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THE PEOPLE OF STONE: A STUDY OF THE BASALT GROUND STONE INDUSTRY AT TRES ZAPOTES AND ITS ROLE IN THE EVOLUTION OF OLMEC AND EPI-OLMEC POLITICAL-ECONOMIC SYSTEMS

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DISSERTATION

A dissertation submitted in partial fulfillment of

the requirements for the degree of Doctor of Philosophy in the

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By

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ABSTRACT OF DISSERTATION

THE PEOPLE OF STONE: A STUDY OF THE BASALT GROUND STONE INDUSTRY AT TRES ZAPOTES AND ITS ROLE IN THE EVOLUTION OF OLMEC AND EPI-OLMEC POLITICAL-ECONOMIC SYSTEMS

This dissertation analyzes the basalt ground stone industry at the archaeological site of Tres Zapotes, Mexico. Artifacts and by-products were recovered in the excavations conducted by a University of Kentucky project directed by Christopher Pool. All contexts were examined, and the corpus of this study comprises the whole sequence of production, use, and discards of basalt such as by-products of manufacture, unfinished and finished tools, and discarded artifacts. In this opportunity was possible to study over time a change from the Early/Middle Formative period (Olmec occupation) a centralized and exclusionary political economic system to the Late/Terminal Formative period (Epi-Olmec occupation) when there was a corporate system. This work applied contemporary concepts in social sciences such as agency, practice theory, technological choice, and *chaîne opératoire*. The variation of raw materials over time was studied recoding physical characteristics and a sample of artifacts was analyzed with X-ray florescence in order to see variation in acquisition of rocks over time.

KEYWORDS: The Olmecs, The Epi-Olmecs, Basalt Ground Stone artifacts, Mesoamerican Political Economy, Archaeology of the Gulf Coast of Mexico.

Olaf Jaime-Riveron

July 23, 2016

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For Bertha Riveron and Homero Jaime (†)

In memory of Román Piña Chán, Jaime Litvak, and Lorenzo Ochoa

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INTRODUCTION

> The antiquity of Indian civilization is enormous: while the Indus Valley civilization flourished between 2500 and 1700 B.C., the "mother" culture of Mesoamerica, the Olmecs, developed between 1000 B.C. and 300 A.D. Another, even more important difference: the Mesoamerican cultures were born and grew in total isolation until sixteenth century. India, in contrast, was always in communication with other peoples and cultures….
>
> Compared to the diversity of the Old World, the homogeneity of the Mexican cultures is astonishing. The image that Mesoamerican history presents, from its origins until the arrival of the Spanish in the sixteenth century, is that of a circle. Time and again these peoples, for two millennia, began and began again, with the same ideas, beliefs, and technologies, the same history. Not an immobility, but rather a revolving in which each epoch was simultaneously an ending and a new."
>
> ***In Light of India, Octavio Paz, 1997***

The significance of this dissertation in the study of ground stone artifacts of Tres Zapotes relies on the approach which takes into consideration the process of production, consumption, and discard of basalt tools. The theoretical framework for this approach is founded in concepts such as *chaîne opératoire*, practice, technological choice, and agency. Therefore, the study focuses on variation among different social status, diversity in types of units of production, function, and distinct communal agencies in every locality of a polity over time during the Formative period in Southern Veracruz, Mexico.

The study is conducted following current archaeological and anthropological orientations. Then, social phenomena are considered as dynamic, and non-static. When these theoretical, methodological, and technical tools are applied to the analysis of ground stone tools it is possible to observe changes in the political-economic model. In Tres Zapotes, during its cultural history, there were two political-economic models, and my purpose is to notice how the differences were in the use of basalt artifacts. I realized that we need in Mesoamerica this new approach in the analysis of ground stone artifacts.

The Olmec area (Olman as it is called by Richard Diehl (2004) is a tropical landscape, where ecological conditions constrained the availability and concentration of resources around the Papaloapan, Coatzacoalcos and Tonalá river systems. Those ecological conditions defined settlement patterns and the relevance of features of the Olmec landscape such as springs, wells, hills, bogs, swamps, islands, and lagoons. Wetlands as ecotones (boundaries between two or more ecosystems which were inhabited shores between land and water) were the scenario of a rapid population growth which transformed from quantitative to qualitative accumulative changes the Olmec political network.

Social circumscription played an important role in concentrating the population in pre-Olmec archipelagic autonomous villages (Coe and Diehl 1980; Lowe 1989) and, later on, in simple chiefdoms. The initial settlement in bottomlands and the subsequent occupation of the upper surface of plateaus, hill-tops, and islands showed qualitative changes in the uses of the space (Ortíz and Rodriguez 1994; Cyphers 1997; Pool 2007). Once that hierarchy of settlement displayed the occupation of different microenvironments and there was more complexity in interaction of those polities, the Olmec area saw the rise of a mosaic of diverse political ways of organization.

The ecological mosaic, seasonality, and long-term climatological changes, in association with social circumscription, determined the size of the Olmec polities (Grove 1994; Lowe and Espoda 1998). They were small, powerful, and well-organized complex polities. In spite of their size, the Olmec mosaic of polities in the southern Gulf Coast of Mexico also interacted on an interregional level with other polities in Mesoamerica. Because of the dimensions of available land in Eastern Olman (only islands and seasonal wetlands), the contested political landscape (a result of social circumscription), and the "tyranny of distance" (in a complicated topography in Mesoamerica at the time), these Olmec polities established different kinds of interactions with their distant neighbors in Oaxaca, Chiapas, Guerrero, the Basin of Mexico, and other places (González-Lauck 2008). Taking into account top-down (vertical relationships among the Mesoamerican elites) and bottom-up perspectives (horizontal and heterarchical relationships between commoners), we can see that the expansion of exchange networks was accomplished through an economic diaspora that allowed for the reinforcement of the political hegemony of the incipient hierarchies in Mesoamerica (Pool 2007). The distant neighbors had their own local histories, identity, and ways of government; and they were active, showing regional agency in a network of exchange, political paraphernalia, and the circulation of technological traditions.

The Olmecs were also one the first civilizations in Mesoamerica (Diehl 2004; Clark and Pye 2000). They established the basis for the development of political-economic institutions in the cultural history of this region. The landscape called Mesoamerica was founded by the Olmecs. The integration of this mosaic of cultures was accomplished through feasting (Clark and Blake 1994), exchange networks (Pires-Ferreira 1973), prestige goods, or kinship ties . Rituals associated to feasting were correlated to exchange of raw materials and finished objects which accelerated the rise of complex societies during a Neolithic way of life. Sedentary occupation of land, cultivation, and exchange were integrated through patterns of cuisine and luxury items (Clark 1994a; Cheetham 2010). The Olmecs, the so-called People of Stone (Fuente 1977) lived in tropical forests in Southern Veracruz and Tabasco, where nothing is perennial because temperature, humidity, volcanic hazards, and microorganisms disintegrated organic materials. Paradoxically, the biomass, latitudinal gradient, ecotones, and arable land were important variables that contributed to origins of Mesoamerican life. The Olmecs are considered by many scholars “The Mother Culture of Mesoamerica” (Caso 1942a and b, 1965;Covarrubias 1942, 1946a, 1946b; Coe 1968; Bernal 1969; Coe and Diehl 1980; Piña Chán 1990; Ortíz and Rodríguez, 1994; Clark 1994b, 1997; Lowe and Esponda 1998; Cyphers 1997; Diehl 2004). Other scholars think that they constituted a culture that interacted with other cultures in contemporary regions in a peer polity interaction, as *primus inter pares*, in equal hegemonic terms (Flannery and Marcus 2000; Joyce and Grove 1999; Graham 2008; González Lauck 2008; Grove 2014). Other scholars take an intermediate position, acknowledging the greater scale and complexity of Olmec culture while accepting significant contributions by contemporary cultures to Mesoamerican civilization (Pool 2007, Lesure 2011).

The Olmecs based their economy on ground stone technology. The phrase “ground stone” in archaeology, around the world, has had a broad and general meaning which does not always define correctly this important part of material culture. Both in the New and Old world, in previous decades, research in archaeology had been more focused on chronology. Currently, research has changed. Pottery and projectile points have been accurately classified and studied for chronological and cultural affiliation purposes. Ground stone artifacts are also more durable and could remain in use during generations in non-industrial communities. For all these reasons, in the cases of Mesoamerica, the Near East, the Aegean, Europe, the Far East, and other cultural areas, ground stone artifacts are included in archaeological reports as a short descriptive chapter or an appendix. They easily fall under the category of “other”. However, when we quantify this part of material culture from past societies, we realize that ground stone artifacts correspond to a significant number of remains of past behaviors and political economic processes.

For centuries, in archaeology, there has been the assumption that there is a definite division between chipped/flaked stone and ground stone. It has been thought that the techniques employed for each lithic industry were completely different. However, the development of anthropology and archaeology has shown us that is not the case. Many artifacts that are classified as ground stone items are made using a wide variety of techniques: flaking; pounding; abrading; polishing; pecking; drilling; heating with fire; cutting with wood, strings or cane with the aid of sands, canes, fire and many others. Many ground stone tools are initially flaked from a larger boulder or nodule. Later, the artifacts are shaped with a large number of techniques. In the case of flaked tools, some items involve platform grinding for effective flaking for obtaining the final tool. In other cases, items obtained through flaking were ground, intentionally or not, through use (Crabtree, 1974). In other cases, artifacts were manufactured using similar techniques and the final products were not used for reducing plant or other materials, for instance, vessels, axes, spindle whorls, adzes, hoes etc. Therefore, we need to go beyond the traditional categorical distinction between flaked and ground stone artifact classes.

