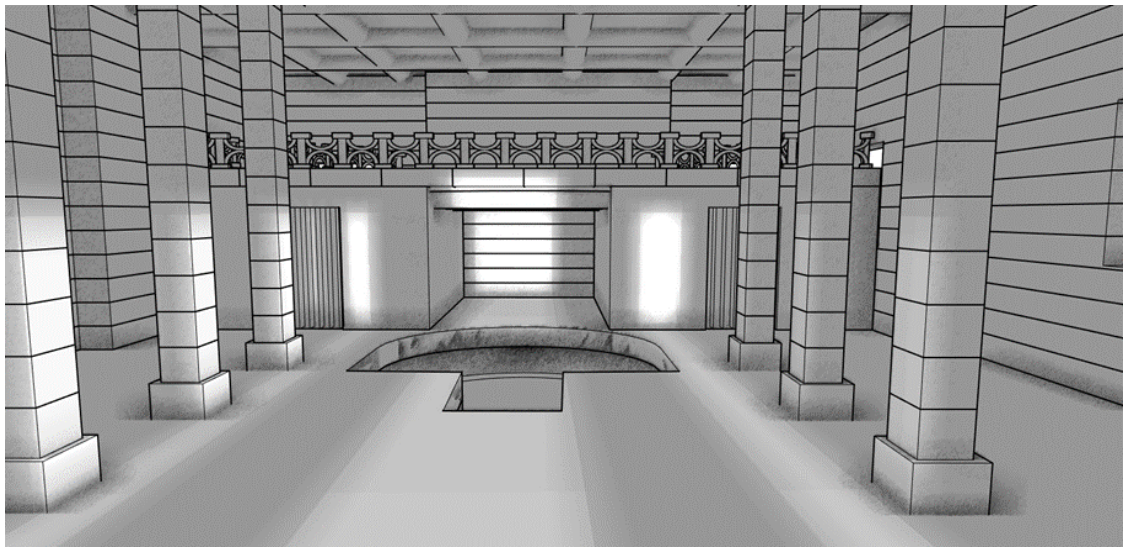

Figure 39 Interior detail

Temple B Volumetric Data

Base Walls	Volume in Cubic Meters	
Wall 1	87.19	
Wall 2	84.24	
Wall 3	81.31	
Wall 4	78.38	
Wall 5	75.46	
Wall 6	72.56	
Wall 7	69.66	
Wall 8	66.77	
Total	615.57	615.57
Floor 1 External Walls		
Wall 9	60.58	
Wall 10	57.86	
Wall 11	55.14	
Wall 12	52.44	
Wall 13	40.74	
Wall 14	38.03	
Wall 15	36.51	
Wall 16	35.17	
Wall 17	33.13	
Wall 18	37.54	
Wall 19	35.68	
Wall 20	32.91	
Wall 21	30.15	
Wall 22	27.41	
Wall 23	24.67	
Total	597.96	597.96
Beams		
East West base beams	98.37	
North South base beams	70.64	
East West roof beams	105.53	
North South roof beams	72.82	
Pulpit Beams	14.35	
Total	361.71	361.71
Floors		
Base Floor	200.49	
Floor 1	256.36	
Roof	778.37	
Pulpit Roof	30.41	
Roof Retainers	155.74	
Total	1421.37	1421.37
Other components		
External Stairs	293.22	
Baptismal Stairs	2.5	
Pulpit Stairs	2.15	
Column bases Floor 0	2.51	
Columns Floor 0	7.59	
Column bases Floor 1	2.51	
Columns Floor 1	17.72	
Floor 1 Internal Walls	52.71	
Pulpit Retaining Walls	10.26	
Pulpit Arches	1.14	
Baptismal base Wall	32.78	
Total	425.09	425.09
	GrandTotal	*3421.7*

Table 3 Temple B volumetric data

3.5.3 Temple C

This built form is located in the eastern part of Adulis, in quad E6 (see Figure 18). Its architectural layout is similar to some old churches in NHA that are extant from medieval times. It has eight columns arranged in a circle at the center of the building most likely to support a structure for devotional frankincense burning to the gods (see Figure 40, and Figure 45). Such structures are preferred for public display of devotion. In the base, it has two rows of five short columns to support the base floor. These columns together with walls support the living floor. The floors are made of cut stone supported by a good deal of wood underneath. Based on the sizable quantity of alabaster found in this temple, it is possible the floor might have made of cut Alabaster.

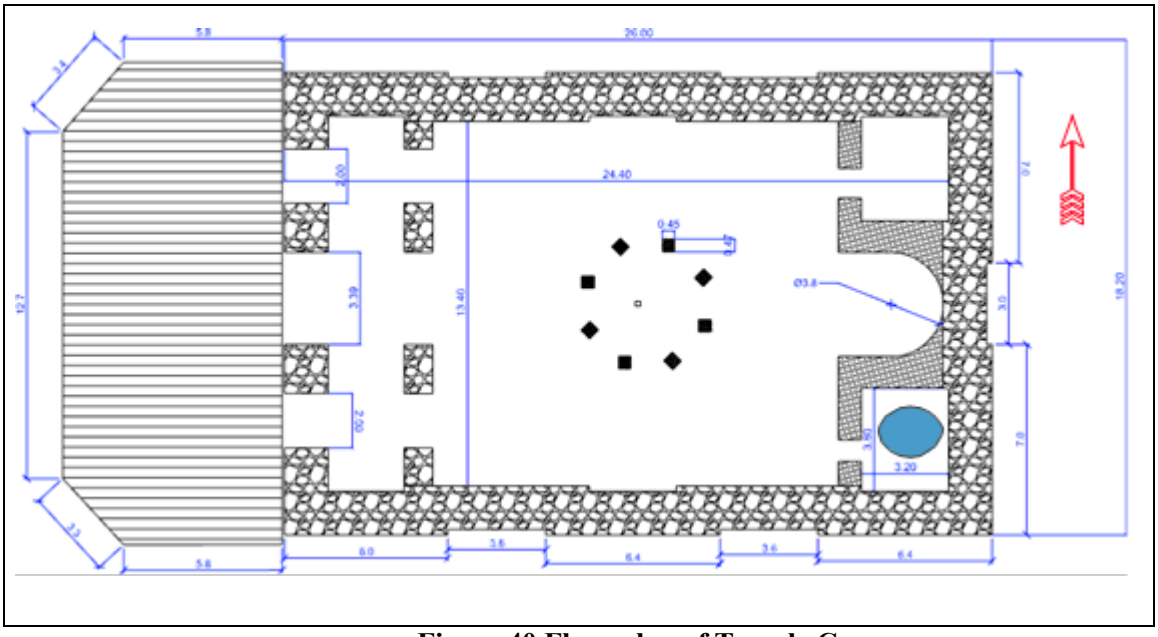

Figure 40 Floor plan of Temple C

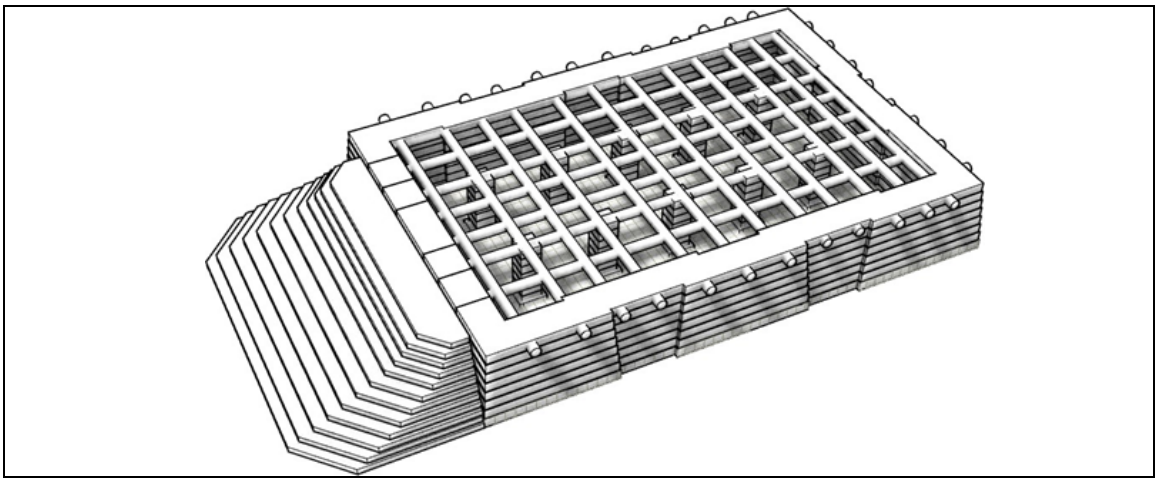

Figure 41 Base Floor, Perspective view from South West corner

A baptismal tub/ well was discovered at the south-east rectangular room as noted by blue shading in the floor plan (see Fig III-39). The wall of the baptismal container was broken and taken as noted by Paribeni (1907). Paribeni's field notes indicate that just under the rim of the tub, a red plaster with inscriptions was observed, most likely from the walls of the tub. It is also possible this might be a well, although if so an uncommonly small one given its diameter being 0.90 m.

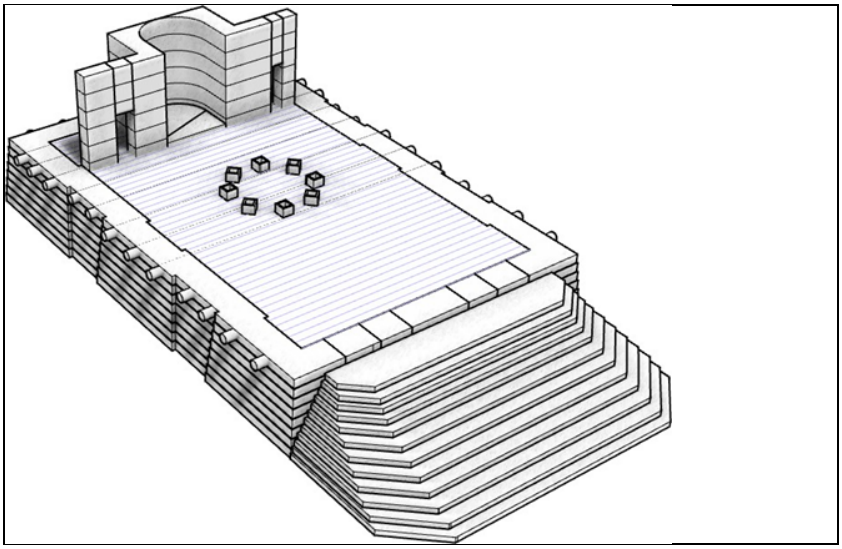

Figure 42 Living floor, column bases and sacristy

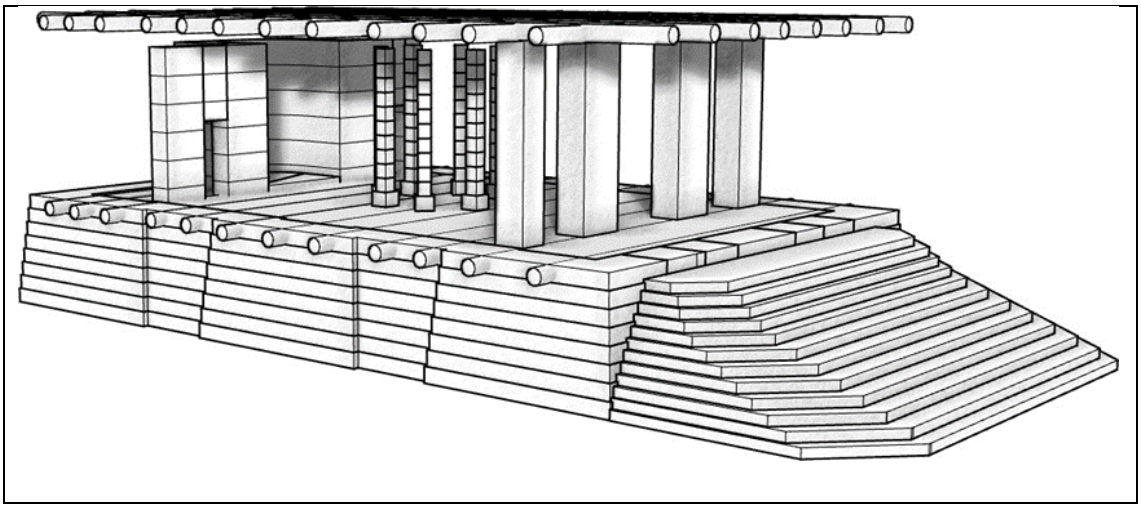

Figure 43 Side view of the interior of living floor

The high-grade walls that support the baptismal tub/well is a clear indication it was built with the base floor being open, or rather a proof of the presence of a base floor. There is no documented evidence available so far as to the entry point to the base floor given the level of destruction this built form endured. The most likely location is the northeast room to make use of the space on the base floor.

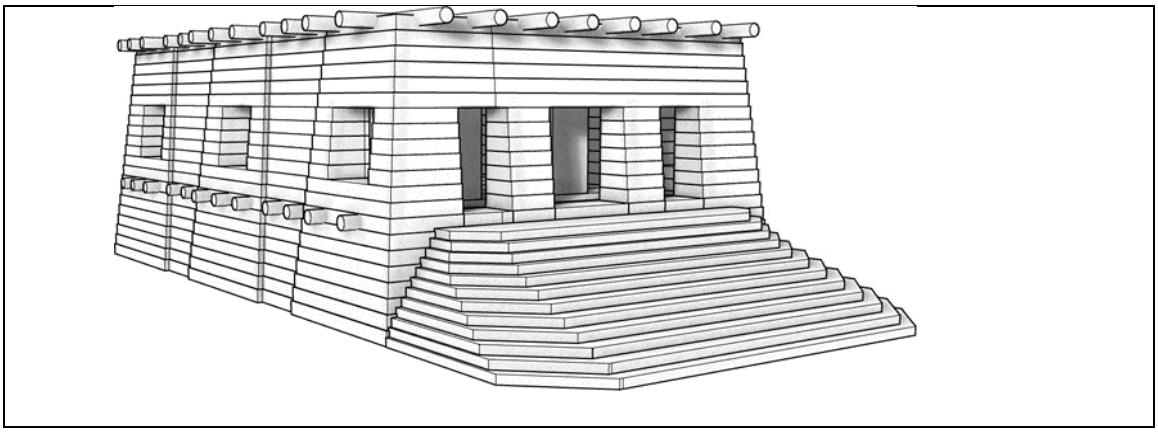

Figure 44 Stairs and door layout, perspective view

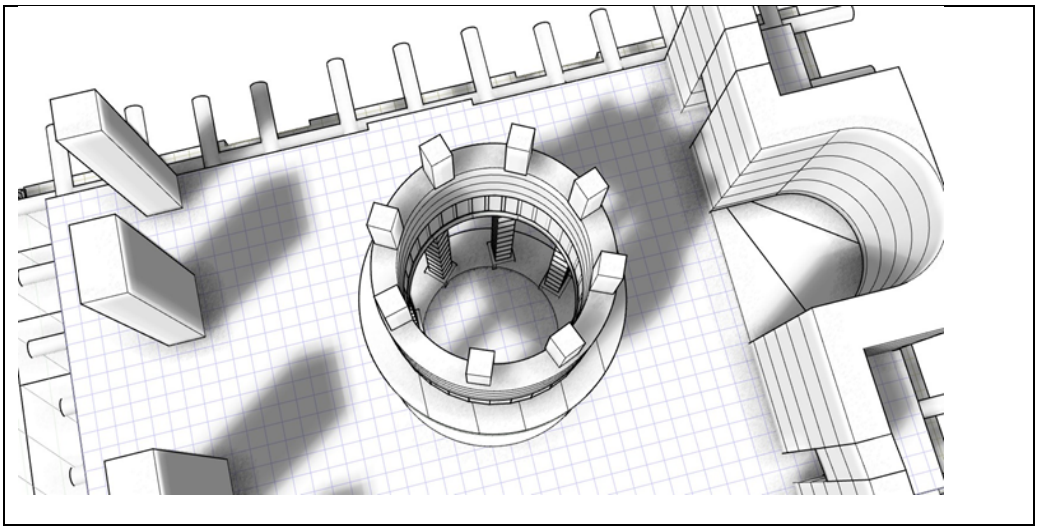

Figure 45 Top view of the living floor and central column structure

Based on the numerous ampullae of St. Minas found in this church, this tub/well might have been used as a refilling station. St. Minas/Menas (285- 389) was an Egyptian saint very popular during the 4th century as patron of merchants and travelers, and loved for purported miracles. Holy-water of St. Minas was commonly brought from

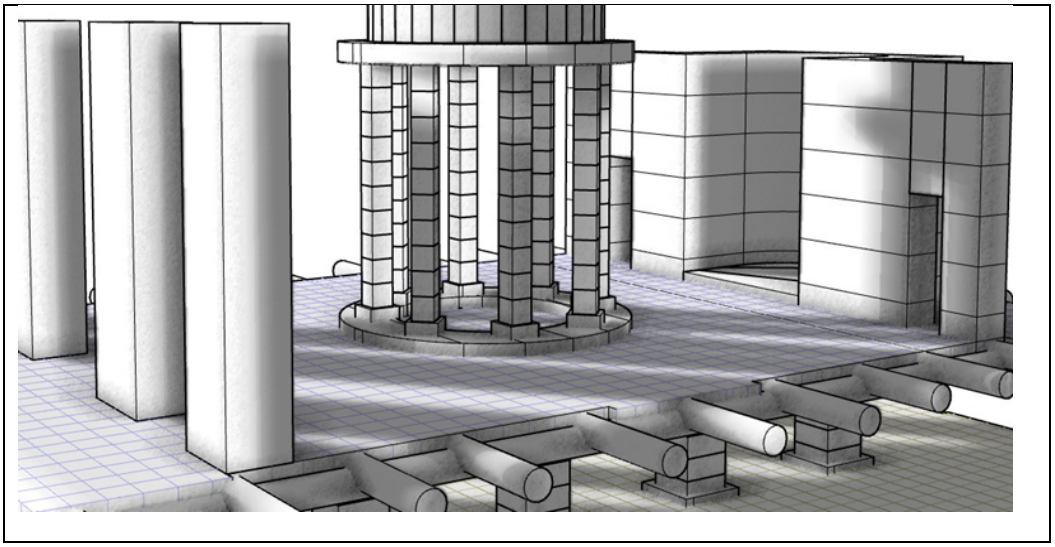

Figure 46 Side view of the living floor and central column structure

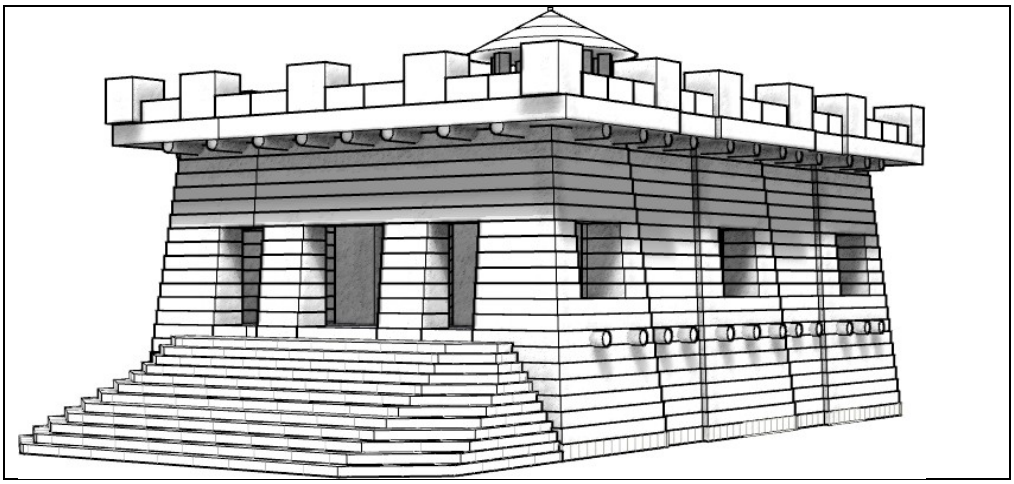

Figure 47 Temple C perspective view South West corner

Egypt and mixed it a larger vessel/tab/well filling many ampullae. Such waters were enormously popular and in demand to cure many ancient diseases (Kazhdan 1991, p. 1339).

The living floor holds four columns at the entry of the building, and together with the central column and walls of the Sacristy support the roof. Wood fragments documented at Adulis suggest the beams were mostly made of East African-Cedar (*Juniperus procera*) or Wild Olive (*Olea africana*, also commonly known as the iron tree for its hardness when cutting or splitting it with an ax).

Temple C also shares the same template of architectural design as the Court House, Temple A, and B, supporting the interpretation of the central planning by consent. The central planning argument at Adulis becomes more evident with a geophysical survey (see chapter 2). Combining the previously excavation report and the geophysical survey, Adulis seems to align with the NW and SE axis.

Temple C Volumetric Data

Base Walls	Volume in Cubic Meters	
Wall 1	80.89	
Wall 2	78.63	
Wall 3	76.37	
Wall 4	74.13	
Wall 5	71.89	
Wall 6	69.67	
Wall 7	67.45	
Wall 8	65.25	
Total	584.28	584.28
Floor 1 External Walls		
Wall 9	57.33	
Wall 10	55.33	
Wall 11	41.12	
Wall 12	39.56	
Wall 13	38.01	
Wall 14	36.47	
Wall 15	34.94	
Wall 16	47.97	
Wall 17	45.86	
Wall 18	43.75	
Wall 19	41.66	
Wall 20	39.57	
Wall 21	31.51	
Total	553.08	553.08
Beams		
East West base beams	43.45	
North South base beams	42.21	
East West roof beams	43.45	
North South roof beams	42.21	
Total	171.32	171.32
Floors		
Base Floor	234.86	
Floor 1	153.96	
Roof	399.55	
Roof Retainers	522.24	
Total	1310.61	1310.61
Other components		
External Stairs	268.13	
Column bases Floor 0	16.71	
Columns Floor 0	37.19	
Column bases Floor 1	0.88	
Columns Floor 1	9.11	
Floor 1 Internal Walls	95.68	
Floor 1 Gate Walls	44.22	
Total	471.92	1216.34
	GrandTotal	*3835.63*

Table 4 Volumetric Data of Temple C

3.5.4 Temple A

Temple A is located in quad D3 (see Fig III-16) and measures 49.94 m long and33.86 m wide. There is compelling evidence at the site that later Christianity used it for religious function based on the added structures inside the built form, which are similar to ancient Christian architecture.

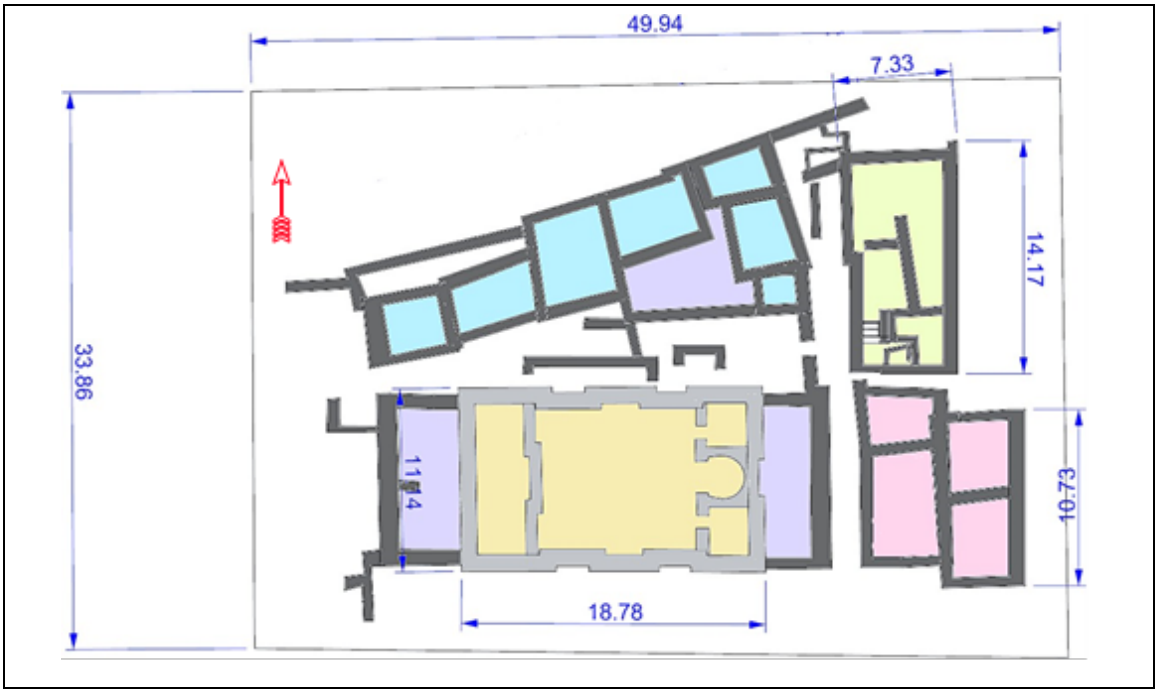

Figure 48 Floor Plan of Temple A

Temple A is surrounded by many low grades built forms. It is not clear whether these low grade built forms were built during the Christian era or in earlier times.

Deriving from the artifact associations, these low-grade residences yielded quite elaborate craft specialization evidence. Some of these artifacts include: gold chains for bishops with inscriptions on them, goldsmithing tools, coin minting and numerous serving utensils and other mundane items.

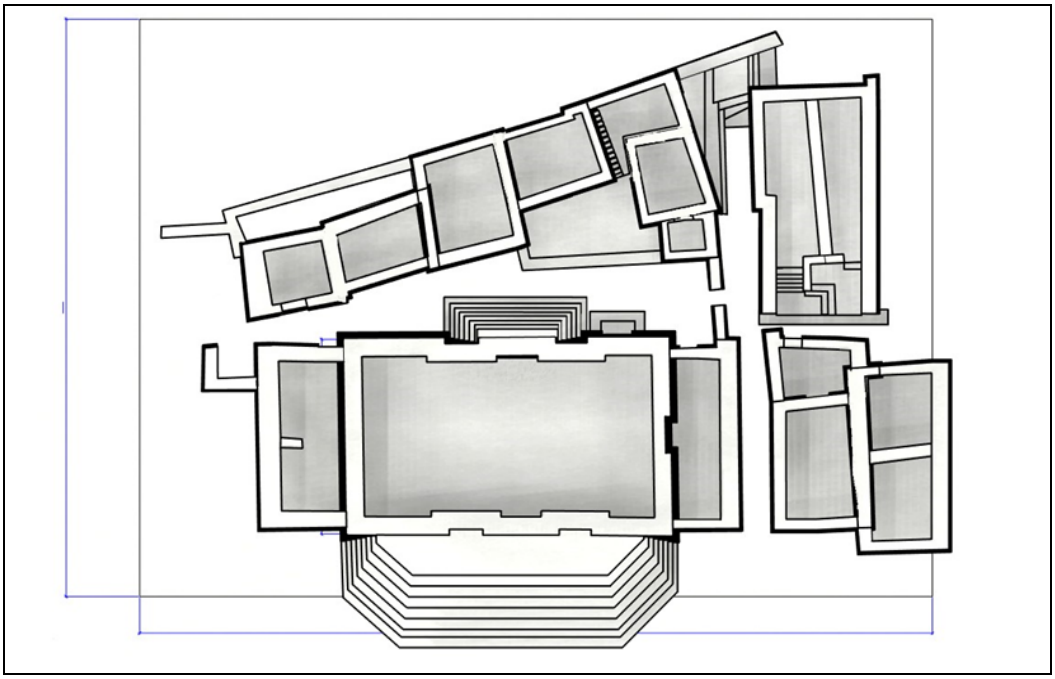

Figure 49 Base Floor layout of the Temple A
Note its surrounding low grade built forms, top view

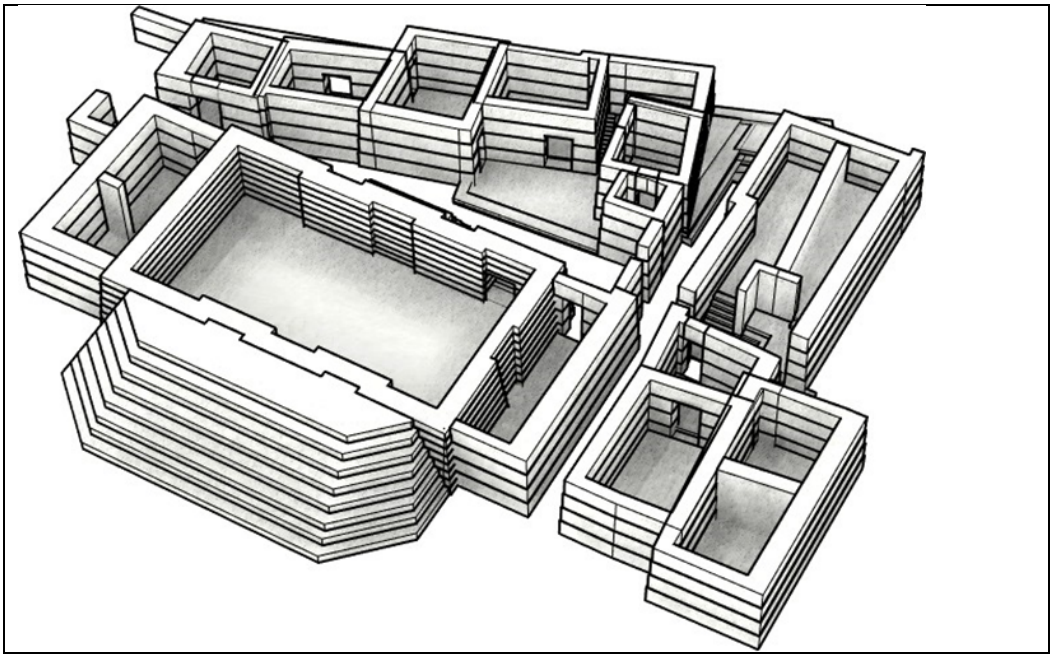

Figure 50 Temple A base walls and surrounding low grade built forms

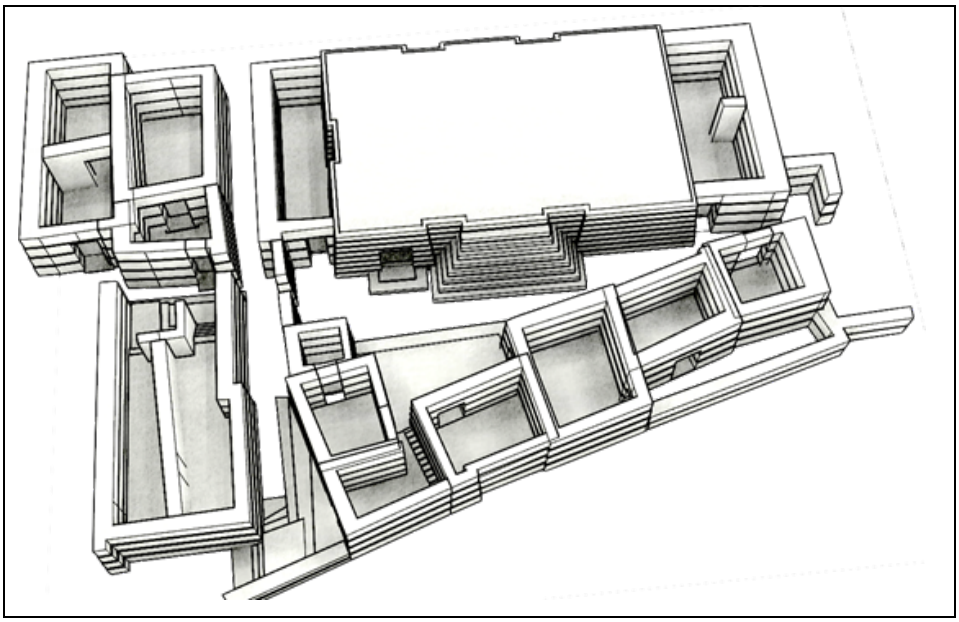

Figure 51 Relationship of the built forms around Temple A

These artifacts will be evaluated in Chapter 5. It appears Temple/Church A had considerable power to organize craft specialists. Contrary to the other built forms at Adulis, these residences along the northern part of the Temple have a controlled entry point. All entrants had to pass through narrow gates to access this area, suggesting some sort of guild or highlighting a crafting place of valuable artifacts.

A close investigation into the Temple A's base floor points to the presence of two rows of four stone columns each, while the upper living floor holds two rows of five columns each. Out of the five columns, the three western ones may have supported the roof while the two short ones on the eastern side supported the upper choir and stairs (see Figure 53).

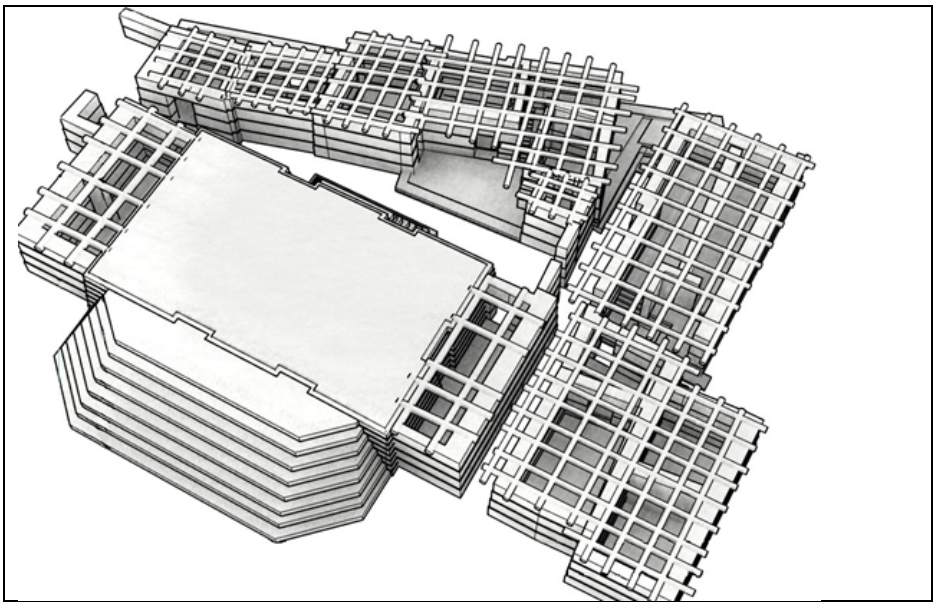

Figure 52 Roofing of built forms around Temple A

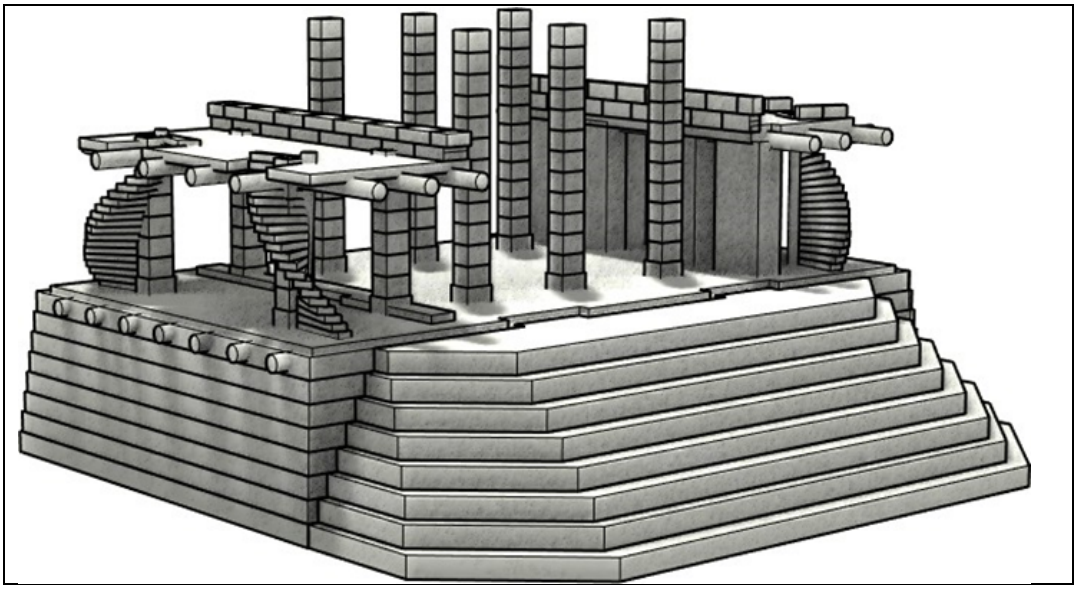

Figure 53 Living floor and internal layout of Temple A

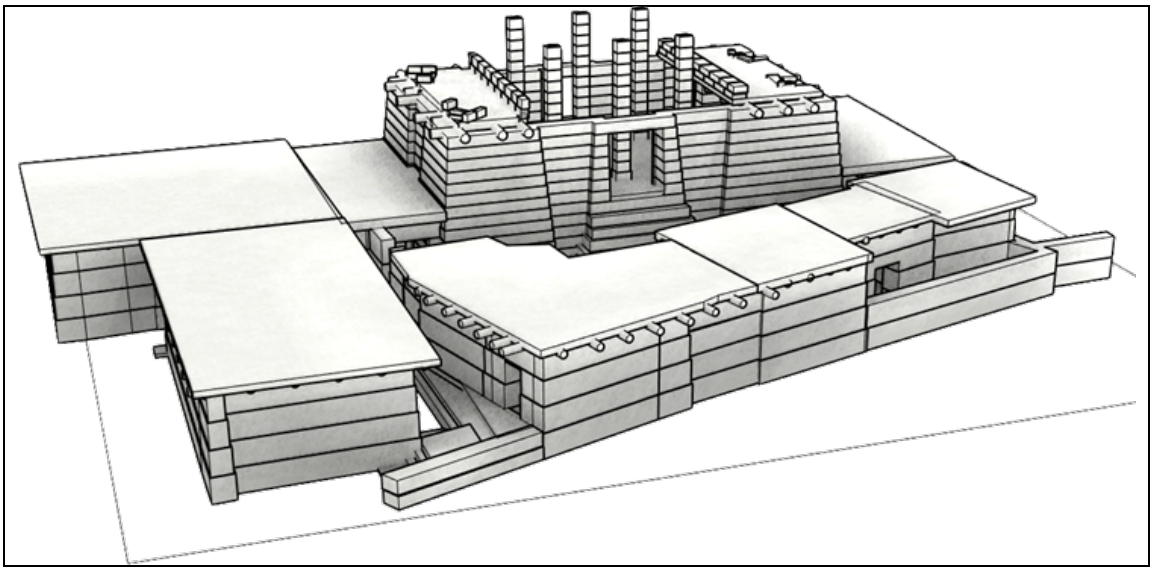

Figure 54 North view of the Temple and its surrounding built forms.

Based on my field work that document the large stairs traces, it appears the southern part was main entrance to Temple A (see Figure 55), while the northern stairs may have been used to access the base floor and two subsequent rooms attached to the eastern and western end in the northern part of the building (see Figure 51 and Figure 52). Two other stairs are also noted on the eastern end and western end within Temple A, the former most likely for the pulpit and the latter for back choir or perhaps for other functions. These may include seating important members or devotees, such as monks. The altar is a later addition adjusted by adding walls. Both the pulpit and the choir have running stairs pegged in one column and the sidewalls. The choir is supported by two rows of columns, two each, transversed by wooden beams. A similarly constructed layout can be observed for the pulpit, except, instead of columns, walls are used. The supporting walls are most likely later additions during Christian era. The data is scarce to successfully identify the pre-Christian architectural layout. Thus, it is impossible to determine the previous layout and what early Christianity added or modified.

Archaeologists in the future may be able to make this determination in the future when more data from field work are collected.

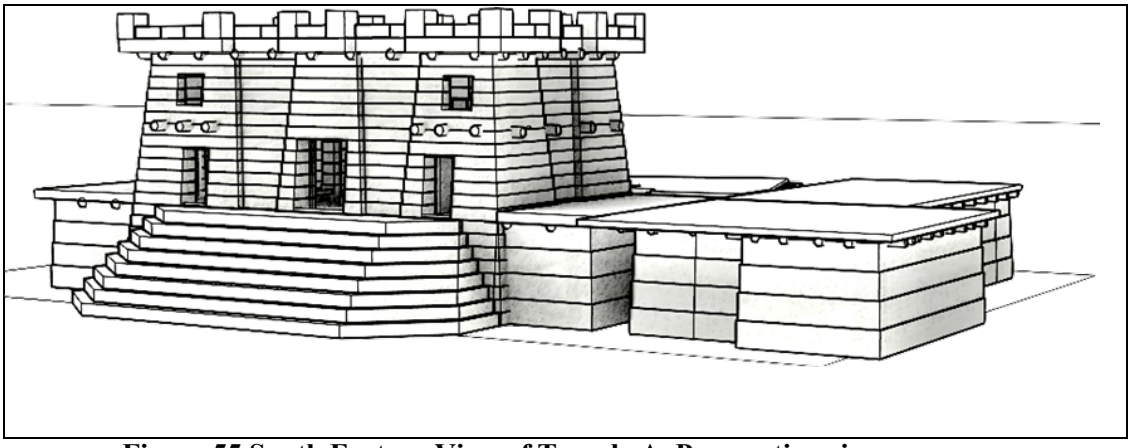

Figure 55 South Eastern View of Temple A, Perspective view

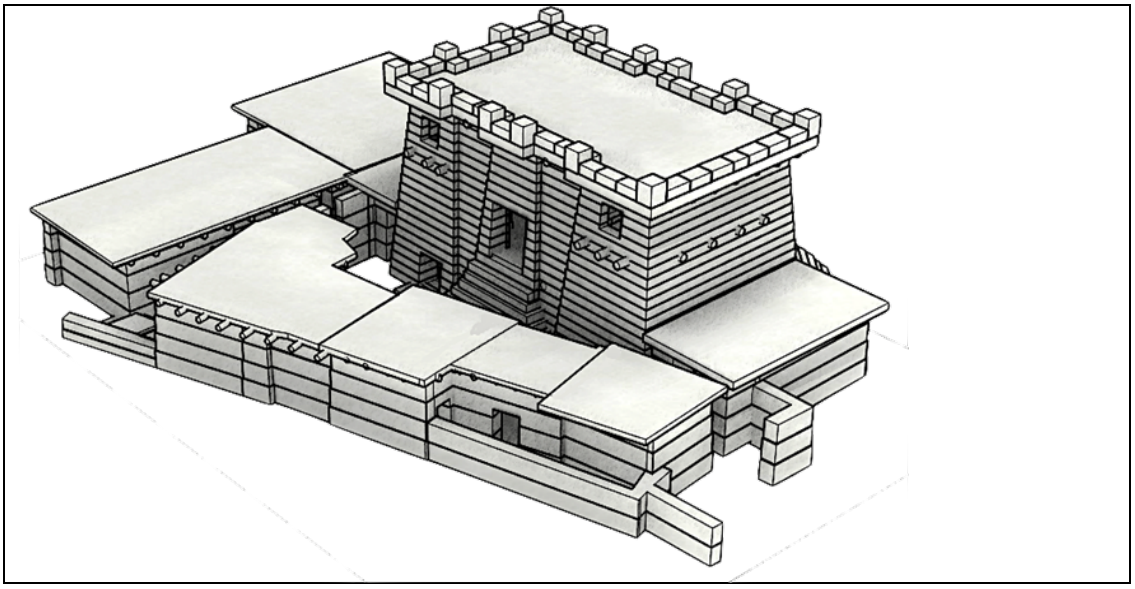

Figure 56 North Western View of Temple A

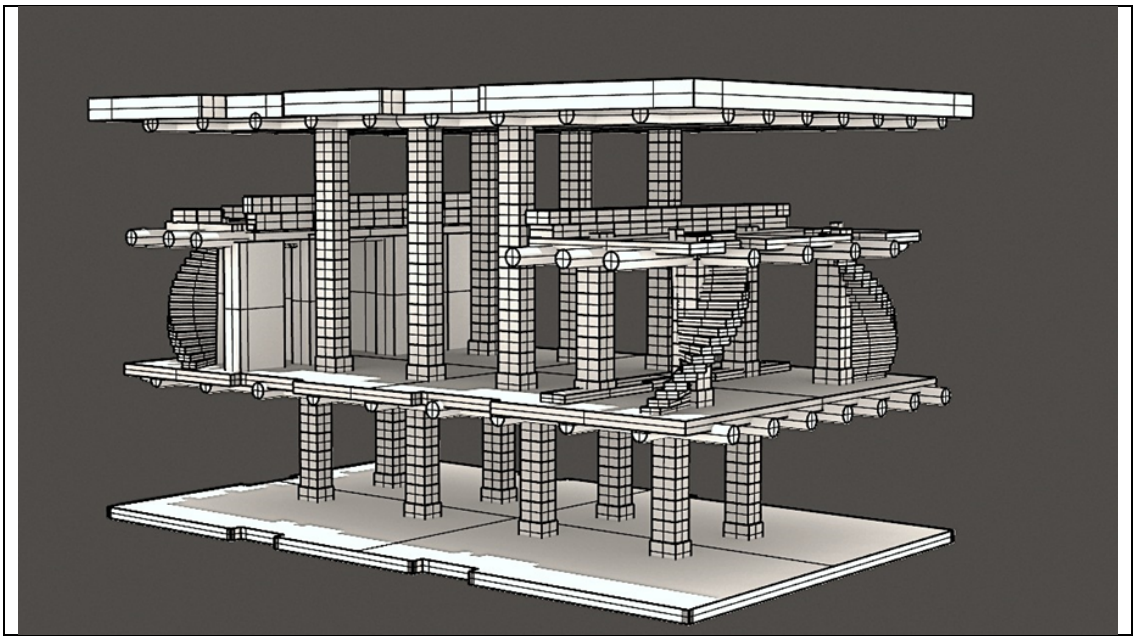

Figure 57 Internal layout of the Temple A, South Eastern View

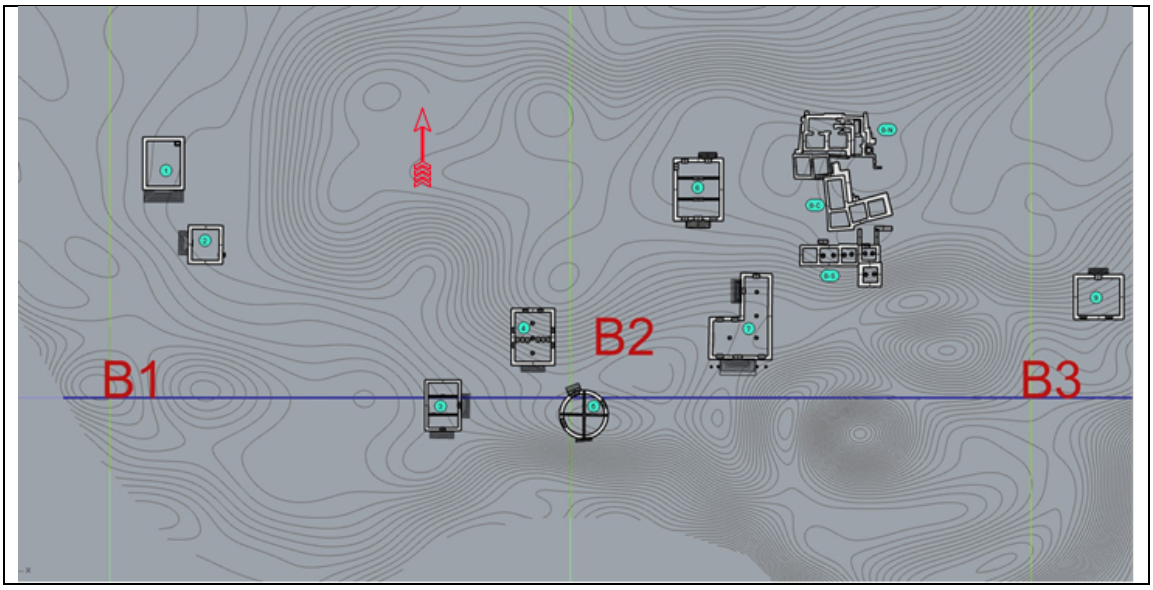

Figure 58 Location of Built forms 1-9 at Adulis

Temple A Volumetric Data

Base Walls	Volume in Cubic Meters	
Wall 1	41.91	
Wall 2	40.25	
Wall 3	38.61	
Wall 4	36.97	
Wall 5	35.34	
Wall 6	33.72	
Wall 7	32.12	
Wall 8	30.52	
Total	289.44	289.44
Middle Walls		
Wall 9	25.11	
Wall 10	23.59	
Wall 11	22.22	
Wall 12	20.86	
Wall 13	19.61	
Wall 14	19.21	
Wall 15	19.63	
Total	150.23	150.23
Upper Walls		
Wall 16	18.11	
Wall 17	15.96	
Wall 18	13.58	
Wall 19	12.23	
Wall 20	11.81	
Wall 21	10.68	
Total	82.37	82.37
Beams-A		
East West base beams	16.8	
North South base beams	11.93	
Altar beams	6.41	
Choir beams	6.93	
East West roof beams	16.46	
North South roof beams	11.93	
Total	35.32	35.32
Floors		
Base Floor	65.01	
Living Quarter Floor	58.39	
Roof Floor	135.18	
Altar Roof	11.44	
Choir Floor	14.67	
Roof Retainers	33.9	
Total	318.59	318.59
Stars South		
Stair 1	54.42	
Stair 2	48.06	
Stair 3	43.42	
Stair 4	37.44	
Stair 5	31.74	
Stair 6	26.31	
Stair 7	21.18	
Star 8	16.34	
Total	278.91	278.91
Stairs North		
Stair 1	6.79	
Stair 2	5.33	
Stair 3	4.01	
Stair 4	2.83	
Stair 5	1.91	
Stair 6	1.1	
Stair 7	0.61	
Total	22.58	22.58
Pillars		
Pillar bases	1.56	
Pillars	8.22	
Center Wall	1.41	
Total	9.78	9.78
Sacrsti		
Antrax	23.52	
Right Wall	3.68	
Left Wall	2.81	
Total	30.01	30.01
	GrandTotal	*1217.23*

Table 5 Volumetric Data of Temple A

3.6 Circular Built forms

There are two circular buildings at Adulis out of the 39 built forms. These two circular built forms are numbered built form 5 located at quad A1 (see Figure 58) and built form 19 located at quad E2 (see Figure 67). There are other circular built forms in Adulis, but not enough work has been done on them to include them in energetics analysis of this dissertation. The two circular buildings were multistory based on the southern stairs documented that runs to a second floor (see Figure 61 and Figure 71).

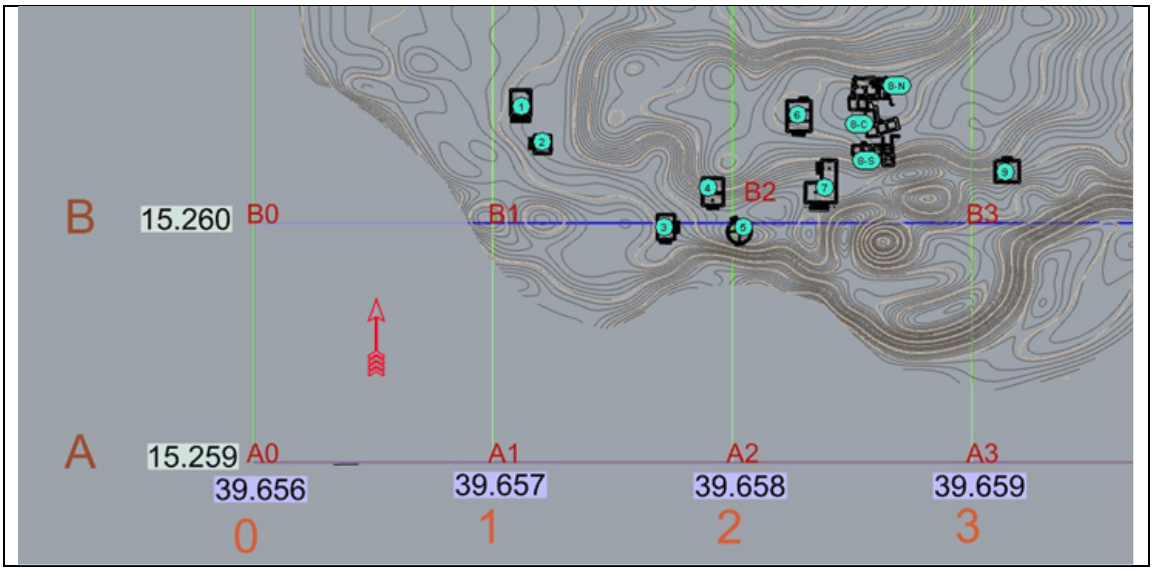

Figure 59 Referenced Location of Built forms 1-9 at Adulis

3.6.1 Built Form 5

Built form 5 is located at A1 has an outer wall diameter of 11.7 m, and an inner wall diameter 9.9 m (see Figure 59). Similar to other built forms at Adulis, these built forms were constructed with Graduated Masonry. There is a high probability of storage under the living floor. The upper floor has windows facing east and west as well as a window facing south above the first floor entry door (see Figure 65). The stairs that run from the ground to the upper floor are built on a wall with alternating slabs for the stepping stones (see Figure 61). Floors, as noted above, are made from a combination of

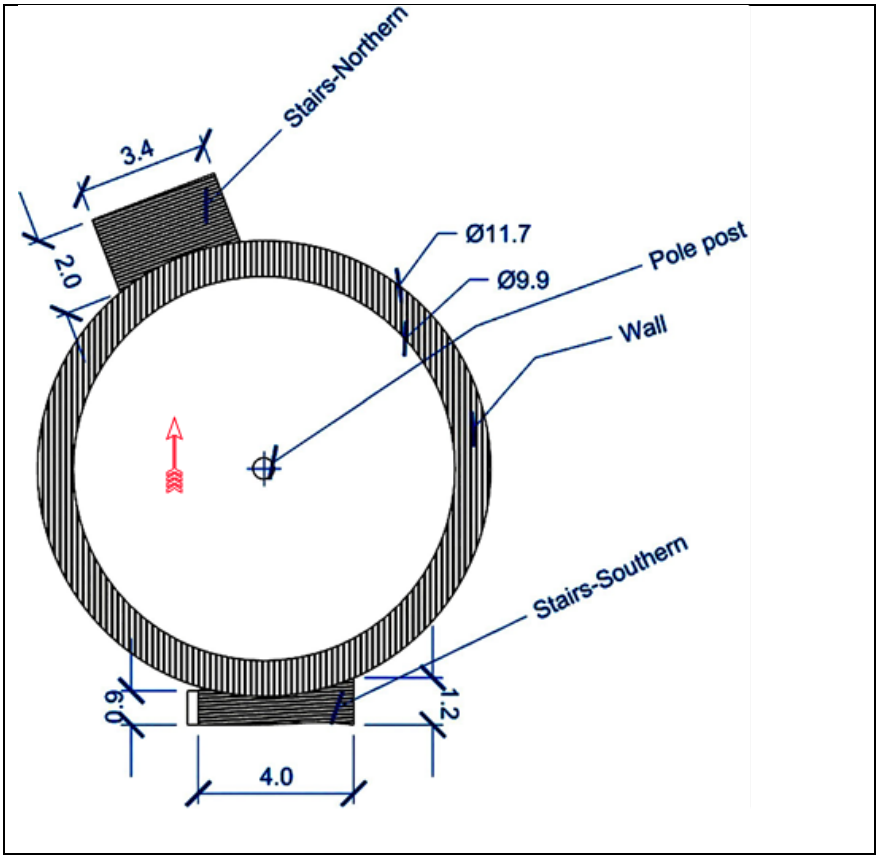

Figure 60 Profile plan of built form 5

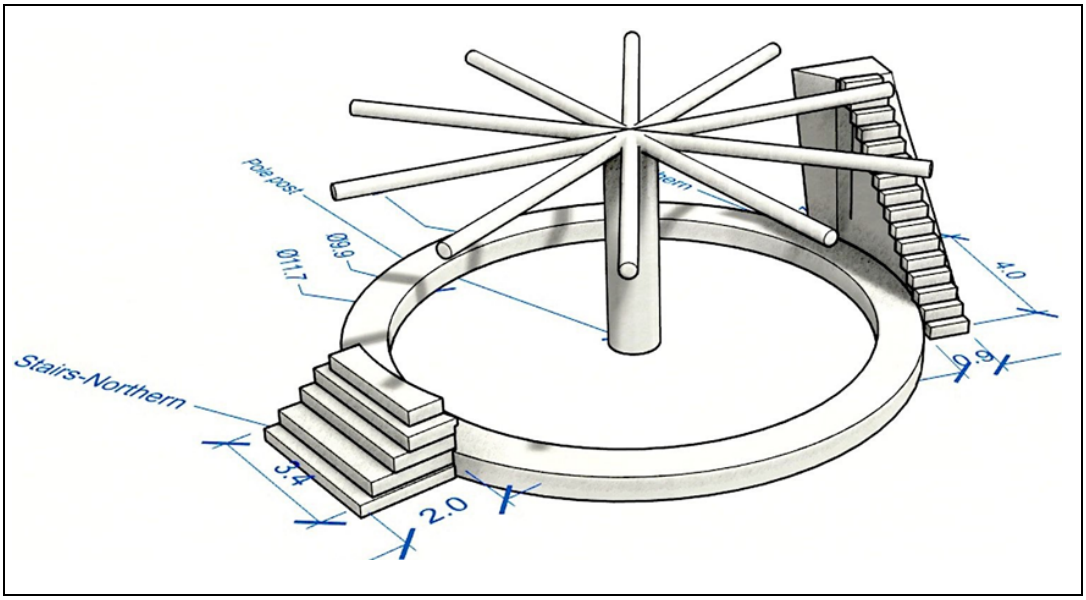

Figure 61 Built form 5, stairs the first wall, and supporting beams

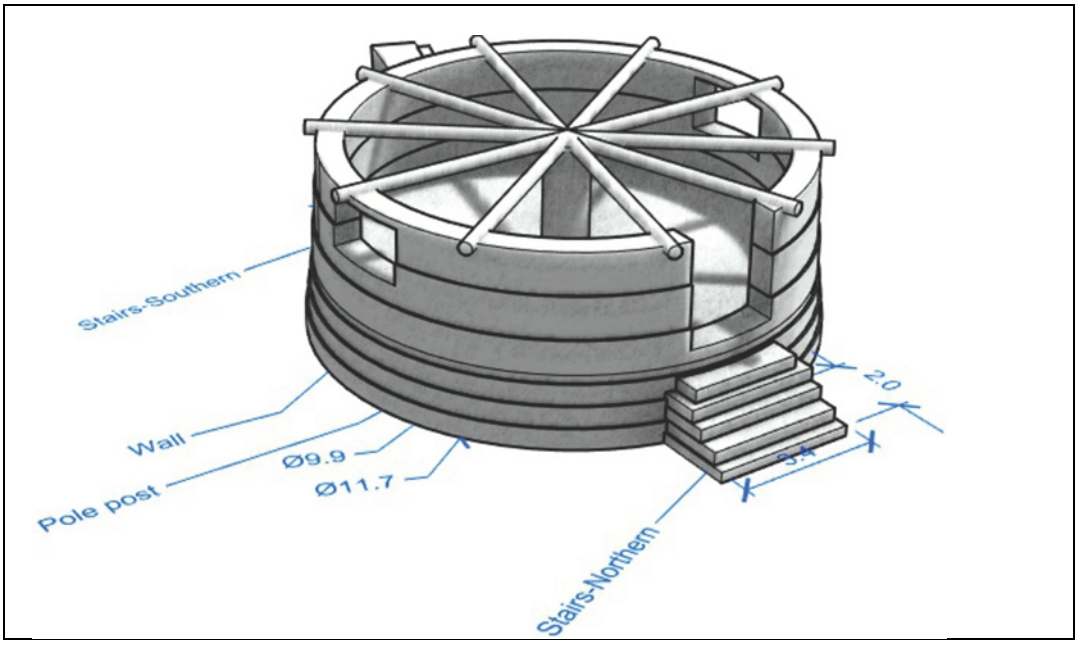

Figure 62 Living floor , windows and base walls

larger beams layered with smaller ones and sealed with wood or mud or animal hides. There is ethnographic and textual evidence of elephant skin were used for flooring (Conti Rossini 1928).

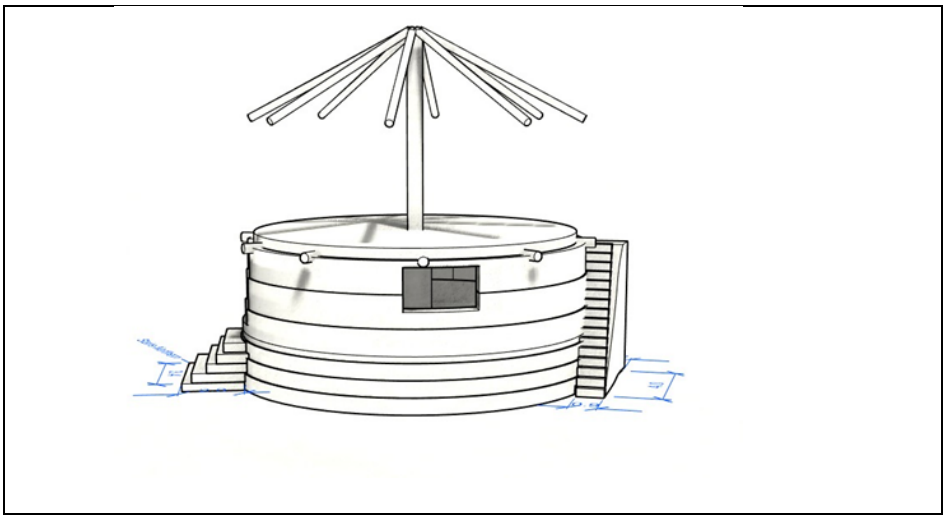

Figure 63 Second Floor supporting structures and stairs

This also makes sense since elephant skin is lightweight and sturdy. For instance, the National Museum of Eritrea has acquired few shields made of elephant skin from local Eritreans that are very light yet very sturdy. While perishable material culture like elephant skin may not be retrievable in the archaeological record, we can nevertheless consider that, if elephant skins were used for flooring then the buildings may have been much higher. Since the purpose of this research is strictly archaeological we have reconstructed the height of this structure at a basic minimum level based on archaeological material evidence.

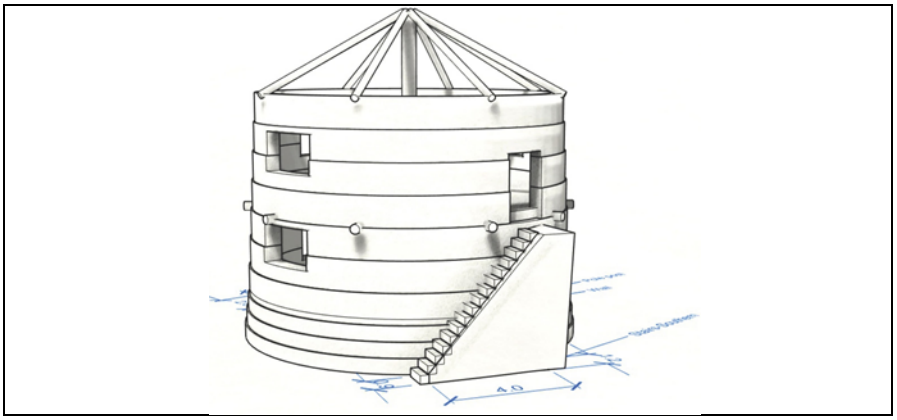

Figure 64 Roof structures of built form 5

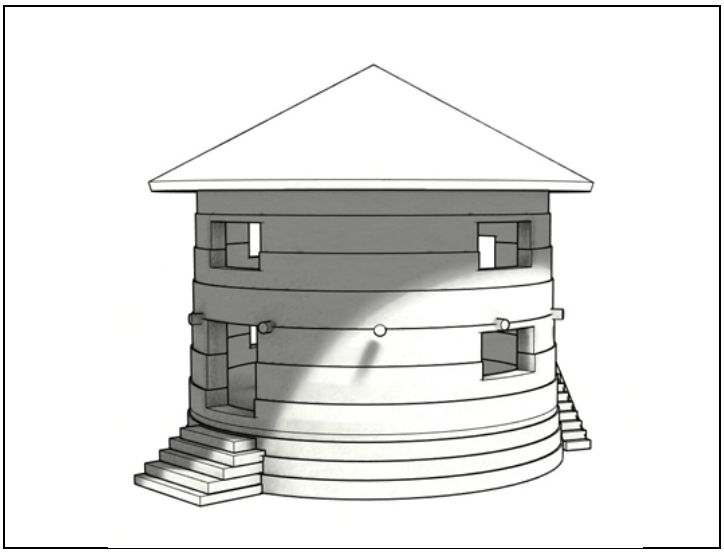

Figure 65 Full view of built form 5

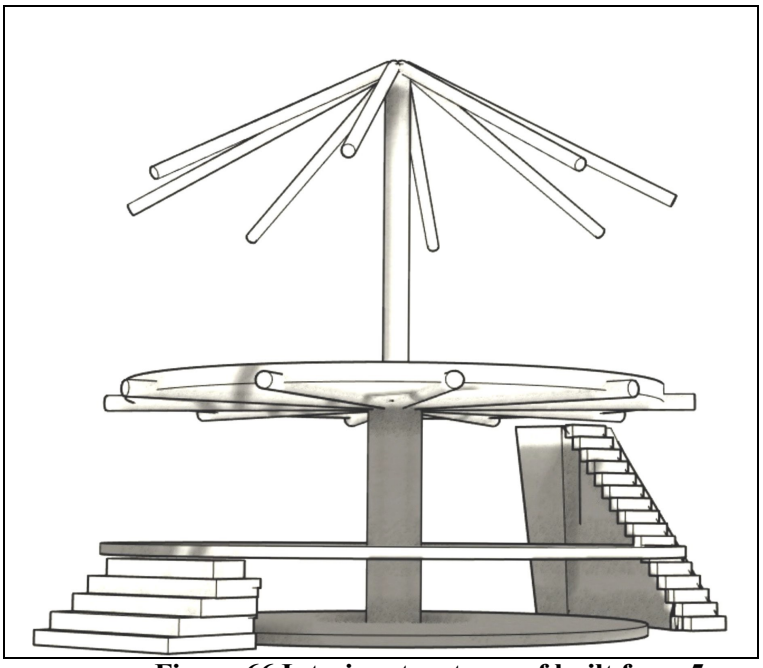

Figure 66 Interior structures of built form 5

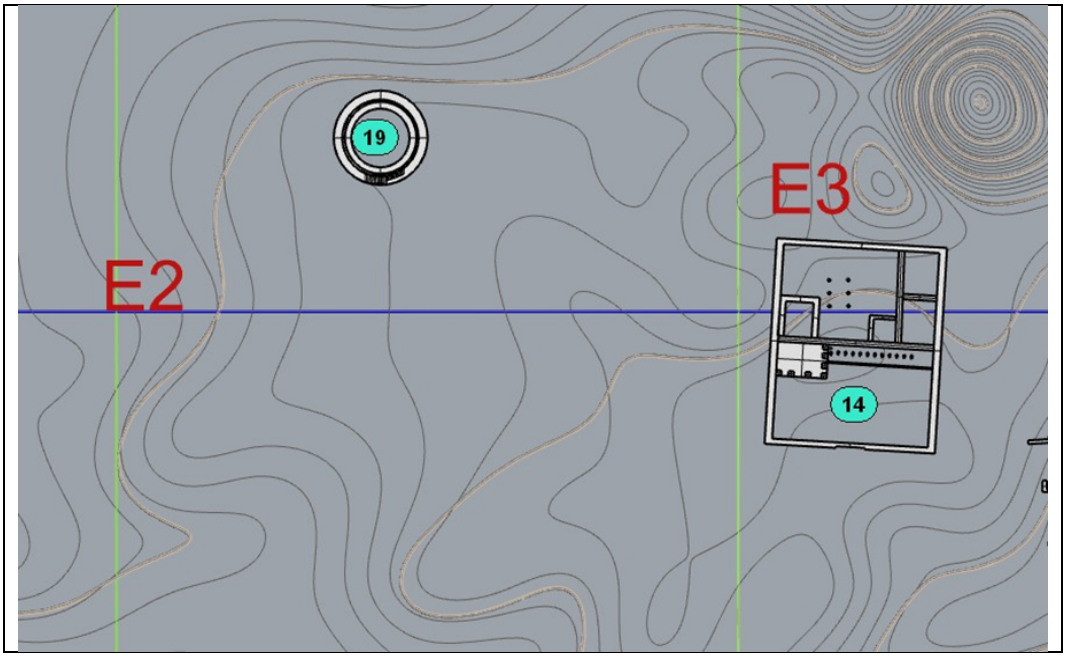

Figure 67 Location of Built form 19 and 14 at Adulis

Built Form 5

Walls	Volume in Cubic Meters	
Wall 1	15.65	
Wall 2	14.54	
Wall 3	13.45	
Wall 4	23.9	
Wall 5	19.52	
Wall 6	17.12	
Wall 7	18.2	
Wall 8	14.74	
Wall 9	12.89	
Wall 10	13.96	
Total	163.97	163.97
Floors		
Base Floor	15.42	
Living Quarter Floor	20.36	
2nd Floor	13.15	
Roof	25.72	
Total	74.65	74.65
Stairs-Southern		
Stairs	1.07	
Stairs Supporting Wall	12.32	
Total	13.39	13.39
Stairs-Northern		
Stairs	5.22	
Total	5.22	5.22
First Floor Roof Support		
Central Pillar	3.92	
Supporting Beams	2.81	
Total	6.73	6.73
Second Floor Roof Support		
Central Pillar	1.18	
Supporting beams	1.09	
Total	2.27	2.27
	Grand Total	*266.23*

Table 6 Volumetric data of built form 5

3.6.2 Built Form 19

Built form 19 is located at E1 in the site plan (see Figure 67). It has 13.8 m diameter outer wall and 10.4 m diameter inner wall. Additionally, it has a base wall retaining cliff or stepped wall on the outside with 16.8 m in diameter (see Figure 68). Unlike circular built form 5, which was supported with wood, built form 19 uses a central wall from the base to living quarters to the upper floor. Also, while similar to built form 5 in having upper floor stairs built form 19's stairs are positioned south in the same direction as the living quarter door (see Figure 71).

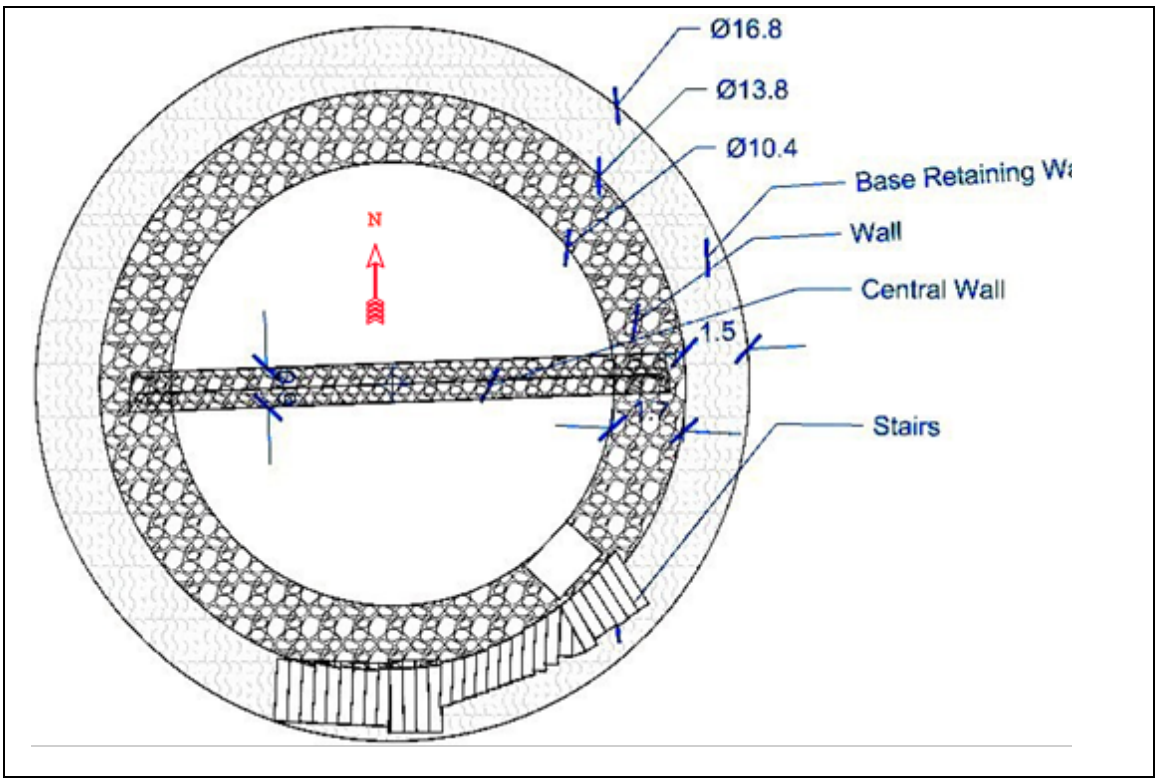

Figure 68 Floor plan of built form 19

Thus a person climbing to the upper floor should pass through the main door, unlike the case for built form 5 where a person may climb without being engaged with

the living quarters. Built form 19 has a base entry from the living quarters by a means of a ladder (wooden or otherwise). The base floor, which is divided by the central wall, is entered through a door (see Figure 69 and Figure 74).

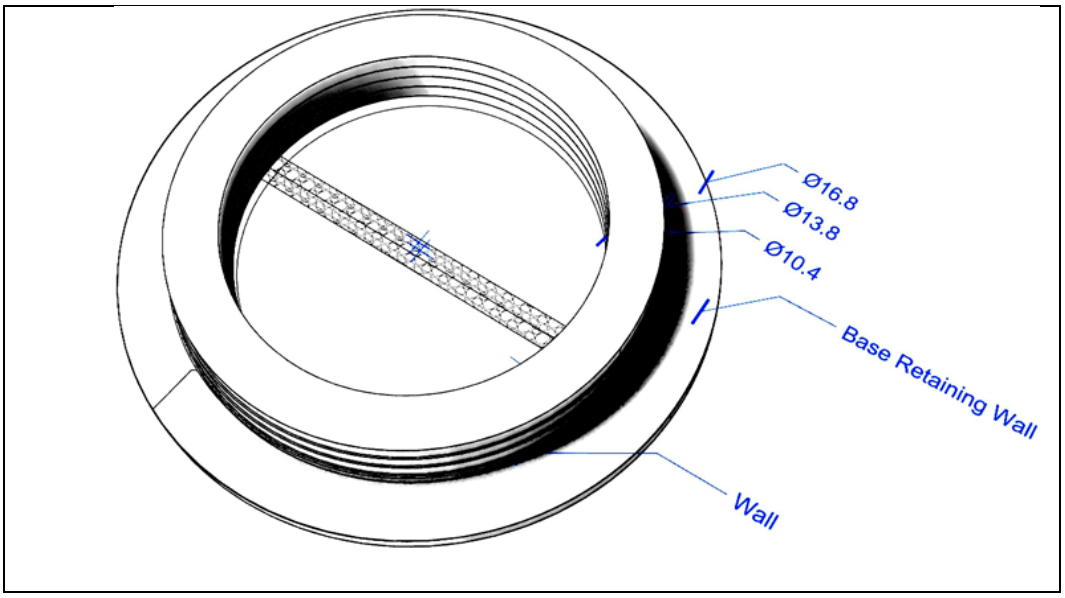

Figure 69 Base Walls, and base wall retaining wall of built form 19

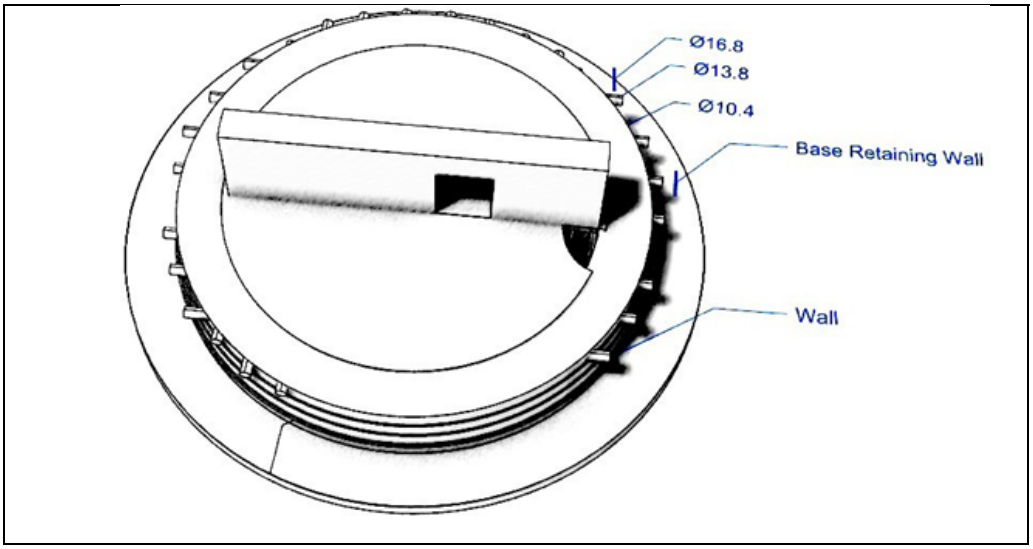

Figure 70 Living Floor, base entry and central wall of built form 19

Four courses of Graduated Masonry are built to reach the living quarter's floor at half meters each. This raises the living quarters 2 m above the ground and the retaining wall (see Figure 72 and 73). There is no material evidence from the archaeological record

to suggest windows in this built form at this moment, but it is highly improbable that such a building would be constructed without windows. The stairs of built form 19 are more elaborate than that of built form 5. Three courses of Graduated Masonry at 1m high are built to get to the second floor.

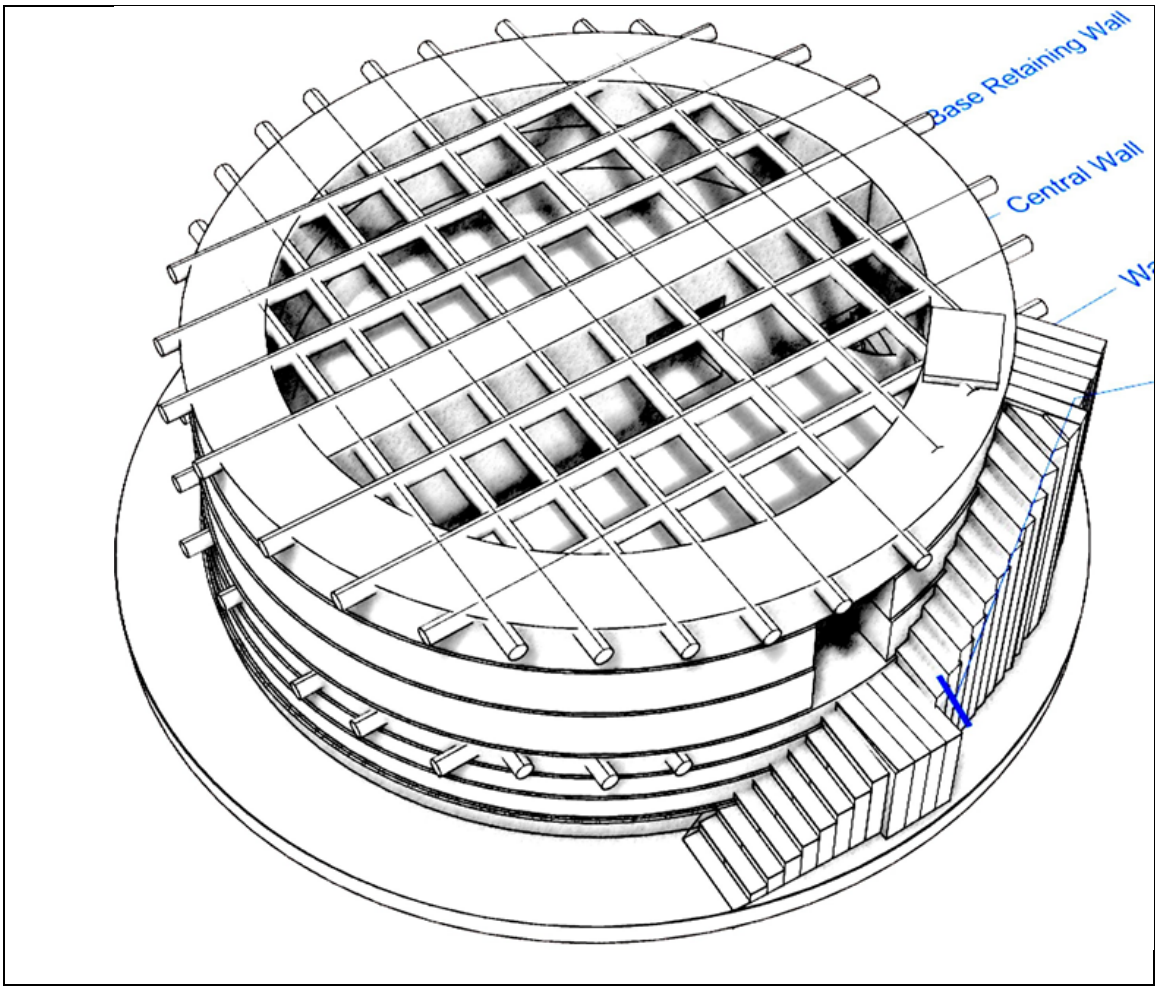

Figure 71 Walls, Stairs and, supporting structures of built form 19

At the second floor which is 5m high from the ground the beams and central wall are implemented to make the flooring. Then either a single pole with other radial beams or the central wall as in floor one are used to finish the built form. There is no direct

material evidence to suggest either, however, given the commanding presence of elaborate stairs for the second floor, the existence of one or the other is highly likely.

Roofing might have been built either from grass or layered wood sealed with mud and animal hides. Given the high temperature of Adulis, the latter was preferred and is the covering almost all of the other rectangular buildings documented at Adulis. For volume estimate of these building, a conservative estimate is made regarding the roofing. In the case of built form 19, a grass roof with a single pole and eight radial beams to support the roof is the least possible roof given the geometry of the building.

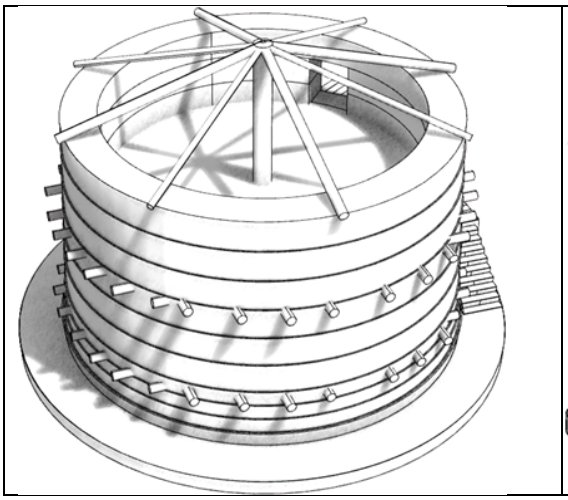

Figure 72 Second Floor Walls, supporting structures

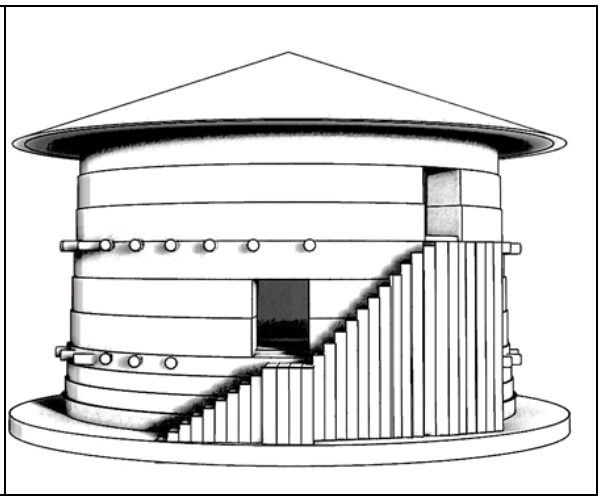

Figure 73 Southern View of built form 19

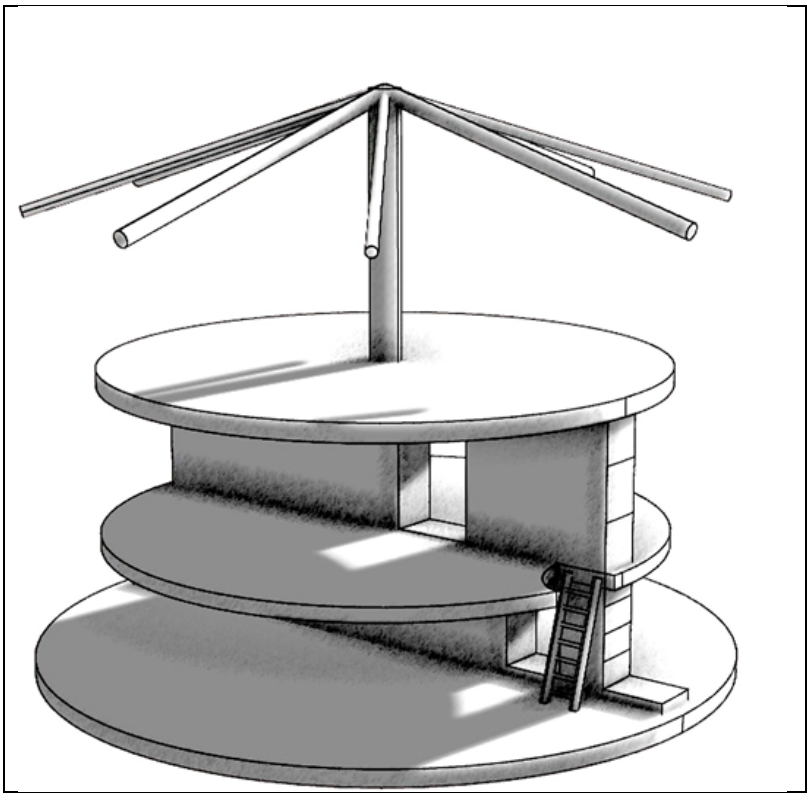

Figure 74 Internal structures of built form 19

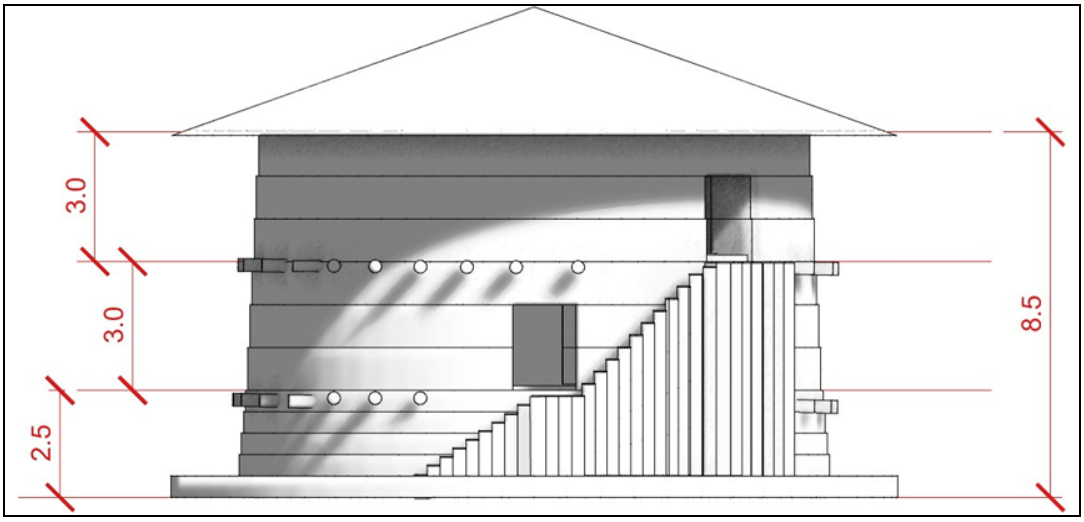

Figure 75 Elevation of built form 19

Built Form 19

Walls	Volume in Cubic Meters	
Wall 1	30.63	
Wall 2	29.56	
Wall 3	28.51	
Wall 4	27.45	
Wall 5	50.73	
Wall 6	48.73	
Wall 7	48.68	
Wall 8	44.77	
Wall 9	42.82	
Wall 10	42.61	
Total	394.49	394.49
Floors		
Base Floor	28.28	
Living Quarter Floor	18.38	
2nd Floor	30.96	
Roof	100.53	
Total	178.15	178.15
Misc		
Stairs	37.01	
Central Wall	49.46	
Total	86.47	86.47
Beams		
Floor 0	11.04	
Floor 1	11.91	
Floor 2	17.67	
Total	40.62	40.62
	Grand Total	*699.73*

Table 7 Volumetric data of built form 19

3.7 Rectangular built forms

The third group of houses that comprise the remaining 33 built forms are rectangular building that ranged from complex buildings to simple one-room residences.

3.7.1 Built form 1

Built form 1 is located at quad A1. Since this spot was excavated up to12 meters deep in 1907 for the then colonial excavators to understand the stratigraphy, it is gone for good. What is left is a sketch drawing from the engineer Checchi who was assigned by the colonial government to draw the site layout. The model is based on these excavation notes, in addition to my fieldwork.

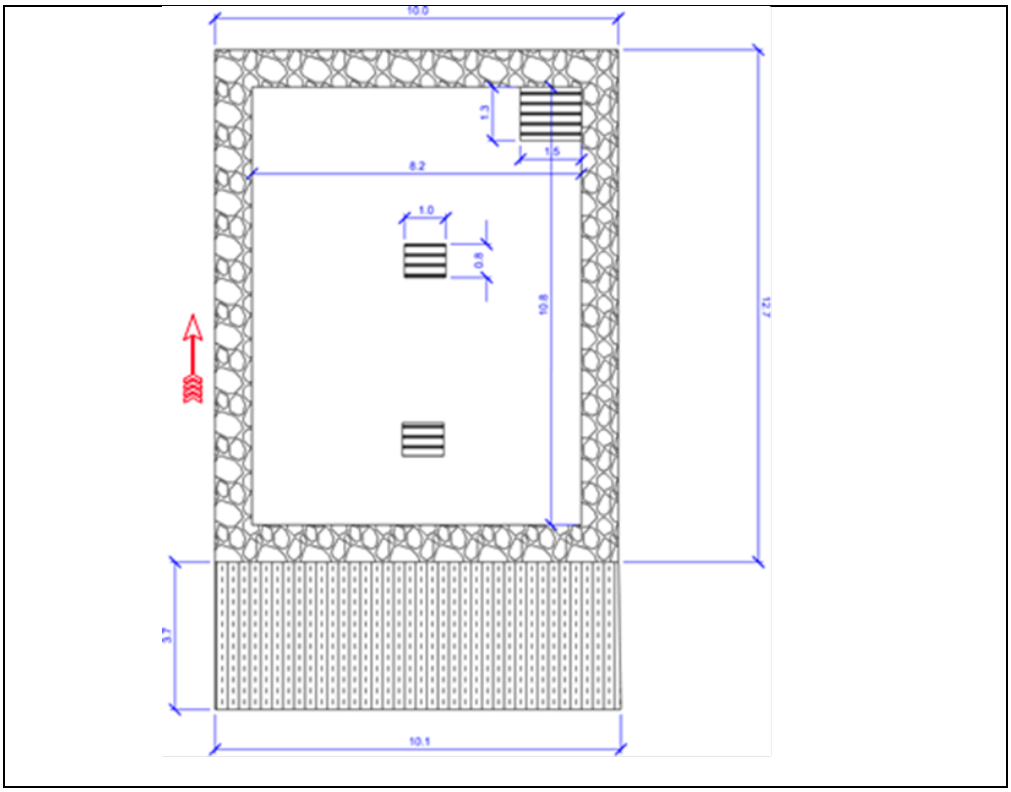

Figure 76 Floor plan of built form 1

Also, this is built form is used in the method of construction demonstration presented above. The volumetric data is of this built form is also discussed above (see Table 1).