Ground stone artifacts, which have long been recognized as part of artifacts that provide the essential domestic tool kit for food processing as well as other activities, are one of the most abundant items that provide information about a number of quotidian activities necessary for human survival. Whether researchers around the world are interested in hunter-gatherer societies, chiefdoms, states or empires, ground stone artifacts are a key component to understanding diverse issues in current research such as subsistence patterns, gender, labor division, ideology cult and religion, social organization of craft production, mortuary practices, identity, among others.

In the case of this dissertation, material culture classes of ground stone artifacts from Tres Zapotes comprise production debris, building stone, decorative items, statuary, subsistence kit tools, and tomb goods which might include artifacts belonging to several of the other categories, among others. This dissertation focuses on different aspects that have not been addressed in Mesoamerica for ground stone analysis; this is a necessity in the case of the Olmec culture, which relied on stone technology for survival as well as for a critical in the prestige economy and for expression of political and religious ideology. Approaches that have been explored in other studies of ground stone tools will be applied to identify archaeological correlates that allow us to analyze current topics in archaeological theory: class, craft specialization, domestic economies, and others. For instance, as ground stone has been associated with female activities related to subsistence, they were long considered uninteresting. However, the development of both economic anthropology and gender anthropology has showed us that these areas of material culture should be studied carefully.

I have the advantage that one of the philosophical orientations in archaeology developed in America is that archaeology is part of anthropology. In recent years, the issues addressed by anthropological archaeology are not only chronological ones, but also behavioral, socio-economic, and political. This framework helps me to analyze the corpus of stone artifacts from Tres Zapotes in a multi-dimensional perspective.

The Olmecs based much of their technology on stones, mainly the extrusive igneous rocks such as basalt. Basalt was useful as a rock material for quotidian activities such as food preparation (grinding maize and tubers), and to make artifacts for transforming nature (blades, hammers, axes), as well as for monumental sculpture such as stelae, colossal human heads, tombs, drainages, and architectural elements.

Studying the role of this key resource (basalt) in the ancient political economy of the Olmecs, is one of the most logical but underutilized ways to understand the daily life of this foundational culture.

The model for addressing the political-economic change from Olmec (Early-Middle Formative) to Epi-Olmec (Late to Terminal Formative) periods at Tres Zapotes suggests that during the Olmec times there was an exclusionary, centralized, and individualized system which was implemented by chiefs for obtaining more power. But during Epi-Olmec times the leaders in the polity instituted a new, less centralized, and corporate form of government in which a confederacy mediates diverse interests of powerful factions and avoid the disintegration of the political unity.

The model aforementioned generates the following hypotheses, which I will test in this dissertation because I employ a hypothesis testing approach:

1. The sequences of the productive processes, as exemplified in the macro-analysis of basalt artifacts, will be more uniform during the early and middle Formative periods than the late Formative.

2. There will be an increase in the variation of raw material sources for the manufacture of artifacts as more outcrops were exploited and each source being distributed differently within Tres Zapotes.

3. There will be greater spatial and social segmentation in the sequence of production as a result of an increase of factionalization and the consequent negotiation of the loci of steps of production.

In Chapter 2 a brief history of archaeological research in Tres Zapotes is provided in order to contextualize the contribution of this dissertation to the studies of Olmec archaeology.

In Chapter 3, Archaeological Theory, I provide the framework for analyzing ground stone technology in Tres Zapotes. I incorporate concepts from “Practice theory”, “Post-structural anthropology”, “Technological choice”, “Chaîne opératoire”, and “Behavioral archaeology” to provide a more holistic perspective about production, consumption and discard. My main goal was to underscore the concept of “agency”, how communities, factions, and leaders are intertwined in the political economic life of artifacts in the archaeological past.

In Chapter 4 I describe multiple datasets that I used for a better understanding of ground stone technology. A better typology, technological and contextual analyses are possible with the aid of ethnoarchaeological data, ethnographic observations, and ethnohistorical information. These datasets enable us to interpret better the archaeological record and avoid arbitrary classifications.

In Chapter 5 Analytical methods are described. I show the required changes to the previous typology used in the Tres Zapotes Archaeological Project in order improve the recovery of important information. Previous research analyzed surface materials whereas the current study examined archaeological remains from excavations The changes take into account different classes of remains such as finished artifacts, by-products and production debris, as well as different raw materials. I explain the implementation of a database based on a fuzzy set theory for clustering artifacts, and maximizing time. I define all the categories employed and their definitions.

In Chapter 6 Contexts of Ground Stone Production and Use in Tres Zapotes are shown. There is a summary of the contexts found in the 2003 field season which provided the corpus of ground stone materials which is analyzed in this dissertation.

In Chapter 7 Technological and Contextual Analysis are shown the results of variation over time and within the site are important for addressing issues related to factionalization, status, identity, differential acquisition, and ritual economy. One of the advantages is the analysis of the contextual meanings of artifacts, production debris, recycling, and consumption. Differential steps of the production in distinct site sectors and phases are important for understand changes in the prehistoric political economy of an Olmec site.

In Chapter 8 Archaeometric Analysis of basalt is presented with important results. Geochemical results were obtained using X-ray fluorescence analysis (XRF) from samples that were obtained from artifacts excavated stratigraphically. They are from Early Formative to Proto-Classic periods. A multivariate statistical method, Cluster

Analysis, was used for studying Major and Trace elements and how they are related to the composition of outcrops studied in the Tuxtla Mountains. In order to compare the corpus of information from the Tres Zapotes site, contemporary samples from the sites of San Lorenzo-Tenochtitlán, Veracruz and San Andrés, a secondary Olmec center near La Venta, Tabasco were analyzed. The samples correspond to monumental sculpture and quotidian artifacts in order to provide a complementary perspective of basalt use by the Olmecs.

Chapter 9 evaluates the initial hypotheses and presents the conclusions of the study. We can see changes in organization of production over time. The variation in the techniques, *chaînes opératoires*, and finished artifacts are evident between early phases of occupation in Tres Zapotes in comparison with later periods. Changes in acquisition of raw materials over time and in different sectors of the site also were observed. The patterns of variation in resource acquisition and operational sequence can be interpreted as reflecting factional competition and changing principles of rulership in chiefdom polities.

Chapter 2. History of archaeological research in Tres Zapotes

As my dissertation is focused on basalt ground stone technology of Tres Zapotes, it is important to provide to the reader the background of archaeological research in the site and to show how the Olmec monuments, colossal masterworks made on basalt, their association with earth architecture, and chronology based on pottery, have been an academic question since the beginning of the history of archaeology in Veracruz. The archaeology of Tres Zapotes is related to the origins of Olmec archaeology. The first international publication as a result of a visit in the field was about an Olmec colossal head known since then as “Cabeza de Hueyapan” by José María Melgar y Serrano. He first published his finding in a local newspaper in Veracruz titled *El Semanario Ilustrado* on November, 27th 1868. The editor of this newspaper was the famous liberal leader and writer Ignacio Ramírez, “El Nigromante,” who wrote in the editorial of that issue that the paper was relevant for a better knowledge of the history of ancient Mexico. Later, in 1869 and 1871, the same information was published in a national academic journal titled *Boletín de la Sociedad de Geografía y Estadística de la República Mexicana*. In the 1869 paper, he described how a campesino reported that he had found a large overturned iron kettle or cauldron (*paila*). The owner of the plantation received the news and ordered him to excavate it and the first Olmec colossal head was discovered in modern times. Melgar heard about the finding and he made several trips to the Hacienda de Hueyapan. He took notes and made a sketch, which was reproduced in his papers. In the 1871 paper, Melgar tried to identify African-American features on the face of the colossal head, referring to it as being of an "Ethiopian type". In this epoch of the history of archaeology there was a trans-cultural diffusion paradigm. It is necessary to understand his interpretation in this context, where scholars tried to make comparisons and infer cultural connections between the Old and New World.

In 1874 Melgar translated and published the same paper in an academic journal in Germany. This paper was very influential some decades later when Eduard Seler had the opportunity to know the kind of archaeological monuments that existed in southern Veracruz.

In 1880 in the multi-volume publication titled *Mexico a través de los siglos*, in Volume 1 Alfredo Chavero contributed to synthesizing the prehistory of Mesoamerica. He estimated the origins of civilization about three thousand years ago. He also distinguished a particular archaeological style in the “Cabeza de Hueyapan.” Chavero had found an Olmec stone axe in southern Veracruz (the Chavero axe) and he underlined the similarity between the face of the Colossal Head and the face represented in the upper part of the votive stone axe. He found similarities in the shape of eyes as well as lips. However, like Melgar y Serrano, Chavero thought that the physical features could be evidence of Ethiopian transatlantic cultural contacts.

Francisco del Paso y Troncoso, a historian-archaeologist-anthropologist was commissioned by Porfirio Díaz to prepare an exhibition about Mexico at the Columbian Historical Exposition of Madrid, in 1892. In order to present a representative sample of archaeological artifacts, he traveled across Mexico to acquire ancient objects. In the Tuxtlas, he bought the collections of Simón Sarlat and Mr. Carbonell and those collections are now part of the National Museum of Anthropology; they are famous because they contain Olmec artifacts similar to Tres Zapotes decorative motifs. During his visit to the Hacienda de Hueyapan, he excavated around the colossal head, where he obtained pottery and other remains, and took pictures (Del Paso y Troncoso 1892, I: 382). Actually, in this publication he defined the “Olmec style” some years before Marshall Saville's more often cited identification of Olmec style. Del Paso y Troncoso defined the “Ulmeca style” which according to him consisted of almond eyes, were-jaguar motifs, baby-face figurines, and down-turned lips in anthropomorphic representations in clay or stone (Del Paso y Troncoso 1892, I: 382-386).

Another important finding which occurred at the beginning of the 20th century and which is related to Tres Zapotes archaeology is the Tuxtla Statuette. Near to San Andrés Tuxtla, a farmer found a jadeite statuette while plowing in 1902. The sculpture represents a man wearing a duckbill mask and a cloak. On the front is engraved a Long Count date, and on the sides a text in the epi-Olmec or Isthmian script. The date in the current correlation is 8.6.2.4.17, March 162 CE. The owner of the plantation sent pictures of the archaeological item to W.H. Holmes, who was chief of Bureau of American Ethnology at Smithsonian Institution. He published in *American Anthropologist* a paper where he described this important and key artifact. It was one of the earliest dates in Mesoamerica and was discovered outside of the Maya area. Actually, Holmes thought that it could be either Maya or Huastec. In that time there was not much information of Southern Gulf Coast archaeology.

In 1905, Eduard and Caecilie Seler visited Los Tuxtlas during January, 1905 (Seler-Sachs 1922: 543-544, and Pl. 1). They conducted small excavations in order to recover pottery artifacts. They also cleared the surroundings of the colossal head to take a picture. They recorded and took a picture of a stone box covered with elaborate carved decorations in low relief (Some years later Weyerstall (1932) called it Monument 5 and Stirling (1943) named it Monument C).

In regard to the publications of the Selers, Del Paso y Troncoso, and Holmes, it is important to emphasize that the theoretical orientations at the time were concerned with artifacts. Architectural features or maps of the archaeological sites were not common. The purpose was to identify former cultures inferred from archaeological styles.

A different perspective began in archaeology during the following decade. Albert Weyerstall, who was planting for the United Fruit Company in Southern Veracruz, visited during 1928-1929 some archaeological sites which were near to his property. He described briefly architectural features such as mounds organized in groups. He described also five monuments: The “Cabeza de Hueyapan” (Weyerstall Monument 1); a horizontal sculpture in the form of a prostrate human figure with the arms doubled at its sides (Weyerstall Monument 2; Stirling's Monument F); another horizontal tenon sculpture in the form of a prostrate human figure with the arms doubled at its sides, but in this case the head bent well back (Weyerstall Monument 3; Stirling's Monument G); Stela D (Weyerstall Monument 4); and a stone box decorated on the surface of four faces with engraved motifs in low relief. As Melgar and Paso y Troncoso had done before him, with respect to the colossal head, Weyerstall interpreted the facial features of Monuments 2 and 3 as Ethiopian.

First controlled excavations in Tres Zapotes

Matthew Stirling, working for the Smithsonian Institution, first visited Tres Zapotes in an exploratory visit in 1938. Stirling described the goals of this trip in the introduction of his paper published in National Geograhic Magazine in 1939. It is possible to read that the title, subtitle, and most of the text, the emphasis was on the identification of Maya culture. Instead of establishing the discovery of a new culture or the emulation of Maya features by local ancient populations in the Gulf Coast of Mexico, he asserted the Maya area extended 150 miles beyond the previously defined limit. He took into consideration historical linguistics, and quoting the well-known relationship between Huastec and Maya languages, he reinforced his argument suggesting that the oldest Maya inhabited the Southern Gulf Coast of Mexico.

However, a very important difference with respect to previous studies at Tres Zapotes is that Stirling studied the association of stone monuments and the array of earthen mounds. When he was looking for the much-cited colossal head of Hueyapan, he described: "Buried to its forehead, I found the object of my quest standing in a plaza formed by four mounds. I cleared away the earth from the face and took photographs" (Stirling 1939: 185).

In that initial 1938 trip, he identified two additional plazas: "Investigating the neighborhood further, I found that somewhat to the east of this plaza was another group of very large mounds one of which was almost 450 feet in length. Beyond these, on an elevated piece of land, was a third group, the central feature of which was another plaza surrounded by four large mounds" (Stirling 1939: 185).

After obtaining funding for conducting excavations in Tres Zapotes, Stirling´s project sponsored by the National Geographic Society and Smithsonian Institution began excavations in 1939. At the same time that the excavation units were conducted, the archaeological team continued the identification of many features of the archaeological site. Stirling realized that Tres Zapotes was an ancient city which had more than fifty mounds streched along the Arroyo Hueyapan for more than two miles. One of the advantages for discovering more monuments as well as mounds was that the inhabitants of Tres Zapotes were in their agricultural activities and could inform about new archaeological features in the area. Stirling said that almost every day during nine days, a monument was discovered during the 1939 field season (Stirling 1939: 206).

Archaeological excavations of monuments

The focus of this dissertation is to analyze the basalt ground stone assemblage of Tres Zapotes. Basalt sculptures are an important component of this corpus of Tres Zapotes. This study constitutes the first detailed contextual analysis of this industry that takes into account the proveniences of excavated artifacts from Formative sites in the Olmec area. As previous studies were interested only in colossal sculptures made of basalt, I take this opportunity to present information about the contextual conditions of the basalt sculptures which have been published previously. This information is helpful for exploring the role of basalt in the context of a confederacy as a variety of polity during the Early Formative period of Mesoamerica. The re-excavation of the colossal head of Hueyapan was an important goal during Stirling's 1939 field season. Even though this important monument was excavated previously by Melgar y Serrano, Del Paso y Troncoso, and Caecilie and Eduard Seler, and all of them took pictures and recovered pottery, still Stirling had some doubts about whether the head might have a body and what the position of that body might be. These excavations were important because the results shed light about the deposition of sculptures and their association with the earthen architecture. The colossal head was only the head, and it rested on a prepared foundation of unworked slabs of stone. In stratigraphic terms, at the level of the foundation was the hard-packed clay floor of the plaza where the colossal head was placed in front of the south mound of Group 1, facing north (Stirling 1939: 207; Stirling 1943: 17). Stirling designated the name for this colossal head as Monument A (Stirling 1943: 16-17). In the 1939 paper, Stirling was influenced by previous interpretations of the sculpture's physiognomy and he stated that its features were negroid (Stirling 1939: 209).

Monument B was the name for a stone box, the surfaces of which exhibited the effects of a complicated history of re-use, mutilation and perhaps re-cycling. It was excavated at a spot close to the Arroyo on an artificially elevated area lying to the east of the Burnt Mounds.

Stirling named Monument C a second stone box that has a more complex contextual history because it was reported by the Selers as well as Weyerstall, who did not specify its precise location. At least, Stirling reported where he found the monument on the surface – in Group 2, lying just south of Mound C. This monument called attention because it was decorated on four sides of the stone box. The monument was transported to the National Museum of Anthropology in Mexico City, and it is one of the few monuments of Tres Zapotes which is outside of the municipio of Santiago Tuxtla.

Monument D was excavated about ten feet south of Monument B and a barrel-shaped stone with a circular depression in one end.

Monument E is a rectangular slab that projects about 10 inches above the bedrock in the Arroyo Hueyapan. Carved on the surface there are two bars and a dot, which is a numeral. Bar-and-dot numerals were also used for dates in other calendars (260-day, 365-day, lunar, venus, etc.). This slab was found just east of the Burnt Mounds where the arroyo cuts through a massive rock formation and 3 or 4 feet under the surface of the stream at low water.

Monument F is a horizontal tenon sculpture in the form of a prostrate human figure with the arms doubled at its sides. Stirling thought it could be part of an architectural feature of the entrance of a mound or be used as a seat or throne. This monument formerly lay in the flat area west of Mound M, Group 2 about 50 yards from the mound. In 1937 the inhabitants of Tres Zapotes decided to move it to the town.

Monument G is a monument of the same class as Monument F. It is a horizontal tenon sculpture in the form of a prostrate human figure with the arms doubled at its sides, but in this case the head is bent well back. Stirling found it lying on its side between Mounds B and C of Group 2. Stirling recorded very important information concerning the contextual history of this monument. He says that: “It was partially up the west slope of Mound B but near the base, a position which indicated that formerly it may have been placed on top of this small mound” (Stirling 1943: 22). This information is valuable because it allows us to suggest that this kind of sculptures would be part of architectural components attached to earthen mounds.

The case of Monument H is interesting for the history of archaeology and the way of seeing pre-Columbian material culture. This monument was found near the base of the southernmost mound of the Burnt Mounds. Stirling took the picture upside down even though he identified “Olmec traits” such as the “baby face”. He wrote that the sculpture seemed to represent an owl. Many catalogs have repeated the mis-identification of an owl instead of an Olmec were-jaguar (Stirling 1943: 23). Schao (1983) and Porter (1989) have independently arrived at the same discovery. Shao writes:"Monument H is one of many blatant examples of visual illiteracy or, at best, visual insensitivity within the field of Olmec archaeology.

Monuments I and J correspond to the representations of lower portions of two seated human figures. Monument I lay in a cornfield near the base of a mound about 400 yards west of group 3, and Monument J was found in the excavations of a small low mound in the great plaza just to the west of mound A, Group 1, at a depth of about four feet. This monument had been painted red, and residues of red pigment were recorded just after the excavations. On the surface of the same low mound was found Monument K, which consisted of the head and shoulders of an anthropomorphic figure (Stirling 1943:23). Porter (1989:106), instead, interprets Monument K as the corner and leg of a throne.