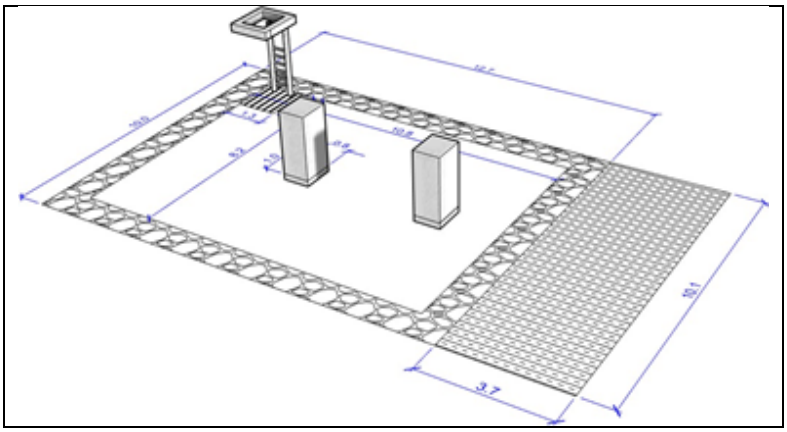

Figure 77 Base floor of built form 1

What is relevant here is understanding the storage practices of residents of Adulis. Since the foundation walls are usually discovered at excavations, some scholars have erroneously suggested these types of houses have no doors and were accessed through the roof perhaps with a ladder. These perspectives do not account for the presence of stairs that at times are very prominent and quite elaborate.

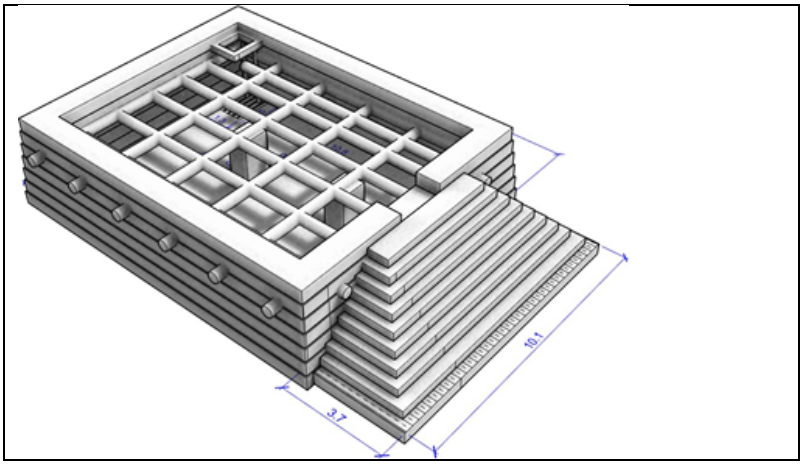

Figure 78 Storage in built form 1

The base floor was accessed through a ladder from the living floor as demonstrated in Figure 77 and Figure 78. In some instances these storage spaces located on the base of a building are accessed from the side wall. For the most part, if the base floor is accessed from the side wall, it is most likely used for animals, sheep and goats or others.

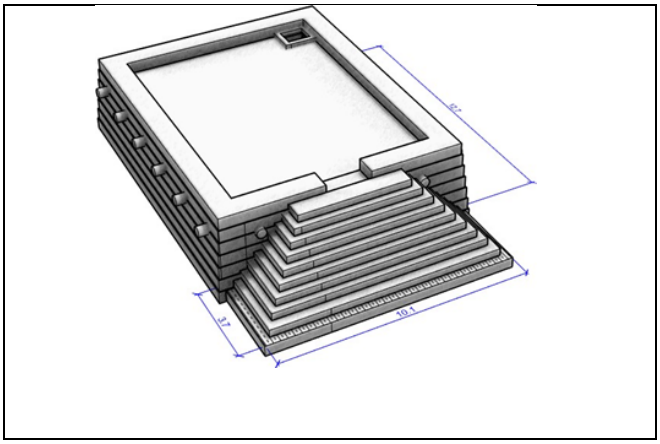

Figure 79 Living floor of built form 1

In the case of built form 1, the spaces are accessed through the house, which suggests they might have been used to store something valuable that needs more supervision or security.

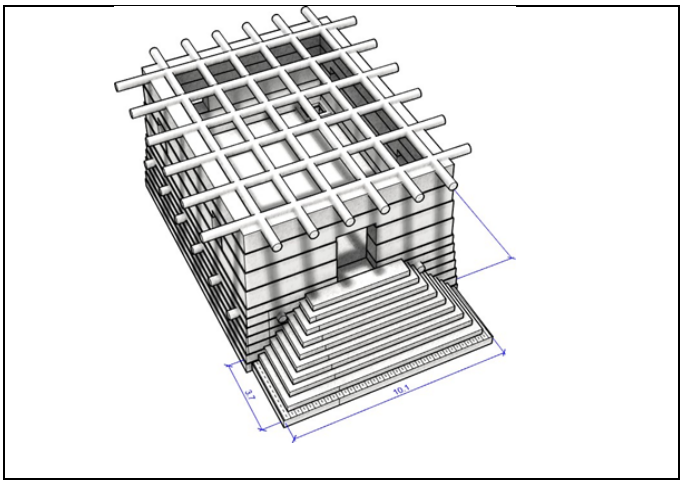

Figure 80 Living floor of built form 1

There is not enough data to detail whether the living quarter was divided or not, but it seems very likely. Both the walls and stairs of built form 1 are elaborate. The building includes five windows.

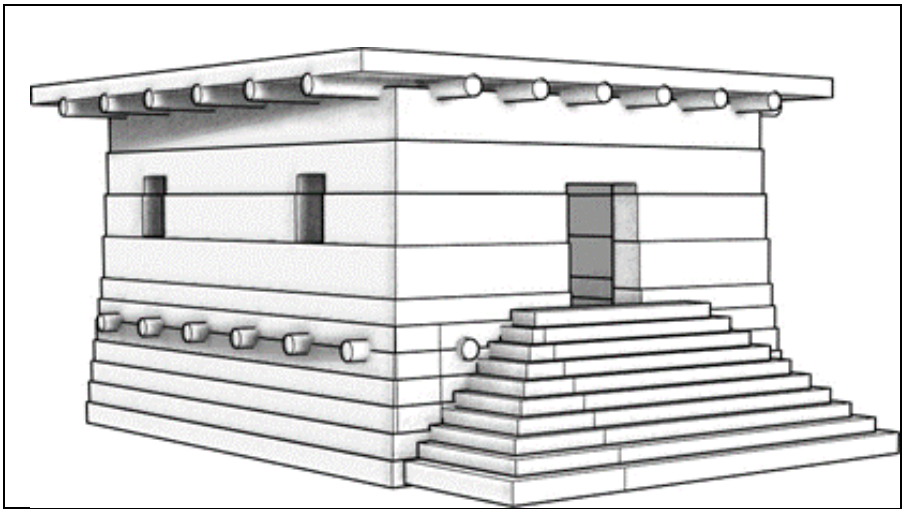

Figure 81 Built form 1 Perspective view

Consistent with the other built forms, it is oriented on the north-south axis. My ethnographic inquiry into such design choices suggests the north-south orientation is preferable in hot places such as Adulis to keep the house cooler. While most private

residences and public building built in pre-Christian era favored this orientation, on the contrary, Christian era public built forms are positioned on an east-west axis.

3.7.2 Built Form 2

Like built form 1, built form 2 is located in the B1 quad (see Figure 57). Its proximity to built form 1 suggests some relationship, however, there is no definitive data to comment in detail on what sort of relation. The artifacts that were documented in these two built forms indicate separate households rather than an extension of built form 1.

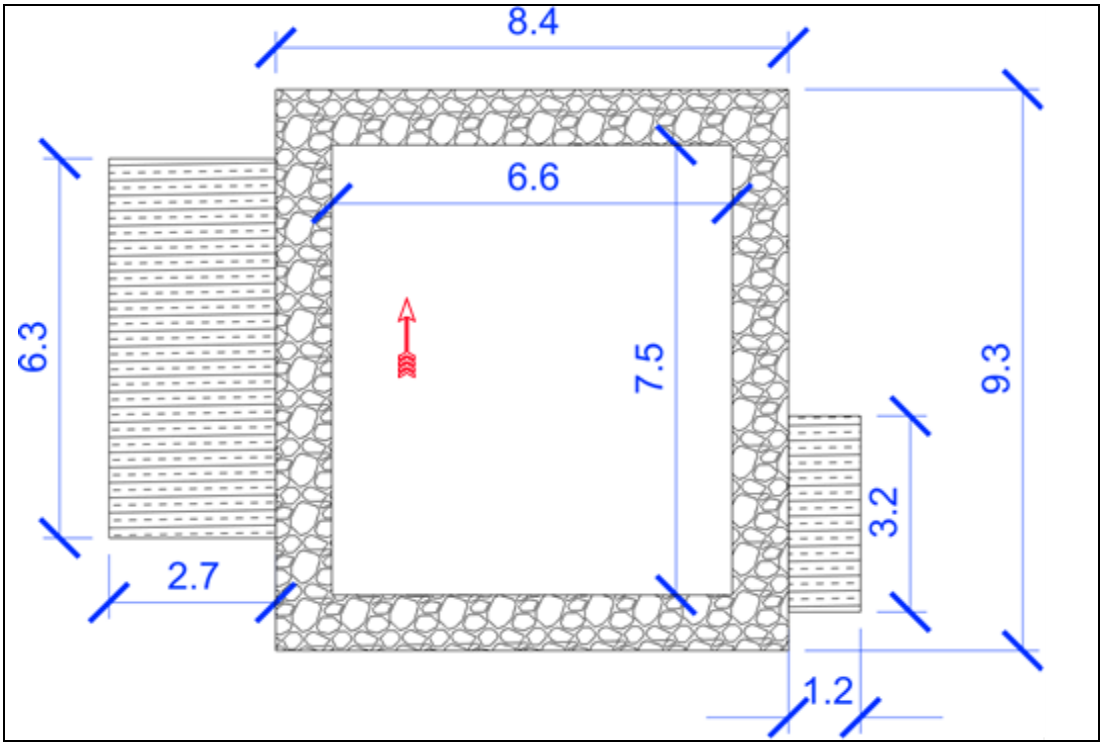

Figure 82 Floor plan of built form 2

While the majority of Adulis built forms are aligned in the north-south axis, built form 2 is on the east-west axis. It has two doors one on the east side (back entrance) and a front door on the west side.

The base floor may have been used as storage by using either elongated beams more than 7.5 m on the north-south axis or more than 6.6 m on the east-west axis. There are no apparent supporting structures for built form 2 such as columns or post-holes.

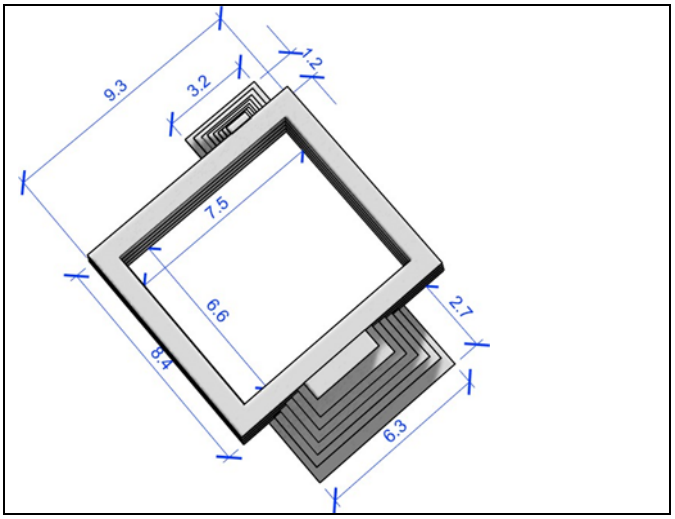

Figure 83 base floor of built form 2

Structures that have two entrances, are more likely to have a divided room, the western part used for formal entry while the eastern door used either by family members or used for gender, class or status specific entries. Aforementioned is demonstrated materially: while the western stairs are elaborate, with bigger and a welcoming door, the eastern door and stairs are just functional.

Built form 2 has one window on the north wall and one window on the south wall. At 5 meters from the foundation crossing beams and a roof completes the built form.

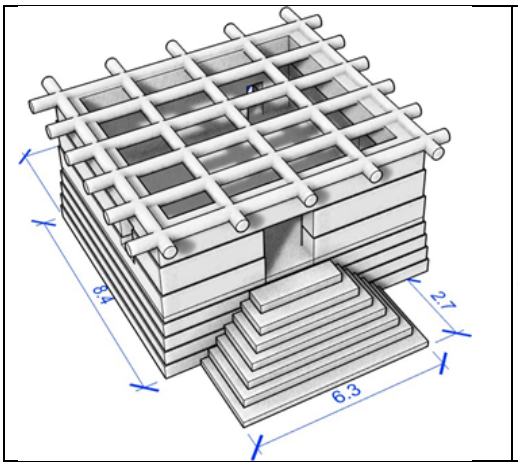

Figure 84 Living quarter of built form 2

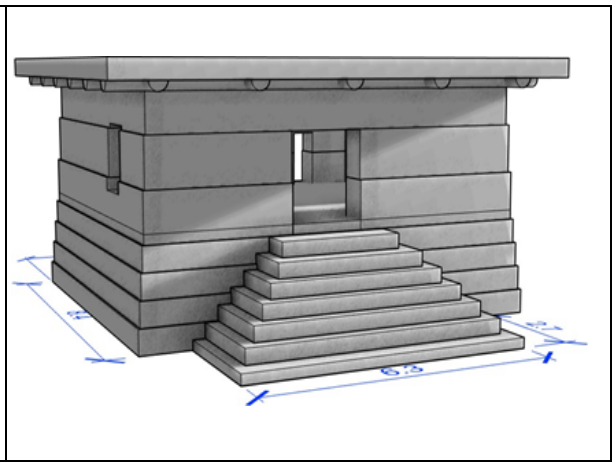

Figure 85 Built form 2, perspective view

Built Form 2

Walls	Volume in Cubic Meters	
Wall 1	14.59	
Wall 2	13.71	
Wall 3	12.84	
Wall 4	11.98	
Wall 5	20.31	
Wall 6	18.01	
Wall 7	18.82	
Total	110.26	110.26
Floors		
Base Floor	9.78	
Living Quarter Floor	14.22	
Total	24	24
Beams		
East-West	5.76	
North-South	7.73	
Total	13.49	13.49
Front Stairs		
Stair 1	3.89	
Stair 2	3.09	
Stair 3	2.35	
Stair 4	1.72	
Stair 5	1.19	
Stair 6	0.56	
Total	12.8	12.8
BackStairs		
Stair 1	0.18	
Stair 2	0.16	
Stair 3	0.13	
Stair 4	0.11	
Stair 5	0.09	
Stair 6	0.08	
Total	0.75	0.75
	Grand Total	161.3

Table 8 Volumetric data of Built Form 2

3.7.3 Built form 3

Built form 3 is found on quad A1 (see Figure 58). Unlike most of Adulis' structures that align either to the east-west axis or north-south through their entry point, built form 3 aligns to both orientations. It is not clear why this unusual built form aligns to both axes.

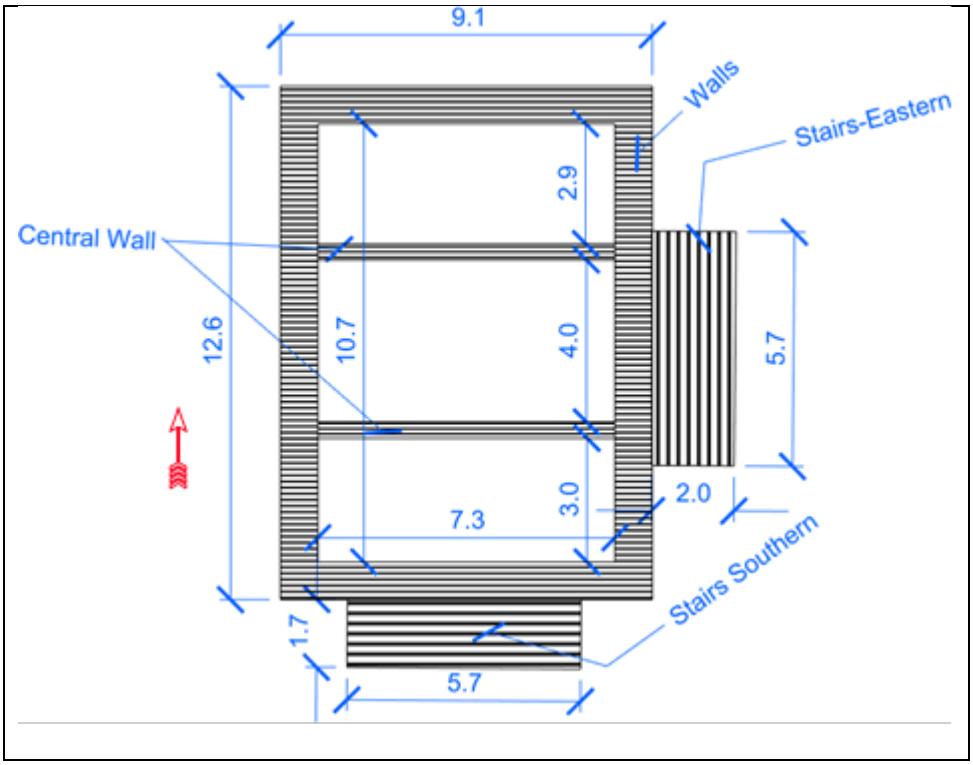

Figure 86 Floor plan of built form 3

Built form 3 has dual access to the structure-one through the eastern stairs and the other from the southern stairs, although more labor is spent on the eastern stairs than the southern. Built form 3 is larger than built form 2 and longer than built form 1.

Two vertical internal walls divide the structure into three rooms that are 3 m, 4 m and 2.9 m wide rooms (see Figure 86) on the base floor and the living floor as well. These rooms are connected through doors cut out of the internal wall.

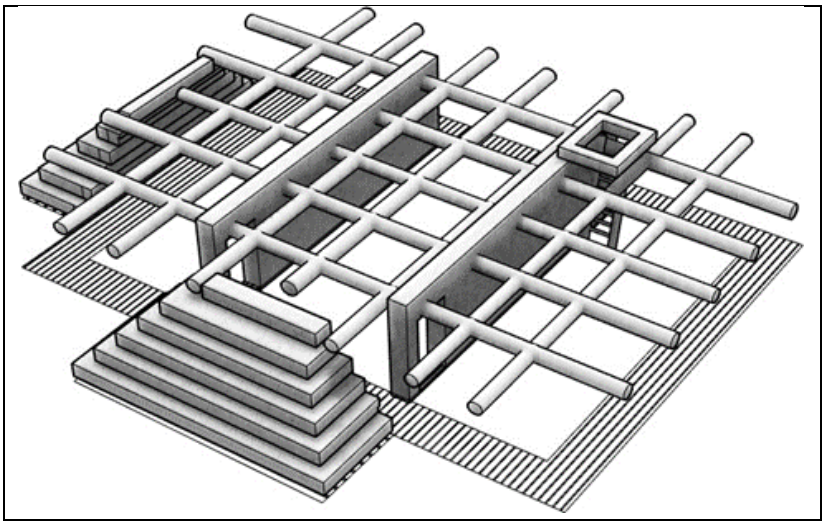

Figure 87 Base floor Built Form 3

Like built form 1 the base floor is accessed through a ladder from inside one of the northern rooms (see Figure 87). Then the same internal wall adjoins the three rooms in the living room. The northern and southern parts of the external wall have two windows while the western external wall has one window (see Figure 89).

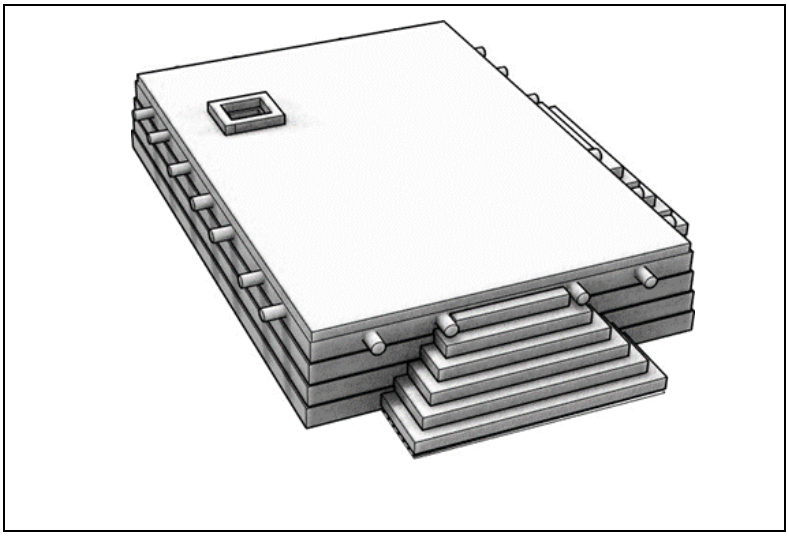

Figure 88 Living quarter of built form 3

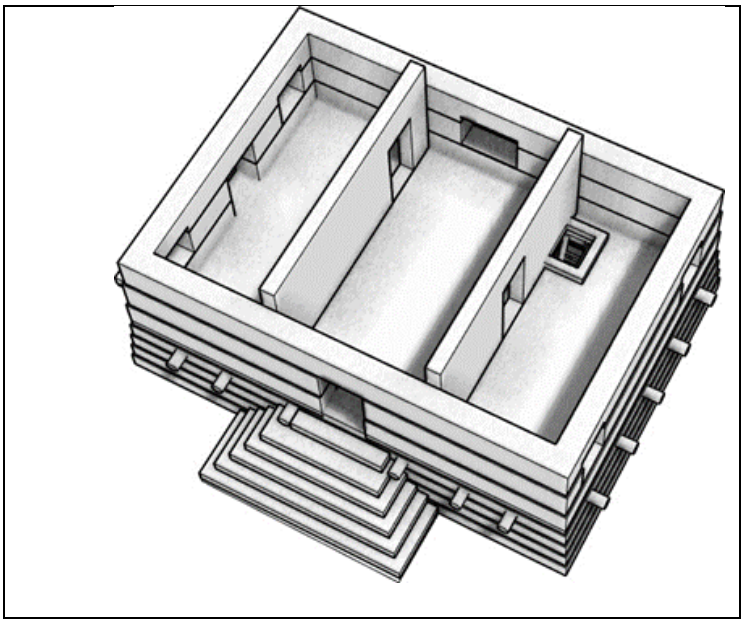

Figure 89 Living quarters with dividing walls

The Graduated Masonry at built form 4 steadily proceeds at 0.5 m up to living floor (four rings), then at 1m range from the living floor to the roof. At 6m from the foundation built from 4 is completed with a roof (see Figure 90).

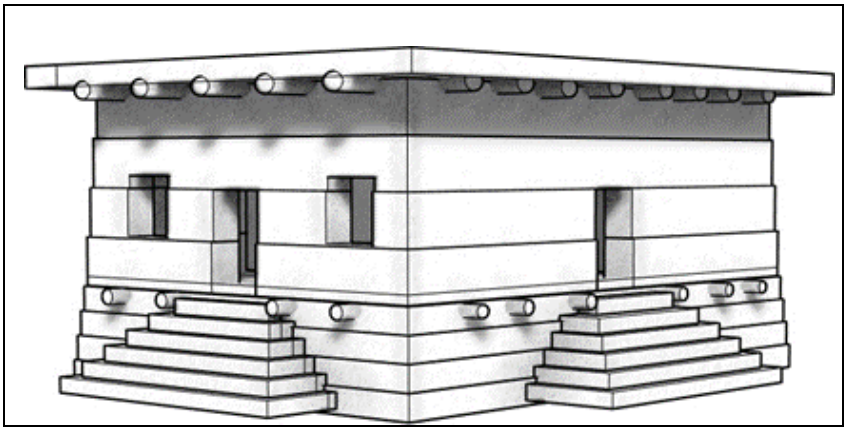

Figure 90 Built form 3

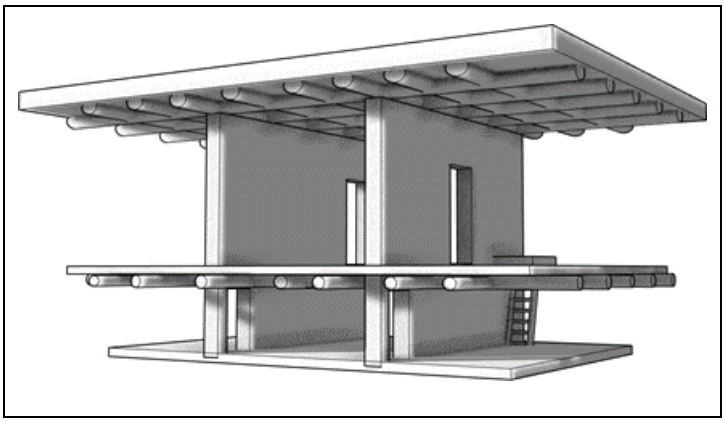

Figure 91 Internal structures of built form 3

Built Form 3

Walls	Volume in Cubic Meters	
Wall 1	18.29	
Wall 2	17.21	
Wall 3	16.14	
Wall 4	15.07	
Wall 5	26.3	
Wall 6	24.34	
Wall 7	23.91	
Total	141.26	141.26
Stairs-Eastern		
Stair 1	3.42	
Stair 2	2.64	
Stair 3	1.95	
Stair 4	1.39	
Stair 5	0.9	
Stair 6	0.36	
Total	10.66	10.66
Stairs-Southern		
Stair 1	2.89	
Stair 2	2.18	
Stair 3	1.54	
Stair 4	1.04	
Stair 5	0.59	
Stair 6	0.23	
Total	8.47	8.47
Floors		
Base Floor	15.69	
Living Quarter Floor	21.3	
Roof Floor	88.44	
Total	125.43	125.43
Beams		
Base East-West	5.27	
Base North-South	6.32	
Roof East-West	15.34	
Roof North-South	13.5	
Total	40.43	40.43
Central Wall		
Central Wall 1	12.72	
Central Wall 2	13.72	
Total	26.44	26.44
	Grand Total	352.69

Table 9 Volumetric data of Built Form 3

3.7.4 Built form 4

Built form 4 is positioned at quad B1 (see Figure 57). It is slightly larger than built form 1, 2 and 3. This built form has three post-holes on the base floor. These post- holes are cut out of stone of about 0.7 m in diameter to accommodate either round wooden or stone pillars.

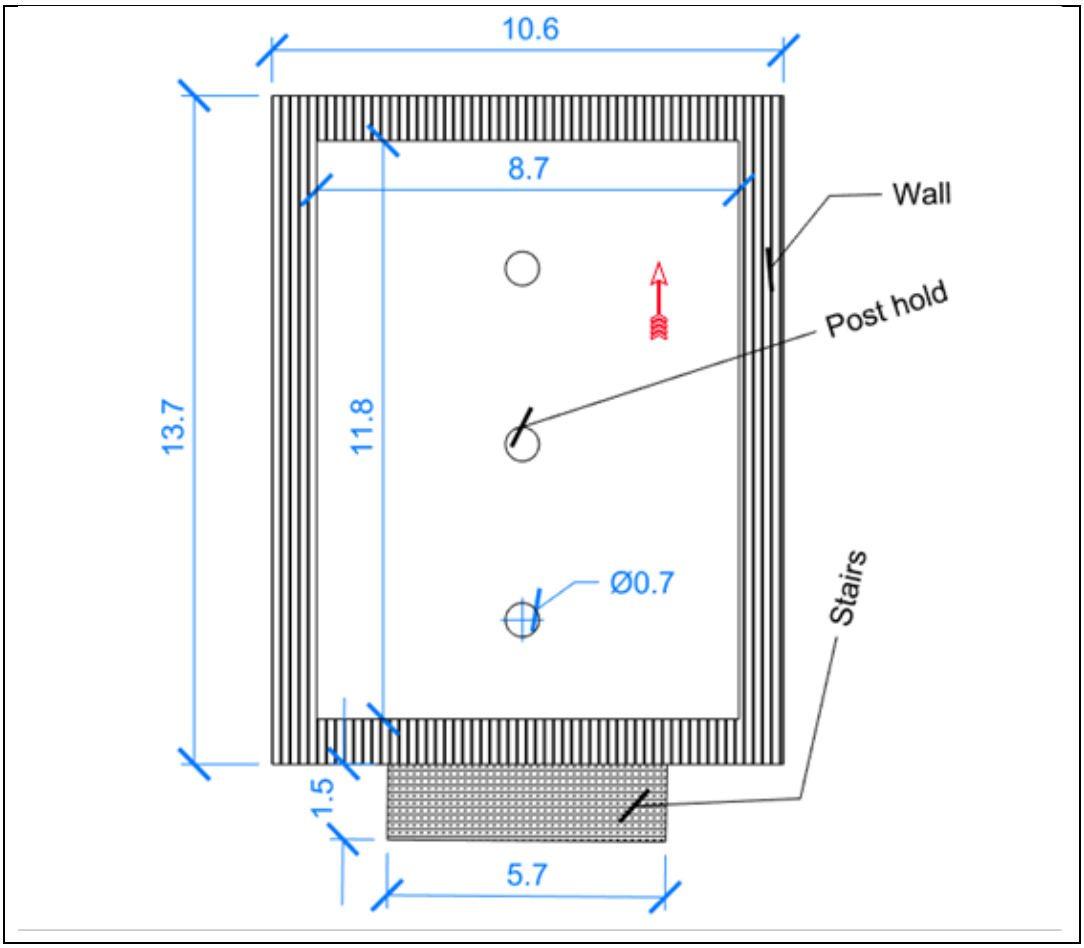

Figure 92 Floor plan of built form 4

Similar post-holes are also documented in built forms 7, 20, 8- S and 20. It has one door on the southern wall and two windows each on the eastern, western and northern walls (see Figure 95).

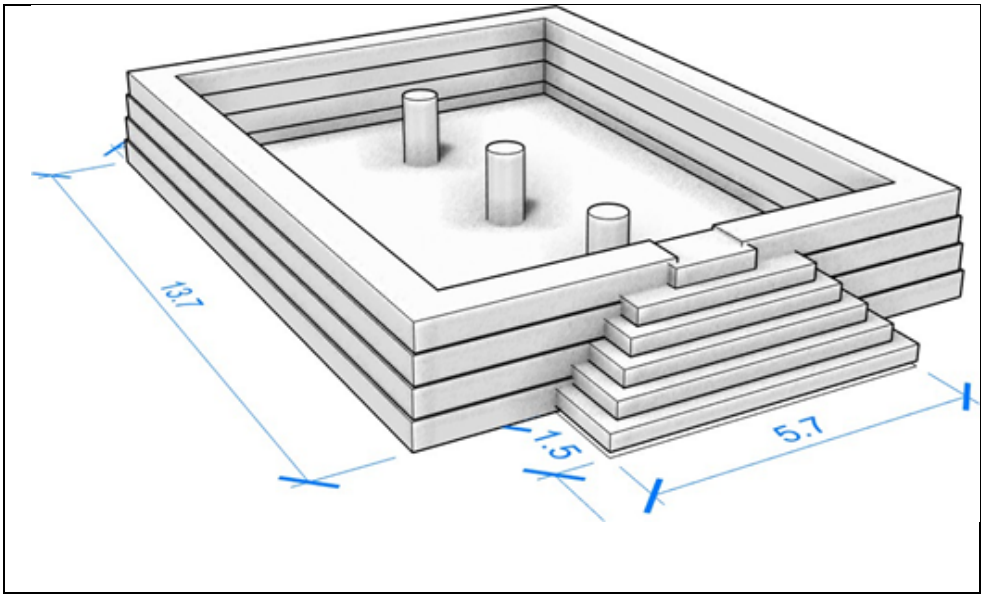

Figure 93 Base Floor of built form 4

The base walls are raised two meters from the ground before they are attached to the living floor. There is no clear observation documented on how the base floor was accessed-the absence of an external door suggests access through the living floor.

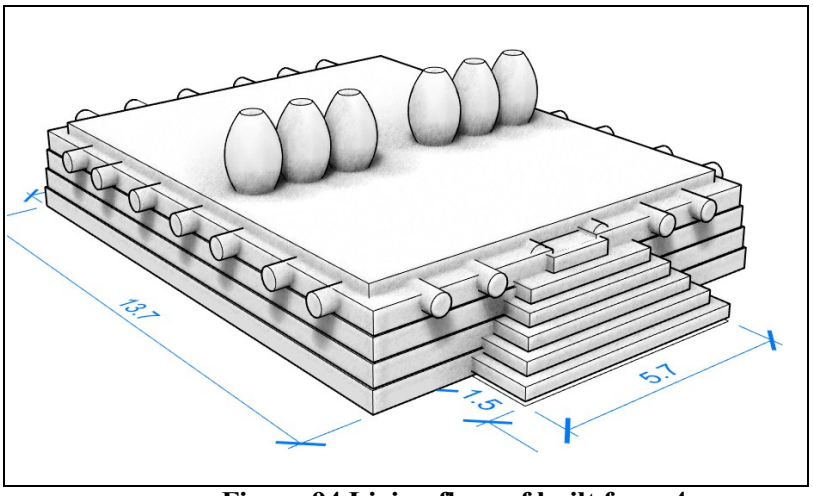

Figure 94 Living floor of built form 4

On the living floor six granaries divide the living space into two separate areas (see Figure 94). It is not clear what the function of these granaries, whether they were

used to store grain or other valuables. It seems they were filled from above and accessed through bottom side hole that can be plugged by cloth or hide. The living floor walls are built another three meters (at 1m interval) before they are fastened to the roof (see Figure 95).

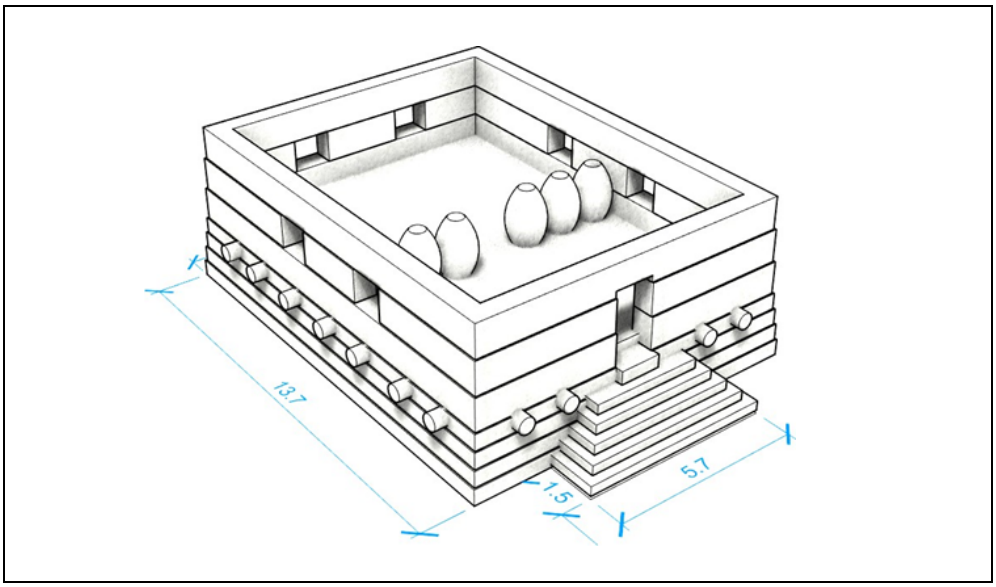

Figure 95 Living floor of built form 4 with granaries as room dividers

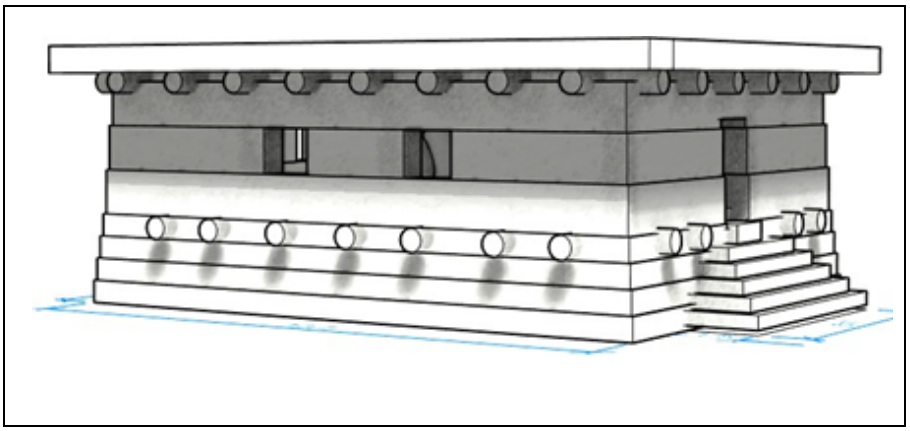

Figure 96 Built form 4, perspective view

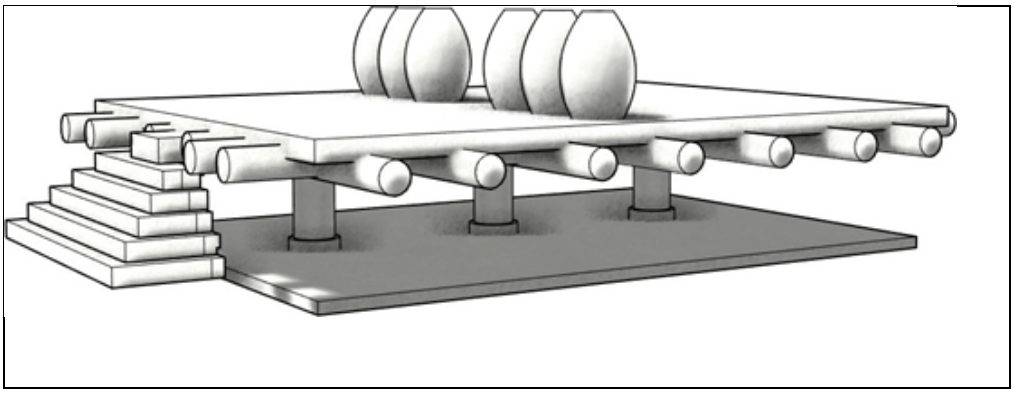

Figure 97 Built form 4, Internal structures

Built Form 4

Walls	Volume in Cubic Meters	
Wall 1	20.58	
Wall 2	19.37	
Wall 3	18.18	
Wall 4	16.9	
Wall 5	30.76	
Wall 6	23.88	
Wall 7	26.84	
Total	156.51	156.51
Stairs		
Stair 1	2.89	
Stair 2	2.18	
Stair 3	1.54	
Stair 4	1.04	
Stair 5	0.59	
Stair 6	0.23	
Total	8.47	8.47
Floors		
Base Floor	20.6	
Living Quarter Floor	26.93	
Roof Floor	108.02	
Total	155.55	155.55
Beams		
Base East-West	7.75	
Base North-South	14.84	
Roof East-West	17.74	
Roof North-South	16.92	
Total	57.25	57.25
Base Columns		
Column 1	0.73	
Column 2	0.73	
Column 3	0.73	
Total	2.19	
Base Columns Post		
Column 1	0.11	
Column 2	0.11	
Column 3	0.11	
Total	0.33	0.33
	Grand Total	*378.11*

Table 10. Volumetric data of Built Form 4

3.7.5 Built form 6

Built form 6 is located in quad B2 (see Figure 57). Unlike built forms 4, 7, 20, 8-S and built form 20 that use a post-hole to support the living floor, built form 6 uses two internal walls both as load bearing walls and as walls dividing the built form into three spaces, something observed in built form 3. It has two entrance points through northern and southern stairs although the southerly stairs are more ornate than the northern stairs similar to built form 3.

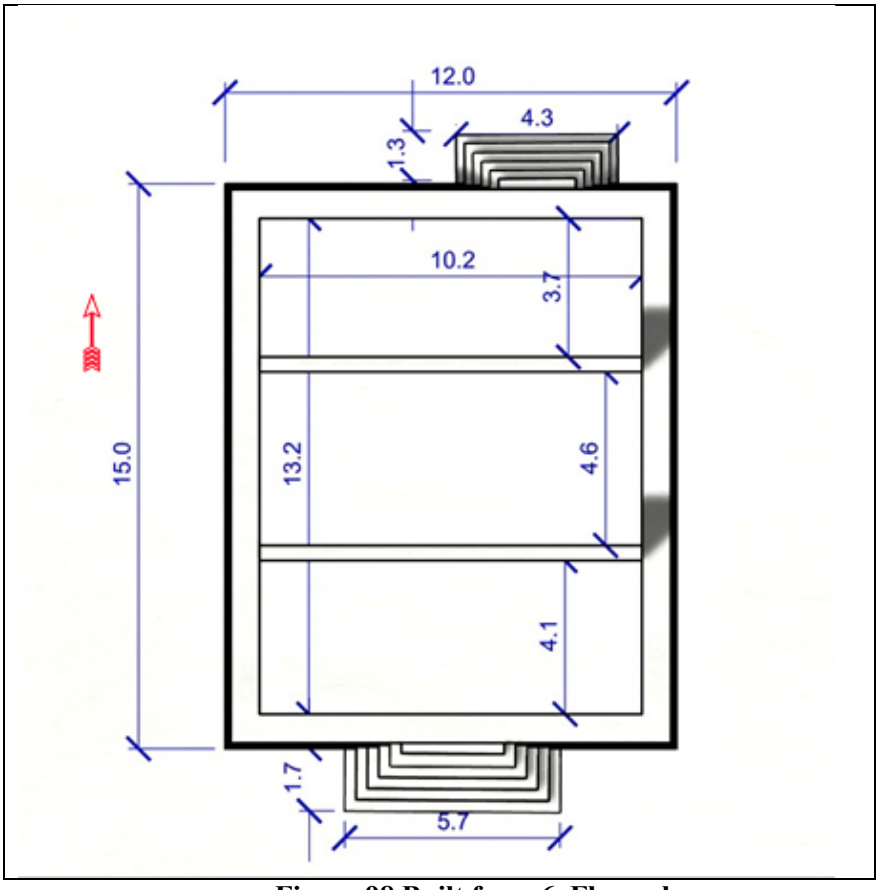

Figure 98 Built form 6, Floor plan

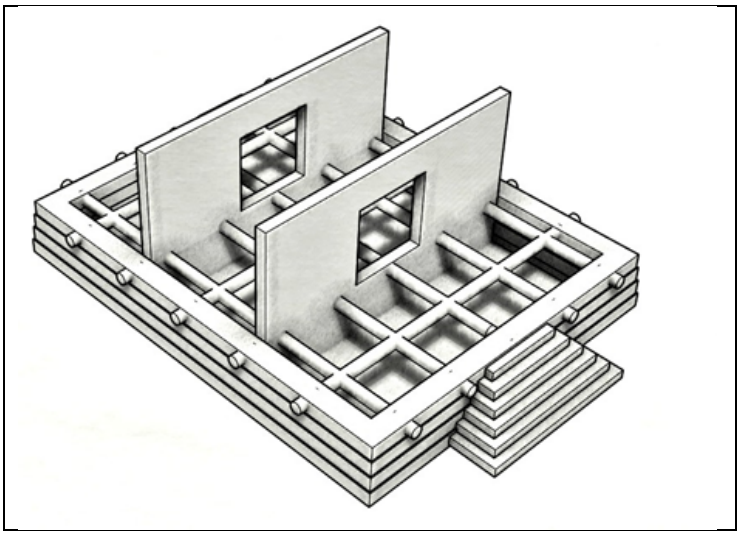

Figure 99 Built form 6,Base Floor and dividing walls

This can be easily demonstrated in the volumetric data, the southern stairs being 8.47 m^3 while the northern stairs measuring 4.9m^3.

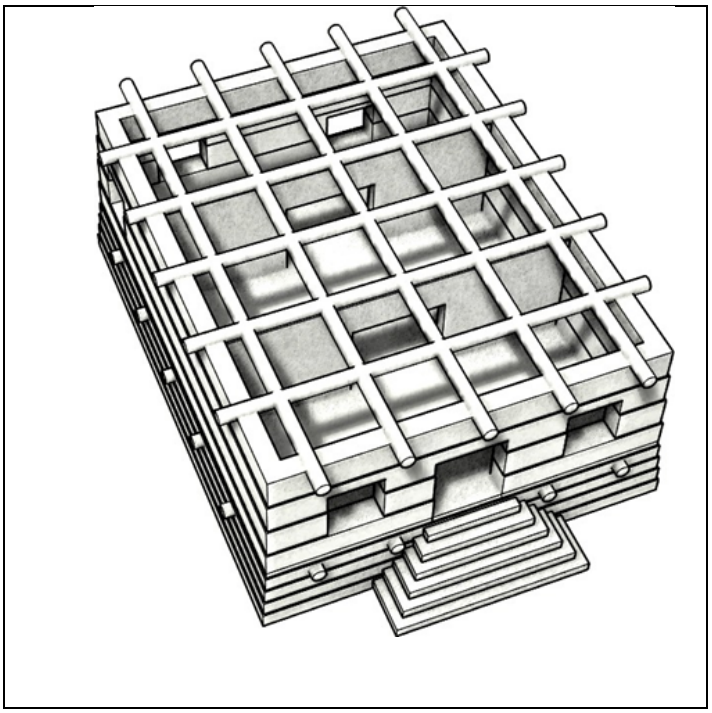

Figure 100 Built form 6, Living Floor

The base floor and the living floor are apportioned into three unequal spaces of 4.1 m, 4.6m, and 3.7m by these two vertical internal walls (see Figure 98). The base walls are constructed to 2m, then the living floor is built by crossing beams. The living floor beams are repeatedly supported by the vertical internal walls.

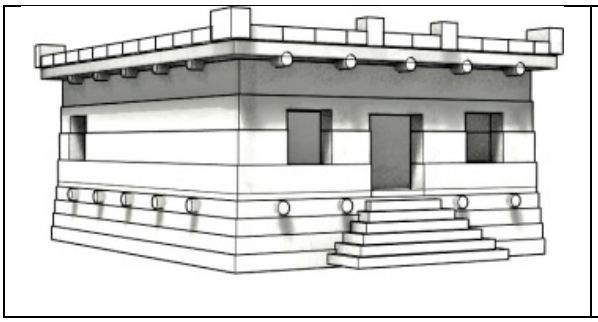

Figure 101 Built form 6, Front view

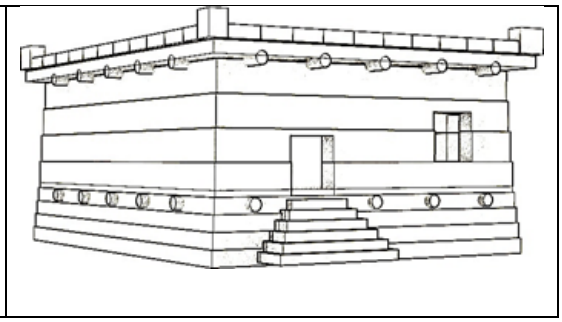

Figure 102 Built form 6, Back view

Built form 6 has two windows on the southern wall and one window on the northern and western wall (see Figure 101 and Figure 102). The three rooms in living floor are joined by two internal doors, and it is most likely the three base floor rooms may have been joined with internal doors as well. The living quarter is built to 4m, and crossing beams close the structure to make a roof (see Figure 101)

Built Form 6

Walls	Volume in Cubic Meters	
Wall 1	23.2	
Wall 2	21.86	
Wall 3	20.52	
Wall 4	19.19	
Wall 5	18.22	
Wall 6	10.05	
Wall 7	27.53	
Wall 8	27.96	
Total	168.53	168.53
Stairs-Southern		
Stair 1	2.89	
Stair 2	2.18	
Stair 3	1.54	
Stair 4	1.04	
Stair 5	0.59	
Stair 6	0.23	
Total	8.47	8.47
Stairs-Northern		
Stair 1	1.68	
Stair 2	1.26	
Stair 3	0.89	
Stair 4	0.6	
Stair 5	0.34	
Stair 6	0.13	
Total	4.9	4.9
Floors		
Base Floor	26.9	
Living Quarter Floor	34.05	
Roof Floor	78.9	
Total	139.85	139.85
Beams		
Base East-West	7.37	
Base North-South	9.25	
Roof East-West	9.95	
Roof North-South	7.75	
Total	34.32	34.32
Central Wall		
Central Wall 1	20.81	
Central Wall 2	20.79	
Total	41.6	41.6
	Grand Total	*397.67*

Table 10 Volumetric data of Built Form 6

3.7.6 Built form 7

Built form 7 is located in quad B2 (see Figure 57). It is one of the most elaborate and prominent built forms with L-shaped footprint. It has three entry points, one on the southern and one on the western side, and another to the base floor on the northern wall.

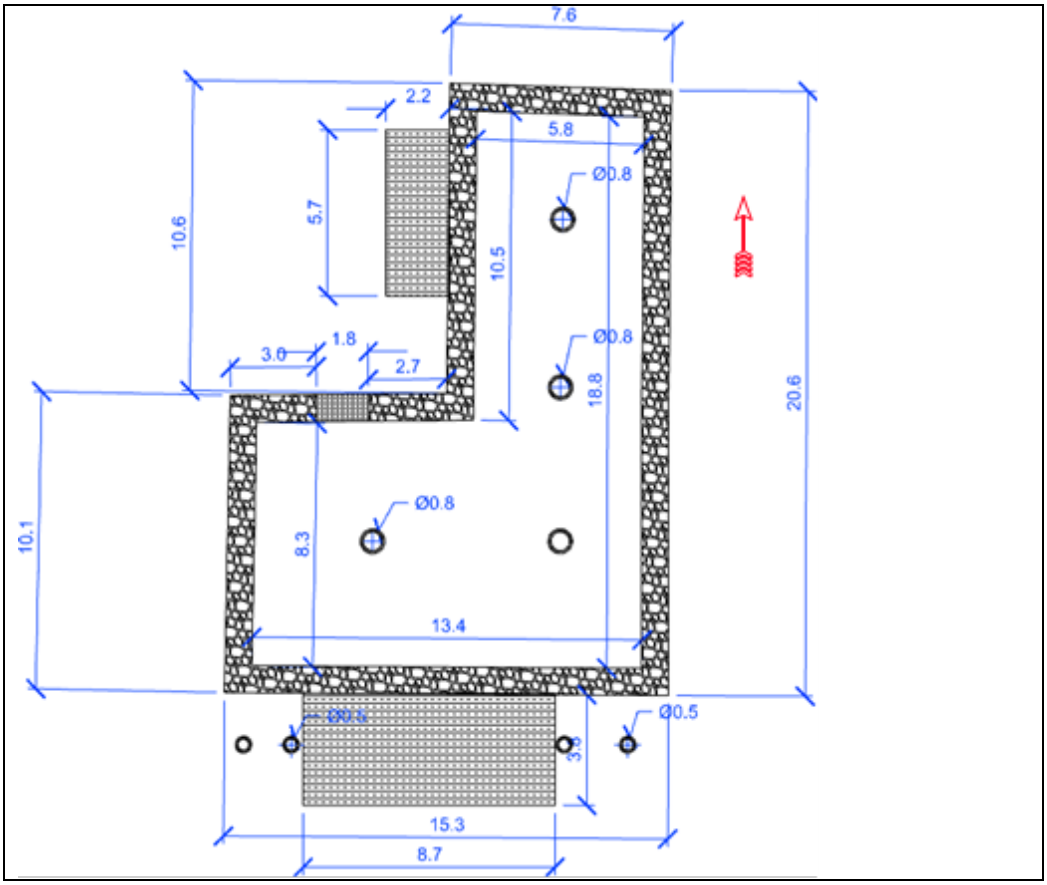

Figure 103 Built form 7, Floor Plan

Like built forms 4, 8-S and built form 20, it uses post-holes to support the floor, although the post-holes are slightly larger in built form 7, with a diameter of 0.8 m. Four post-holes are aligned in L-shaped form at the base floor (see Figure 104), while four

others are aligned in the east-west axis at the southern wall to support columns (see Figure 104 and Figure 105).

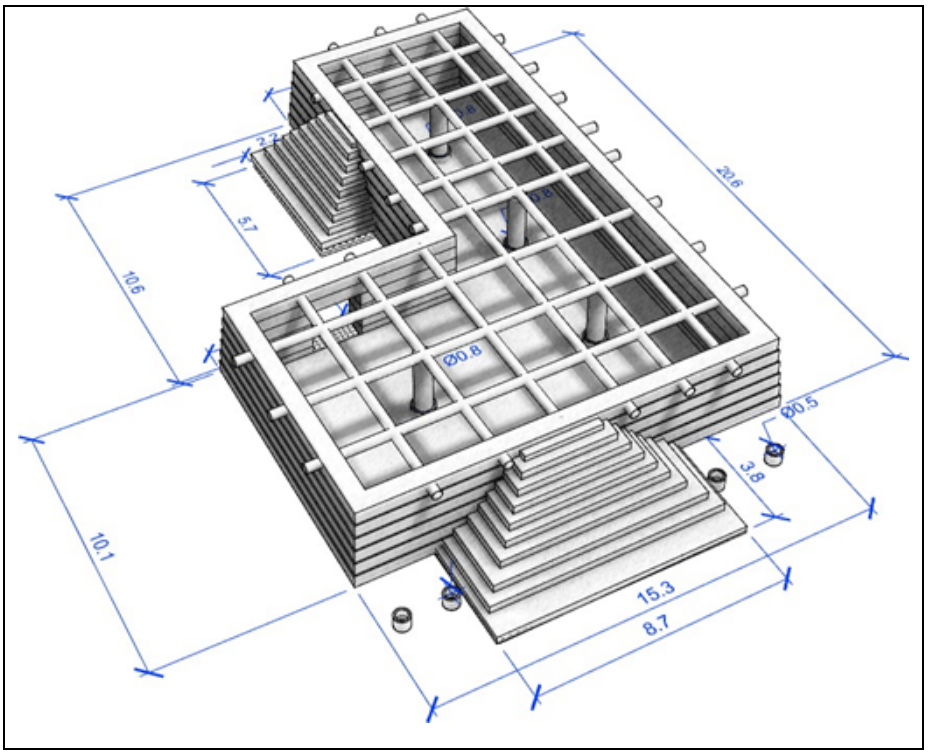

Figure 104 Built form 7,Base Floor

The southern stairs are more elaborate and conspicuous than the western stairs suggesting it was the formal or main entry.

Built form 7 has two windows on the southern wall and one on the most northern wall and two on the middle north wall (see Figure106 and Figure 107). What is of note is built form 7's walls continue to be built with measurements of one cubit, or half a meter all the way to the roof- a feature that is mostly associated with a public building.

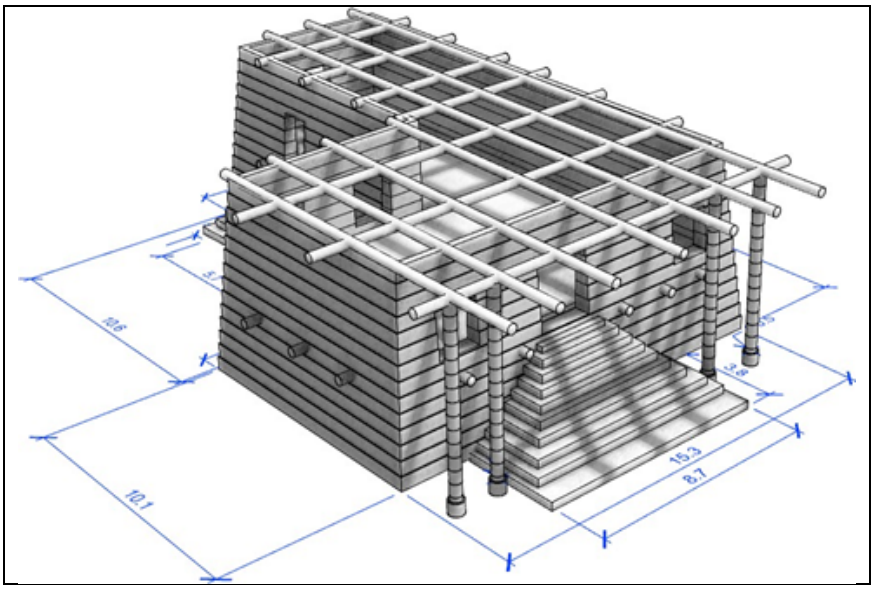

Figure 105 Built form 7,Living Floor

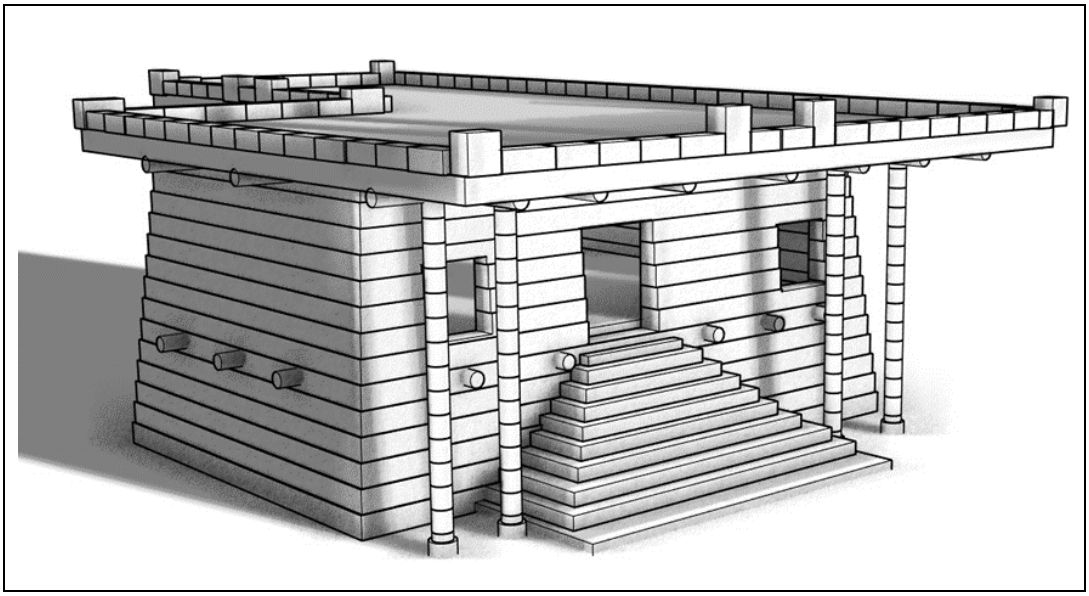

Figure 106 Built form 7,Living Floor Front view

It has 14 courses of walls in the height of 7 meters structure, while other built forms show 4-6 courses in one cubit, or half a meter, and the rest in two cubits, or one meter.

As noted in this chapter Graduated Masonry decreases in volume from the base wall to the roof wall as can be shown in built form 7. For instance, Wall-1 is 31.24 m^3

while Wall-14 is 8.82 m^3, which shows the gradual decrease in volumetric data (see Table 11).

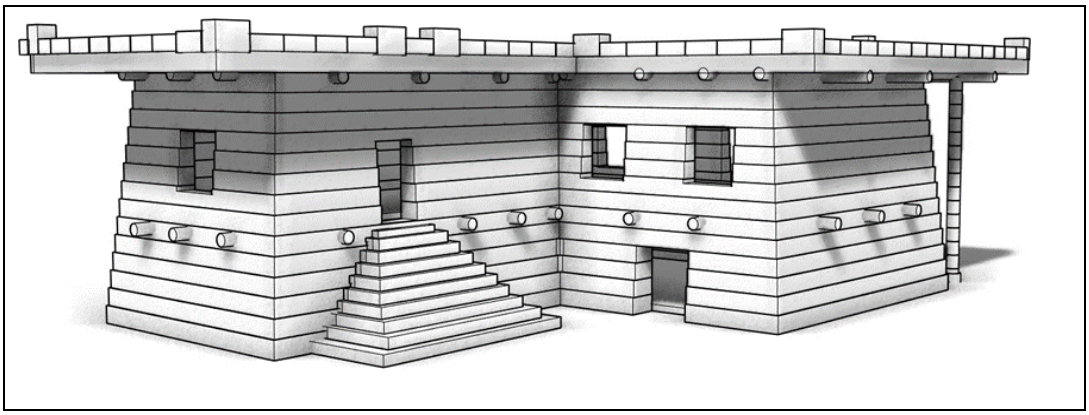

Figure 107 Built form 7,Living Floor Back view

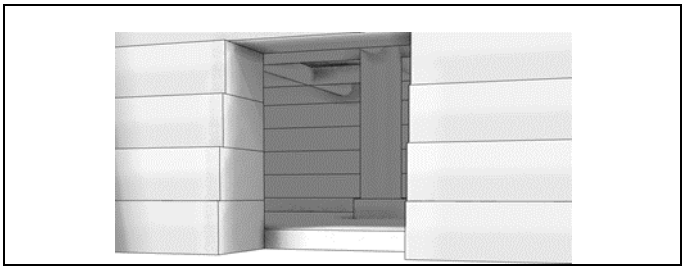

Figure 108 Built form 7, Base Floor entry door

Built Form 7

Walls	Volume in Cubic Meters	
Wall 1	31.24	
Wall 2	29.57	
Wall 3	27.69	
Wall 4	25.92	
Wall 5	24.16	
Wall 6	22.42	
Wall 7	19.64	
Wall 8	16.82	
Wall 9	14.32	
Wall 10	12.9	
Wall 11	12.22	
Wall 12	12.15	
Wall 13	10.48	
Wall 14	8.82	
Total	268.35	268.35
Stairs-Southern		
Stair 1	9.92	
Stair 2	7.62	
Stair 3	5.57	
Stair 4	4.01	
Stair 5	2.9	
Stair 6	2.18	
Stair 7	1.54	
Stair 8	1.04	
Stair 9	0.6	
Stair 10	0.17	
Total	35.55	35.55
Stairs-Western		
Stair 1	4.16	
Stair 2	2.97	
Stair 3	2.24	
Stair 4	1.68	
Stair 5	1.27	
Stair 6	0.89	
Stair 7	0.6	
Stair 8	0.35	
Stair 9	0.09	
Total	14.25	14.25
Floors		
Base Floor	34.43	
Living Quarter Floor	34.43	
Roof Floor	174.63	
Total	243.49	243.49
Beams		
Base East-West	6.59	
Base North-South	4.18	
Roof East-West	6.96	
Roof North-South	8.43	
Total	26.16	26.16
Porch Colomns		
Column support	0.19	
Colomns	3.47	
Total	3.66	3.66
Basement Posts		
Post support	0.52	
Posts	3.62	
Total	4.14	4.14
	Grand Total	*595.60*

Table 11 Volumetric data of Built Form 7

3.7.7 Built form 8

Built form 8 is comprised of three buildings designated North, Center and South buildings. These are located at quad B2 on the sitemap (see Figure 57). A striking feature regarding built form 8 is that it provides evidence regarding Adulis' underground drinking water structures. But first the built forms' floor plan and walls are presented.

A. North

The northern section of built form 8 consists of 5 rooms at the base and four rooms at the living floor. The base floor has one entry point through the southern wall (see Figure 111), the living floor has double entry, one through the southern wall and

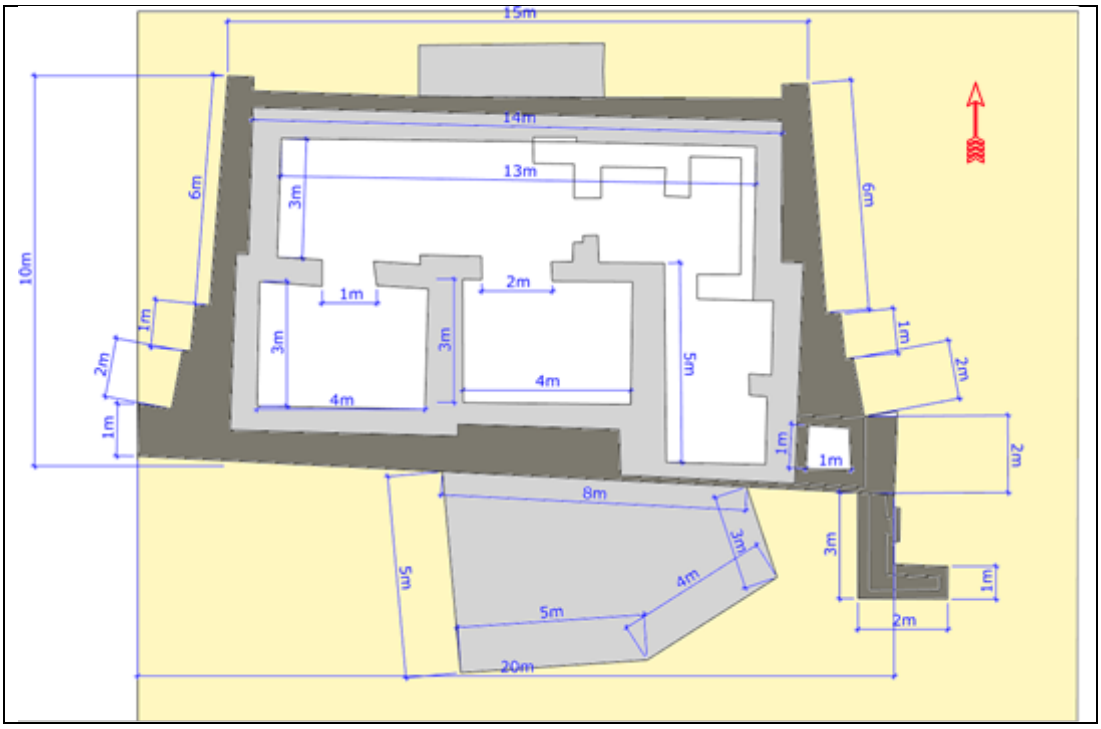

Figure 109 Built form 8, North Floor Plan

another through the northern wall (see Figure 110). The northern wall entry door seems to be more formal, while the southern entry to the living floor (see Figure 111) seems more functional as it gives access the courtyard shared by two other structures, or perhaps a water source that I will discuss shortly.

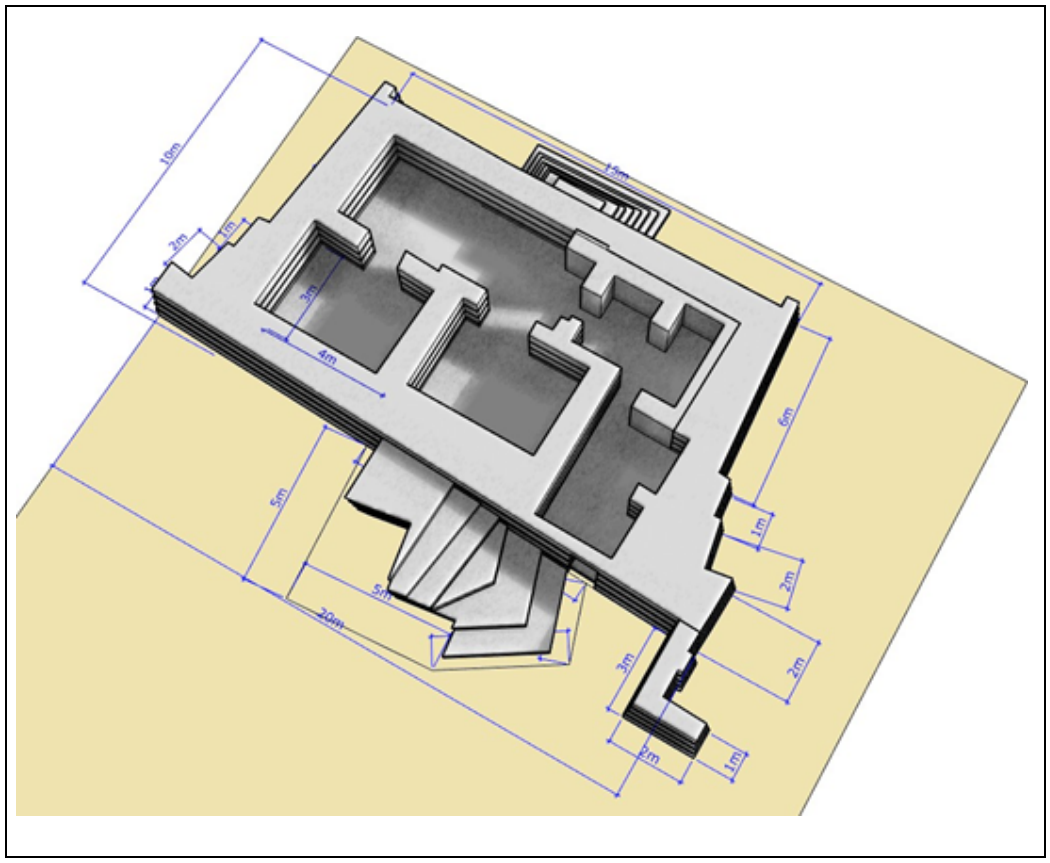

Figure 110 Built form 8, North Base Floor

A small room on the north-east side of built form measuring one meter by one meter (see Figure 112) might serve either as a toilet or watchtower. In a traditional construction, toilets are built few meters away from small houses, but more prominent houses can accommodate toilets within the structure. More rarely, bigger houses can have both.

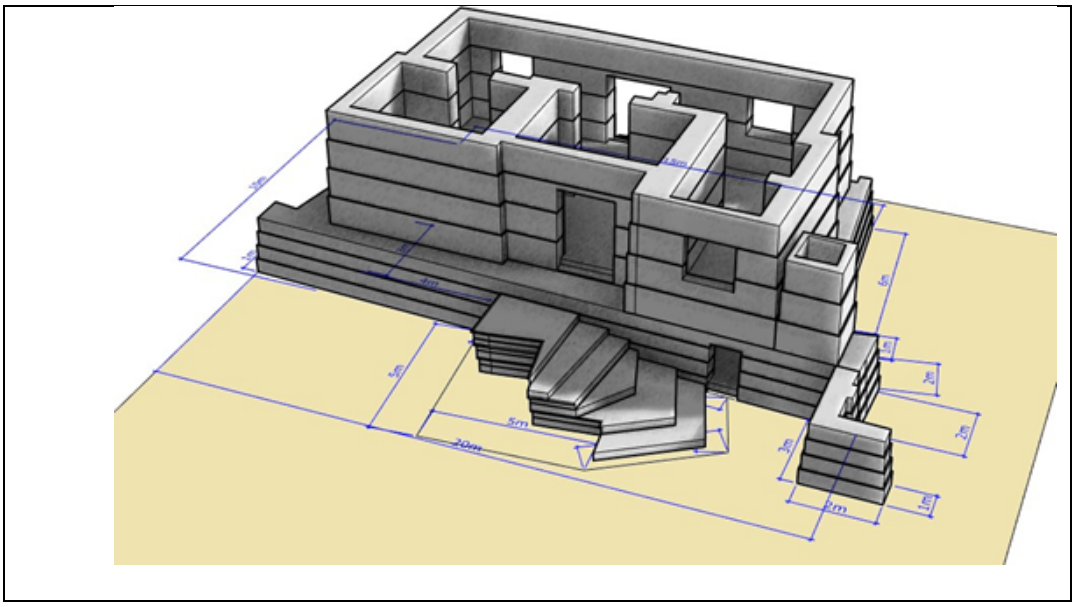

Figure 111 Built form 8, North Living Floor

Built form 8-N has one window on the southern wall and eastern wall, while it has two windows on the northern and western walls (see Figure 113). The entire built form 8 points to a very defensive settlement because it has protective walls, and is built on a sturdy foundation of higher quality walls, although this gets degraded on the upper walls (see Figure 125 and Figure 126).

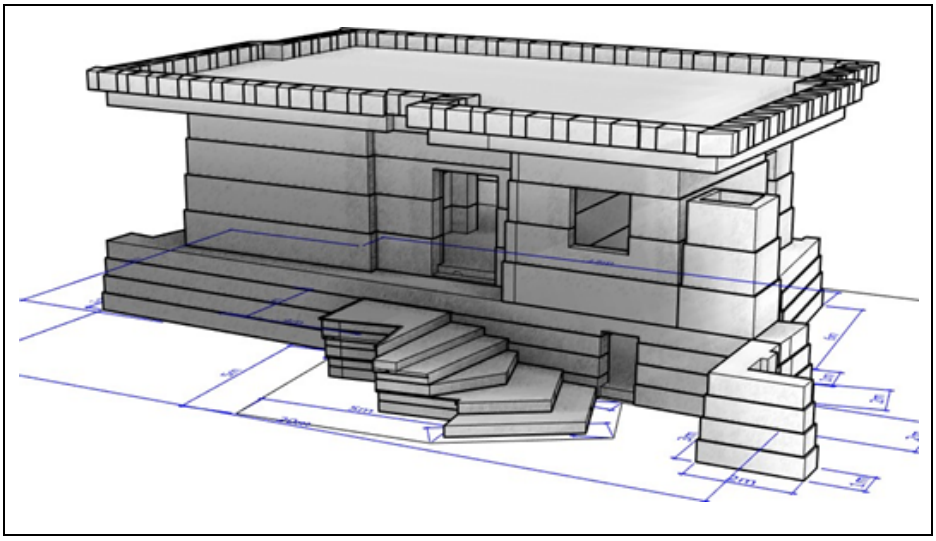

Figure 112 Built form 8 Perspective view

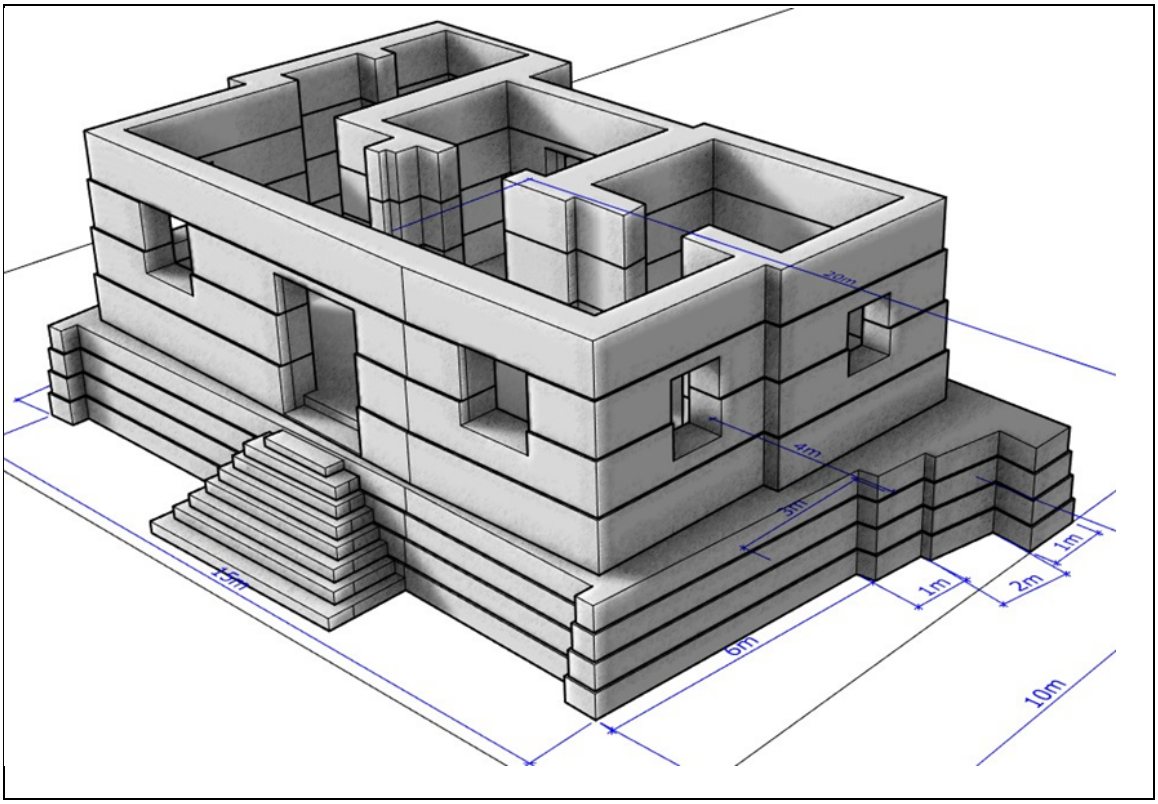

Figure 113Built form 8-N north-western side perspective view

Built Form 8 North

Walls	Volume in Cubic Meters	
Wall 1	44.38	
Wall 2	42.88	
Wall 3	41.4	
Wall 4	40.09	
Wall 5	42.61	
Wall 6	37.59	
Wall 7	34.22	
Wall 8	38.08	
Total	321.25	321.25
Stairs-Southern		
Stair 1	2.16	
Stair 2	2.71	
Stair 3	3.2	
Stair 4	4.24	
Stair 5	5.35	
Stair 6	1.37	
Total	19.03	19.03
Stairs-Northern		
Stair 1	2.29	
Stair 2	1.7	
Stair 3	1.39	
Stair 4	0.96	
Stair 5	0.75	
Stair 6	0.5	
Stair 7	0.34	
Stair 8	0.15	
Total	8.08	8.08
Floors		
Base Floor	32.73	
Living Quarter Floor	26.88	
Roof Floor	102.8	
Total	162.41	162.41
Beams		
Base East-West	6.03	
Base North-South	5.67	
Roof East-West	6.04	
Roof North-South	5.68	
Total	23.42	23.42
Central Wall		
Base-Central Wall 1	13.21	
Total	13.21	13.21
Misc		
Gate/Wall	7.01	
Bathroom/Tower	5.1	
Total	12.11	12.11
	Grand Total	547.40

Table 12 Volumetric data of built form 8-N

B. Center

The center of building 8 contains three sets of double rooms joined by internal doors. The first set, two rooms located on the north, have a door facing west. These rooms are joined by an internal wall and are 3 m by 4 m on the inside. These rooms are not connected to the other sets of rooms that face to the east. Two rooms that face north

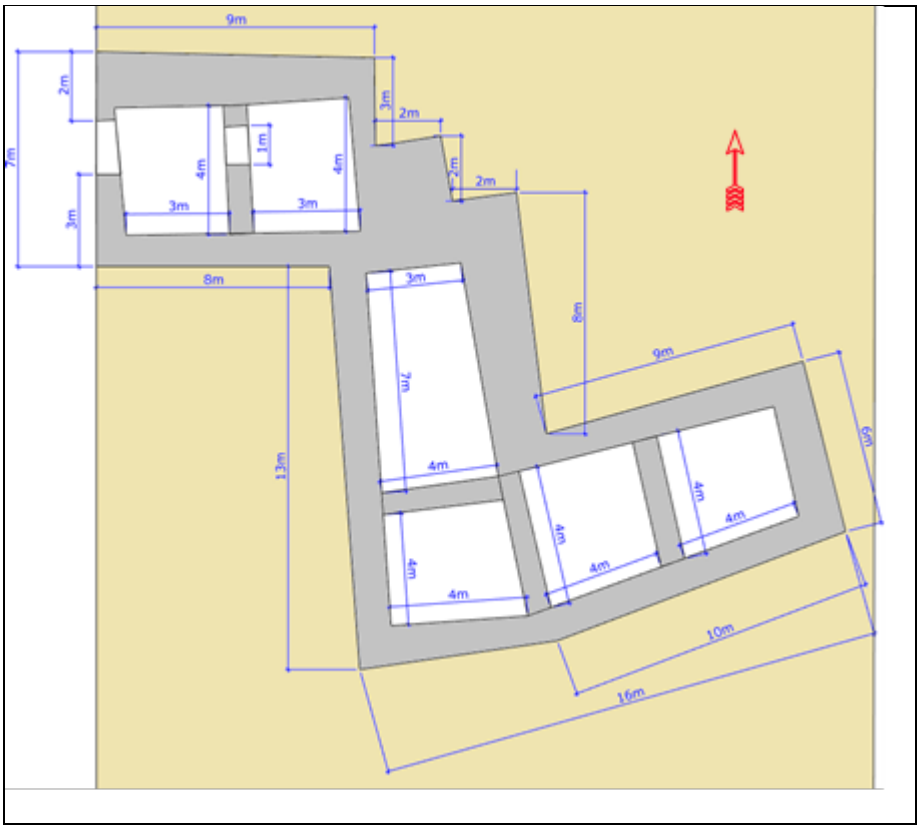

Figure 114 Floor plan of built form 8-C

are 4 m by 4 m each. In the last set of rooms, one seems irregular, and is 4 m by 7 m on the south wall and 3 m by 7 on the north wall (see Figure 114).

While the other is 4 m by 4 m. The center of built form 8 is similar to the Northern section, in that it uses a sturdy foundation up to 2 m.

However, unlike the northern part which offsets the living floor by a bit toward the center, the central part's wall is built without any offset on the living floor (compare Figure 113 and Figure 117). The base floor uses four internal walls to support and further divide the living floor, and to tie up the living floor to the roof. Crossing beams of wood support both the living floor and roof. The base floor can be accessed through the western wall or through the back of the built form (see Figure 118)

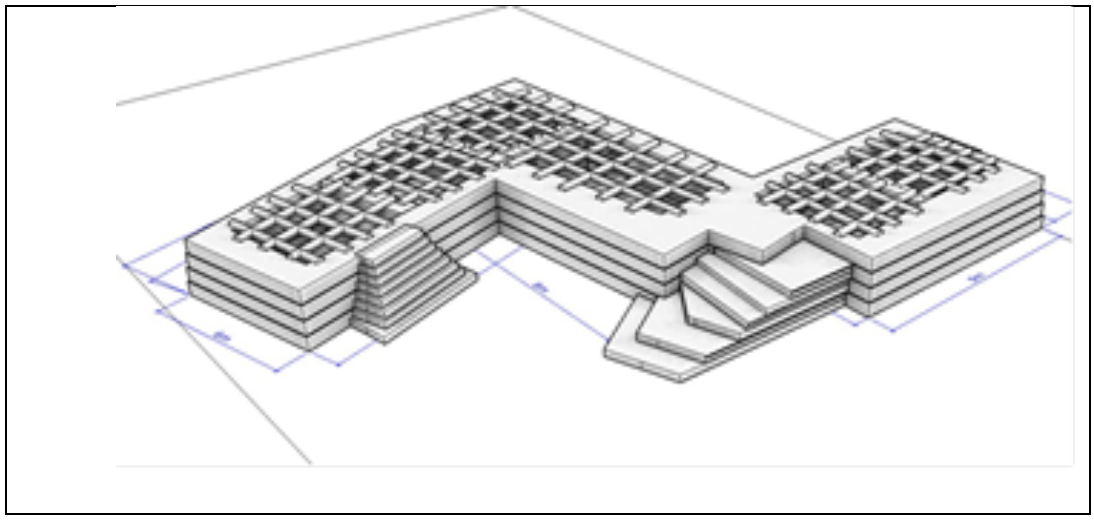

Figure 115 Base floor of 8-C

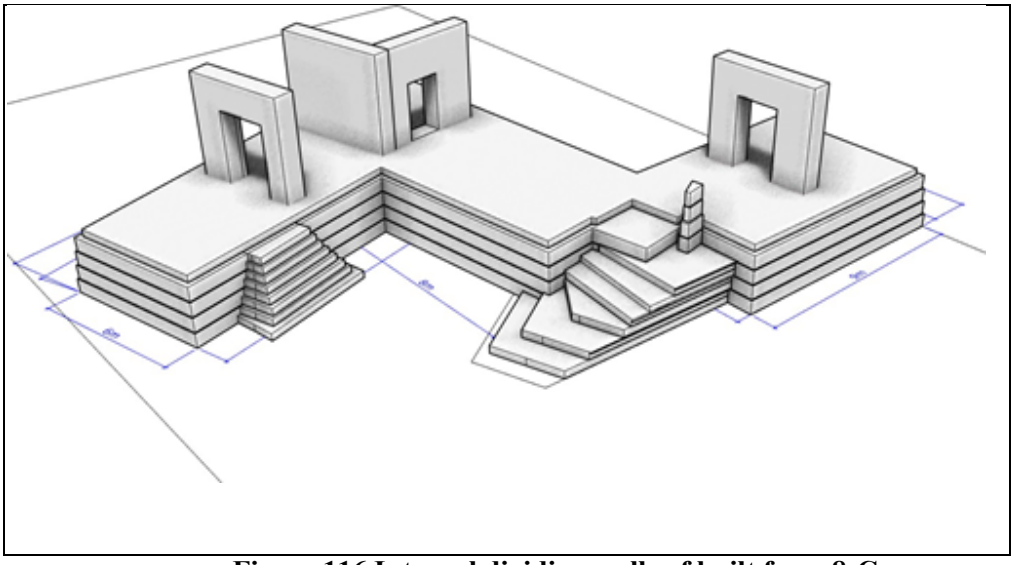

Figure 116 Internal dividing walls of built form 8-C

Built form 8-C has structures constructed of bricks (red fire-baked bricks) on the foundation. These types of bricks are associated with water supply channel of ancient towns.

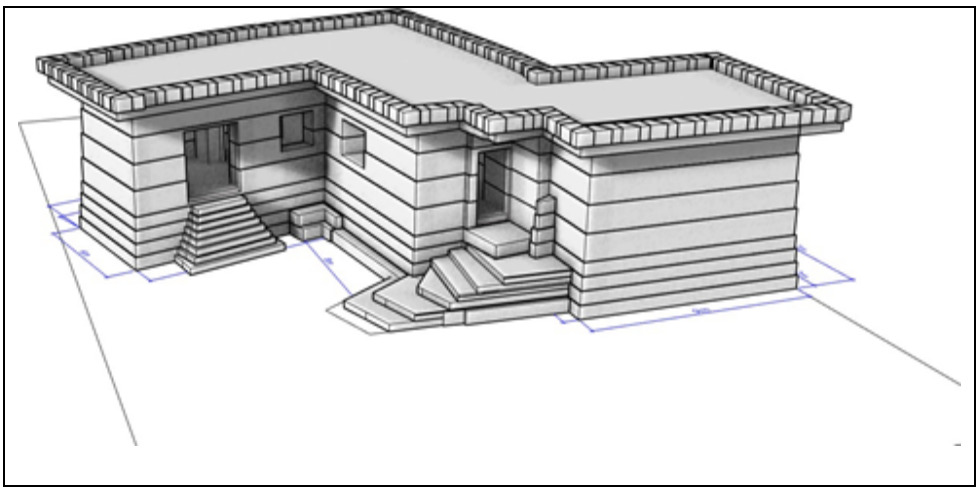

Figure 117 Built form 8-C front view

For instance, at the site of Aratu (Piva 1907), located at the northern Eritrea, these bricks enabled archaeologists to make a complete reconstruction of the entire water system for the site. Adulis is built in the same way as Aratu, Graduated Masonry construction method, using vesicular basalt rocks interfaced with mica schist, even the structures have a striking similarity that no other site may have. Thus it is possible these brick channels may have been used as water distribution features.

This observation is also supplemented by the fact that when these bricks for a water distribution channel appear in the archaeological data, the houses built around them are unusually crowded as can be noted from the data in Adulis and Aratu. At Adulis, these bricks appeared not only on built form 8 but also in built form 20, built form 14 and around Temple A, where many possible households can be observed living nearby. That is while most built forms at Adulis are built with enough spaces, these built forms

associated with these water channel bricks are quite full of many rooms, perhaps to meet the needs to be closer to a water source?

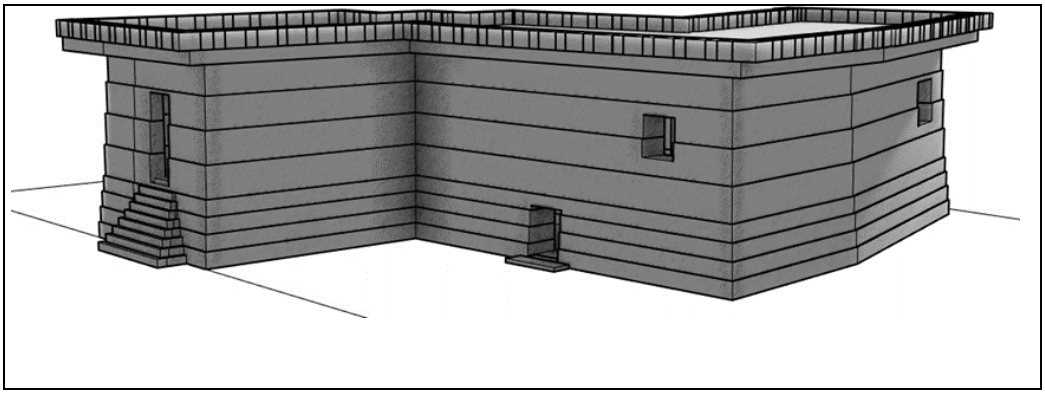

Figure 118 Built form 8-C back view

Built Form 8-C

Walls	Volume in Cubic Meters	
Wall 1	50.4	
Wall 2	48.31	
Wall 3	46.23	
Wall 4	44.16	
Wall 5	75.78	
Wall 6	67.32	
Wall 7	63.64	
Wall 8	68.99	
Total	464.83	464.83
Stairs-West		
Stair 1	1.03	
Stair 2	0.87	
Stair 3	0.74	
Stair 4	0.62	
Stair 5	0.53	
Stair 6	0.44	
Stair 7	0.38	
Stair 8	0.32	
Total	4.93	4.93
Stairs-Northern		
Stair 1	1.7	
Stair 2	1.29	
Stair 3	1.2	
Stair 4	0.9	
Stair 5	0.4	
Stair 6	0.47	
Stair 7	0.56	
Stair 8	0.66	
Total	7.18	7.18
Floors		
Base Floor	28.05	
Living Quarter Floor	18.71	
Roof Floor	133.96	
Total	180.72	180.72
Beams		
Base East-West	6.03	
Base North-South	5.67	
Roof East-West	6.04	
Roof North-South	5.68	
Total	23.42	23.42
Central Wall		
Base-Central Wall 1	13.21	
Total	13.21	13.21
Misc		
Gate/Wall	7.01	
Bathroom/Tower	5.1	
Total	12.11	12.11
	Grand Total	*694.29*

Table 13 Volumetric data of built form 8-C

C. South

The south of built form 8 is a structure of five rooms of three sizes. One room is 4m by 4m; three rooms are 4m by 3m, and one is 3m by 3m (see Figure 119).