Monument L was discovered near to the top of one of the Burnt Mounds. It consisted of a representation of a dwarf-like potbellied human figure with bent elbows and hands placed over the stomach (Stirling 1943: 24).

Monument M originally was the representation of a were-jaguar seated figure. It has on both sides of the face the representation of crenulated, possibly made of paper, a recurrent motif represented in this kind of sculptures in the Olmec area. Monument M has a complicated history of re-use and modification because after its discovery it ended up in hands of art traffickers who sold it to private collectors. Currently it is in the Amparo Museum, Puebla. David Grove knew about this case and communicated to Christopher Pool who conducted an investigation and discovered an interesting history of Monument M and how it was modified in order to be attractive to the buyers or collectors of ancient art (Pool 2010: 172). In its currently re-carved state, it is more anthropomorphic in style (Christopher Pool, personal communication, March 2014). Stirling reported the context of this monument in 1943: "A little more than a half mile above Group 3 on the west bank of the Arroyo Hueyapan is a good-sized mound about 40 yards from the arroyo bank. On the level ground between this mound and arroyo were two stone objects. Monument M is a seated figure, somewhat reminiscent in style of that from La Venta (Blom, 1926, Figs. 79, 80)" (Stirling 1943: 24).Monument N was a cylindrical stone basin similar to Monument D.

Monuments O and P were found almost half a mile northeast of the Long Mound at the bottom of an arroyo which cuts through a mass of basalt in the bottom of a gorge. On the top of the east bank of the arroyo, there was a mound which was cross-sectioned and below the mound, there were two monuments of U-shape pieces of basalt which a cylindrical element attached to one arm of the U. Comparing these monuments with La Puente monument - these are likely arms as well, but they have been broken and greatly eroded by the arroyo (Christopher Pool, personal communication, May, 2016).

Naturally occurring prismatic columns of basalt were also brought to Tres Zapotes. Stirling found this columnar basalt in situ in two places, both in Group 3. On Mound E, Group 3, there were two rows of very large boulders which led from the base to the top at the southern front. Each column ended with a basalt column. And on the southern side of Mound D, Group 3, were found three basalt columns, and two of them were still in vertical position.

Other monuments were named stelae. It is important to notice that Stirling divided the monumental corpus of Tres Zapotes between monuments and stelae. This division needs to be understood in the context of the archaeological research in Mesoamerica. These categories corresponded to Stirling´s initial belief that the Maya area should extend to Tres Zapotes and the Olmec culture was Maya. The stela-altar complex had previously been identified in different Maya sites. Furthermore, stelae in the Maya area had evidence of writing and the Long Count Calendar system. It was important for the history of Olmec archaeology that Stirling recorded the archaeological contexts of stelae as well as the monuments.

Stela A was discovered lying on its back, at the southern base of Mound L, Group 2. (However, Stirling is inconsistent here. When one looks at the photograph (plate 2b) in Stirling´s 1943 publication, it appears to be taken from north of the monument, looking south toward Loma Camila (also, Weiant's (1943) Map 3 places it well north of the Long mound. Christopher Pool, personal communication, March, 2014). Stirling, after interpreting the context asserted that formerly stood with the carving face facing toward the west. The stela had fallen on its back so the carved face was very intentionally mutilated and eroded. During the excavations, there were discovered associated thousands of obsidian flakes and prismatic blades, which were packed at the sides of the monument after it fell. Also, found in association were four figurine heads of early style and a solid effigy head of a king vulture. An important point was that there was not sign at all of a foundation at the base. All the contextual information is important for a better understanding of the importance of this monument made of volcanic breccia because in other important Olmec sites such as La Venta, San Lorenzo, or La Merced, small or colossal sculptures made in non-basalt material were set at a central place in groups of monuments or in association with sculpture and architecture.

Stela B was found lying about 25 yards southeast of the base of Mound C, Group 3. It was a slab made of basalt, it was smooth and flat on both surfaces. It is important to underscore the kind of material and the context associated because the base of the monument had rested upon a foundation of unworked stones (Stirling 1939: 209; Stirling 1943: 14). The importance of this association relies on the pattern of clustering raw/unfinished raw material set as foundation and the finished ground stone monuments located on the upper part where the sculpture was located. This pattern is part of the Olmec ritual practices. It is found in the contextual records of excavation of monuments and small sculptures at La Venta, San Lorenzo, La Merced, among other cases.

Stela C was one of the most highlighted discoveries in this first field season. The reason was that the excavated monument had a carved bar-and-dot Initial Series date on one surface. This monument was important because it provided some hard evidence of the antiquity of occupation in Southern Gulf Coast of Mexico. The reconstructed date of this monument provided the title and subtitle for the paper published in 1939 in *National Geographic Magazine*: “Discovering the New World´s oldest dated work of Man.A Maya

Monument Inscribed 291 B.C. is Unearthed Near a Huge Stone Head by a Geographic-Smithsonian Expedition in Mexico"; and an exceptional publication only focused on this monument titled*: An Initial Series from Tres Zapotes Vera Cruz, Mexico* (1940). The contextual information was recorded and it is very useful to underline very important points. First, in the 1940 publication Stirling summarized the layout of the core of the archaeological site and the precise location of Stela C. He says that the mounds are separated into four groups, and each one has a rectangular plaza as a central feature. The easternmost of this clusters was designated Group C. The principal mound of this group was named C1, and he says that it was the second largest in the entire series of mounds at Tres Zapotes. It was situated in the highest point of the terrace and had a commanding view of the site. In front of the south base of this mound was the third stela which was excavated and was named in accord to the order as Stela C. This stela was the only monument that was accompanied by an altar. Stirling noticed that the monument was broken, that it was manufactured in an earlier occupation and then re-used by a later people who inhabited Tres Zapotes.

This monument was at the center of a debate between the scholars specialized in Maya archaeology and Matthew Stirling. The problem was that the monument was broken. The piece recovered by Stirling shows the following numerals: 16.6.16.18. The missing upper part of the Stela corresponded to the first numeral (and actually there were two missing parts of the Stela, as the bottom was also broken off, cutting through the 6 Etznab tzolkin date at the bottom of the date on the reverse and a panel below the mask on the obverse [Pool, 2010: 118-129]). Marion Stirling helped to the project to reconstruct a date for the Stela:

> A hoped-for but quite unexpected find was that of Stela C. Matt rushed back to camp with exciting news. Carved on the stela in bars and dots were the numerals 15-16-18 with a terminal glyph 6 in front of a day sign. The cycle numeral and introductory glyph were missing. Fortunately, we had brought with us Sylvanus Morley´s "An Introduction to the Study of the Maya Hieroglyphs", Bulletin 57 of the Bureau of American Ethnology (1915). Using the numbers 15-6-16-18, I computed the date and correlated it, arriving at the cycle number "9" with a date 6 Eznab 16 Yaxkin, August 24, A.D. 478 (almost Matt´s birthday - August 28)
>
> Matt continued to study the stela every now and then, and the next day was sure he could see a dot above the three top bars, which could make the katun 16 instead of 15. I figured the date on this basis with the resulting cycle 7, 6 Eznab 1 Uo, or 31 B.C., according to the Thompson correlation. This date seemed plausible for the site but, lacking carbon-14 at the time, it could not be proved. When Matt published the stela date as 7-16-6-18, 31 B.C., the result was as expected. He was widely criticized, especially by the Mayanists, who claimed that the date was too early and not contemporary; but, when carbon-14 provided dates for Olmec sites, 31 B.C. was too late.(Stirling Pugh 1981:6).

However, Stirling in the paper published in 1939, chose the Spinden correlation. At the footnote of the first page of the paper, where he asserted the date 291 B.C of Stela C, he wrote:

> This is according to the H.J. Spinden correlation. If the J. E. Thompson correlation which carries the calendar forward 260 years, is used, the reading becomes 31 B.C. (Stirling 1939: 183).

On the other side of the stela was a jaguar mask. Stirling focused on this trait and found similarities with the earliest Maya representations. The upper missing part of Stela C was found in 1971 when the archaeological project directed by Francisco Beverido and Robert Squier recovered the upper part with a bar and two dots on one side (Beverido 1971).

Stela D was located at the center of the plaza of Group 4 (an outlying secondary center of the Tres Zaptoes(polity).The obverse shows an elaborate scene where there are three anthropomorphic beings inside of an open mouth of a zoomorphic being. They could be participating in a ceremony of ascension of power. In the upper part of the scene the face of a being is shown in profile (Stirling (1943) described it as a "gnomelike pot-bellied figure." Porter (1989), however, shows that it is a bird, and Ayax Moreno and

Christopher Pool have confirmed that (Christopher Pool, personal communication, March, 2014) and it seems that is witnessing the ceremony.

Stela E was located in a mound that was at the top of a promontory which was in a middle distance between Groups 2 and 3.It is important to note that the promontory is on the east side of the arroyo. This is Cerro Rabón. It is likely that Stirling was referring to a mound on the platform attached to the south end of the hill (Christopher Pool, personal communication, March, 2014). The Stela was lying near the western foot of this mound.

Architecture

The landscape where Tres Zapotes developed as an important capital during Pre-Classic Mesoamerica was analyzed by Stirling. He took into account geomorphological processes as well as the geological features, topographic differences and how all these variables had an impact in the adaptations and the choices of former populations to inhabit a certain place in the environs of the Tuxtla Mountains. In regard to the intra-site settlement pattern, Stirling writes: "It is along the southeastern slopes of this plateau, the plain at their foot, and on the northeastern outlier, that the greater part of the archaeological remains are found" (Stirling 1943:10).

He found that the mounds were clustered in groups which seemed without a specific orientation:" The mounds are arranged in irregular groups for the most part, but there are also a fair number of small mounds which do not appear to be situated with reference to any group. It should be made clear at the outset that none of the assemblages of mounds that we designate as "groups" were laid out on a precise geometric plan. The units are straggled about at unequal distances, although in several cases they appear to have meant to outline a rather lopsided court. There is not indication of attemps at orientation. One very deffinite mound-group pattern does appear, however, and is made significant by its recurrence at other sites in this region" (Stirling 1943: 10). It is important to note that the later mapping by PATZ showed the plaza groups were more regular in their layout than Stirling's description and sketch maps suggest.

Stirling also described some regularities of construction:: “The custom consisted in building a relative steep mound, often circular but sometimes four-sided in plan, adjacent to a long narrow mound. Smaller mounds, usually rather low domes, were built as flankers, often in pairs, to complete the group” (Stirling 1943: 11).

Stirling also described the main characteristics of the earthen mounds which he found: “The Tres Zapotes mounds are not large compared to the pyramids of the classic Maya area, but some of them are of moderate size. The two higest are in the neighborhood of 40 feet at their crests, and something over 150 feet along their baselines (both are square in plan). The most imposing of the long mounds is 425 feet long by 57 feet wide, and 25 feet high. At the other extreme are the small mounds barely 6 to 8 feet high and 40 to 50 feet across. None of the mounds were stone faced, nor are the remains of any major stone structure, aside from a few small areas flagged with slabs of blocks of sandstone, a small stone platform, and two small stairways found in 1939 season which had sandstone-paved treads.” (Stirling 1943: 11).

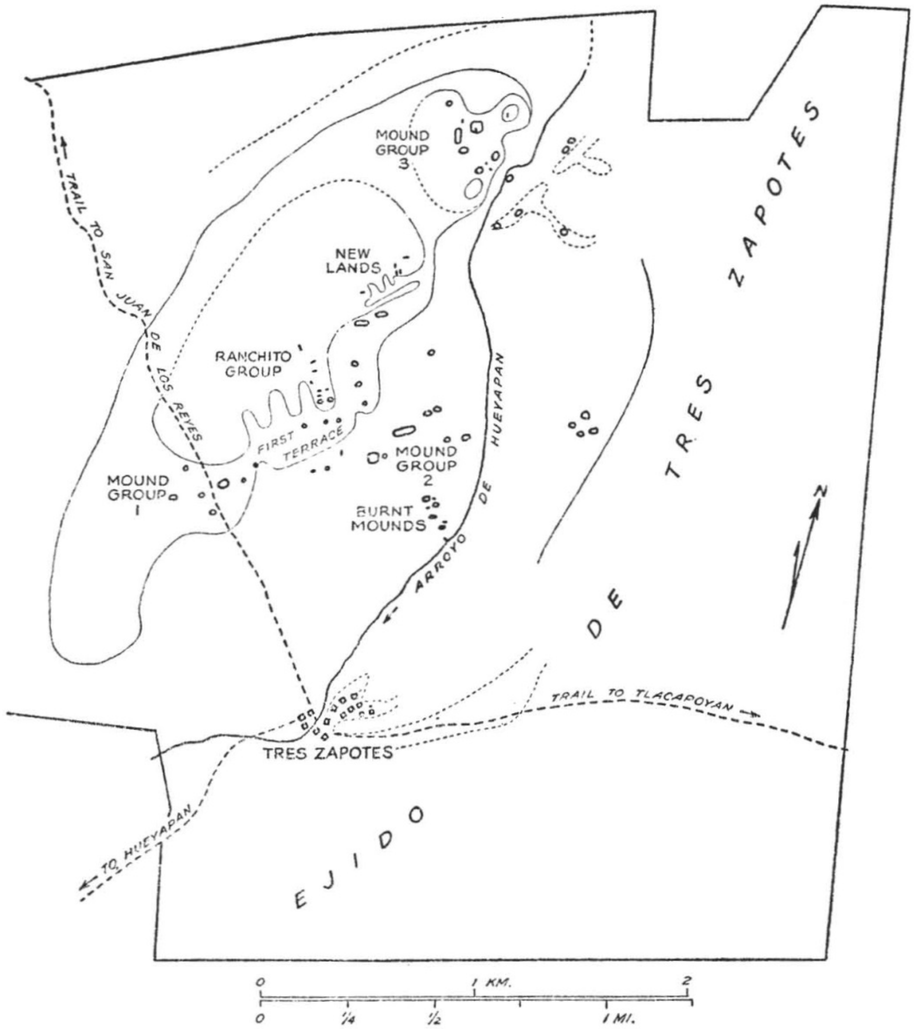

Figure 2.1 Map of Tres Zapotes,by Matthew Stirling (Stirling 1943: Fig. 2, p. 9).

In this map, it is possible to see the main groups identified by Stirling in his 1943 publication. He identified: Mound Group 1, Mound Group 2, Mound Group 3, Burnt Mounds, the Ranchito Group, and the area called New Lands. He defined also the kind of land tenure as "Ejido de Tres Zapotes" with capital letters and with larger font. Stirling learned that this kind of political organization was very important in rural Mexico after the Mexican revolution and maybe he decided to label this territory in this way (Fig. 2.1).

Analysis of material culture as a result of 1938-39 and 1940 seasons

One important fact during the first and second seasons was the aim to achieve a better understanding of Tres Zapotes's chronology. Matthew Stirling had two important specialists in field archaeology and analysis. During the 1938-1939 field season Stirling had the collaboration of Clarence W. Weiant whose PhD dissertation at Columbia University was about pottery typology in Tres Zapotes. In his short-term plans Matthew Stirling had the idea of getting a general outline of ceramics in Tres Zapotes in order to know the antiquity of the site as well as relations with other areas of Mesoamerica, and to understand the relationship with the sequences built in that time in the Maya area and Central Mexico. Clarence Weiant was the ideal scholar for this assignment because his advisor, George Vaillant, innovated in Mesoamerican archaeology with chronology based on the analysis of pottery and figurines obtained from stratigraphic excavations. This first attempt at ceramic typology had the purpose only to provide an idea of how ancient human occupation was in the Tuxtlas. Most of Weiant's analysis, however,did not include artifacts obtained from stratigraphic excavations.

For the 1940 field season, Stirling assigned pottery analysis to Philip Drucker. Drucker had a solid background in field anthropology and he was up to date with current anthropological theory at the time. Before excavating test pits and trenches, he designed a strategy to study Tres Zapotes as an ancient population. He wrote: "For the purpose of stratigraphic testing, localities bearing refuse layers were sought. All of these had small mounds on or nearby them, but no important deposit was found in the major mound groups. The first of these localities is that called the "Ranchito." Three narrow rounded spurs extend out southward from the top of the plateau, or better, have been isolated by the cutting of shallow gullies between them, at a point nearly half a mile from Group 1. Excavations in 1939 showed the easternmost of the series to be the most promising for stratitests." (Drucker 1943: 7). He used quantitative techniques for obtaining results about changes in the use of types derived from his studies of materials obtained in stratigraphic excavations. It was important for the history of archaeology of the Gulf Coast of Mexico that he focused on sequences of mainly pottery and figurines, which were fragmented. He was not searching for complete artifacts. In his report he distinguished among fill, activity areas in households, dumps, and looting pits, in summary, he was careful to select contexts that would provide a good sequence.

Clarence W. Weiant

Weiant provides a more complete description of the archaeological site than Stirling, and he had the opportunity to explore the site. Weiant described the main features that they found: the level of the Arroyo Flood Plain and the associated top of the banks of the Arroyo. Above, he distinguished two features: The Main Terrace and an intermediate level area between the flood plain and the Main Terrace called the Lower Terrace. Also, Weiant distinguished two prolongations from the Main Terrace that jut out upon the Lower Terrace; these features were called the West Promontory and East Promontory and both had a privileged view of the site. (Weiant, 1943: 1).

Weiant labeled to different mound groups in the following way: the Cabeza Group was where "Cabeza de Hueyapan" was found. It was associated with six mounds (A-F) and he says that the face of Cabeza was directed toward the magnetic north; the Ranchito

Group consisted of 11 mounds (A-K) and comprises the mounds of the Lower Terrace, those of the West and East Promontories, and the mounds named J and K; the Arroyo Group included all the mounds found on the Arroyo Flood Plain (A-P), the mounds were high such as the Long Mound, and Mound G contained the only Stone Platform. In this group was found Stela A.