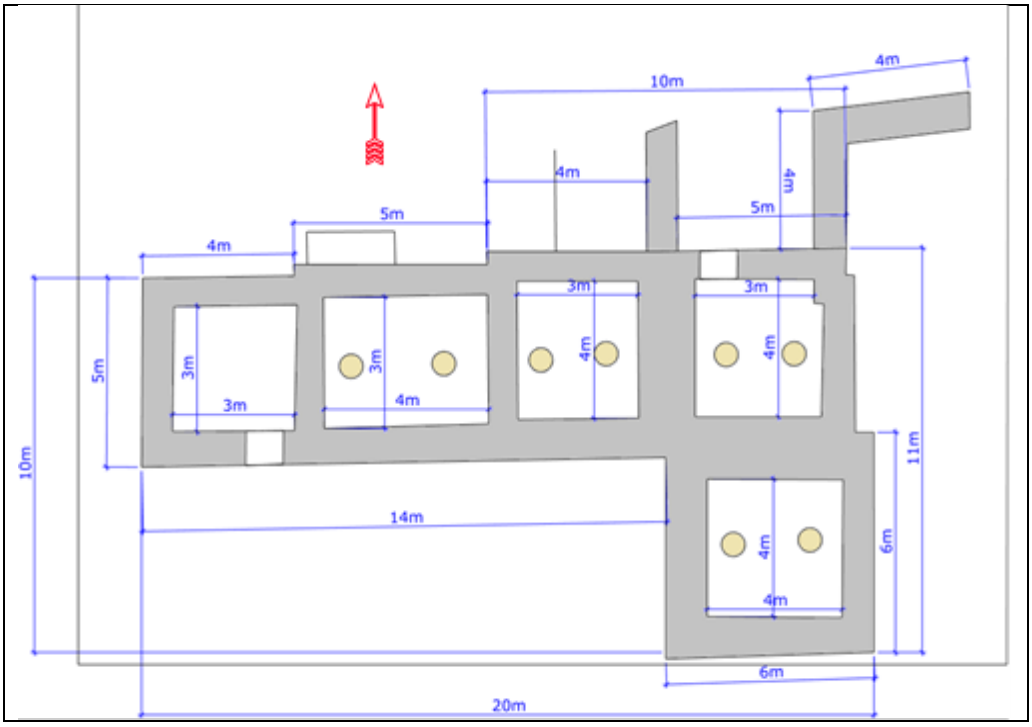

Figure 119 Floor plan of built form 8-S

This built form unlike the center and northern buildings uses post-holes for holding circular stone pillars to support the existing floor structure (see Figure 120). There are eight pillar posts in built form 8-S. The base floor has two entry points or doors. It can be accessed through the northern wall or the southern wall.

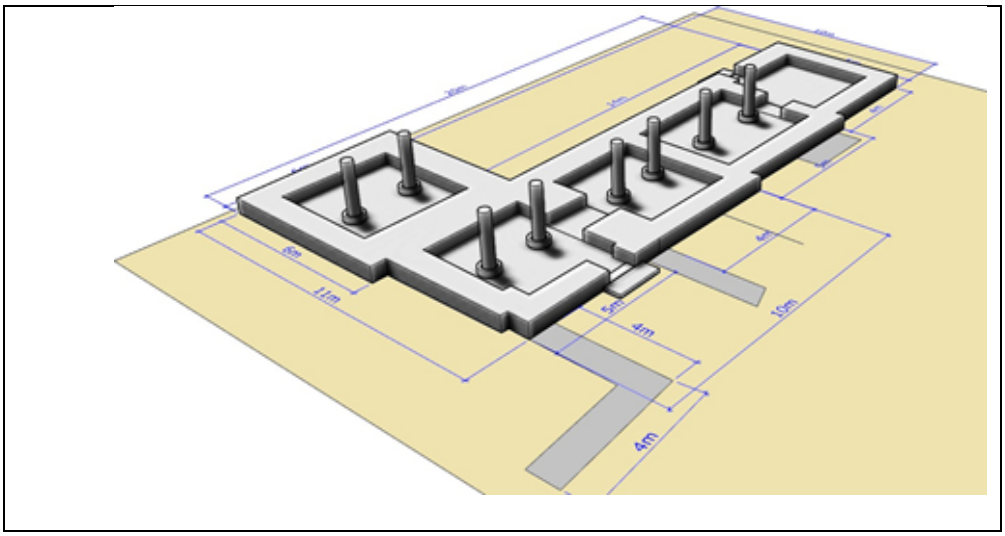

Figure 120 Base floor of built form 8-S

The northern wall door seems more protected by defensive walls than the southern entry point. If this built form was used by a single household, it is most likely the base floor might be used for valuable storage, the one on the northern wall, while the southern may be used to house something that needs less supervision, for instance, animals.

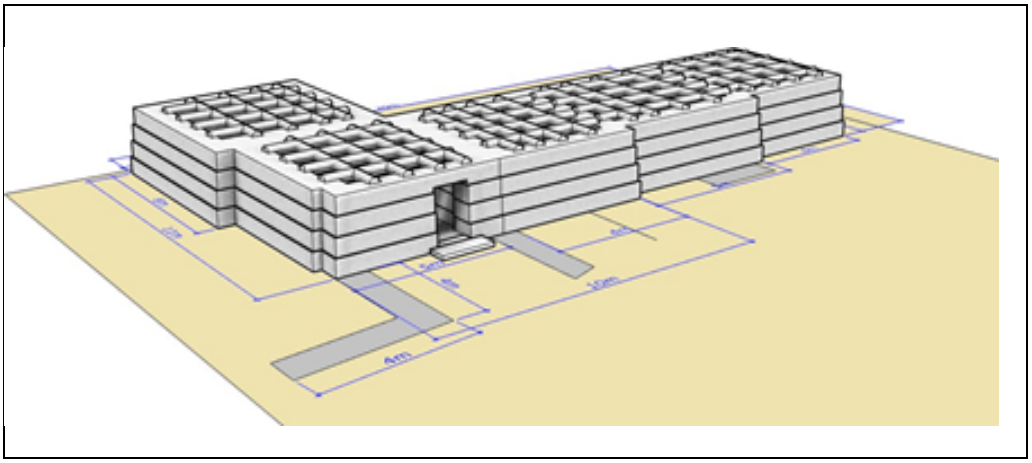

Figure 121 Base floor of built form 8-S

However, it is also possible different households may have occupied this built form. The two entry points to the base floor lead to another room through doors of the

internal walls (see Figure 120).The base floor is raised from the ground up to 2m, similar to built forms 8-N and 8-C then wooden floor beams crisscross to form the first floor (see Figure 121). There are three stairs in this built form (see Figure 122 and Figure 124), one in the north wall, and the other in the south, and one in the eastern wall. Each room has one window at least, and the most western room has two windows (see Figure 123 and Figure 124).

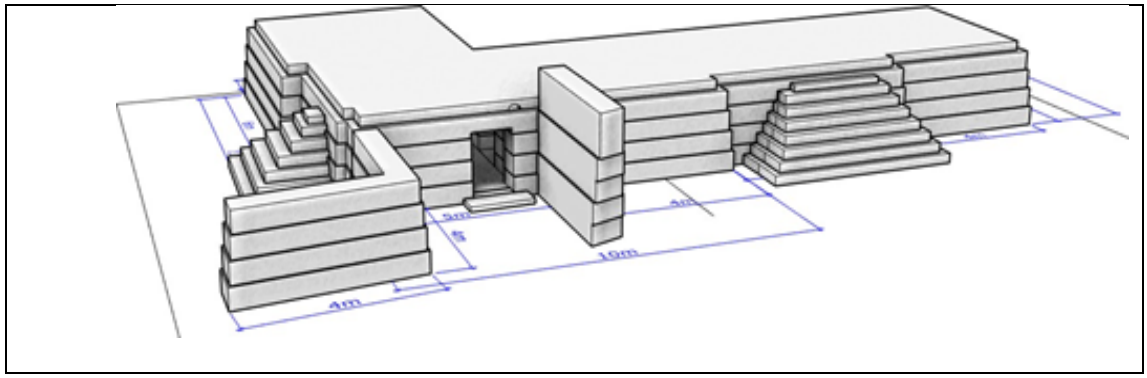

Figure 122 Living floor of built form 8-S

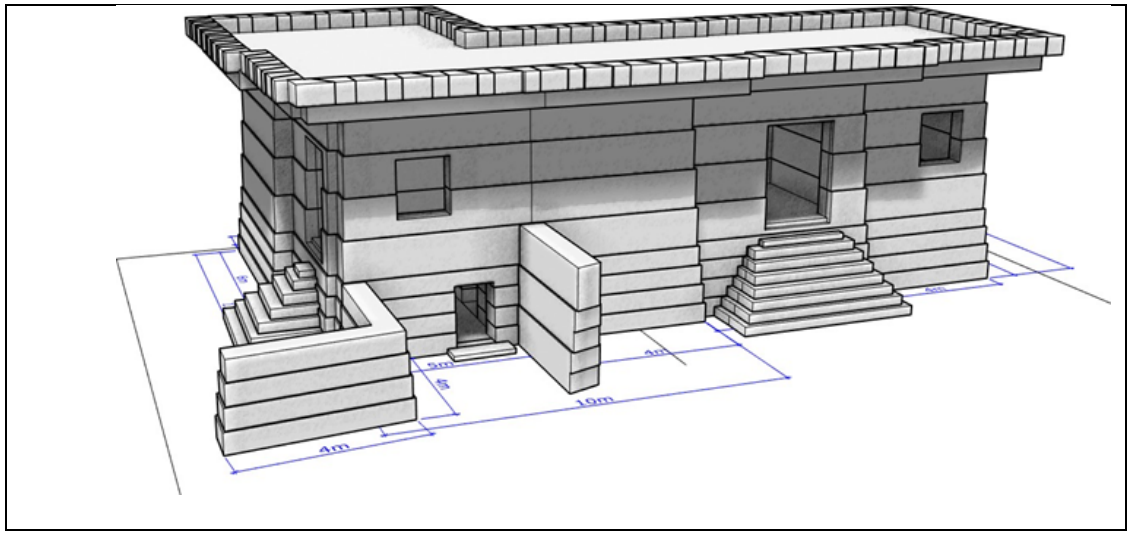

Figure 123 Built form 8-S, front view

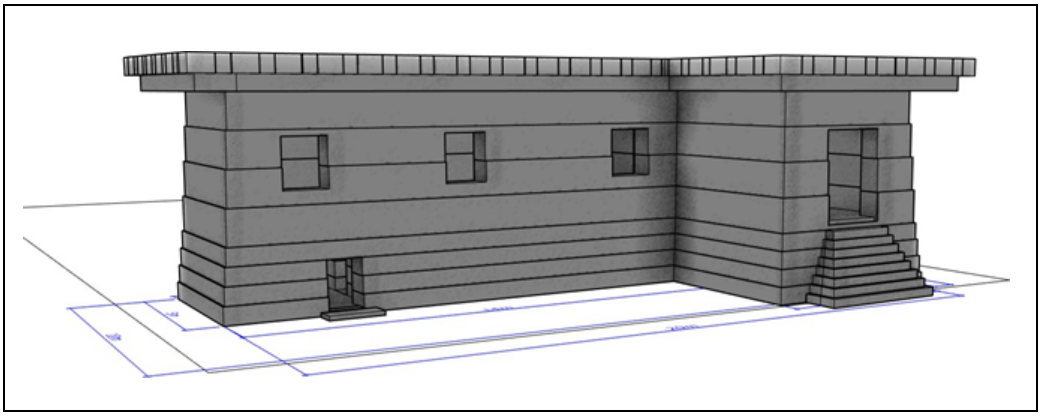

Figure 124 Built form 8-S back view

Built Form 8-S

Walls	Volume in Cubic Meters	
Wall 1	32.68	
Wall 2	30.81	
Wall 3	29.35	
Wall 4	29.48	
Wall 5	52.53	
Wall 6	46.77	
Wall 7	43.86	
Wall 8	47.27	
Total	312.75	312.75
Stairs-Southern		
Stair 1	1.1	
Stair 2	0.93	
Stair 3	0.79	
Stair 4	0.66	
Stair 5	0.56	
Stair 6	0.47	
Stair 7	0.41	
Stair 8	0.34	
Total	5.26	5.26
Stairs-Northern		
Stair 1	2.09	
Stair 2	1.72	
Stair 3	1.46	
Stair 4	1.12	
Stair 5	0.82	
Stair 6	0.53	
Stair 7	0.32	
Stair 8	0.09	
Total	8.15	8.08
Stairs-Eastern		
Stair 1	1.76	
Stair 2	1.31	
Stair 3	0.95	
Stair 4	0.63	
Stair 5	0.38	
Stair 6	0.16	
Stair 7	0.05	
Total	5.24	5.24
Floors		
Base Floor	15.65	
Living Quarter Floor	27.83	
Roof Floor	86.89	
Total	130.37	130.37
Beams		
Base East-West	5.87	
Base North-South	5.96	
Roof East-West	5.86	
Roof North-South	5.96	
Total	23.65	23.65
Pillar Posts		
Base Posts	0.58	
Total	0.58	0.58
Misc		
Gate/Wall	11.01	
Wall/fence	7.78	
Total	18.79	18.79
	Grand Total	*485.93*

Table 14 Volumetric data of built form 8-S

D. North, Center and South

When all the built forms, i.e., North, South, and Center are constructed together, built form 8 gives a structure that is slightly crowded compared to other built forms at Adulis. Strategic resources such as running water or essential places for trade or symbolic values, might explain the desirability of some sections of town.

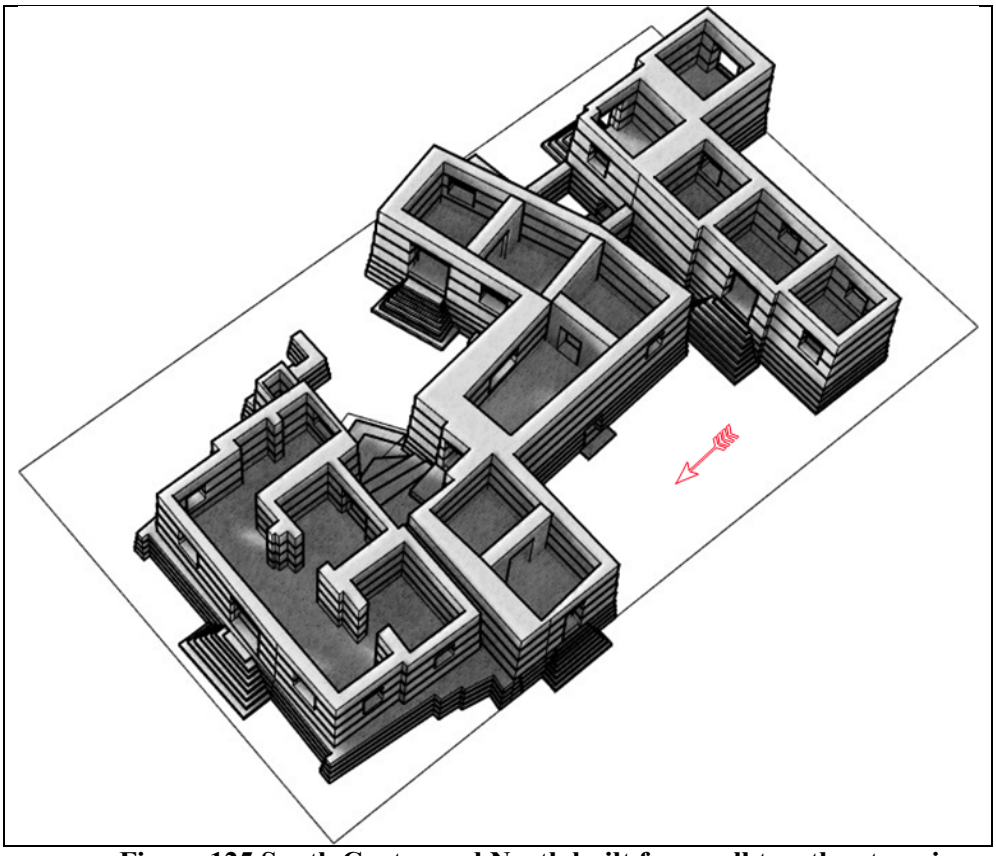

Figure 125 South Center and North built forms all together top view

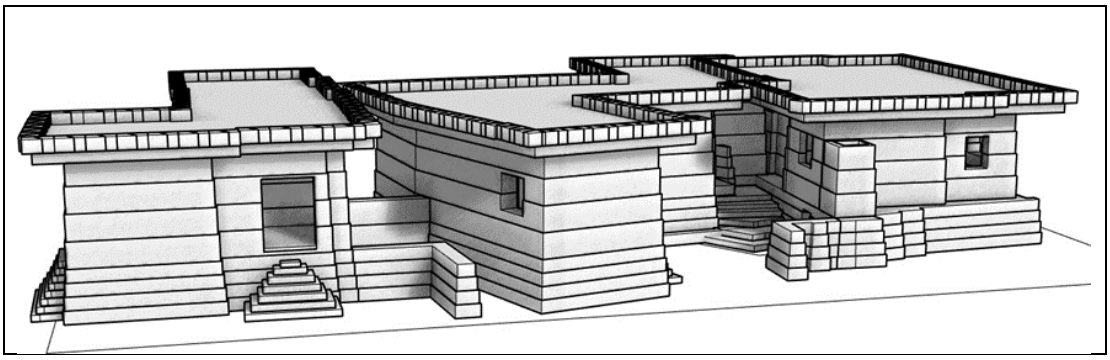

Figure 126 South Center and North built forms Front NE view

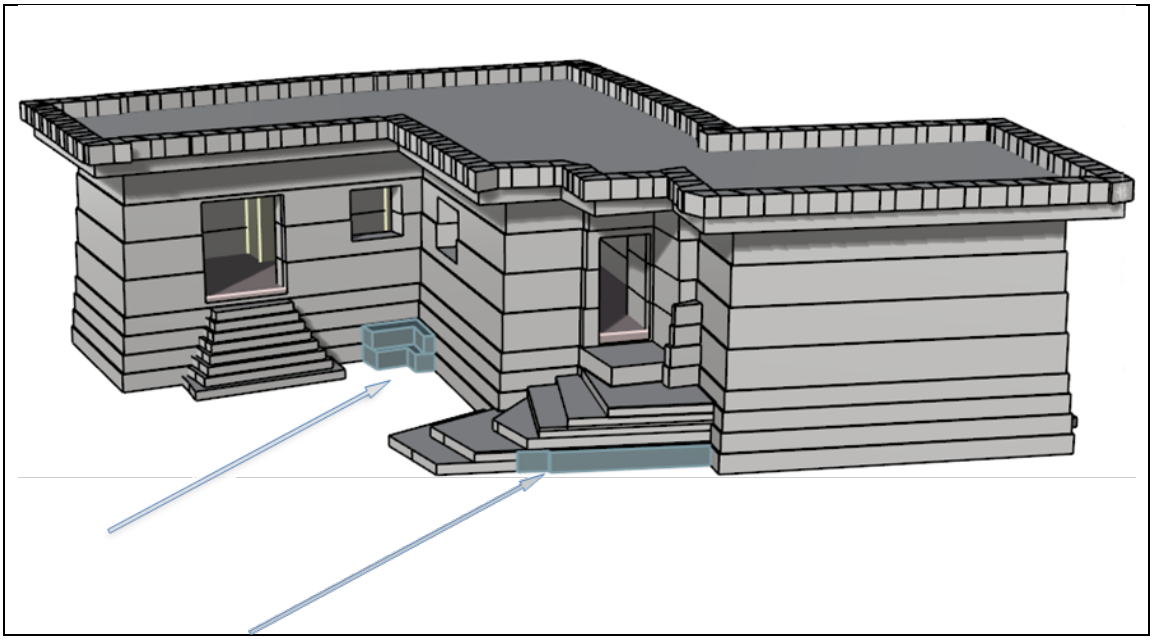

Figure 127 122 Built form 8-C fire baked bricks used as water channel

3.7.8 Built Form 9

Built form 9 is located at quad B3. It is a rectangular building aligned to the north south axis facing toward the North. It is 10.2 m by 8.9 m on the inside, and has a base and living floor. There are not any indications of the presence of either of post- holes for the support pillars or internal walls. It is most likely more extended beams were used to support the living floors.

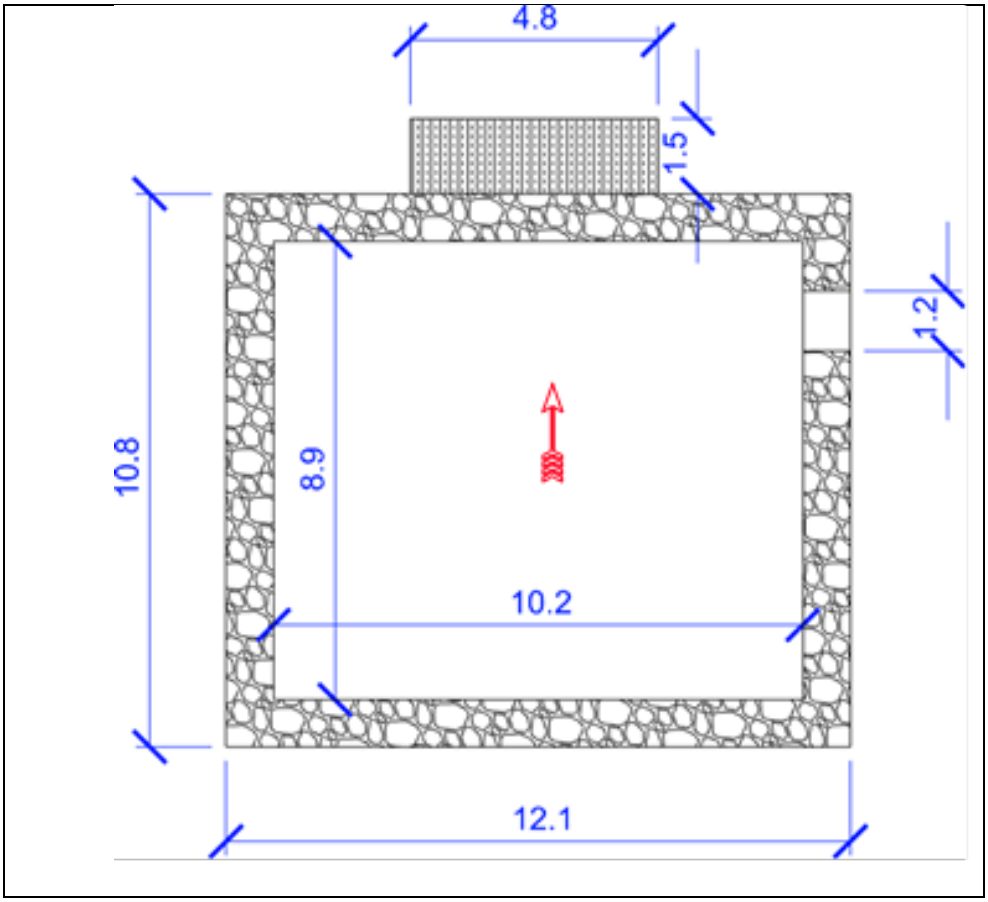

Figure 128 Built form 9 floor plan

The base floor has an entry door 1.2 m wide and 1.4 m long (see Figure 129) on the eastern wall. The base floor is raised up to 2 meters to the living level. There is one

stair located at the northern wall of the built form. The stair is 4.8 m by 1.5 m (see Figure 128).

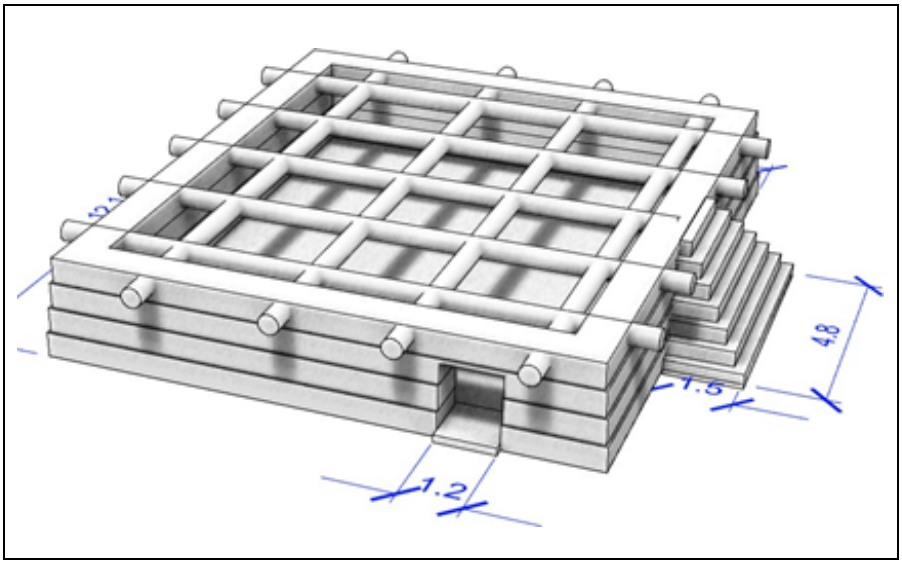

Figure 129 Base floor of built form 9

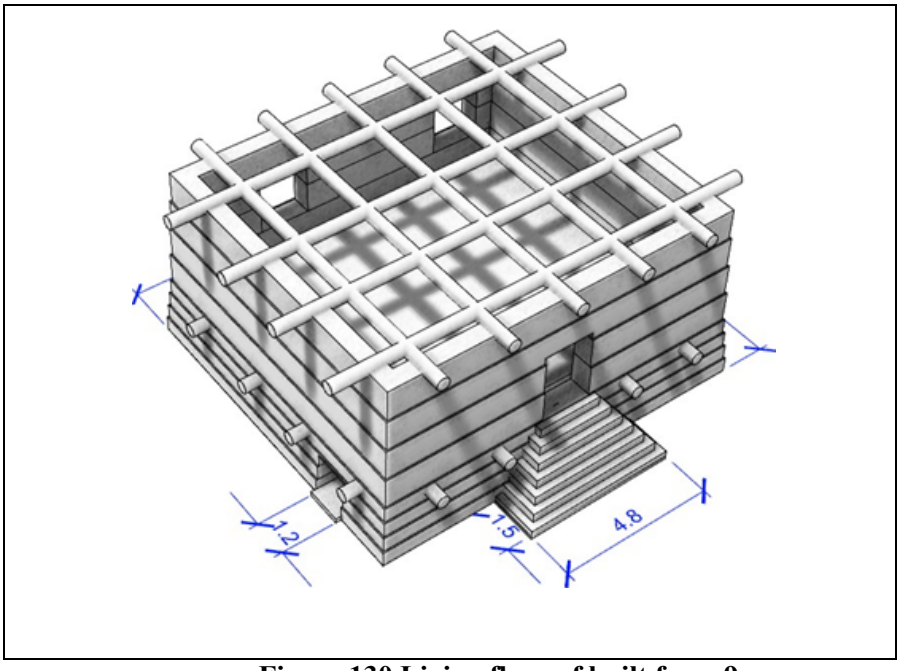

Figure 130 Living floor of built form 9

The living floor has two windows located at the southern wall (see Figure 130), and there is no evidence of either dividing wall or any supporting structures in the living floor. The living floor extends to 4 m up to the roof, thus making built form 9 a construction with an elevated ceiling.

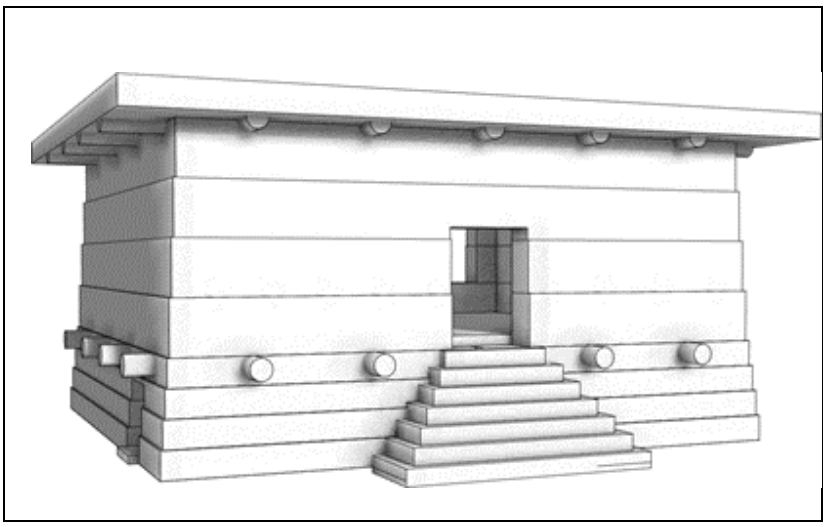

Figure 131 Built form 9 Front view

Built Form 9

Walls	Volume in Cubic Meters	
Wall 1	19.33	
Wall 2	18.19	
Wall 3	17.06	
Wall 4	15.95	
Wall 5	28.53	
Wall 6	24.29	
Wall 7	23.92	
Wall 8	23.16	
Total	170.43	170.43
Stairs-Northern		
Stair 1	2.14	
Stair 2	1.68	
Stair 3	1.26	
Stair 4	0.89	
Stair 5	0.61	
Stair 6	0.34	
Stair 7	0.13	
Total	7.05	7.05
Floors		
Base Floor	18.29	
Living Quarter Floor	18.29	
Roof Floor	84.63	
Total	121.21	121.21
Beams		
Base East-West	6.01	
Base North-South	6.55	
Roof East-West	6.84	
Roof North-South	7.05	
Total	26.45	26.45
	Grand Total	*325.14*

Table 15 Volumetric data of built form 9

3.7.9 Built form 14

Built form 14 is a large rectangle, 38.52 m by 30.52, divided into two by a central wall. The northern part has rectangular structures, 4 of them on the living floor and base floor. However, rather than being used as living space, the southern part as some sort of grave or ceremonial site or shrine.

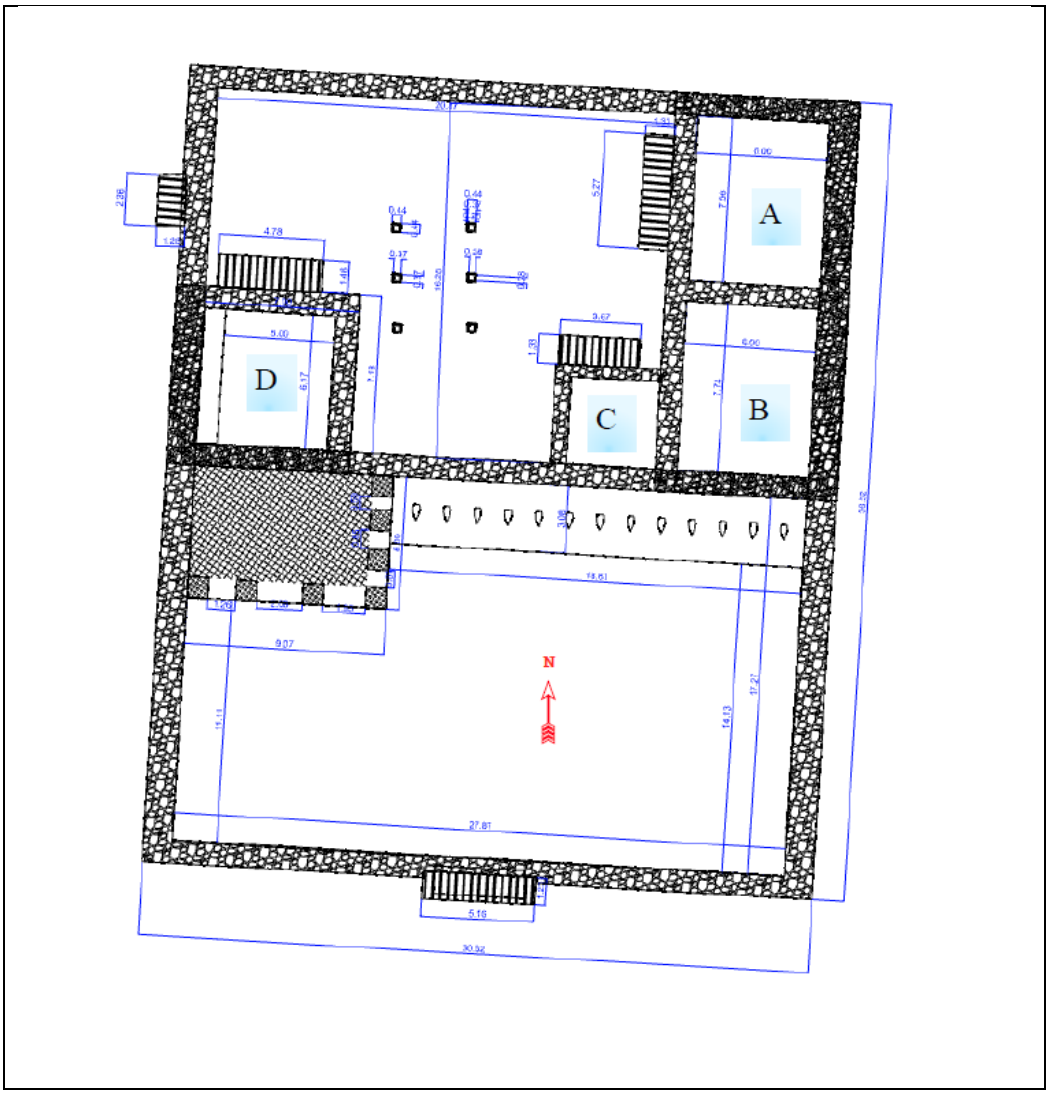

Figure 132 Built form 14 floor plan

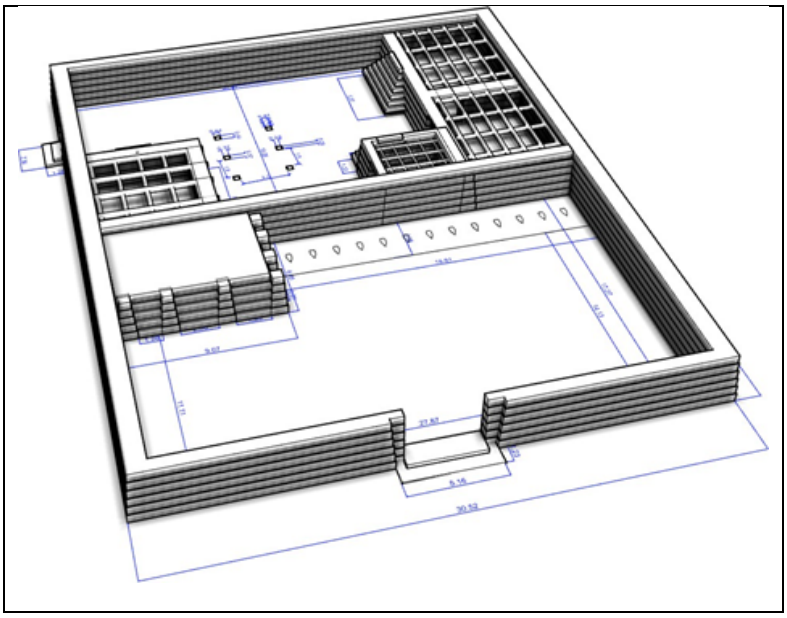

Figure 133 Built form 14 base floor

When excavated in 1907 by Paribeni, the southern part bordering the central wall, yielded 13 human remains. These human remains were placed inside Dressell 2-4 amphora. These amphorae were modified in that their tops were cut to accommodate human bones and then sealed (see Figure 138).

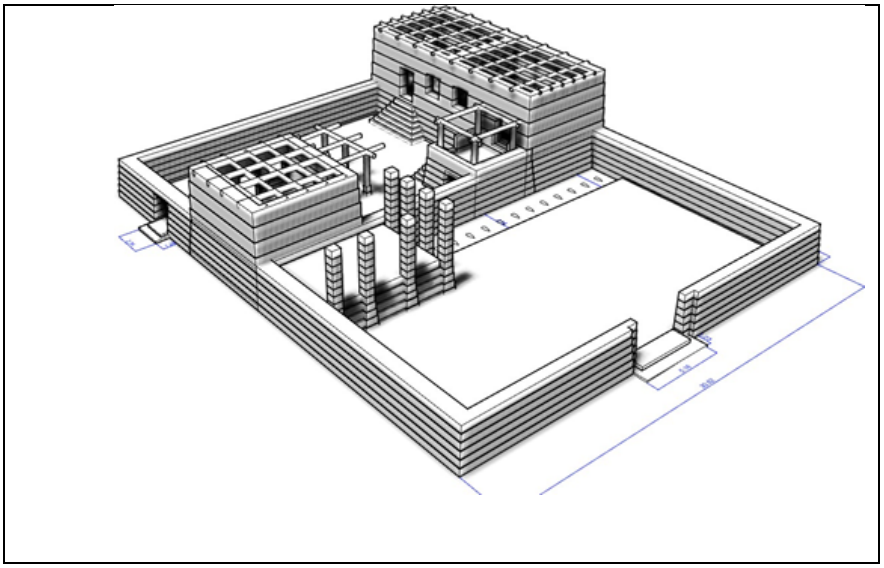

Figure 134 Built form 14 living floor

It is not clear whether this location is the site of first burial, or whether bones from an original grave were collected and reburied. Future excavation will likely provide more evidence as to how this was practiced. All we can infer at this point is the time of this practice, which was at least before 79 ACE. The reason is that Dressell 2-4 amphora went out of circulation in the Red Sea after Mount Vesuvius eruption in 79 ACE

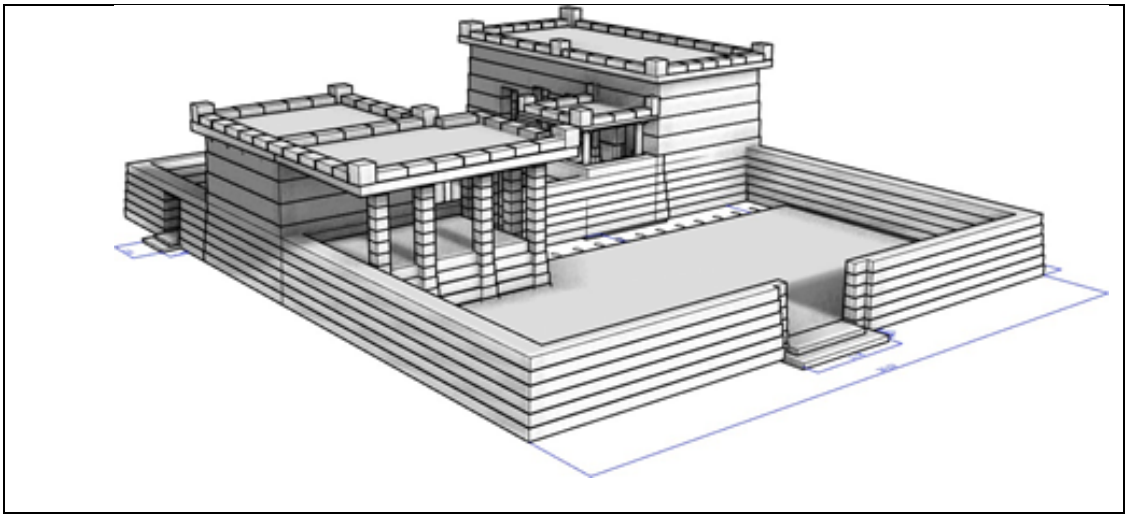

Figure 135 Built form 14 S-W view

On the western corner of the southern part of the built form 14, there is a platform built with walls and pillars, most likely an altar given the association with human remains (see Figure 133 and Figure 135).

Built form 14 has entry gate on the southern wall with a few stairs. A different entrance is also available on the western wall for the northern part of the built form (see Figure 135 and Figure 136). The base walls are built up to 6 m till they are joined by the living floor.

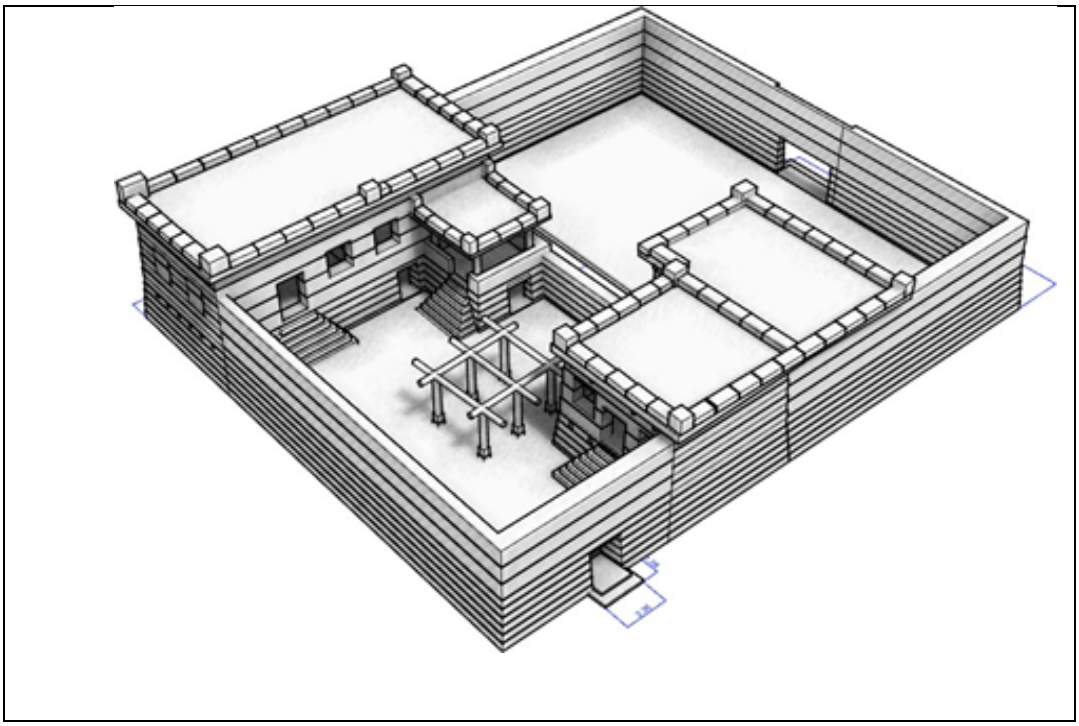

Figure 136 Built form 14 N-W view

The north part has two rooms on the eastern wall joined by a third that looks to be a balcony, designated by A, B, and C respectively (see Figure 132). The courtyard of the northern section of built form 14 is adorned by six stone pillars (see Figure 137). Another structure is also built with a base floor and living floor on the back of the platform on the western wall marked by D on the floor plan (see Figure 132). It is not definitive whether the northern and southern sections of built form 14 are one built form or separate, but it seems more likely one structure based on the short central wall at the center. It is reconstructed to a height of 6 m based on field evidence. Because of this built form 14 is discussed as one structure. Artifact associations from northern part of the section also support this perspective.

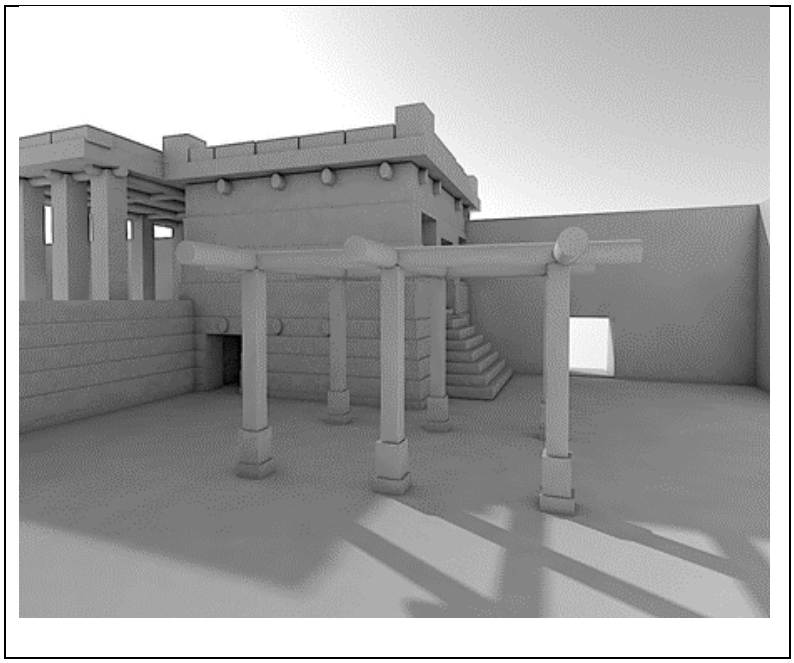

Figure 137 Pillar detail of built form 14-N

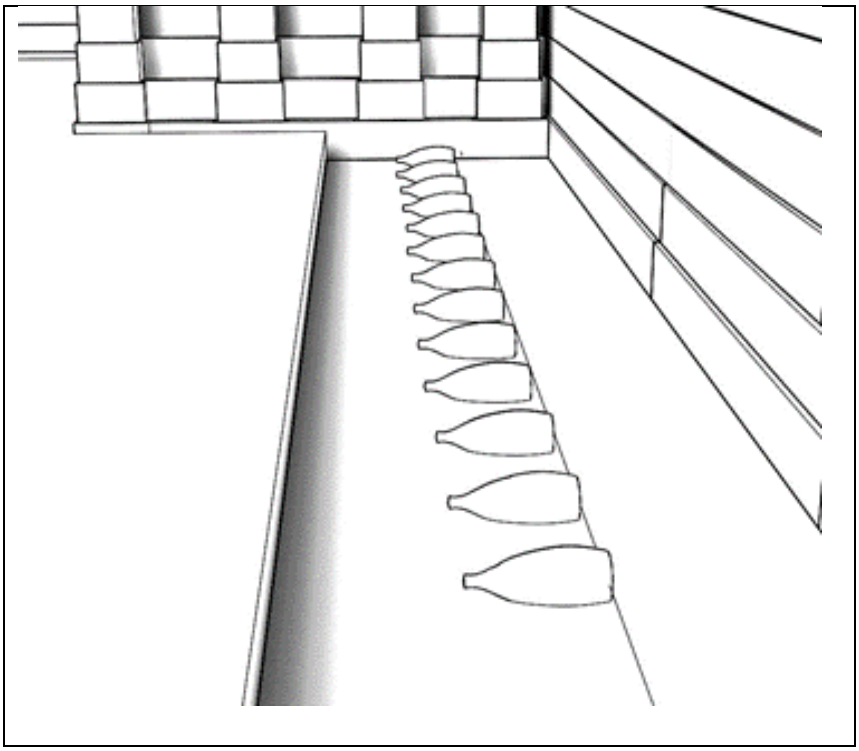

Figure 138 Dressell 2-4 Amphora containing human remains

Built form 14 North

Walls Base-A	Volume in Cubic Meters	
Wall 1	14.74	
Wall 2	13.92	
Wall 3	13.14	
Wall 4	12.37	
Wall 5	12.19	
Wall 6	21.64	
Wall 7	18.46	
Wall 8	17.71	
Wall 9	18.26	
Total	142.43	142.43
Stairs-A		
Stair 1	2.14	
Stair 2	1.68	
Stair 3	1.26	
Stair 4	0.89	
Stair 5	0.6	
Stair 6	0.34	
Stair 7	0.13	
Total	7.04	7.04
Beams-A		
Base Beams	5.68	
Roof Beams	5.68	
Total	11.36	11.36
Floors-A		
Base Floor	20.02	
Living Quarter Floor	11.75	
Roof Floor	31.49	
Total	63.26	63.26
Walls Base-BC		
Wall 1	29.09	
Wall 2	27.58	
Wall 3	26.31	
Wall 4	25.03	
Wall 5	24.39	
Wall 6	44.61	
Wall 7	39.28	
Wall 8	36.05	
Wall 9	39.37	
Wall 10	37.43	
Total	329.14	329.14
Stairs-BC		
Stair 1	2.56	
Stair 2	2.01	
Stair 3	1.51	
Stair 4	1.07	
Stair 5	0.72	
Stair 6	0.41	
Stair 7	0.22	
Total	8.5	8.50
Beams		
Base East-West	7.56	
Beams North-South	10.45	
Total	18.01	18.01
Floors		
Base Floor	36.12	
Living Quarter Floor	33.56	
Roof Floor	57.68	
Total	127.36	127.36
Walls Base-D		
Wall 1	7.47	
Wall 2	6.86	
Wall 3	6.35	
Wall 4	5.85	
Wall 5	5.67	
Wall 6	9.15	
Total	41.35	41.35
Stairs-D		
Stair 1	1.81	
Stair 2	1.41	
Stair 3	1.06	
Stair 4	0.75	
Stair 5	0.51	
Stair 6	0.29	
Stair 7	0.11	
Total	5.94	5.94
Misc		
Beams	1.28	
Columns	1.36	
Roof Retainers	36.96	
Total	39.6	39.6
Floors		
Base Floor	7.19	
Living Quarter Floor	5.91	
Roof Floor	5.99	
Total	19.09	19.09
	GrandTotal	*813.08*

Table 16 Volumetric data of built form 14-N

Built form 14 South

Walls Base-all	Volume in Cubic Meters	
Wall 1	73.33	
Wall 2	70.07	
Wall 3	66.82	
Wall 4	63.35	
Wall 5	60.35	
Wall 6	57.14	
Wall 7	109.52	
Wall 8	102.92	
Wall 9	96.34	
Total	699.84	699.84
Stairs-Entry		
Stair 1	2.26	
Stair 2	1.3	
Total	3.56	3.56
Central Wall		
Wall 1	13.81	
Wall 2	13.11	
Wall 3	12.32	
Wall 4	11.58	
Wall 5	10.88	
Wall 6	10.23	
Total	79.05	79.05
Platform Walls/Pillars		
Wall 1	27.59	
Wall 2	26.83	
Wall 3	26.07	
Wall 4	25.47	
Wall 5	24.89	
Platform base Pillars	10.89	
Platform upper Pillars	12.31	
Total	154.05	154.05
Floors		
Base Floor	137.92	
Roof Floor	37.47	
Total	175.39	175.39
Beams		
Roof East-West	2.78	
Roof North-South	1.89	
Total	4.67	4.67
Misc		
Basement Ashlar	5.7	
Central Wall base	10.18	
Central Wall up	9.67	
Roof Retainers	14.94	
Small Room Walls	23.67	
Round Post holders	0.61	
Total	64.77	64.77
	Grand Total	*1181.33*

Table 17 Volumetric data of 14-S

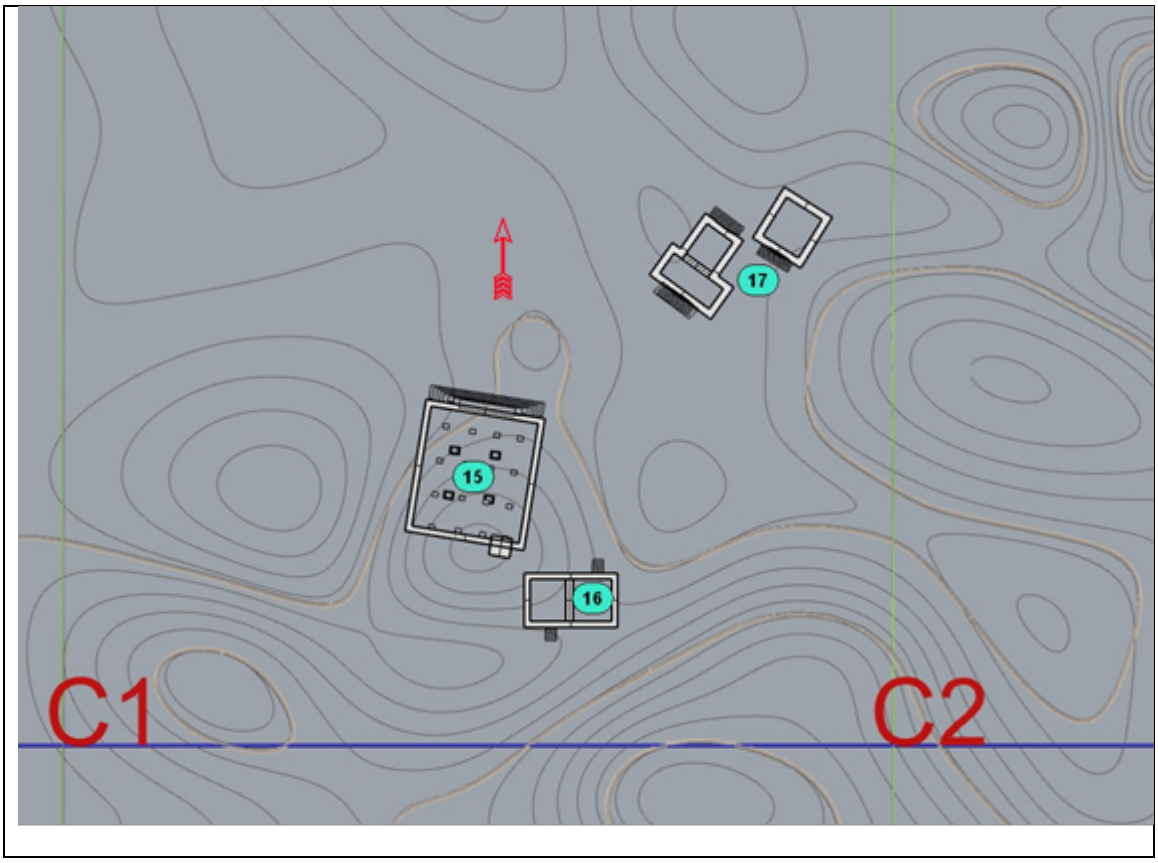

Figure 139 Location of built forms 15, 16 and 17

3.7.10 Built form 15

Built form 15 is located in quad C1 (see Figure 139). This type of structure is common in most trading centers and those located in an important land or sea trade route. These types of structures are believed to be used as trading posts both by archaeologists and local tradition. At Adulis the built form has a base floor and the living floor. The pillars of built form 15 are quite numerous compared to other structures in Kohaito (a site in Southern Eritrea with similar structure). For instance, the columns at Adulis' built form 15 are laid out in rows of four by four while that of Kohaito are in two by two rows.

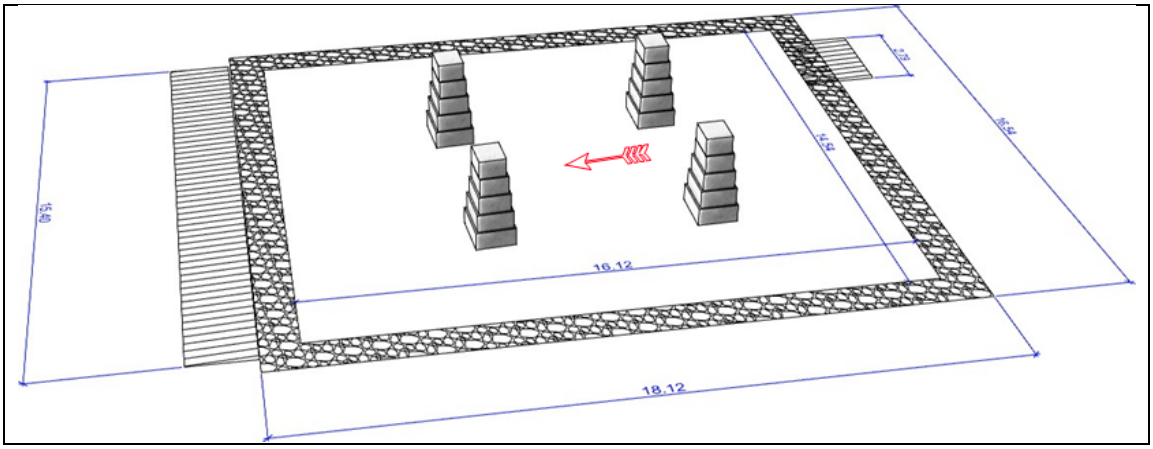

Figure 140 Floor plan of built form 15

Built form 15 is a rectangular shape 18.12 m by 15.40 m. Four columns made of 5 rectangular cut stones support the living floor (see Figure 140). The columns of built form 15 are constructed by attaching rectangular stones by a hole through the middle.

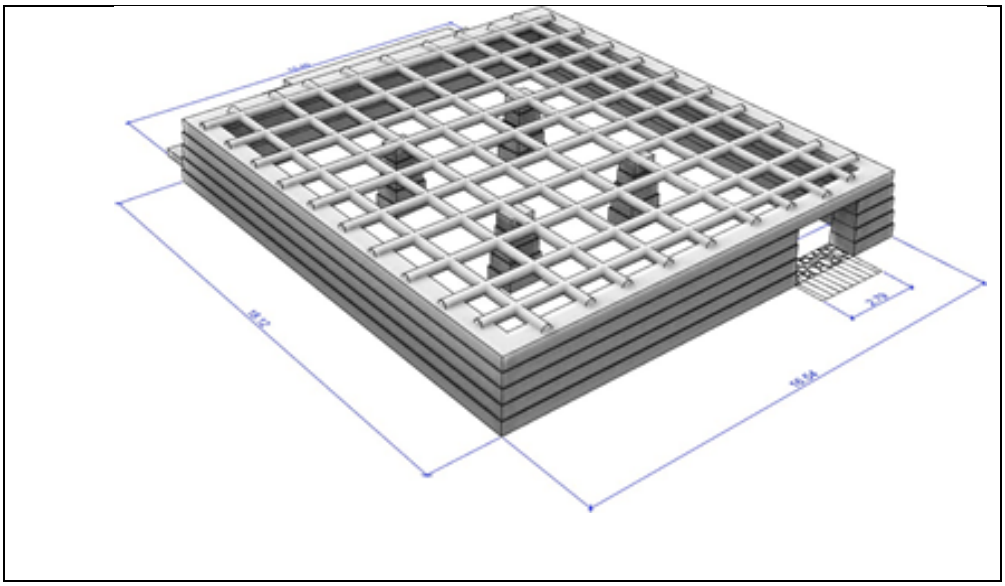

Figure 141 Base floor of built form 15

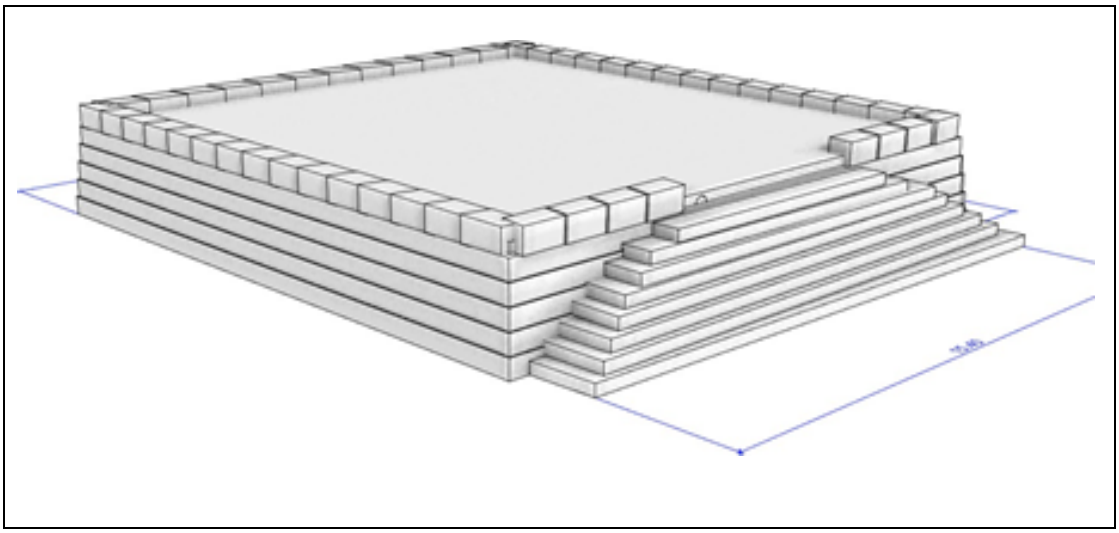

Figure 142 Living floor of built form 15

The hole can be circular or rectangular, and in the case of built form 15, it is rectangular. Then each rectangular stone is secured in place by hammering the top rectangular stone in the middle, making a slot for the lower part of the last rectangular stone to be placed. Thus another stone runs in the middle of the four rectangular stones to

secure them in place. On the outside, each rectangular stone is slightly smaller than the lower one creating visual parallelism of Graduated Masonry (see Figure 140).

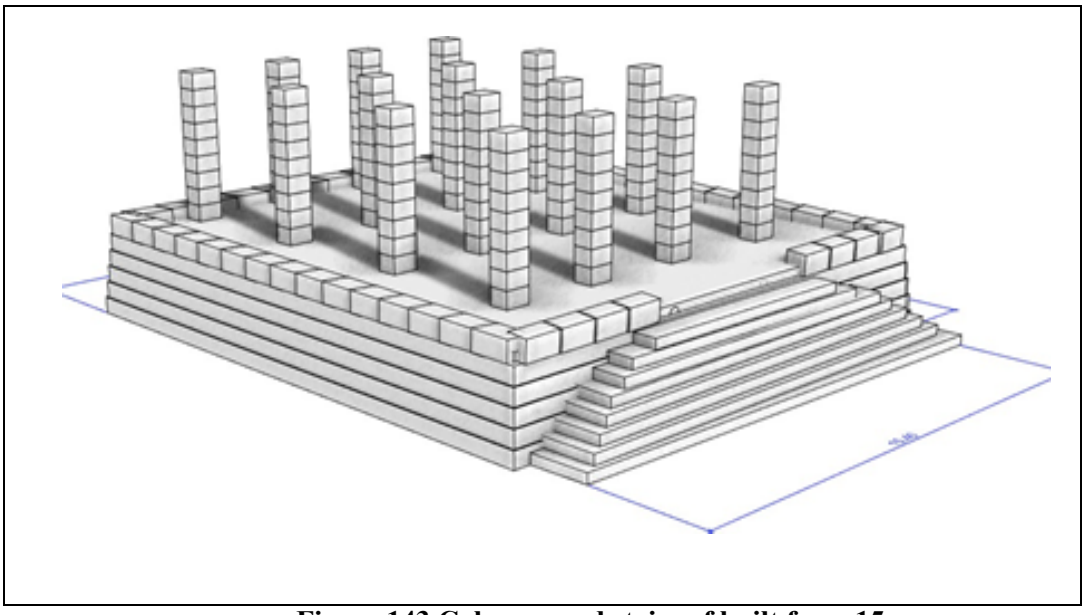

Figure 143 Columns and stairs of built form 15

The base walls are constructed up to 2.5 m. Beams supported by four walls and the four columns on the base floor spread the weight of the living floor. The base floor has a large door on the southern wall, a door 2.79 m wide and 2 m high, suggesting storage functionality with transport animals with loads readily accessible (see Figure 145). On the Northern wall, eight stair slabs rise to the living floor each subsequent slab with slightly reduced size than the previous one (see Figure 142).

The living floor has a retaining wall of rectangular cut stone surrounding the edges. Then the 16 columns of rectangular stones populate the living floor. The beams that tie these columns on the top end complete the building, such that it has a roof with retaining stones (see Figure 144).

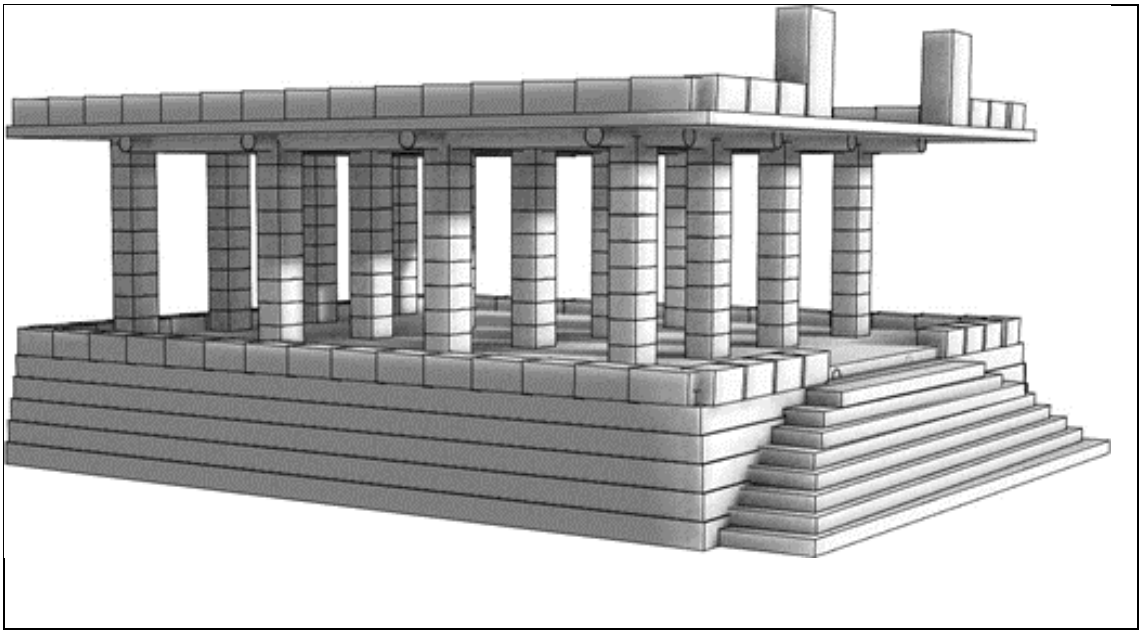

Figure 144 Built form 15 perspective view

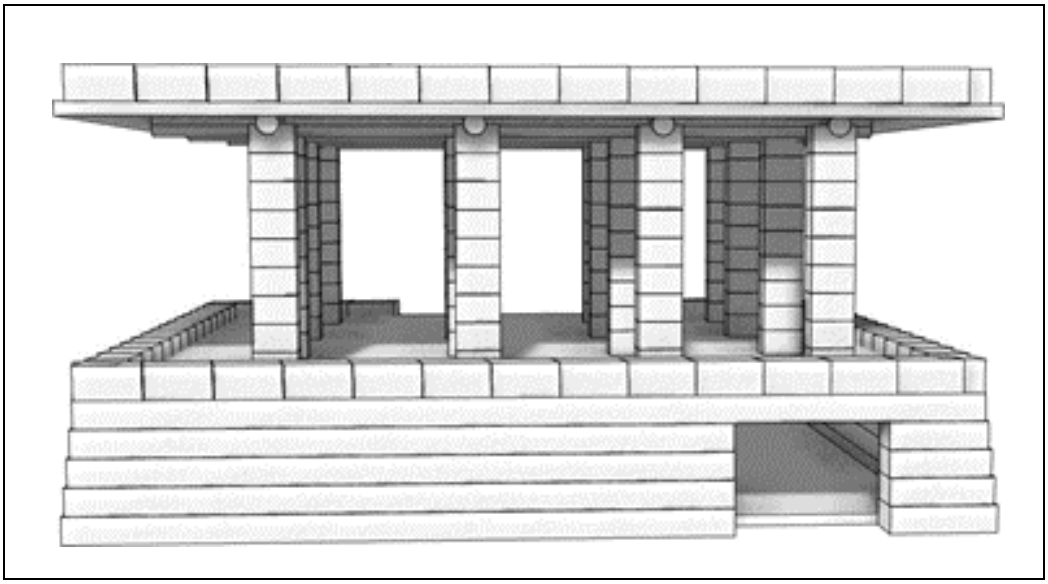

Figure 145 Built form 15 South view

Built form 15

Base Walls	Volume in Cubic Meters	
Wall 1	31.26	
Wall 2	29.60	
Wall 3	27.95	
Wall 4	26.32	
Wall 5	25.80	
Total	140.93	140.93
Floors		
Base Floor	46.88	
Living Floor	68.15	
Roof	73.52	
Total	188.55	188.55
Columns		
Base Columns	10.11	
Living Floor Columns	36.38	
Total	46.49	46.49
Stairs		
Stair 1	8.10	
Stair 2	7.49	
Stair 3	6.25	
Stair 4	5.18	
Stair 5	4.08	
Stair 6	2.59	
Stair 7	2.57	
Stair 8	2.51	
Total	38.77	38.77
Beams		
Base floor N-S	15.58	
Base floor E-W	15.68	
Living floor	14.45	
Total	45.71	45.41
Misc.		
Retaining walls living floor	28.17	
Retaining walls Roof	30.69	
Total	58.86	58.86
	Grand total	519.01

Table 18 Volumetric data of built form 15

3.7.11 Built form 16

Built form 16 like built form 15 is located in quad C1 (see Figure 139). It is divided into two almost equal rooms by a sturdy middle wall that supports the living floor and the roof. It has two stairs, one on the north side and the other on the south side. Although the southern stairs seem to be more elaborate, more material was used on the northern, perhaps to compensate for the tilting landscape (see Figure 149).

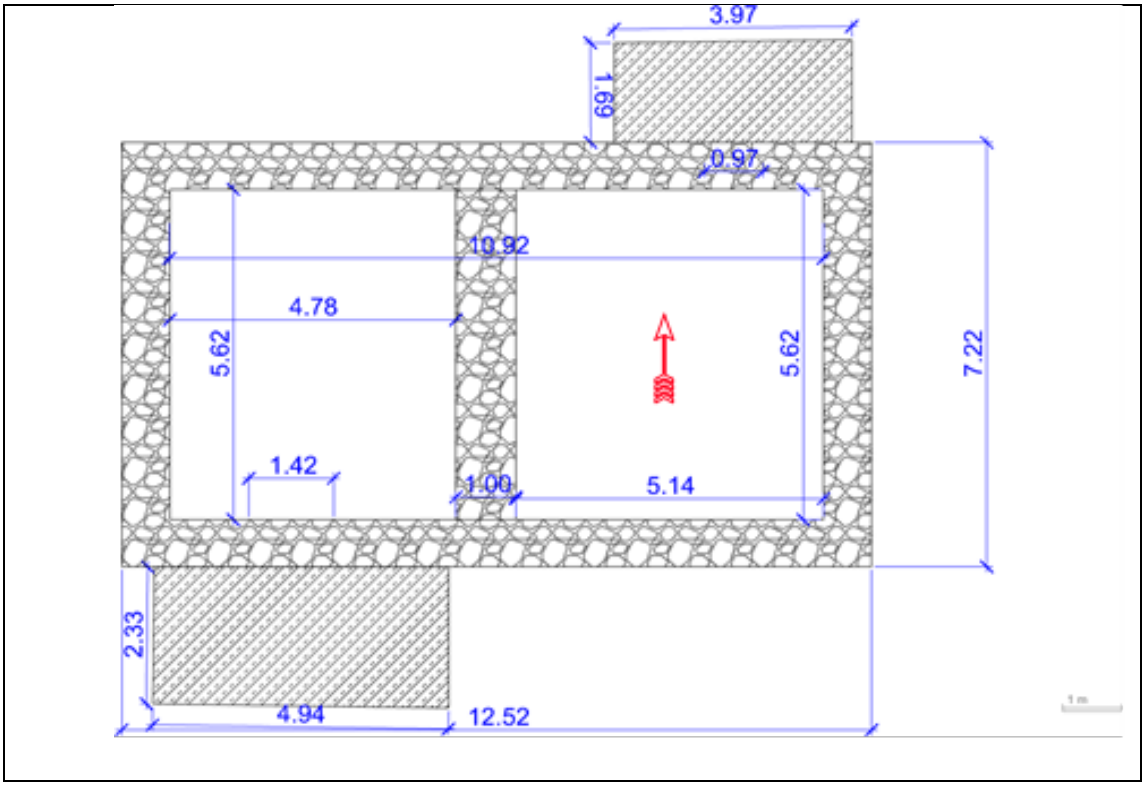

Figure 146 Floor plan of built form 16

Built form 16 is aligned in the north-south axis and has two windows for each of the two rooms connected by a middle wall door. The base walls rise to 2.5 m before the

beams assisted by the central wall make the living floor. There is no information how the base floor was accessed.

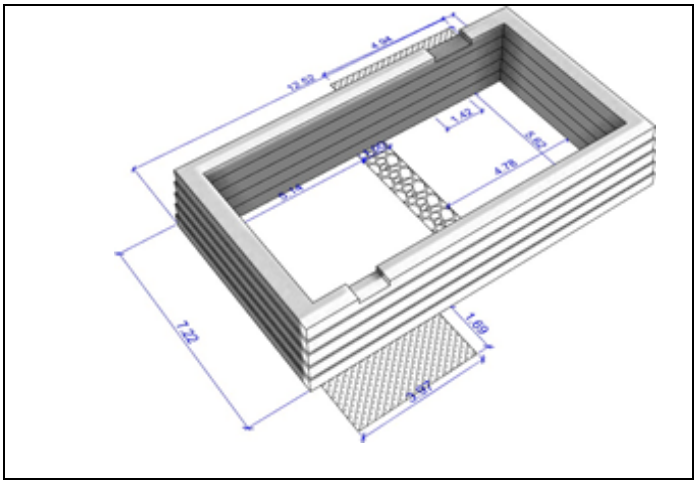

Figure 147 Base floor of built form16

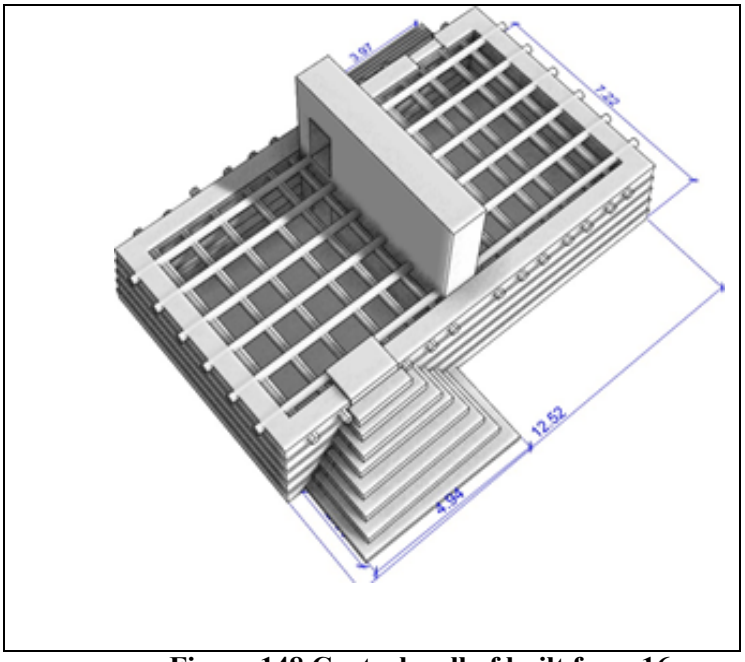

Figure 148 Central wall of built form 16

Most likely the absence of an external wall door can only mean it had an internal door that descends to the lower level by a ladder, similar to built form 1. Similar to the

door on the living floor that is connecting the two rooms there is a connecting door on the base floor (see Figure 152).

The internal wall of built form 16 is sturdily built at 1 m thickness, perhaps indicating either this built form was built multi-story or was intended to so. However, for this study, it is only considered as a one-story building.

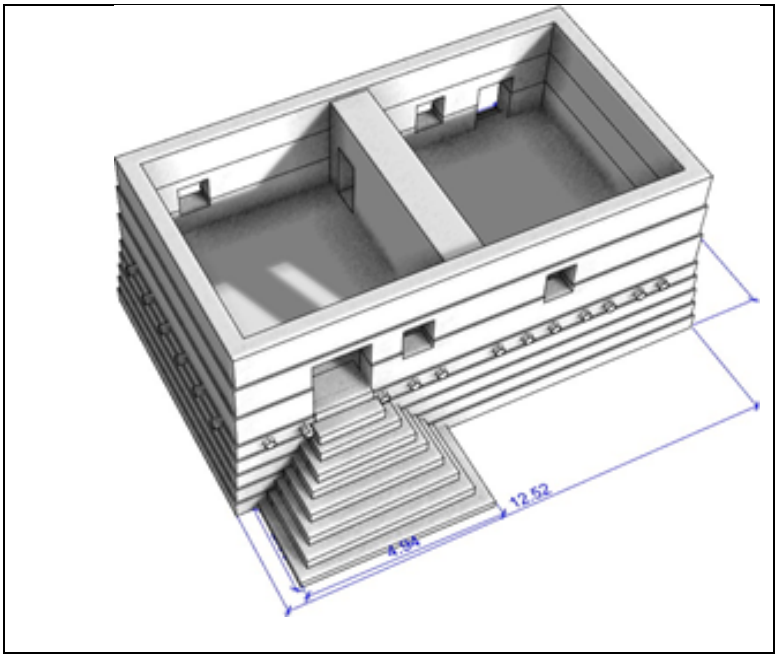

Figure 149 Living floor of built form 16

There is a strong correlation between internal wall's thickness and the number of stories. The living floor walls are 3 m high making each room decent sizes of 5.62 m by 4.78 and the other 5.62 m by 5.14m. There are no windows or doors on the eastern or western walls.

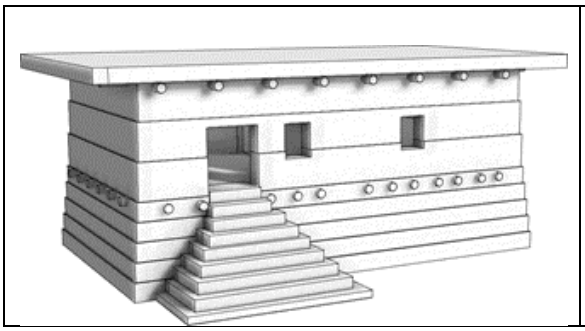

Figure 150 Built form 16, S-W view

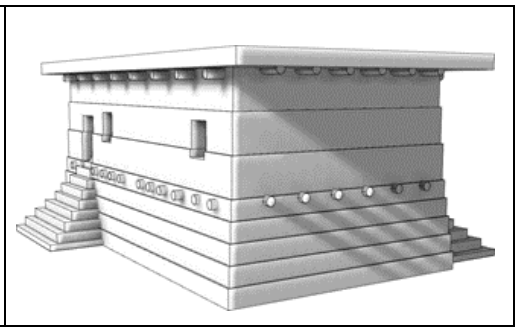

Figure 151 Built form 16 N-E view

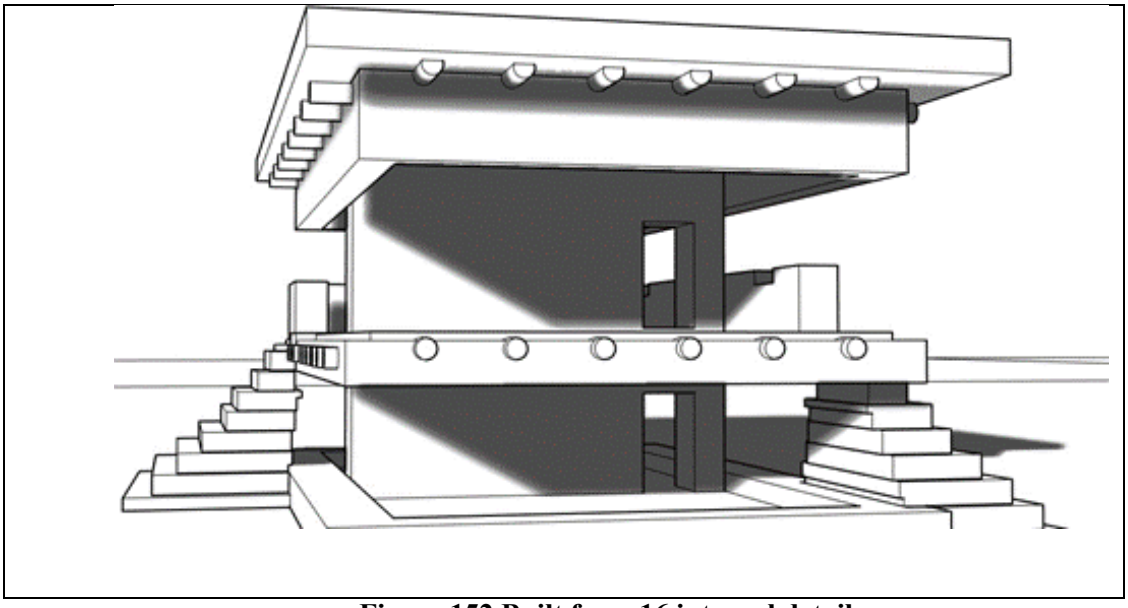

Figure 152 Built form 16 internal details

Built form 16

Walls	Volume in Cubic Meters		
Wall 1	14.51		
Wall 2	13.53		
Wall 3	12.56		
Wall 4	11.6		
Wall 5	10.37		
Wall 6	17.75		
Wall 7	15.63		
Wall 8	15.7		
Total	111.65	111.65	
Stairs-Southern			
Stair 1	1.88		
Stair 2	1.41		
Stair 3	1		
Stair 4	0.67		
Stair 5	0.51		
Stair 6	0.26		
Stair 7	0.15		
Total	5.88	5.88	
Stairs-Northern			
Stair 1	2.62		
Stair 2	1.98		
Stair 3	1.4		
Stair 4	0.94		
Stair 5	0.72		
Stair 6	0.36		
Stair 7	0.2		
Stair 8	0.5		
Total	8.72	8.72	
Floors			
Base Floor	18.99		
Living Quarter Floor	14.33		
Roof Floor	22.55		
Total	55.87	55.87	
Beams			
Base	5.59		
Roof	5.58		
Total	11.17	11.17	
	Grand Total	193.29	

Table 19 Volumetric data of built form 16

3.7.12 Built form 17

Built form 17 is located in quad C1 on the sitemap (see Figure 139). Unlike built form 16 that is aligned to the north-south axis built form 17 is aligned to the northeast-southwest axis. It is a collection of two built forms designated as 17-A and 17-B here (see Figure 153). Built form 17-A is a T-shaped structure while 17-B is rectangular structure. Built form 17-A is 10.14 m by 11.04m while built form 17-B is 8 m by 7.60 m.

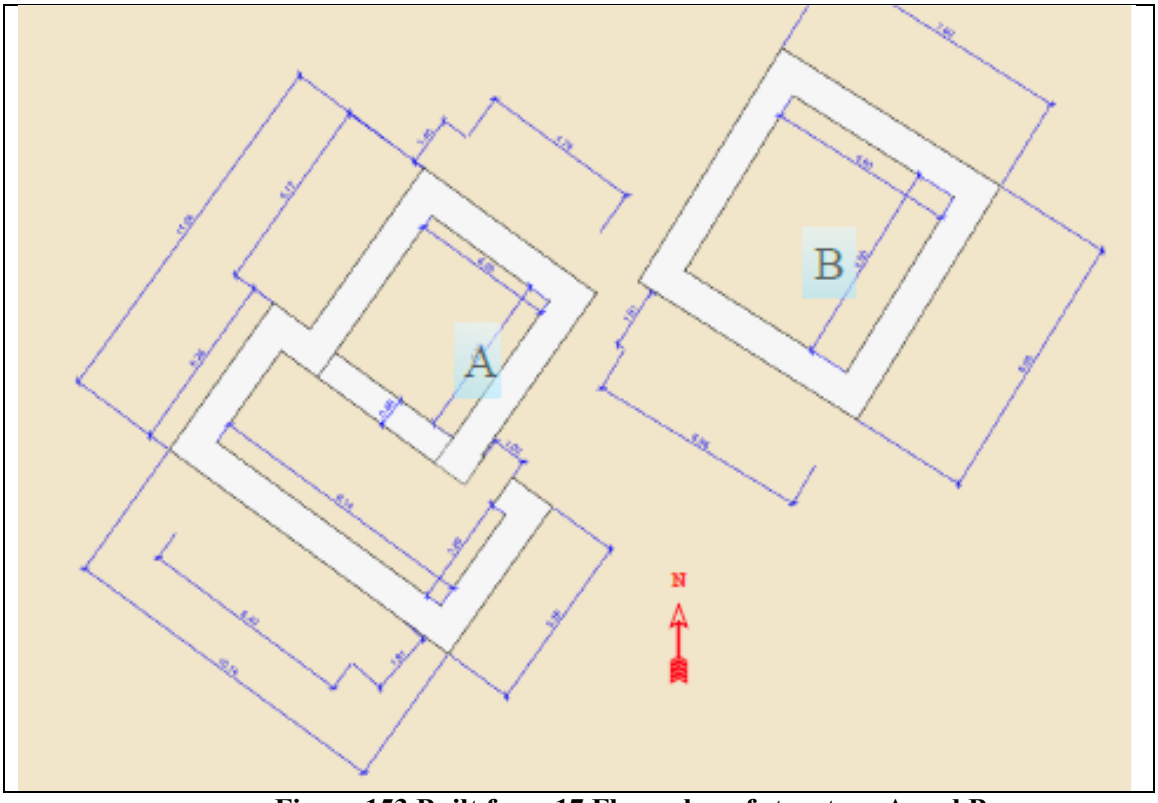

Figure 153 Built form 17 Floor plan of structure A and B

Both these built forms have a base floor, and both these base walls are built to a

height of 3 m. Built form 17-A's base floor has an outside entry door, and is 1.03 m wide, located on the north-east wall of the structure. An internal wall joins the two rectangles of built form 17-A (see Figure 154 and Figure 157).

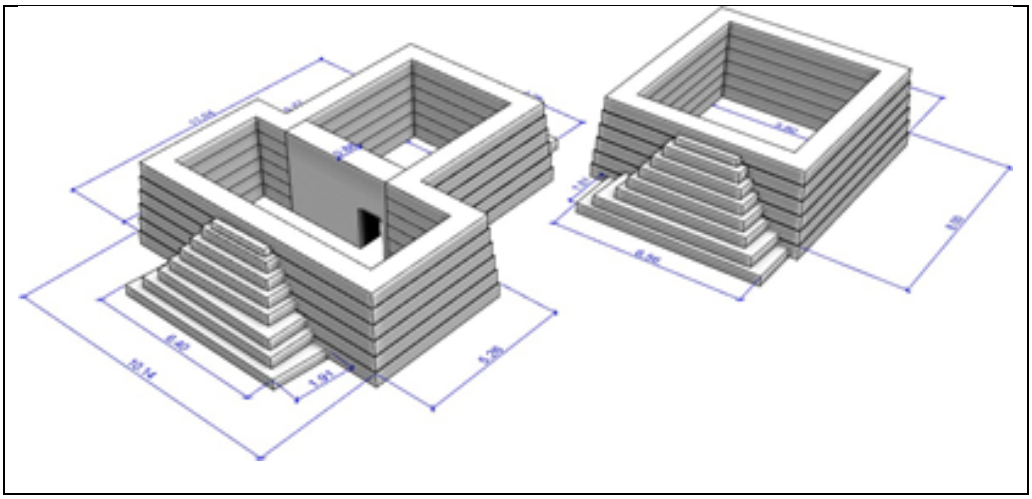

Figure 154 Base floor of 17-A and 17-B

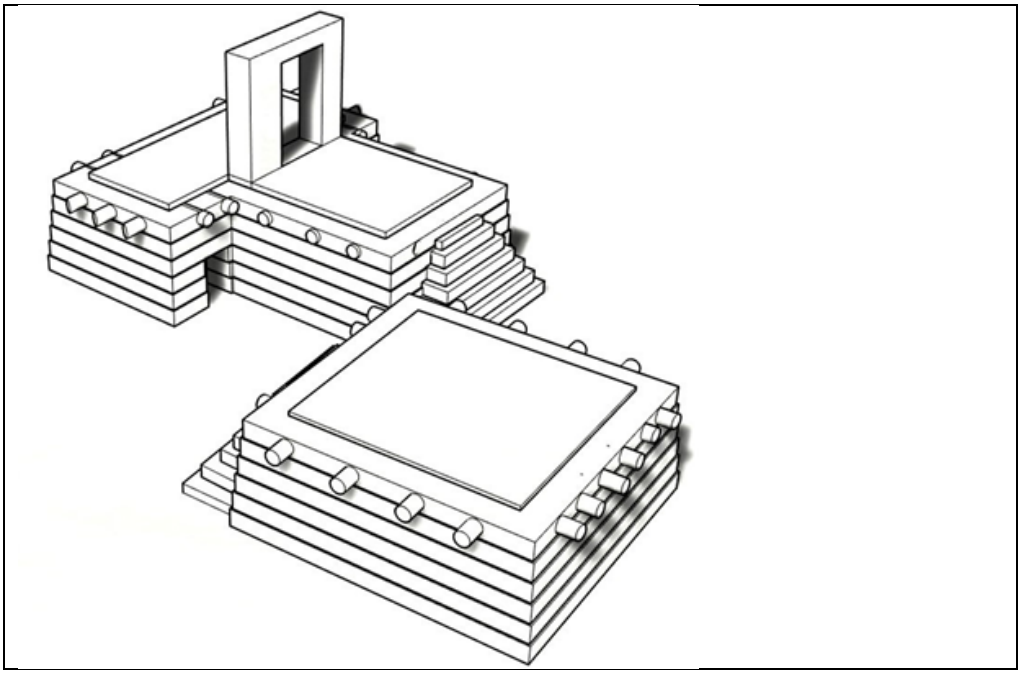

Figure 155 Living Floor of 17-A and 17-B

Built form 17-A has two entry points through stairs located, one on the southern wall and another at the northern wall of the structure. On the other hand built form 17-B has only one stair on the south wall (see Figure 154 and Figure 155). The beams of built form 17 are more elaborate than other built forms. The base entry wall of built form 17-A is 1.5 m high and 1.03 wide pointing most likely for human use or animal use but less convenient than built form 15 for loading and unloading transport animals.

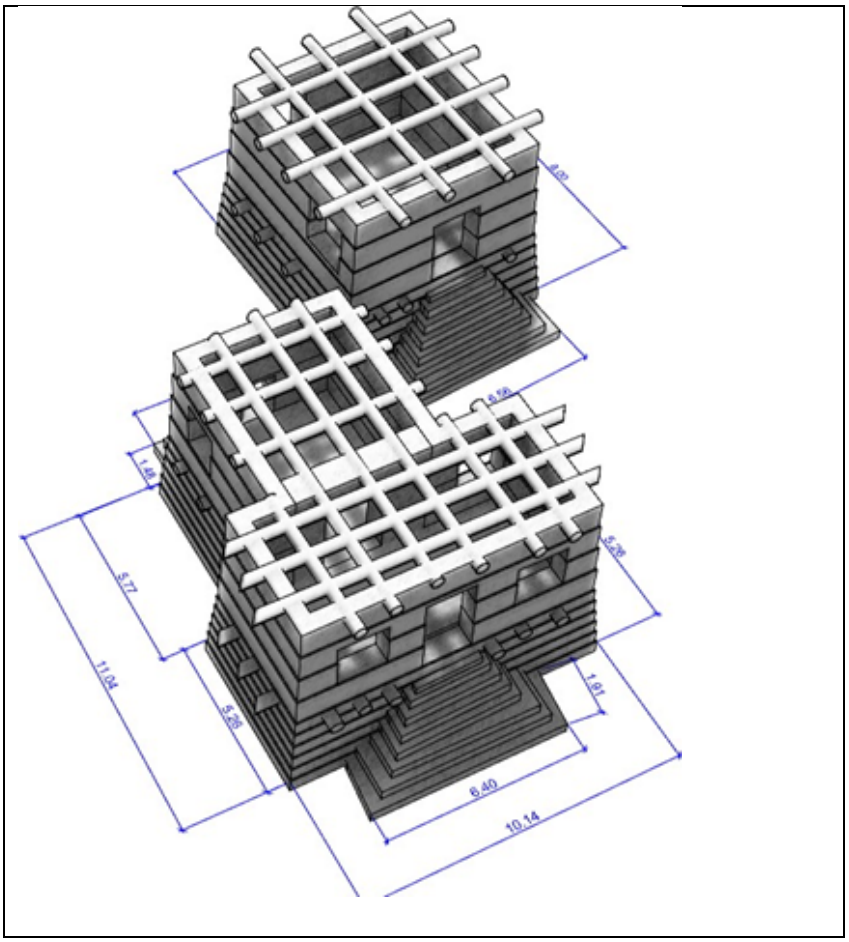

Figure 156 Roof of 17-A and 17-B

The living floor which starts at the height of 3m, is divided by a central wall in built form 17-A, while there is no evidence of any dividing wall in built form 17-B. Built form 17-A has four windows, two on the southern wall, one on the western wall, and one on top of the door that accesses the base floor door (see Figure 158).