In the following map it is possible to identify the groups identified by Weiant in his 1943 publication

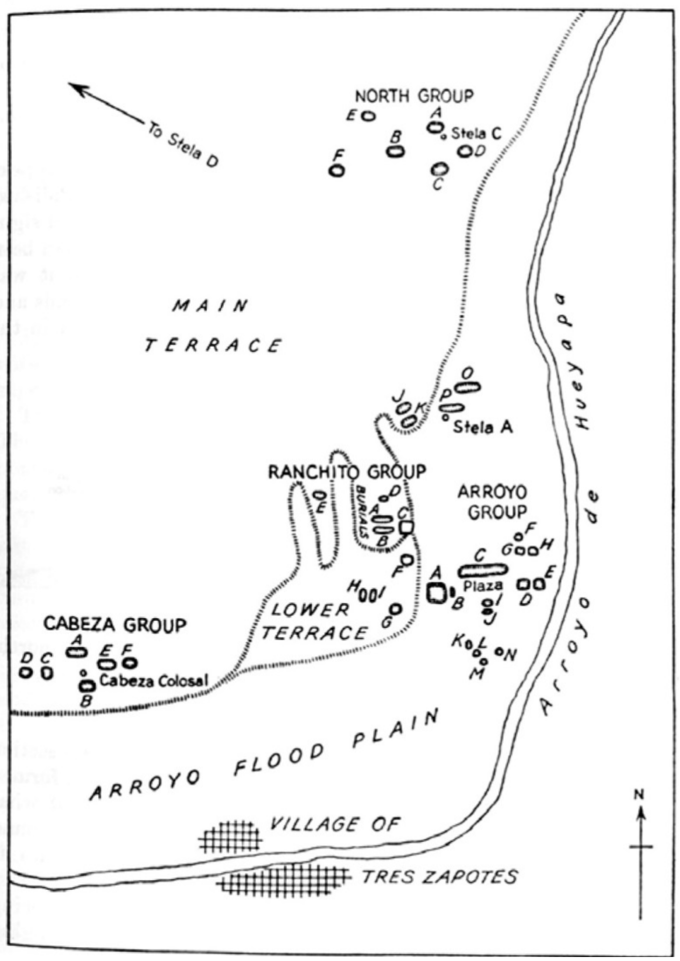

Figure 2.2 Map of Tres Zapotes by Clarence Weiant (Weiant 1943: Map 3, p. 5)

Excavations

Weiant provides interesting information concerning the excavation units in which he participated,which were the following:

Cabeza Colosal. Weiant described a highly disturbed area around the colossal head, and identified some pottery such as Coarse Red ware and Black polished ware, which were abundant as well as the finding of two heads and one torso of Tres Zapotes figurines.

Mound E, Cabeza group. This mound was excavated with a transversal trench. Important data on construction were obtained, including the presence of a staircase 8 m wide with five steps, the use of red clay utilized during the early phase of construction of the mound and the use of sandstone slabs for the building of the staircase. Among the pottery, Weiant reports that Coarse Red and Polished Black wares were obtained. Red solid Tres Zapotes figurines and faunal skeletal remains were also obtained.

Stela A. Weiant provided important data concerning Stela A. In the Stirling´s publications apparently there was not a clay floor or support for this monument. Weiant said that there was a meter of sterile soil before the clay floor was reached. Weiant also described the associated figurines and thousands of obsidian flakes and blades. He also said that knives made of obsidian were found.

Ranchito Group. This group was distinguished by the finding of two burial groups in the East Promontory: one group was found at 30 cm and was characterized by a pot or olla which contained cremated human bones and was covered with a dish. These

"Shallow Cremation Burials" correspond to Drucker's "Soncautla Complex." (Christopher Pool, personal communication, March 2014).

The other group of burials were found at 1.3 to 1.7 m and consisted of very large inverted ollas containing occasional non-cremated human remains.

Weiant also described the excavations in Mound A of the Ranchito Group which had a retaining wall of sandstone slab that was about 2 m long. In Mound C he noticed almost 90 % of the ceramic assemblage was of trichrome and polychrome pottery, as well as the excavation of a large laughing figurine, and an adult secondary burial with a "pie plate" behind the skull and a jadeite pendant in the form of a dog's head. There was another direct burial and complete vessels as well as a hexagonal fragment of columnar basalt and fossils.

Mound D was a low platform, and Weiant says that it was the most productive of all the excavations undertaken. He found ceramic materials like pottery of Teotihuacan, tripod whistles, zoomorphic figurines, and a decorated yoke. Also, he found a mosaic of sherds, and a few burials (Weiant 1943: 10).

In Ranchito Group, Mounds J and K, he discovered potsherds of Coarse Red ware, fine Black Incised with Red pigment incisions, and several "teapot" spouts. Mound F was completely excavated. Weiant found there figurines which he says were similar to Totonac and Maya styles, deep olla burials, fragments of plain stone yokes and one of decorated yoke. There was found, also in ground stone, a stone skull, a burial, and a large circular, stone fireplace located almost in the exact center of the mound (Weiant 1943: 11-12).

In Arroyo Group, in the excavation of the Plaza, he found ceramic materials which resemble those of the cremated burials on the Ranchito group. In the excavations of the Long Mound (C), he found a series of floors, zooarchaeological remains, solid figurines (one was Vaillant´s A type), pot sherds of highly polished Red ware, and several mano and metate fragments. In Mound G, a stone platform, there were obtained ceramic wares similar to those of the deep level of the Long Mound; and also it was found a polished head of black stone. The excavations in Mound F recovered pottery like to the pot sherds found in the Ranchito deep level. In Mound B was found a seated stone figure with the top part missing. Finally, in the excavations of Mounds I and J were found only a few sherds similar to those of the Plaza surface (Weiant 1943: 12-15).

Analysis of Material culture by Clarence Weiant

Weiant (1943), after talking with Philip Drucker about pottery analysis in Tres Zapotes (they were preparing their reports almost at the same time), decided to divide his typology into Middle Tres Zapotes A, Middle Tres Zapotes B, and Upper Tres Zapotes. Drucker demonstrated with his excavations that there was an older occupation in the site and for this early occupation was reserved the name Lower Tres Zapotes. There was a dispute between Weiant and Drucker concerning the ceramic analysis in Tres Zapotes which was published in *American Antiquity* in 1952 and it is discussed below

As the purpose of Weiant´s typological study was to identify relationships or connections in styles with other cultures in Mesoamerica, it is possible to read in the final parts of his report important questions which he raised and which give us an idea of the then-current topics in debate in the academic circles of Mesoamerica.

At the time a theme of discussion was the so-called Q Complex derived from excavations at Holmul (Merwin and Vaillant, 1932) or from El Salvador (Lothrop, 1927) which it was thought was shared for all Maya Prehistory. At the time, the scholars concerned with the definition of the Protoclassic period. Weiant said that taking into account the pottery analyzed, there was a little evidence of this complex Q at Tres Zapotes.

Another important topic that he discussed was the Archaic question, which at the time referred the Pre-classic period also called the Middle cultures, a question analyzed by Lothrop (1927) and Spinden (1928). Basically, the period was identified by features in figurines. Weiant, taking into account the features that characterize the "Archaic" artifacts found that with the exception of "coffe-bean" eyes, the rest of features were included in the solid Tres Zapotes figurines. Actually, after quantifying figurine types in Tres Zapotes, he realized that more than 82 % percent of figurines analyzed pertained to the "Archaic" style. The A type of Vaillant for the Basin of Mexico was part of this tradition and this style was considered as an intrusive to Central Mexico. Weiant wrote: "We have shown that Vaillant's A Type is an integral part of this tradition. In the Valley of Mexico this type is regarded intrusive, yet here it makes up more than a third of the main bulk of locally specialized figurines. The conclusion seems inescapable that the Tres Zapotes area, if not Tres Zapotes itself, was the place of origin of Type A figurines. But if they appear in the Valley of Mexico on a late Copilco-Zacatenco horizon, as

Vaillant (1930) has demonstrated, then they must have been manufactured at Tres Zapotes at least as early as that period, and their claim to "archaic" antiquity is validated" (Weiant 1943: 125-126). Weiant stated that at least since Middle Tres Zapotes period this kind of solid “Archaic” figurines were made locally in Tres Zapotes and this type was associated with types common in Uaxactun and pottery similar to Monte Albán I. He suggested that this “Archaic” type of figurine influenced the type A of Central Mexico. Weiant has the advantage that Vaillant was his advisor of this dissertation. However, after some decades of research, with more samples, it is really important to take into account Mark Harlan´s study of Chalcatzingo figurines (Harlan 1987: 259). He wrote: "The Typical Vaillant's Type A from Tres Zapotes (Weiant 1943: Pls. 10-12) actually bears only a general resemblance to A figurines from Chalcatzingo and central Mexico."

Weiant also addressed the Olmec question. Here, he thought that with the evidence available at the time, just a little could be said about the Olmec civilization. He only could say that the Olmec Colossal head and Stela C were locally made and that the jaguar mask of Stela C was related to jaguar masks represented in Maya facades represented in buildings. He also could say that both Totonac and Mayoid figurines evolved from “baby-face” figurines, although he thought “baby-face” figurines seemed to be imported from long-distance regions to the Gulf Coast of Mexico.

Weiant found similarities between the so-called Old Maya Empire and Middle Tres Zapotes A and B occupation; and with the Maya Renaissance for the Upper Tres Zapotes period especially an identical tradition of hollow figurines.

In regard to the Teotihuacan and Totonac cultures, he found just a few similarities, basically some clay artifacts. Relationships with Cholultecan and Aztec traits were absent.

For the Upper Tres Zapotes occupation, Weiant found similar traits with the Huastec region. And also he found a similar tradition of the Gray ware of Tres Zapotes and the Gray ware in Monte Albán.

Taking into consideration the absence of metal archaeological materials as well as Aztec material culture, he considered that the Nahua population that inhabits the Tuxtlas might be arrived at least from Toltec times and which he felt could explain the dialect variation that many linguists have observed for many years.

Analysis of ground stone and obsidian by Clarece Weiant (1943)

Clarence W.Weiant wrote in his report *An Introduction to the Ceramics of Tres Zapotes Veracruz, Mexico,* a brief section titled "Work in Stone," (Weiant, 1943: 118-121) in which he described the types of artifacts found in the excavations. He described general categories such as *Stone Yokes*, *Metates*, *Stone Vessels*, *Stone Rings*, *Sling Stones*, *Human Figurines* as well as *Miscellaneous Stone Objects* where he included *Stone balls*, *Natural Pebbles with High Polish on one Side*, *Stone pounders*, *Bark-beaters,* and *Polished Celts*. Another class of artifacts was called *Minor Stone Objects* in which he described figurines made of jade, ilmenite cubes (which they were called galena specimens, and artifacts made of obsidian).

One important aspect is that he provided the locality in Tres Zapotes where every kind of artifact was found as well as the ceramic phase that was assigned to the context. In regard to the Stone Yokes, he noticed that there were found carved and plain fragments as well as closed and open varieties. All the specimens were found in the Ranchito Group and the First Terrace. He says that closed and plain yokes were found associated with Upper Tres Zapotes ceramic materials and laughing-face figurines; and carved and open yokes were earlier because they were found associated with Middle Tres Zapotes ceramics.

Metates, either in Upper Tres Zapotes or Middle Tres Zapotes periods, consisted of one basic type, tripod support with two legs on one end and a supporting ridge on the other. Metates were made of basalt and fine-grained sandstone. Manos were called mullers and made of fine-grained sandstone. Stone vessels are like to the ones analyzed in this dissertation "in the form of a "flower-pot" with flat base and outward flaring sides" (Weiant 1943: 118).It is noticed that the bark-beaters that he found are like to one that is analyzed in this dissertation. He says that all the bark-beaters that he discovered were associated with Upper Tres Zapotes ceramics.

There are types of artifacts that he analyzed which were classified with other names in this dissertation such as Rubbing Stones (5. Polishers), Sling Stones (12. Abraders), Stone Balls (15. Spheres), Ring Stones (18. Tejos), Pebbles (24. Pebbles), Galena (64. Ilmenite).

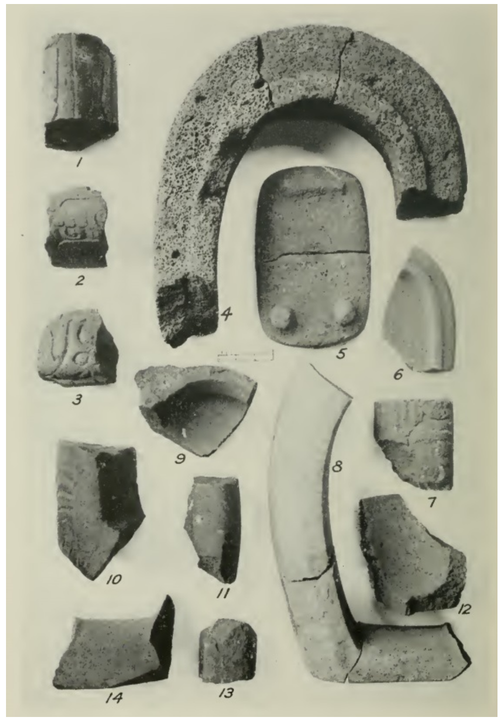

Figure 2.3 Examples of ground stone artifacts analyzed by Clarence Weiant, 1943 (1943: Plate 66)

Drucker, 1943

Philip Drucker continued the research in Tres Zapotes during the 1940 field season. It was thought that it would be important to conduct a careful stratigraphic study in the excavations in order to provide a complete view of pottery transformation in the site.

When one reads Drucker´s report, it is possible to identify a scholar who was up to date in the archaeological theoretical currents at the time. He wrote that in his report a ceramic column is provided. He studied and worked during the development of the "Classificatory-Historical period" paradigm as Willey and Sabloff labeled this age of the history of American archaeology (Willey and Sabloff 1993) and the concepts that he used are similar to the ones summarized by Gordon Willey and Phillip Phillips in 1958 (Willey and Phillips 1958). Drucker wrote in regard to cultural phases:

> The Tres Zapotes material itself divides into three main chronological divisions on the basis of changing preferences for certain wares and innovations. It must be borne in mind that throughout the Tres Zapotes period proper we have to do with a ceramic, and inferentially a cultural continuum. The divisions have been termed "phases" to avoid any connotations of cultural unconformities. Thus we have a Lower, a Middle, and an Upper phase of Tres Zapotes.. (Drucker 1943:4)

In regard to his concepts of material change and time, he stated that the breaks that he established in the ceramic sequence:

> The final analyses demonstrate two main periods of prehistoric occupation of the site. One was a very long period, during which ceramic patterns changed, presumably through normal processes of culture growth. This is the Tres Zapotes period proper. There was no break in the ceramic tradition from beginning to end of this period.

A result of his analysis, Drucker identified three phases: the Lower phase, which was distinguished by monochrome wares and few figurine types; the Middle phase characterized by a growing Polychrome pattern[1] and modifications of the Early figurines; and the Upper phase Zapotes which was characterized by quantitative predominance of Polychrome ware and introduced new figurine types.

Drucker argues that there were differences between his classification and the classification done by Weiant. He said that the two major differences were: the Weiant´s Upper Tres Zapotes is equivalent to the Upper phase and the “Soncautla complex” defined by Drucker; and the second difference is that Drucker, based in quantitative

[1] Drucker included all Fine Orange pottery in his "Polychrome" type, regardless of whether it had polychrome definition. The "Polychrome" in his Middle Tres Zapotes consists of monochrome and bichrome (Plain Fine Orange, Red-on-Fine Orange, etc.). (Christopher Pool, personal communication, March 2014)

terms, did not find a division whitin the Middle phase. In contrast, Weiant divided Middle Tres Zapotes A and B mainly with respect to burials from different levels discovered in the Promontories of the Ranchito Group.

Another important difference is the use of the term “ware” for classifying pottery. Drucker said that he used ware as technological classes of pottery, and that Weiant´s wares are equivalent to the Drucker´s “sub-wares”. He wrote that the pottery of the Lower phase was not found in the 1939 excavations.

Architecture

Drucker wrote:"There are three major mound groups at the site, several smaller ones, and, as well, the stragglers which seem to belong to no particular complex." (Drucker 1943: 6). The Drucker´s description of the mound groups do not differ much from Stiling´s and Weiant´s descriptions quoted above. The difference was in the labeling of the compounds. Drucker referred to the groups as Group 1, 2, and 3 (as opposed to Stirling´s (1940) A, B, and C, or Weiant´s (1943) Cabeza, Arroyo, and North Groups.

Methodology in Drucker´s excavations

In his 1940 excavations at Tres Zapotes, Philip Drucker implemented three kinds of excavation units: test pits, mound cuts, and stratigraphic trenches.

Test pits have an exploratory purpose in order to know the extension and depth of refuse deposits. In test pits Drucker did not employ vertical control by levels. Mound cuts were excavated in the same way as test pits. In both kinds of excavation units, the pottery was selected in the field and only rims, bases, decorated sherds, and figurines were saved.

The materials obtained from these excavations was packed and labeled in accord with the number of excavation unit.

The Stratigraphic Trenches were excavated in arbitrary levels of 12 inches thick, except Trench 1, dug in 6 inch levels below the first 12 inches. Recognizing that there was some variation in the ability to maintain the 12 inch thickness with picks and shovels, Drucker thought the deviations probably averaged out. Pottery and figurines excavated in the Stratigraphic Trenches was separated by level, and bagged adding a label containing level, trench number, and date. Later on, the materials were washed and packed in boxes with all contextual data.

In the case of lots associated with burials, and caches, the materials were separated, numbered and packed. All the data recovered in these excavations were recorded in the English measurement system.

When Drucker is explaining the kind of contextual deposits which were excavated, he said that almost all were refuse dumps. He interpreted them as activity areas in household contexts which would explain his recovery of debris of production, faunal remains, charcoal, and discarded artifacts. It is very important that he considered that the remains were primary deposits (Drucker 1943: 10).

Drucker considered soil and temperature in the Tuxtlas as natural agents that modify the archaeological context. He was aware that in the excavation units there was evidence of activity areas such as a fire pit (However, he accepted that the purpose of this project was only chronology and it was not work on ancient houses (Drucker 1943: 10)

A very important contribution to the published literature on the archaeology of this site was that he made a list of the excavation unit, its location, and the kind of excavation unit. He also located in a map the excavation units. I show this list as well as the map:

Table 2.1. List of excavations by Drucker in Tres Zapotes, 1943 (Drucker 1943:12).