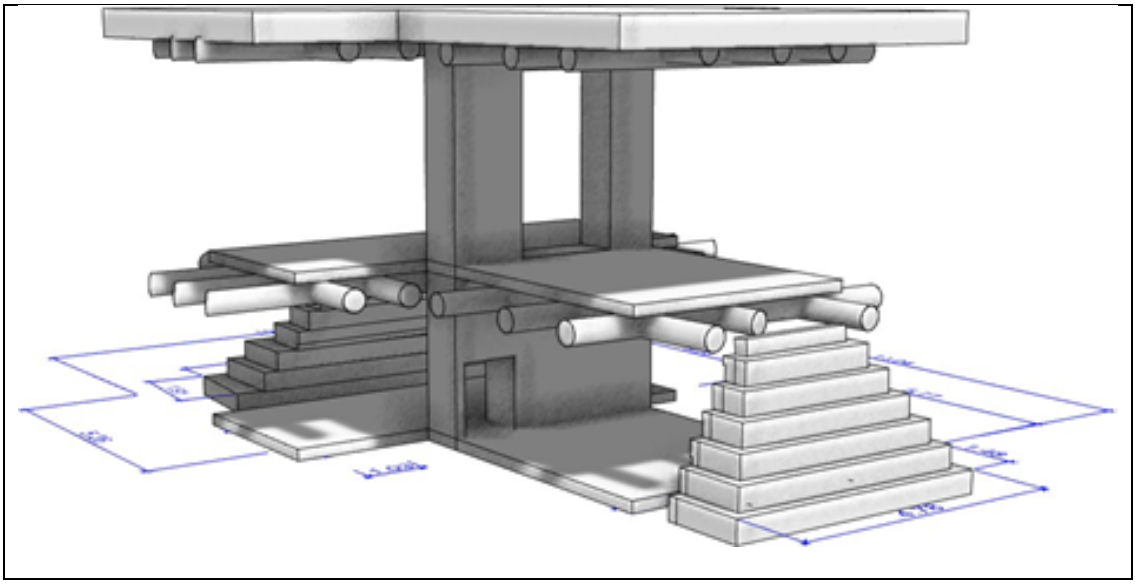

Figure 157 Internal detail of built form 17-A

At the base floor, there is a central door that connects the two rooms in built form 17-A (see Figure 157). At the height of 4 m, the beams make the roof supported by the central wall in built form 17-A, and from one end to another in built form 17-B (see Figure 156).

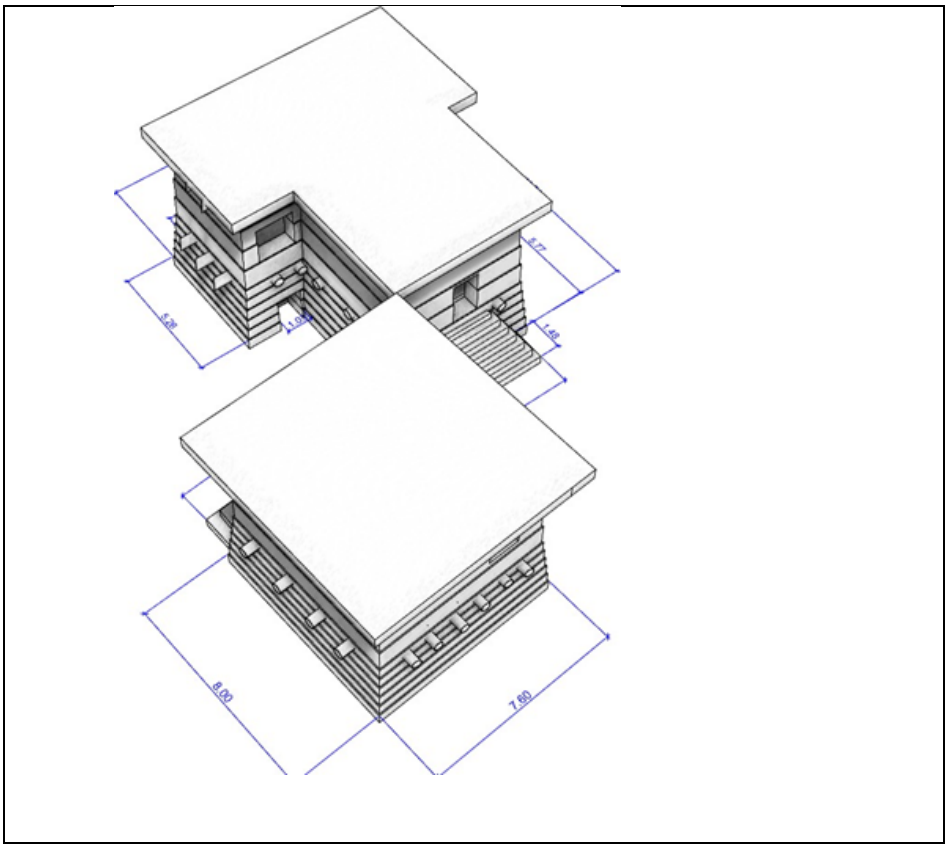

Figure 158 Top view of built form 17-A, 17-B

Built form 17-A

Walls	Volume in Cubic Meters			
Wall 1	19.18			
Wall 2	18.12			
Wall 3	17.08			
Wall 4	16.05			
Wall 5	15.02			
Wall 6	14.01			
Wall 7	24.17			
Wall 8	18.41			
Wall 9	18.98			
Wall 10	20.11			
Total	181.13	181.13		
Misc				
Internal Wall	21.12			
Total	21.12	21.12		
Stairs-				
Southern	13.35			
Northern	9.07			
Total	22.42	22.42		
Floors				
Base Floor	10.23			
Living Quarter Floor	10.23			
Roof Floor	51.31			
Total	71.77	71.77		
Beams				
Base	6.12			
Roof	6.12			
Total	12.24	12.24		
	Grand Total	308.68		

Table 20 Volumetric data of built form 17-A

Built form 17-B

Walls	Volume in Cubic Meters		
Wall 1	13.61		
Wall 2	12.82		
Wall 3	12.06		
Wall 4	11.31		
Wall 5	9.92		
Wall 6	9.83		
Wall 7	17.04		
Wall 8	14.13		
Wall 9	13.11		
Wall 10	13.97		
Total	127.8	127.8	
Stairs-			
Southern	14.54		
Total	14.54	14.54	
Floors			
Base Floor	6.72		
Living Quarter Floor	6.72		
Roof Floor	39.32		
Total	52.76	52.76	
Beams			
Base	7.34		
Roof	7.29		
Total	14.63	14.63	
	Grand Total	209.73	

Table 21 Volumetric data of built form 17-B

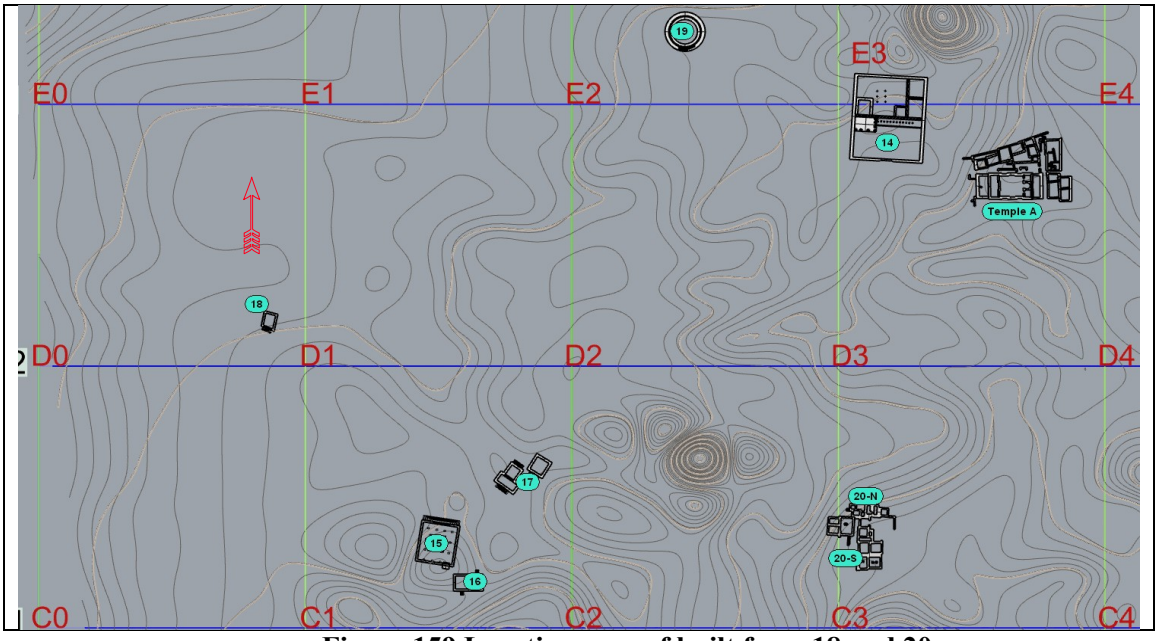

Figure 159 Location map of built form 18 and 20

3.7.13 Built form 18

Built form 18 is located at quad D0 (see Figure 159). Built form 18 is quite unique in the architecture of Adulis in that it is the only built form that is designed as a trapezoid model than rectangular or circular forms. The built form has dimensions of 5.9m by 7.5m by 5.9m by 6.7 m. It is not clear why such a design was implemented. Perhaps this was a part of a bigger building, although at this point there is no evidence to suggest that built form 18 was part of a more prominent building.

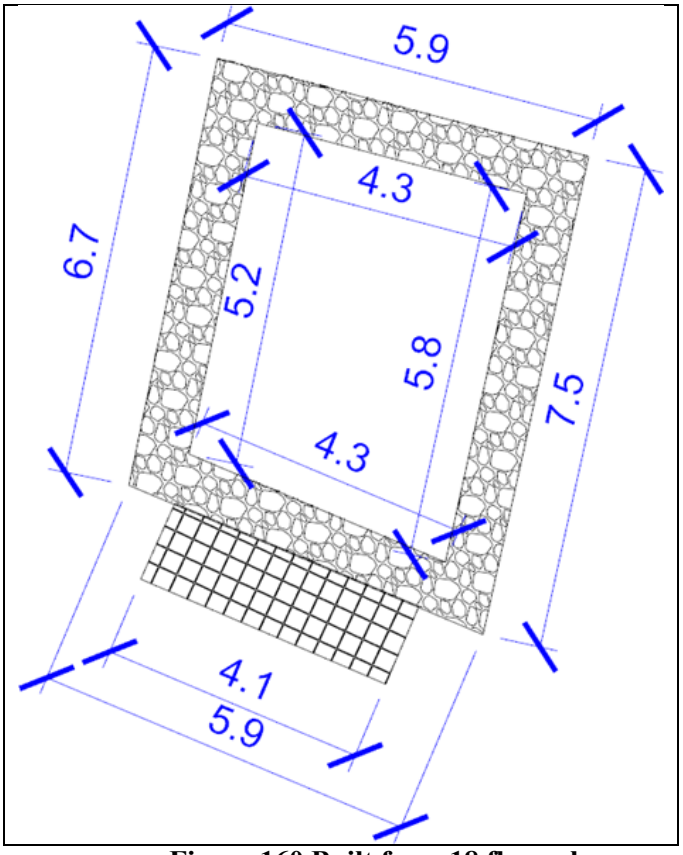

Figure 160 Built form 18 floor plan

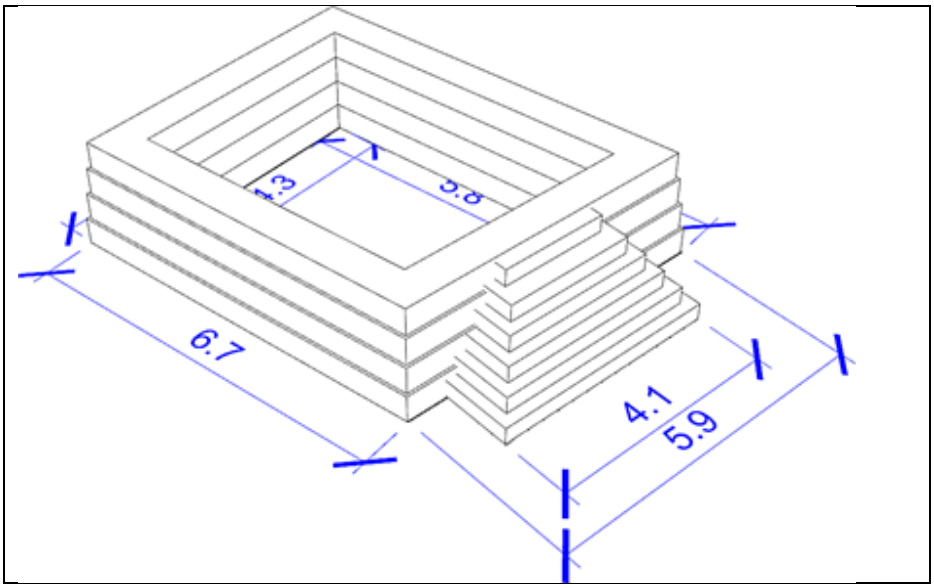

Figure 161 Built form 18 base floor

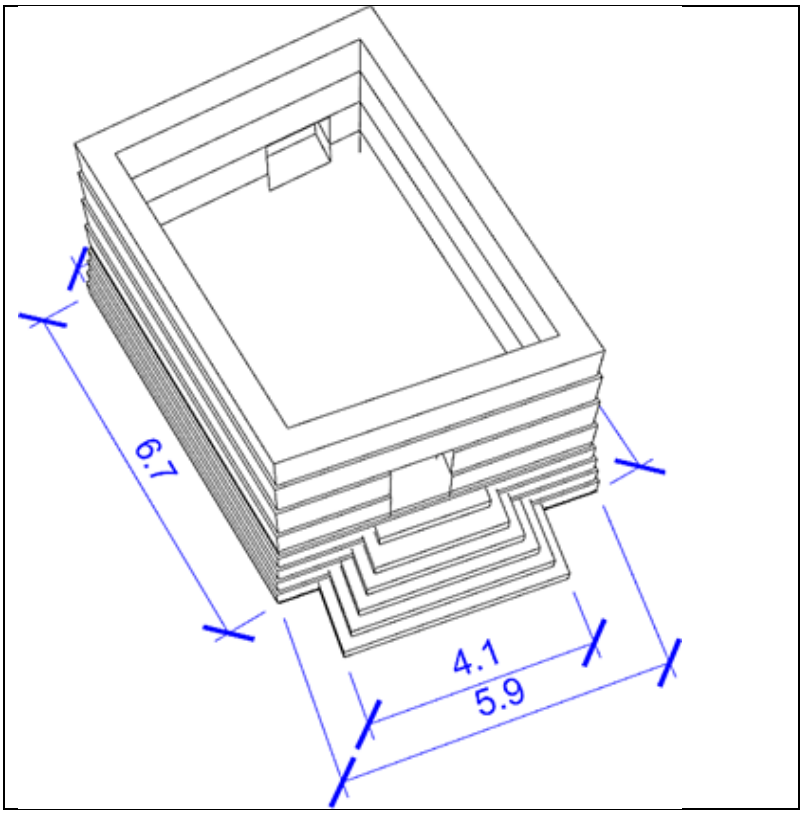

Figure 162 Built form 18 Living floor

Another possibility points to some experimentation, either builders experimenting with different types of designs, or builders experimenting with making built forms more comfortable by experimenting with designs that assist air flow or heat dissipation, etc. Since this built form is located on the outskirt of the town with fewer built forms it is more likely the latter perspective of experimentation may be the case.

Built form 18 has a base floor, and the base floor rises to 2 m to make the living floor. There is no indication of side entry to the base floor. It is most likely the entry was from the living floor.

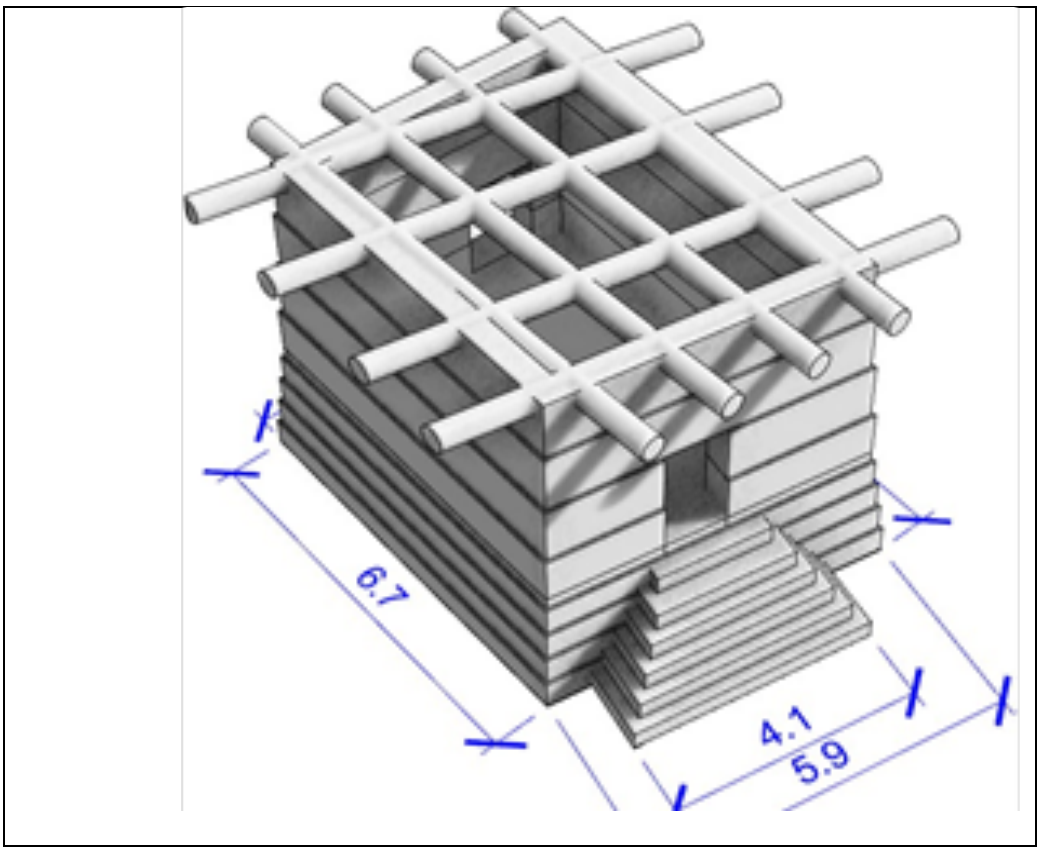

Figure 163 Built form 18 Roof

The living floor extends up to 4m to meet the beams that make up the roof. Built form 18 has one stair and one door on the southern wall and another

door/window on the northern wall. The northern door/window does not have stairs, so it is not a definitive indication of a door, but it is about 1m high and sits on the same level as the living floor (see Figure 165). Most windows at Adulis are raised from the living floor by at least 0.5m or more. The northern window/door of built form 18 is not raised from the living floor, but is on the same level as the living floor, and thus actually may be a small door.

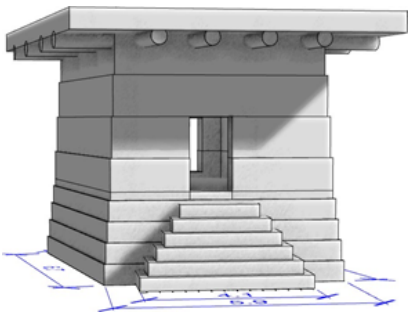

Figure 164 Built form 18 Front view

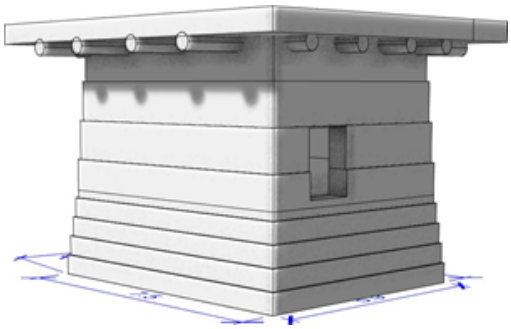

Figure 165 Built form 18 Back view

Built form 18

Walls	Volume in Cubic Meters	
Wall 1	9.09	
Wall 2	8.45	
Wall 3	7.82	
Wall 4	7.19	
Wall 5	12.09	
Wall 6	10.75	
Wall 7	10.76	
Wall 8	9.6	
Total	75.75	75.75
Stairs-Southern		
Stair 1	2.04	
Stair 2	1.63	
Stair 3	1.23	
Stair 4	0.91	
Stair 5	0.62	
Stair 6	0.31	
Total	6.74	6.74
Floors		
Base Floor	4.63	
Living Quarter Floor	7.27	
Roof Floor	35.7	
Total	47.6	47.6
Beams		
Base	4.93	
Roof	8.16	
Total	13.09	13.09
	Grand Total	143.18

Table 22 Volumetric data of built form 18

3.8 Rectangular built forms around Temple A

There are fifteen built forms around Temple A, some within the compound of Temple A on the north and others across a street U (see Figure 166). A naming convention used by Paribeni (1907) is used here to create consistency. It is not clear from the archaeological record that these rectangular built forms were built or owned by the Temple, or whether they were built around the temple for a specific reason. It is more likely the Temple did not own these built forms given the grades of the walls. The walls of the Temple are built with Grade A masonry type, while these built forms around Temple are built with Grade C.

Figure 166 Rectangular built forms around Temple A

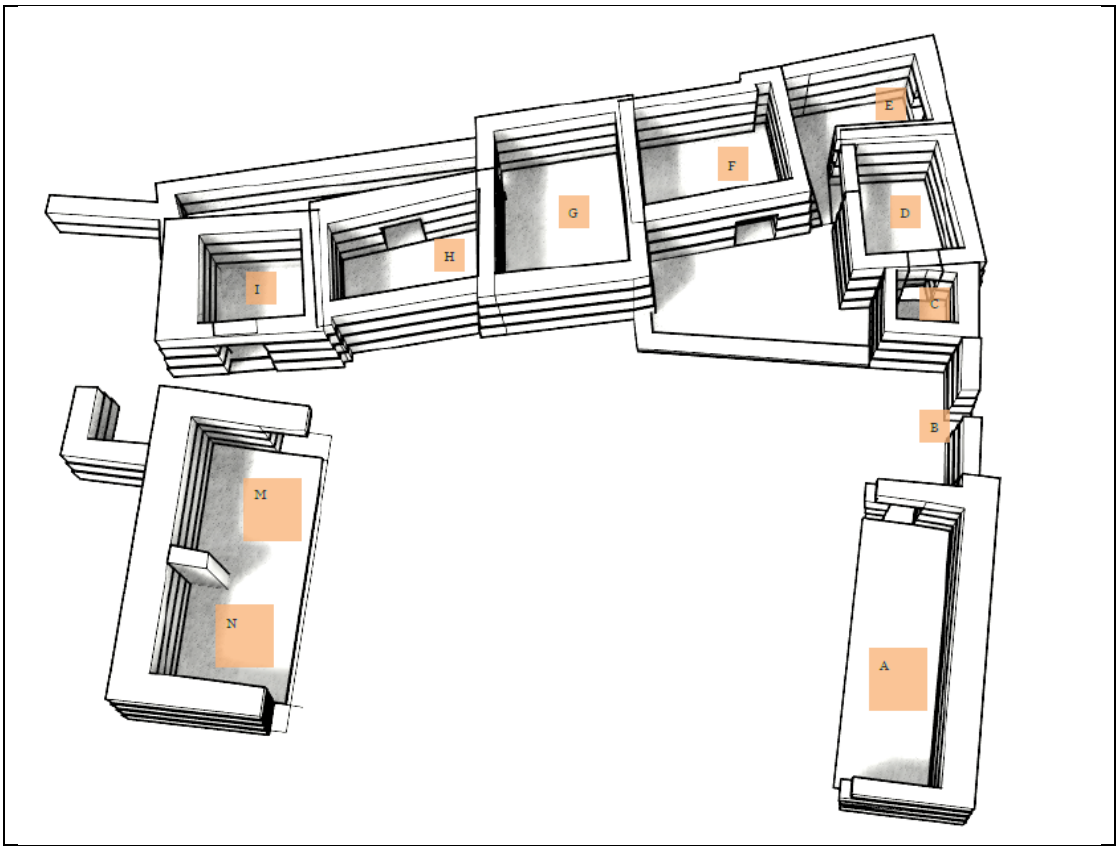

Figure 167 Built forms around Temple A

Assuming all Adulis inhabitants have obligations to contribute labor to the Temple, including a skilled labor, it is less likely to see such contrast in wall grade construction if these were temple properties.

There is a strong indication from the artifacts discovered that this compound may have been inhabited by specialists, crafts (WO) men. For instance, there is evidence of another marble throne (not MA-II) that was documented in built form M&N (see Chapter 4). Built form H was uncovered with goldsmithing tools, furnace bellows, an unprocessed bar of gold, two bishop necklaces with Greek names on them and perhaps gold and copper coins minting. All these artifacts typically for and by specialists unearthed in situ suggest these built forms could be a guild. Or it is also possible these professions picked

these built forms because of security that might be found by living on sacred grounds around Temple A.

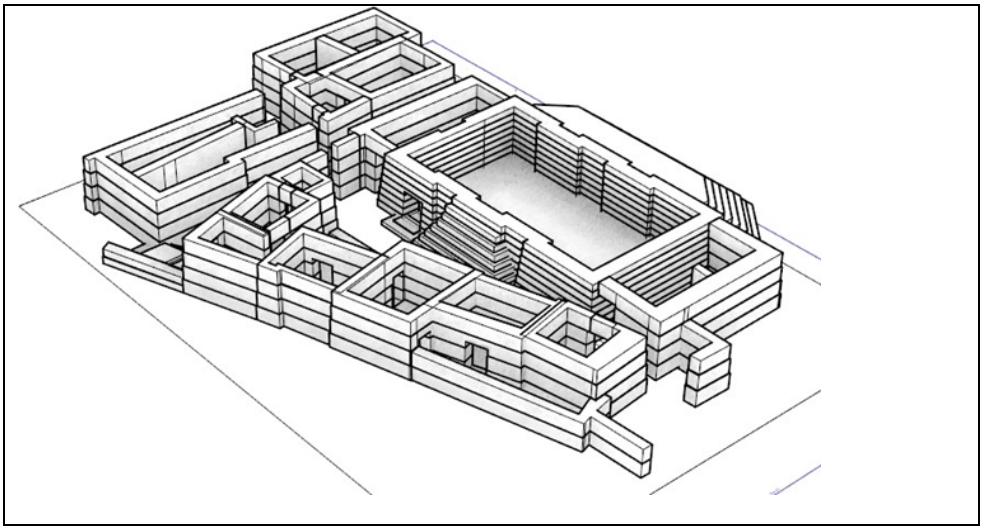

Figure 168 Built forms around Temple A North-East view

3.8.1 Built forms M&N and A

Built form M&N is an attachment building on the western wall of Temple A, while built form A is on the eastern wall (see Figure 167). Both these built forms extend in length to the edge of the temple wall and rise to about 4 m in height. Built form M&N is divided into two rooms by a central wall. In contrast, built form A flows as one unified room. Both these built forms have doors facing north, and no indication of windows are documented. Built form M&N has an attached wall 3 m high on the east side to make some enclosure for a door or protective compound. A similar structure can be noted on built form A on the western end designated by letter B (see Figure 166). Built form M&N has slightly larger walls and surface area than built form A (see Table 25 and Table 26). Based on the artifacts excavated from these built forms, built forms I, which is positioned opposite to built form M&N seems related to it. More data is needed to understand these structures but is possible to make energetic assessments of them.

Built Form M&N		
Walls M&N	Volume in Cubic Meters	
Wall 1	21.19	
Wall 2	20.34	
Wall 3	19.48	
Wall 4	19.71	
A	4.73	
B	4.09	
C	3.53	
Total	93.07	93.07
Floors		
Base Floor	8.11	
Roof	26.97	
Total	35.08	24
Misc		
Beams	7.71	
Central Wall	2.76	
Total	10.47	10.47
	Grand Total	*127.54*

Table 23 Volumetric data of built form M&N

Built Form A		
Walls	Volume in Cubic Meters	
Wall 1	17.19	
Wall 2	16.43	
Wall 3	15.62	
Wall 4	14.93	
Total	64.17	64.17
Floors		
Base Floor	7.05	
Roof	21.82	
Total	28.87	28.87
Misc		
Beams	5.47	
Total	5.47	5.47
	Grand Total	*98.51*

Table 24 Volumetric data of built form A

3.8.2 Built forms C, D, E and F

Built forms C, D and E might be considered as related built forms based on the excavation details that come out of these structures. Built form E features a seating

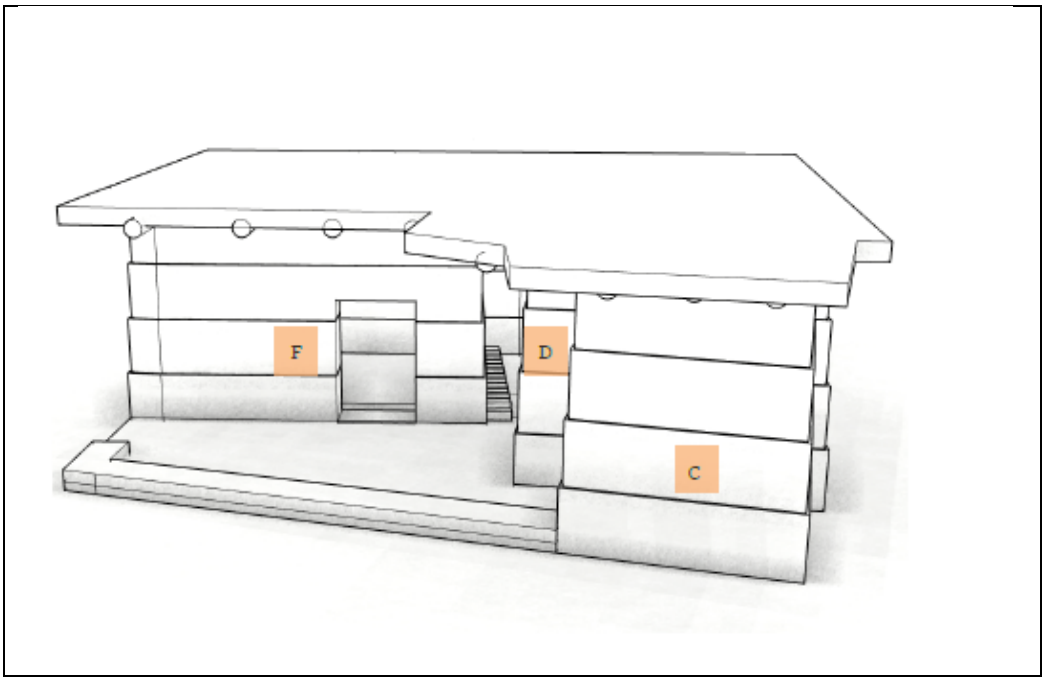

Figure 169 Built forms C, D, E and F Front view

arrangement (see Figure 170), while built form D gives evidence of three large cooking pots sitting on a hearth and charred wood and charcoal, with many animal bones and numerous serving utensils. Built form C, on the other hand, yielded dagger knives, and many coins. Based on the artifacts excavators documented in situ during excavations, these three built forms functioned as some food serving station or as a restaurant (Paribeni 1907). Meanwhile, built form F seems an ordinary dwelling most likely associated with those who are serving the food. This food station has dual access: it can be accessed from the northern stairs of Temple B, thus can serve the temple, or it might

also be possible to access it through built form E door that links to street U (see Figure 166 and Figure 180). It might also be within a compound cafe or eatery.

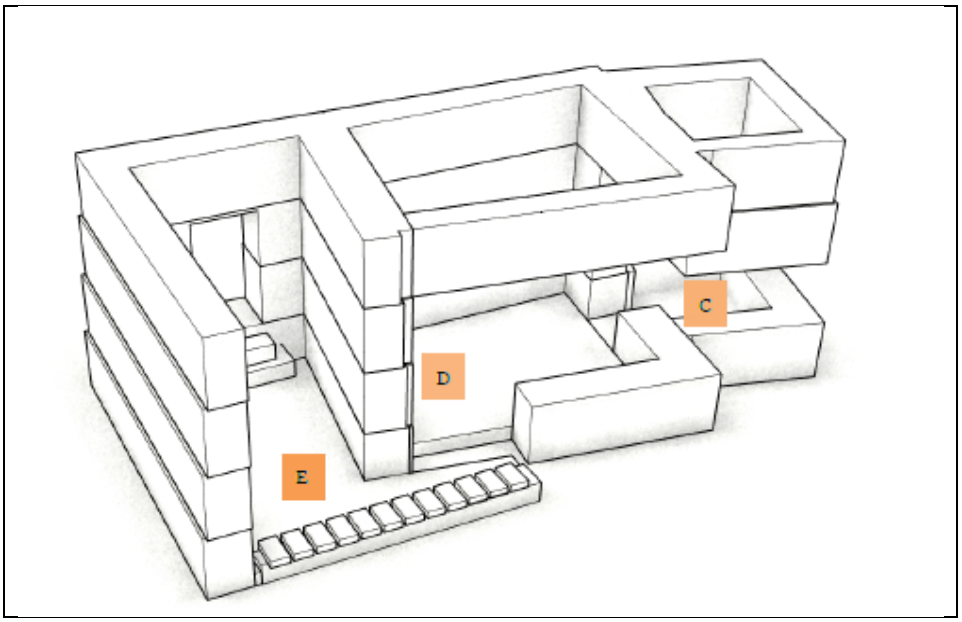

Figure 170 Built forms C,D and E

Built form C		
Walls	**Volume in Cubic Meters**	
Wall 1	4.83	
Wall 2	4.53	
Wall 3	4.23	
Wall 4	3.93	
Total	**17.52**	**17.52**
Floors		
Base Floor	1.41	
Roof	4.17	
Total	**5.58**	**5.58**
Misc		
Beams	1.58	
Gate Walls	10.37	
Total	**11.95**	**11.95**
	Grand Total	***35.05***

Table 25 Volumetric data of built form C

Built form D		
Walls	**Volume in Cubic Meters**	
Wall 1	10.15	
Wall 2	9.33	
Wall 3	8.52	
Wall 4	9.09	
Total	**37.09**	**37.09**
Floors		
Base Floor	3.03	
Roof	9.91	
Total	**12.94**	**3.03**
Beams		
Beams	4.41	
Total	**4.41**	**4.41**
	Grand Total	***44.53***

Table 26 Volumetric data of built form D

Built form E		
Walls	**Volume in Cubic Meters**	
Wall 1	8.71	
Wall 2	7.2	
Wall 3	6.66	
Wall 4	6.78	
Total	**29.35**	**29.35**
Floors		
Base Floor	2.18	
Roof	9.01	
Total	**11.19**	**2.18**
Misc		
Beams	3.51	
Stairs	0.37	
Seats	0.65	
Total	**4.53**	**4.53**
	Grand Total	***36.06***

Table 27 Volumetric data of built form E

3.8.3 Built forms G, H and I

Built form G is located on the western side of the platform of built form C, D, E and F (see Figure 166 and Figure 167). It has dual access point, one on the eastern wall (see Figure 172), and another on the western wall (see Figure 171).

There is a wall attached to the northern wall of built form G that most likely is an enclosure wall. It seems this wall was built up to the height of built form G which is 4 m from the ground (see Figure 172).

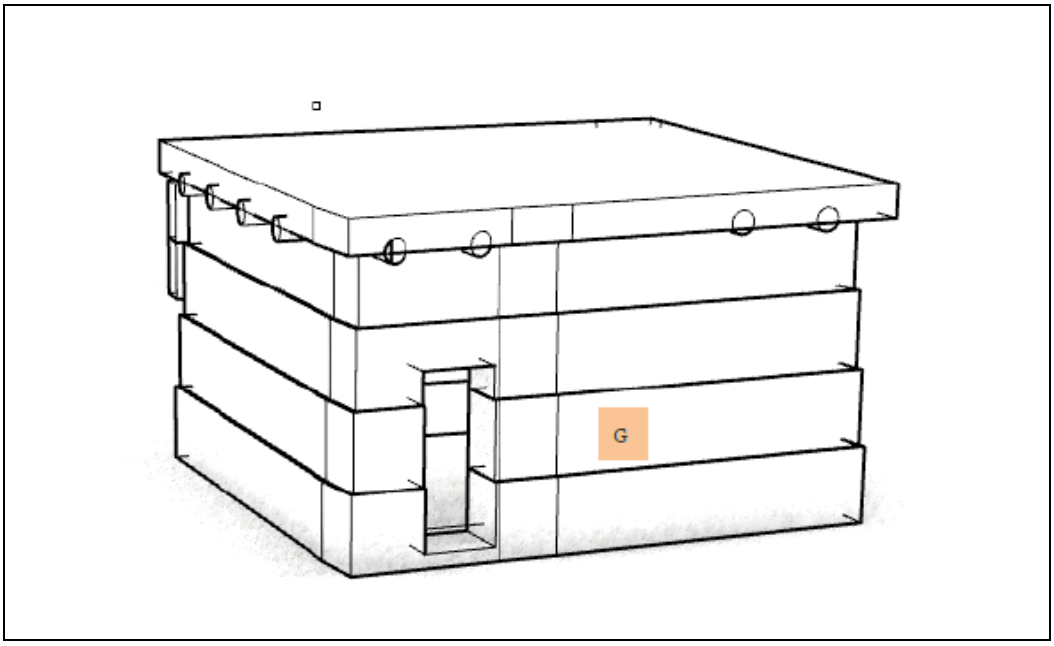

Figure 171 Built form G, western door

In particular built form H is only accessible through the two doors of built form G. Built form H could be a goldsmith residence or workstation that gave artifacts such as furnaces, a circular bar of unprocessed gold, coins and

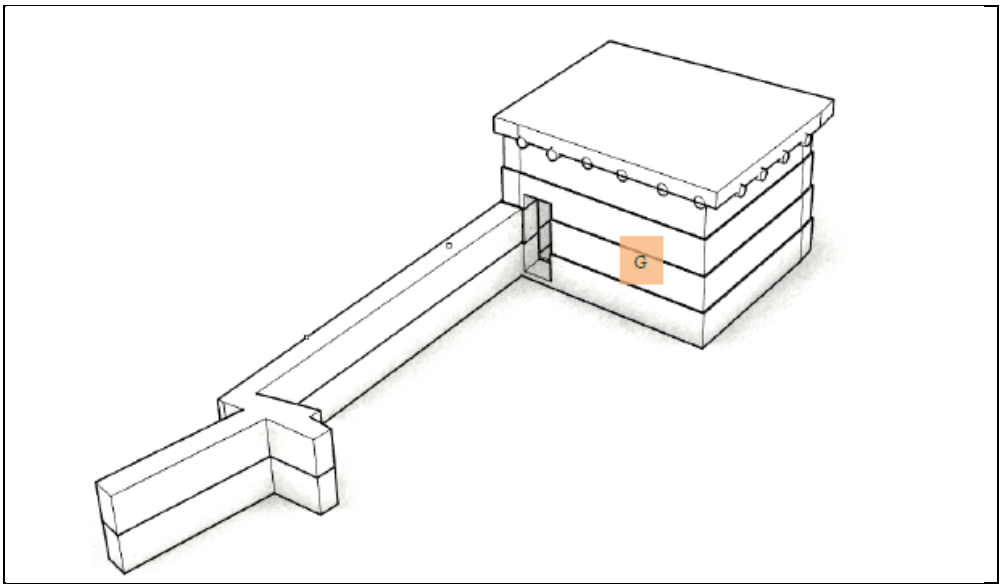

Figure 172 Built form G, eastern door

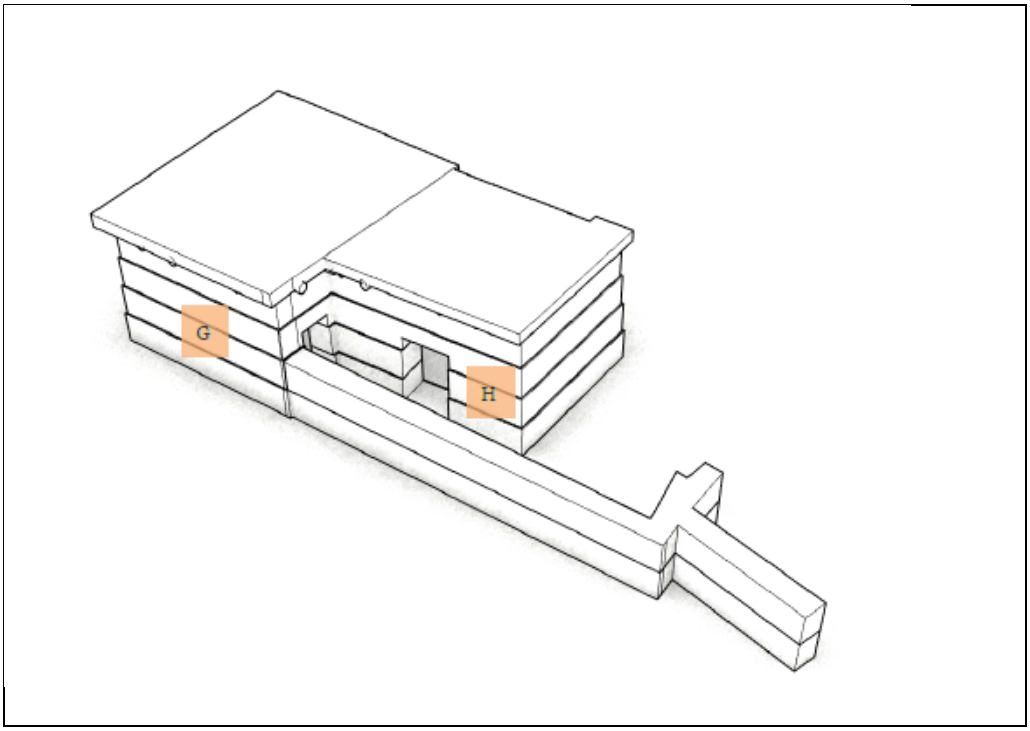

Figure 173 Built form G and H

pectoral cross (the necklace that bishops or cardinals wear) with crosses and Greek engraving on them (Paribeni 1907). Built form H, like other structures, raises for

about 4 m till it met with the roof. There are no windows or any entry form besides only through G.

Built form I has a door facing Temple A's northern wall like built form F (see Figure 175). There is no documented presence of windows in this built form as well. Its wall is 4 m high and includes a 3 m door slightly higher than that of built form F.

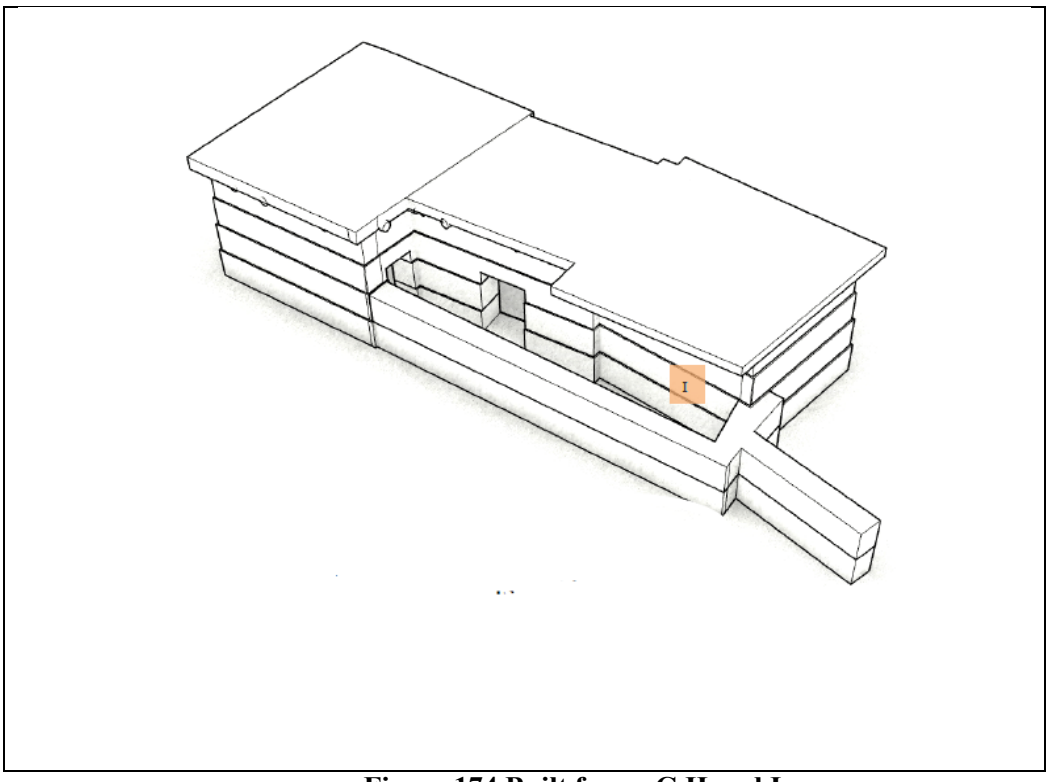

Figure 174 Built forms G,H and I

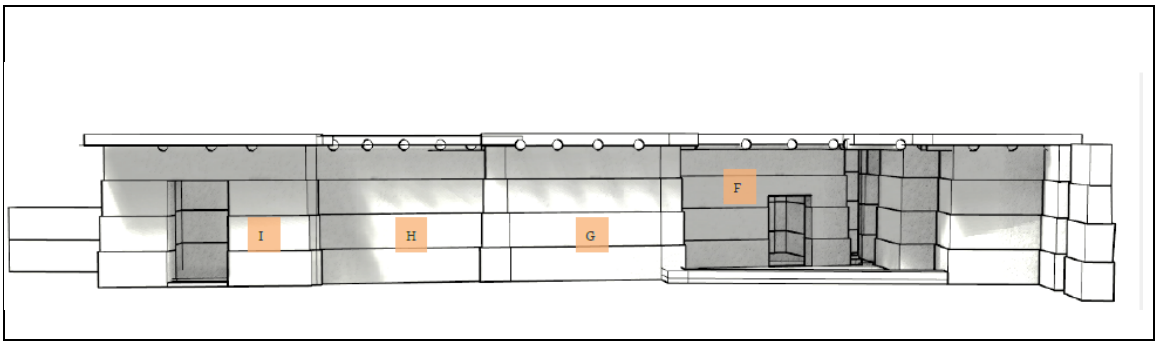

Figure 175 Built forms I,H,G, F, E, D and C front view

Built form G		
Walls	**Volume in Cubic Meters**	
Wall 1	16.69	
Wall 2	15.25	
Wall 3	14.81	
Wall 4	14.12	
Total	**60.87**	**60.87**
Floors		
Base Floor	5.6	
Roof	11.12	
Total	**16.72**	**5.6**
Misc		
Beams	4.6	
Total	**4.6**	**4.6**
	Grand Total	***71.07***

Table 28 Volumetric data of built form G

Built form H		
Walls	**Volume in Cubic Meters**	
Wall 1	14.23	
Wall 2	12.89	
Wall 3	12.51	
Wall 4	11.97	
Total	**51.6**	**51.6**
Floors		
Base Floor	3.66	
Roof H	8.38	
Total	**12.04**	**12.04**
Misc		
External wall 1	11.21	
External wall 2	11.21	
Beams	3.12	
Total	**25.54**	**25.54**
	Grand Total	***89.18***

Table 29 Volumetric data of built form H

Built form I		
Walls I	**Volume in Cubic Meters**	
Wall 1	14.17	
Wall 2	13.23	
Wall 3	12.32	
Wall 4	12.34	
Total	**52.06**	**52.06**
Floors		
Base Floor	2.69	
Roof	11.05	
Total	**13.74**	**13.74**
Misc		
Beams	2.48	
Stair	0.07	
Total	**2.55**	**2.55**
	Grand Total	***68.35***

Table 30 Volumetric data of built form I

3.8.4 Built form R

Built form R is located in the upper right corner of Figure 166. It consists of two rectangular houses facing built form S and V. There is a small road between built form R, and built forms S and V. This road narrows to 1 m before it joins to street U (see Figure 166).

Built form R is divided into two sections by a central wall, and each section appears to have its entry point, i.e., doors with stairs that let inhabitants of built form R join the narrow street (see Figure 176). The walls rise to 4 m before they are roofed. It is highly probable that built form R might have been built into a second floor given the thickness of the walls however, here it is constructed to one floor.

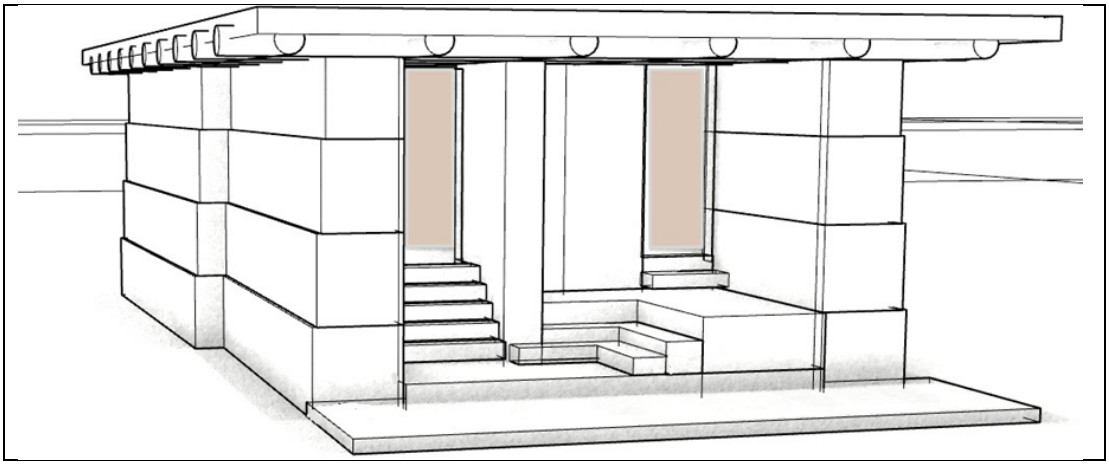

Figure 176 Built form R front view

Unlike the surrounding built forms that have windows built form R does not feature windows, which enforces the notion that it was most likely used as commercial space on the first floor, while the second floor might have been a residence. If the second

floor had been used as residence, then it is most likely traces of stairs will be discovered either at the center of the built form or on the western wall. The central wall adjoins the two sections, and is constructed in such a manner that it appears as a sort of load bearing wall, and thick consistent with the central walls used for a multi stories built forms.

Built form R		
Walls	**Volume in Cubic Meters**	
Wall 1	31.5	
Wall 2	29.74	
Wall 3	28.01	
Wall 4	26.27	
Total	**115.52**	**115.52**
Floors		
Base Floor-1	0.96	
Base Floor-2	23.38	
Base Floor-3	50.77	
Roof	33.46	
Total	**108.57**	**108.57**
Misc		
Stairs left	0.62	
Stairs right	7.46	
Internal Walls	27.16	
Beams EW	5.96	
Beams NS	6.21	
Total	**47.41**	**47.41**
	Grand Total	***271.5***

Table 31 Volumetric data of built form R

3.8.5 Built form V, S and T

Built forms V, S, and T are two long rectangular built forms which adjoined together by a wall at the center. Built form V was most likely built first, and then T and S may have been added (see Figure 177). Both these built forms are divided into rooms by a dividing central wall with a door. Similar to built form I built form V, and S&T have a taller door at 3 m. The walls are raised to 4 m before they are roofed. While built form V room division by the central wall seems more or less equal, built form S&T is larger on room T compared to S.

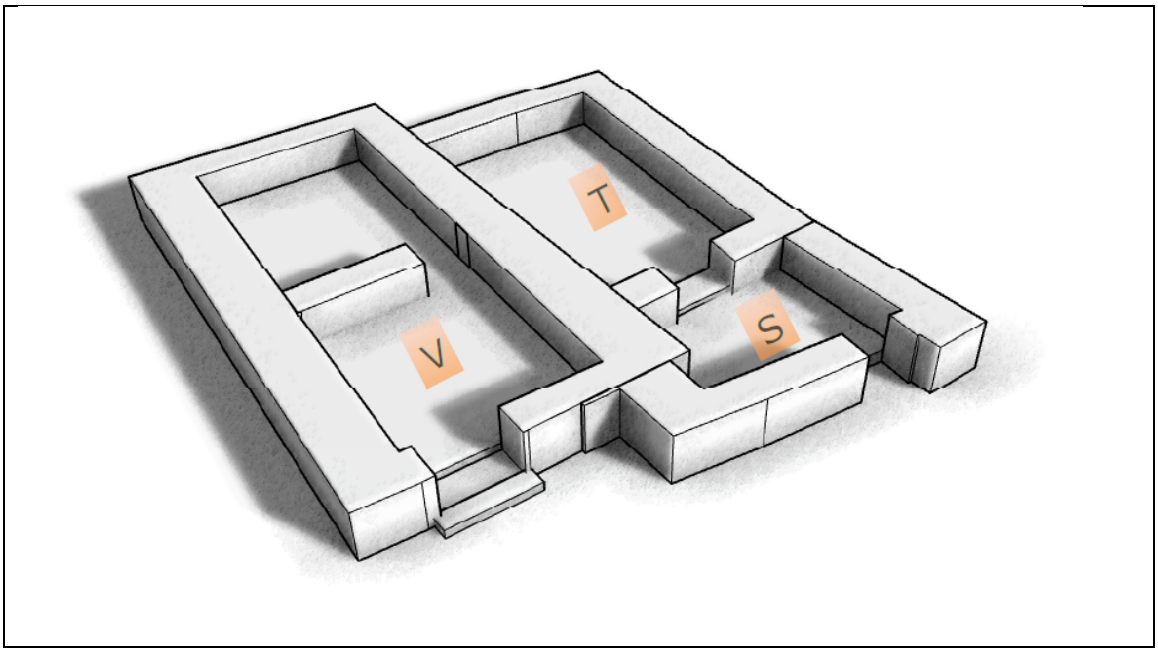

Figure 177 Floor plan of built form S, T and V

There is no evidence documented suggesting the presence of windows in built form V or S&T. But it is more likely that, as for built form R, either these built forms are

base floors where residences are located in the second floor, or there might be windows in the first floor but not documented during excavation.

It is doubtful that residences public or private would be built without a window in particular sites like Adulis that have hot weather. It is constructed with no windows temporarily for now, and may be amended when more data is gathered.

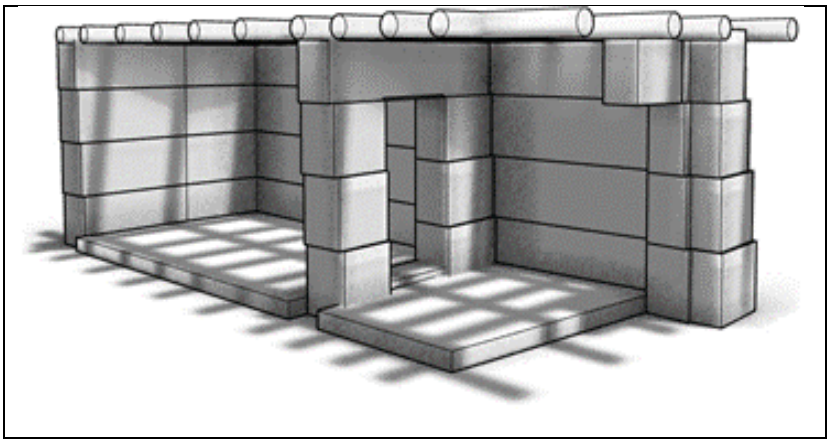

Figure 178 Internal detail of S and T

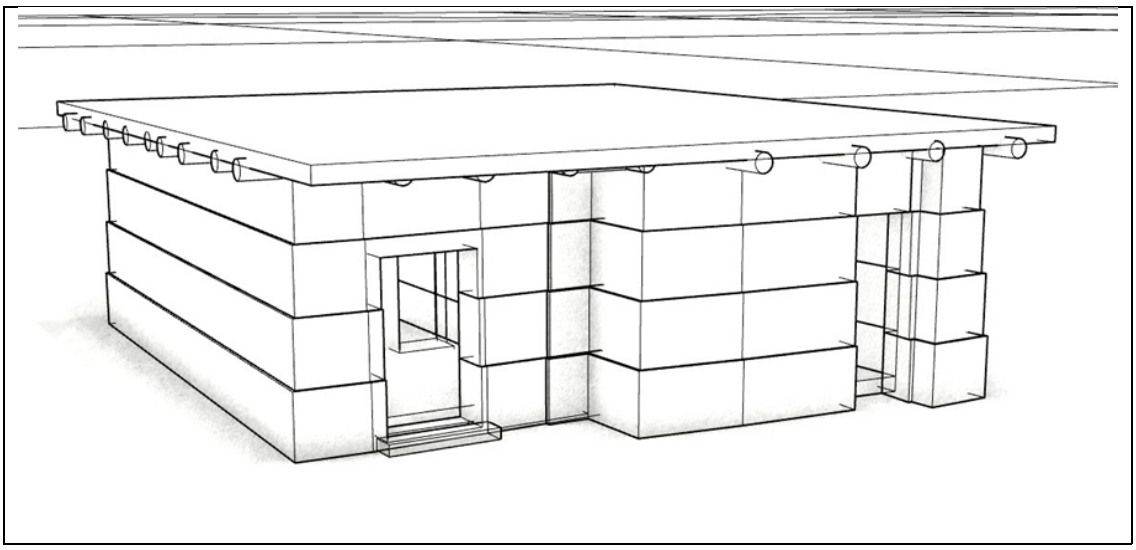

Figure 179 Built form V (left), Built form S and T (right)

Built form V		
Walls	**Volume in Cubic Meters**	
Wall 1	29.97	
Wall 2	28.31	
Wall 3	26.66	
Wall 4	25.04	
Total	**109.98**	**109.98**
Floors		
Base Floor	8.51	
Roof	19.49	
Central Wall	10.76	
Total	**38.76**	**38.76**
Misc		
Beams EW	3.42	
Beams NS	3.52	
Total	**6.94**	**6.94**
	Grand Total	***155.68***

Table 32 Volumetric data of built form V

Built form S		
Walls	**Volume in Cubic Meters**	
Wall 1	13.74	
Wall 2	12.87	
Wall 3	12.02	
Wall 4	11.76	
Total	**50.39**	**50.39**
Floors		
Base Floor	2.76	
Roof	3.17	
Total	**5.93**	**5.93**
Misc		
Beams	**2.97**	2.97
	Grand Total	***59.29***

Table 33 Volumetric data of built form S

Built form T		
Walls	**Volume in Cubic Meters**	
Wall 1	20.03	
Wall 2	18.73	
Wall 3	17.46	
Wall 4	17.05	
Total	**73.27**	**73.27**
Floors		
Base Floor	6.32	
Roof	21.79	
Total	**28.11**	**28.11**
Misc		
Beams EW	2.54	
Beams NS	2.32	
Total	**4.86**	**4.86**
	Grand Total	***106.24***

Table 34 Volumetric data of built form T

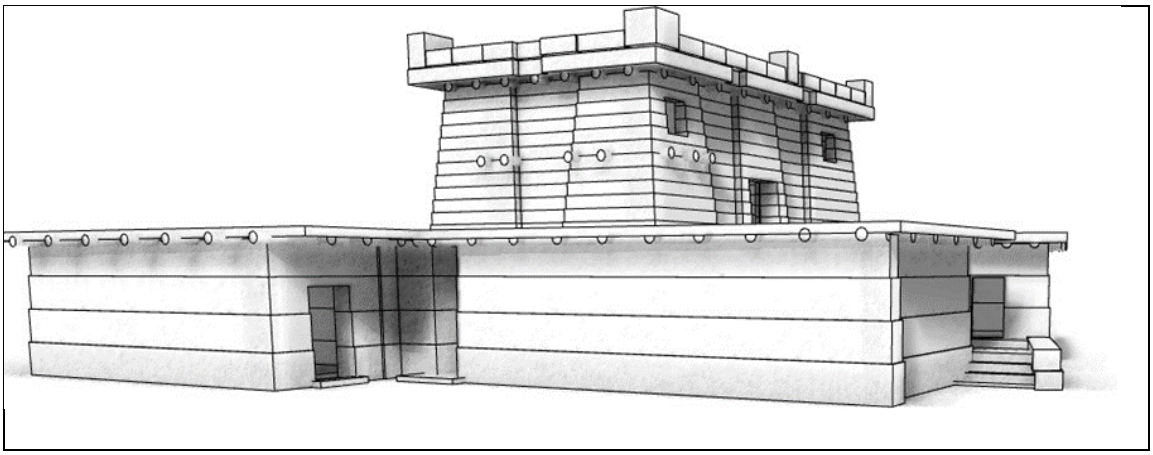

Figure 180 Built form V (left) built form R (center) and stairs to built form E (right).

3.9 Built form 20

Built form 20 is located at quad C2 and comprises two groups of residences i.e. north and south (see Figure 181). This built form was excavated in 1961-62 by Ethiopian Institute of Archaeology under Francis Anfray. It comprises of two structures marked as north and south here, joined by a structure that seems later constructed (see Figure 181).

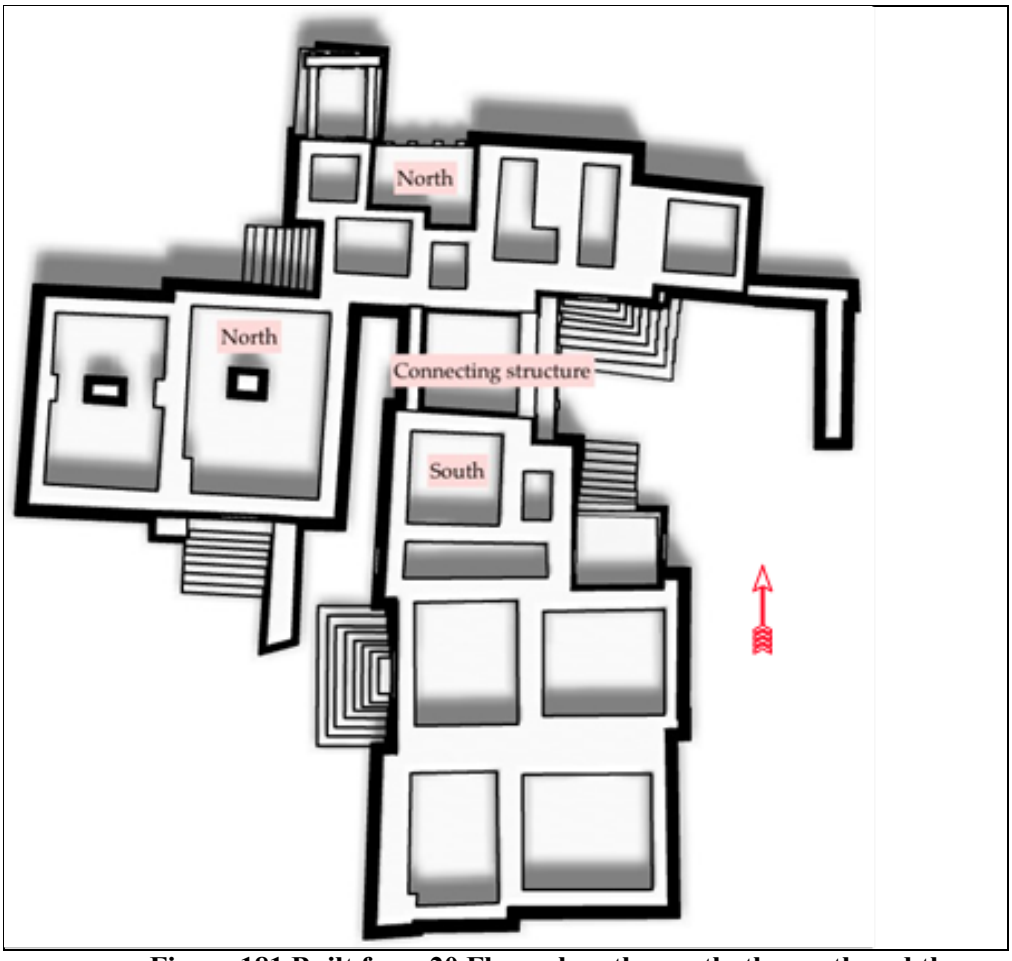

Figure 181 Built form 20 Floor plan, the north, the south and the connecting structure

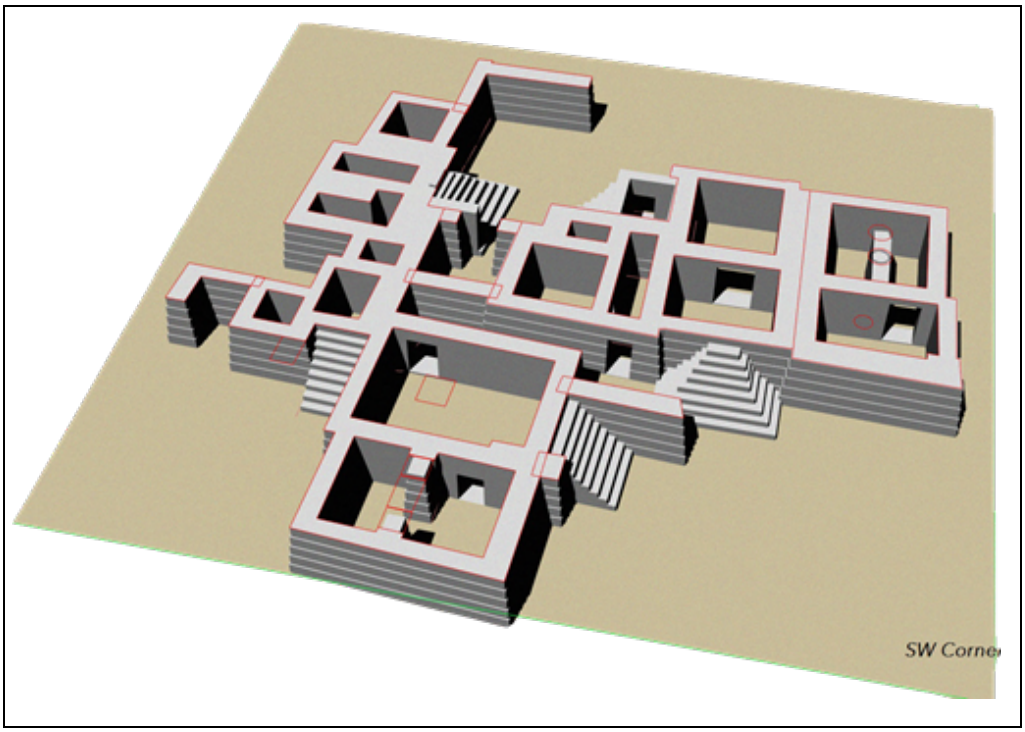

Figure 182 Built form 20's base floor

The north section of the built form implements narrow spaces with wide internal walls for the support of the roof, although the western two rooms use stone pillars layered on top of each other at the base floor and living floor (see Figure 182 and Figure 183).

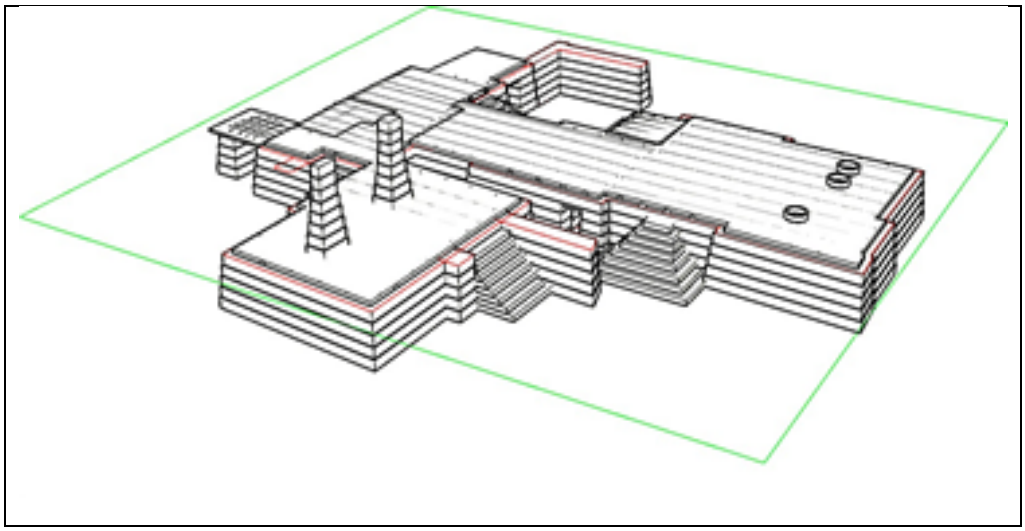

Figure 183Built form 20 living floor columns

It is highly probable that this built form might have been built to multiple floors however it is reconstructed only to one floor based on the limited evidence available on this excavation.

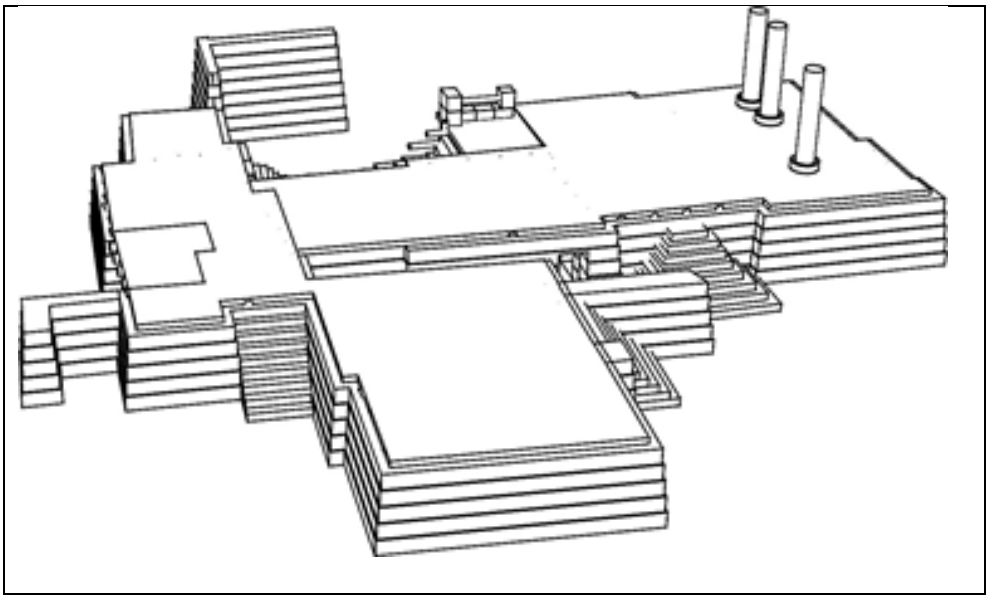

Figure 184 Circular pillars of built form 20

Similar to the north, the south section of the built form also uses full central walls to support the living floor and the roof. To support one of the most southern rooms this built form used large ashlar blocks of stones (see Figure 182).

The base floors of built form 20 are accessed through three doors located on the southern and eastern wall for the Northern section, and Western wall for the Southern part of the built form (see Figure 182, and Figure 187). These doors also lead to other doors, thus making the base floor quite accessible and large. It is here on the Southern section that on the base floor that full elephant tusks were documented- the subject of chapter 5.

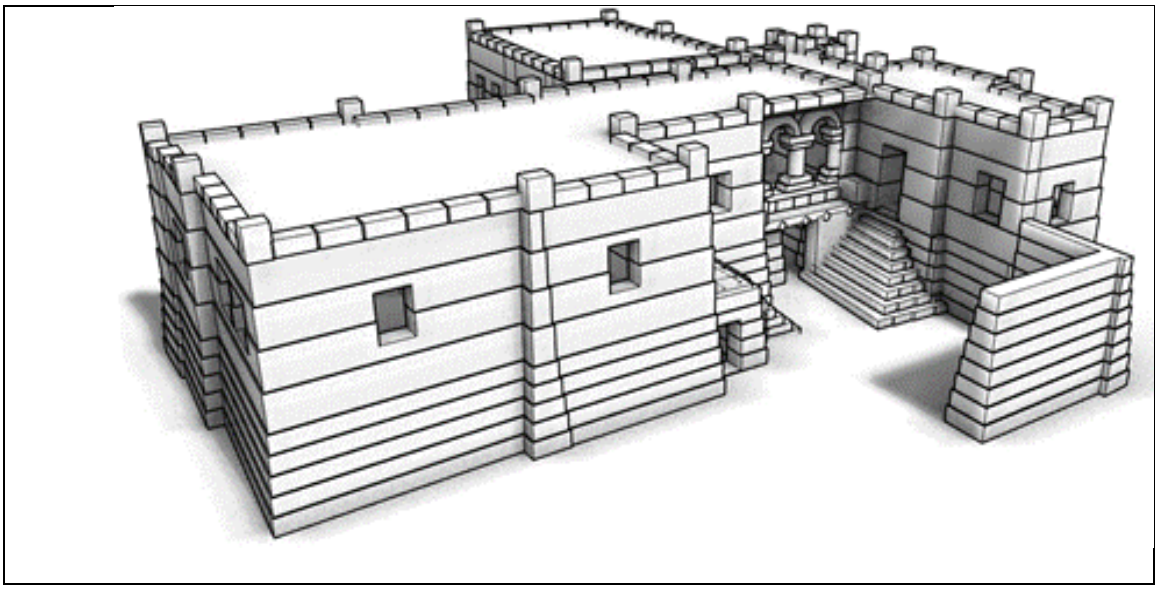

Figure 185 Built form 20 South East corner view

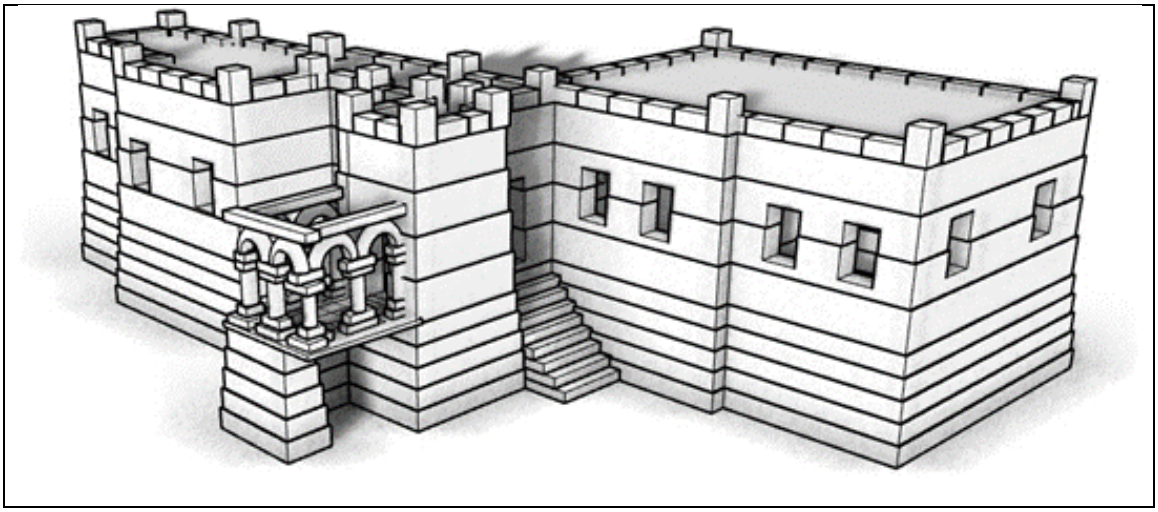

Figure 186 Built form 20 North West Corner

There are multiple stairs three for the northern section, and two for the southern part of the built form (see Figure 183, and Figure 184).

The living roof is supported by two columns of stone in the North, three circular pillars in the South, and multiple central walls (see Figure 183 and Figure 184). The base floor walls are built to 2.5 m while the living floor walls are built to 4 m.

There are 18 windows on the northern section of built form 20 all on the living floor. The same structure has 6 doors two on the base floor and 4 on the living floor.

Similarly the southern section has 10 windows all of them on the living floor and 5 doors three on the base floor and two on the living floor. Both the northern and the southern section of the built form have balcony with decorated arches and pillars (see Figure 185 and Figure 186).

Built form 20 may have enclosure wall as can be evidenced from the Figure 185 and Figure 186. Almost all of the stairs of built form 20 are elaborate and the ceiling of living quarters built up to 4 m suggesting perhaps built form 20 might have been a palace.

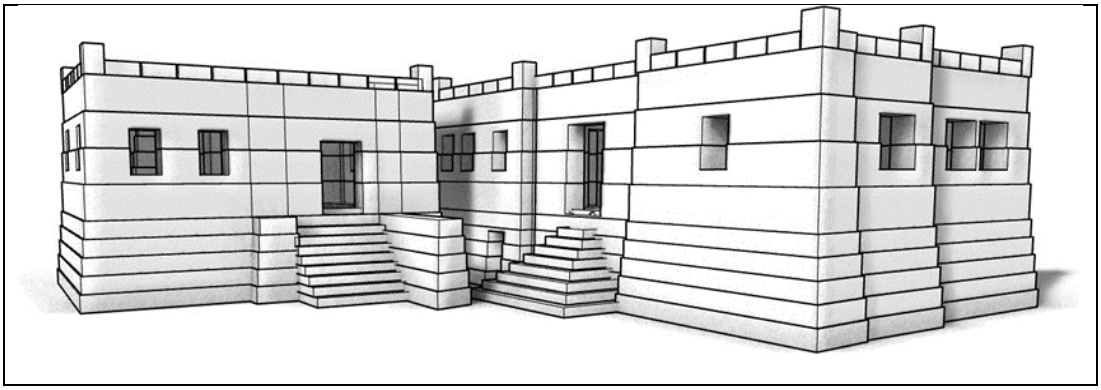

Figure 187 South West corner view of built form 20

Built Form 20-North

Walls (North)	Volume in Cubic Meters	
Wall 1	52.06	
Wall 2	49.86	
Wall 3	47.68	
Wall 4	45.51	
Wall 5	43.35	
Wall 6	75.03	
Wall 7	58.06	
Wall 8	64.75	
Wall 9	69.58	
Total	505.88	505.88
Stairs-West		
Stair 1	1.24	
Stair 2	1.07	
Stair 3	0.92	
Stair 4	0.74	
Stair 5	0.61	
Stair 6	0.46	
Stair 7	0.31	
Stair 8	0.16	
Total	5.51	5.51
Stairs-South-1		
Stair 1	3.31	
Stair 2	2.47	
Stair 3	1.72	
Stair 4	1.56	
Stair 5	0.9	
Stair 6	0.63	
Stair 7	0.37	
Stair 8	0.12	
Stair 9	0.04	
Stair 10	0.01	
Total	11.13	11.13
Stairs-South-2		
Stair 1	2.11	
Stair 2	1.83	
Stair 3	1.56	
Stair 4	1.28	
Stair 5	1.03	
Stair 6	0.82	
Stair 7	0.59	
Stair 8	0.37	
Total	9.59	9.59
Floors		
Base Floor	32.15	
Living Quarter Floor	28.75	
Balcony Floors(2)	3.42	
Roof Floor	28.75	
Total	93.07	93.07
Beams		
Base East-West	7.95	
Base North-South	8.22	
Roof East-West	7.94	
Roof North-South	8.22	
Tower East-West	0.92	
Tower North-South	0.91	
Total	34.16	34.16
Pillar Posts		
Base Pillar Walls	4.14	
Floor 1 Pillars	6.47	
Total	10.61	10.61
Misc		
Northern Enclosure Wall	10.09	
Eastern Enclosure Wall	30.23	
Retainer Walls	22.77	
Roof Retainers	13.74	
Roof Ret Capstones	5.46	
Stair Support Wall	3.39	
Archs	2.99	
Total	88.67	88.67
	Grand Total	*758.62*

Table 35 Volumetric data of built form 20-N

Built Form 20-South

Walls (South)	Volume in Cubic Meters	
Wall 1	45.07	
Wall 2	43.37	
Wall 3	40.46	
Wall 4	41.81	
Wall 5	40.71	
Wall 6	69.51	
Wall 7	59.02	
Wall 8	59.56	
Wall 9	71.01	
Total	470.52	470.52
Stairs-West		
Stair 1	3.45	
Stair 2	2.67	
Stair 3	2.01	
Stair 4	1.48	
Stair 5	1.03	
Stair 6	0.76	
Stair 7	0.63	
Stair 8	0.44	
Total	12.47	12.47
Stairs-North		
Stair 1	1.42	
Stair 2	1.22	
Stair 3	1.05	
Stair 4	0.85	
Stair 5	0.69	
Stair 6	0.53	
Stair 7	0.36	
Stair 8	0.25	
Total	6.37	6.37
Floors		
Base Floor	34.08	
Living Quarter Floor	34.02	
Small Room upper Floors	1.82	
Roof Floor	34.02	
Total	103.94	103.94
Beams		
Base East-West	10.71	
Base North-South	8.96	
Roof East-West	10.71	
Roof North-South	8.71	
Small Room East-West	0.39	
Tower North-South	0.32	
Total	39.8	39.8
Misc		
Basement Ashlar	5.7	
Central Wall base	10.18	
Central Wall up	9.67	
Roof Retainers	14.94	
Small Room Walls	23.67	
Round Post holders	0.61	
Archs	3.83	
Total	68.6	68.6
	Grand Total	*701.70*

Table 36 Volumetric data of built form 20-S

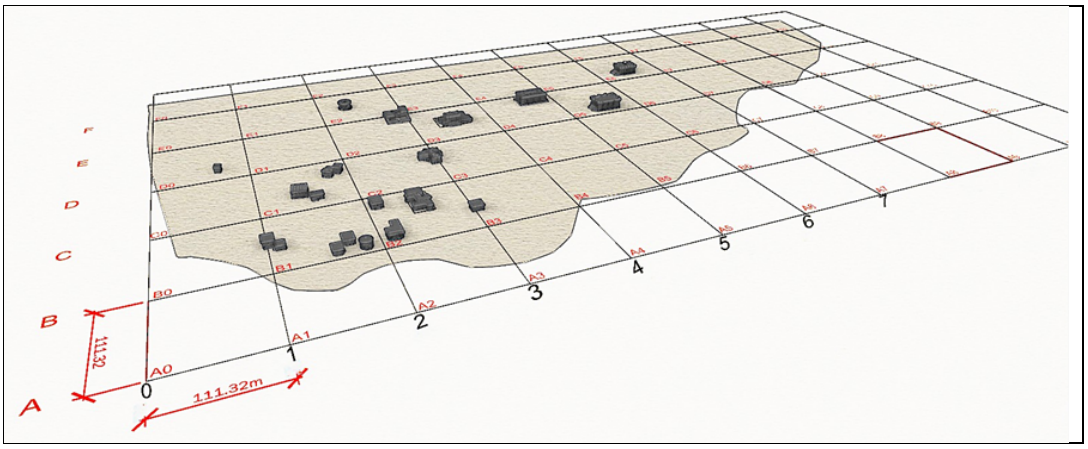

Figure 188 A glimpse of ancient port of Adulis

Rank	Built forms	Walls	Floors	Stairs	Beams	Columns	Misc	Volumetric Data
1	C	17.52	5.58	0	1.58	0	10.37	35.05
2	E	29.35	2.18	0.37	3.51	0	0.65	36.06
3	D	37.09	3.03	0	4.41	0	0	44.53
4	S	50.39	5.93	0	2.79	0	0	59.29
5	F	43.81	15.03	0	4.17	0	0	63.01
6	I	52.06	13.74	0.07	2.48	0	0	68.35
7	G	60.87	5.6	0	7.81	0	0	74.28
8	H	51.6	14.29	0	7.8	0	22.42	96.11
9	A	64.17	28.87	0	4.47	0	0	97.51
10	14- D	41.35	19.09	5.94	1.28	1.36	36.96	105.98
11	T	73.27	44.43	0	14.01	0	0	131.71
12	M&N	93.07	35.08	0	7.71	0	2.76	138.62
13	18	75.75	47.6	6.74	13.09	0	0	143.18
14	V	109.98	28.00	0	6.94	0	10.76	155.68
15	2	110.26	24	13.55	13.49	0	0	161.3
16	16	111.65	55.87	14.6	11.17	0	0	193.29
17	17-B	127.8	52.76	14.54	14.63	0	0	209.73
18	14- A	142.43	63.26	7.04	11.36	0	0	224.09
19	5	163.97	76.65	18.61	9	0	0	268.23
20	R	115.52	108.57	8.08	12.17	0	27.16	271.5
21	17-A	181.13	71.77	22.42	12.24	0	21.12	308.68
22	3	141.26	125.43	19.03	40.43	0	26.44	352.59
23	4	156.51	155.55	8.47	57.25	2.52	0	380.3
24	6	168.53	139.85	13.37	34.32	0	41.6	397.67
25	14-BC	329.14	127.36	8.5	18.08	0	0	483.08
26	1	281.87	132.44	38.44	36.69	3.72	1.29	494.45
27	8-S	312.75	130.37	13.32	23.65	0.58	18.79	499.46
28	15	140.93	188.55	38.77	45.41	46.49	58.86	519.01
29	8-N	321.25	162.41	27.11	23.42	0	25.32	559.51
30	7	268.35	243.49	49.8	26.16	7.8	0	595.6
31	19	394.49	178.15	37.01	40.62	0	49.46	699.73
32	20-S	470.52	103.94	18.84	39.8	4.44	64.16	701.7
33	8-M	464.83	180.72	12.11	23.42	0	25.32	706.4
34	20-N	505.88	93.07	26.23	34.16	4.14	88.67	752.15
35	14-S	778.89	103.94	3.56	4.67	196.19	64.77	1152.02
36	Temple A	522.04	318.59	301.49	35.32	9.78	30.01	1217.23
37	Court House	808.36	797.51	191.72	241.62	24.04	1000.58	3063.83
38	Temple C	1136.37	1310.61	268.13	171.32	159.57	44.22	3090.22
39	Temple B	1213.53	1421.37	297.87	361.71	30.33	96.89	3421.7

Table 37 Volumetric data of the 39 built forms from the smallest to the largest

3.10 Analysis, Data Translation and Discussion

The previous sections described a built from the ground up and compiled volumetric data of each built form in a table. Table 40 presents the volumetric data for all the structures in this study of Adulis, arranged from the smallest to the largest. The subsequent section is an analysis of the volumetric data, the energetics assessment based on experimental studies, and additional pertinent analysis.

The overall dissertation's central question has been evaluating Adulis under two political economy models, i.e. Adulis as a center of its own or Adulis as a periphery in Aksum dominated world. These two models, are tested through the analysis of architecture of Adulis. Volumetric assessment is the first step in a two-tier system of looking into the data of Adulis' built forms without a translation. The second tier of evaluating these models would be an energetics study of the built forms. It is critical to assess the volumetric study first, so that our construction of categories of wall grades and the recent experimental archeology that I conducted at the site (estimating how much time needed to construct these building components) might not cloud or silence the raw physical data of built forms.

3.11 Expectation under the Two Models

The two models that are evaluated here, Adulis is a center of its own, is the thesis; and the null hypothesis or the antithesis is that Adulis is a periphery of Aksum dominated political economy. If the thesis is to be confirmed, Adulis' architectural data, i.e., the volumetric data in the first analysis and energetics data second should show a regular and

continuous line from low to high. Adulis under Aksum dominated world would display a data of architecture that is bimodal (see Figure 189) or sharp and pointed convex graph (see Figure 190).

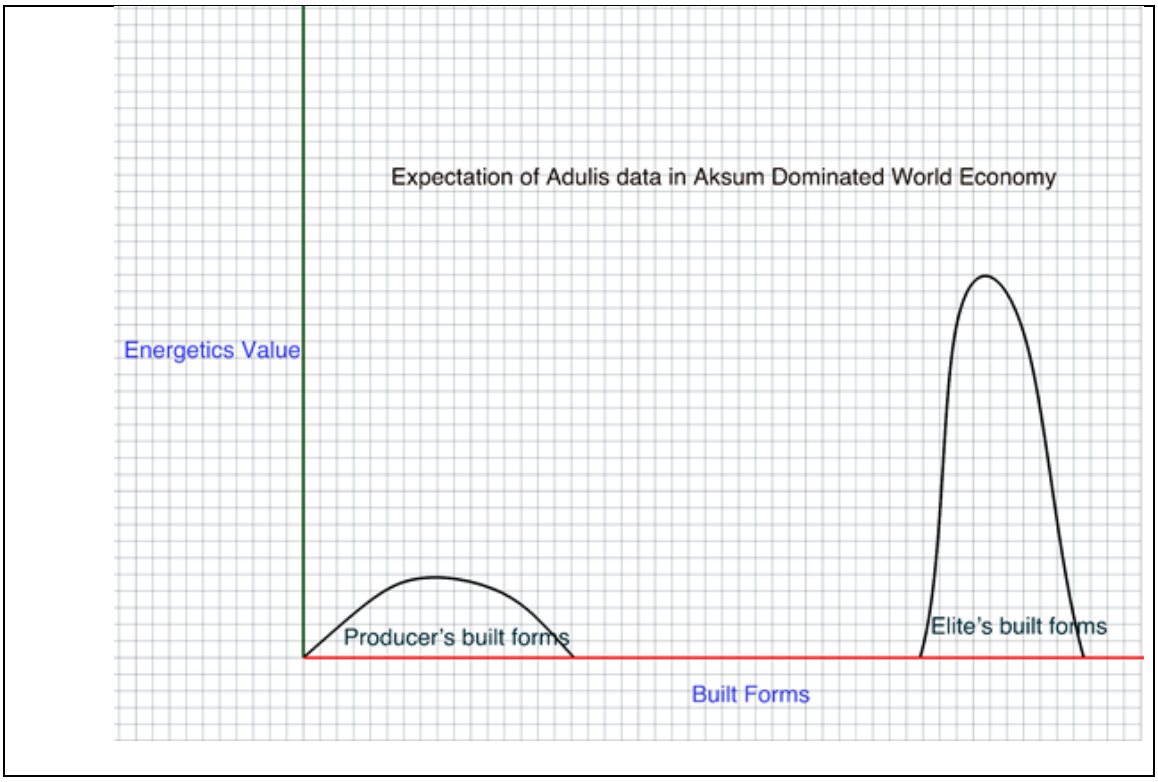

Figure 189 Data expectation in Aksum dominated world economy

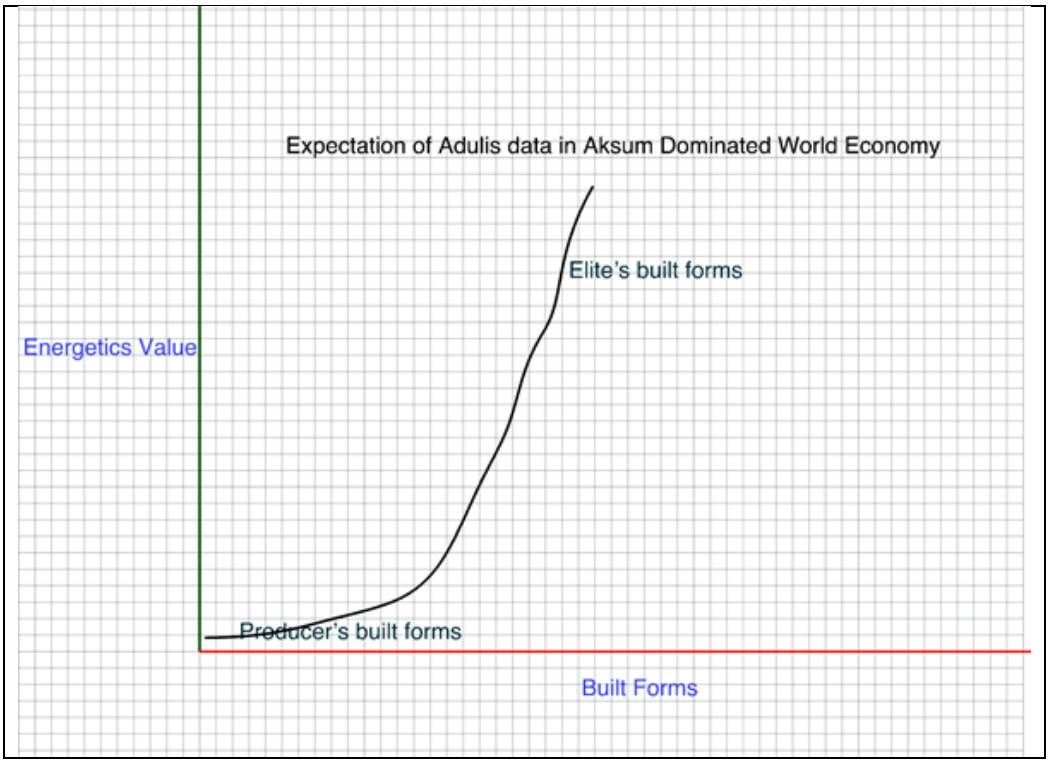

Figure 190 Data expectation in Aksum dominated model, a convex graph

3.12 Raw Volumetric Data Analysis

Figure 191 is a bar graph on a distribution of the 39 built forms at Adulis. The x-axis is each built form discussed earlier and the y-axis volumetric data in m3 of the same. Looking at the compiled raw volumetric data of all the 39 built forms at Adulis presents a smoothly rising bars until getting closer to the right where it begins to rise in steps (see Figure 191).There is a significant variation in the sizes of building at Adulis. The sizes range from a small size, ca.13 built forms under 125 m^3 to a handful of built forms of very large sizes, more than 1000m^3. The latter that include 14S, Temple A, the Court House, Temple C, and Temple B are public built forms, and volumetric data indicates they are outliers, with volumetric data more than 1000 m^3. The other built

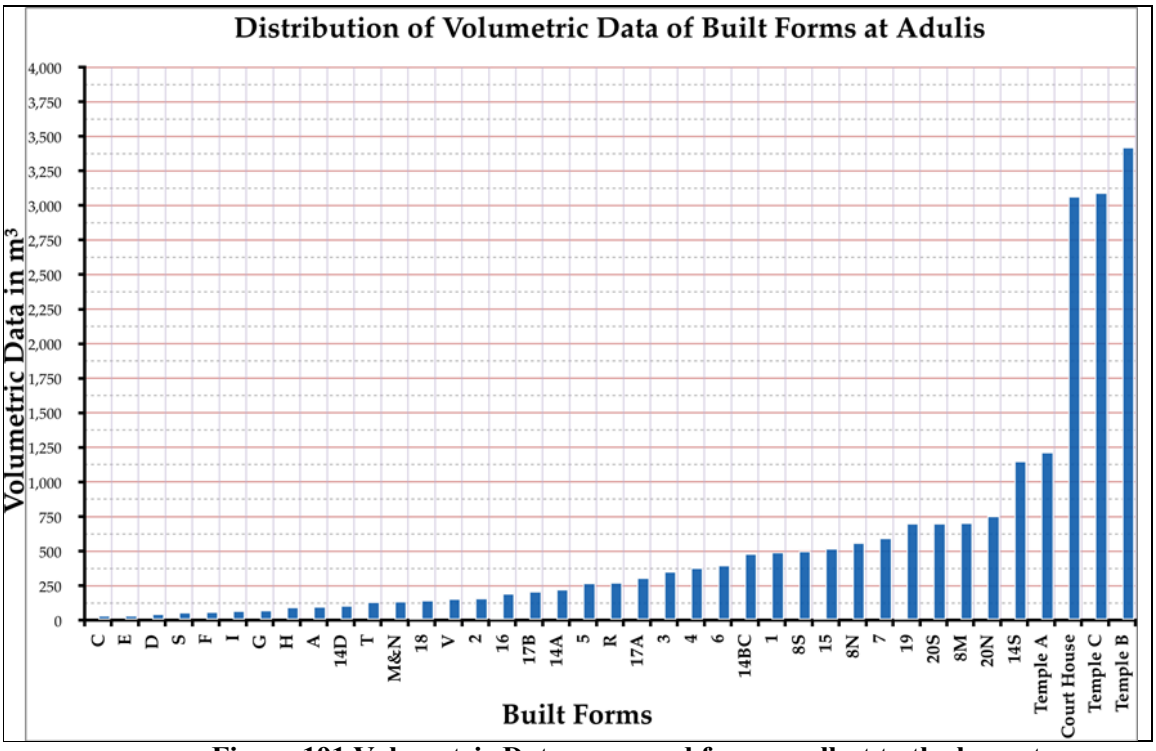

Figure 191 Volumetric Data arranged from smallest to the largest

forms that are mostly private residences and commercial built forms, such as built form 15, are situated in between these two. Clearly, this heterogeneity in Adulis' built forms' volumetric data is an important indication of a dominant political economy contrary to a homogeneousness of built forms anticipated in peripheries.

Next is a consideration of the building components, i.e., walls, floors stairs, beams, columns, and miscellaneous features, to assess which components have many materials invested in them. Figure 192 composes these seven building components in one, a line graph. The x-axis is built forms, and the y-axis is volumetric data for each component. As can be seen from the line graphs of the building components, clearly in private residences, walls by far absorb the most significant percentage of material volume and by extension labor, followed by floors and then by stairs. On the contrary, in public built forms, floors seem to be on par with walls in sharing a large volume of construction

material and labor, followed by various features marked as miscellaneous components, such as central supporting walls, pulpits, etc.

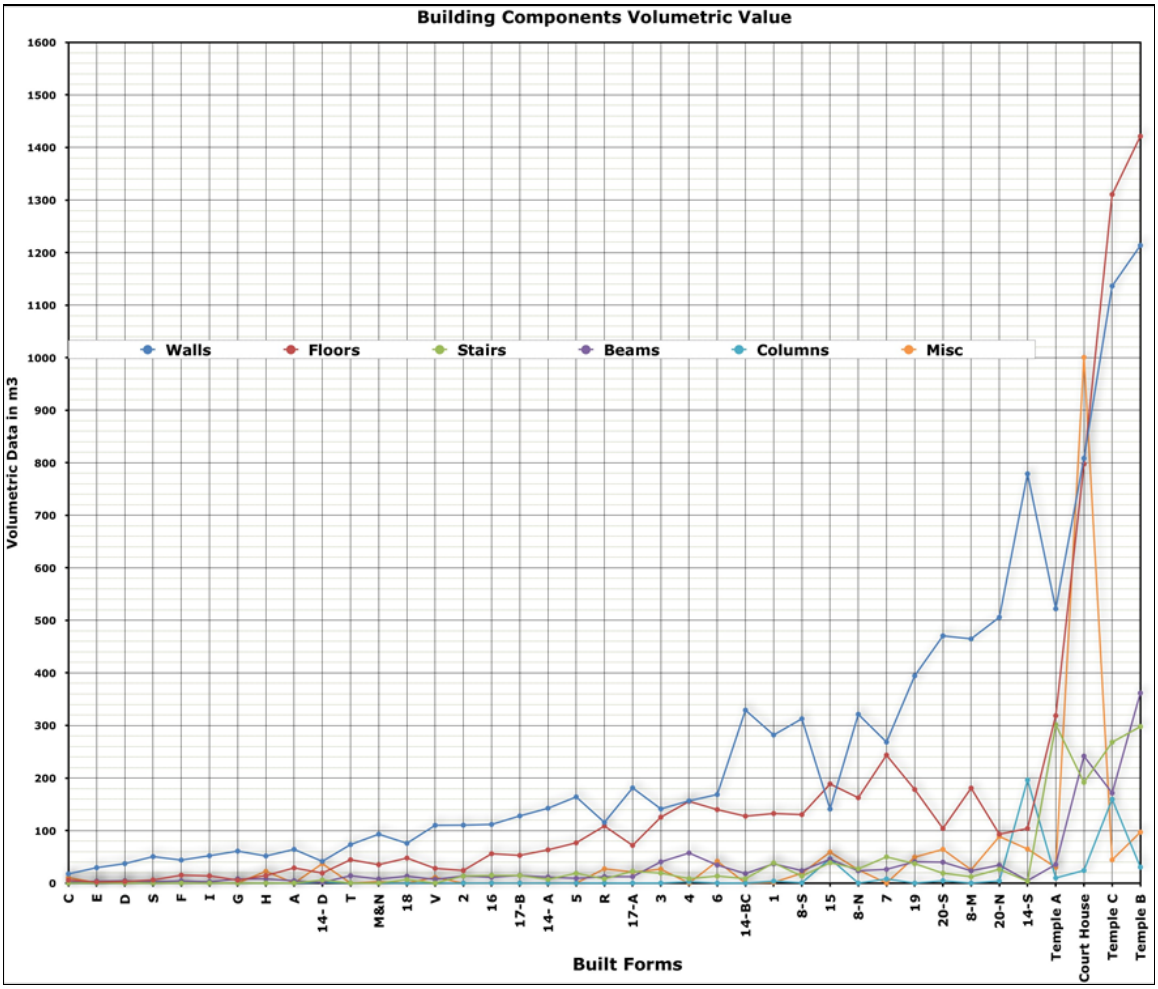

Figure 192 Building components volumetric data

3.13 Lumper vs. Splitter approach to built forms at Adulis

The previous analysis of the built forms at Adulis is guided by a splitter approach in which each rectangular or circular built form is treated as independent. However, as can be seen from the previous discussions of the structures, some appear to be different parts of a related built form. For purposes of studying the building volumeterics and energetics, I lumped conjoined buildings, assuming they were part of the same social units. In some instances, indications of this social relationship can be inferred from the physical relationship of shared open spaces, access routes, storage spaces, sharing complementary artifacts in adjacent built forms, and sharing defensive structures, such as gated walls.

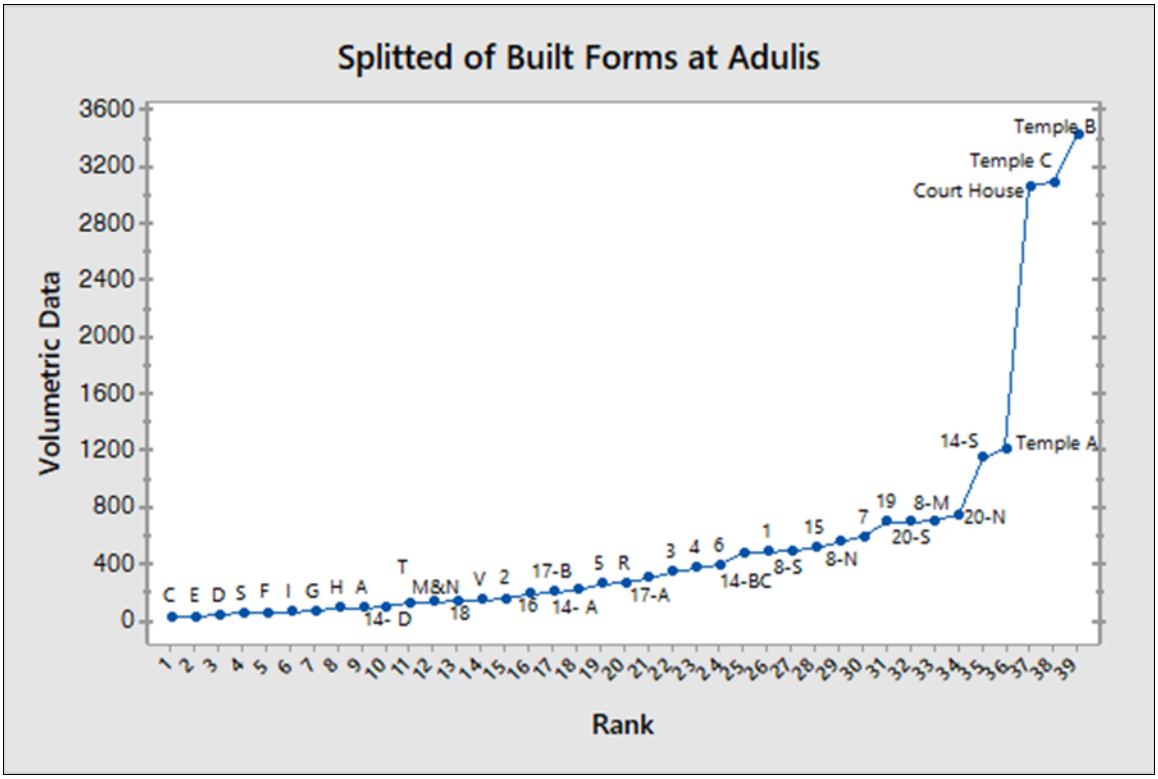

Figure 193 Splitter approach to volumetric data of built forms at Adulis

The first approach would be would be a moderate lumping which may reduce the built forms' count from 39 to 28, and this is done by grouping some built forms that are interrelated in some way. For instance, built forms C, D, E, and F can be categorized in one (-3).

Lumper (Moderate) approach to built form at Adulis

	Built forms	Walls	Floors	Stairs	Beams	Columns	Misc	Volumetric Data
1	I	52.06	13.74	0.07	2.48	0.00	0.00	68.35
2	A	64.17	28.87	0.00	4.47	0.00	0.00	97.51
3	M&N	93.07	35.08	0.00	7.71	0.00	2.76	138.62
4	18	75.75	47.60	6.74	13.09	0.00	0.00	143.18
5	V	109.98	28.00	0.00	6.94	0.00	10.76	155.68
6	2	110.26	24.00	13.55	13.49	0.00	0.00	161.30
7	G-H	112.47	19.89	0.00	15.61	0.00	22.42	170.39
8	C-F	127.77	25.82	0.37	13.67	0.00	11.02	178.65
9	S-T	123.66	50.36	0.00	16.80	0.00	0.00	191.00
10	16	111.65	55.87	14.60	11.17	0.00	0.00	193.29
11	5	163.97	76.65	18.61	9.00	0.00	0.00	268.23
12	R	115.52	108.57	8.08	12.17	0.00	27.16	271.50
13	3	141.26	125.43	19.03	40.43	0.00	26.44	352.59
14	4	156.51	155.55	8.47	57.25	2.52	0.00	380.30
15	6	168.53	139.85	13.37	34.32	0.00	41.60	397.67
16	1	281.87	132.44	38.44	36.69	3.72	1.29	494.45
17	17-A&B	308.93	124.53	36.96	26.87	0.00	21.12	518.41
18	15	140.93	188.55	38.77	45.41	46.49	58.86	519.01
19	7	268.35	243.49	49.80	26.16	7.80	0.00	595.60
20	19	394.49	178.15	37.01	40.62	0.00	49.46	699.73
21	14-A-D	512.92	209.71	21.48	30.72	1.36	36.96	813.15
22	14-S	778.89	103.94	3.56	4.67	196.19	64.77	1152.02
23	Temple A	522.04	318.59	301.49	35.32	9.78	30.01	1217.23
24	20-N&S	976.40	197.01	45.07	73.96	8.58	152.83	1453.85
25	8-N-C-S	1098.83	473.50	52.54	70.49	0.58	69.43	1765.37
26	Court House	808.36	797.51	191.72	241.62	24.04	1000.58	3063.83
27	Temple C	1136.37	1310.61	268.13	171.32	159.57	44.22	3090.22
28	Temple B	1213.53	1421.37	297.87	361.71	30.33	96.89	3421.70

Table 38 Moderately lumped energetics data of built forms at Adulis

As considered earlier, these four built forms appear to be related for they share common adjoining spaces, in addition to complementary artifacts unearthed in situ

suggest an ancient eatery or a restaurant (see Figure 169 and Figure 170). Built form C appears to be a panty, or pay station because of the dagger knives and coins discovered in it. In built form D, there were three large cooking pots with scores of serving utensils, by far exceeding household needs. Built form E has seating features. And finally built form F appears to be a bedroom or residence. Next, G and H are also be combined as one (-1). This is it is impossible to access built form H without passing through built form G (see Figure 171, Figure 172 and Figure 173). Moreover, built form S and T can be added to one (-1) because they are two adjacent built forms that are joined by a door (see Figure 177). Built forms 17-A and 17-B can be lumped into one (-1) as well because they appear to share a common storage and an open space (see Figures 154-158). Next would be built forms 14-A, 14BC, and 14D (-2). These built forms are inside a gated compound and share a common courtyard (see Figures 132-137). Subsequently, grouping built forms 8N, 8C, and 8S into one makes the count reduced by two (-2) for the same reason noted above. Finally lumping built form 20 N and S into one (-1) because they share a common compound will bring the number of independent structures to 28. Table 38 is compiled based upon such analysis and is graphed. Figure 194. Figure 194 is a line graph of the above lumped 28 built forms based on Table 38. The x- axis designates the rank of each lumped 28 built forms while the y-axis is volumetric data.

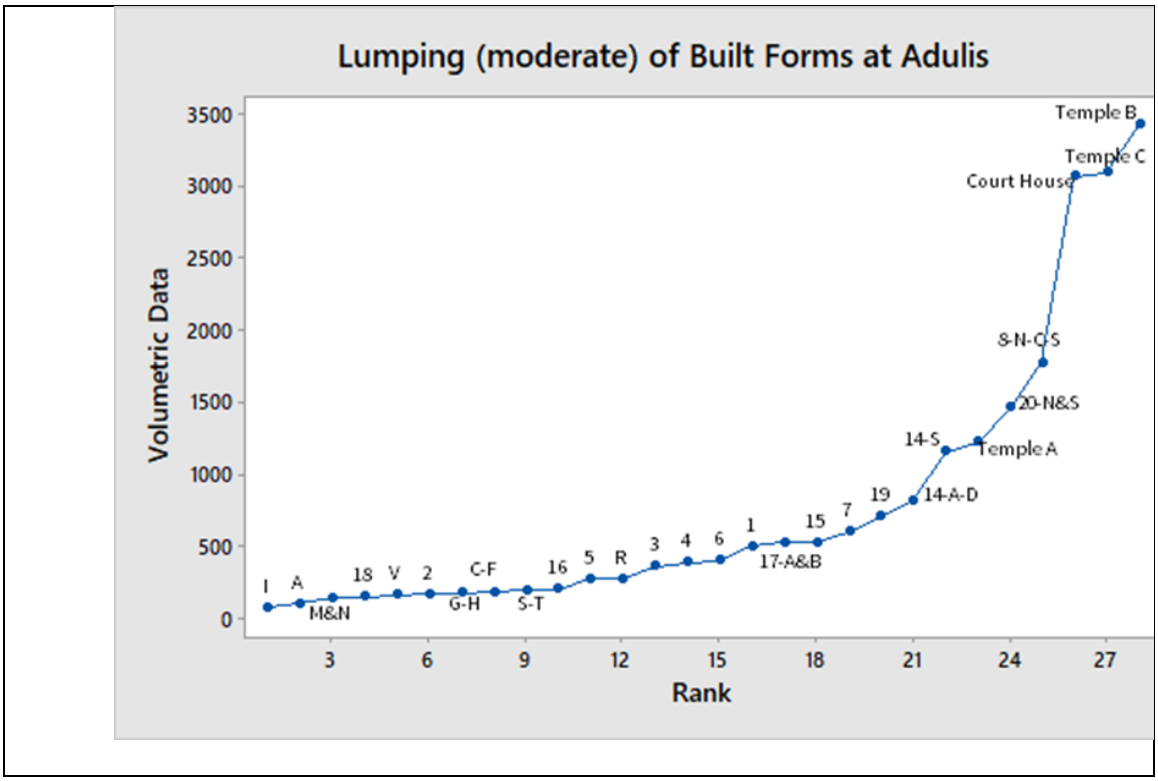

Figure 194 Moderately lumped volumetric data of 28 built forms

Let's also look at extreme lumping in which all the built forms around Temple A are lumped and added to Temple A (-8) which will reduce the count from the previous 28 to 20 built form. It is important to test the structure of the data under different scenarios or grouping to avoid bias and detect if there is a pattern difference.

Comparing these three data structures of volumetric data, i.e., under the splitter perspective, the moderate lumping and extreme lumping, the data is so solid with a strikingly similar pattern with minor differences (compare Figure 193, Figure 194, and Figure 195). The obvious difference is the number of built forms that ranged from 39 to 28 to 20; nonetheless, the pattern is the same no matter what extrapolations of category to data are used.

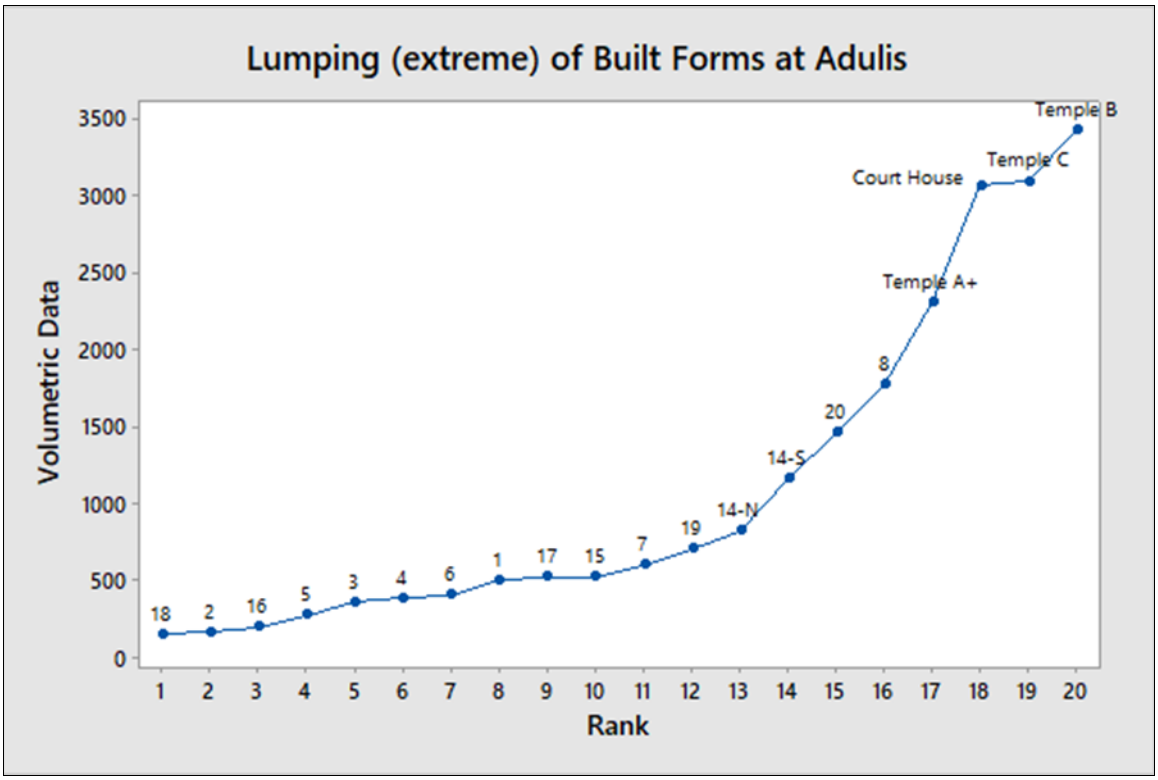

Figure 195 Extreme lumping of 20 Built forms volumetric data

3.14 Rejecting the null hypothesis based on volumetric data

The volumetric data compiled in different ways, whether split (see Figure 193), moderately lumped (see Figure 194), or extremely lumped (see Figure 195) presents a gradual and continuous line from low to high as demonstrated in Figure 193,Figure 194 and Figure 195. Thus the thesis is confirmed.

Under the null hypothesis scenario, or antithesis the volumetric data should be a bimodal graph (see Figure 189) or a sharp convex graph (see Figure 190) showing a majority producers and wealthy elites. The data indeed is not bimodal, but a continuous data, confirming the presence of middle range class and an upper middle class and elites. Thus the null hypothesis is rejected.

3.15 Energetics Data Extraction of Built Forms at Adulis

3.15.1 Wall Grades and their Energetics Value

The raw volumetric data needs to be translated into energetics data, i.e., labor time intensity needed to construct a given building component, be it a wall, column, etc. Archaeologists have implemented experimental archaeology, i.e., reproducing these components in real time to estimate how much labor/time is needed. According to my experimental archaeology done at Adulis, it requires 3.5 person-day to produce 1 m^3 Grade A wall type. Two days are needed to produce 1 m^3 of Grade B wall type and one day to produce Grade C. All the built forms' walls are then classified on what Grade of walls they have, and energetics data is extracted (see Table 42).

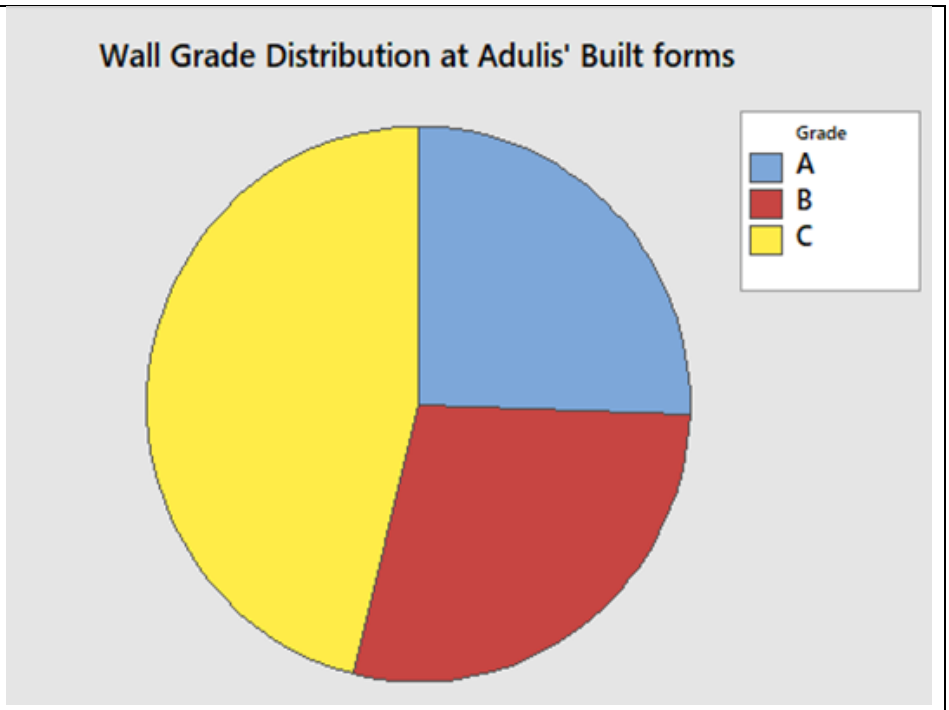

Figure 196 Distribution of Wall Grades at Adulis' built forms

The distribution of all grades across built forms shows a picture familiar to archaeologists looking at a stratified settlement. Grade C wall types (18/39) comprise 46.2%, while Grade B (11/39) make 28.2% and Grade A (10/39) 25.6% (see Figure 196). The distribution of these wall grades across class quite striking. Grade A walls are evenly distributed among lower middle and higher. Grade C is strictly limited in lower level while Grade B is observed in lower and middle rang households. It is not clear why Grade A which is associated with public building such as Temples and Courthouse is discovered among the lowest and the highest energetics classes.

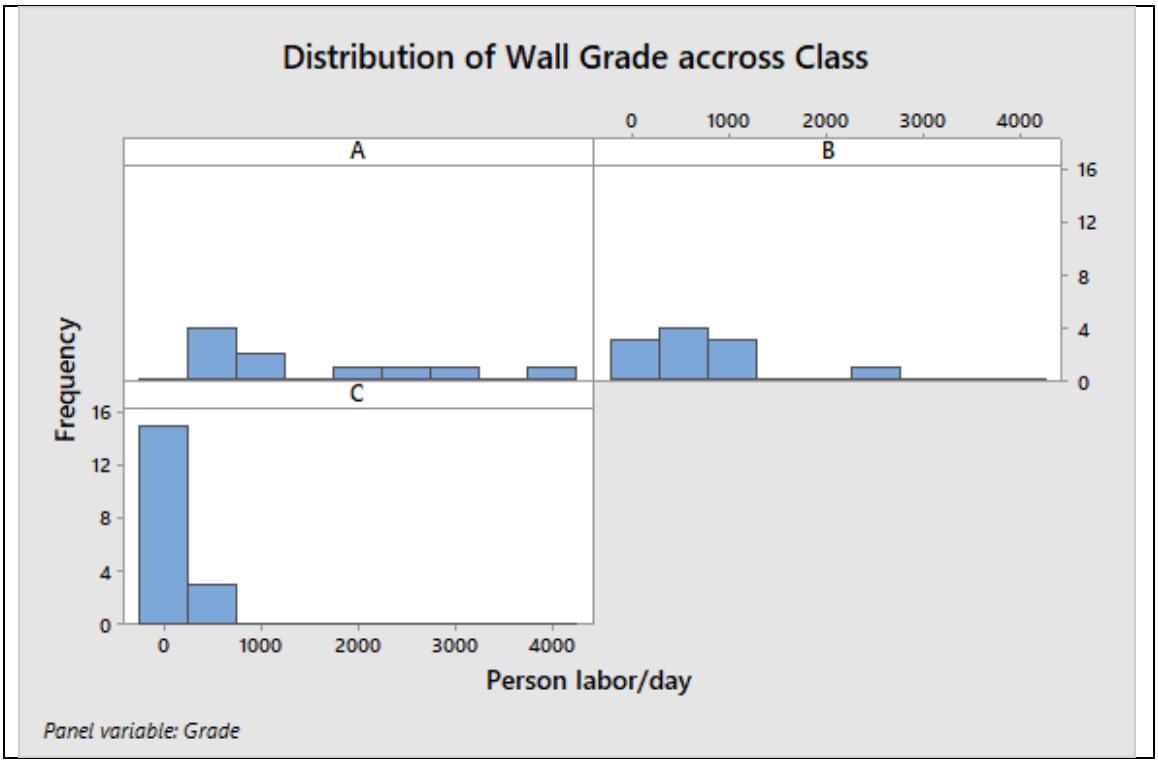

Figure 197 Distribution of Wall Grades across Class at Adulis

3.15.2 Other Building Components

Similar volumetric data translation is made derived from the same experimental data on walls discussed earlier to columns, beams, stairs, floors and other miscellaneous components. Here are some lines of reasoning behind it. There are three floor grades in Adulis' built forms. There are rectangular cut stones associated with public built forms that require 2.5 days to produce 1 m^3 and the second tier cut stone but less elaborate than the first which takes two days for 1 m^3. Floor and the lower grade that needs only one day.

	Built forms	Walls	Grade	Value	Wall Energetics
1	C	17.52	C	1.0	17.50
2	E	29.35	C	1.0	29.35
3	D	37.09	C	1.0	37.09
4	S	50.39	C	1.0	50.39
5	F	43.81	C	1.0	43.81
6	I	52.06	C	1.0	52.06
7	G	60.87	C	1.0	60.87
8	H	51.60	C	1.0	51.60
9	A	64.17	C	1.0	64.17
10	14- D	41.35	B	2.0	82.70
11	T	73.27	C	1.0	73.27
12	M&N	93.07	C	1.0	93.07
13	18	75.75	A	3.5	265.13
14	V	109.98	C	1.0	109.98
15	2	110.26	B	2.0	220.52
16	16	111.65	A	3.5	390.78
17	17-B	127.80	B	2.0	255.60
18	14- A	142.43	B	2.0	248.86
19	5	163.97	A	3.5	573.90
20	R	115.52	C	1.0	115.52
21	17-A	181.13	B	2.0	362.26
22	3	141.26	C	1.0	141.26
23	4	156.51	C	1.0	156.51
24	6	168.53	A	3.5	589.86
25	14-BC	329.14	B	2.0	658.28
26	1	281.87	A	3.5	986.55
27	8-S	312.75	C	1.0	312.75
28	15	140.93	B	2.0	281.86
29	8-N	321.25	C	1.0	321.25
30	7	268.35	A	3.5	939.23
31	19	394.49	B	2.0	788.98
32	20-S	470.52	B	2.0	941.04
33	8-M	464.83	C	1.0	464.83
34	20-N	505.88	B	1.0	1011.76
35	14-S	778.89	A	3.5	2726.12
36	Temple A	522.04	A	3.5	1827.14
37	Court House	808.36	A	3.5	2829.26
38	Temple C	1136.37	A	3.5	3977.30
39	Temple B	1213.53	B	2.0	2427.06

Table 39 Wall Grade and Energetics Data

The columns are quite time/ labor intensive and need four days to produce 1 m^3 while the stairs and other building components take about one day for 1 m^3. Finally, the beams will take two days for 1 m^3. There is no such evidence regarding the beams except the documented two types of trees, the East African-Cedar (Juniperus procera) or Wild Olive (Olea africana). The latter is commonly known as the iron tree for its hardness when cutting or splitting it with an ax.

Finally, Energetics data is computed based on the above considered labor time experiment done at Adulis. Table 43 is compiled by translating the building components' volumetric data of each built form, that include walls, floors, stairs, columns, beams and miscellaneous, multiplied by the experimental data to estimate their respective labor time value. The result is energetics value for each building component, and aggregate energetics values of the built form as well. This energetics value is furthermore used to test the dissertation inquiry.

Energetics Value of Building Components

	Built forms	Wall	Floor	Stairs	Beam	Column	Misc.	Total Energetics Value
1	C	17.50	5.58	0.00	3.16	0.00	10.37	36.61
2	E	29.35	2.18	0.37	7.02	0.00	0.65	39.57
3	D	37.09	3.03	0.00	8.82	0.00	0.00	48.94
4	S	50.39	5.93	0.00	5.58	0.00	0.00	61.90
5	F	43.81	15.03	0.00	8.34	0.00	0.00	67.18
6	I	52.06	13.74	0.07	4.96	0.00	0.00	70.83
7	G	60.87	5.60	0.00	15.62	0.00	0.00	82.09
8	A	64.17	28.87	0.00	8.94	0.00	0.00	101.98
9	H	51.60	14.29	0.00	15.60	0.00	22.42	103.91
10	T	73.27	44.43	0.00	28.02	0.00	0.00	145.72
11	M&N	93.07	35.08	0.00	15.42	0.00	2.76	146.33
12	14- D	82.70	19.09	5.94	2.56	5.44	36.96	152.69
13	V	109.98	28.00	0.00	13.88	0.00	10.76	162.62
14	R	115.52	108.57	8.08	24.34	0.00	27.16	283.67
15	2	220.52	48.00	13.55	26.98	0.00	0.00	309.05
16	3	141.26	125.43	19.03	80.86	0.00	26.44	393.02
17	18	265.13	95.20	6.74	26.18	0.00	0.00	393.25
18	17-B	255.60	105.52	14.54	29.26	0.00	0.00	404.92
19	14- A	248.86	126.52	7.04	22.72	0.00	0.00	405.14
20	4	156.51	155.55	8.47	114.50	10.08	0.00	445.11
21	8-S	312.75	130.37	13.32	47.30	2.32	18.79	524.85
22	16	390.78	111.74	14.60	22.34	0.00	0.00	539.46
23	17-A	362.26	143.54	22.42	24.48	0.00	21.12	573.82
24	8-N	321.25	324.82	27.11	46.84	0.00	25.32	745.34
25	5	573.90	153.30	18.61	18.00	0.00	0.00	763.81
26	8-M	464.83	361.44	12.11	46.84	0.00	25.32	910.54
27	14-BC	658.28	254.72	8.50	36.16	0.00	0.00	957.66
28	6	589.86	279.70	13.37	68.64	0.00	41.60	993.17
29	15	281.86	377.10	38.77	90.82	185.96	58.86	1033.37
30	19	788.98	356.30	37.01	81.24	0.00	49.46	1312.99
31	20-S	941.04	207.88	18.84	79.60	17.76	64.16	1329.28
32	1	986.55	264.88	38.44	73.38	14.88	1.29	1379.42
33	20-N	1011.76	186.14	26.23	68.32	16.56	88.67	1397.68
34	7	939.23	486.98	49.80	52.32	31.20	0.00	1559.53
35	14-S	2726.12	207.88	3.56	9.34	784.76	64.77	3796.43
36	Temple A	1827.14	3296.47	301.49	70.64	39.12	30.01	5564.88
37	Temple B	2427.06	2842.74	297.87	723.42	121.32	96.89	6509.30
38	Court House	2829.26	1993.78	191.72	483.24	96.16	1000.58	6594.73
39	Temple C	3977.30	3276.52	268.13	342.64	638.28	44.22	8547.09

Table 40 Energetics Value of Building Components

3.16 Energetics and Hierarchy

The volumetric data and the energetics data when charted together in a single graph, as done in Figure 190, the patterns of these two data structures are strikingly similar. The energetics value, i.e., labor time allocation is consistent with the observation of the volumetric data discussed earlier. Further, assessment of the energetics data based on Table 40 and line graph Figure 198, shows a four-tier hierarchy within built forms at Adulis. The upper tier, public built forms, that include religious structures such as Temple A, Temple B and Temple C and administrative

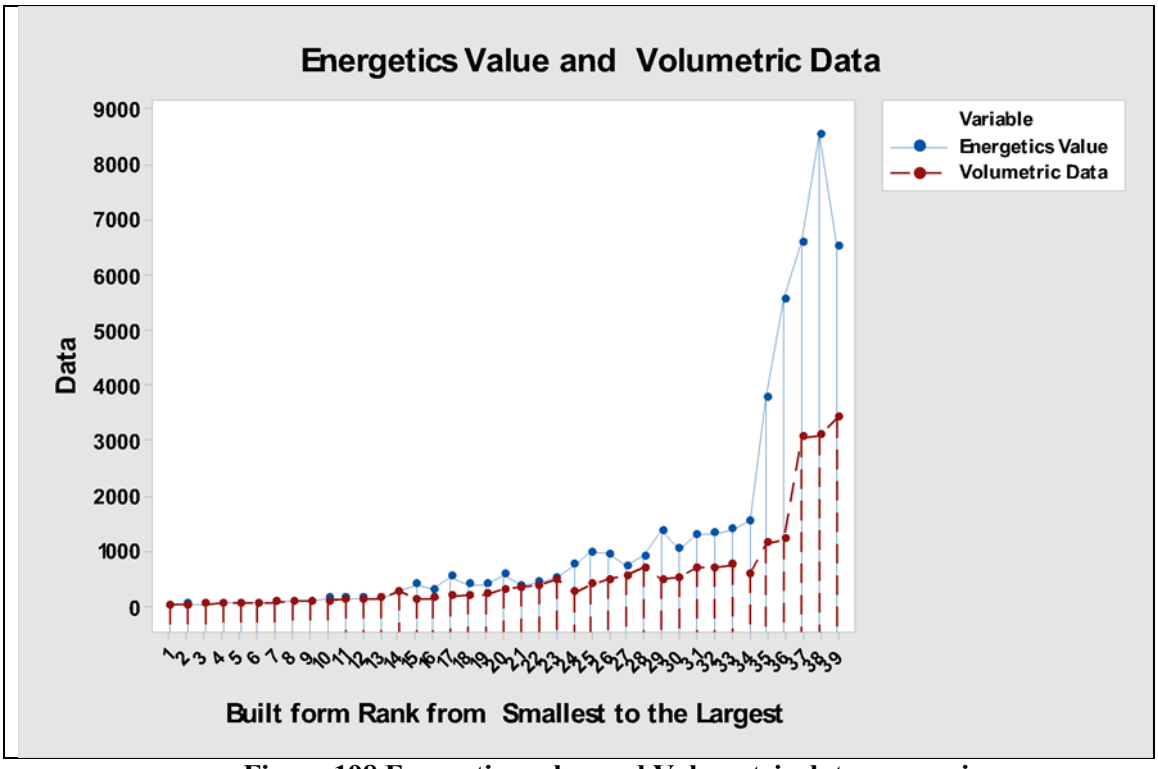

Figure 198 Energetics value and Volumetric data comparison

centers such as Court House, needed an estimated 3796-8547 Person-Days to be constructed (see Table 40).The large-scale energetics value difference between the upper-tier (3796-8547 Person-Days), and the second-tier (1033-1559 Person-Days) is due to labor organization considered earlier. All Adulis' inhabitants have an obligation to contribute labor to public structures building that includes religious built forms such as Temple A, B and C and administrative centers such as the Court House. Both the volumetric and energetics data confirm this. For instance, there is a 4.7 fold labor difference between tier-one and tier-two. The labor contribution obligation to build a structure dwindles as one moves from tier-one to tier-two, to tier-three and ultimately tier-four. Understanding this is quite helpful for further research in the future, in particular, if we knew how long these built forms took to be constructed, then it would be possible to estimate the population of Adulis.

Then there is the second tier of built forms that comprise most likely elite residence such as built form 20, 7, 19 and 1 and built form 15. The latter is most likely a trading structure; all these needed labor between 1033-1559 Person-Days. The next group is an upper middle class that has built forms from 700 to 1000 Person-Day. These include built forms 6,14,8 and 5. The middle class built forms range from 250 to 650 Person-Day. Finally, all built forms below 200 Person-Day can be considered as a lower class or built forms with lower social power.

3.17 Rejecting the null hypothesis based on the energetic data

The energetics analyses similar to the volumetric analyses have demonstrated the built forms of Adulis as hierarchical pointing to a multi-tiered social organization with

multiple religious centers and administrative structures, elite, upper-middle class, middle class and lower class residences and shops. The expectation of the null hypothesis that Adulis as a political and economic outpost of the Aksum's political economy is not supported, as built forms' energetics data would demonstrate, showing contrasting wealth differential among wealthy elites and poor producers. Thus the null hypothesis is rejected. The thesis Adulis is not a periphery of Aksum but a center of its own is affirmed. Not only has that Adulis had its own unique architectural mark compared to other regional centers such as Aksum.

3.18 Conclusion

The motivation of this chapter was assessing the broader dissertation question, whether Adulis is a periphery or a center of its own by evaluating built forms at Adulis. It applied two theoretical perspectives, one, an energetics study based on extensive fieldwork and Computer-aided Design (Rhino 3D and Grasshopper) 3d models of the 39 built forms of Adulis were reconstructed. Built forms were described from the ground up. Volumetric data were compiled for the models. And by implementing experimental archaeology studies of construction times it was translated into the energetics estimates for the built forms. Then both the volumetric data and the energetic data were evaluated against the general model expectation of what Adulis might look like as a periphery of Aksum were not supported. Instead, the data are more supportive of Adulis being a center of its own. I have shown through analysis of the built forms that Adulis had multi-tiered hierarchical household as substantiated by the data.

The second theoretical framework was architectural communication theory that holds built forms send messages regarding identity, status, wealth, power, or cultural values. This dissertation has extensively compiled a research-based illustrations and 3D models to create further social discussion and research. Additionally, the dissertation has shown an enhancement to this theory by way of successive and rigorous validation that the messages sent by architecture while attainable, its original meaning can be elusive. The next chapter explores a different line of evidence, some of the artifacts found at Adulis aside from evidence of built forms. These artifacts are assessed to evaluate Adulis' relationship to Aksum during the Africa's classical age (1000BCE-700ACE).

CHAPTER 4

ASSESSING CRITICAL ARTIFACTS AT ADULIS

4.1 Introduction

This chapter assesses artifacts critical to evaluating the dissertation question about whether Adulis was part of an Aksum-dominated world economy, or rather a central place of its own in a more complex world economy. The artifacts of concern came from older and more recent excavations, and from recent survey collections at Adulis. For instance, Paribeni (1907) collected 1600 artifacts that he thought were worthy of selection and discarded the rest at the site after his excavation at Adulis, while Anfray collected more than 550 artifacts from built form 20 (see Chapter 3). All the artifacts that were retrieved during the Anfray excavation of built form-20 are housed at the National Museum of Addis Ababa. Similarly, the National Museum of Eritrea houses more than 400 artifacts from Adulis, mostly from Paribeni's excavation in 1907. The latter has organic artifacts that include bone artifacts, shells, and ivories that date to different times from the first millennium BCE to the 7th century ACE (Zazzaro 2013).

Part of this dissertation research outcome is the compilation of a comprehensive database of Adulis artifacts. The artifacts of Adulis may shed light on the daily life of the Adulites in future research. This study is not the place to examine all these artifacts thoroughly. Instead, this chapter focuses on three critical data sets that help evaluate the dissertation's central question. The three data sets that deserve a closer look are ancient coins discovered at Adulis, which offer the possibility of Adulis' minting coins during antiquity, the throne of Adulis, which can be compared with other thrones in the region,

and archeological data related to bishops, which appear uniquely at Adulis, and not, for example, at Aksum.

Regarding the first data set, the coins, out of more than 1550 coins discovered in the NHA, ca. 1085 were retrieved from Adulis (Godet 2004). That is a substantial 70% of all the coins found in the NHA (Munro-Hey 1982). Some of the coins discovered at Adulis have Aksum's king names and others. The archaeological data showing Adulis accumulating almost 70% of coins supports the idea that Adulis was a center that held its own in the world economy compared with Aksum. If so, this raises the question of whether Aksum payed tribute to Adulis. The data from coins suggests Aksum paid tribute to Adulis, which is consistent with the claim in the *Monumentum Adulitanum* (See chapter 5) that the Adulite king subdued Aksum's power and that in other regions as well. If this observation is right, then this data needs revisiting.

Regarding the Adulis throne, there are ca. 36 thrones in the NHA so far documented, Adulis had one, MA-II, or more commonly known as the Throne of Adulis (Littmann et al. 1907). In Cosmas Indicopleustes' visit to Adulis, sometime between 518-523 ACE, it is noted that all the criminals in the region were executed in front of the Throne of Adulis. (Fiaccadori 2007). If Cosmas is right, the implication of taking a life in front of a throne is much supportive of Adulis being not only as a center of its own, but also a dominant one in the region.

Finally, granted that the presence of bishops at Adulis in itself is not conclusive of Adulis' power ranking in the region. But on official visits to India in the fourth century ACE, one of the known bishops of Adulis, Bishop Moses, describes the Aksumite king as an insignificant kinglet compared to Adulis (Kobishanov 1981). These three data sets deserve scrutiny.

4.2 Coins of Adulis and Coin Minting

Only a few other states minted coins besides the NHA in late antiquity. These are the Sasanian Persian Empire, the Roman Empire, and the Kushan kingdom of Northern India and Afghanistan. The Sasanian Persian Empire minted only in silver, while the Romans in gold contemporaneously with the Northern Horn of Africa. In the case of the NHA, coins were issued in trimetallic: gold, silver and copper/bronze. These coins suggest that for a considerable period a state of some significance ruled the Red Sea coasts such that it was able to monetize its local economy.

Over the last century, around 1085 (+/-50) coins in gold, silver, and copper were discovered at Adulis (Munro-Hey 1982, 1995). These coins of Adulis are in the hands of private collectors, museums, or banks outside Eritrea. For example, the coins are held by the Bank of Ethiopia, the Ashmolean Museum, the British Museum, etc. and numerous private collectors. Archaeologist Munro-Hey is a British scholar who built a career out of studying these coins from his dissertation to multiple books and articles. He has seen all the coins and run tests on them. If Munro-Hey (1982, 1995) accounts are correct, 70% of all the known coins in the Horn of Africa came from Adulis. A question worth investigating in this work is the reason why is this so. There are also considerable collections that were collected through unofficial channels such as field work, as can be demonstrated by Kirwan's (1972, p. 169) observation: “many coins could be picked up at the site of the ancient port Adulis, washed out of the soil by the rains." One dominant explanation for the large number of coins found in Adulis claims that coinage was intended to interact with Roman currency (Munro-Hey 1984b, 1995). This perspective is discredited for two reasons. First, the idea of interlocking coins is a recent phenomenon, and applying it to ancient economies is problematic at best.

Presuming Munro-Hey (1984b, 1999) bases his observation mainly on the weight of the coin. If Munro-Hey is right in his hypothesis of interlocking currencies, then the exchange would have required a most cumbersome set of calculations. If we look collectively at the pre-Christian coins (earlier than 300 BCA) issued in the NHA, the weight ranges from 2.5 to 2.8 grams, and with a diameter of 15-21 mm (for comparison the US 1 Cent weighs 2.5 grams while a Dime weighs 2.27 grams). The supposedly equivalent Roman coin would be the Aureus, which weighed 4.62-6.51 grams (for comparison the US Nickel weighs 5 grams while a Quarter weighs 5.67 grams). Thus, strictly based on weight, Munro-Hey (1984b, 1999) advances these NHA coins would exchange the Roman Aureus at half the exchange rate.

This supposed interlocking currency hypothesis advanced by Munro-Hey is opposed by Darley (2013). Darley notes the fierceness with which the Roman Empire defended its exclusive right to issue gold coinage, and the propriety it assumed to regulate it would have negatively affected the NHA. Or if the NHA was not aware of the Roman currency perspective, then a case for closeness and interlocking currency cannot be made. Darley (2013) makes a point suggesting socio-political distance between the two powers:

> *"Prokopios' sixth-century diatribe against Theudebert for placing himself on a gold coin, an affront to Roman imperial authority, demonstrates the political and social significance of such a gesture."*

The archaeological record supports Darley's (2013) claim. Virtually no coins of the NHA have been discovered in the Mediterranean or in Roman territory, or even indirectly referenced in any classical text. Almost all NHA coins have come from what

was at some point a territory of the NHA locally or across the Red Sea in South Arabia. An exception to this is a few coins that were discovered in India (Phillipson 2009). The circulation of coins mostly within the border of the NHA territory would point to the fact that the coin system was most likely made to serve the internal or local economy of the NHA rather than external trade.

The perspective of coins serving the local economy rather than external trade is not without critics. For instance, based on the NHA coins retrieved in South Arabia and India, Phillipson (2009) contended that the use of Greek on these gold coins indicates that the intended trade was interregional rather than local. While Phillipson is right that the use of Greek suggests some trans-local perception of these coins, it should not necessarily suggest significant economic impact in that scope (Darley 2013). As discussed previously (see chapter 3) the use of the Greek language in epigraphy by elites in the NHA is geared more regionally than trans-regionally. It is also far less clear how just the mere presence of a Greek legend would play any role in the economic acceptability of a given coin. Of all the factors that enhance the value of a currency relative to other currencies in exchanges, the language of the legend is the least significant.

Finally, looking at the archeological aspect of coins, in particular, assessing the spread and volume of these coins, suggests a three-tiered hierarchy among sites in the NHA. According to Philipson (1998:63), copper/bronze coins appear to have circulated in small rural settlements, which suggests the ancient economy was heavily monetized, although it would have also been supported by barter as well. Any attempt to dichotomize the economy into monetized vs. barter does not do justice to the ancient understanding of economy. At the time silver coins circulated in mid-level sites while maintaining the use of copper coins as well. Gold coins were discovered in major urban centers, but still

keeping the silver and copper in circulation. A multi-year, extensive excavation conducted at Aksum by Phillips (2000) yielded 0 gold coins, 11 silver coins, and 36 copper/bronze coins. Adulis not only yielded gold coins, but also money boxes (pottery) that were filled with gold coins. For instance, Paribeni (1907) discovered a money box of 33 gold coins of King Israel, and another hoard that is less known. It appears Adulis was a major urban center possessing 70% of all the coins discovered in the NHA made of gold, silver, and copper. The proportion of gold coins to silver to copper/bronze is still open to debate. The pattern of circulation discussed above does not support an Aksum-dominated world economy; instead, it points to an Adulis- dominated political economy.

To conclude, minting coins in ancient economies appear to originate and perhaps valued to facilitate a particular phase of a state development that includes promoting payments (for instance paying the army), and facilitating the collection of taxes.

4.2.1 Description and Iconography of NHA Coins

In this section, a basic outline of the NHA coins, in particular, those documented at Adulis, is provided. The coins have a primary image of the king, a royal bust, symbols, and a written legend. The royal statue is shown facing right (reader's right), and the shoulders are positioned frontally, as can be seen from what is possibly a V-shaped ornament on the neck. The eyes and shoulders are depicted full face. This representation is unique if, for instance, compared with coins from the Middle East or Roman coins.

The bust is framed with two barley or wheat stalks that represent Medr, the god of the Land (see Hahn 1995, Munro-Hay and Juel-Jensen 1995 for a review). Looking closely at the image shows the king wearing a short head cloth, sometimes also on the obverse, but at times the obverse image may depict a tiara, on gold coins (see Figure 202,

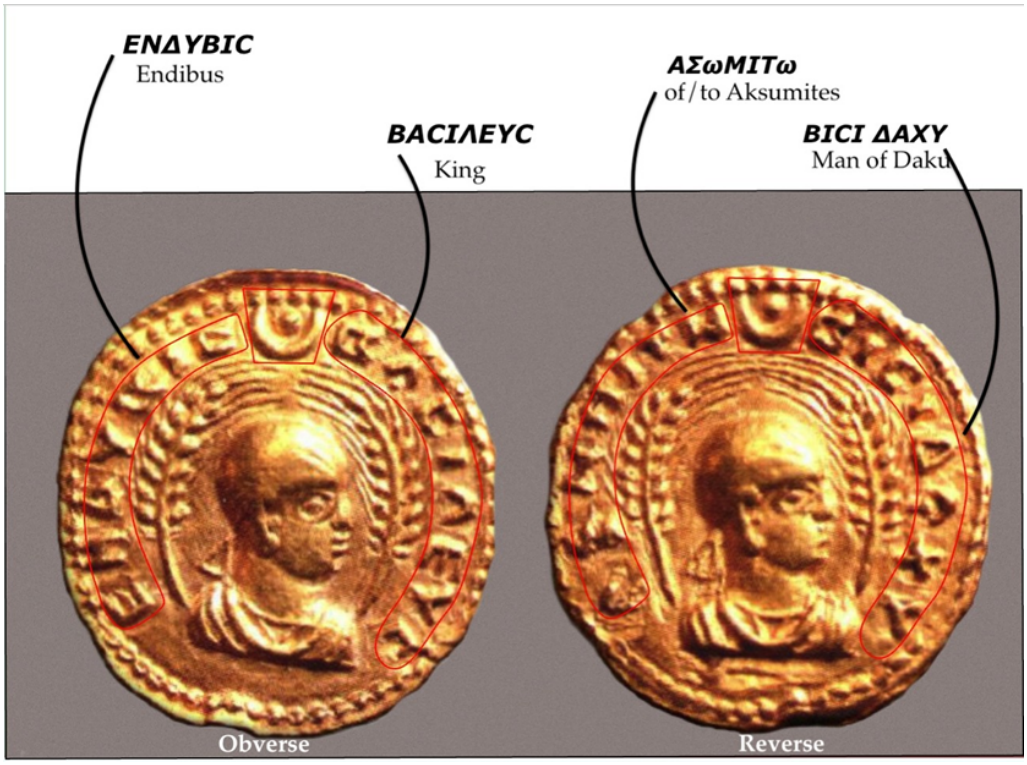

Figure 199 Endibus gold coin discovered at Adulis
Picture reproduced from (Hahn and West 2016).

Figure 203 and Figure 204). However, on silver and copper/bronze coins, the head cloth is very common on both sides, although there are some exceptions. The idea of the dual bust is open to debate, although Hahn (1995) Munro-Hay and Juel-Jensen 1995) suggest it might represent the king being royal and divine. The king's ear bears jewelry, an elliptical and bulged earring, and this jewelry was also discovered at Adulis (see Figure 200).

At Adulis in built form H near Temple A (see Chapter 3) two earrings were documented in 1907 that are most likely the jewelry seen in coin bust. The goldsmith at built form H was producing very high-end status goods that include two bishop pectoral

crosses and chains (See Figure 210 and Figure 211), coins, and multiple gemstones. The artifact associations suggest these are not ordinary jewelry needed by ordinary people, but high-status jewelry for elites. The majority of coins follow this basic tenet and style, with a few modifications here and there, although a king only known from such coins, Aphilas, or his mint master, had experimented with fractions and multiple designs (see Figure 201 and Figure 202) (Munro-Hay and Juel-Jensen 1995).

Figure 200 Golden Jewelry discovered at Adulis
Reproduced from Paribeni (1907).

Figure 201 Aphilas gold coin
Picture reproduced from (Hahn and West 2016).

Figure 202 Aphilas gold coin discovered at Adulis Note the Tiara and the full-face image. Picture reproduced from (Hahn and West 2016).

4.2.2 Territorial Claims

Both local and global politics attempt to make Aksum more prominent than others (see chapter 2 for detail discussion). As a result, the coins associated with Aksum received more attention. However, within the broader understanding of the NHA, there are other territories claimed by the coins besides Aksum. These claims include Himyar and Raydan, Saba and Salhen, the Beja, Kasu or Kush, the Tihama, Yemen, the Hadramawt, the lands of the Habashat, and some unknown territories such as DRBT and WYTG (Hahn and West 2016, Munro-Hey 1984b, 1995, Munro-Hay and Juel-Jensen 1995). All the above lands are the same territories claimed by MA-II (See chapter 5 for a detail discussion and map illustration).

Figure 203 Coin of Ezana with stretching of hands symbol
Picture reproduced from (Hahn and West 2016).

Figure 204 Coin of Ezana with Christian symbol
Note the cross above the bust). Picture reproduced from (Hahn and West 2016)

Figure 205 Gold coin of king Ela Gabaz discovered at Adulis

Figure 206 Gold coin of king Israel
This discovered at Adulis in (pottery) a money box that contained thirty-three gold coins

4.2.3 Languages on Adulis coins

The Coins in the NHA are in three languages or rather scripts, i.e., Ge'ez, Greek, Geez rendered in Greek, and Ge'ez rendered in Sabean (South Arabian). Ge'ez appears to be the dominant language, but other languages' scripts such as Greek and Sabean are also used. Those coins are written in Greek mix some Geez words. There is an ongoing debate among numismatists regarding this hybridity. For instance the word BICI in Figure 199 on the coin written in Greek is a Ge'ez word for a man of. The word BICI is a term used in Ge'ez language to point to the place of origin. For instance, in Figure 199 coin, BICI Daku means King Endibus' place of origin is a place called Daku. This word, BICI was convincingly demonstrated that it is a Ge'ez word rendered in Greek in King Wazeba coins (Halevy 1873, Munro-Hey and Jensen 1995, Hahn and West 2016). King Wazeba coins show the same legend written in both scripts, in Greek and Ge'ez keeping the word BICI constant in both legends. There is no Greek word for BICI demonstrating Ge'ez use rendered in Greek script.

4.2.4 Contribution of Coins in the NHA

More than 25 king's names are documented and identified in the NHA, sometime between first millennium BCA to the 8th century ACE. Eighteen king's names are inferred only from coins, as demonstrated in Figure 205. This dissertation is not a place to discuss the elusive chronology of NHA kings (for a review, see Hahn 1984, 1995, 2000; Munro-Hay and Juel-Johnson 1995). Suffice it to point out two critical points here. First, although the circulation pattern of coins based on the metal grade (gold, silver, copper) and distribution among sites in the NHA points to Adulis as one of the most

important, if not the most important, center, the coins do not provide any further information in particular regarding the time framework.

Establishing an Aksumite chronology is well known as elusive within Aksumite Studies, which makes any comparison with other sites, including Adulis, very difficult. The entire Aksumite history is pegged on two kings: King Ezana, a 4th-century king, and King Kaleb, a 6th-century king. These two kings are dated based on external references and inscriptions. Dating for other rulers is inconclusive at best, and unknown at worst. Since most scholars who constructed Aksumite history initially were philologists and numismatists (see chapter 2), the first thing they observed, and maybe rightly so, was that coins can be divided between Christian and non-Christian types. Since King Ezana minted both type of coins, one with a pre-Christian symbol (hand stretching to the sky), another with a Christian symbol (a cross), conversion to Christianity was inferred. Perhaps King Ezana converted to Christianity, but the mixed symbolism could also indicate an opportunistic attempt to please both Christian and non-Christian denominations with his coins. We do not know. Once the two religious groups (Christian and non-Christian) were established, metal grade finesse on the coins (purity of gold, for instance) was used by Munro-Hay (1984) to add more typological sequences that eventually created king lists (see Table 41). The gold content of a King Endibus coin was 97-93% and declined gradually to 64% during King Kaleb, and further declined after Kaleb (see Table 41, Munro-Hay 1999). This gold grade or finesse was used to create lists without any adequate explanation. The coins are a complex collection that are deserving of lengthy analysis in their own right, a project beyond the scope of this dissertation

Sequence	King Name	Chronology	Source of information	Discovered at Adulis
1	GDR/GDRT		Bronze object from Adi Galamo	
2	WDBH		Inscription	
3	DWTNS and ZQRNS		Coin	
4	Monumentum Adulitanum		Christian Topography	yes
5	Zoskales		Periplus Maris Erythraeae	yes
6	Sembrouthes		Inscription at Deki Mahari, Eritrea	
7	Endubis		Coin	yes
8	Aphilas		Coin	
9	Wazeba		Coin	yes
10	Ella Amida		Coin	yes
11	Qusanas I		Coin	
12	Ezana(s)	4th ACE	inscriptions	yes
13	MHDYS		Coin	
14	Quazebas		Coin	yes
15	Eon Bisi Anaaph		Coin	yes
16	Ebana		Coin	
17	Anonymous AV.1		Coin	
18	Ousas or Ousana(s)		Coin	
19	Nezana or Nezool-Tazena		Coin	
20	Khaleb Ella Asbeha	6th ACE	inscriptions and various writers	yes
21	Alla Amidas-Allamiruis		Coin	yes
22	Wazena AR.I and AE.I		Coin	yes
23	Ella Gabaz, or AGD		Coin	yes
24	WZB		Coin	
25	Ioel		Coin	yes
26	Iathlia-Hataz		Coin	yes
27	Israel		Coin	yes
28	Armah	7th ACE	Coin	yes
29	Gersem		Coin	yes

Table 41 Names of kings retrieved from coins of Adulis.
Reproduced from Munro-Hay (1984) with amendment and adding of data.

Thus, the presence of ancient coin material culture in the NHA proved to be a double-edged sword. On one hand, the coins contributed to understanding the nature of the political economy of the NHA (for instance, the monetized vs. non-monetized economy), while on the other hand, they contributed to a hasty historical reconstruction

devoid of a basic chronology that makes any archaeological comparisons with other sites a near-impossible task.

Yet, there is a clear pattern of the existence of a hierarchy from inscriptions. For example, the author of the *Monumentum Adulitanum* (MA-II) clearly describes many kings in terms of kinship and the exchange of tribute (see chapter 5), suggesting a king of kings hierarchy. This presence of a hierarchy among kings is further confirmed by another inscription in Dekemhare, Eritrea, regarding King Sembruthes, who addresses himself as a king of kings. All the numismatic evidence at Adulis suggests such circumstances might have been likely in the NHA, with many kings claiming kingship to different places. But at the same time, the distribution pattern of coins suggests these kings were paying tribute to Adulis.

4.3 The Bio-politics of Adulis' Throne

The Dutch-Aksum expedition traveled in the NHA during 1906-07 and documented ca. 36 thrones in the NHA (Littmann et al. 1913). Many major ancient urban centers like Metera, Aksum, and others had thrones. However, the throne of Adulis is unique in the region due to the material it was made of, its style, and its symbolic representations, the biopolitics of the NHA. This deserves a closer look. Cosmos Indicopleustes, an eye-witness (McCrindle 1897:54-55) who visited Adulis in 525 AD, reveals MA-II:

> *"the throne was made of costly white marble such as we employ for marble tables but not of the sort that comes from Proconnesus (Turkish island in the sea of Marmara which is known for its quarry of a marble of white color with streaks of black), its base is quadrangular and it rests at the four corners on four slender and elegant pillars, with one in the middle of greater girth and grooved in spiral form. The pillars support the seat of the chair as well as its back against which one leans, and there are sides to the right and left. The whole chair with its base, five pillars, seat and back and sides to the right and left, has been sculptured from one single block into this form. It measures about two cubits and a half (4.3 feet=1.3 meters) and is in shape like the chair we call the bishop's throne. Behind the chair is another marble of basanite of quadrangular form like a tablet (i.e. MA- I)." As to the location of these monuments Cosmas asserts, the marble throne was placed on the western side of Adulis by the road, which leads to Axum. "To this very day," Cosmas adds, "in this very place where the throne stands, they execute in front of it condemned criminals; but whether this custom*

has prevailed from the time of Ptolemy, I cannot say" (McCrindle 1897:67).

It is clear from the account that the Adulis Throne was made of marble, while most of the thrones in the NHA are made of granite stones. There is no value comparison

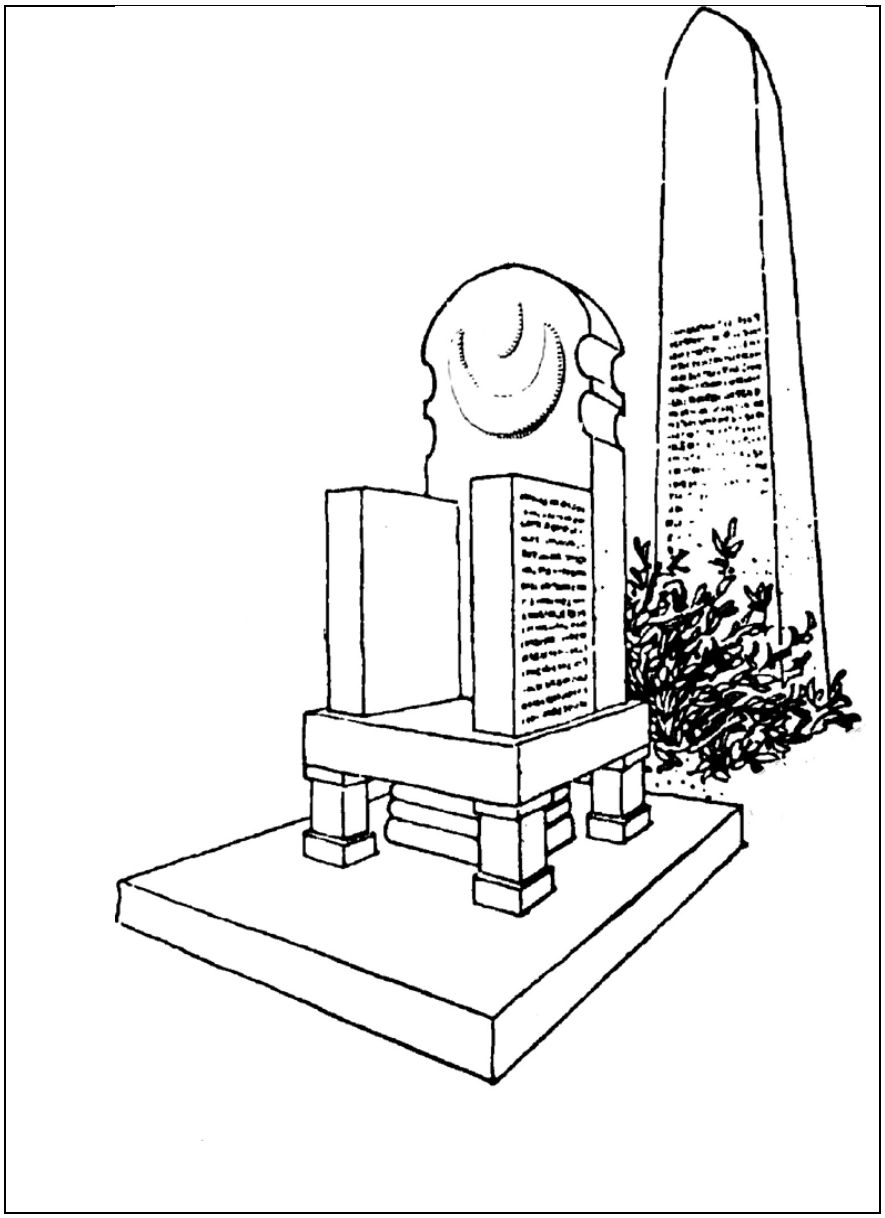

Figure 207 MA-II (Adulis throne) and MA-I
A reconstruction reproduced from Littmann et al (1913).

available that would enable us to suggest whether granite or marble was more valued during Adulis era. This may be a subject of future research. Another feature is unique to the Adulis Throne. All other thrones in the NHA are assembled of different (separate) throne components: the base stone slabs were all made separately, and then assembled on site. However, the throne of Adulis is cut out of a single marble block. Moreover, the entire inscription of MA-II is written on the sides and back of the throne. One can only wonder at the artistic and technical mastery needed not only to carve a throne out of a block of marble, but also to engrave a long inscription on it (see Figure 207). This can be compared with other thrones in the region, which can be constructed with mid-level skills and then assembled. The throne of Adulis demonstrates a considerable investment of skilled labor. If such markers are not enough to advance our thesis, another significantly advances our point–the use of the Adulis Throne as and execution place for all criminals in the region.

As elsewhere, execution places in the NHA offer an anthropological window into what Foucault describes as bio-politics (Foucault 1976:252-3). Assessing the bio- politics of the NHA may point to residences or place of extreme power.

If Cosmas' description is right that all the criminals in the region were executed at the throne of Adulis, this place must be of great importance both legally and symbolically. Both ethnographic and historical data underscore this importance.

Ethnographic data for the NHA points to only two institutions that would take life in the Northern Horn with impunity, the king or a person's kin. If any other party takes a human life, it must be avenged, even if were to take decades. The rules regarding this vengeance may be described as follows: Preference is given to target the vengeance toward the specific malefactor, but other kin members can be targeted when the

malefactor is not accessible, or due to other equivalency considerations. This can start a mini-war, or civil war if we consider a kin group as a unit within a state. A mini-war among two kin groups within a state naturally is not a desirable event, and can lead to other potential consequences besides bloodshed. For example, other kin groups may want to intermarry with a malefactor kin group for fear of being dragged into a battle. Thus, a dishonored kin group has a vested interest in diffusing the pending disaster brought by a relation's fatal actions. The Throne of Adulis served as a place for such critical diffusion and judgement.

The ethnographic record sheds further light on the Throne as a key place of judgment regionally. The record shows that the time for a just execution could range from shortly after the homicidal event, to 10-20 years after, or even generations afterwards. A king could be invited to be involved–not just any king, but a king with a court, and most likely a king of kings. Presumably a king with a court has the experience and resources to diffuse a divisive case of ordinary murder and fend off a potentially explosive event that could start a civil war. Intermarriages have been used to diffuse tension – mostly a member of the malefactor kin group offering a bride to the victim kin group. But even such an arrangement needs to be guaranteed by the king physically, or symbolically via witnesses. In some instances, the malefactor kin group might surrender the malefactor to the victim kin group, who can use their own discretion to decide what to do with the person. All these arrangements presume perfect conditions where the malefactor admits wrongdoing and all relevant events are clear.

However, of course, in reality not all murders take place with clearly available witnesses. In such cases a king and court could collect enough information to resolve murders and condemn relevant individuals to death as appropriate. A king can also order

the seizure of runaway malefactors to avoid an inside war. As a response, the NHA also had, and still has, safe havens (mostly old monasteries) for accused individuals that are inaccessible to a king or any other entity.

Historical documents in the NHA reveal the harsh realities that also underlined the significance of the throne. The era of the 15-17th century is called a "Dark Age" or "Age of the Princes" in NHA history because, instead of following the tradition described above for judgment and execution, princes who were only regional kings were granted such important rights. This started a brutal and vicious bloodbath in the region. A similar reference exists in ancient Ge'ez documents for 8th century ACE (Sergew Hable Selassie 1972). Curiously, the latter information is close to Cosmas' time, which was 6th-century Adulis, yet what Cosmas was describing was the antithesis of what happened in the chaos of the 8th and 15-17th centuries. Rather than blossoming, during Cosmos' time internal wars were held in check by a king and his court.

4.4 Bishops of Adulis

The archaeological data at Adulis brings forth a set of data that suggests the presence of bishops, which can be deduced from names written on artifacts and specialized artifacts, such as bishop crosses and chains. The names of two bishops are known, others not. There is no further data to understand how these Christian church leaders were involved within Adulis' political economy, and whether Christianity as a global religion co-opted to local traditions, or imposed itself as a break from previous religious beliefs.

Figure 208 A lamp of Bishop Yoseph
Now available at National Museum of Eritrea. Picture source Zazzaro (2013).

4.4.1 The Bishop's Lamp

The first artifact is a small lamp that was discovered during Paribeni (1907) excavation (see Figure 209 and Figure 210). Paribeni (1907) was able to find the small but now missing fragments to make the words ΑΒΒΑ ΙΩΣΗΦ ΕΠΙΣΚΟΠΟΣ from the lamp that reads ABBA IOSEPH EPISKOPOS, and translates Abba Yosef (Joseph) The Bishop.

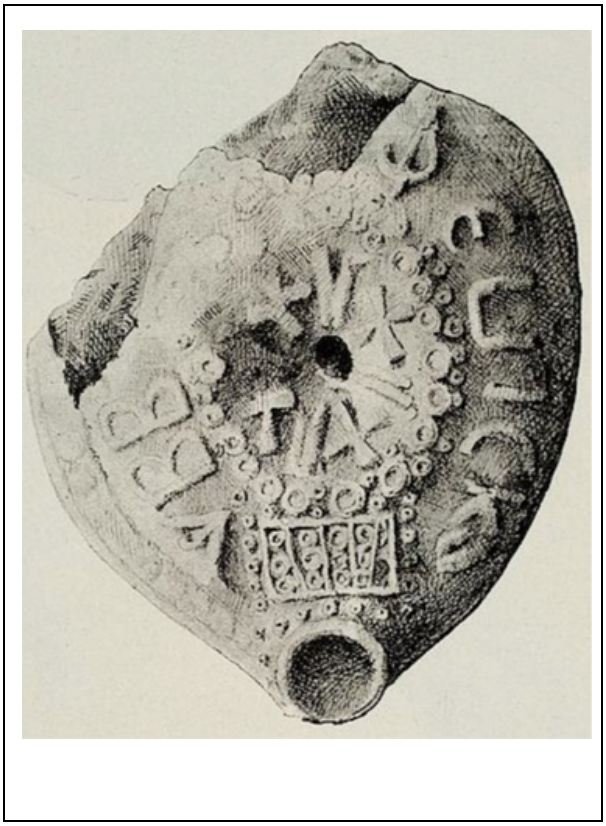

Figure 209 Top view of Bishop Joseph's lamp

If of any significance, the titular territory of Adulis is still being used in the modern Roman Catholic Church. For instance, Martin Lucas of Scandinavia was given the title of being archbishop of Adulis in the period 1945-1969 (Cheney 2018). The Titular See *Adulitanus* is a territory that an archbishop had to oversee. Further research

may determine whether this use of Adulis as a territory has a historical link, and what that link might be. The location where this lamp was unearthed points to an association with Temple

A. It was found in built form S (see Chapter 3), a street apart from Temple A, suggesting most likely that built forms S and T may have been a bishop residence. Closer examination of other artifacts that came from built form S and T include sandstone slabs that were probably for the wall's internal decoration, rectangular stones most likely of the floor, five bronze coins, and a statue, all suggesting this built form was not an ordinary residence. The latter might just have hearths and other artifacts indicative of daily life.

4.4.2 Bishops' Pectoral Crosses

In built form H (see chapter 3) at Adulis two bishops' pectoral crosses were documented. The first (see Figure 210) weighs 35.2 grams (1.24 oz.) with equilateral. arms.

Figure 210 Pectoral Cross with emerald beads
Image reproduced from Paribeni (1907)

The arms are flared and rounded at the ends, attached to a chain. Two emerald beads are attached at the base of the cross with a small gold chain that attached them to the cross. The Pectoral cross is 5 cm wide and 11 cm long.

The second pectoral cross also has arms almost equilateral, with flared ends, but bifid; the chain is similar to the first one. At the base of the cross, there is a very pale sapphire closed by a clip of golden cup in the shape of a flower. On both sides of the cross is there is an inscription. Paribeni (1907) points out these inscriptions on pectoral cross two (Figure 211) are used to subtly point out those who reached the top most pinnacle of ancient Christian church hierarchy. Whether this assertion may have merit is an object of future research.

Figure 211 Pectoral Cross with sapphire clip

. Image reproduced from Paribeni (1907).

4.4.3 Insignificant kinglet of Aksum?

Another known bishop of Adulis by name is Bishop Moses. We know about archbishop Moses of Adulis from Palladius. Palladius was a bishop born in Galatia in 363-4, he wrote the Lausiac History in 420 (Colman-Norton 1926). The Lusaic history is a book that documented the life of monks of the Egyptian desert. One of Palladius, preserved letters, he discusses of going to India to investigate the Brahmin philosophy accompanied by Moses, a bishop of Adulis (Desanges 1969; 1978). Colman-Norton (1926) narrows the date the journey to India where Palladius and Mosses traveled can only be before 420 ACE.

Of interest is to this dissertation is Bishop Moses' affirmation that the king of Aksum was an insignificant kinglet within the broader NHA power structure (Desanges 1969; 1978). This statement, as noted above, is supported by archaeological observation of an accumulation of coins at Adulis, as well as the bio-political symbolism associated with the Throne of Adulis. All the above data combined show Adulis' treatment as just an Aksumite port is not supported by the archaeological record. In fact, the archaeological data at Adulis sheds light the intricacies of political economy in the region.

4.5 Conclusion

This chapter has considered three data sets that shed light on the dissertation question, whether Adulis is part of an Aksum-dominated world economy, or rather a center of its own in an Adulis-dominated world economy. By focusing on the circulation pattern of coins based on the metal grade (gold, silver, copper) and distribution among sites in the NHA, Adulis appears as one of the most important, if not the most critical, center, having an accumulation percentage of 70% of all the coins in the NHA.

The bio politics of the Throne of Adulis highlights the not-so-visible aspects of political economy, i.e., governance. It is one thing to wreak havoc through raids and wars. It is another thing to govern, to serve as a legally-limited port such that the lives and properties of not only locals are protected, but also of foreign merchants. Part of this is demonstrated in Cosmos' description of criminals being executed in front of the Throne of Adulis. As NHA inhabitants might say today “tell me who is executing life and I will tell you who the king is.” The chapter also sheds light on moments within the history of the NHA, in which granted life ownership by king or kin was not practiced; it clearly instigated frightful times marked by internal wars and dramatic loss of life.

The presence of bishops, as demonstrated from artifacts and pectoral crosses discovered at Adulis, show an institutional ability to accommodate even those in the upper pinnacle of the church hierarchy. Considering all this evidence–if Bishop Moses is right in his characterization of the King of Aksum as an insignificant kinglet, if all the criminals in the region were executed at Adulis during 525 ACE, and if all the distributional pattern of coins pointed to Adulis as a center–how could Adulis not have been the center?

CHAPTER 5

PRODUCTION OF WAR ELEPHANTS AT ADULIS

5.1 Introduction

This chapter focuses on a central aspect to the local political economy of Adulis, namely, its role as a key site for the production of war elephants, i.e., elephants used as instruments of war. It probes material evidence at the site, textual evidence, and ethnohistorical data to develop a model of a political economy in which war elephant training at Adulis contributed to a more complex and fluid regional political economy.

In the subsequent discussion l will introduce the use of elephants as tools of war, discuss a modern taxonomy of elephants, and describe the current state of knowledge. As introduced below, it becomes important to revisit material lines of evidence for war elephant use in light of recently discovered knowledge in the areas of taxonomy and DNA analysis. The chapter presents a theoretical framework for understanding the war elephant as well as the contribution of this chapter to the broader theoretical discussion. It enumerates three lines of evidence that strongly suggest Adulis was producing war elephants. Next, by tapping into material representation, oral tradition, and ecological data, I demonstrate the symbolic importance of Adulis locally and regionally due to the production of war elephants. Finally, I model the production of war elephants by looking at a known battle-the battle of Raphia-that the African war elephants warred against Asian war elephant. Looking at the Battle of Raphia, a micro-process highlights the macro-process that provides us with a window into comparing state-level polities. In turn, this may provide insight into of the boarder context of Adulis' complex and fluid regional political economy.

5.1.1 Use of Elephants in warfare

According to the literature, the only animals implemented for use as combatants in warfare have been dogs, mules, pigeons, oxen, horses, and camels (Anglim 2002; Gardiner and Imperial War Museum 2006). These animals have been domesticated for thousands of years, which has made them available for use in human warfare. Yet human use of animals in war has not been limited strictly to such domesticated animals. Wild animals with intensive training have been implemented as well for military use–our prime case being the elephant. Although elephants can function as a beast of burden, like horses and camels, they were selected for use in combat largely in part because of one suggestive characteristic – their tusks (Toler 2011).

When considering elephants as tools of war, three characteristics need to be considered: their size, weaponry, and manageability. First, the sheer size of an elephant (5.1 tons) offers enormous intimidation. Next, their pair of tusks are undoubtedly useful and unique as a weapon. Finally, the very fact that an animal so large is manageable has great value. Regarding the latter, crucially, elephants can be trained and have the ability to learn. The elephant's intelligence is often considered to fall in the range between cetaceans and higher primates, which places them firmly amidst the group of animals known to be intelligent (Liar 2006: x). Elephants can't gallop or jump, but can walk up to 16km/h (10mph). Further, they can move through very rough terrain, can descend slopes by breaking down steep banks and sliding down, and can swim across rives using their trunks as snorkels, as was documented in Hannibal's famous crossing of the Alps in 218 B.C with 37 elephants (Anglim 2002; Tarn 1975).

Elephants have always been, and remain, wild, and not domesticated. But, although genetically and behaviorally wild, this has not prevented their utilization as a

weapon in human warfare. Investigating their role in this capacity at Adulis, as elsewhere, helps us to better understand human conflict in general.

Non-domestication is key to elephant warfare specifically at Adulis because nearly all elephants ever used in warfare were first caught in the wild, and then trained. As Liar (2006: ix) notes, a wild elephant that has its will broken in training will always fear humans, and thus can be implemented in war. Capturing, rather than breeding and sustained domestication, arose for several pragmatic reasons. Elephants typically do not reproduce successfully in captivity, and an elephant mates only once in four years; it takes two years for a cow-elephant to give birth, and it takes twenty years for an elephant to reach maturity and possess the strength to do the productive work of transportation or service as a tool of war. Moreover, elephants are "high-maintenance" animals. They consume 200-300 pounds of fodder per day (Kistler, 2006). Sustaining such large consumption while raising an elephant to maturity, while not impossible, is less economically practical compared to capturing and training. Thus, the relationship between elephants and humans is better defined as a "cooperative" one rather than one of a "master-servant" model of domestication. It is defined not only by giving material rewards, such as special food, but also by rewards based on social integration and bonding (a rub, etc.). Because an elephant is a wild animal that establishes a one-to-one bond, it takes about two to three years to train a war elephant, and the training has to be done by the same elephant rider, known as a mahout. It is possible to "enslave" and forcefully require an elephant to work long hours. However, this breaks the bond between the elephant and the rider, and often results in the exhaustion and death of the elephant, or the elephant killing its tormentor. Thus, elephants basically work in exchange for some favor. One may wonder whether elephants actually understand their relationship in this

way. Scholars may argue about this point, but the cooperative nature of the relationship has so far been supported in the literature (Kistler, 2006:6).

Ultimately, an ideal war elephant, like a human soldier, should have two characteristics: the capability to kill when needed, and an ability to respond correctly to commands. And, as with humans, these traits can be acquired through military training. The result offers an advantage over a rival war animal, the horse. Unless horses are trained extensively with war elephants, horses typically run away in terror at the sight of an elephant. Thus war elephants are very useful in confrontations with a horse-based enemy cavalry.

5.1.2 Broader Historical Context and Regard for Elephants in the Region

At a macro level, the significance of the war elephant as a tool of war is underscored in part by their role in what historians have described as the first "ancient arms control agreement." This took place between Carthage and Rome after the battle of Zama in 202 B.C (Williams 2006). The agreement required the Carthaginians to surrender all their African war elephants to Rome, an act that has been compared to the ideological and strategic considerations revolving around nuclear weapons control in our times (Williams 2006).

The symbolic significance of the elephant also functioned at the macro level, although varying by interregional patterns in the Old World. For North-East Africa and South West Asia, an elephant was considered sacred, a kind of "angel" in importance. For example, in numerous ancient churches in the northern Horn, there are plenty murals of elephants as supernatural beings or saviors (See Figure 236 and Figure 237).

But to the north, in the Middle East, and in the Mediterranean, the elephant by contrast was considered a threat, a kind of "demon." The religious (Zoroastrian-6th century B.C.) traditions in Persia viewed elephants as creatures of Ahriman, the "destructive spirit" (Tafazzoli 1975). The fundamentally negative orientation of the war elephant to the Persians is seen in the socio-historical associations with the beginning of the Islamic calendar, which starts with "The year of the elephant" (Am al fil, the year 571 AD. Not only the year the prophet Mohammed was born, it was the year when Mecca averted destruction by Abyssinians who were employing war elephants. Today the path in which Abyssinians marched to Mecca with war elephants is called The Road of the Elephant (dar'b al fil). For the Mediterranean perspective, simply quoting Ammianus Marcellinus (4th century Roman historian) who fought against war elephants suffices. He wrote "the human mind can conceive nothing more terrible than their noise and huge bodies" (Tarn 1975:132).

5.1.3 Analytical Framework

Two theoretical perspectives are implemented to model the production of war elephants within the political economy of Adulis. First, I discuss a broader anthropological discussion of warfare but enhanced to describe the under-developed area concerning the prosecution and perpetuation of warfare. Second, I cover the topic by means of broader materialistic perspectives in anthropological studies.

5.1.4 War and the Demands of Elephant War in Particular

The fundamental characteristics of war in which elephants play an integral role (hereafter "elephant war") can be illuminated by considering elephant warfare through a lens incorporating various theories about warfare in general.

First, in terms of a working definition of war, Schmidt and Schroder (2001:19) define it as the use of violence as a means to achieve specific ends (Schmidt et al. 2001). They offer an extended four-step analytical description that places actual warfare as the last stage. The first stage is conflict resulting from socio-economic contradictions at the base of intergroup competition. This initial conflict will lead to the second stage, confrontation. This involves the perception of these causes by the parties involved as relevant, and the creation of an antagonistic relationship. These two stages lead to legitimation, or the official sanctioning of violence as a legitimate course of action, accomplished by drawing from memories and by social representations of them. When all these steps are fulfilled, then actual war takes place.

The battle of Raphia provides both a demonstration and an analytical application of the above. The Battle of Raphia occurred between Ptolemaic Egypt and the Seleucid Empire to control the province of Coele Syria (essentially an area near modern day Rafah including parts of modern Lebanon, Palestine/Israel, Jordan and Southern Syria). It took place on June 22, in 217 BCE, pitting Ptolemy IV against Antiochus III. In this conflict, 102 Asian war elephants battled against 73 African elephants. Ptolemy IV, who aligned 73 African elephants, carried the day. Notably, the African elephants that waged war at Raphia came from Adulis.

In the first stage, conflict from intergroup competition occurs when a well-established Adulis-based aromatics trade becomes threatened by new South Arabian

aromatics merchants using established land routes. Various parties took part in the second stage, the creation of a commonly-perceived antagonistic relationship. They included producers who lived in the ecological niches where the aromatic trees grew, those who ran the trade to diverse markets, and those who controlled the trade routes. Other relevant parties may have been war elephant producers at Adulis. The first two stages provide fertile ground for the third stage escalation through social memory and representations to justify a legitimate use of violence and hence war.

While Schmidt and Schroder's (2001:19) definition of war provides analytical insight into the causation of war, it stops short of providing substantial insight into the prosecution and perpetuation of war. Carneiro (1990), Ferguson (1990), Hass (1990b), and Whitehead (1990) all note that the prosecution of warfare is entirely different from its causation. Maintaining warfare requires the emergence of a complex social and ideological subsystem notable in its own right. For example, the training and prosecution of elephants as weapons takes so much time and so many resources that it creates its own guiding logic in warfare, almost regardless of the initialization of conflict.

The investment into war prosecution generates a need to constantly justify its relevance, and such justification leads to a consideration of the power dynamics in war. This presents a key dialectical relationship: structures of domination are necessary for understanding the power dynamics of war, and in turn war is integral to understanding the evolution of structures of domination. We next discuss this dialectical relation in terms of warfare that employs war elephants, which offers its own specific relations of power in its own right (Reyna and Downs 1994: xx). An elephant force is an organization dedicated to domination. We understand domination in a Gramscian sense. Gramsci (1997:169-170) cites coercion and consensus as two fundamental forces of domination.

War Elephants facilitate domination of people and structures through organized forces. The means of domination are people, tools, resources, and know-how. In this case elephant riders, elephants, and other weapons and resources used in training and war constitute the means of domination. The organization of domination is a particular way these means are combined to generate or structure practice (Reyna and Downs 1994:35). Coercion is attained by organizing the means of domination to perform practices involving violence and punishment either to deter or attract specific practices, while consensual forces function by doing something internal or psychological to persons to manufacture consent (Herman and Chomsky 2002; Reyna and Downs 1994). These two forces generate relations of domination. In a given society there is not one mode of domination, and these modes often overlap and intersect with one another.

5.2 Taxonomy of Elephants

Recently discovered knowledge in the areas of taxonomy and DNA analysis suggest revisiting material lines of evidence for war elephant use in terms of taxonomical evidence. The taxonomy of elephants in Africa and Asia has been a rich area of speculation and conjecture for the past century. Unfortunately, researchers working with historical and archaeological accounts that involve identifying ivory artifacts and the use of elephants in warfare have fallen prey to confused taxonomic designation unsupported by data (Roca et al. 2001). Until recently, the prevailing view in the historical and archeological literature on elephants has referred to only two species, the Asian elephant (*Elephas maximus*) and the African elephant (*Laxodonata africana*), each having further subspecies divisions. Regarding African elephants, researchers have tended to adopt the

extremes of either a mentioning a single species classification, or a confusing abundance of species.

Opinions on classification varied for over a century until in 2000 two research efforts have helped to settle the confusion based on recent advances in ancient DNA analysis. The first effort (Grubb et al. 2000) is a quantitative study of morphological variation in African elephants that incorporates large, representative African elephant samples of known provenance. Grubb et al. have shown two strikingly non-overlapping elephant habitats – forest and savanna – with few intermediary zones. The research implemented representative samples in space and time, and the results were statistically compelling. The researchers, pointing to their new evidence, called for abandonment of the single species classification of the African elephant.

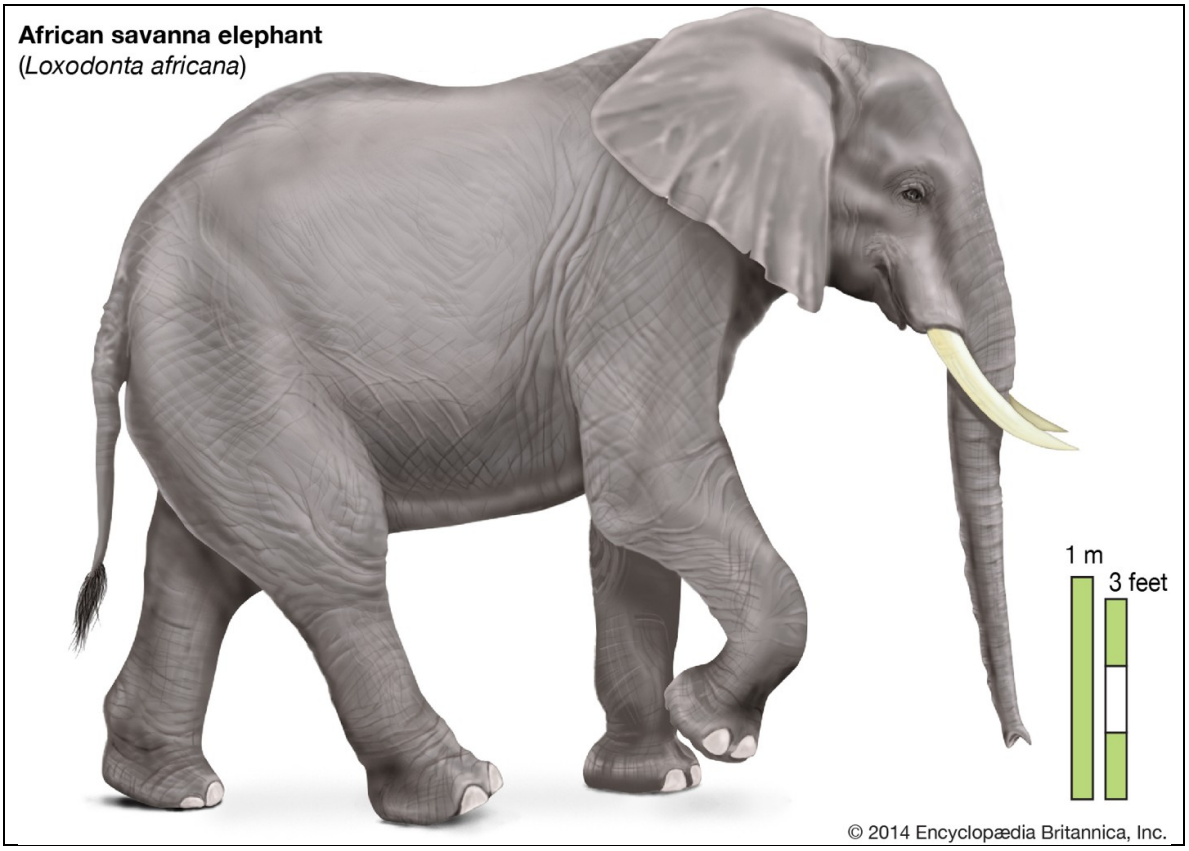

Figure 212 ***Laxodonata africana***

Image source Encyclopedia Britannica

A year later, more research (Roca et al.2001) has pointed out that the lineages of forest and savanna elephants were profoundly divergent and reciprocally monophyletic. According to Roca et al. (2001), species divergence between the African forest and savanna elephants took place between 2.6-5.6 Mya. The African forest and savanna elephants are as divergent as mammoths are from Asian elephants (Rohland et al. 2010). A similar study (Comstock et al. 2001) using the same samples, but focusing on nuclear microsatellites, reached the same conclusion. However, for researchers (Johnson et al. 2007, Debruyne R. 2005) who scrutinized the samples and looked at the mtDNA of these samples, the distinction between the two species was not so clear, and they rejected the

two species model. Soon it becomes clear that the unusual patterns of mtDNA can be attributed to sex differences in dispersal (Roca et al.2001, 2007). In all known elephant groups, males leave their natal social group while females do not. In contrast to all other genetic markers transferred by males, mtDNA is bound to maternal lineage, and the matrilocality of female elephants significantly circumscribes gene flow (Ishida 2011).

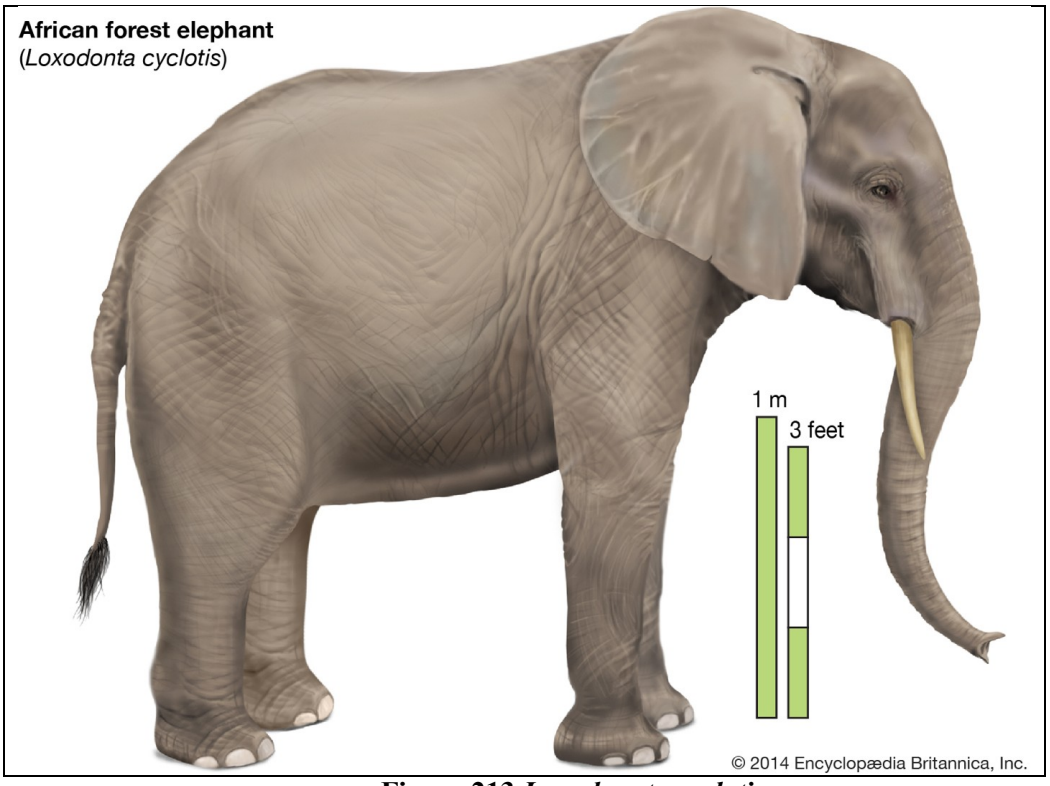

Figure 213 ***Laxodonata cyclotis***

Image source Encyclopedia Britannica

After separating the nuclear haplotypes of the samples, Boca et al. (2001) found a lack of gene flow between forest and savanna elephant. As a rule, one of the most commonly used tools to measure population differentiation is the Fixation Index (Fst), which is based on genetic structure. Fst ranges from 0 (no difference between two groups in allele presence or frequencies) to 1 (entirely different). When African forest elephants

and savanna elephants are compared in Fst, a high value of 0.938 results, and this is indicative of a separate species, and this value is comparable to the values when comparing Asian forest (0.902) and Asian Savanna (0.997) (Boca et al..2001).

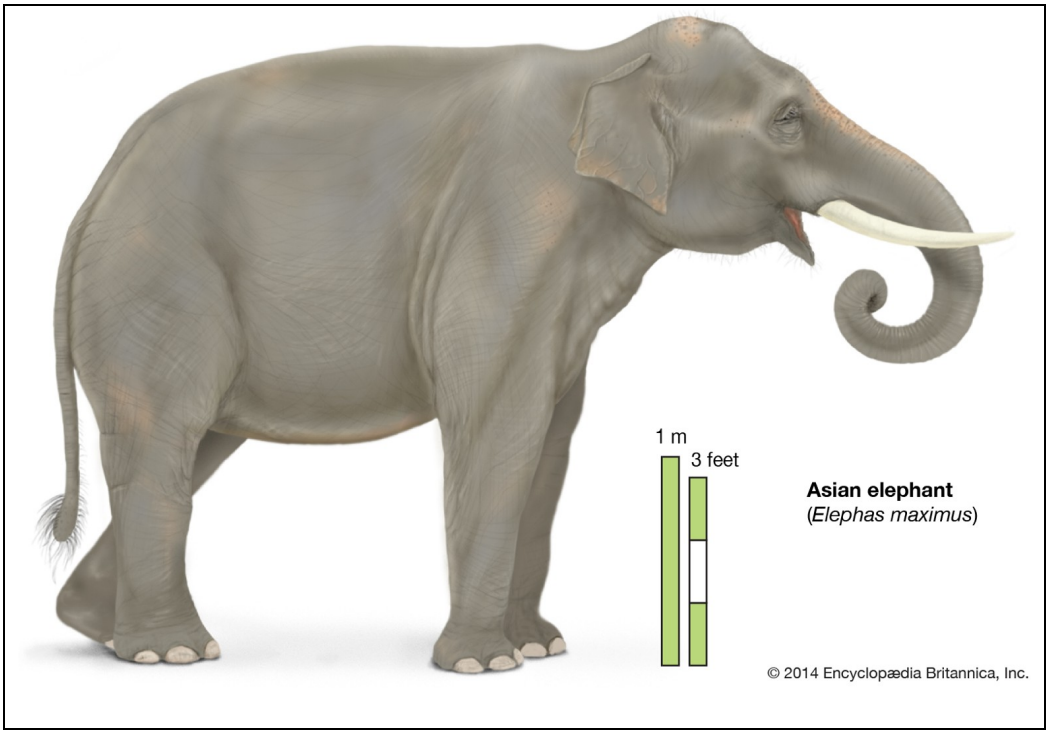

Figure 214 *Elephas maximus*

Image source Encyclopedia Britannica

In 2004 taxonomists determined that, along with having significant morphological differences, two varieties of the African elephant considered subspecies did not interbreed to any significant level, and thus each was deemed a full species. The African savanna elephant remained *Laxodonata africana*, while the African forest elephant was named *Laxodonata cyclotis* (Lair 2006: ix). Of the two African species, it appears that only the forest elephant (*Laxodonata cyclotis*) ever fought in wars (Lair 2006: ix). Forest elephants, which are much smaller than their savannah cousins, are about the same size as

the Asian elephant, and share with the latter enough characteristics to suggest to many biologists a high degree of convergent evolution (Liar 2006: ix).

The question of where forest elephants lived in space and time is significant for understanding who controlled them.

5.2.1 Shifting Ecological Niche of Elephants in space and time

In recent years it has been demonstrated that the forest elephant (Laxodonata cyclotis), once common in the Northern Horn of Africa, is now extinct in this region (Trautmann 1982). Reasons advanced for this regional extinction include human hunting, climatic changes, ecological disturbances, and wars (Welsby 1996:7).

The extinction of Laxodonata cyclotis is consistent with the fate of elephants in the Red Sea region as a whole. A look at the historical and archaeological evidence shows elephants being pushed further South before extinction. There is sufficient data to suggest there were no elephants left in the Nile Delta and adjacent regions after the second millennium BCE (Kisteler 2006). The most likely explanation seems to be that the Egyptians completely exterminated the elephants seeking ivory. This observation is supported by the fact that archaeologists in the region have argued the town of Elephantine in Southern Egypt received its ancient name, Abou (elephant town), due to the vast quantities of ivory that was sent to Egypt from the south (Kendall 1996).

The herds of elephants that once inhabited Syro-Palestine and Mesopotamia were gone by 8th century BCE. This left the Sudanic belt and the Erythraean coast as primary remaining sources for African forest elephants –as a source of treasured ivory, and for the purposes of warfare (Barnett 1948).

5.2 The Production of War Elephants at Adulis

Next, I will enumerate the archaeological, textual and ethnographic pieces of evidence that support the production of war elephants at Adulis.

5.2.1 Gower's Hypothesis

Gowers (1948:177) was the first to suggest that the African war elephants of Raphia came from Adulis. However, his observation was completely dismissed as speculative. Such unanimous dismissal reflected several factors. First, Gower's suggestion predates the discovery of two African elephant species. Moreover, few, if any, of his European critics had close personal experience with forest elephants. Finally, racism blinded critics to accept the ability of Africans as expert elephant handlers, i.e., the ability of Africans to produce war elephants that would be responsive to human command (Bullard 2002).

The accumulated relevant archaeological data drawn over the last few decades warrants Gowers's conclusion. The following discusses direct and indirect evidence to justify the assertion that Adulis was producing war elephants: a) artifacts of ivory (from *Laxodonata cyclotis)* that include wheels, post holds, buttons, household artifacts, and full tusks discovered at Adulis, b) the discovery of 13 mummies wrapped in elephant skin at the monastery of Debre-Ham on elephant skin in 1990's, c) textual evidence from Monumentum Adulitanum I and II, and other classical texts, and d) the architecture of Adulis. Each of these highlights varying aspects of the complex nature of early Adulis' relationship with the war elephant.

5.2.3 Ivory artifacts at Adulis

Although there is no comprehensive archaeological survey of the use of ivory in the Old World, and of the Northern Horn of Africa, in particular, Warrnington's (1974) enumeration of how ivory was used during the classical era is relevant for comparison with Adulis. These uses include ivory for:

> "*statues, chairs, beds, scepters, hilts, scabbards, chariots, carriages, tablets, book-covers, table-legs, doors, flutes, lyres, combs, brooches, pins, scrapers, boxes, bird-cages, floors*" Warrnington (1974:163)

At Adulis' numerous excavations plenty of ivory artifacts have been documented, some of them available at the National Museum of Eritrea, and others lost after excavation. While a rich resource for future research (for a review see Shoshani et. al.), our concern here is the identification of these ivory artifacts as originating from *Laxodonata cyclotis*. Artifacts depicted below range from a chariot wheel (Figure 215), to post-holes (Figure 217), to various utensils and tools, and in some cases, full tusks (Figure 217).

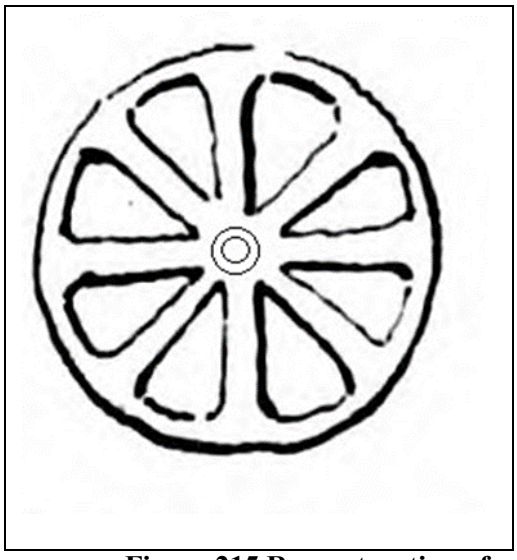

Figure 215 Reconstruction of Ivory chariot wheel of Adulis

Figure 216 Ivory post-hole

Figure 217 Full Tusk from built form 20, base floor
Picture reproduced from Sergew Hable Selassie (1971)

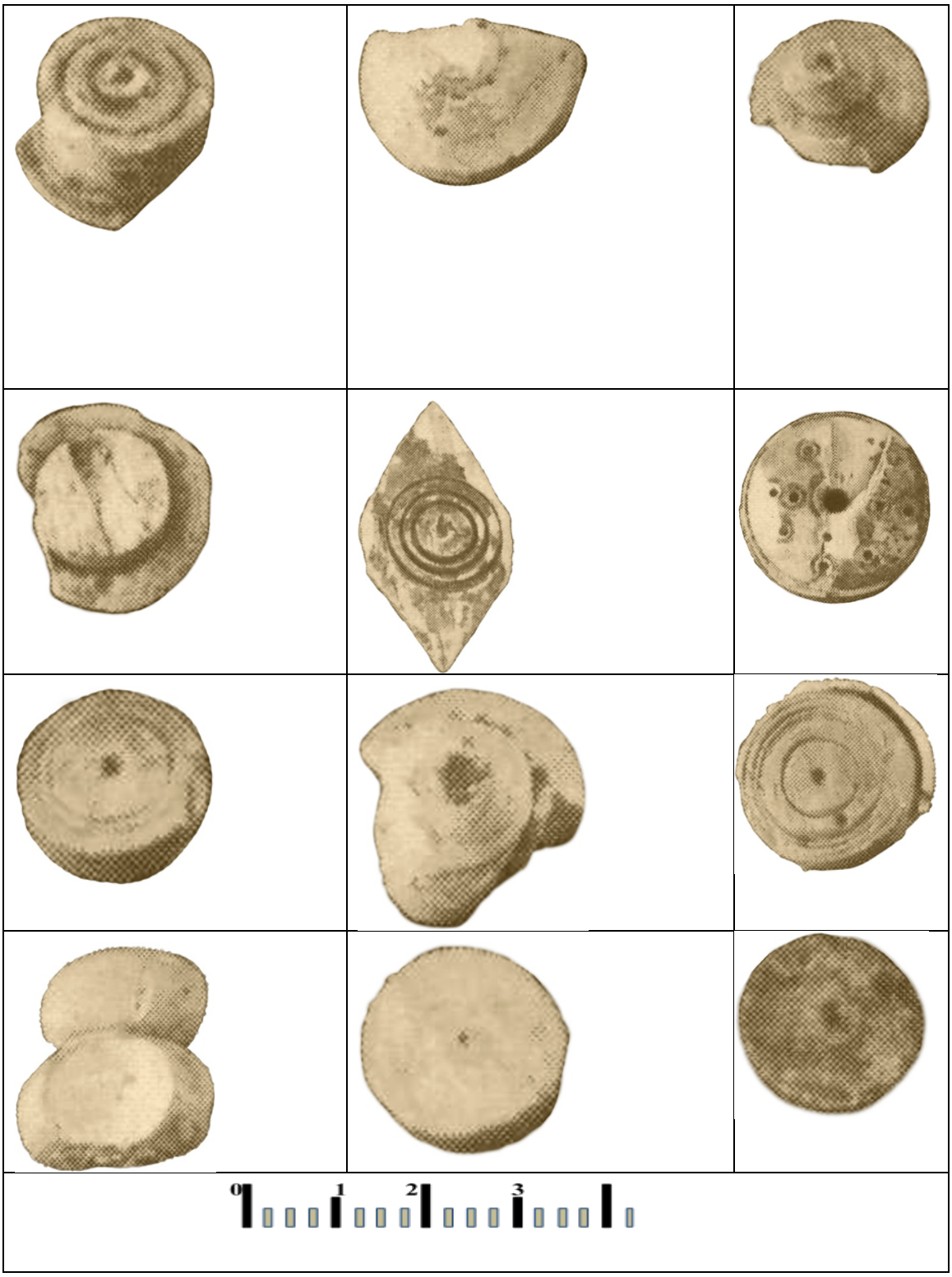

Figure 218 Small Ivory artifacts discovered at Adulis

Scale is in cm

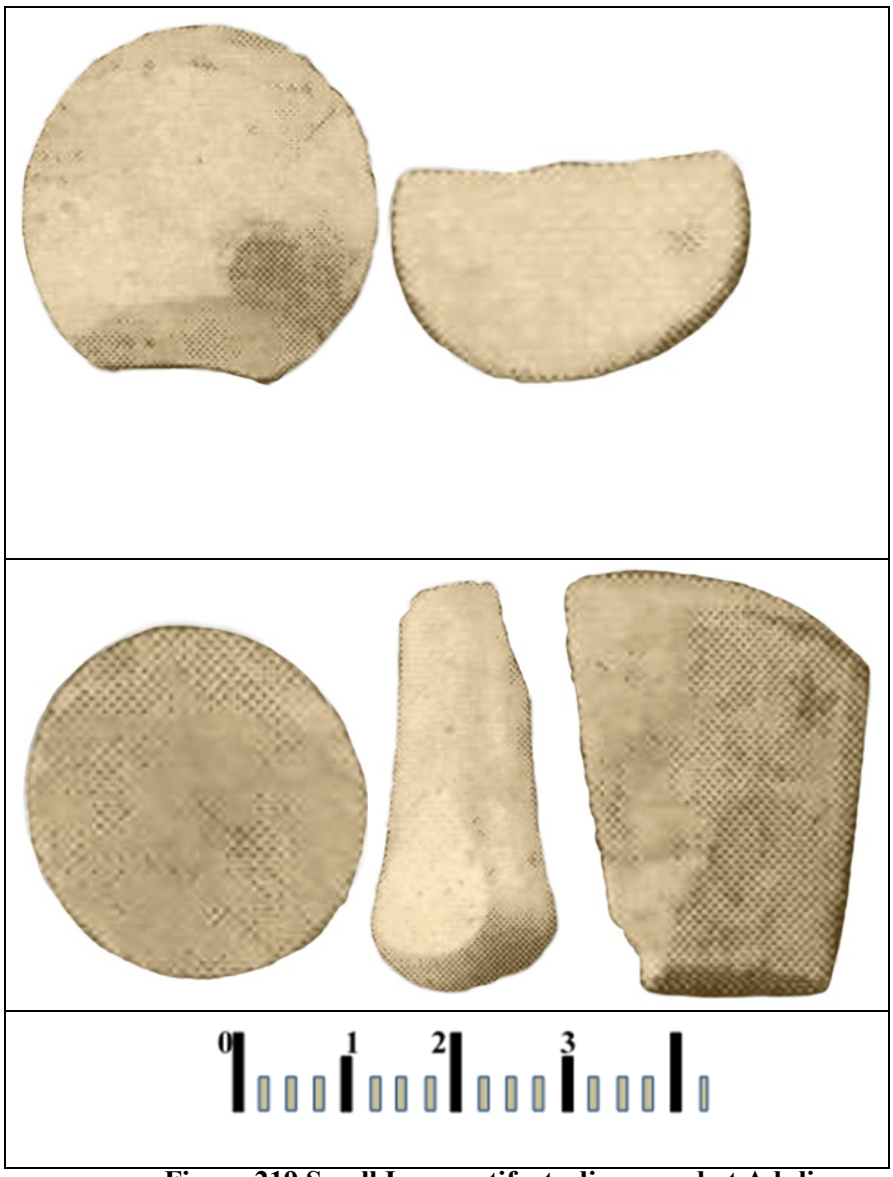

Figure 219 Small Ivory artifacts discovered at Adulis

Scale is in cm

Figure 220 Ivory post-hole upper part

Figure 221 Decorated Ivory artifact

Note the engraving of open arms with six circles inside

The ivory wheel artifact representation in Figure 215 is of particular interest. According to a 530 ACE account, a diplomat named Nonnosus visited Adulis region. The diplomat Nonnosus was received by the king on an elephant pavilion. Nonnosus also observes chariots with ivory wheels (Bowersock, 2013:110,137). It is possible the ivory

wheel at Adulis served as a high-status artifact. Nonnosus came from a family of diplomats – his grandfather and his father were also diplomats of the Byzantine Empire (Eastern Roman Empire). He describes witnessing the elephant pavilion as one of the most memorable events in his long, three-generational diplomatic career. The purpose of his visit in a diplomatic capacity was to lobby both the Northern Horn and Arabia to turn against Persia. While traveling from Adulis to Aksum at a place called Aua, Nonnosus accounts observing a herd of elephants, 5000 in number in a vast open space (Hable Selassie, 1972).

5.2.4 Mummies wrapped in Elephant Skin

In the 1990's in Southern Eritrea, at the monastery of Abba Libanos, Debre- Ham, a remarkable discovery occurred accidentally during a construction work dig. Thirteen mummies were discovered wrapped in elephant (*Laxodonata cyclotis*) skin. Despite many requests to study these mummies, it was not possible to access them because the monks who discovered them saw them as sacred, and not the subject of research. Future research may provide more data on the identity of the mummies. Preliminary observation of these mummies shows they had long hair still observable, slightly larger toes, and average height. Why each of these 13 individuals was wrapped in elephant skin and mummified is a subject for future research.

Figure 222 Mummies of Debre-Ham
Note these mummies were wrapped in elephant skin identified to be *Laxodonata cyclotis* skin

5.2.5 Architecture at Adulis

The presence of war elephants in the vicinity of residences is a double edge sword. Making use of war-trained elephants for protection is useful, but also can raise a serious threat to residences. The architecture of Adulis' has to address this contradiction. As Carsten and Hugh-Jones (1995) have noted, house construction can serve as a site where contradictions are negotiated and obviated through labor and material choice. Thus, investigating the architecture of Adulis, which involves in particular building in

graduated masonry, can be a material index for investigating how social relationships with war elephants are reproduced and interact within the political economy of Adulis.

By engineering standards, building in graduated masonry is considered structurally stable, but nevertheless integrates soft material in the form of porous basalt stones (as compared to many other sturdier stone types for the masonry). The means by which the buildings of Adulis remained structurally stable in a war elephant environment using graduated masonry can be compared to how modern cars are built to ensure driver safety. Cars have a firm structure and soft front and back sections. In case of an accident, the soft part absorbs the shock to save the driver. Up until the 1950's, automakers built stiff, sturdy cars. When Mercedes-Benz released vehicles with front and rear crumple zones that book-ended a rigid passenger cell, they became known for car safety (Béla Barényi 2018). In the case of Adulis, graduated masonry buildings helped protect residences against the threat posed by elephants. When an elephant decided to scratch at such a house for whatever reason (ward off bothersome pests, for example), the household would be able to absorb the substantial shock.

An association with elephants at Adulis is also visible in mural depictions (see Figure 237, Figure 224, Figure 223). Figure 237 is a mural that shows sparring elephants discovered at Temple A. Figure 224 shows the shape of an elephant as seen from atop in a piece curved out of marble. For a reference on the appearance of elephants from above, see Figure 223

Figure 223 A shape of elephant seen from top

Figure 224 A worked marble decorated in an elephant shape seen from the top

5.3 Monumentum Adulitanum I, and II and other Classical texts

Monumentum Adulitanum (and hence after MA-I and MA-II) is a name coined by Allatius (1631) for two inscriptions that were once visible at the entrance of the port city of Adulis. These inscriptions survived in the copies made by Cosmas Indicopleustes in his visit to Adulis sometime between 518-523 ACE (Fiaccadori 2007). Cosmas published his book in 547-49 ACE known as the *Christian Topography*; three codices of this manuscript survived to the present, and range from the 9th to 11th century (Kominko 2006). The 9th century codex.in Rome in the Vatican library (codex Gr. 699), and the 11th-century manuscripts are in Sinai, Saint Catherine Monastery (codex Gr. 1186), and Florence, Italy (codex Plut. IX. 28) (Kominko 2006:113). Cosmas was a trader who became a monk at his later life, the purpose of his travels as described in his own words

> "I myself have made the voyages for commercial purposes in three of these gulfs- the Roman (=Mediterraneans Sea), the Arabian (=Red Sea) and the Persian (=Indian Ocean), while from the natives or from seafaring men I have obtained accurate information regarding the different places" (McCrindle 1897:39; McCrindle 2000).

5.3.1 Monumentum Adulitanum I

Monumentum Adulitanum-I (see Figure 206) is a two-fold basalt engraved stone tablet (Fiaccadori 2007) that stood behind Monumentum Adulitanum II (i.e., the Adulis throne). According to Cosmas, the MA-I was three cubits tall (about 1.4 meters or 4.5 feet) made of volcanic igneous rock (basanite) available in the region. MA-I and MA-II are some of the oldest Greek inscriptions in Northern Horn of Africa (Fiaccadori 2007:1010). The time and setting for its placement in Adulis offers clues into the relations of power between its originators, i.e. the Red Sea emporium, Adulis and the Ptolemies.

Hendrickx (1984:19) suggests the inscription must be written between 221-241 BCE noting the historical importance of the inscription. Based on the region's comparative monument placement, it is safe to assume that MA-II (the Throne of Adulis) was placed at the minimum any time before 221-241 BCE.

There are a few critical claims made by MA-I that are of relevance. These include: the war elephants used in the Asian wars (that includes battle of Raphia) came from Adulis (See Figure 226 lines 4-5), this undertaking was a two-generation investment (See Figure 226 lines 5-6), and perhaps the monument was erected to be grateful to Adulis (but not large enough to overpower the throne monument).

MA-I reads as follows:

"King Ptolemy the Great, son of king Ptolemy and queen Arsinoe, ... having received from his father the kingdom of Egypt and Libya and Syria and Phoenicia and Cyprus and Lycia and Caria and the Cyclades islands, departed on an expedition into Asia with forces of infantry and cavalry and a naval contingent, and Troglodyte and Ethiopian elephants, which his father and himself were the first to hunt from these places, and (which) they had brought to Egypt and trained for use in war. And having mastered all the territory around the Euphrates, and of Cilicia and Pamphylia and Ionia, and the Hellespont and Thrace, and of all the forces in these countries and of the Indian elephants, and having made all the rulers of these places his subjects, he crossed the river Euphrates and having subdued Mesopotamia and Babylonia and Sousiana and Persia and Media and all the rest as far as Bactriana, and having sought out whatever sacred objects had been carried off by the Persians from Egypt, and having brought them back with the rest of the treasure from these places to Egypt, he sent forces across the dug out rivers" (Hendrickx 1984:17)

Figure 225 Inscription content of MA-I

The inscription is attributed to Ptolemy III "Euergetes" who reigned from 246-221BCE (Kirwan 1972a). As to whether the claims of MA-I can be confirmed, there are numerous external sources for that. For instance, St. Jerome commentary states that Ptolemy took booty of 40,000 talents of silver and 2500 cups and images of the gods and also these carried off by Cambyses from Egypt. Another confirmation comes from inside Egypt. Because of this campaign to Asia using war elephants, Ptolemy III received a title "Euergetes" (Benefactor or Repatriator) from Egyptians.

The campaign to Asia and the repatriation can also be confirmed from the Stele of Canopus (a decree of Egyptian Priests issued in honor of Ptolemy III on March 4th 238 BCE. Later the Egyptian Priests did the same for Ptolemy IV after the battle of Raphia on November 15, 217 B.C and of importance in 196 B.C we have the celebrated Rosetta Stone. All these inscriptions were written in hieroglyphs, demotic and Greek. Lines 8-10 state:

> *"the king on a campaign abroad brought back to Egypt the sacred statues that had been taken out of the country by the Persians and restored them to the temples from which they had initially been taken" (Austin 2006:471; Budge 1970:234).*

Burstein (1996) notes the Ptolemaic activity in the Red Sea as unusual in that it is the only known example in antiquity of a sustained program of exploration undertaken by a state. Ptolemaic interest in the Red Sea was not primarily commercial, but military, and this included a desire to find a secure source of war elephants. Austin (2006:460), Fiaccadori (2007:1011), Sergew Hable Selassie (1971), Tarn (1975:246), Walbank (2003), and Strabo (Oldfather 1935; Rawlins 1982) all attest to the venturing of Ptolemy II (283-246 B.C) and Ptolemy III (246-222 B.C) into Adulis and its surroundings for purpose of obtaining war elephants (Strabo, et al. 1966).

But what about the claim that war elephants were trained back in Egypt? Contrary to our Adulis-based thesis, one could ask whether Ptolemy III could go to the Adulis region, hunt elephants, and take them back in Egypt for war training, leaving Adulis training out of the picture. Applying what we know, this seems unlikely to be the case. First, since elephants establish a one-on-one bond with the original human being they encounter, securing an elephant also requires dealing with its mahout (rider), an extra burden. Even with the resources of the Ptolemies, such a claim does not seem feasible. An elephant needs 200-300 pounds/day fodder (mostly bush and not grass). The battle of Raphia required 73 war elephants (200 lb. /day x 73= 14,600 lb. /day). In 221-246 BCE Egypt, how is this amount of fodder to be provided? If elephants ate grass, a case can be made strictly based on the Nile delta, but good vegetation of this magnitude is generally not available. By contrast, Adulis has such resources, and thus it is more likely all the training and maintaining was done at Adulis, and elephants were moved when needed.

The training of war elephants at Adulis can further be supported by documentation in Egypt that Ptolemy II-Philadelphus had specially designed elephant carriers built for the shallow waters of the Red Sea (Kisteler 2006:83).

Other practical considerations also fly in the face of the claim of Egyptian-based training in the MA-1. Considering sea transport, how would it be possible in antiquity to mount a five-ton, untrained animal on a ship? For this to happen, the elephant would need to be sedated, and then perhaps some sort of crane would be needed to lift the animal and mount it on a ship with the hope that the elephant does not wake up for the duration of sea travel on the Red Sea needed to reach the destination. If considering a land route, how were the elephants sustained while traveling 1810 km (1124 miles) from the Adulis region, crossing the Eastern Desert to Egypt? Elephants can walk up to 16km/h (10mph), and under a rigorous travel plan, if the elephants were made to travel five hours a day in the hostile environment of the Eastern Desert, it would take more than 23 days to reach the destination. The 73 elephants used at the battle of Raphia, to take one example, would need 330,325 pounds of fodder for the entire trip. In environments that have plenty of trees and bushes, this is not hard to accomplish. But the Eastern Desert does not provide such vegetation. The Ptolemaic claim of Egypt- based war elephant training, therefore, is moot on logical and logistical grounds.

5.3.2 Monumentum Adulitanum II

MA-II proves even more significant than MA-I to understanding the relationship between Adulis' war elephant production and the political economy of the region. MA- II is a sculptured throne cut out of a single block of white marble with narrow black veins. It gives firsthand and concrete information about Adulis' regional geography, climatology, orography, hydrology, demography, and ancient polities organized along ethnicity (Fiaccadori 2007:1011).

The MA-II provides an account of a king's campaign to subdue twenty-three organized polities in the Northern Horn and across the Red Sea. This campaign was able to create what seems to be a Pax Erythraean of tributary regions to Adulis (See Figure 227). The king accomplished all this in the twenty-seventh year of his reign, and claimed he was the first to accomplish all this. He dedicates the throne to the gods at Adulis – something that suggests the absolute symbolic importance of Adulis in relationship to all other regions concerned (See Figure 226).

The Last part of the MA-II reads as follows:

> "*Having imposed peace on the entire world under me I come to Adulis to offer sacrifices to Zeus and Ares, and to Poseidon for the safety of those who sail the sea. Once I had brought together my forces and united them, I have established this throne on this spot and offered it to Ares as a dedication in the 27th year of my reign." (Hendrickx 1984:36, Bowersock 2013:46-48)*

The MA-II includes geographical information that can be extracted out of this inscription (See Figure 227) and applied to map the ancient polities of the Northern Horn

of Africa. A striking pattern of toponym appears regarding the ancient polities and influence of Adulis in the region (see Figure 226). The geographical information of the MA-II (see Figure 226) includes statements such as:

> *"...people who live beyond the Nile, in inaccessible and snowy mountains, in which there are storms, and ice and snow so deep that a man sinks up to his knees..." (See Figure 227 Lines 7-9)*
>
> *"...who live by a mountain, with bubbling and flowing streams of hot waters...?" (See Figure 227 Lines 12-13)*

"... inhabitants .... on craggy mountains..." (See Figure 227 Lines 16-17)

"... the greatest and most inaccessible mountain..." (See Figure 227 Lines 12-13)

"...great waterless plains..." (See Figure 227 Lines 18-19)

"...who dwell across the Red Sea..." (See Figure 227 Line 30)

The first part of the inscription, which most likely had contained the name of the king, was broken in 525 ACE when Cosmas copied it during his visit to Adulis. It is not clear whether removing the king's name was a conscious decision to institutionalize the conquered territory without personal aggrandizement, or whether other kings subsequently removed it before 525 ACE as a direct result of violence or resistance. There are indirect references in Ge'ez (ancient Ethiopic) texts that suggest the former might be more likely to be the case; however, accessing these texts has proven to be impossible at this point. Assessing descriptions of the institutionalization of what seems to be individual achievement or leadership may be important and intriguing future anthropological research.

Why was the MA-II written in Greek? Multilingualism consistently was a skill possessed by ruling elites in the Northern Horn, and particularly kings. It is not surprising during Adulis era, for instance, to find three languages employed among the populous:

Greek used toward the North, Sabean (ancient South Arabian) used toward the Middle East, and Ge'ez (ancient Ethiopic) used in local governance. Although Ge'ez is a written language, evidence of mastery of other regional languages, in particular, those used in commerce, is available.

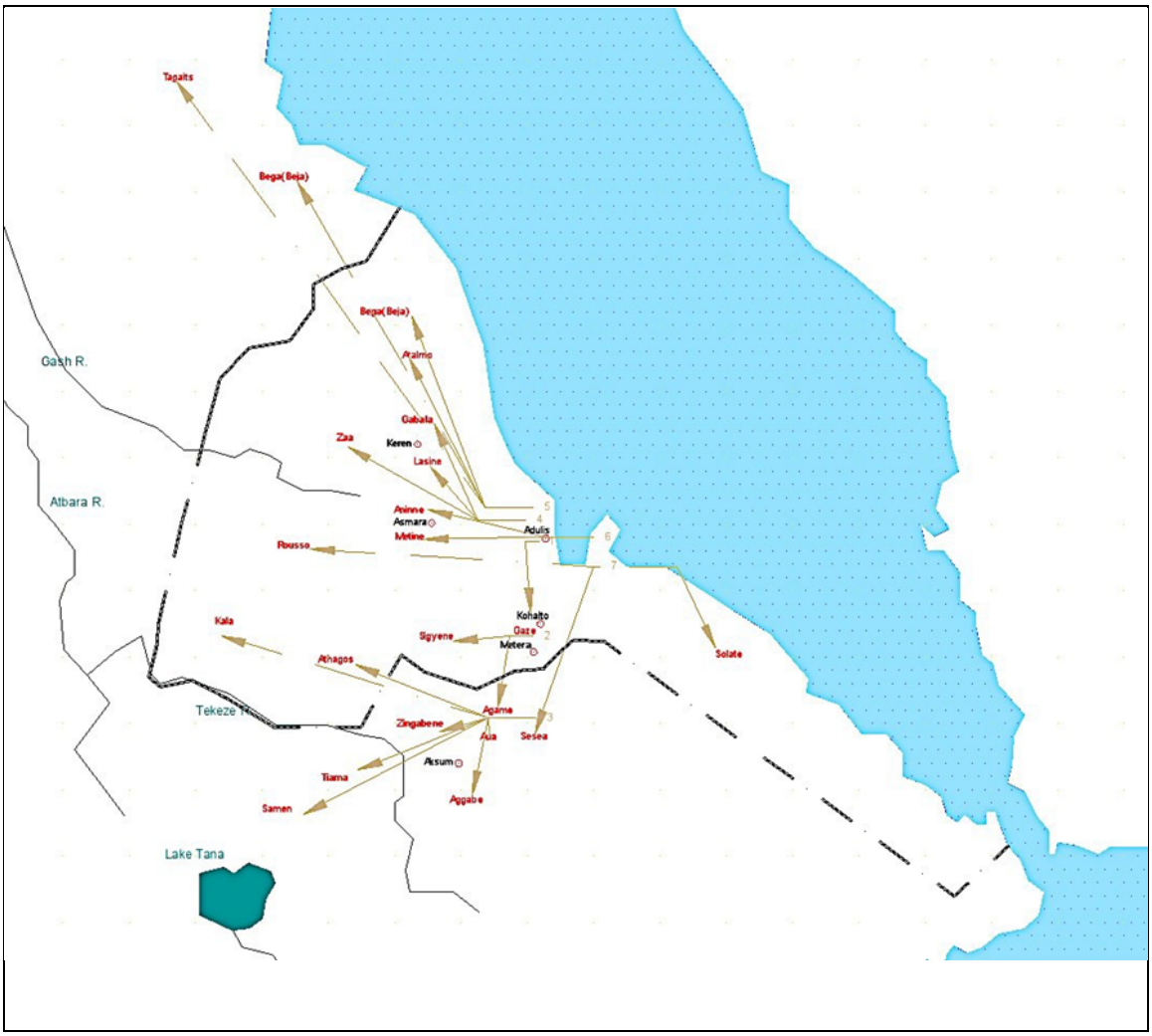

Figure 226 Identification of places and ancient polities of MA-II

Multilingualism was a required trait among elites in the Northern Horn of Africa. It not only made various linguistic regions more accessible, it also served as a means to project power. Multilingualism provides a window of insight into the political economy of Adulis based on the material remains of the languages used and inscribed. Yet this very

feature has also inadvertently obfuscated the history of Adulis. Since the MA-I and MA-II were written in Greek, some scholars conjectured Adulis as a port of the Ptolemies (Anfray F 1968; 1974; Kirwan 1972a). This perspective can be easily discredited by the fact that the Ptolemaic territorial domain is one of the most clearly demarcated territories in history, and Adulis is not within it. The presence of Sabean inscriptions led others to conjecture that Adulis was a derivative of one of the ancient Middle Eastern states. As discussed earlier, this perspective is also discredited on archeological, linguistic, and textual grounds.

Regarding the identity of the author of the MA-II, no agreement exists among scholars, although most archaeologists in the region identify the author to be a king of Adulis. Other scholars (Connah 2001; Fiaccadori 2007; Munro-Hay 1982; Munro-Hay 1996; Peacock et al. 2007; Phillipson 2000) attest that the inscription belongs to an Aksumite king. Was the author of the MA-II an Aksumite king? With a degree of certainty, the ethnicities mentioned in lines 4-6 of the MA-II constitute the power base of Aksum. If the author of the MA-II was an Aksumite king, then why would he attack his power base in the first place? To suggest that the author of the MA-II was an Aksumite king is as far-reaching as to suggest that Charlemagne was an Italian monarch of Lombardy. Didn't Charlemagne invade Lombardy in 774 ACE? If Charlemagne was an Italian monarch, why would he invade his Italian power base? The invasion thus suggests the author of the MA-II was not Aksumite.

Momentum Adulitanum-II (MA-II) or The throne of Adulis reads as follows:

"...and afterwords I grew to manhood and bade the nations closest to my kingdom to keep peace, I waged war and subjugated in battle the following peoples.

I fought the Gaze people, then won victories over the Agame and the Sigyen. I took as my share half of their property and their population. The Aua and the Ziggabene, and the Aggabe, and the Tiama and the Athagaous and the Kalaa, and the Semene, people who live beyond the Nile, in inaccessible and snowy mountains, in which there are storms, and ice and snow so deep that a man sinks up to his knees- these people I subjugated after crossing the river. Then I subjugated the inhabitants of the Lasine, and the Zaa, and the Gabala, who live by a mountain, with bubbling and flowing streams of hot waters. I subjugated the Atalmo, and the Beja, and all the people of the Taggaitai with them who dwell as far as the frontiers of Egypt. I made passable the road from places of my kingdom all the way to Egypt. Then I subdued the inhabitants of Annine and the Metine, on craggy mountains.

I fought the Sesea people, who had gone up onto the greatest and most inaccessible mountain. I surrounded them and brought them down, I chose for myself their young men, women and boys and girls and all their property. I subjugated the peoples of the Rausai, who live in the midst of incense-gathering barbarians between great waterless plains, and I subjugated the people of Solate, whom I ordered to guard the coasts of the sea. All these people, encloses by mighty mountains, I myself conquered in person in battle and brought them under my rule. I allowed them to use all their lands in return for the payment of tribute. Many other people voluntarily subjugated themselves to me by paying tribute.

I sent both a fleet and an army of infantry against the Arabitai and the Kinaidokolpitai, who dwell across the Red Sea, I brought their kings under my rule. I commanded them to pay tax on their land and travel in peace by land and sea. I waged war from Leuke Kome to the land of the Sabaeans.

I was the first and only king of any down to my time to subjugate all these people. And for this I give thanks to my greatest god Ares, who also begat me, through whom I brought under my sway all the people who are adjacent to my land, on the East as far as the Land of Incense and on the West as far as the places of Ethiopia and Sasou. Some I went and conquered in person, others by dispatching expeditions. Having imposed peace on the entire world under me I come down to Adulis to offer sacrifices to Zeus and Ares, and to Poseidon for the safety of those who sail the sea. Once I had brought together my forces and united them, I have established this throne on this spot and offered it to Ares as a dedication in the 27th year of my rein.

Figure 227 Inscription content of the Throne of Adulis (MA-II)

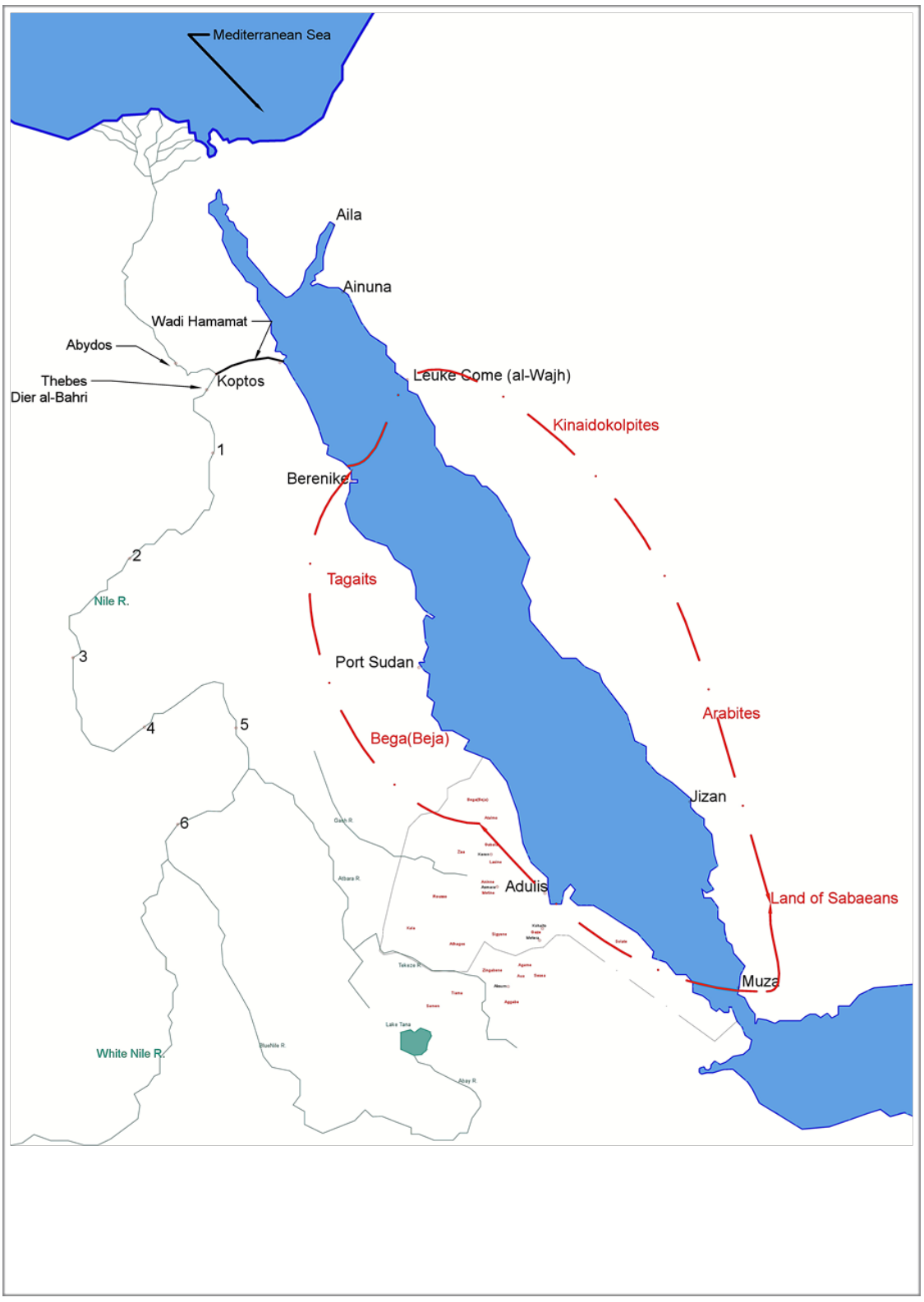

Figure 228 Names of polities across the Red Sea claimed by MA- II

5.3.3 Other Classical text on Adulis' war elephant production

There are other ancient documents that refer to elephants in the Red Sea area. An important one is by Agatharchides, a text that describes transactions between Macedonian kings of Egypt and locals for elephants. Agatharchides was an ancient historian who wrote the book *On the Erythraean Sea* describing the conditions of the Red Sea during the 3rd century BCE. Here he writes:

> *"the Macedonian kings of Egypt had concluded a deal with the local people to supply the king's hunters with elephants" (Burstein 1989; Hendrickx 1984).*

The text points out how "the king's hunters" were provided with elephants by the local people. This statement is consistent with the point made above that Adulis had elephants that could be obtained by Egyptian rulers, rather than Egyptians raising their own in Egypt. The reference to a Macedonian king could be to Ptolemy II, and also to Ptolemy III, who, as noted above, was featured in the MA-I.

A set of documents referred as "royal hypomnemata" (=royal memorandum) provide information that might reasonably link to the Ptolemies, Adulis, and the production of war elephants. For instance, in the text Satyrus identified sites for capturing/obtaining war elephants (Strabo 16.4.5, C769 cited in Burstein 1989). Simmias, who reported on war elephants south of Ptolemais, and Anaxicrates are described in search of elephants as well (Fragment 41 Burstein 1989). They all appear to be agents of Ptolemies II and III. Burstein (1996) notes that Ptolemaic activity in the Red Sea provides a rare example in antiquity of a sustained program of exploration undertaken on a formal

state initiative. Taken together, the areas visited by the aforementioned explorers suggest that their reports provided the foundation for the war elephant deal Agatharchides described (Tarn 1929).

5.4 The Adulite Myth, Rituals and Symbols

At Adulis elephants held an integral symbolic and ideological place that echoes from the past to the present, and is accessible through the expressions of ritual. Until recently, the typical way Eritrean kings were greeted was via bowing on one's knee, striking the ground with each hand in three times in sequence (six times total), then raising both hands to the sky, as demonstrated below (Figure 229).

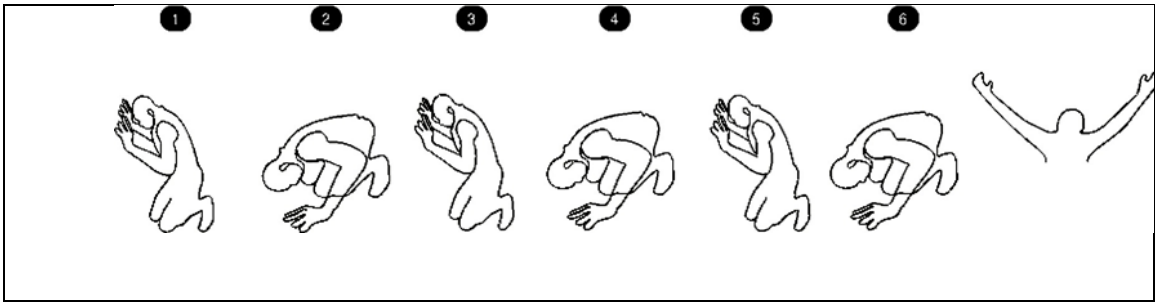

Figure 229 How ordinary folks greet a king in Eritrea

Dating the earliest uses of this practice was elusive until it was observed engraved in sherds that could be dated. The ceramics that depict this ritual in abstract choreography are documented for many ceramics at Adulis' early settlement deposit. These ceramics were excavated by Paribeni (1907) in a 12m-deep pit that revealed earlier phases of occupation of the site. Paribeni (1907) points out that this particular pit had a long stratigraphic sequence characterized by atypical black and micaceous pottery. However, since the excavators, including Pariebeni (1907) and Francis Anfray in the 1960s (Anfray

1963; 1966; 1974), provided no clear stratigraphic sequence at Adulis, their dating was unclear. At the Mersa Gawasis site in Egypt, a similar assemblage of pottery, and in particular, the bag-shaped jars documented at Adulis' earlier settlement, most likely coming from Adulis, were dated in the 2nd millennium BCE (Manzo 2010, 2012).

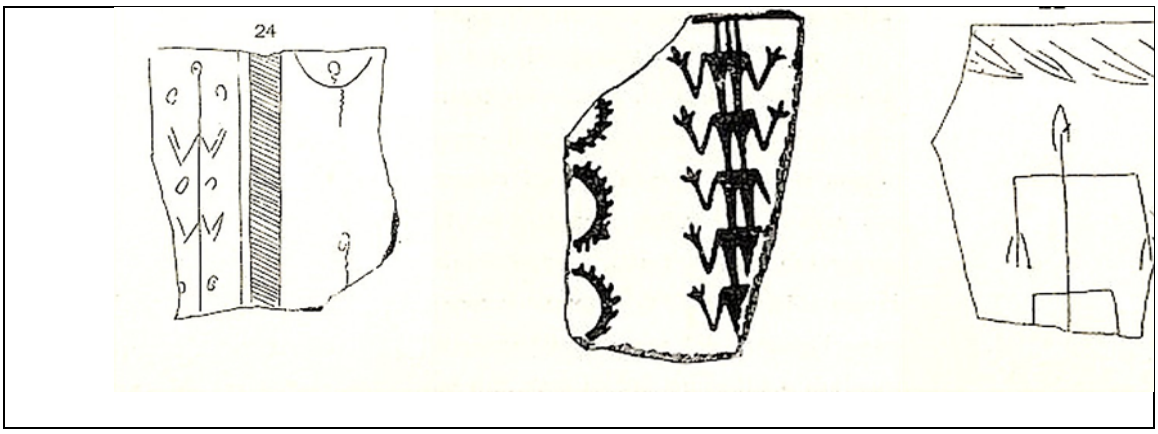

Figure 230 Abstract Choreograph depicted in black micaceous sherds

These sherds are documented at the earliest phases of occupation at Adulis. Note that the first sherd has six tapping the ground and then open arms to the sky, the second and third sherd different representation of the same ritual. Note the anthropomorphic representation of the second sherd (a group) or one individual (third sherd) and other sherds of the same assemblage should have six fingers, three on each side.

In 2011 a joint Italian-Eritrean mission at Adulis studied these assemblages by excavating three areas at Adulis and comparing the Adulis samples with all available ceramics in the highland and Red Sea sites (Zazzaro et al. 2012). By stylistic, technological, and thin section analysis of this assemblage, the researchers have shown a unique ceramic tradition of Adulis that dates to at least the 1st millennium BCE (Zazzaro et al.2012). The name "Adulitan ceramic tradition" was suggested as early as 1907 by

Paribeni, but there was no solid archaeological basis to warrant it. This more recent research (Zazzaro et al.2012) did affirm such an Adulitan ceramic tradition, and provide an archaeological basis and details for this tradition. If Zazzaro et al. (2012) and Manzo (2010,2012) are right regarding an Adulitan ceramic tradition dating from at least 1st millennium BCE, this implies the practice of greeting the kings mentioned above has occurred at least that far in the past. It also implies the presence of a king, and begs for further analysis as to the embeddedness of this symbolism and its possible relationship with war elephants. Consider, for example, the following ritualistic element (FigV-20):

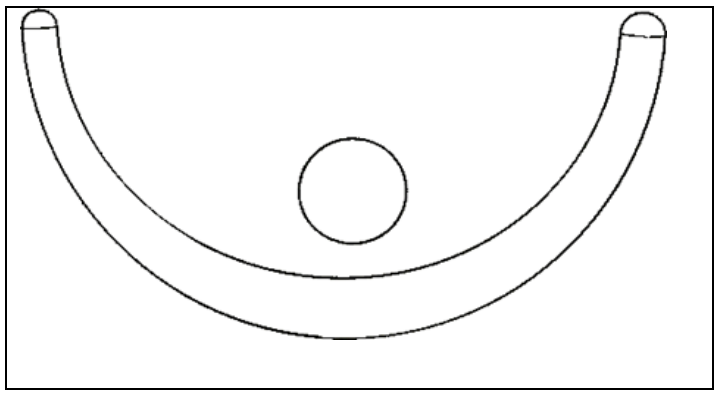

Figure 231 Abstract symbol of raising hand to the sky

This symbol is found in major highland urban centers. It is documented on sites in the highlands that include Keskesse (Eritrea), Tokondae (Eritrea), Metera (Eritrea), and Axum (Ethiopia). It is also found on monuments, coins and murals (Figures 232-237). The symbol appears on Matera's Ge'ez monument (See Figure 232), believed as the first Ge'ez inscription in the region written in an unvocalized Ge'ez alphabet. It is also found in Aksum's fallen stelae (See figure 233); the standing stelae uses different symbols. All coins minted before the Christian era carry this symbol as well, as seen in examples that King Endibus (Figure 234) and King Almiryis (Figure 235) discovered at Adulis. Note the six points discussed above in Figure 235, three on each side. Moreover, there are murals

discovered at Adulis in Temple A (see Figure 237) in the Church of Debre Damo (see Figure 236). While the Figure 237 depicts elephants sparring, the one found in Debre Damo (Figure 236 A) illustrates the heroic act elephants played in slaying Arwe (the monster who kept hostage Abyssinians from traveling in the Red Sea and robbed their produce, their sons, and daughters as tax). Note the elephant's foot on Arwe the monster's throat or trumping Arwe. Figure 236 B seems to depict a role elephants play in chasing away big cats that terrorize livestock and people and finally in Figure 236 C illustrates a likelihood this was done because people beat six times the ground and raised their hand to the sky to get the favor of an elephant to help them with the Arwe problem or all this gave rise to a state-level society with a king who is greeted by the above action.

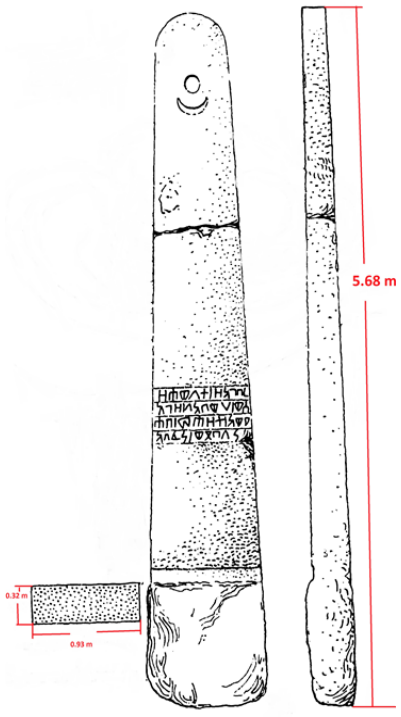

Figure 232 Matera Ge'ez Stelae
Reproduced from Littmann et al (1913)

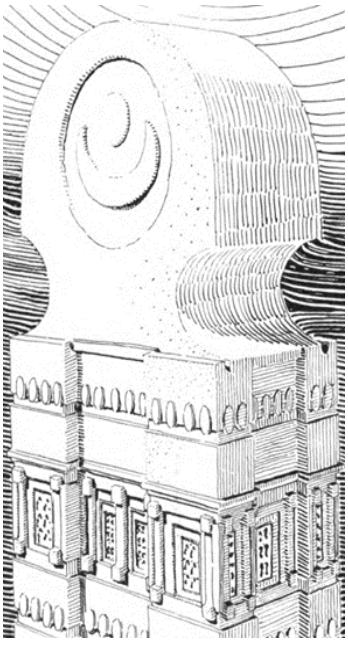

Figure 233 Fallen Aksum Stelae
Reproduced from Littmann et al (1913)

Figure 234 Endibus coin from Adulis.
Image reproduced from (Hahn and West 2016)

Figure 235Almiryis coin.
Image reproduced from (Hahn and West 2016)

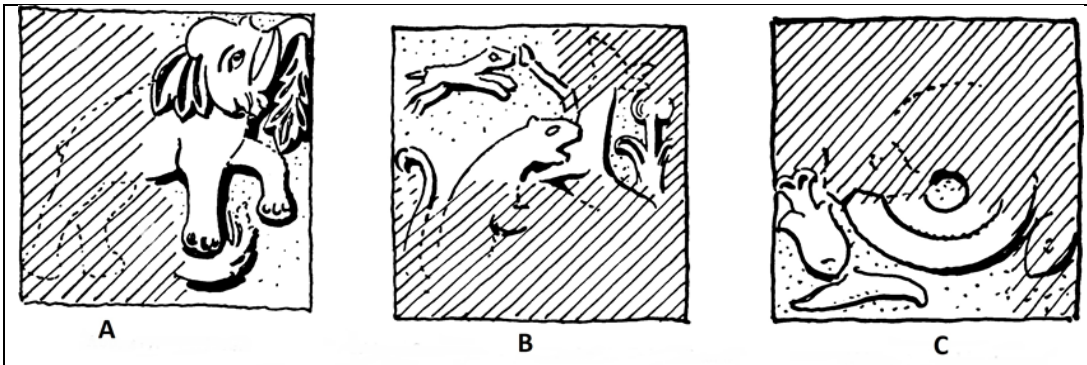

Figure 236 Engraved Elephant Mural of Debre Damo Church.
Reproduced from Littmann et al (1913).

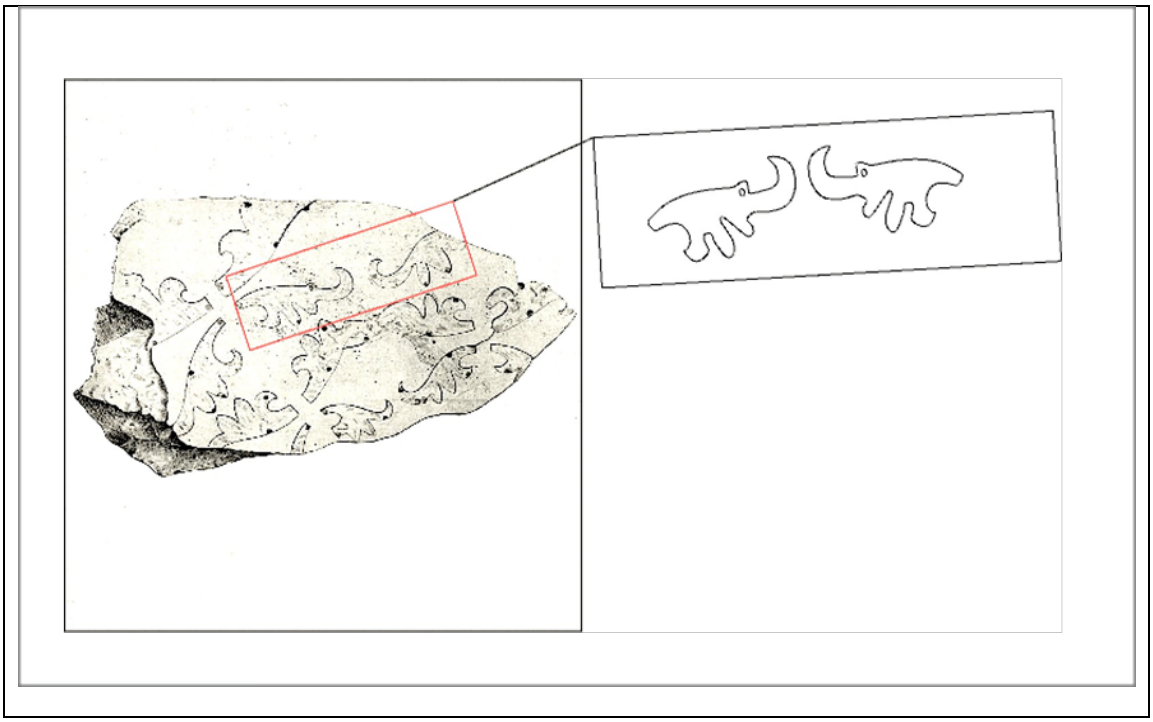

Figure 237 Elephant mural excavated from Temple A at Adulis

5.5 State Origin Oral tradition at Adulis

Every society has stories or narratives known as myths, sagas or legends that recount its origins, significant people, and their deeds. The oral tradition of origin narratives for the Northern Horn of Africa is fairly consistent, but with many regional variations. The oral tradition may be summarized as follows:

> *At the beginning of time a long time ago there was a monster who ruled the Northern Horn of Africa and its name was Arwe (Ge'ez term for a python monster). This monster took young sons and daughters and consumed them; it was the most horrible time. Arwe kept the people prisoners and did not let them travel in the Red Sea. If anyone traveled in the sea (Red Sea) he ate them, inhabited the sea, and went to the land to wreak havoc. Then a hero with different names (Ambelay in the Northern Eritrea, Weynabo in the Center of Eritrea, and Gebgebo in the South) came mounted on an Elephant and torched Arwe the monster in six places and killed it. (Conti Rossini 1928).*

The oral tradition then differs on interpreting the beating of the ground six times and the raising of the hands. Some versions attribute this practice to what the hero Ambelay did to get help from the elephant, highlighting the importance of elephants. In some regions the six ground beatings represent the six places in which the hero torched the monster Arwe to kill it. In either case, elephants played key role in this origin story recounted in the oral tradition

There are many artifacts in the Northern Horn that appear to be material manifestation of this oral tradition. For instance, at a site called Tokondae, there is a stone statue that depicts Arwe with its six limbs (see Figure 233).During 1907 excavation a

gemstone with engraving was discovered that locals identify as the depiction of the hero-Ambelay-who has slain Arwe-the monster (See Figure 241). Arwe is also made of cooked earth (ceramic). For instance, in my 2001 archeological survey that I conducted at Keskesse Valley, I documented a sherd that depicts Arwe (see Figure 239 and Figure 240).

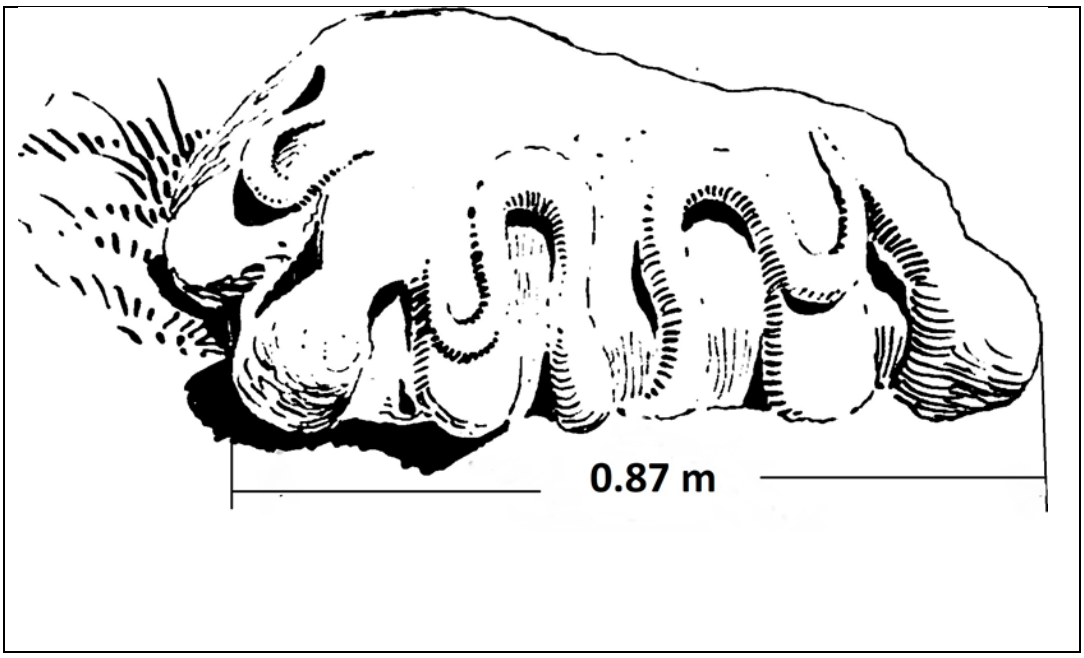

Figure 238 Arwe depicted on a worked stone at Tokondae.
Note it has six limbs three on each side and a tail Reproduced from Littmann et al (1913).

The oral history discussed above does not specifically point to Adulis. However, there are some intriguing clues. For instance, in the oral tradition, the dwelling place of Arwe was on the sea.

Figure 239 Arwe represented in a sherd-Front view

Figure 240 Arwe represented in a sherd Side view

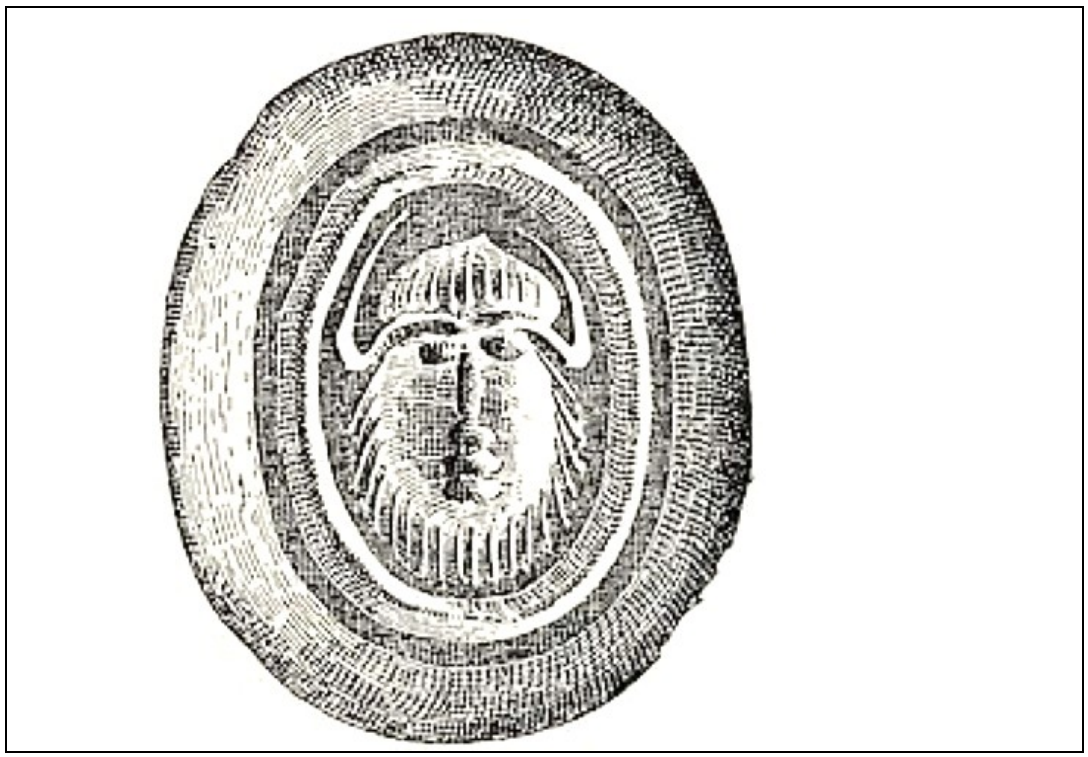

Figure 241 A gemstone ring identified as the depiction of Ambelay

Ambelay is the hero who slain Arwe. Note the head cloth on the figure, this head cloth is also shown on all earlier coins' portrait.

Moreover, if Arwe is to prevent Abyssinians from traveling across the Red Sea, there is a general spatial presumption of doing this from a port on the Red Sea rather than from other hinterland sites. I hypothesize this accidental discovery most likely may help us to unmask the assumptions of the oral tradition and thus assist in revealing the symbolic importance of Adulis.

5.6. Symbolic importance of Adulis

Adulis is important symbolically both locally and beyond. At a local level, the key symbolic importance of Adulis becomes apparent when considering why the author of the MA-II went specifically to Adulis, out of all the prominent places in the Northern Horn of Africa. If the author of the MA-II is right in the claim that he subjugated all polities in the Northern Horn, and a few across the Red Sea, then he could have had the throne erected anywhere. The fact that it was built at Adulis bears great weight.

The regional symbolic importance of Adulis is demonstrated by the name designations used by the author of the *Periplus.* The *Periplus* employed a number of terms to refer to the thirty seven ports it described. All the maritime outlets of states are called *emporion (*port of trade). Three of them – Adulis, Muza, and Aplologos – have an additional label *nomimon* (regulated or legally limited port), a name designation indicating institutionalization. Other ports called *emporion* have the additional labels of *mikron* (small*)* or *topika* (local*)*, which signifies that they were of secondary commercial importance, while other coastal sites were labeled *kome* (village*)* or *hormos* (harbor*)* or *polis* (cities*)* (Bukharin, 2011). The designation of "legally limited port" says that the lives and property of traders were protected by law within ports of trade like Adulis:

> *"some traders went the whole length of a route, all the way down the east coast of Africa to Rhapta or all the way across to India, but ... most stopped short, at Adulis or Muza." (Casson, 1989:15).*

The excerpt above presents a picture where, on one hand, there was safe, predictable, regulated trade in the Red Sea. Here, at legally limited ports such as Adulis and Muza, the lives and property of traders there were protected adequately by a legal system supported of paying taxes. On the other hand, there was unsafe, high-risk, high reward trade outside these ports. According to Periplus, most traders played it safe by stopping at Adulis on the African coast or Muza at the Arabian coast, although some took the risk of traveling all the way to the Indian and African coasts, and onto present day Tanzania.

A review of Adulis' surrounding areas also suggests a place of region-wide significance. I collected about 402 points of latitude, longitude, and elevation to map the Adulis region, and in particular, the Forro sub zone administrative area that goes to about 60 km on the east west axis, and 82 km to the North-South Axis (See V-24). Taking these points trying to plot contour lines led to a familiar shape and representation coming to life, namely, Arwe himself, the monster slain around Adulis. It is for this reason that the author of the MA-II came to Adulis to offer to its gods a throne, either as votive or commemorative, because of Adulis' symbolic importance.

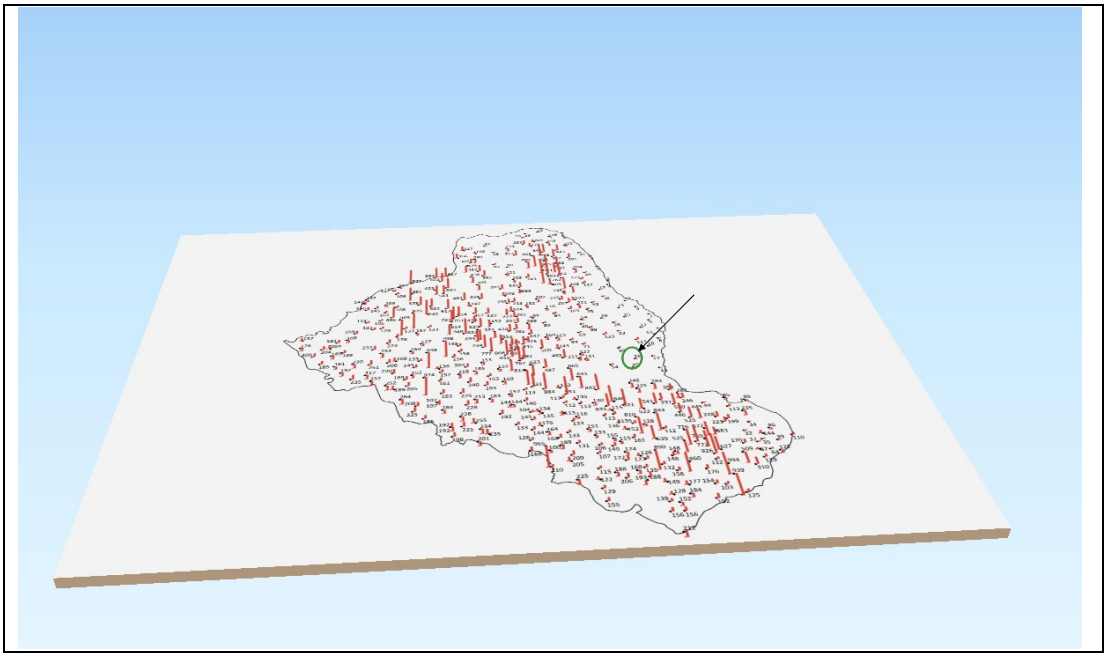

Figure 242 Forro region, elevation points plotted.
Note the location of Adulis on the green circle on the right side.

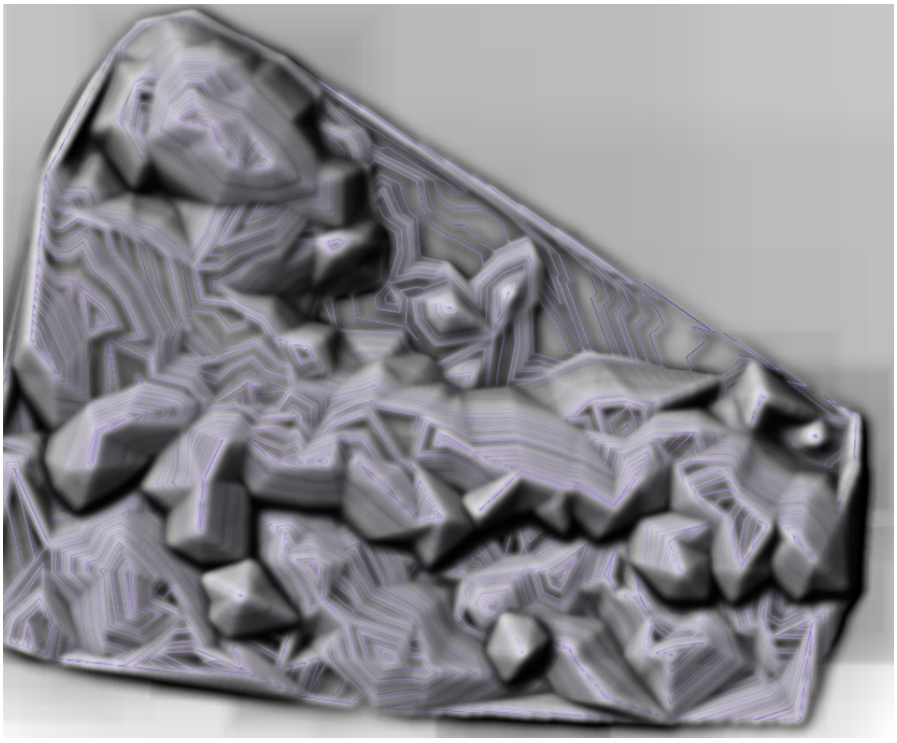

Figure 243 Forro region topography showing Arwe's body
as the oral tradition states

5.7 Modeling War Elephant Production

The subsequent section describes a model for the production of war elephants. It looks at the battle of Raphia, a historical event, to understand the nature and evolution of war elephant production. It then looks at an elephant herd's organization, i.e., how mostly male elephants are extracted for training, and the training and logistics of moving trained war elephants in battle fields such as that of Raphia.

5.7.1 Battle of Raphia

As noted above, the battle of Raphia is dubbed as the most prominent of the Syrian wars (Anglim 2002:127), was one of a series of conflicts between Ptolemies and Seleucids to control the province of Coele Syria (essentially Modern Lebanon, Palestine/Israel, Jordan and Southern Syria). It took place on June 22, in 217 BCE. It was fought between Antiochus III and Ptolemy IV. In this battle, 102 Asian war elephants fought against 73 African elephants. Ptolemy IV who lined the 73 war elephants that came from Adulis carried the day. The battle was described by Polybius (an ancient writer) (Polybius 1922-1927; Tarn 1975:127)

> *"The armed crews of the elephants put up a beautiful fight and the elephants themselves even finer one, shoving with all their might and clashing head to head. For the way elephants fight is this: with their tusks interlocked they press against each other's heads, circling, till one, overpowering the other,*

pushes his trunk aside and gets on his flank; then he jabs him with his tusks as bulls do with their horns."

From MA-I and other classical texts discussed above, there is an agreement among scholars the elephants that combated at Raphia against Asian elephants came from Adulis. We know Ptolemy IV acquired more elephants by the end of the day ca. 154 (73-16=57 African, 102-5=97 Asian, Total=154) (See Figure 244). We also know more of Adulis' war elephants were killed at the battle than that of the Asian war

	Ptolemy IV	Antiochus III
War Elephants	73 African War Elephants	102 Asian War Elephants
Cavalry	5000	6000
Infantry	70,000	62,000
Loss	Casualties	Casualties
War Elephants	16 killed at the battle	5 killed at the battle the rest taken by the Ptolemies
Cavalry	700 horses	300 horses
Infantry	1,500	10,000

Figure 244 Battle of Raphia data,
Reproduced from Kisteler 2006; Polybius 1922-1927; Tarn 1975.

elephants, 16 versus 5. A majority of the Asian war elephants were captured by the Ptolemies (97 of them). What we don't know is how Adulis' war elephants

transported to the battle place. Next, the production of a war elephants from birth to war is modeled.

5.7.2 Elephant's Capture for warfare training

Forest elephant (*Laxodonata cyclotis*) herds have a matriarchal organization. The male elephants leave their natal group at ages 13-14. These males either roam solitarily or join other male elephants as kind of bachelor group. Elephants do not have natural enemies. In the 17th century, following the invention of the gun, humans become the most consequential threat. Females in a herd have more responsibility for raising, feeding and protecting the young, and while this is occurring, the males have plenty of opportunity to join other males in activities like sparring, where they acquire battle skills and self-understanding. This group of loosely aggregated male elephants is the primary target for warfare training. In modern times, male elephants are also targeted for ivory because of their sizable tusks.

Cosmas, an Adulis resident between 518-523 ACE, provides valuable clues as to how the Adulites acquired elephants. In his *Christian Topography* book Cosmas states:

> *"The Abyssinians do not tame elephants as do the Indians; but should the king wish to have one or more, they capture them and subject them to training. Now the country abounds with them and they have large tusks which are exported by sea from Adulis even into India and Persia and the Homerite country (Middle East) and the Roman dominion" (McCrindle 1897:372).*

Three crucial points can be inferred from the above quote. First, the two war-elephant- producing regions, the Northern Horn of Africa and India, were distinct in the way they approach war elephant production. India tames, but the Northern Horn of Africa

does not. Second, war elephant training is a king's province, and only kings have legal power over this ancient warfare technology. Third, as Cosmos indicates, there were plenty of elephants, most likely trained war elephants, around Adulis where he resided. The last point regarding abundant war elephants around Adulis perhaps explains and reinforces strongly the material observation of all buildings at Adulis (see chapter 3), which are more than 2 m at least elevated from the ground. This is an adequate height to have above the ground if elephants are nearby.

5.7.3 Elephants use for Agro-Pastoralists

There are many uses of elephants, besides war; elephants are very helpful to Argo- pastoral communities. Elephants consume many bushes and trees, which can make a farmer's life easier by clearing bush for farming. Elephants do not eat grass, and thus do not compete with livestock. Clearing the bushes is, in fact, further advantageous in the Agro-pastoral subsistence pattern because big cats will not be nearby, as elephants will chase them away and destroy their hiding places. Besides, elephants are a tremendous source of fertilizer for farmers, helping to quickly restore soil fertility. An elephant's alimentary system digests less than half of the food that is eaten (200-300 pounds of fodder/day); the rest is deposited on the ground. A calculation for the frequency of evacuations resulted in urination every two hours at 5-10 liters every time, and defecation once every 100 minutes, five to seven lumps every occasion, which means evacuating 250 pounds per day (Adams, 1981). In this way, Agro-pastoral subsistence patterns are augmented by the continuing presence of elephants. Elephants ably assist farmers with simpler access to more farming land, natural fertilizer, and protection from threats, without posing a threat to the resources used by humans. What

else could so unquestionably make the life of an Agro-pastoral community in antiquity easier than having an elephants around?

5.7.4 Training Elephants for war

There is no definitive guide on how war elephants were trained at Adulis. Although Ge'ez manuscripts from the Adulis classical era might have been useful to provide bits and pieces of information, accessing these sources proved to be too difficult. This section is based on an interview that I conducted in Eritrea with community members that appear to know about elephants. A direct historical approach is used for initial approximation in the following descriptions.

Male forest elephants have two conditions that can be used or abused to train them for warfare. First, they are more "touchy-feely" than female elephants, the latter being more "strictly business" about protecting and feeding the young. Observed while drinking water, a male group will intertwine their trunks, or put their trunks over another elephant's head, or place their ear over another head, etc. This need for physical contact from other males and humans would enable them to establish a bond with humans. Once this bond is created, then this bond can be manipulated to train the elephants as tools of war.

The second trait pertinent to warfare training has to do with the ability of young elephants to learn and obey. Young elephant males need to learn from older elephants, including an ability to fight. Males are taught to fight even at a very young age in the form of playful fighting. Older elephants, by getting on their knees, spar with the young. This enables the younger elephant to evaluate its strength against other males in a hierarchical male group setting. The hierarchy of elephants determines which elephant

drinks water first, etc. Thus the older males are likely key for a younger bull's status or place in a hierarchy. If the trainers establish a bond with the older elephants, then by default they create a relationship with the associated young bulls. In this way a group of trained elephants may take shape. Human trainers serve as substitutes for older male elephants by providing social contact, setting up sparring matches with other elephant males of the same age, and supervision from other older males that are already trained and continuously working on ways to improve fighting skills. Thus the merit-based status within the male elephant hierarchy can be routinized and simulated.

The mahout (rider) is of course highly relevant to the martial training of elephants. The mahout sits atop an elephant's back just behind the animal's ears (See Figure 245). Most mahouts have some object to tap the ear of an elephant as a way of commanding the elephant, the ear being a sensitive part of the animal. Taps are associated with doing specific actions, and various objects can be used to produce the taps. At Adulis bronze artifacts used by mahouts were unearthed in 1907, and are now available at the Museo Africano di Roma in Italy (see Figure 246, and Figure 247). These include two bronze tap rods, most likely one for a right-handed person (see Figure 246) and another for a left-handed person (see Figure 247).

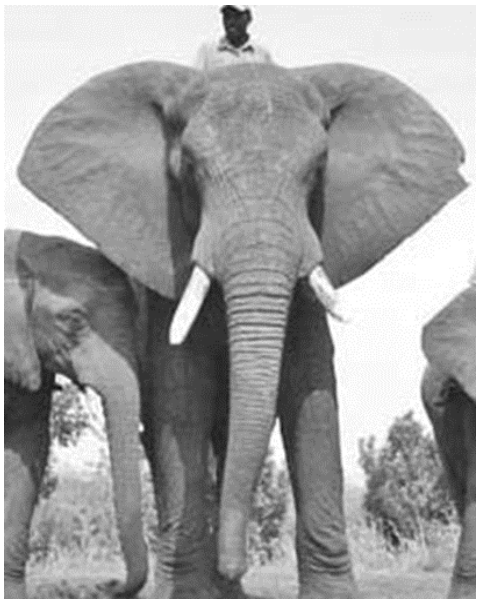

Figure 245 A mahout position.
Note the proximity to an elephant ear. Image source Mpumalanga Tourism, South Africa.

Figure 246 Mahout tap-rod from Adulis For a right handed person
Housed at Museo Africano di Roma-Image Source Zazzaro 2013

Figure 247 Mahout tap-rod For left handed person
Housed at Museo Africano di Roma-Image Source Zazzaro 2013

These two artifacts are catalogued in a 1987 inventory as 5138-13 and 5138- 11 respectively.

5.7.5 Logistics of Transporting War Elephants across Red Sea

Several important questions come to mind when considering the viability of a war elephant force in the region: How were trained elephants transported to distant places like Egypt, and then taken to battle, for instance, to Raphia? What routes and means of travel were possible, how much space was needed aboard vehicles, and could elephants even withstand such a long journey?

The most likely route makes use of sea transportation. There is no evidence for how many elephants were boarded on a ship, but such transport certainly occurred. In fact, a new ship design was developed specifically for transporting war elephants for Ptolemaic use (Casson, 1993). Scholars have approximated the space needed on a ship to transport elephants using a point of comparison as follows–40 horses can take up the space required for 200 people on a ship, while the space of 40 horses is required for a single elephant.

The most likely travel route would be a relay involving four ports on the western shores of the Red Sea (See Figure 248). The first trip would be Adulis to Ptolemais Theron, then from Ptolemais Theron to Berenice, and then from Berenice to Myos Hormos. These stations were well prepared for such cargo. As noted by Casson (1993), they were:

> *"bases fitted with elaborate facilities and the staffing of them with personnel that included many who had to be recruited and specially trained for their jobs launching a fleet of boats of a new design*

to bring the captured beasts back to Egypt. Within Egypt itself it involved the establishment of staging areas and permanent stables; there seem to have been staging areas around Koptos and in the Fayum, and the stables may have been in Memphis"

An estimation for the duration of the trip can be calculated from the account of Diagenes, a navigator during Ptolemaic times who sailed the African coast up to Raphta (essentially the Tanzanian coast). He provides a rate of travel by noting that a trip of a day and a night's navigation (a 24-hr. period) covered 1000 stadia. Since 1 stadion equals 185 m, 1000 stadia equal 180 km, or 97 nautical miles per 24 hr. day (Schlichter 1879). Given this rate, the time for traversing the whole elephant-transport route can be found from the constituent distances. According to *Periplus*, the distance between Adulis and Ptolemais Theron is 3000 stadia (3 days at Diagenes' rate), the distance between Ptolemais Theron and to Berenice is 4000 Stadia (4 days), and finally the distance between Berenice to Myos Hormos is 1800 Stadia (nearly 2 days). In total this amounts to about nine days of travel on the Red Sea. This does not include time taken for rest at a giving station, a topic for further research.

Figure 248 The four ports on the Red Sea for transporting war elephants.

5.8 Conclusion

This chapter has discussed elephants as tools of war and Adulis' role in the production of war elephants during classical times. It did so by enumerating the three clearest lines of evidence that have shown Adulis was producing war elephants. The ivory artifacts excavated from the site are identified as *Laxodonata cyclotis,* an extinct species of elephant in the Northern Horn of Africa. The identification of ivory artifacts is augmented by mummies wrapped in elephant skin and by architecture at Adulis. Then, by looking at textural evidence from monuments documented at Adulis known as MA-I and MA-II, and other classical texts, the chapter has argued for a complex regional political economy of Adulis, the Northern Horn, and the Red Sea. Next, by tapping into material representation, oral tradition, and ecological data, the chapter has demonstrated the symbolic importance of Adulis locally and regionally due to the production of war elephants.

Finally, I modeled the production of war elephants by looking at a known battle, the battle of Raphia, in which Adulis-based African war elephants warred against Asian war elephants. The analysis of the Battle of Raphia provided a micro-process reflecting the macro perspective of the boarder context of Adulis' complex and fluid regional political economy. This chapter thereby contributed to the broader theme of assessing the long-term perpetuation, prosecuting, and reproduction of structures of domination and warfare by reviewing an integral component, the martial use of elephants centered at Adulis

CHAPTER 6

AROMATICS TRADE AT ADULIS

6.1 Introduction

Out of the several resins that played a vital role in humanity's ethnobotanical medicine–including pine, copal, styrax, and dragon blood–none are as universally distributed and filled with economic and ideological significance as frankincense and myrrh. Frankincense and myrrh were imported to be used as temple incenses and essential medicines. These resins were prized possessions in the ancient world, on a par in value with many precious gems and metals (Crow 2013). The wide distribution of frankincense and myrrh was due to trade that begun during antiquity. The aromatics trade was of great economic importance to those who lived in the ecological niches where the trees grew, to those who ran the trade toward its diverse markets, and to those who controlled the trade routes. To users, these resins yielded well-being, status, identity, and ideological (ritual) value. A trade in frankincense and myrrh (a native in the Horn of Africa) via the Red Sea, and the role of Adulis in this trade, is the focus of this chapter.

This chapter analyzes the motivation, point of origin, taxonomic identification, and general trade route of the aromatics trade – principally in frankincense and myrrh – during antiquity. After considering current theoretical and methodological debates regarding this trade, and reviewing evidence, it suggests that the region of eastern Sudan, Eritrea and Northwest Ethiopia appears as the most likely origin in a trade taking place through the inner coastal channels of the Red Sea. The analysis incorporates the importance of considering religious, political, and cultural influences in motivating and

configuring the trade, and it signals caution that modern myths and disciplinary biases should not cloud the accurate assessment of this significant exchange.

The discussion below shows that scholars investigating the aromatics trade have based their individual assessments on several broad lines of evidence, but the most common source of evidence is ancient texts. This dissertation, however, incorporates archaeological data from Red Sea sites and the Horn of Africa, geographical and nautical considerations, biophysical and chemical analyses of organic remains combined with botanical and taxonomic science, and architectural patterns. Debates about the nature of the trade often hinge on the weight scholars have given to a particular theoretical or methodological approach or evidential finding, and no one discovery has proven definitive to date. What this chapter brings forth is a narrowing of the plant species of interest–beginning with about ten–and an identification of the four true frankincense varieties and their biogeography. It focuses on the two most dominant plant species based on archaeological findings in the region to establish the point of origin of the aromatics trade.

I trace two important lines of evidence: First, every botanical and taxonomic identification done on ancient frankincense recovered from the archaeological record in Egypt and Mediterranean region points to *Boswellia papyrifera* (For a review see Atta ur, et al. 2005; de Rapper et al. 2012; Tucker 1986), which only grows in the Adulis region (See Figure 250). Second, during classical antiquity, there is a shift from *Boswellia papyrifera* (Adulis region) being dominant to *Boswellia sacra* (native to Yemen and Oman), as demonstrated by the archaeological record. Scholars have explained this observation as a shift in preference among ancient frankincense consumers (Tucker 1986,

de Rapper et al. 2012). Egyptian consumption of these aromatics for secular and religious purposes was a significant factor driving this trade.

All the evidence indicate that aromatics trade was associated with Punt. Since Adulis is considered either Punt or part of the Punt polity–a significant polity and trade network in the Red Sea during the Egyptian era that carried over to classical antiquity–assessing the aromatics trade becomes essential to this dissertation's thesis regarding Adulis' centrality. Thus, the Adulis trade in aromatics may have constituted a significant basis for its, at times, relatively autonomous standing within the network of regions in the Northern Horn of Africa and the Arabian Peninsula.

The chapter will review the present understanding of the ethnobotany of myrrh and frankincense, their place the social lives of Egyptians and the Red Sea peoples, and the origins of this trade. What will emerge is the likelihood that Adulis was well-located to be a leading center for the distribution of these aromatics throughout Northeast Africa and the Red Sea communities during antiquity. This chapter's main approach concerns locating the trade in space and time, but it begins with describing the aromatics themselves along with factors motivating the trade.

6.1.1Aromatics and the Basis of the Trade

This consideration of "aromatics" focuses on two plant-derived products, frankincense and myrrh, although the term also can include kohl, which is mineral based. All three did have, and continue to have, political, economic, and cultural value.

Frankincense and myrrh are obtained from trees and shrubs of the genera *Boswellia* and *Commiphora*, respectively (Lemenih M. and Teketay D. 2003). The aromatics are produced from the fragrant gum resins of these species which grow on both sides of the Red Sea (Herzog 1968; Kitchen 1971; Lemenih M. and Teketay D. 2003). The aromatics are harvested by scraping the bark of the tree, allowing the resin ducts to ooze a thick liquid. These "tears" harden into translucent clumps in about a week, and are ready for export 10-20 days after collection (Bandes 1988).

Frankincense, an important incense of the ancient world, was implemented for domestic and religious purposes. Myrrh is a reddish-brown color, bitter to the taste, less aromatic than frankincense, and was traditionally used in anointing oils, as a fumigant, in cooking, and in embalming. Myrrh was also far more expensive than frankincense, but the demand for frankincense was greater in antiquity (Bandes 1988). As medicines, aromatics have been widely used in the traditional medicine of several ancient and contemporary cultures for treatments of bronchitis, coughs, diarrhea, dysentery, female reproductive disorders, infections/wounds, inflammation, leprosy, mouth ulcers, typhoid, tumors, viral hepatitis, and other ailments (Lemenih M. and Teketay D. 2003).

Kohl is a powdered galena (Adamson 1982) often mixed with frankincense. It is believed to have been in use since Protodynastic Egypt (3100 B.C), and has been used as a multi-purpose eye cosmetic serving to protect the eyes against the glaring rays of the

sun, as a guard against eye aliments, and to shield its wearer against malevolent spirits (A.D. Hardy 2006; Bradley and Creagh 2006). It is widely used in northern Africa, the Horn of Africa, the Middle East, and Asia.

The reference to protection against malevolent spirits underscores the religious value held by aromatics in the region, which was a key element motivating their popularity. While the role of frankincense and myrrh in the Christian biblical magi story has popularized them as exotic, elite luxury goods, and indeed are treated as such today, there are reasons against projecting this 21st century image to their role in ancient trade. A growing set of literature and archaeological evidence indicates that, because these two sap resins were crucial for everyday religious, medicinal, and funerary practices, they are better understood as regional necessities in antiquity (Sidebotham 1990).

Therefore, the aromatics trade is best understood as an exchange in necessities rather than in luxury items, which of course has important implications for their accessibility and distribution (Paul, et al. 2012; Tucker 1986). One way to establish clarity in the case of plant-based aromatics is to carefully consider biomarkers of each species.

6.1.2Taxonomic Identification

As a preliminary note to looking at the data of this chapter, the question of consistent nomenclature deserves mention. In some instances, aromatics have been commonly described by geographical or trade name rather than a specific scientific name (Assefa, et al. 2012). These descriptions have created confusion in the past. Quoting and requoting erroneous conclusions have perpetuated misunderstanding into the present

(Paul, et al. 2012; Tucker 1986). One way to establish clarity in the case of plant-based aromatics is to carefully consider biomarkers of each species.

Botanical and taxonomic identification and classification aid in generally locating the plant-based aromatics geographically and temporally. Frankincense and myrrh can be harvested from a multitude of species that are mainly available in northeast Africa (Sudan, Eritrea, Ethiopia and Somalia), the Arabian Peninsula (Yemen and Oman) and India (Paul, et al. 2012). About ten species of trees and shrubs have been documented so far, and all of them are distributed in tropical parts of Africa and Asia (Atta ur, et al. 2005). Four species are considered as a true frankincense trees for grade of aroma in their resins. These are *Boswellia papyrifera (*also known as Elephant tree*), Boswellia sacra (*synonymous with *Boswellia Carteri), Boswellia frereana (*also known as African elemi*)* and *Boswellia serrata (*also known as Indian frankincense).

However certain species have predominated in the past, as evidenced from the archaeological record, as well as in the present (Tucker 1986). *Boswellia sacra* and *Boswellia frereana* are the main sources of frankincense today. Most relevant here, *Boswellia papyrifera* was the principal source of frankincense during antiquity (Atta ur, et al. 2005; de Rapper, et al. 2012; Tucker 1986) while *Boswellia sacra* was the main source during Classical times. *Boswellia papyrifera* is native to the Horn of Africa and grows in Sudan, Eritrea, Ethiopia and Uganda (Hairfield 1984 et al.; Hepper 1969; Lemenih M. and Teketay D. 2003; Tucker 1986). Furthermore, *Boswellia serrata* is native to India (See Figure 250).

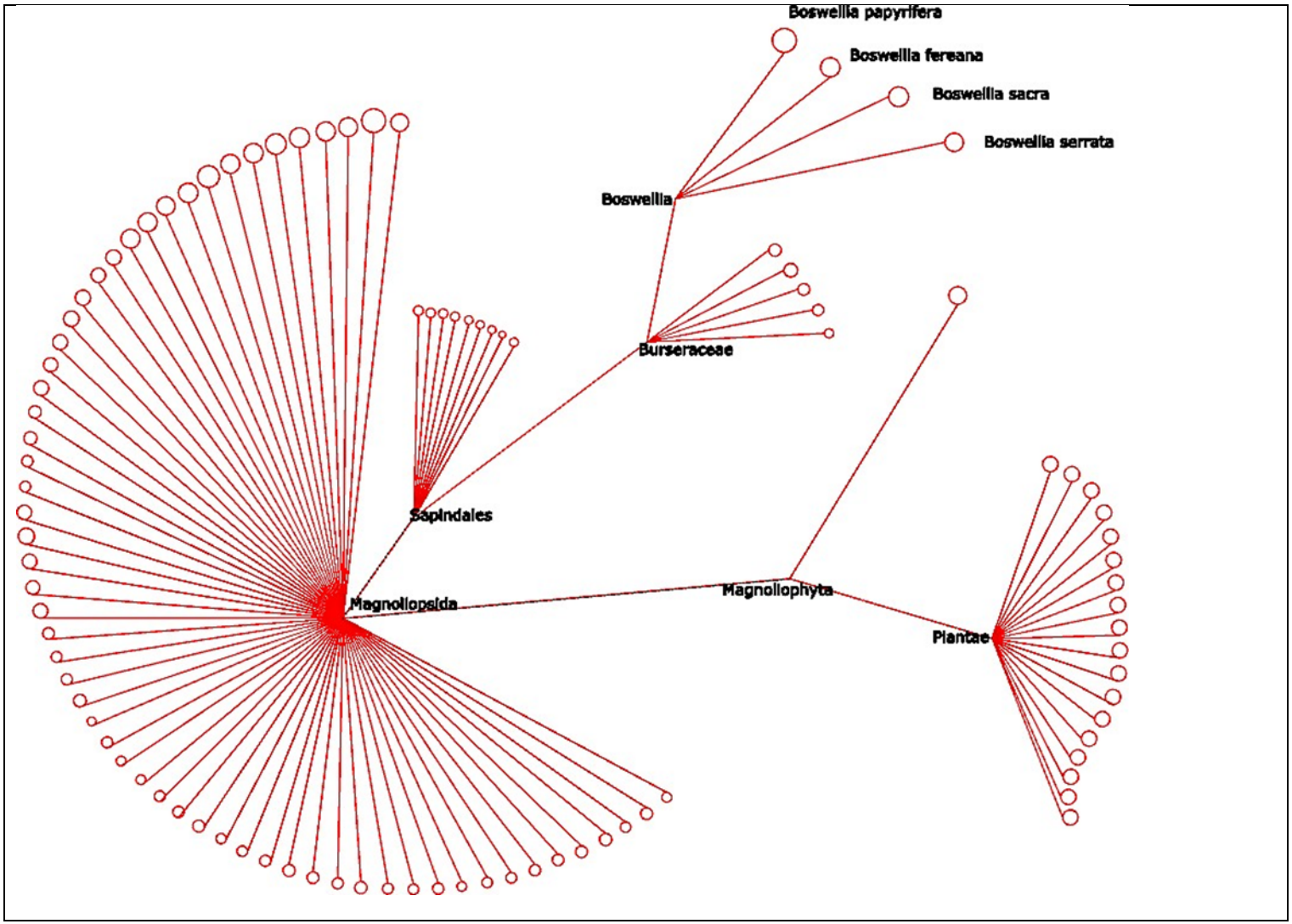

Figure 249Taxonomic identification and classification of Boswellia trees

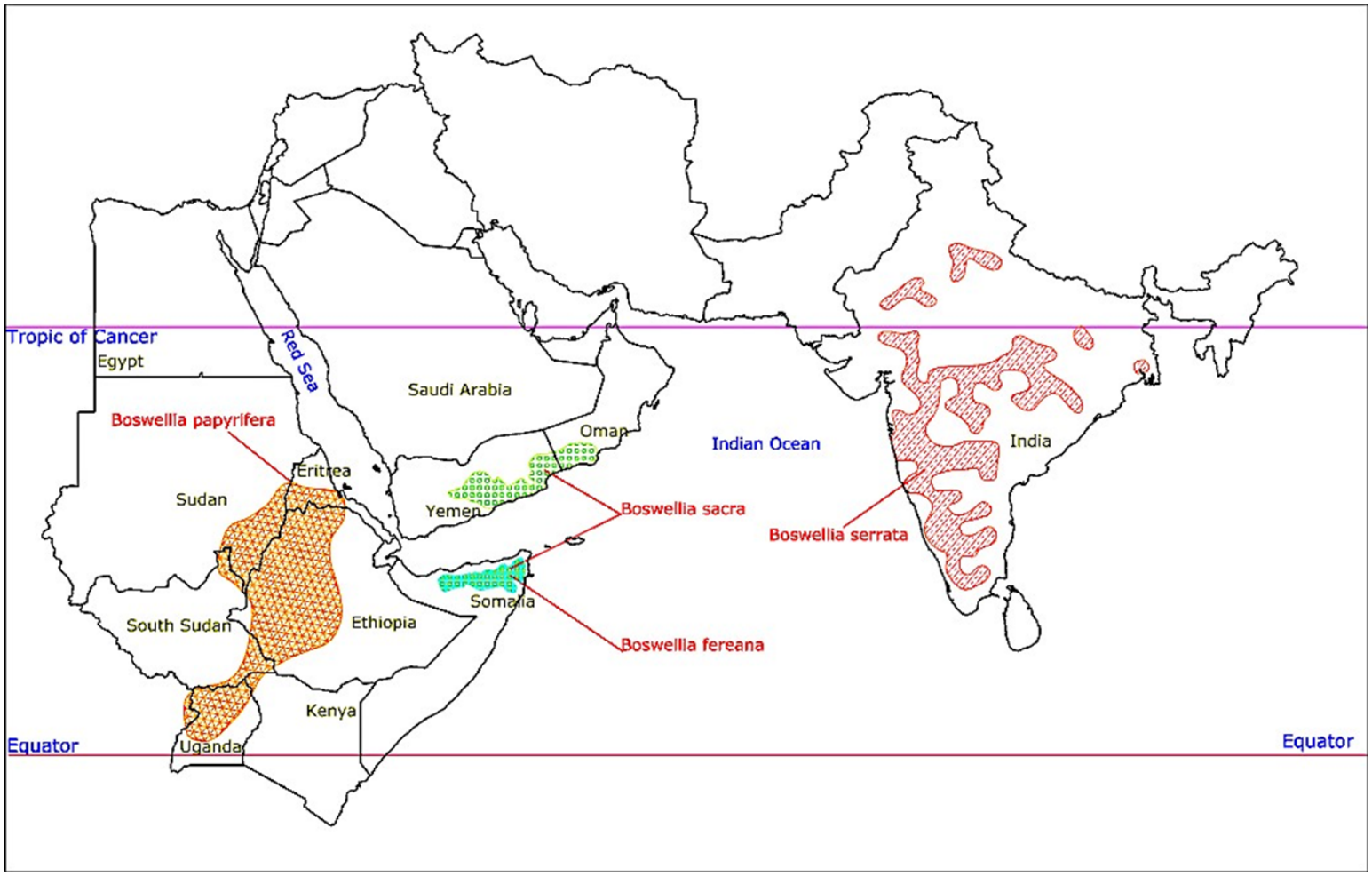

Figure 250 Distribution of Boswellia trees in Northeast Africa and Asia

6.2 The Puzzle of Punt

Much of the energy surrounding locating the origin of the aromatics trade has centered on locating its nominal origin, Punt. The name Punt (pronounced 'poont') is a geographical designation that was branded as a source of extensive aromatics during the Egyptian era of influence by Egyptian scribes (Shaw and Nicholson 1995). A variety of locations for Punt within the possible Egyptian range of influence have been proposed by scholars over the last century. These regions range from Syria and Sinai to the Eastern Desert, the Ethio-Sudanese borderland, Eritrea, northern Somalia, southern Arabia, east Africa as far south as Zimbabwe, and to the east as far as India (Herzog 1968, Kitchen 1971, Phillips 1997).

Naville (1893, 1926) held Punt to be a far-ranging term covering large areas neighboring the Red Sea, and actually referring to a people rather than to a place. Most other scholars have preferred more limited locations. Though there is general agreement that Punt was important for the aromatics trade in the Egyptian era, there is no agreement on its location. It is worth noting that some scholars do consider the location around Adulis to be a possible location for Punt. Among the many and diverse opinions that made their way into the literature on Punt are the following:

> *"The fabulous land of Punt, the region of fresh myrrh on the Arabian and African coasts south of the Red Sea." (Wilson 1951: 127)*
>
> *Punt was "probably the African coast opposite Aden" (Gardiner, 1961: 37).*

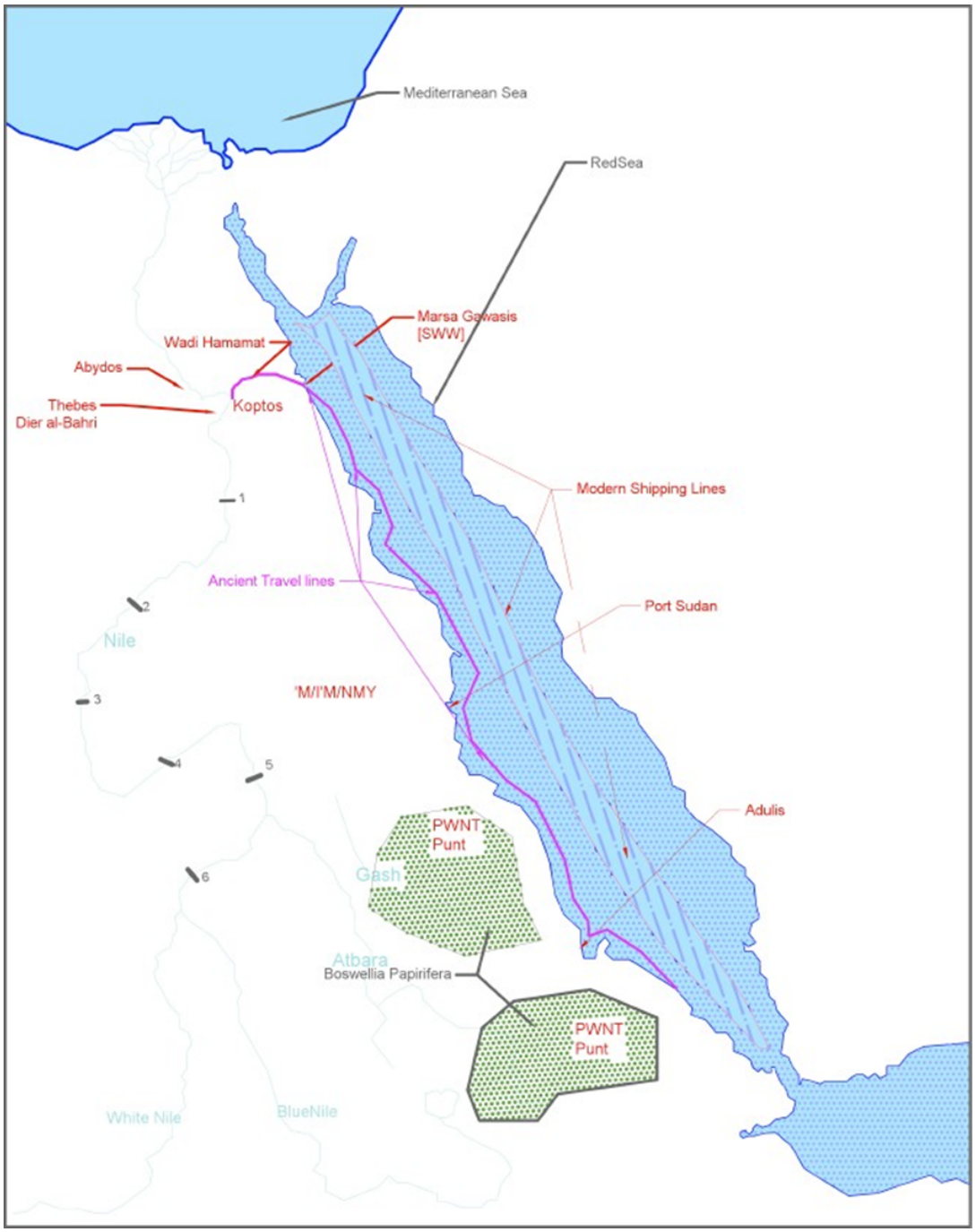

Figure 251 Location of Punt, Red Sea ancient travel lines and site names

Punt was "an African land, possibly on the shores of the Red Sea" (Hallo and Simpson 1971:263).

"Punt extended from the shore of the Red Sea inland into the eastern Sudan" (Lichtheim 1973:27).

"The location of Punt is not firmly established . . . but it is most likely to have been in the region of modern Eritrea or Somalia" (Baines and Málek, 1980:20).

"The most likely area is the Sudan-Eritrea border zone, rather than further along the coast and even through the straits of Bab el-Mandeb" (Kemp, 1983 p. 136–37).

"Punt included the coastal plain and the hilly country east of it between latitudes 17° and 12° N, but little of the semi desert and savanna lands east of the hills"(O'Connor 1983:270)

Punt is "at the southern end of the Red Sea," "in East Africa." (Redford 1992: 434,452)

"The land of Punt is thought to have been situated somewhere between eastern Sudan and northern Eritrea" (Grimal 1992:76–77).

Egyptian textual reference gives Punt a long history. All the available textual and archaeological evidence on Punt comes from the Middle and New Kingdoms, ranging from c. 2500 to 1100 BCE. When considering evidence, although a range of products need be considered in understanding the aromatics trade (Kitchen 2002), almost all available references on Punt consistently mention frankincense and myrrh as strategic resources. Other products from Punt include leopards, baboons, black rhino, and precious items such as gold and ivory. Baboons and leopards were viewed as sacred by the pharaohs, and were taken as royal pets. The pharaohs organized expeditions to Punt, received delegations from Punnites, and pharaonic scribes recorded Punnite gifts and commercial products in detail (see Figure 252). However, none of the scribes revealed Punt's actual location (Perlman 2010).

In fact, the question of locating Punt is in fact as old as Egyptology (Kitchen 1971). Several claims have been made as to its location. We next provide a discussion of locating Punt in the literature.

6.2.1 Arabia

From the 19th to the early 20th century, Egyptologists consistently argued that Punt was in Arabia. Early Egyptologists who held this view include Sir J.G. Wilkinson and Brugsch, who placed Punt in southern Arabia (Herzog 1968). They based their arguments on textual reference, specifically, a statement from Herodotus, writing in the 5th century, that frankincense and myrrh trees grew only in Arabia. But the credibility of Herodotus' description is called into question by Herodotus also writing that Punt contained secret groves where nameless workers gathered the priceless sap, and were guarded by venomous flying serpents. Also, Herodotus specifically uses the placename "Arabia Felix" ("the blessed Arabia"), which raises questions that it might refer to a place, real or mythical, distinct from Arabia.

6.2.2 Somaliland

Following his discovery of the Deir el Bahri scenes, and influenced by Schweinfurth's anthropological work in Africa, Mariette argued that Punt should be located in East Africa, specifically Somaliland. He noted the appearance of giraffes, native only to Africa, in reliefs (Herzog 1968, Kitchen 1971). In time Maspero would concur, and even Brugsch amended his opinion to point to an African locus for Punt (Herzog 1968). Over the following years, others sought to set Punt north of Somaliland. For example, Krall argued for South Sudan and Eritrea, while others argued Punt was further south on the east African coast (Kitchen 1971).

6.2.3 East Sudan and the Eritrean Coast

Although Punt was once identified with the region of modern Somalia, the strongest arguments support its location in southeastern Sudan or the Eritrean region. In a review of Knapp and Bernard's volume, Kitchen (1991) challenges ongoing literature equating the land of Punt with Arabia and modern Somalia, declaring:

> *"The hesitant equation of the land of Punt with 'the Somali coast or with coastal Arabia opposite of it' is out of date."*

In his 1968 compact monograph, where Herzog surveyed the question of Punt, he makes a compelling argument that Punt was in East Sudan, based on several factors, including hydrology, fauna representation, and the distribution of incense-bearing flora. Herzog integrated ethnographic arguments, noting that pre-Old Kingdom Nubian relations with Egypt could be seen ethnographically, for example, in the use of throw-sticks (Herzog 1968). Later Herzog amended his view to include the Eritrean coast, after Dixon's (1969) work on Egyptian flora representation. Kitchen would also later refer to Hepper's (1969) work on Arabian and African incense-bearing flora (Kitchen 1991) in making a similar claim. Shaw and Nicholson looked to the way flora and fauna in these regions correspond best with those depicted in Egyptian reliefs (Shaw and Nicholson 1995:231).

Fattovich (1993: 15) contends the problem of Punt is primarily archaeological, and argues:

> *"Many scholars including myself presently agree to locate Punt in Eastern Sudan and Eritrea, from Port Sudan to the Gulf of Zula, with a hinterland possibly stretching along the Ethio-Sudanese borderland as far as the middle Atbara valley."*

He suggests not enough serious effort has been made so far to investigate the Punt problem from an archaeological point of view. Exceptions, like the 1970's project of Lecant and Labroserousse, unfortunately gave no appreciable results, and Fattovich dismisses the Gli-Artagnan 1984 project that sailed around Africa, supposedly following the Egyptian route, as only interesting from a sportive point of view. Fattovich argues that ultimately only direct Egyptian evidence going back to Pharaonic times could rest the Punt problem. Unfortunately, direct archaeological evidence of trade goods is scant. Whenever one tree of Boswellia (incense tree), one elephant, and one source of gold have been recorded, extravagant claims have been made about Punt (Fattovich 1993).

Some scholars claim that textual information could be sufficient to satisfactorily locate Punt. For example, Phillips (1997:438) notes that, for identifying Punt,

> *"The textual records that have survived, when their information is pooled, provide us with enough information to suggest strongly a generalized area within the eastern coastal regions of modern Sudan south of modern Port Sudan, Eritrea, and northern-most Ethiopia, or somewhat further inland."*

An immediate line of inquiry is to consider where frankincense and myrrh source plants have been found to grow. The term "incense" refers to the sap resin obtained from plants of the *Burseraceae* family, and "frankincense" specifically from the subspecies *Boswellia* (Hepper 1969, Kitchen 1971). Myrrh can come from either species *Commiphora* or *Balsamodendron* (Kitchen 1971). Various members of *Boswellia* and *Commiphora* are to be found on both sides of the Red Sea.

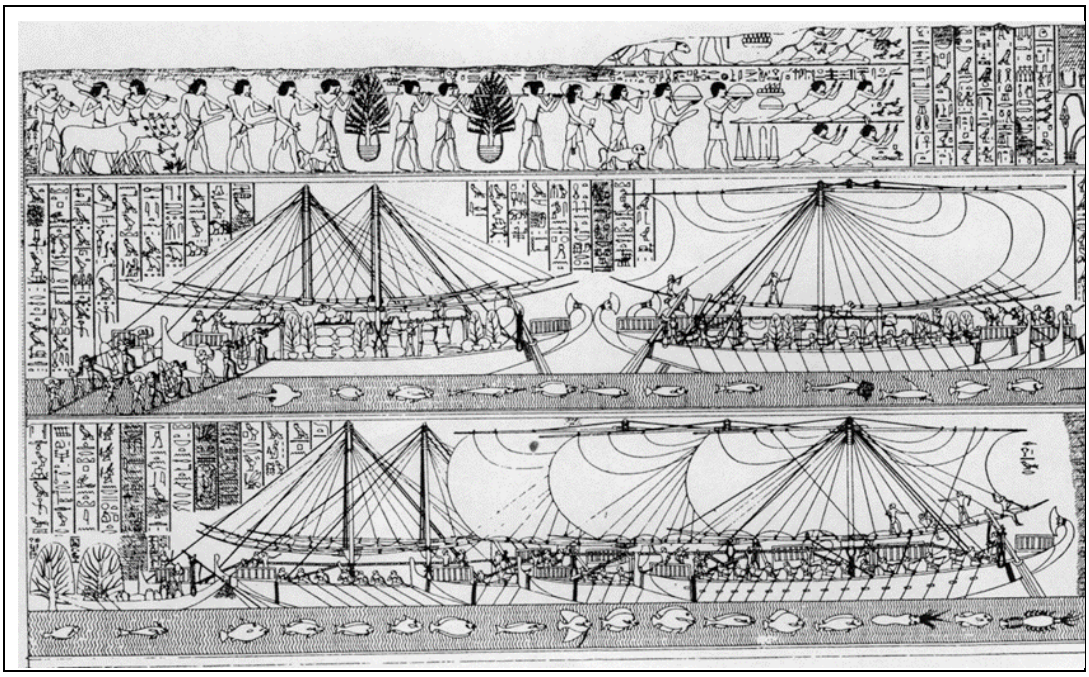

Figure 252 Relief of Temple Deir el Bahri
That accounts Punt voyage and fueled major Punt debate

Both *Boswellia* and *Commiphora* are documented in South Sudan, in the east adjoining Eritrea and Ethiopia, and in the province of Kassala bordering South West Eritrea and Ethiopia (Herzog 1968, Hepper 1969, Kitchen 1971). A 1961 survey of the region indicated that there were 200,000 feddans/Tsmdi (207,600 acres) of incense-bearing flora with 60-120 trees per acre in eastern Sudan, Eritrea and northeastern Ethiopia (Herzog 1968).

The link between aromatics and regionally-specific fauna, flora, and jewelry supports placing Punt in the Horn of Africa. Hilzaheimer identifies the baboons referenced in texts and mummified specifically as Hamadryas, which are present in the hillier coastland of Eritrea and in Ethiopia, but not Arabia (Kitchen 1971), the most frequently cited alternate home for Punt. The association of baboons with dom-palms fits Herzog's (1968) locus of Punt in Africa rather than Arabia. Herzog, after botanist Burret,

suggests that dom-palm is rarely found in Arabia, and though present in Yemen, it is not wild there. Further African-leaning evidence includes the fact that the ordinary African (black) rhino has a longstanding recognized presence in Eritrea (Kitchen 1971). And most exclusively of all, the giraffe is wholly unique to Africa.

Following Mariette and Naville, Herzog (1968) noted that metal rings similar to those found archeologically are used by various present-day Sudanese and Eritrean tribes, for example, the Bongo, Blin, Djur, and Niam-Niam. Similar comparisons can be made for pile-dwellings (a type of raised hut requiring a ladder for entry), which he argues are native to Sudan. Egyptians depict the Punnites residing in pile-dwellings.

Equally important the British Museum in London's collection holds two mummified baboons that were once brought to pharaohs from Punt. Recently the researchers used these mummified baboons to narrow the African locus even further by extracting DNA. They convincingly argue the "region of eastern Ethiopia and all of Eritrea was the place to look for Punt" (Jarus 2010).

6.3 The Route to Punt: Nile or Red Sea?

Evidence about the role of the aromatics trade in Adulis' political economy would be the trade routes that linked the ecological growing zones to aromatics to Egypt. Two different trade routes have been proposed. Given that the source areas proposed for aromatics have two major waterways available for transport in relative proximity, the Nile and the Red Sea, perhaps it is not surprising that debates about their origins would ensue about which waterway was used as a primary trade route. The debate over the two waterways is represented below in arguments of Herzog, who favors the Nile hypothesis,

and Kitchen, who argues for Red Sea transport. The arguments generally pit estimations about insufficient nautical capabilities for Red Sea transport at the time against primarily textual evidence to the contrary, though they also include other forms of argument and evidence.

Herzog (1968:74-75) noted, Egyptologists have not been in general agreement regarding whether Egyptians reached Punt by sailing the Red Sea, and Herzog considered himself to belong to "the camp of skeptics" on the issue. He mentions a Faulkner and Save-Soderbergh argument that Egyptians were sailing the Red Sea during the Old and Middle Kingdoms, particularly Hatshepsut's fleet. Yet Herzog dismisses this claim given that it fails to address the fact that the Old and Middle Kingdoms have yielded no evidence of Egyptian seagoing shipping. Herzog furthermore points out that the greater navigational hazards of the Red Sea compared to the Mediterranean cast doubt about the Red Sea seaworthiness of Hatshepsut's fleet.

Herzog (1968) likewise questions whether there is reason to believe the necessary infrastructure for a Red Sea fleet was in place. He remarked that no trace of ancient harbors on the Red Sea coast predates Ptolemaic times. Ship construction logistics also appear prohibitive. If it took months to build a boat in the Memphite dockyards, a truly masterful organization was needed to organize and build a ship on the desolate Red Sea coast. The ability to move all the material and men across the dessert wadis seems highly unlikely (Kitchen 1971). If Egypt already had a long maritime tradition, Herzog (1968:75-76) asks why did Ptolemy II have its coast explored anew? Herzog dismisses any application of 'Stumme Handel' to the Egyptian relationship with Punt as dubious. He (p. 73) argues

> *"No inscription allows one to determine beyond doubt whether the movement of manpower or transport of material was*

> *immediately concerned with the construction of a seagoing ship or the preparation of a sea-travelling fleet on any part of the coast."*

Instead, Herzog suggests that Ptolemy II's surveying of the Red Sea coast anew (see literature review in this dissertation above) suggests that up to his time the Nile remained the primary means of navigation.

Other scholars, like Kitchen, have been much more persuaded by evidence from texts. Kitchen (1971:189) counters Herzog's position by stating

> *"Herzog's argumentation looks impressive as if it had been as sound as it first looked, however it fails totally to account for the overall evidence especially some textual evidence that seems beyond refutation."*

He enumerates the clearest possible references that document an Egyptian expedition that moved back and forth via the Red Sea, and traversed part of the Nile. For example, in the reign of Ramses III, he quotes from Papyrus Harris I (77:8-78:1):

> *The expedition was sent forth upon the 'great' sea of inverted waters they arrived safely at the desert country of Koptos, they moored in peace, carrying the goods they had brought. The goods were loaded, in traveling overland upon asses and upon men, being reloaded into vessels in the river at the harbor of Koptos. They were sent forward downstream arriving in festivity, bringing tribute into the royal presence… (Kitchen 1971:190)*

Kitchen argues that no clearer indication could be desired than this regarding transshipment along the Red Sea. He additionally offers as evidence the Hamamat inscription referring to the official Henu, where Henu explicitly mentions organizing 3000 men with daily rations to build a ship. Henu dispatched the ship in the Red Sea, and it came back safely from the "land of Gods" (Kitchen 1971) .The reference "land of Gods" is another name used for Punt. Kitchen adds further textual evidence based on the

stela of Khenty-khety-wer, which was found in the ancient site of Wadi Gasus. It mentions ships located at a Sawaw harbor:

> **"***Praising and adoring Horus, Min of Koptos, by …Khenty-khety-wer-, when he had arrived in peace from Punt, his force being with him hale and healthy, his ships resting at Sawaw, year 28…" (Kitchen 1971:191).*

Kitchen ironically challenged the Nile thesis:

> *"to suggest Khenty-khety-wer had gone up the Nile to Punt, returned down the Nile to Koptos, and then have slipped quickly over to Wadi Gasus to plant an out-of-the-way stela there just to deceive us all – this is frankly incredible" Kitchen (1971:191).*

Finally, Kitchen refutes Herzog's claim regarding the surveying of the Red Sea under Ptolemy II by saying that the lore of the New Kingdom that surveyed the Red Sea was lost by the time of the Ptolemy II. The last expedition in fact took place 900 years earlier, and was unknown to Ptolemy II.

More generally cultural and ideological arguments supporting a Red Sea route have also been advanced. Phillips (1997), for example, has argued that the Egyptians saw their world with Egypt as the center and with four neighbors: to the North, Syro-Palestine; to the South, Nubia; to the West, the Aegean; to the East, Punt. The first two neighbors that were reachable by land were conceived as threats to Egypt, while the last two, the Aegean and Punt, reachable by sea, were conceived of favorably. This, argues Phillips, suggests a Red Sea route and enough Egyptian seamanship to support it.

The longstanding Egypt−Punt trade link ended after the mid−12th century BCE at least on an official level. By official, it is meant a state-to-state agreement or deal. It is too coincidental for a later time rulers of Egypt, the Ptolemies in their quest for control of Egypt one of the first things they did was strike a deal with Adulis to access war

elephants. Agatharchides, (Ancient historian who wrote a book On the Erythraean Sea describing the conditions of the Red Sea in 3rd century BCE) wrote regarding this deal in 3rd Century BCE. He states “the Macedonian kings of Egypt had concluded a deal with the local peoples to supply the king's hunters with elephants (Burstein 1989; Hendrickx 1984).” Also, Agatharchides states the presence of Royal Hypknomntera, known as official documents most likely signed contracts among ancient state officials. If Agatharchides is right, that there were Royal Hypknomntera in Egypt, presumably used by the Ptolemies used to sign a new deal, this in itself advances the presence of the previous relationship. It is no wonder then for instance, that out of 34 ports mentioned and discussed in the Periplus, only three ports are described as “legally limited ports” and Adulis is one of the three.

Why Egypt-Punt trade link ended is unknown. Possible reasons scholars enumerate include a breakup of Punt confederation, climatic change, lack of resources for Pharaohs to send expeditions, or the encroachment of the shift to a new south Arabian trade up to Gaza for aromatics (Kitchen 2002).

6.4 A closer Look at the Red Sea Route’s Feasibility

Following Herzog's comment about the insufficiency of textual evidence alone for the determination of the trade route, the preceding discussion needs to be supplemented with relevant particularities about the feasibility of a Red Sea route. After addressing the issues of sea-lanes, currents and tides, winds, type of ships used, and the nature of travel during the Pharaonic era, I argue that scenarios support the feasibility of the Red Sea route.

As noted by Koster (1967), the Red sea has a main central channel (used by modern shipping-see map 06-1) and two lateral or inshore channels, which are divided from the main channel by islands and coral reef. If Pharaonic flotillas traveled in the western inshore channel, and not the open sea (Kitchen 1971), then questions about seaworthiness and infrastructure becomes moot.

The impact of the direction of current flow and tides on navigation also requires careful consideration. In the summer months of June-September, when the sun lies overhead at 23.5º North, the currents flow downward, north to south, on the Red Sea. In the winter months, November-March, they flow in reverse, south to north. Tides are semi-diurnal and diurnal. The diurnals are slight, but the semi-diurnals reach an average of 2-6 feet in the northern end of Red Sea (for example, the Suez Canal), or 3 feet at the southern end of the Red Sea near the Gulf of Zula (Massawa, Eritrea, or Adulis in ancient times). And they decrease inward to nil in the center, for example, at Sawakin, Sudan (Kitchen 1971; Koster 1967). In the summer period, NNW winds blow down the whole length of the Red Sea (from Suez to the Bab-el-Mendeb strait), to join the SW monsoon in the Arabian Sea and Indian Ocean. Therefore, boats going south from Suez would find both winds and currents favorable. In the winter (November- May) there is a dichotomy. For travel up to Quseer or Marsa Gawasis (Sa'waw) SE winds and currents would contribute only for the return, thereafter, moderate NW winds would require boats to row with the currents but against the winds (Koster 1967, Kitchen 1971). This factor would encourage transshipment at Quseer (Sa'waw) in going north, rather than sailing fully laden all the way up to Suez (Koster 1967, Kitchen 1971).

Ship size and seaworthiness for Red Sea travel also deserve analysis. Although a ship length of 180 feet is referenced in the Palermo stone (Shaw 2003:5), the *Tale of the*

Shipwrecked Sailor refers to the dimensions of 200 feet by 60 (Kitchen 1993), unfortunately no conclusive dimensions are yet available for ships going to Punt. Barnet (1958) estimates the size of Queen Hatshepsut's vessels at about 70 feet long, 18 feet wide and 5 feet deep. However, Herzog (1968) thinks that Barnet's estimate is based on a relative scale of people and ships taken from the Punt-related reliefs, and thus argues that these figures are only rough guides. Kitchen (1971) points out that 15 feet sweep of oars on each side could yield ship dimensions of 70 to 100 feet long, 20-25 feet wide, and 5-7 feet deep. These figures serve as approximations for Egyptian ships following the Red Sea coast to Punt. These ship dimensions are quite sufficient for travel to Punt, given the ships are traveling in the inner channels of the Red Sea.

6.5 The Distribution of *Boswellia papyrifera* in Eritrea, Past and Present

The contemporary landscape and vegetation of the area around Adulis supports the growth of frankincense- and myrrh-producing vegetation, thus arguing for a role for ancient Adulis's involvement in the aromatics trade. A question remains if today's distribution of these plants is a reliable key to where they were located in the periods of concern for this dissertation. Archeologists have implemented contemporary landscape and vegetation studies to provide diachronic information on archaeological research.

Landscape studies do not presume the area of study will remain the same since antiquity without accounting for human impact, but it attempts to give a holistic review of the region in time.

Although there is a considerable presence of *Boswellia papyrifera* in Eritrea today, there is no detailed survey of the current population number of the species.

Though evaluating the current frankincense-bearing flora in Eritrea and comparing it with Adulis' time can be a formidable task, it is possible to estimate through careful systematic analysis. This includes several logical steps that consider biology, ecology, and anthropogenic impacts on the species growth over time. First, understanding the ecological niche of *Boswellia papyrifera* is critical to narrowing the likely geographical location of the species. Second, in combination with other data, the amount of frankincense yield per tree per year is vital to estimating the plant population number and can serve to compensate for the lack of a detailed survey of the current population number of the species. Next, anthropogenic effects in the recent past can be assessed by looking at recent data for Eritrean exports of frankincense retrieved from the Chamber of Commerce and Ministry of Agriculture (Ogbazghi et al. 2001), and then comparing these with colonial data from the last century to assess effects over time.

Finally, ethnographic data on counties within frankincense's possible ecological niche in Eritrea can help understand the climatic and anthropogenic impact on the plant population, both in the past and at present.

6.5.1 Ecological Niche, Boswellia Papyrifera

Boswellia papyrifera thrives at an altitude range of 800–1850 m.a.s.l, with a mean annual rainfall of 375– 700 mm, distributed in such a way that the growing season lasts 45–100 days. The fact that the current tree population of Boswellia is now restricted to special areas within this niche, mostly in steep rocky slopes on marginal and shallow soils, illustrates that the niche is being narrowed down by pressure on the land for agricultural production, construction needs and war (Ogbazghi et al. 2001, 2006). Along

these lines, a look at the map below (Figure 253), which shows major ecological zones of Eritrea, enables one to rule out some areas, for instance, the eastern lowlands and western lowlands marked in yellow (too low, dry, semi-desert) and the central highlands marked in black (too high, too wet), The arid lowlands and moist lowlands are where frankincense trees grow.

At present, *Boswellia papyrifera* is threatened as the result of several interrelated factors. Increasing population pressure has resulted in the conversion of woodlands to agricultural land while unregulated grazing by which young seedlings are either eaten or trampled by livestock, is hindering the natural regeneration.

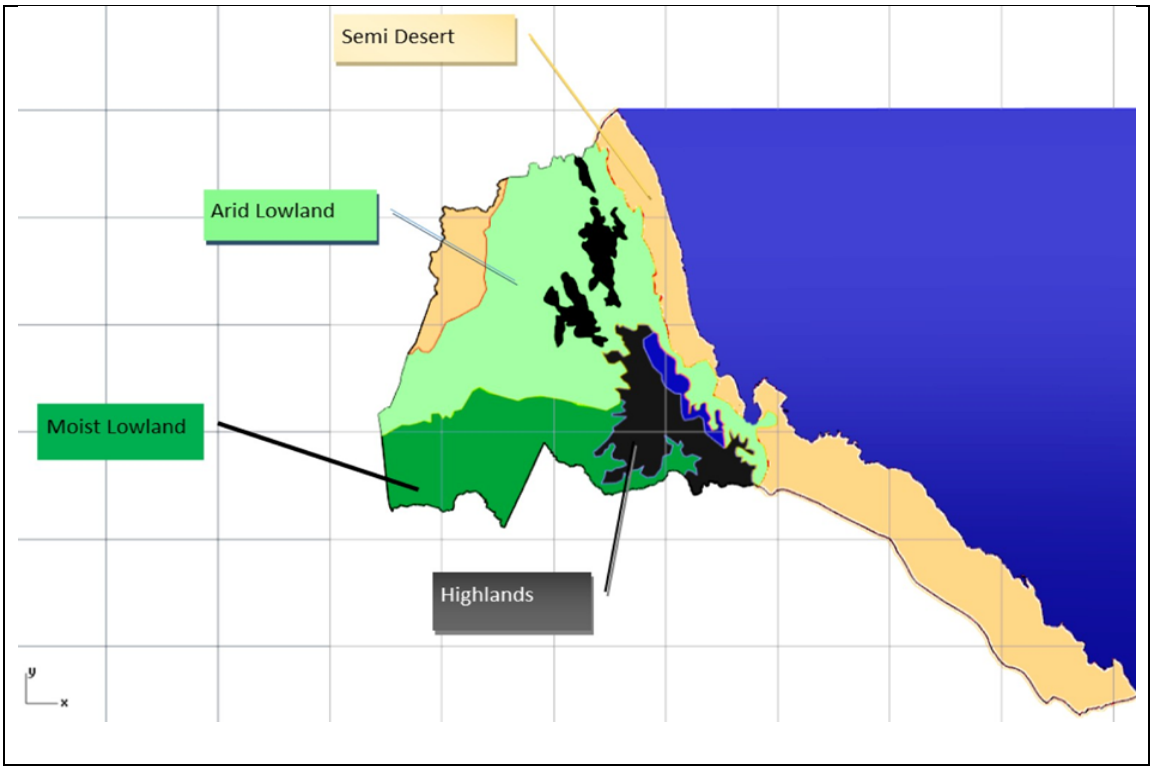

Figure 253 Ecological zones of Eritrea.

6.5.2 Annual Resin Yield of Boswellia papyrifera tree

A precise measure of the yield of *Boswellia papyrifera* on a per tree per year basis is elusive because the yield varies significantly depending on the tree size, soil

conditions, tapping intensity, altitude, and rainfall. However, agro-ecologists have surveyed and measured the annual yield per tree per year diachronically in recent times, and this can be useful for an estimate. According to Tadesse et al. (2004), the yield is 6.7-451g per tree per year, while Eshet et al. (unpub.) maintain a yield of 207-352 per year per tree (Lemenih et al. 2003). Averaging these yields to 255g (0.6 lb.) per tree per year produces a ballpark figure for a conservative assessment.

6.5.3 Effect of Cleaning and Grading on Distribution

There is another component that needs to be considered. Not all the frankincense harvested makes it to the market for export. Evaluative grading and cleaning must take place before it is offered for sale. The grading can be classified into 7 grades (see Table 42), a grading of 1 being of highest quality and 6 being the lowest, while those of grade 7 are discarded. In most export-oriented markets, produce at grade 6 and below, and in some very particular markets, grade 5 and below, is discarded as well (see Figure 254). Ultimately, an average of 69% of the total collected becomes available for market.

Grade	Size	Color	Percentage (%)
1	≥ 6 mm	white	22
2	≥ 6 mm	Creamy white	9
3	4-6 mm	yellow	11
4	2-4 mm	yellow	8
5	any	brown	19
6	any	black	17
7	any	bark,soil,powder	14
Total			**100**

Table 42 Grades of Frankincense of Boswellia Papyrifera

Figure 254 Boswellia papyrifera from Eritrea cleaned at 69%, to step 5

6.5.4 Export Data and Estimating Anthropogenic Disturbance

The two sources of data just discussed–the annual yield of a frankincense tree, and the useful end-product quantity (percentage of the collected frankincense for market (69%) and discarded (31%))–can serve to approximate the number of trees responsible for production. For example, the Eritrean chamber of Commerce reports it has exported 1395 metric tons of Frankincense in 1962 (see Table 43). Since 31% of 1395 metric tons (418.5) is discarded at cleaning and grading, the total frankincense production of 1962 was 1813.5 metric tons. If one tree yields 255g per year, it is safe to estimate that there were about at least 7,111,765 trees.

By comparison, in 1906 Italian colonial documents at the port Massawa and Assab show 14,110 metric tons of frankincense were exported from Eritrea (Annuario Statistico Italiano 1905-1907). By the same logic, accounting for the 31% discard of that year, the total production was 18,484 metric tons. About 72+ million trees are needed to produce that amount of yield. Therefore we can safely estimate there were 72+ million *Boswellia papyrifera* trees in Eritrea at the beginning of the 20th century, then that population dwindled to one tenth the size, or about 7+ million trees, by 1962, and to about 5-10 million trees at present (export numbers from port Massawa). If the above export figures are right, then this gives us an approximation of anthropogenic disturbance for the *Boswellia papyriferra* species over the last century.

Year Exported	Exported in Metric Tonnes
1962	1395
1963	1962
1964	1759
1965	1617
1966	2035
1967	797
1968	739
1969	1728
1970	1963
1971	2351
1972	1856
1974	1500
1992	200
1996	446
1997	463
1998	461
Tottal	**21272**
Average/Mean	**1329.5**

Table 43 Frankincense exported from Eritrea 1962-1998.

Source: Asmara Chamber of Commerce (1974), Ministry of Agriculture of Eritrea archives (1998), (Ogbazghi et al. 2001, 2006). For certain years no data is available. **Metric ton**=1,000 kilograms (2,205 lb.).

6.6 Ethnographic Data on Aromatics

There are 18 counties (administrative zones) in Eritrea that either produced in the past, or are currently producing, frankincense from the *Boswellia papyrifera* tree that grows in the region (see Table 44). For many Eritrean farmers and agro- pastoralists, selling frankincense to the nearby market has been, and still is, an income supplemental to farming. One kilogram (2.205 lb.) of frankincense can fetch $80-120 on the global market, although the initial producers would hardly benefit from this.

Albeit uncoordinated, several efforts to revitalize production of resins exist. Some are driven by a will assist farmers economically amidst a global market, while others adopt an environmental preservation perspective that values the way *Boswellia papyrifera* trees are extremely useful in stabilizing tenuous arid environments.

Past and Present distribution of Boswellia Papyrifera in Eritrea

Present Occurrence	Past Occurrence	Regions (Counties)	Maximum Altitude	Mean Rainfall
0	1	Haikota	850	600
0	1	Gonei	850	650
0	1	Mensura	1,200	425
0	1	Mai Aini	1,911	454
0	1	Emni Haili	2,100	700
1	1	Omhajer	900	625
1	1	Mogolo	1,000	425
1	1	Shambqo	1,000	600
1	1	La'elay Gash	1,000	700
1	1	Barentu	1,127	516
1	1	Habero	1,600	418
1	1	Molqi	1,600	600
1	1	Halhal	2,000	416
1	1	Keren	2,000	489
1	1	Adi Kuala	2,000	612
1	1	Areza	2,000	655
1	1	Mai Mne	2,000	694
1	1	Elabered	2,400	509

Total Past Occurrence	18
Total Present Occurrence	13

Table 44 Past and Present distribution of Boswellia Papyrifera in Eritrea

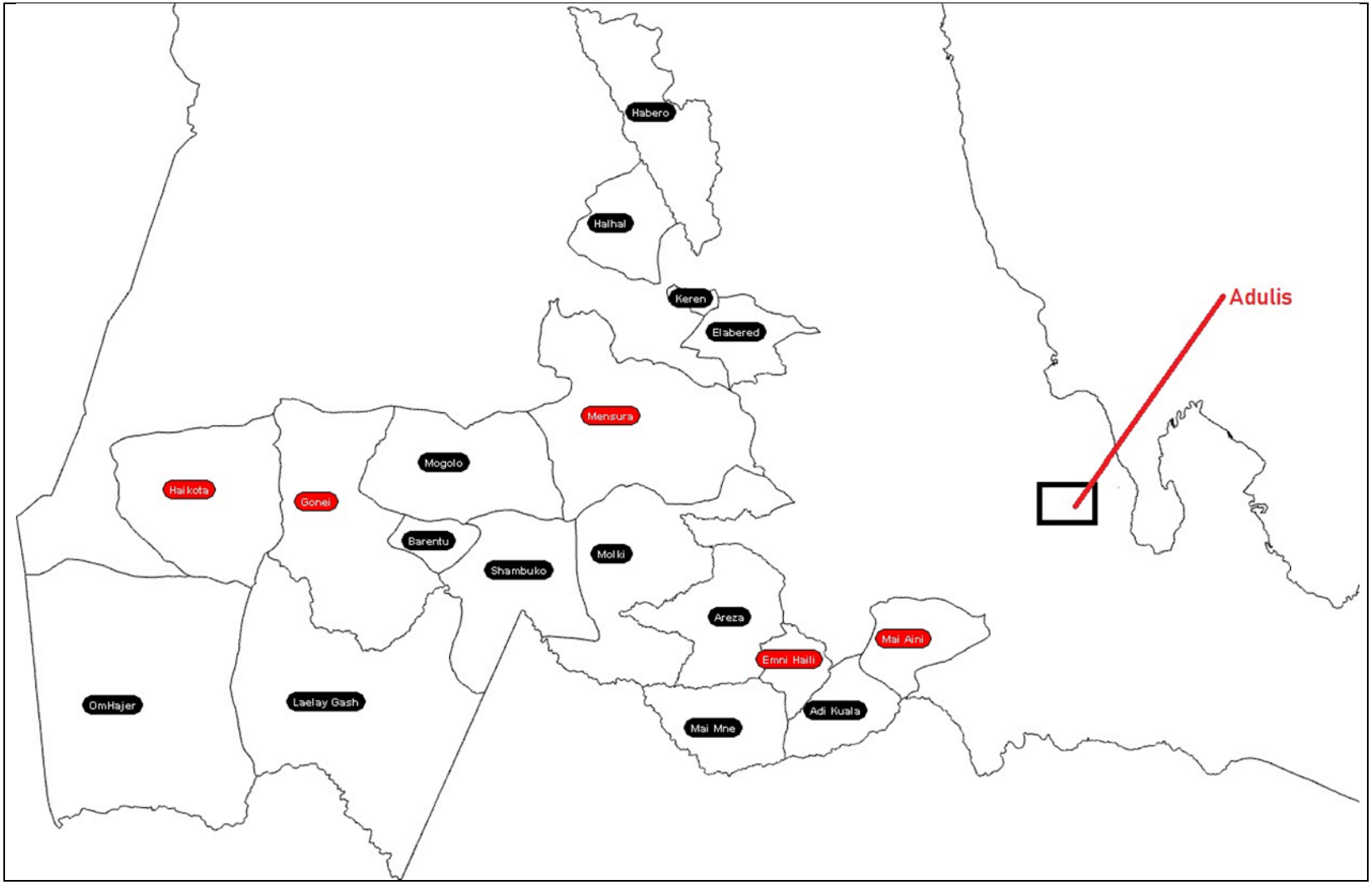

Figure 255 Frankincense producing counties in Eritrea.

Note the counties marked by red are counties that used to produce in recent past but not at present. Source (Ogbazghi et al. 2001,2006)

6.6 Conclusion

Aromatics like frankincense and myrrh were strategic resources for the ancients in the regions surrounding the Red Sea where they played an important ritual, medicinal, and aesthetic role. Although often conceived from a modern perspective as luxury items, they were in fact essential trade items in antiquity. Due to its integral place in everyday religious practices, frankincense was an important part in the functioning of theocracies. With these aromatics religious rulers could justify their power and legitimacy by creating the image of control of strategic resources, which created an ongoing need to secure aromatics.

A substantial debate, unfortunately more speculative than data-focused, has existed about the whereabouts of the nominal origin of ancient aromatics at Punt, and of the likely trade route waterway. While an older but influential tradition of scholars during the 19th century placed the land of Punt in Arabia, and scholars since have also located it in the southern Sinai, or as far as India, a compelling argument is made that its location was in southern Sudan and on the Eritrean coast, this based on botanical, cultural, and architectural arguments. A close examination of feasibility, along with textual support, suggests a Red Sea route for the aromatics trade, as opposed to primary exchange via the Nile.

General insufficient arguments and evidence have been advanced by scholars to date explaining the gap between Bronze Age trade of incense and myrrh, and the subsequent rise of first millennium BCE port trade at Adulis (Gulf of Zula). The dominant explanation so far has been, as Sugerman (2006) has characterized it, that "a miracle happened." This chapter has provided a review of the origin and likely route of

trade to help fill this gap. Signs suggest further research is needed to investigate Adulis, along the Eritrean coast, as potentially a key link between Classical age Red Sea trade and earlier antiquity trade in aromatics.

CHAPTER 7

CONCLUSION

7.1 Du Boisian Overarching Meta-Theory of the Dissertation

This dissertation research has addressed the political economy of Adulis in the Red Sea and the NHA. In so doing, it incorporated Du Bois' observation of North East Africa, one of the world's ancient crossways since the time of human origins, to the beginnings of food domestication, to the earliest period of state formation, it has been a site of human interaction, material, social, ideological, and biological. As such it is as, Du Bois has noted, an important region in human history. Du Bois' critical engagement with this region calls attention to the region's role in the broader human experience that deserves much more attention than the recent faulty and limited ways the region has been portrayed. The recent past, tainted with slavery, colonialism, apartheid and racism have overwhelmed the history of Africa as a whole and especially the history of the Northern Horn of Africa, creating a situation in which any other human experience before it is suppressed. Implementing world systems perspectives to assess the data of North East Africa, by specifically binding together data from a region that stretches from eastern Egypt to the highlands of Ethiopia as a unit of ancient political- economy, this work has analyzed and strengthened Du Bois' observation. This method is a shift in subject focus from a prevailing categorization based on political units (Egypt, Nubia, Abyssinia), and has guided this study's solid grounding in material data as a means to disclose the political economy of the past.

This dissertation has particularly addressed the political economy of the port city of Adulis in the Northern Horn of Africa during what is known as Africa's Classical Age (1000BCE-700ACE). The research systematically collected archaeological, textual, ethnohistoric and environmental data to show an assessment of the sites' political economy, and its interaction with local and regional economies.

7.2 The Dissertation Question and Findings

The fundamental question of the dissertation evaluates whether Adulis was part of an Aksum dominated world economy or whether Adulis was a center of its own in a complex web of regional power dynamics.

In chapter 2, the dissertation has reviewed the literature of the Northern Horn of Africa for the last three centuries to pinpoint the interest this region had generated, in particular, after the Battle of Adwa, when NHA defeated colonial Europe. It has summarized four paradigms supportive of the Aksumite model. Even those antithetical paradigms on opposite political agendas colluded to enforce the Aksumite model. For instance, Orientalist-Semiticist paradigm that is Eurocentric in its origins and affiliation, advocates uniqueness of NHA and the Aksumite model analogous to the Pan African paradigm, which is more an Afrocentric approach. Similarly, the Aksumite Paradigm which is a local elite and establishment developed paradigm advocates for the uniqueness of NHA similar to the Leftist Paradigm that is an opposite theoretical perspective. Had the uniqueness advocated by these paradigms and the Aksumite model been based on the archaeological record or any systematic data it would have been advantageous and would facilitate comparisons of NHA with other regions. Instead, the uniqueness advanced was

based on ideology, and has created more heat than light in human understanding of the past, and contributed to more ethnic conflicts and genocides. The dissertation then has illustrated how such templates of "a historically relevant NHA" or "Worthy Ethiopia" vs the "other" Africa were used to foment ethnic conflict within NHA affecting the Oromo and the Somalis, outside NHA in Rwanda and others. Focusing on these recent experiences underscores the historical relevance of Du Bois' observation and the impact of the recent past is having in the present. The dissertation calls for alternative models based on material culture, conceptualizes and tests a new model, i.e., the Adulis model and shows how NHA would benefit from such interpretation of the past.

Chapter 3, Energetics study at Adulis is a first step in assessing the Aksum centric model and the Adulis model, and its relevance for understanding Adulis. This work looked at the 39 built forms at Adulis and assessed critical artifacts that were documented from my field work and various other excavations. The Built forms were modeled using the best evidence available to develop computer-aided 3D models representing the actual built forms at Adulis from the ground up. Volumetric data were compiled from these models. These volumetric data of the built forms were translated into the energetics - the labor inputs - of the built forms based on experimental archaeology. Then both the volumetric data and the energetic data were evaluated against the general model expectation of what Adulis might look like under an Aksum dominated world economy or Adulis as a center of its own. I have shown through analysis of the built forms that Adulis had a multi-tiered hierarchical distribution of built forms expected in an autonomous center than a simplified distribution expected for a dominated economy sending surplus to a distant center. Thus, the null hypothesis of Adulis being a minor part

of Aksum's world-system was rejected and replaced with Adulis being an autonomous center operating within a network of centers, including Aksum.

In chapter 4 the dissertation then carefully considered the distributional pattern of ancient coins in the region to show that Adulis accumulated ca.70% of the coins in the NHA. This circulation pattern of ancient coins does not support that Aksum dominated this world economy, instead it shows that all other polities, and including Aksum among others were paying tribute to Adulis. Furthermore, this distribution of coins is consistent with the claims of the *Monumentum Adulitanum* in which 23 polities including Aksum, were tributaries toAdulis and its king. Besides, the dissertation compared about 36 thrones in the region to the throne of Adulis. Based on the amount of labor invested in these thrones the dissertation has shown while low and mid-level skill were needed to carve the thrones, the throne ofAdulis required highly skilled labor to cut the throne from a single marble block, and write perhaps one of the longest texts on the throne. Moreover, considering the bio-politics of the throne cements Adulis' unique position within the region and its interregional importance in the Red Sea.

The dissertation research then considered the trade items that played an important role in Adulis' unique position, namely Adulis' role in war elephant production in chapter 5, and the Aromatics trade in chapter 6, two important trade networks to of the region. By identifying the three most clear lines of evidence that have shown Adulis was producing war elephants; the dissertation has argued for a complex regional political economy of Adulis, the Northern Horn, and the Red Sea. Next, by tapping into material representation, oral tradition, and ecological data, it has demonstrated the symbolic importance of Adulis locally and regionally due to the production of war elephants. To this can be added Adulis's role in commerce in general as can be seen in it being

classified in the upper tier of the 37 ports described by the *Periplus*; it is designated a "legally limited port" a rare classification given only to two other ports besides Adulis, in which the designation means the lives and property of not only of locals, but also other foreign merchants were protected by law.

In the end, in chapter 6, the dissertation evaluated aromatics trade and makes a compelling argument for the location of *Punt* in South-Eastern Sudan and on the Eritrean coast. *Punt* is an Egyptian era designation for the aromatics trading polity. The location assessment is based on botanical, cultural, ethnographic and architectural arguments. A close examination of feasibility, along with textual support, suggests a Red Sea route for the aromatics trade, contrary to primary exchange via the Nile. Thus, conceivably the aromatics trade that started during the Egyptian era might have developed into the classical era, creating a prevailing political economy of Adulis in the Northern Horn of Africa, and in the Red Sea.

7.3 Contributions of the Dissertation

7.3.1 Theoretical Contributions

7.3.1.1 Adjusting for Colonial Distortions

The dissertation traced the bifurcated Mediterranean meta theories of Eastern/ Western Mediterranean, and how these paradigms created a ripple effect on the Red Sea research and the Northern Horn of Africa, as detailed in the dominant paradigms. This work has corrected these colonial distortions and effectively contributed towards resolving the modern North/ South divide in scholarship by interchanging the old models

with a new more complex and dynamic understanding of the ancient political economy throughout the region in its place.

7.3.1.2 Advancing Significant Theoretical Position in NHA

The relationships of Aksum and other major archaeological sites such as Adulis and others were explained via one way, the Aksumite model. The dissertation has shown an alternative model of Adulis' centrality. Through extensive material evidence of built forms, artifacts, ecology, textual, ethnohistorical and oral traditions Adulis was a center of its own with substantial local and regional significance. This centrality of Adulis is demonstrated in the class structure of its built forms, having the most consequential throne in the region; the amount and high grade of coins collected the site. External references such as *Periplus'* "legally limited port" a designation that was given to three ancient ports out of the 37, for ancient pots that safeguarded the lives and property of all traders, also confirm what is detectable archaeologically.

This dissertation also discussed multi-regional cores among various centers in the NHA with unique architectural markers of each. This was assessed via regional comparative built forms throughout the region; perhaps further comparative research may illuminate this further.

7.3.1.3 Contribution toward long term prosecution and perpetuation of warfare

In the broader anthropological literature of warfare, this dissertation contributes toward a less theorized area, i.e. an understanding of a long-term prosecution and perpetuation of warfare in the pre-modern world. By considering war elephants and

Adulis' economy, the dissertation has shown prosecuting warfare requires the emergence of a complex, social and ideological subsystem, significant in its own right. The time invested in training the war elephants, resources extracted to be used for human trainers, and more, resources used to sustain the elephants trained, creates its own guiding logic in warfare, almost regardless of the existence of conflict. With regard to Adulis' style of war elephant production this work has demonstrated that this subsystem's sustainability burden was ameliorated by the benefits elephants contributed to agro-pastoral subsistence, and the ideological and jural support it allowed for the ruling elite.

7.3.2 Methodological Contributions

7.3.2.1 Integrated GIS and 3D Modeling for Archaeology

This dissertation has integrated GIS (geographical information systems), epigraphy and in-depth local knowledge of NHA's landscape to map out ancient polities known from the Monumentum Adulitanum. The result effectively provided a window into the 3rd century BCE political economy of the NHA, and an insight into Adulis' power base.

7.3.2.2 Use of Parametric Modeling in Solving Archaeological Problem

The dissertation tackled the graduated masonry hurdle that discourages researchers in the region from further investigating the architecture of major archaeological sites. These hurdles include difficulty in calculating volume of a single course because there are three layers material of in one course, mica schist at the bottom,

then a basalt layer, followed by another mica schist layer, all with distinct dimensions. Additionally, each wall course is different from the previous and abutting wall courses in dimensions as well. By adopting a technology intended and used for other purposes, Rhino 3d and its add-on Grasshopper, these hurdles were addressed for each of the building of the 39 structures at Adulis.

7.3.2.3 Oral traditions Integration

The dissertation unified archaeological evidence with oral traditions in the NHA to interpret a major symbol in the region; the symbol of stretching of hands all the way to the sky that dominates most ancient sites. Previously the same symbol was interpreted as crescent moon and a disc, similar to the recent Islamic symbol of crescent moon and star. The dissertation argues that this symbol is related to the actions of humans in communicating with elephants.

7.3.3 Data Contributions

7.3.3.1 Architecture of Adulis

For the first time we have the ancient port of Adulis simulated, situated on its site map that was systematically prepared with absolute and relative coordinates. These data were collected in field work that I oversaw in 2004-5 (Habtemichael 2004b). The dissertation developed these data and additional ones collected by me to model and analyze all the available built forms known at the site.

7.3.3.2 War Elephant Production at Adulis

An original insight of the dissertation is war elephant production at Adulis, and the attribution of the aromatics' trade as a basis for Adulis' origin that may support advanced understanding of the political economy of Adulis. Linkages from thepast to the present were made in this dissertation by compiling wide varieties of data sources to assess these critical resources diachronically.

7.4 Directions for Future Work

7.4.1 Ge'ez Resources Use

In pursuing this dissertation research, I was not able to access critical resources for the research on political economy in NHA. In particular, there are diverse Ge'ez (ancient Ethiopic) manuscripts that are housed in many countries in Europe, the USA, and varying places in NHA. Since I was trained in Ge'ez in my early education, I hope to make use of these resources in the future and develop a more nuanced understanding of the political economy of Adulis.

7.4.2 Improved Geophysical Survey

Reflecting back on my field work at Adulis, there was a lost opportunitywhen we were doing geo-physical surveys at Adulis. Had I known wall thickness in graduated masonry modeling as the most important pointer of building height then, I would have documented the wall thickness of all the underground structures to estimate the remaining

built forms that are not excavated yet at Adulis. Hopefully, this research will provoke other researchers, if not myself, to develop these studies.

7.5 Recommendations for the future work

During the course of my research there were a number of other lines of work that need attention. Here is a partial list:

1. Need for better research on the anthropogenic impact on the environment of the NHA and Red Sea Coastal Ecology
2. Incorporating Ge'ez resources in archaeological research
3. Built forms of other archaeological sites in NHA need to be simulated for comparative and political economy studies
4. Need for better chronological controls in the NHA archaeological sites
5. Gender component of war elephant production needs investigation
6. Introduction of Christianity to NHA needs revisiting.

In conclusion, Du Bois' point about the lack of attention paid to Africa in general and to the Northern Horn of Africa in particular, is still a valid point. My most earnest hope is that this dissertation plays a role in provoking others in joining in the task of brining the history of this fascinating region to light.

CHAPTER 8

APPENDIX SOURCES THAT SUPPORT THE ENERGETICS ANALYSIS

8.1 Introduction

Four published excavation reports on Adulis and one regional survey cautiously applied in this dissertation are further sources of information for chapter three alongside my fieldwork. These are reports of Sundström (1907), Paribeni (1907), Anfray (1974) and Munro-Hay (1989c). The regional survey is the Dutch-Aksum Expedition (Littmann et al. 1913) that also documented floor plans of Adulis structures.

There are also other primary sources that I consulted from the Colonial Library Collection housed at Pavoni Social Center Library in Asmara, Eritrea. These appear to be reports of colonial propaganda office that published Adulis structures (Romanelli 1930) field notes of many amateur archaeologists such as Tringali (1985,1986), and map drawing of Adulis structures prepared by Checchi among others. Checchi was an engineer assigned by the colonial government to assist archaeologists such as Paribeni while excavating at Adulis in 1907. Some of them are difficult to attribute to the right author; perhaps these can be an earlier version of a later published version. For instance, Checchi published a map of the entire Adulis site in Paribeni (1907), it is merely impracticable to map a whole town without assembling data building by building, and these drawings can be part of that.

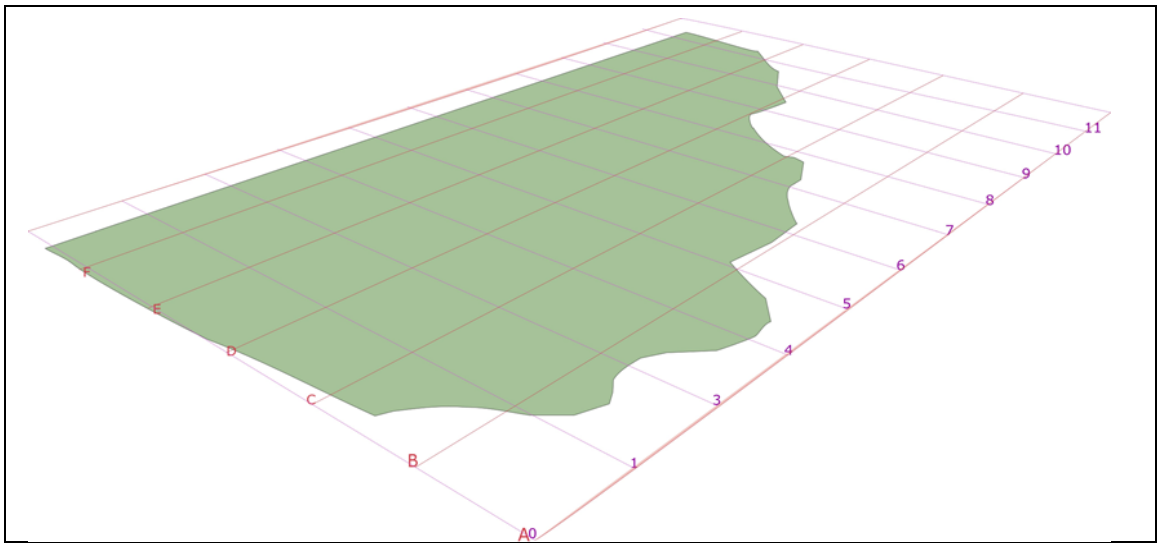

Figure 256 Grid of 111.32 by 111.32 quads of 49 hectares of Adulis.

Note the naming conventions for quads, alphabets for Latitudes and numbers for Longitudes.

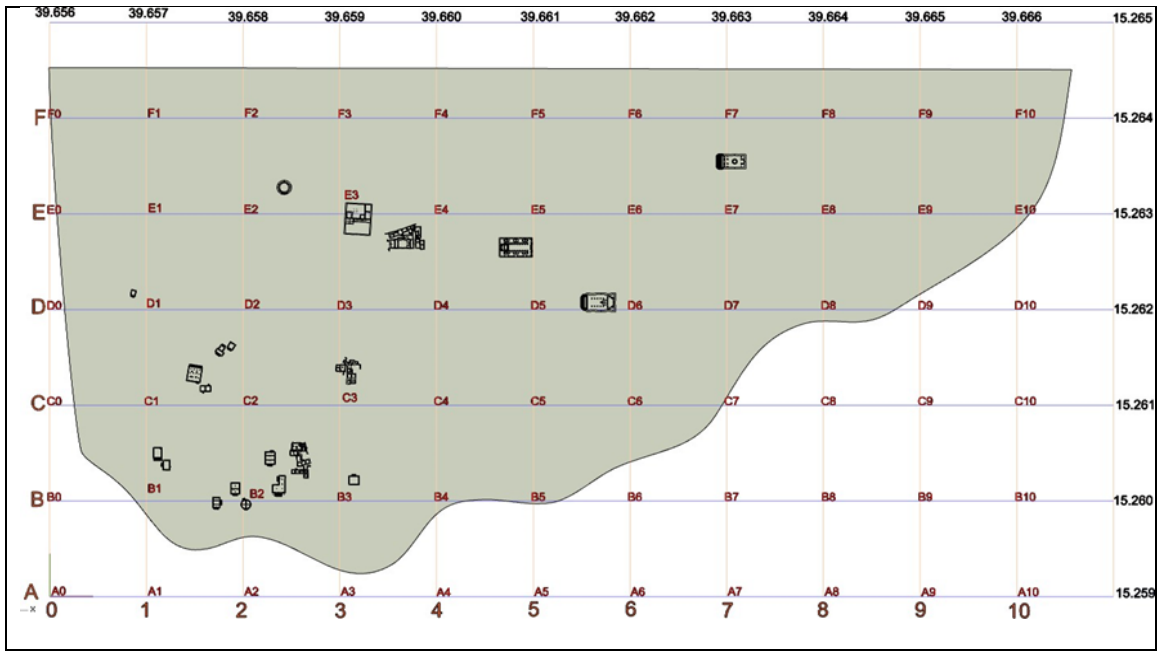

Figure 257 Adulis built forms footprint illustrated on quads

These sketches can be necessary on a few occasions where field data is scanty for built forms that were gone after excavation. These field notes and drafts drawings are

cited here as Colonial Library Collection. Prospective investigations may shed more light on those.

This section will briefly illustrate how these sources extended the energetics study, what logical premises and physical structures' reasons are implemented to systematically model and then comprehensively collect data in chapter 3. First topographic map of the entire site was prepared after acquiring data from a total station.

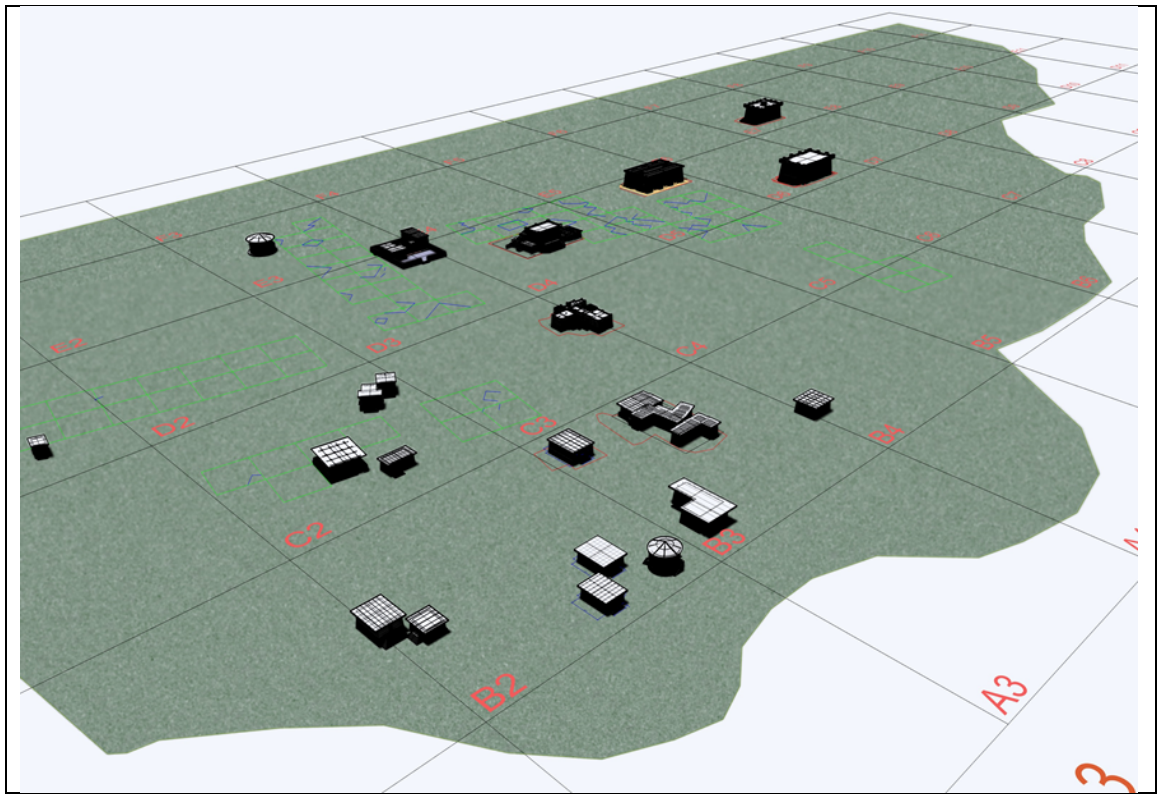

Figure 258 Built forms at Adulis plotted with a geophysical data.
The green lines indicate a geophysical survey grid. The blue lines represent building structures still underground.

I have plotted this data in 111.32 m x111.32 m grids, the light-blue and red square grids in Figure 250. The southwest datum point at A0 is Latitude: 15.259 N, and Longitude: 39.656 E (see Figure 251). The total surface area of the site is about 49 hectares (121.079 acres). The new surface area was extended from my previous

publications of 38 hectares (Habtemichael et al. 2004) to include more structures and better explain the water system of Adulis.

The geophysical data collected during my fieldwork at Adulis is also plotted in the next map (see Figure 252) to highlight the structures that are still underground. The green lines indicate the geophysical survey grid. The blue lines represent building structures. The red lines represent the pits still open at Adulis or opened recently. These are discussed here to suggest this dissertation research is not only comprehensive but also predictive for future research.

8.2 Public Built Forms

Then the next step is to discuss the critical data that was used in developing the building detail of each built form addressed in chapter 3. In chronological order of their excavation, Temple B was the first to be excavated by British soldiers who camped at Adulis in 1868 in the Napier Expedition (Munro-Hay 1989c), then Sundström (1907) excavated the Court House, Paribeni (1907) was responsible for Temple A and Temple C and Built form 14 and many other private residences. Then Anfray unearthed built form 20.

This section will not deal with the history of the excavations (for review see Habtemichael et al. 2004) but how these data from these were used in this dissertation. I will use many visual examples to demonstrate how I used these studies in developing the built form models.

8.2.1 Temple B

The first sketch, a sketch of Temple B by R.R. Holmes is included here to better visualize what Temple B looked like when excavated in 1868 (see Figure 253). The same sketch is also recently published by Munro-Hey (1989c). The second image is an illustration of the plan of Temple B by Holmes (Figure 254). The latter, the plan of Holmes of Temple B is redrawn based on field data collected at Adulis.

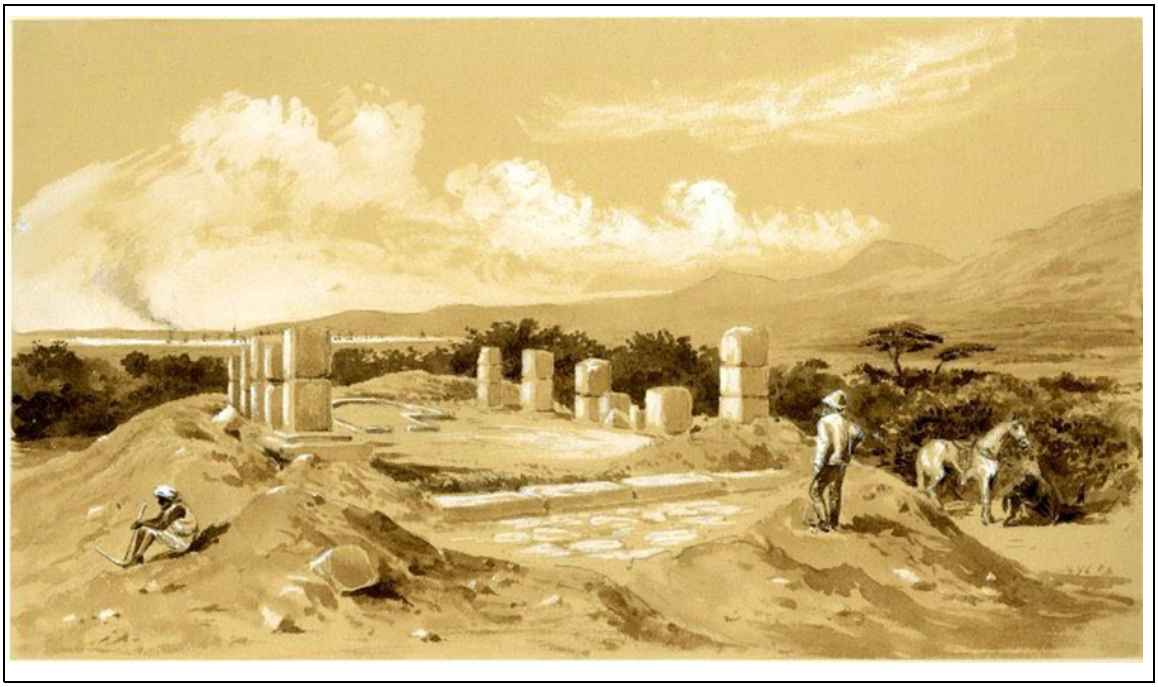

Figure 259 Temple B from British Museum collection (1972, U, 566). Note the number of columns, baptismal apse and stairs, location of walls. © The Trustees of the British Museum.

The blue lines (Figure 254) represent the walls' profile and a stair (at the bottom of the plan). The black rectangles in the middle of the blue lines represent each column at 1.82 m apart. There are the two rows of columns 5.89 m apart. Note the two rows of columns of possess five columns each.

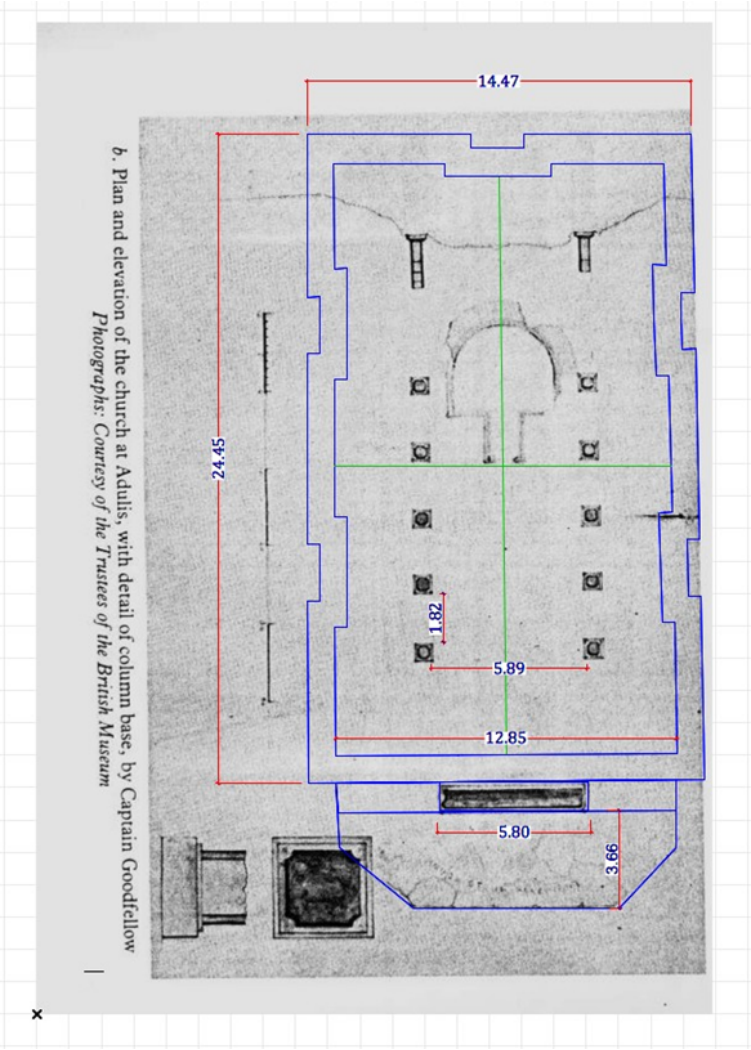

Figure 260 Plan of Temple B,
Reproduced from Munro-Hay (1989c)

Moreover, note the baptismal apse (between the top two black rectangles), the walls of the sacristy (two long black boxes at the top of the image), a location of the door, etc. During the excavation of Temple B, the side walls were damaged due to the excavators looking for something exciting or precious. The walls are visible at the site; all the columns have fallen and the excavation pit backfilled. Temple B, was built in graduated masonry, with this information it is easy to model the first floor as explained earlier. The evidence is abundant at Adulis in the excavation pit of Temple B of cut

stones to dress window edges. These stones assist in modeling the location of windows by measuring the dimensions from the walls cleared at the excavation. There are also numerous decorative stones that were used to model the pulpit.

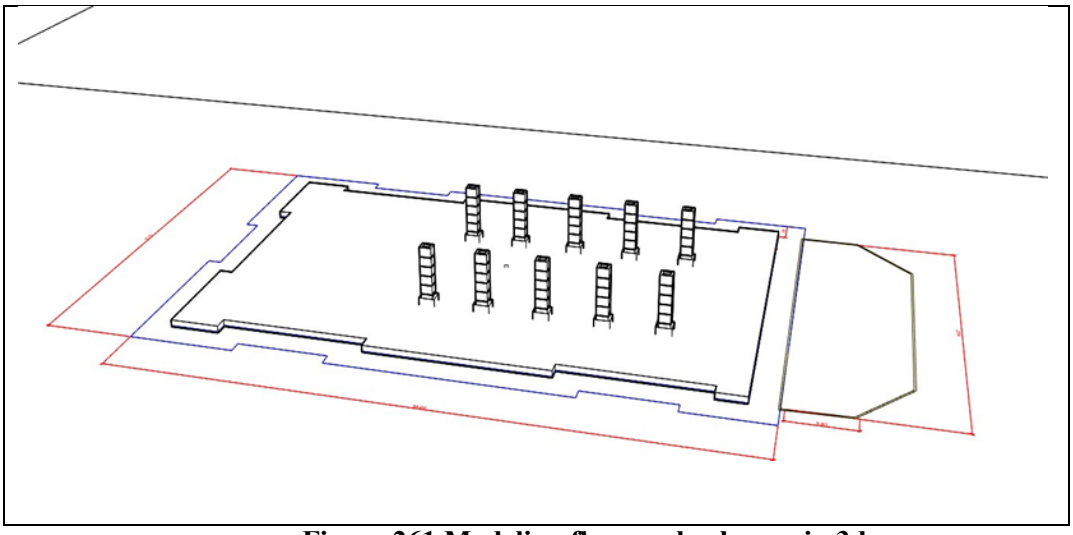

Figure 261 Modeling floor and columns in 3d

The current status of Temple B is not the same condition as seen in the sketches above. It was backfilled, and the columns seen standing in the drawing have fallen (see Figures 257, 258, 259). The walls are retrievable and the most important information regarding this built form was modeled accordingly (see Figure 260).

It is vital to point out some of the energetics data were not included in the model Temple B. These include marble and alabaster decorative flat panels that are of the same size as the columns' face (see Figures 261 and 262). Based on the size and the fact the columns of Temple B are chamfered (edge truncated, see Figures 257, 258 and 259), with a degree of certainty, we can state these were plaques used to cover the columns (see Figures 261 and 262). There are other more substantial plaques of decorative stones documented previously and during my fieldwork but are not included in the 3D models as well. The following figures area few examples available at the British Museum in

London taken after 1868 excavations at Adulis. Because of the ambiguous nature of some of the ornamentations I did not use all the materials that were no doubt part of the ancient architecture of Adulis. Thus, these models and the energetic analysis are conservative estimates of this built form. The models of the built forms in chapter 3 are minimally viable case scenarios than all-inclusive.

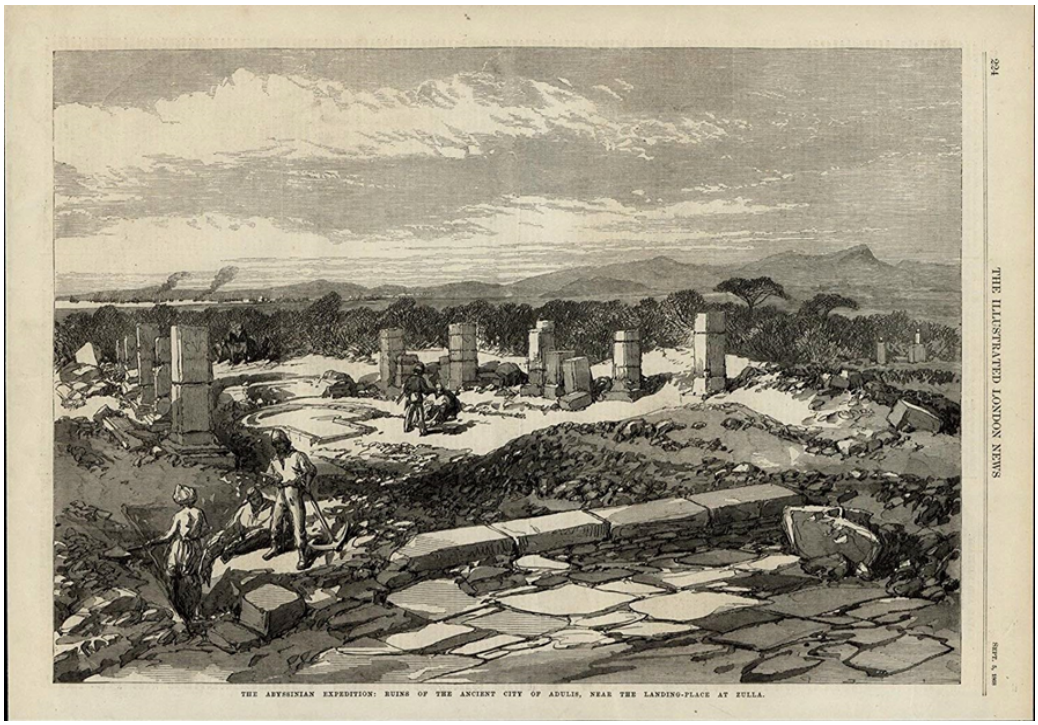

Figure 262 Temple B, Published in The Illustrated London News, September 5, 1868. Image source, Amazon, historical Fine Arts Collections, Accessed 2018. Note the workers digging Temple B's walls on the left bottom of the illustration.

Lastly, there are numerous column heads both in Temple B (see Figure 264) and other built forms that were not used in the models but certainly point to even more elaborate architecture than is found in the models.

Figure 263 Fallen Pillar of Temple B, in a backfilled pit.
Image source D.H.

Figure 264 Chamfered pillar block from Temple B

Figure 265 Another chamfered pillar block from Temple B

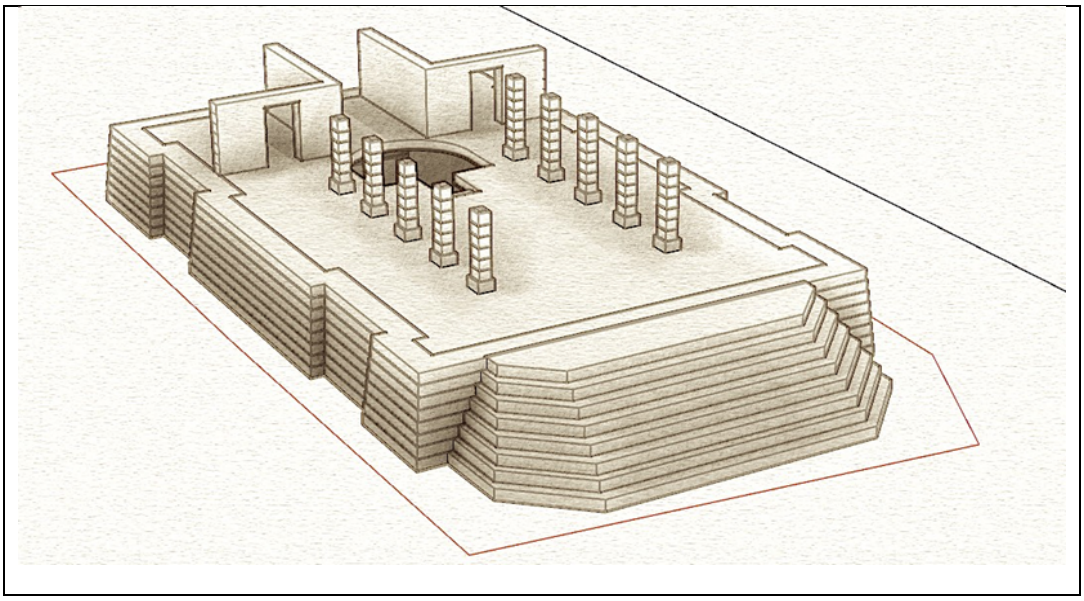

Figure 266 The model of Temple B.

Compare this model with the previous sketches and floor plans of Holmes

Figure 267Temple B's marble plaque

Image reproduced from Zazzaro (2013)

Figure 268Temple B's Marble plague

Image reproduced from Zazzaro (2013)

Figure 269 Temple B's marble plague,
Image reproduced from Zazzaro (2013)

Figure 270 Marble Column Head from Temple B,
Available at the British Museum. Image reproduced from Zazzaro (2013).

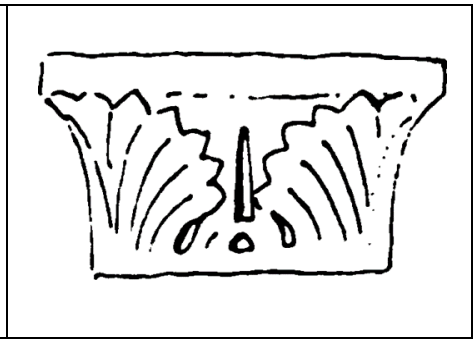

Figure 271 Illustration of Column Head from Temple B
Reproduced from Littmann (1913:165)

8.2.2 Court House

Richard Sundström excavated the Court House in 1906. The project at Adulis was part of the broader expedition to Abyssinia by Princeton University under Enno Littman's leadership. The colonial government suspended Sundström's excavations at Adulis due to partiality to Paribeni and Gallina who were Italians. In the brief moment before his suspension, Sundström unearthed the Court House. He reports the built form having two stairs on the west side of the structure and large rectangular columns, and he left us a description of his excavation and a building plan for the Court House in his report

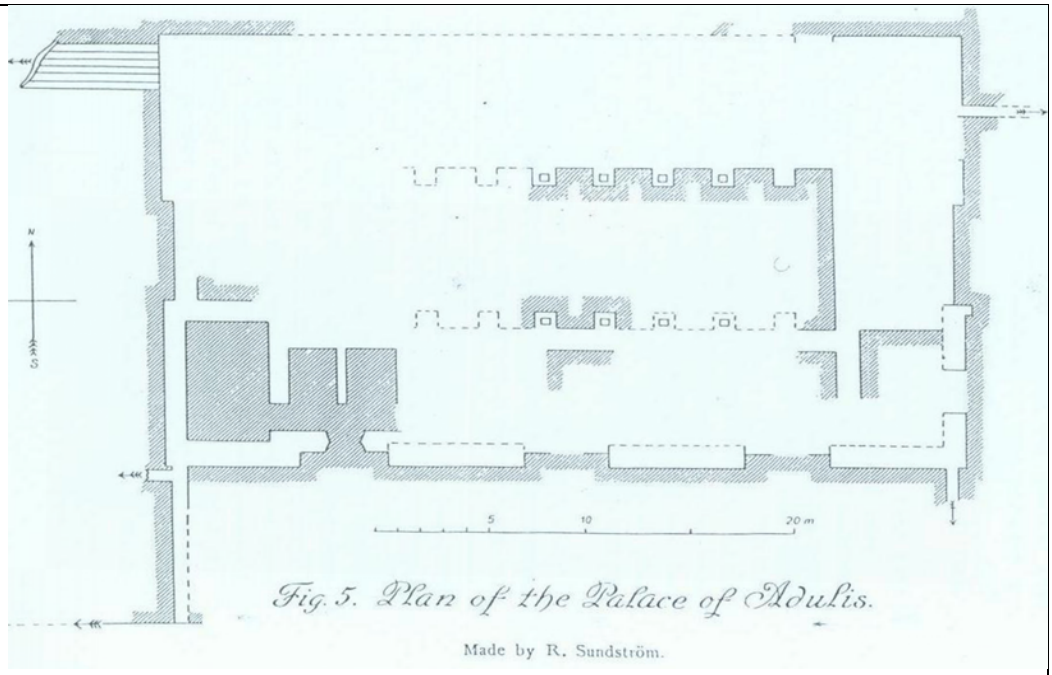

Figure 272 Sundström's plan of Court House.
Note the shaded area is the excavated one and the two rows of seven columns each and the location of the stairs on the west side of the built form.

(Sundström 1907). Figure 266 is Sundström's floor plan. The shaded area is the excavated area, and the lines are walls. There is a scale bar (Sundström provided a scale

of 7.3 cm to be 20 meters, and this represents the dimensions of the structure at Adulis correctly. The built form is 38 m long and 22.5 m wide.

Another illustration of the same built form comes from Littmann et al. (1913), a Deutsche-Aksum expedition, a German crew of researchers that swept the Northern Horn of Africa from Adulis to highlands' hinterlands and described and sketched everything they observed in the region in 1906. The floor plan by Littmann et al. (1913) reproduced in Figure 267 is much improved, in particular, with regards to the northerly wall features, column arrangement, and internal walls' position and width, and stairs place and the external wall thickness of the built form in contrast to that of Sundström's floor plan.

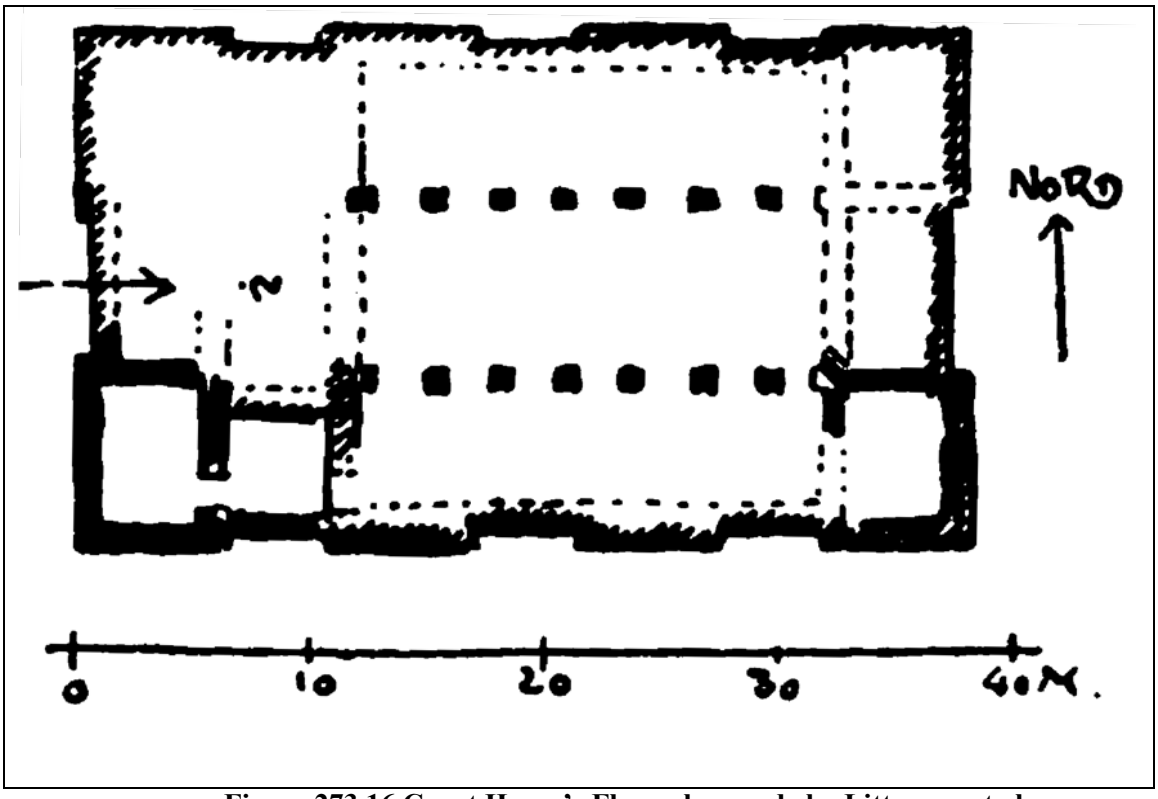

Figure 273 16 Court House's Floor plan made by Littmann et al.
In the Deutsche-Aksum expedition (1913:165)

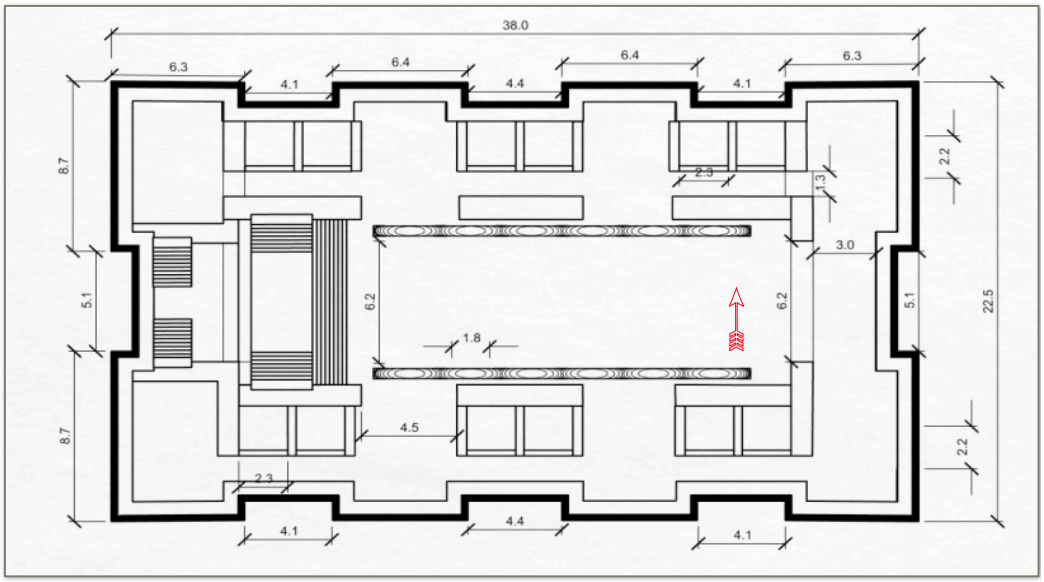

Figure 274 Floor Plan of Court House with respective dimensions

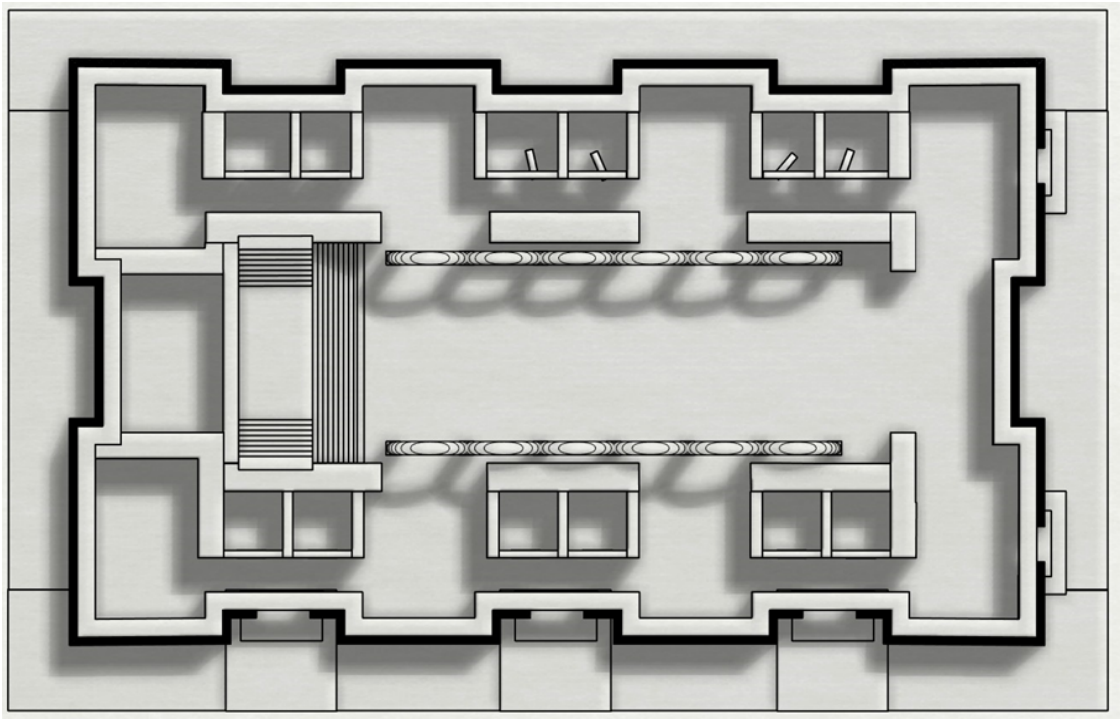

Figure 275 3D top view of Court House

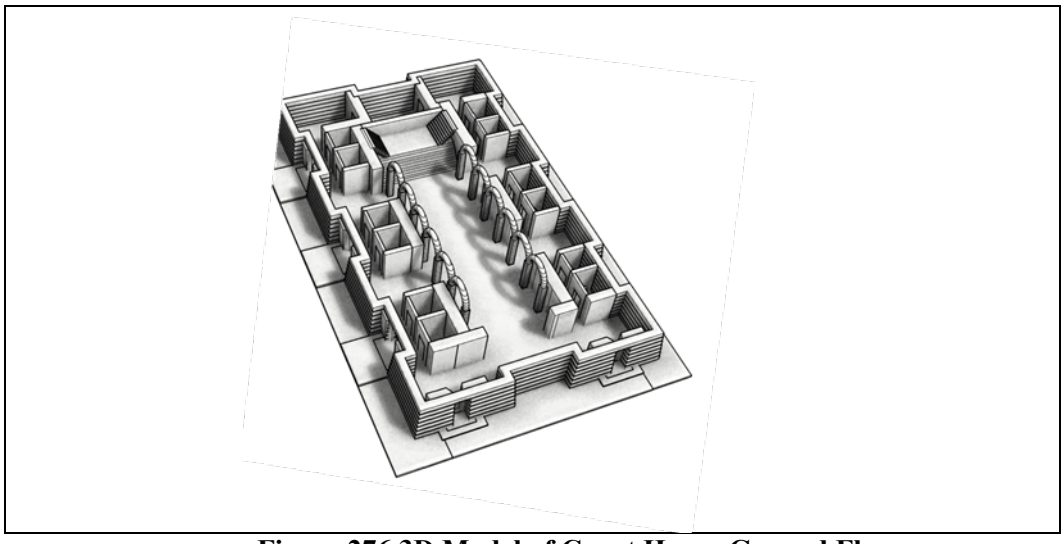

Figure 276 3D Model of Court House Ground Floor

The next illustration is based on my fieldwork supplemented by the above sources of the Court House walls which were retraced at the site, measurements taken and presented in Figure 268. The built form was further modeled based on physical evidence of graduated masonry, the rediscovery of the second set of stairs located at the most western part of the built form and internal wall structures (see Figures 269 and 270).

The current Court House structure is buried, and the site is backfilled. If Sundström (1907) is correct that the Court House has the largest columns in the entire site, it would be natural to ask where these larger columns might be. It is most likely that these larger columns were relocated a few kilometers along the sea coast in a place called Samadi. The most likely cause for their transport, according to the locals, is by Ethiopian soldiers to use them as trench enforcement during the 30-year Eritrea-Ethiopia war (1961-1991). I was not able to confirm these claims. Accordingly, these large columns' base and column body (see Figures 271 and 272, and for illustration see Figures 273 and 274) are not included in the energetics data of the Court House. Thus the dissertation

presents the minimum possible model until reliable data most likely from recent documents prove these columns were resettled.

Figure 277 Large column body from the Court House.
Image Source D.H.

Figure 278 Another Large column base from the Court House.
Image Source D.H.

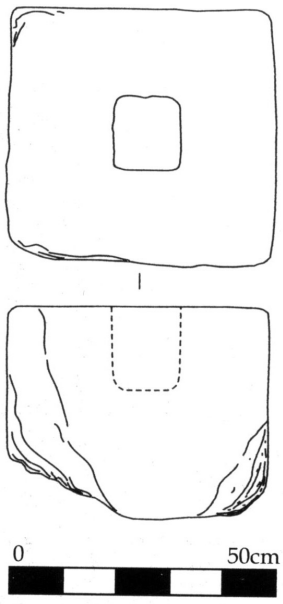

Figure 279 Large column body illustration.
Image reproduced from Peacock et al.(2007)

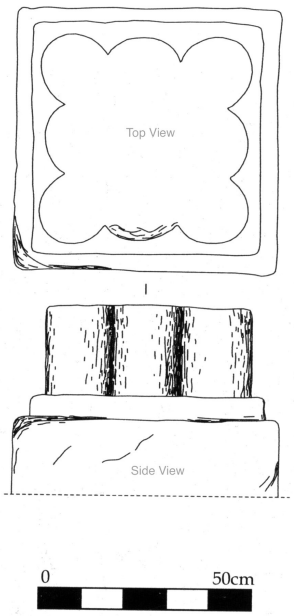

Figure 280 Large column base. illustration
Image reproduced from Peacock et al. (2007)

8.2.3 The Colonial Excavation at Adulis

In the year 1906ACE, the colonial governor of Eritrea, Ferdinando Martini, sent a request to Italy for archaeologists to excavate in Adulis. Colonial Italy responded by sending two distinguished Italian scholars. These were an archaeologist, Roberto Paribeni, who served as a director of Rome and Lazio Antiquities, as well as a professor at the Catholic University of Millan, and Francesco Gallina, who was a professor of Ethio- Semitic languages at the University of Naples "L'Orientale" (Paribeni 1907). Gallina directed the excavation and was in charge of investigating the coins discovered at Adulis; while Paribeni was the archaeologist at the site. This excavation at Adulis, by Paribeni and Gallina, was by far the most extensive excavation Adulis has ever witnessed. Aside from the Court House excavated by Sundström later joined by Littmann et al. (1913), British soldiers under Holmes who excavated Temple B, and Built form 20 excavated by Anfray, all the other structures are unearthed in this extensive archaeological excavation.

The colonial government significantly supported this research at Adulis by providing a multitude of workers, some of them skilled, such as Michele Checchi, an engineer assigned to Adulis to help with preparing topographic maps and building profiles of the entire site. The maps and floor plans by Checchi yielded valuable information about forms that are no longer visible. For instance, Checchi made a map of Adulis with all the structures mapped in a scale of 1:4000 (Paribeni 1907:439, Pl.1).

The colonial excavation yielded three key documents that are suggestive of the primary purpose of the colonial government in requesting this excavation at Adulis in the first place. These are: an excavation report (Paribeni 1907), a summary in the Bollettino Ufficiale Della Colonia Eritrea (Gallina and Paribeni 1907), and an article written by

Mancini (1908: 207) in the newspaper called Illustrazione Italiana formed for colonial indoctrination (Zazzaro 2013). All these works, in varying degrees of weight and emphasis, advanced a colonial perspective. The imperial attitude, that profoundly promoted research at Adulis, advanced the Sabeans (South Arabian) first, then the Roman Empire as responsible for the spread of civilization in Northern Horn of Africa. Colonial Italy, as the successor to the Roman Empire, accordingly is only playing its proper role in guiding the Northern Horn's participating in the modern world economy (Conti Rossini 1928:91-108).In a rather extreme case, Adulis was promoted as a principal center established by the Romans (Romanelli 1930, Zazzaro 2013:13). There is ample Roman Amphora at the archaeological record of Adulis that can be pointed at, used as evidence, to promote such interests instantly.

8.2.4 Temple A

Paribeni (1907) discusses this temple in detail, and called it *Temple of the Sun.* He also discusses the surrounding area's built forms. Temple A and surrounding built forms are drawn as well most likely by Checchi (see Figure 275). The plan has a scale of 1:200. The dissertation aptly utilizes the naming convention used by Paribeni to have uniformity and avoid misunderstanding. In 1907, Temple A and surrounding buildings were backfilled immediately after excavation, the backfilling contributed to the walls in Temple A and surrounding buildings to be better preserved than, for instance, built form 8, which deteriorated because it was left open. Further, relative experience in excavating walls by the excavators taught them not to tamper with the walls because now they could distinguish walls clearly, unlike the damage they did on walls of built form 1, 2, and built form 3. In recent times in 2011, this area was opened by archaeologists from National

Museum of Eritrea, the CeRDO (Eastern Desert Research Center) University of Siena (See Figures 284 and 285) and Università Cattolica of Milan.

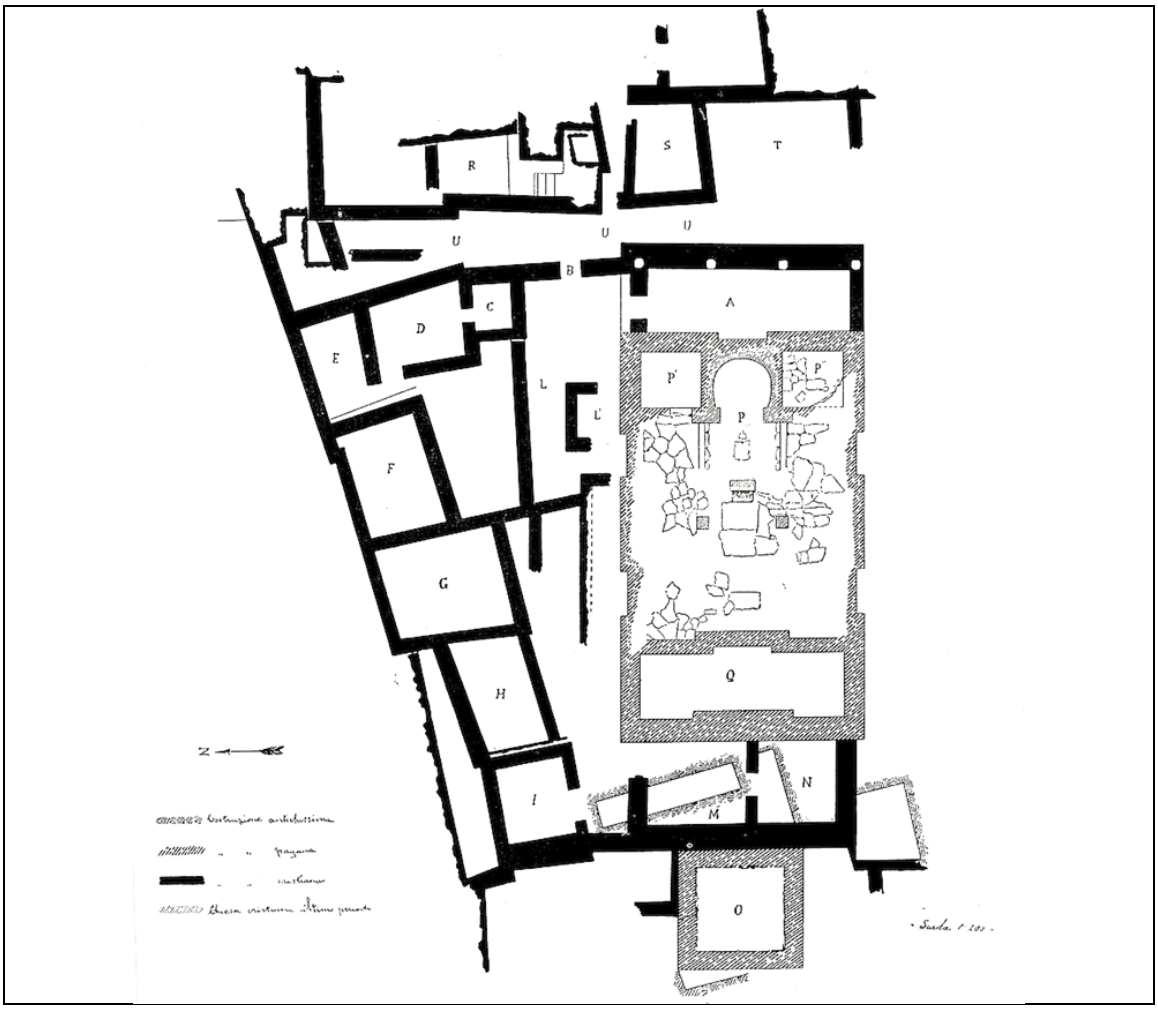

Figure 281 Plan of Temple A and surrounding built forms.
Reproduced from Paribeni (1907)

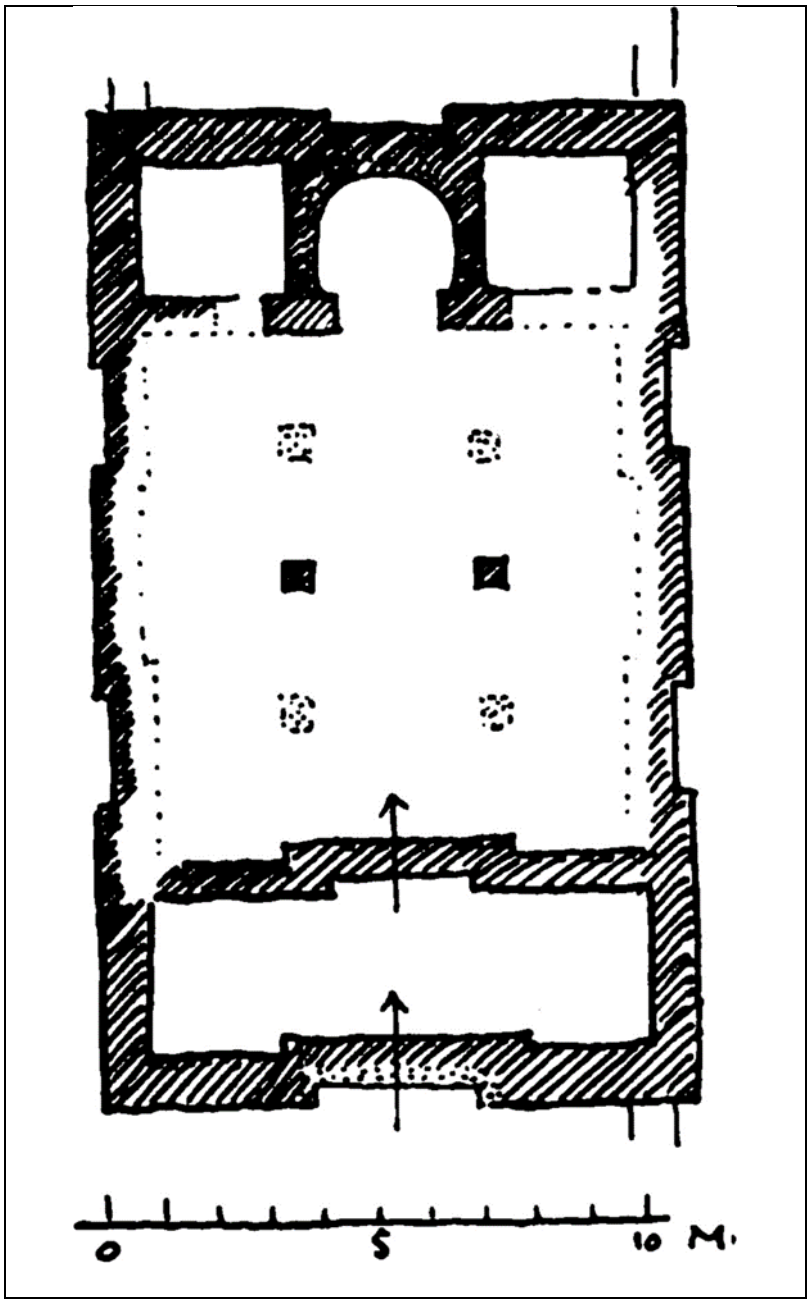

Figure 282 Floor plan of Temple A made by Littmann et al.

In the Deutsche-Aksum expedition (1913:166)

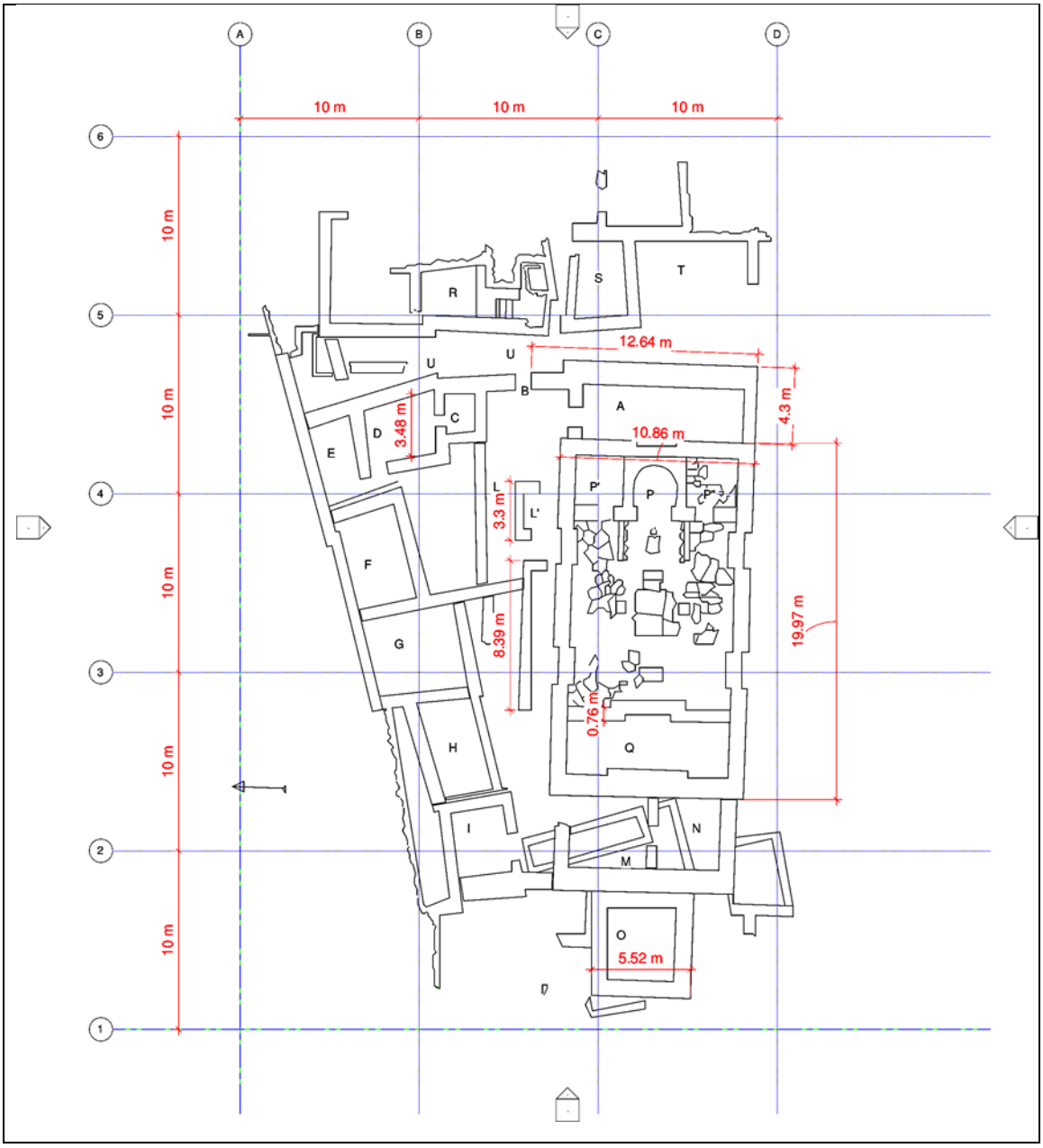

Figure 283 Temple A and adjacent built forms

Mapped and measured after my field work ready for 3D modeling.

Figure 284 Temple A southern walls excavated by Paribeni.
Note the six courses visible. Image reproduced form Paribeni (1907)

Figure 285 Northwest corner of Temple A,
Note this area is where the Temple ends and built form A is attached.
Note the six visible courses of Temple A. Reproduced from Paribeni (1907)

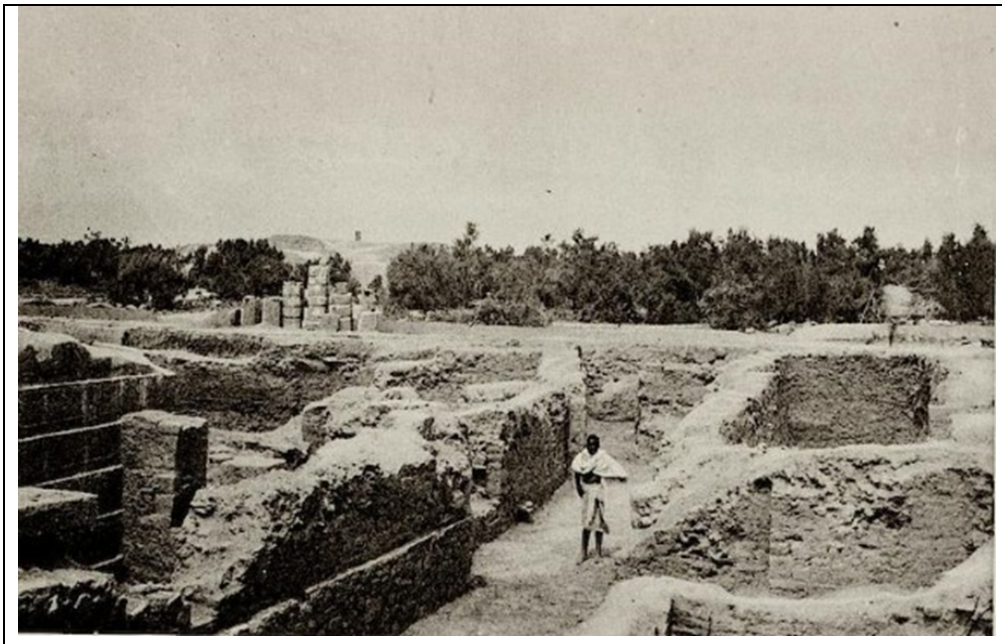

Figure 286 Northwest part of Temple A and adjacent built forms.

The individual in the picture is standing at street U (see Figure 276) or see the red hexagon in Figure 282 where the person location is on the 3D model. Also note the columns at the center left of the picture, all these came from Temple A Picture reproduced from Paribeni (1907).

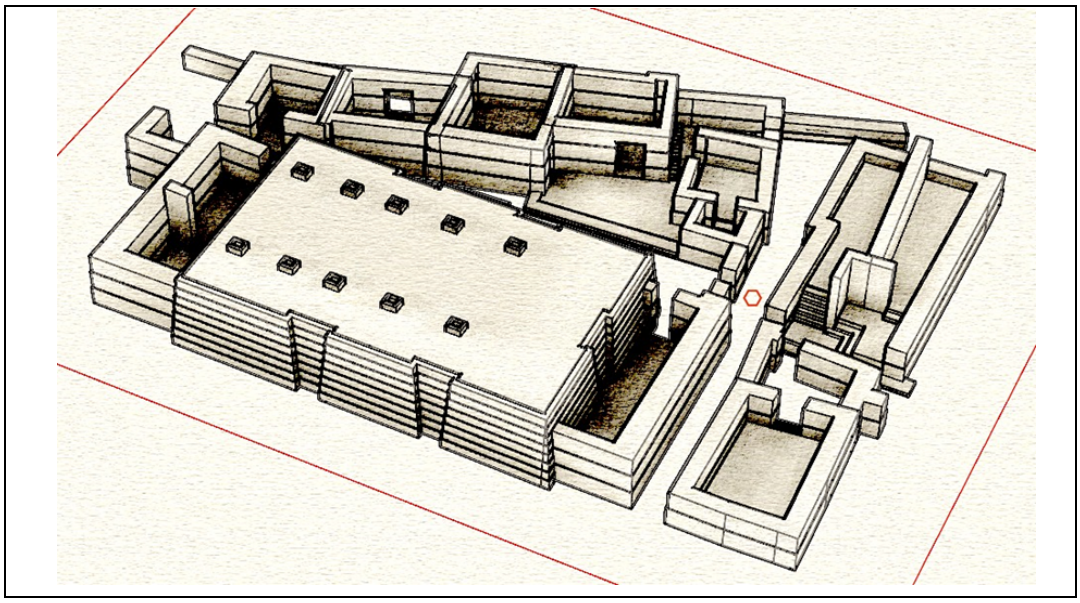

Figure 287 A 3D model of Temple A and surrounding.
Note the street where the red hexagon is the same street that the individual in Figure 281is standing

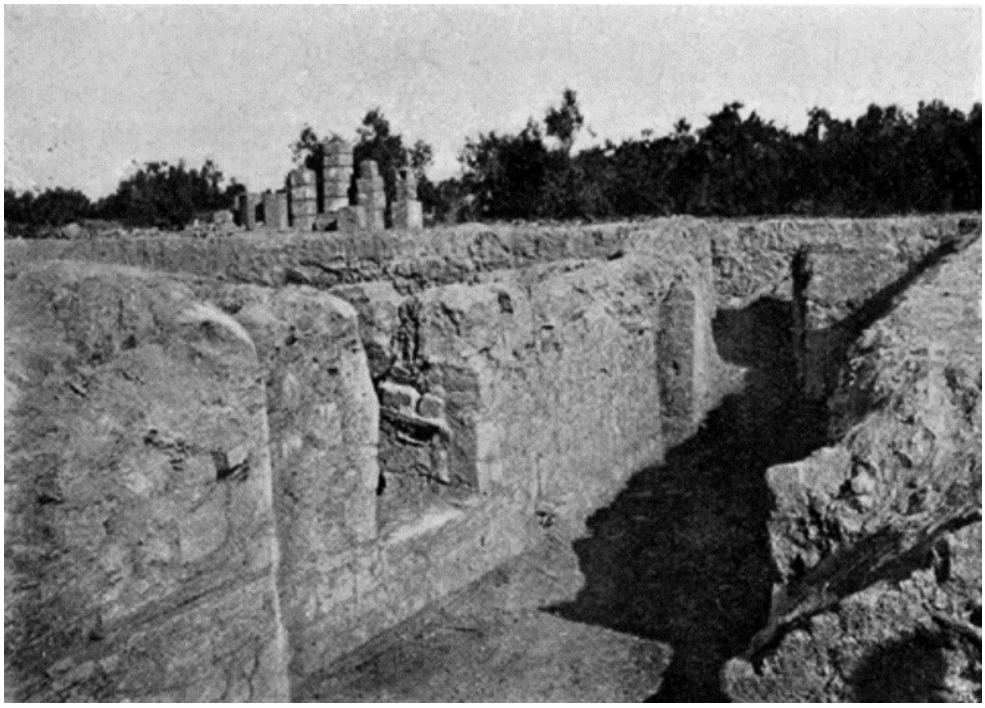

Figure 288 Temple A excavation image.
Note this image and Figure 281 have columns that came from Temple A, counting these contributes to the height of the columns used.
Image reproduced from Romanelli (1930).

Figure 289 Temple A excavation image,
Facing built form C, D, and E. Image reproduced from Paribeni (1907).

Figure 290 Re-excavation at Temple A in 2011.
Note the stone stairs at bottom of the picture (not the dirt stairs used by archaeologist to climb up and down).
Image Source Solomona Abraha 2014

Figure 291 A Re-excavation at Temple A in 2011
This was done by Università Cattolica of Milan. Note the quality of masonry of Grade A in temple A. Image source Diego Salinas

8.2.5 Temple C

There are two sources of information for Temple C, one comes from Paribeni (1907) report (see Figure 286), and another comes from Littmann et al. (1913:167) (see Figure 287). Paribeni's floor plan has a scale of 1:200 while that of Littmann et al.

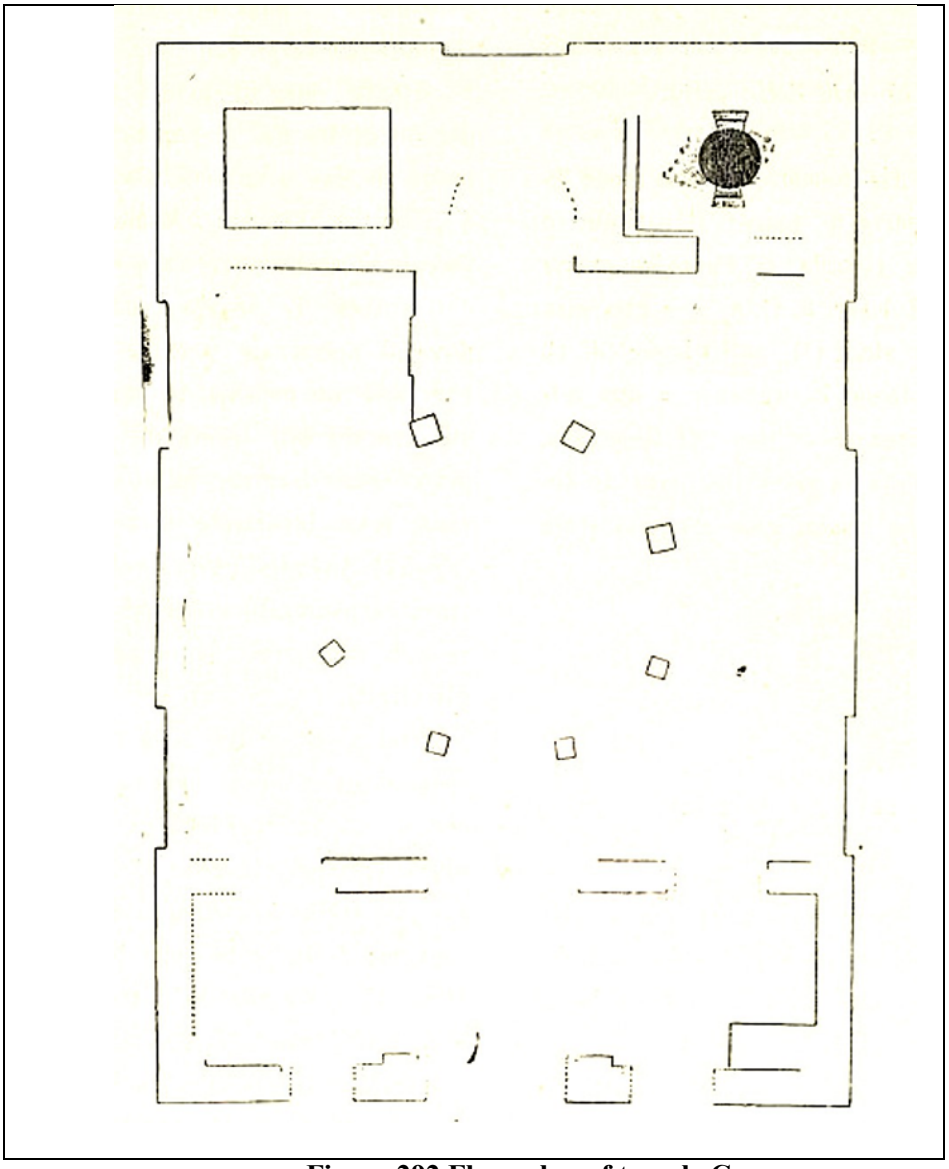

Figure 292 Floor plan of temple C.
Image reproduced from Paribeni (1907). The scale of this plan is 1:200 as described in the text of Paribeni.

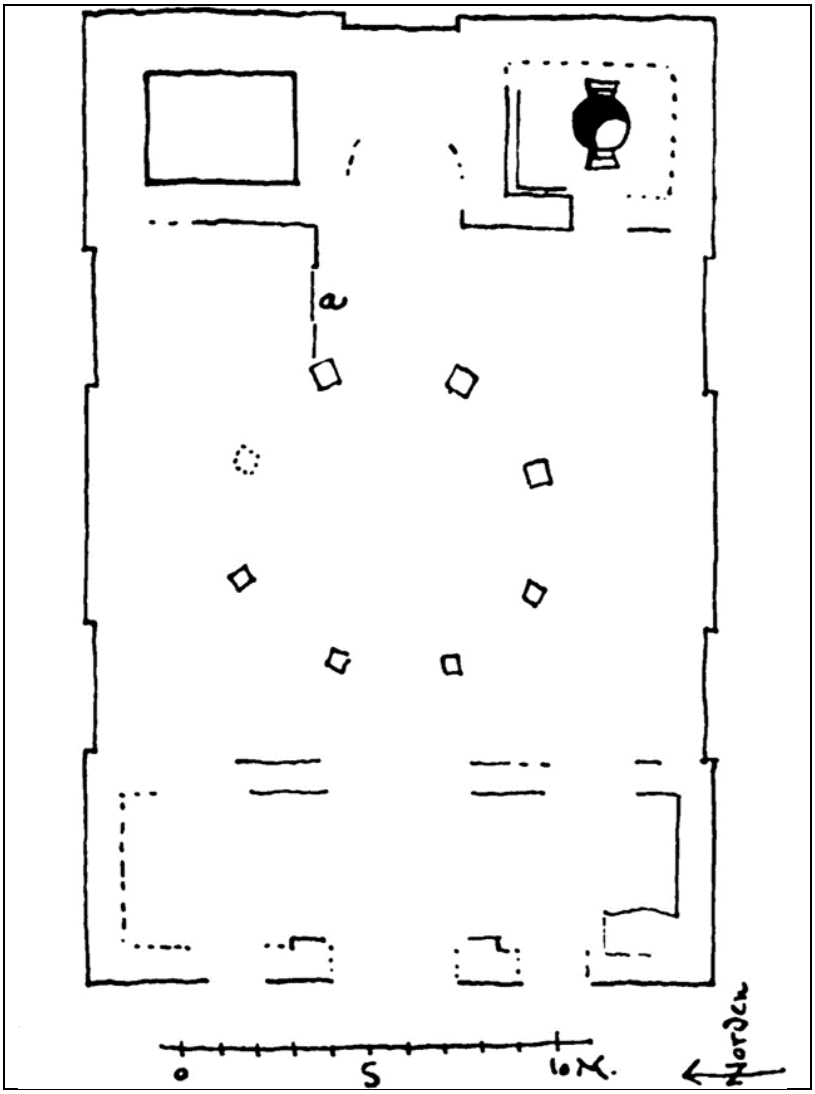

Figure 293 Floor plan of Temple C made by Littmann et al.
In the Deutsche-Aksum expedition (1913:167)

(1913) has a scale bar of 10 m. The wall thickness can be easily retrieved from fieldwork notes. Then it was modeled in 3d based on this vital information.

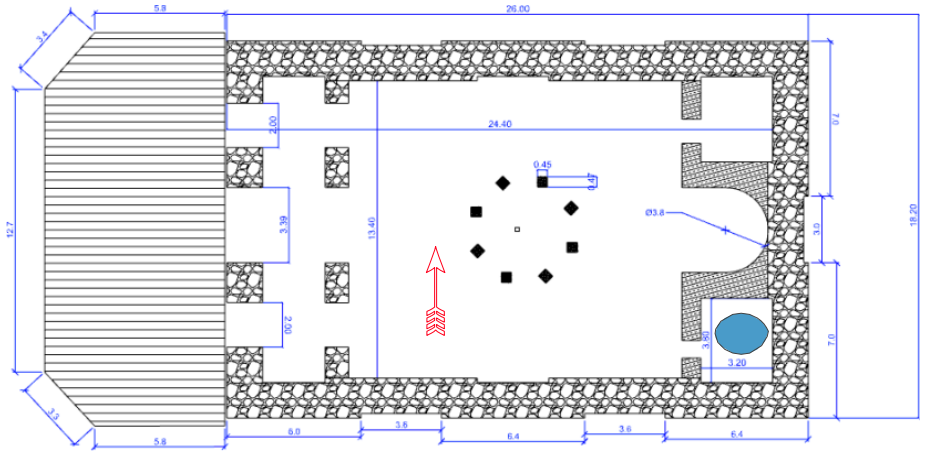

Figure 294 Temple C floor plan wish dimensions

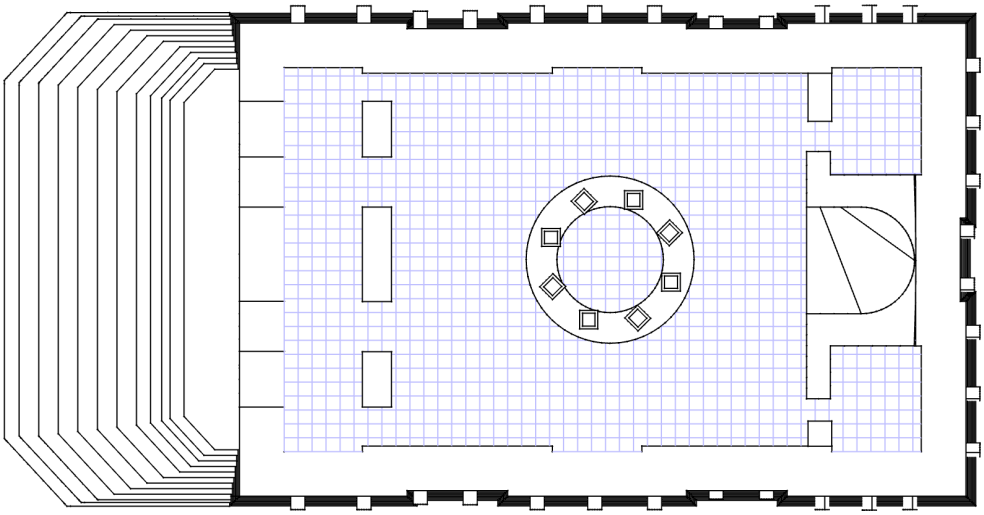

Figure 295 Top view of a 3D model of Temple C

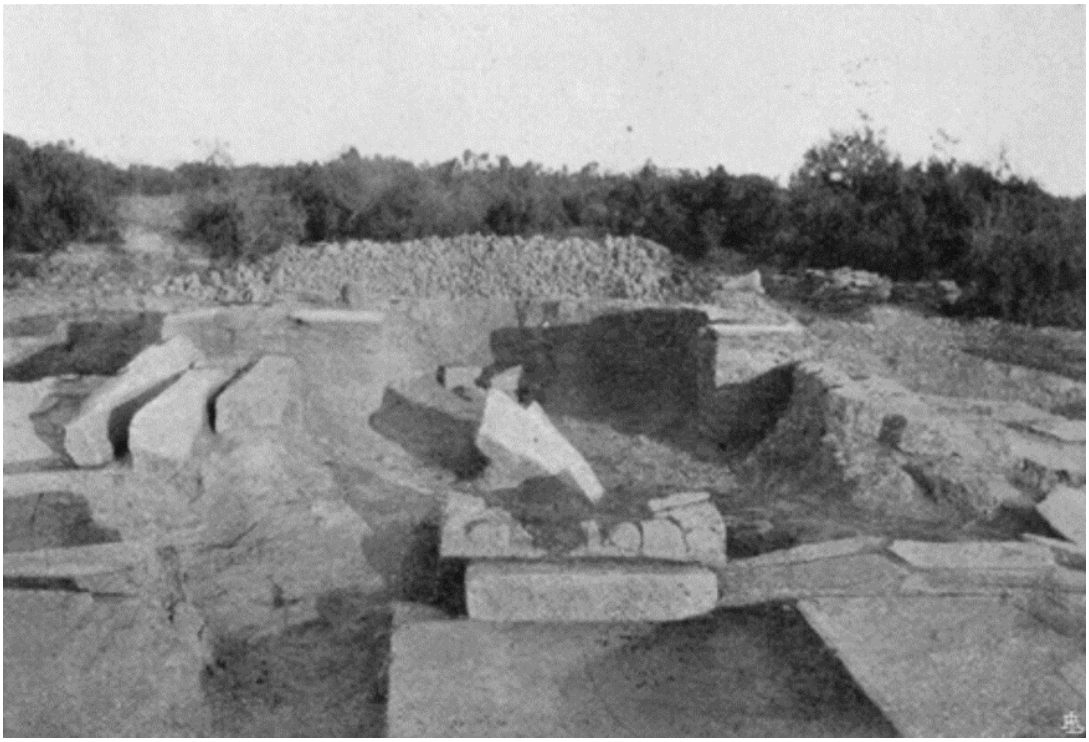

Figure 296 Temple C excavation image.
Reproduced from Romanelli (1930)

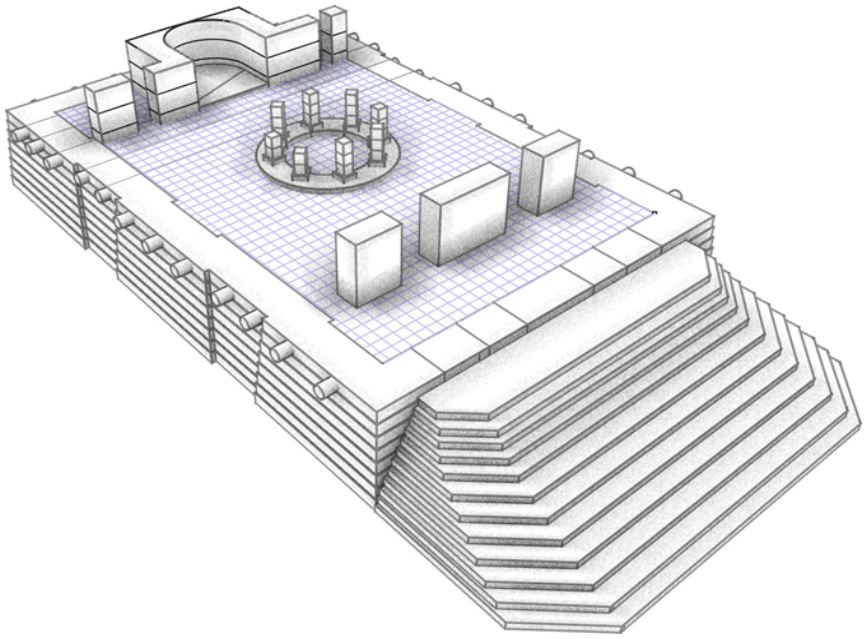

Figure 297 Perspective view of a 3D model of Temple C

8.3 Private Residences at Adulis

The only excavations that affected private residences field records are the report of Paribeni (1907) and Anfray (1974). The focus on Palaces and Churches and not ordinary folks are consistent with the colonial era presented earlier. The motive of Anfray's 1961 excavation at Adulis was entirely different, to prove Adulis was an Aksumite port. The next section will address these two reports. Both these excavation pits of private residences built form 8 from Paribeni and built form 20 from Anfray were left open without being backfilled and thus deteriorated subsequently.

8.3.1 Built form 8

Paribeni excavated built form 8 and called these structures private residences of Haddas River. Haddas River is a river nearby to these residences located on the south section of the town (see Figure 251). There is an image (see Figure 292) and floor plan (see Figure 293) made by Paribeni (1907) that details built form 8 graphically. The floor plan has a scale of 1:200 and designates the north, the center and the south parts of the structure. Further retracing and measuring were done during my fieldwork (see Figure 294) to complete some of the missing walls in Paribeni's report.

Figure 298 Built form 8 from 1907 colonial excavation.
Reproduced from Paribeni (1907)

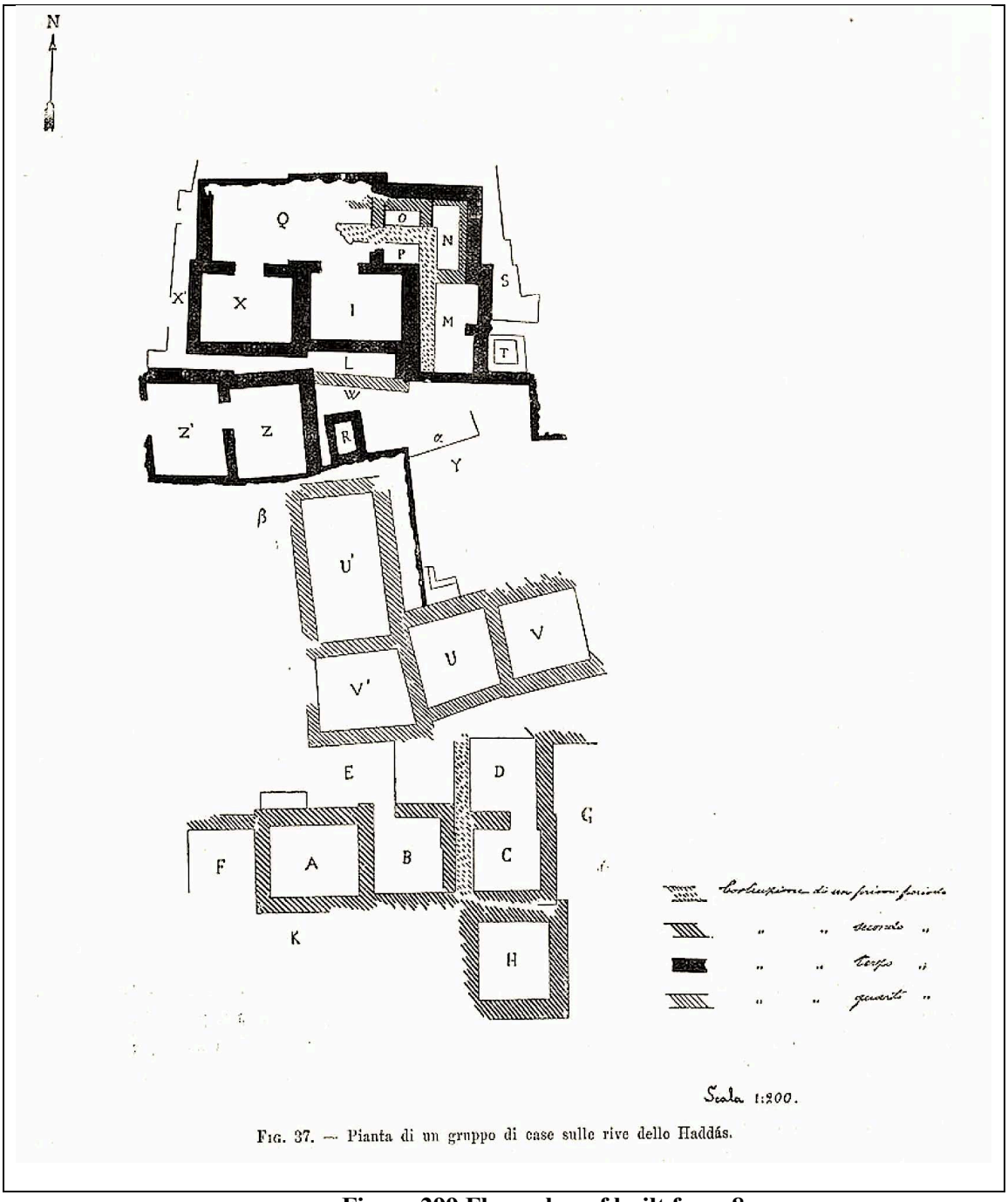

Fig. 37. — Pianta di un gruppo di case sulle rive dello Haddás.

Figure 299 Floor plan of built form 8.
Reproduced from Paribeni (1907).

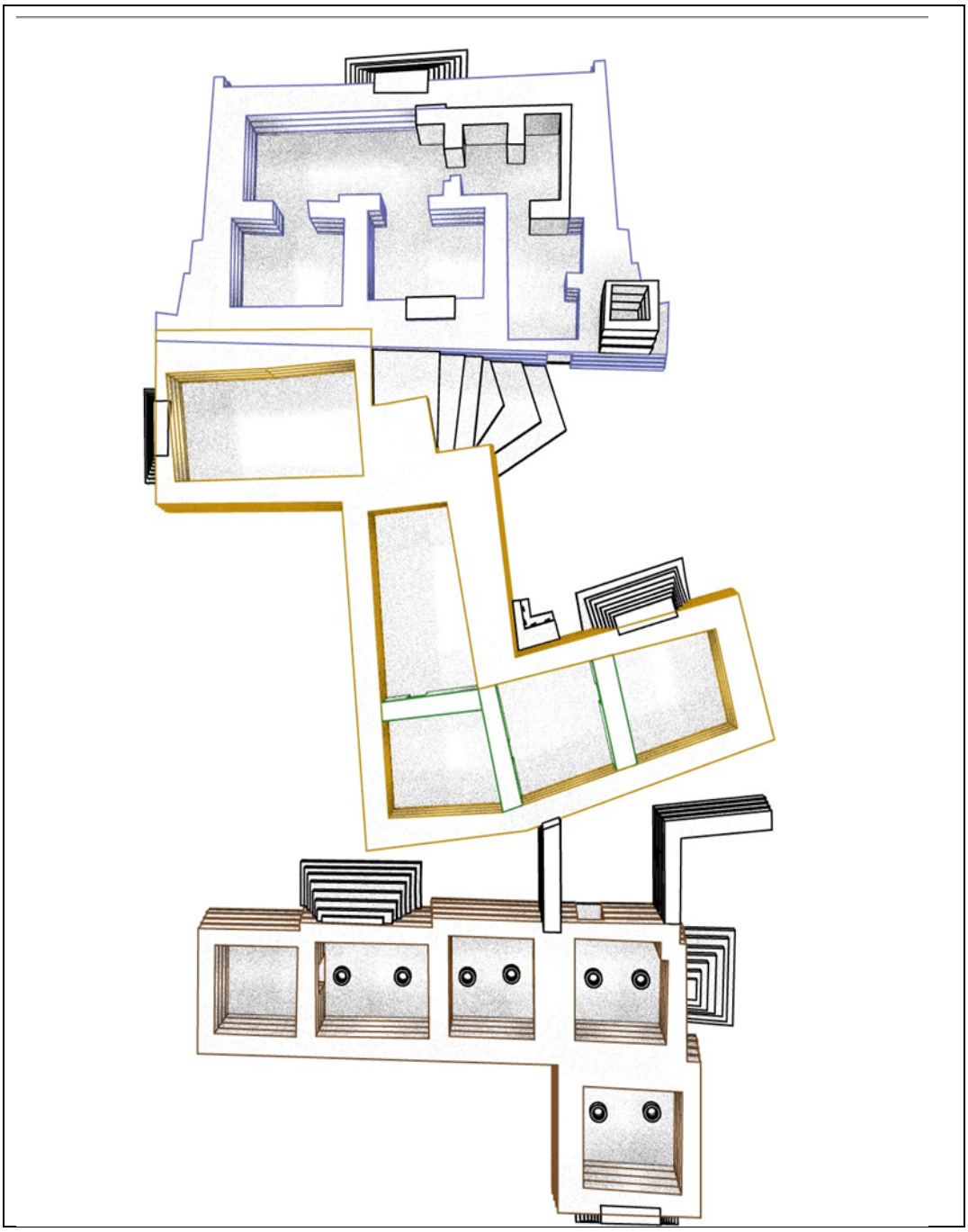

Figure 300 A 3D model of built form 8

Figure 301 Built form 8 current status,
Deteriorating excavation pit for being left for open. Image Source DH

8.3.2 Built form 20

Francis Anfray led excavations of built form 20 in the 1960's. The excavation at Adulis was part of several archaeological digs at sites in Eritrea. Anfray directed the Ethiopian Institute of Archaeology established by Emperor Haile Selassie (Ras Tafari) to prove Eritrea was part of Axum, hence justifying annexation on historical grounds. Anfray (1974) published this Adulis report as part of a large book. His excavation sketch of built form 20 at Adulis was useful (see Figure 296). A considerable effort was made to ground-truth the data on the floor plan the same method applied to all others to redraw as shown in Figures 297, 298 and 299.

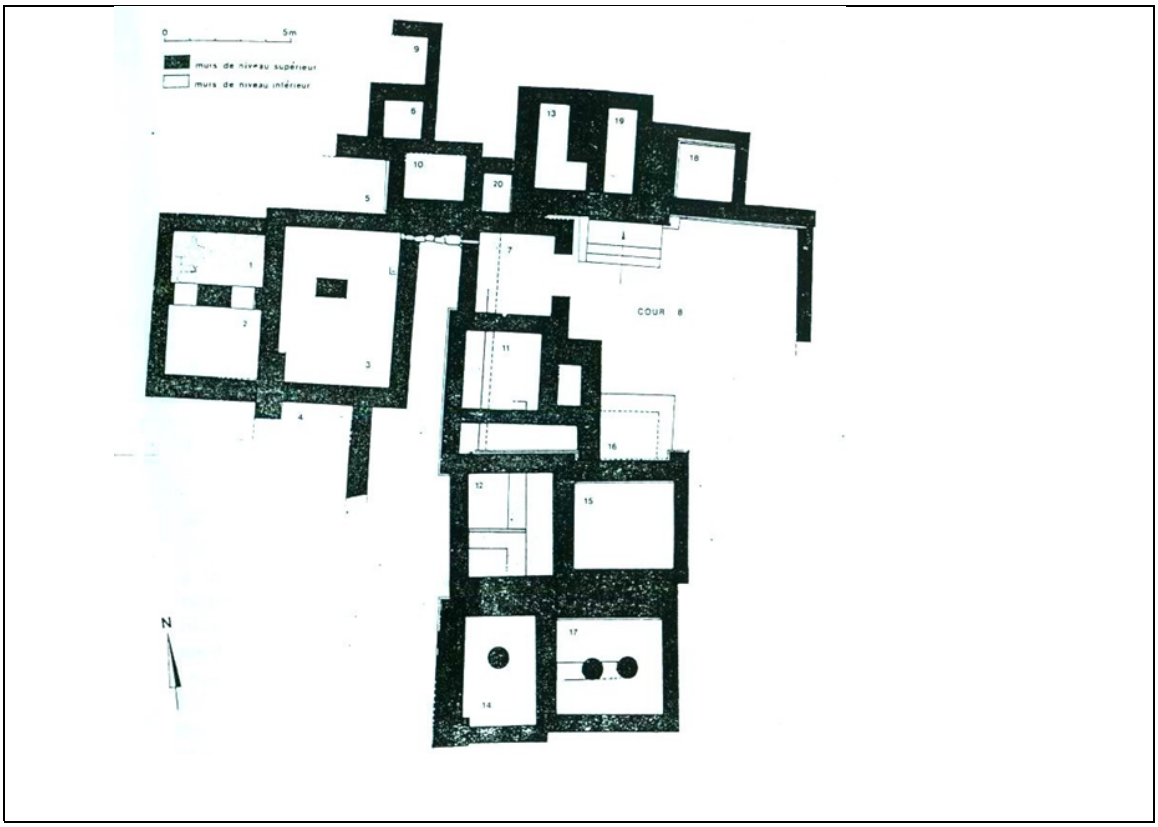

Figure 302 Plan of built form 20.
Reproduced from Anfray (1974).

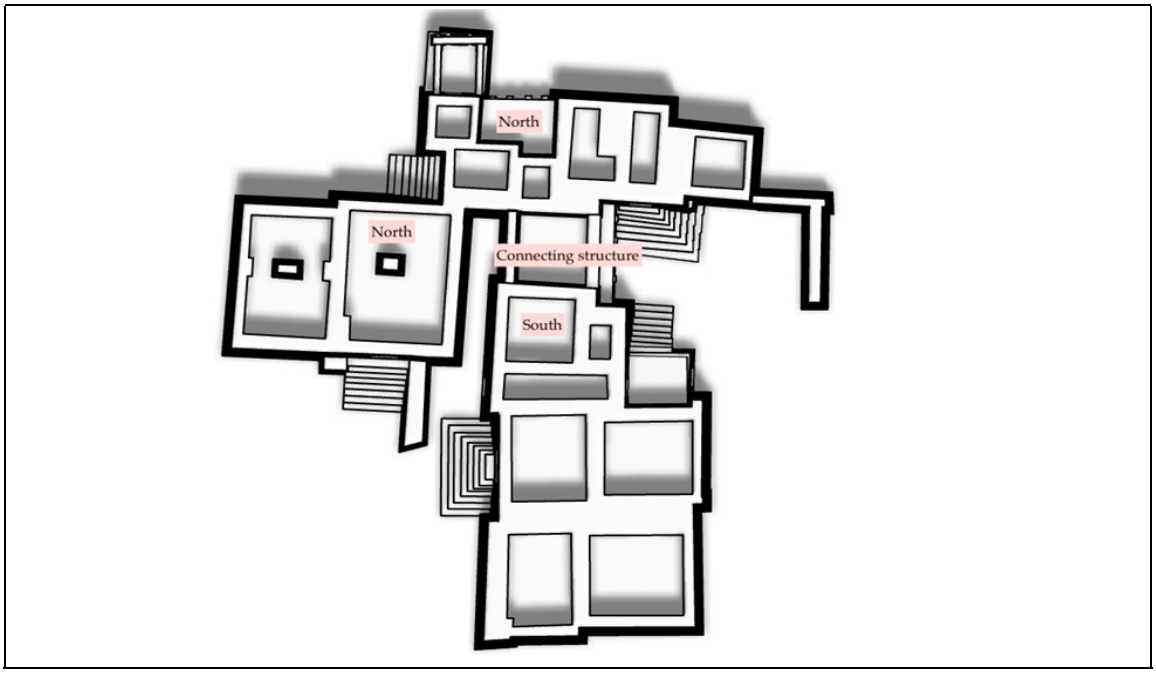

Figure 303 A 3D Model of built form 20 top view.
Compare this image with Fig A.38

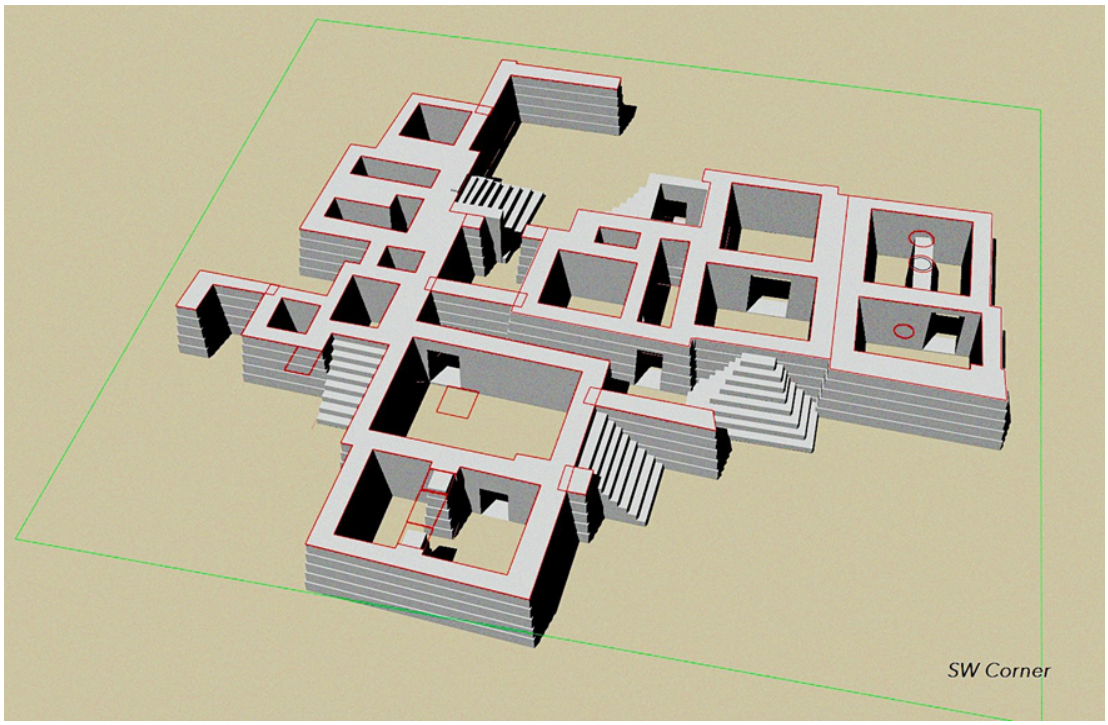

Figure 304 A 3D Model of built form 20

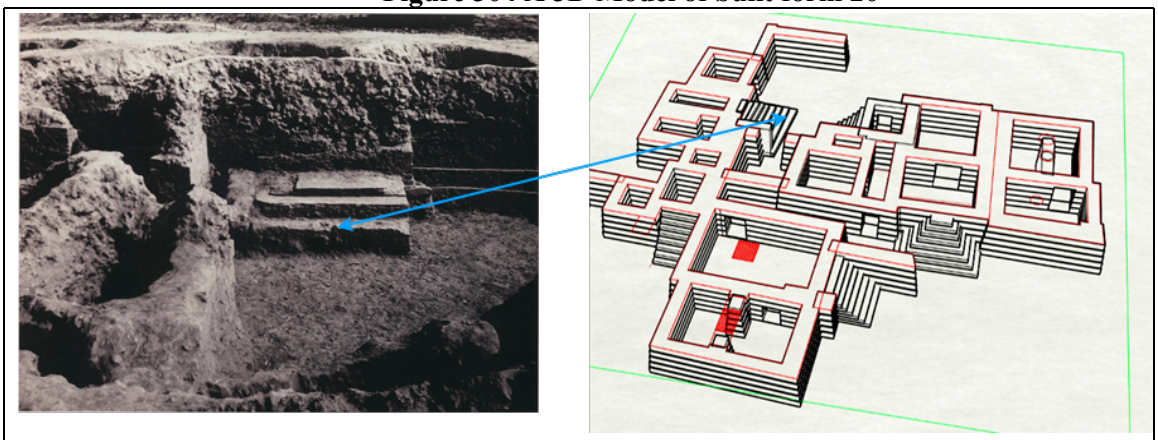

Figure 305 Stairs of built form 20 in Excavation (left) and 3d Model (right)

Reproduced from (Anfray and Zazzaro 2016)

Figure 306 Excavation picture of built form 20.
Note the wall grade (Reproduced from Anfray and Zazzaro 2016)

Figure 307 Excavation picture of built form 20.
(Reproduced from Anfray and Zazzaro 2016)

Figure 308 Current status of built form 20.
Image source DH.

Figure 309 Columns and Capitals from Adulis.
Image reproduced from Romanelli (1930)

8.3.3 The Remaining Private Residences at Adulis

Paribeni's (1907) report is the only excavation report that excavated many private houses at Adulis. The level of detail description given to ordinary homes is not the same as that of elite residences such as churches and palaces. Colonial engineer Checchi's sitemap (see Figure 304) is a different matter. Not having archaeological training but another discipline has helped in this case, that the residences on his plan enabled me and others to locate these built forms at the site Adulis. Once situated retracing and collecting the necessary information becomes part of the fieldwork. Checchi's site plan has a scale of 1:4000 and uses the same numbering system used in this dissertation. The only difference is that Temple B is outlined as structure 10, Temple C as 11, Court House as 12, and Temple A as 13, the remaining are the same as the dissertation.

Checchi's sitemap is slightly different than my site plans listed in Figures 250 to Figure 252. This difference is due to many scientific advances in recent years than when Checchi was plotting his map in 1907.

Other colonial source photographs were also published by the colonial propaganda office that have useful pieces of information but it is challenging to place these artifacts in situ. For instance, observe Figure 303, an image of capitals and columns from Adulis by Romanelli (1939), a colonial propaganda officer. Some these columns and capitals are not reported in any of the excavation reports.

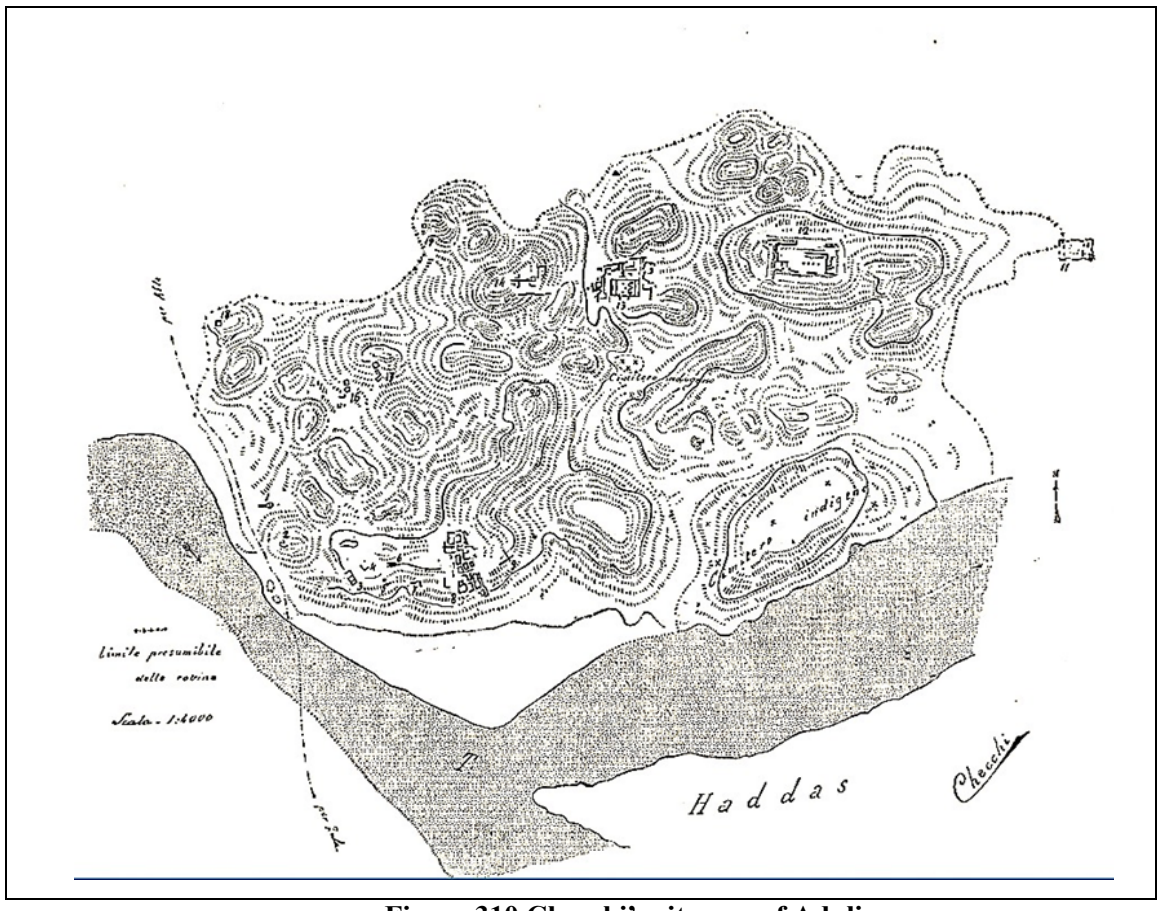

Figure 310 Checchi's sitemap of Adulis

It compiled during 1907 excavation at Adulis. Note the same numbering system of residences is used in this dissertation for consistency

8.4 How built form's height is inferred

Graduated masonry type of building while presenting all kinds of challenges, for instance, to measure its volume, is much easier and predictable when it comes to height estimation of a given built form unlike for example straight walled structures.

8.4.1 Wall Thickness Method

With graduated masonry, a building in courses reduces wall thickness as you move up from the foundation (see Figure 305). How high these walls go is dependent on wall thickness and it is physically impossible to run another course when you reach to .30 m. Most walls terminate at .4 m thickness that is the last course documented. Further, in built forms discovered with this masonry, such as Aratu structures that were built up to 8 m started at the foundation with a 1.65m thickness course and the uppermost course being 0.90 m thick. That is, the first course is 1.65 m thick, the second 1.60 m, the third 1.55 m, the forth 1.50 m and so forth.

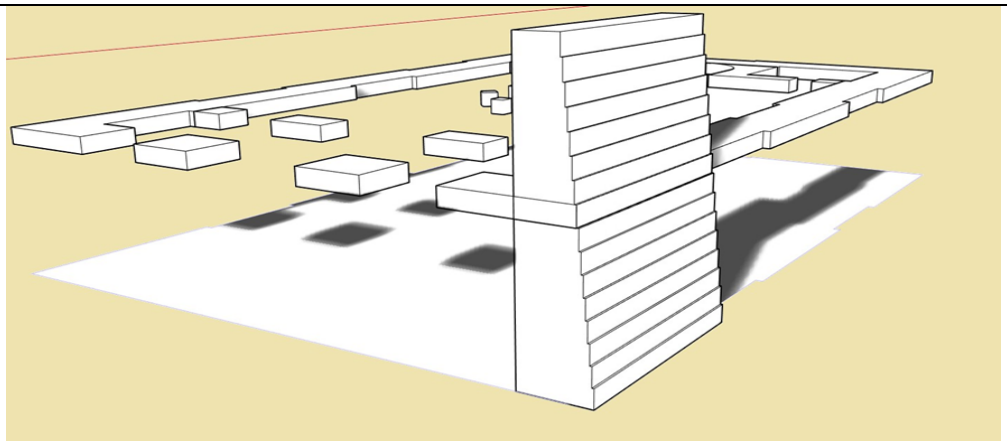

Figure 311 Graduated masonry thickness reduction from foundation to upper walls.

This understanding enables any keen researcher to infer a height of a given built form from a few courses of walls discovered at the site. For instance, built form 1 is documented as having seven courses with stairs which easily allows for an estimation of the height based on the wall thickness of the last course. The upper course is 0.05 m less in width from the previous course, while the lower course is thicker by 0.05 m. Built form 1 for instance, is modeled to 4 m from the living floor, which is the usual height (3-4 m) at Adulis. Where the windows are placed, and the elevation to the door and stairs are also great indicators of the height of a wall. For instance, there needs a space of 1 m (that is two courses of .50 m) between the door and roof so if there is an indication in the wall the door was 2.3m it is definitely 4 m while in many structures where the door stops at 1.8m these built forms were modeled as 3 m. Adulis' built forms are conservatively modeled only to a first floor except for Courthouse (because of two internal stairs leading the way) which provided evidence of a second floor, and are modeled to a second floor accordingly.

8.4.2 Column Length Method

Another good indicator of a built form's height for public built forms with very thick walls that could have a very high height such as Temple A, is the column length. The columns although they seem similar upon closer examination vary by a matter of a few centimeters. This observation is essential to group columns together based on their length (see Figure 308).

For instance, in figure 308 that is what Paribeni did because he discovered them in one place. Similar groupings can be made for other columns. Short columns are responsible for carrying the heavy load of a choir or pulpit as illustrated in Figure 308.

Once these short columns are placed then the next inference would be evaluating whether Adulis builders preferred to add five or more blocks on the short columns and make longer columns so that the roof can be supported by short beams or would it be possible to get cypress and/or wild olive trees of 12 m long or 19 m long (dimension of the Temple A, See Figure 309).

Both are possible although the second option is harder. Only short wood was discovered at Adulis. Then looking at the archaeological material favors longer columns (see Figure 280 and Figure 282). All these columns came from Temple A, and more at a site and in the excavation report. And with a degree of certainty, longer columns were used by fitting more blocks than longer wood. How high Temple A goes from pulpit or choir will be contingent upon a standing distance from the pulpit or choir. Why make a choir or pulpit if you can't stand in it or sit on it thus, the minimum possible height would be five blocks from the choir (1.8-2 m). How do we know about the choir? The stairs are a giveaway, why build a stair meticulously if not intended for climbing up, in this case, to the choir.

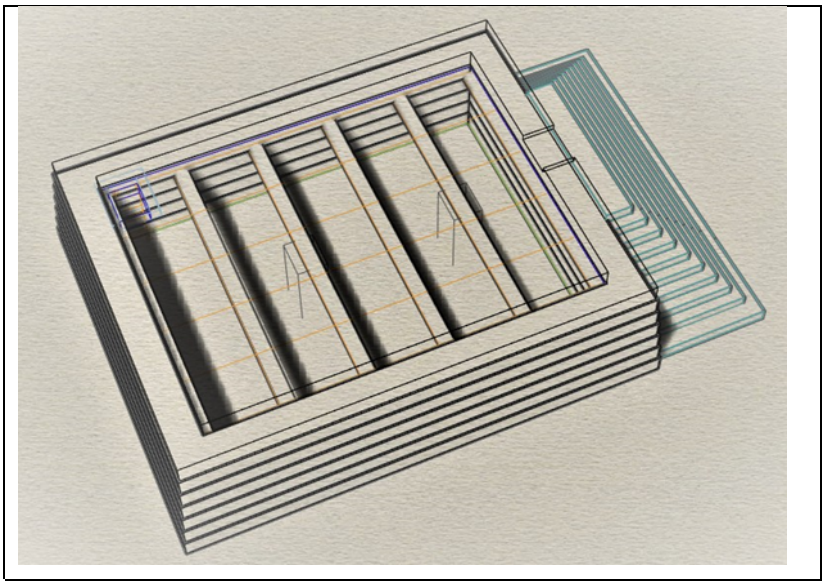

Figure 312 built form 1 documented at Adulis.

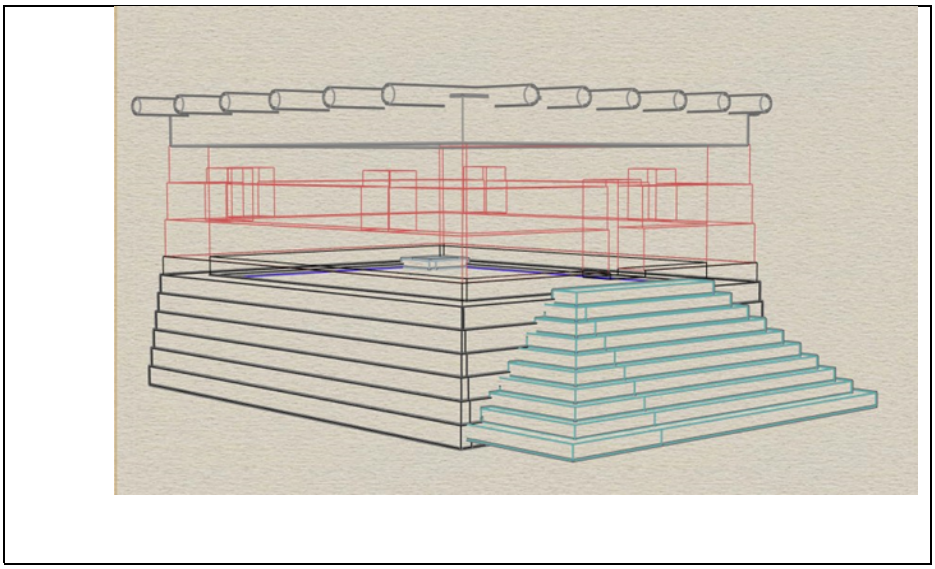

Figure 313 3D model of built form 1 with the upper (red lines) walls inferred

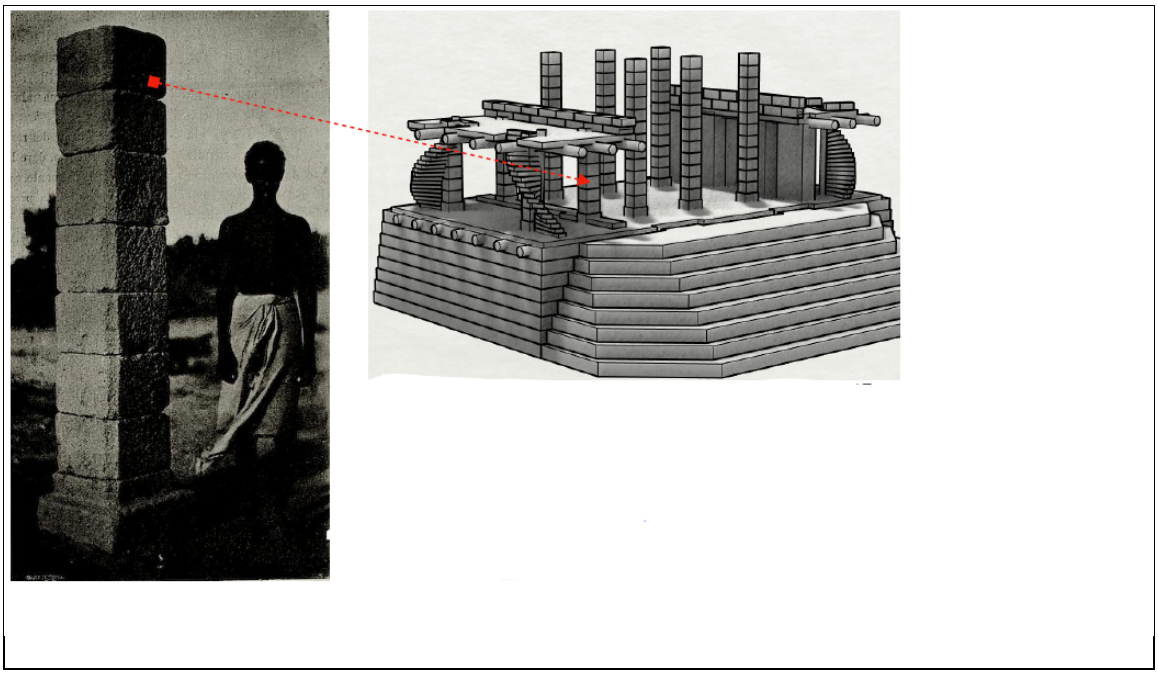

Figure 314 Columns from excavation assisting 3D modeling

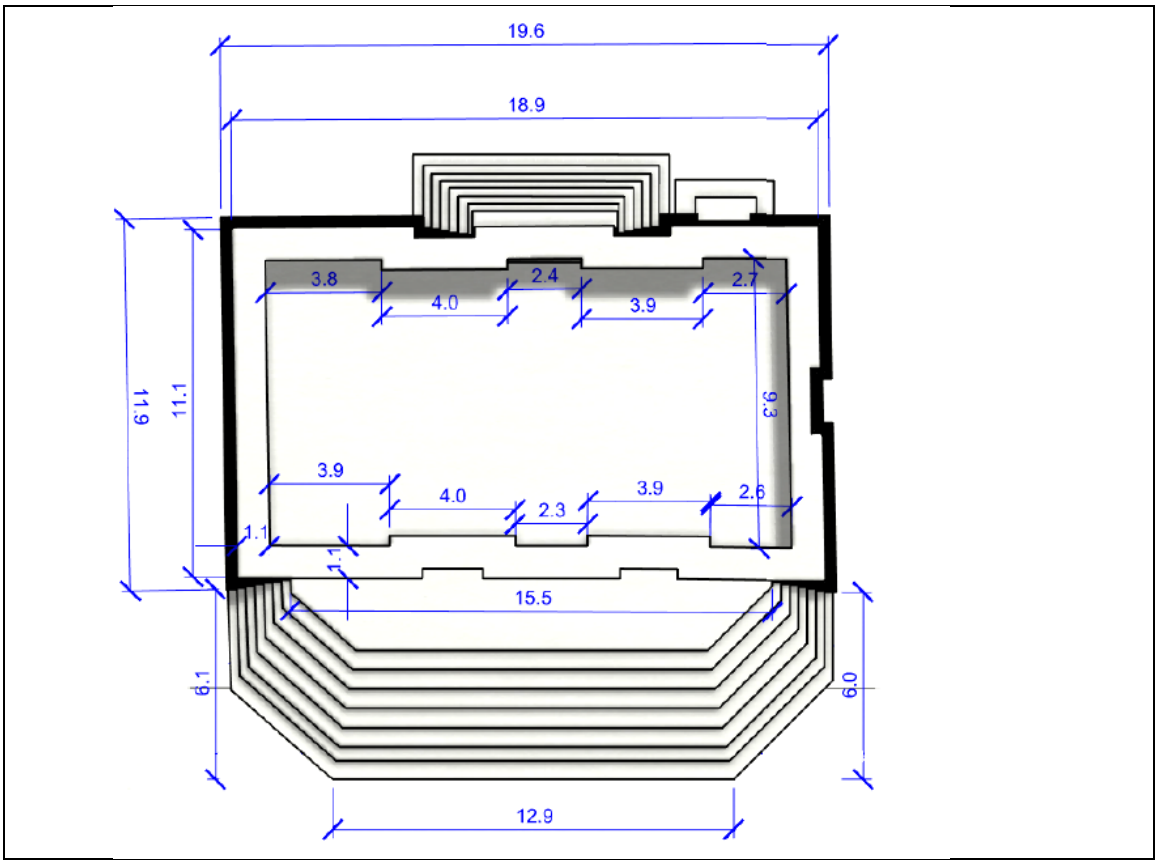

Figure 315 Temple A 3D Model with dimensions

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