Trench No.	Type	Locality
1	Stratitest	Ranchito
2	Test pit (not completed)	Ranchito
3	Test pit (not completed)	Ranchito
4	Mound section	Ranchito
5	Test pit	Ranchito
6	Test pit	Ranchito
7	Test pit	Ranchito
8	Test pit	First Terrace
9	Test pit	Group 2
10	Stratitest[1]	Ranchito
11	Test pit	New Lands
12	Test pit	New Lands
13	Stratitest	First Terrace
14	Test pit	New Lands
15	Test pit	Group 3
16	Mound section	Group 3
17	Test pit	Group 3
18	Test pit	Group 3
W, X, Y	Tests	Group 3
19	Stratitest	New Lands
20	Test pit	Laguna
21	Test pit	Laguna
22	Mound section	Group 2
23	Mound section	Burnt Mounds
24	Mound section	Burnt Mounds
25	Test pit	Burnt Mounds
26	Stratitest	Burnt Mounds
27	Mound section	Burnt Mounds

[1] Begun as test pit to locate material of Soncautla complex;

Secondarily made into stratigraphic section

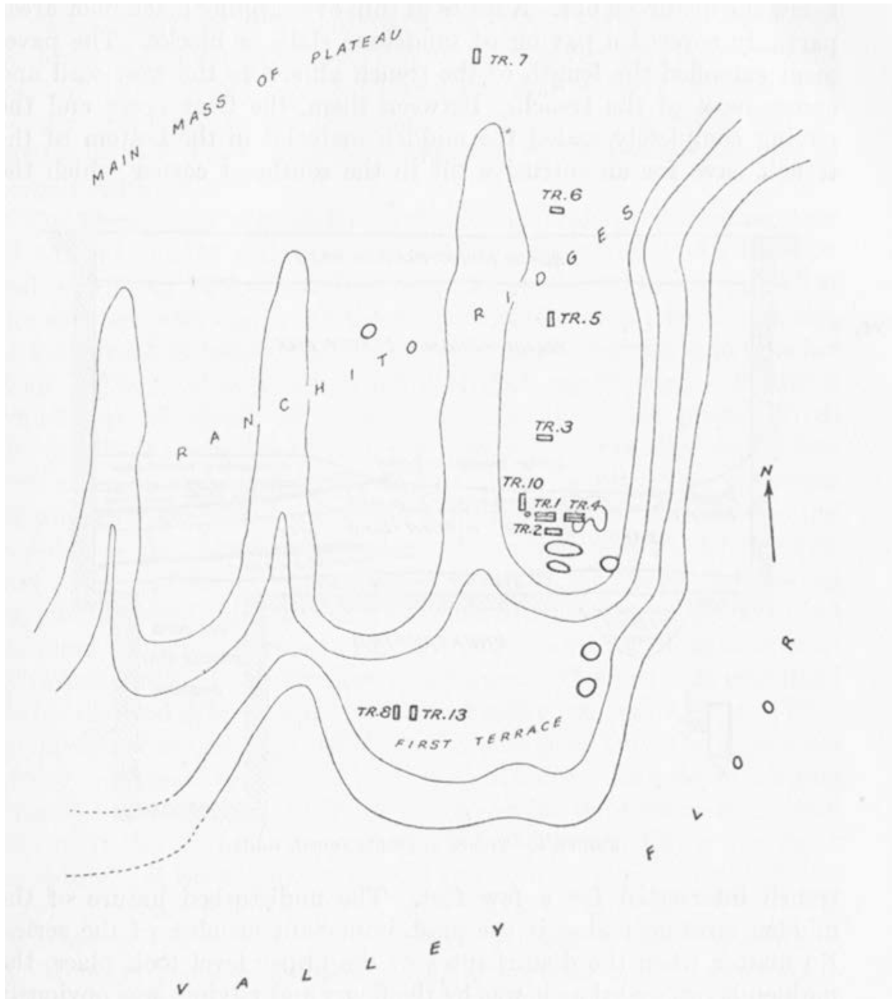

Figure 2.4 Map of Philip Drucker's Ranchito Group excavations at Tres Zapotes, 1940 (Drucker 1943: Fig. 3, p.13)

In total, during 1940 field season in Tres Zapotes Drucker directed the excavation of 27 excavation units. Excavation units 1 to 7 and 10 were dug in the Ranchito Group. Excavation units 8 and 13 were conducted in the little terrace, just below the Ranchito Group. Excavations 9 and 22 were dug in Mound Group 2. Excavations 11, 12, 14, and 19 were conducted in the New Lands between Mound Groups 2 and 3. Excavations units 15 to 18 and tests W, X, and Y were conducted in Mound Group 3. Excavations 20 and

21 were dug in the border of “la Laguna.” Excavations 23 to 25 and 27 were dug in the “Burnt Mounds Group”. The stratitest 26 was excavated in the Arroyo bank adjacent to the “Burnt Mounds” group.

The stratitest 26 is a good example about how Drucker took into consideration the surrounding landscape, interpreted the geomorphological features, analyzed cultural remains on the surface before excavating and took notes of a stratigraphic column which involved natural and cultural important deposition.

The trench was excavated in a place where the arroyo bank was steepest. Close to the site was a bar-and-dot numeral, carved in the country rock (this numeral was recorded by Matthew Stirling, and he named it Monument E (Stirling 1943: 21). This cultural element suggested to Drucker some possible antiquity to this area. He found the following stratigraphy, from top to bottom: a layer of sterile yellow-brown alluvium; then a brown alluvium layer with scattered sherds; below that, a layer of volcanic ash which had different sub-layers and some leaf molds; next a yellow-brown clayey mix layer which included a high number of sherds; a gray clayey mix with fewer potsherds; and at the bottom of the excavation, a sterile brown muck layer. One of the advantages that Drucker had in the development of excavations in the 1940 field season was that in the trench 24 he found at the bottom a volcanic ash layer, which discovery encouraged him to look for more evidence to estimate the extent of volcanic hazards that affected ancient populations in Tres Zapotes. Trench 26 was also important because it provided evidence of an ancient occupation of the site, in sealed contexts below the ash. Furthermore, Drucker thought that this oldest occupation might be related to the bar-and-dot numeral.

He reflected on the depositional history of the site and suggested that the ash could be eroded over time from the top of mounds and other upper areas of the site. His profiles and picture of this excavation unit give an idea of this very careful record of material residues.[2] The following images are an example of this excavation unit, Trench 26:

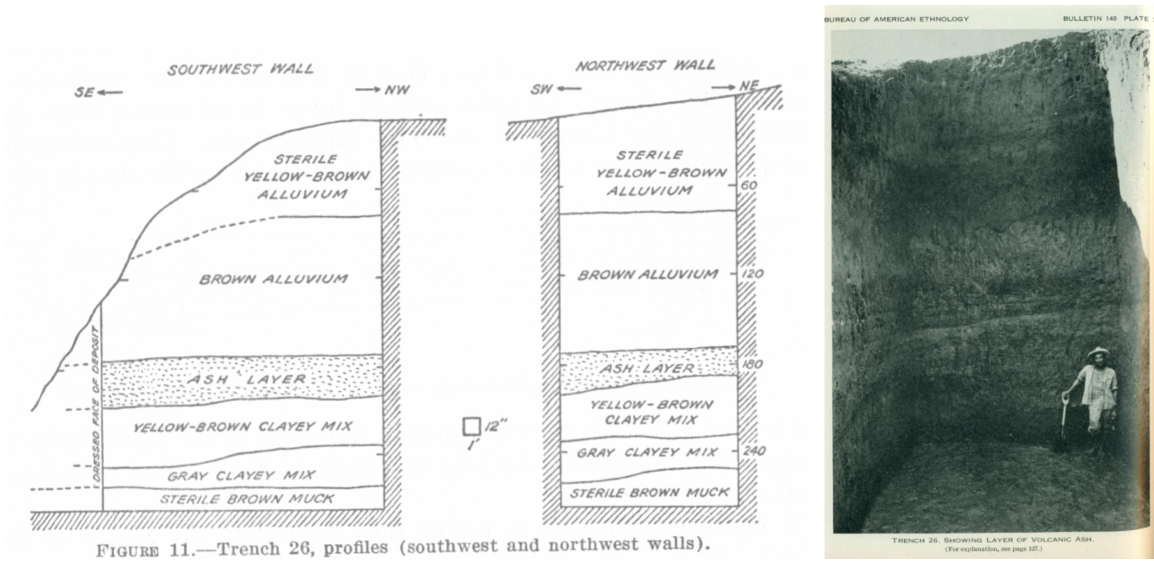

Figure 2.5 Profile and picture of Trench 26 (Drucker 1943:Fig. 11, p.32; and Plate 7).

Analysis of pottery by Philip Drucker

Philip Drucker, after considering all factors which altered preservation of pottery remains in the materials obtained from excavations, wrote that the only characteristics that it should be taken into consideration are slip, vessel shape, and paste. He opined that the difference in his concept of ware that enable him to divide the universe of pottery excavated in Tres Zapotes is that he was not able to record painting as a decorative motif.

[2] As Ortíz Ceballos's excavations nearby showed, the ash fell in the Nextepetl (Protoclassic) phase (Ortíz Ceballos 1975), and Drucker's excavations below the ash mainly sampled Late Formative levels. Ortíz Ceballos documented the presence of earlier Middle Formative layers and recovered some redeposited Early to Initial Formative sherds. (Christopher Pool, personal communication, March 2014)

For Drucker “ware” meant: “a ceramic group in which these three criteria (slip, vessel shape, and paste) occur most frequently associated” (Drucker 1943: 35). Drucker divided ceramics of Tres Zapotes into six major categories (or wares), three of which were divided in several subtypes: Polychrome (with several subtypes); Coarse Paste Brown ware (which includes Red, White, and Red-and-White Bichrome as subtypes), Polished Black ware (also containing several groups of lesser order), Incensario ware, Comales, and Unslipped Ollas. Drucker asserted that Lost-color ware was not found in the materials excavated in 1940 by him.

In the description of pottery types, it is possible to see that the attributes which are now known to characterize Preclassic occupations, including Olmec traits, were recognized years after these pioneer excavations and analysis were conducted. For instance, Differential firing vessels were included in the Black Polished Ware (Drucker 1943: 60-65). Drucker, analyzing paste, discovered that the former pottery specialists of Tres Zapotes made either a cultural choice or timed firing process in a specific way, or decided to select certain shapes of this ware, for obtaining decorated rims or part of the vessel body with black and white colors. Sometimes there were different tones of gray, or the division between colors was not a sharp line, or there were irregular lines developed in the course of firing. Drucker (1943: 60) mentioned that Stirling found similar differentially fired potsherds at La Venta. Drucker (1943: 65) defined some subtypes as: “White-rimmed, Brown-rimmed, and Mottled-Black shapes. His profile drawings show that the differential firing technique reached the core of the shape (Drucker 1943:66; Fig. 37 and 38).

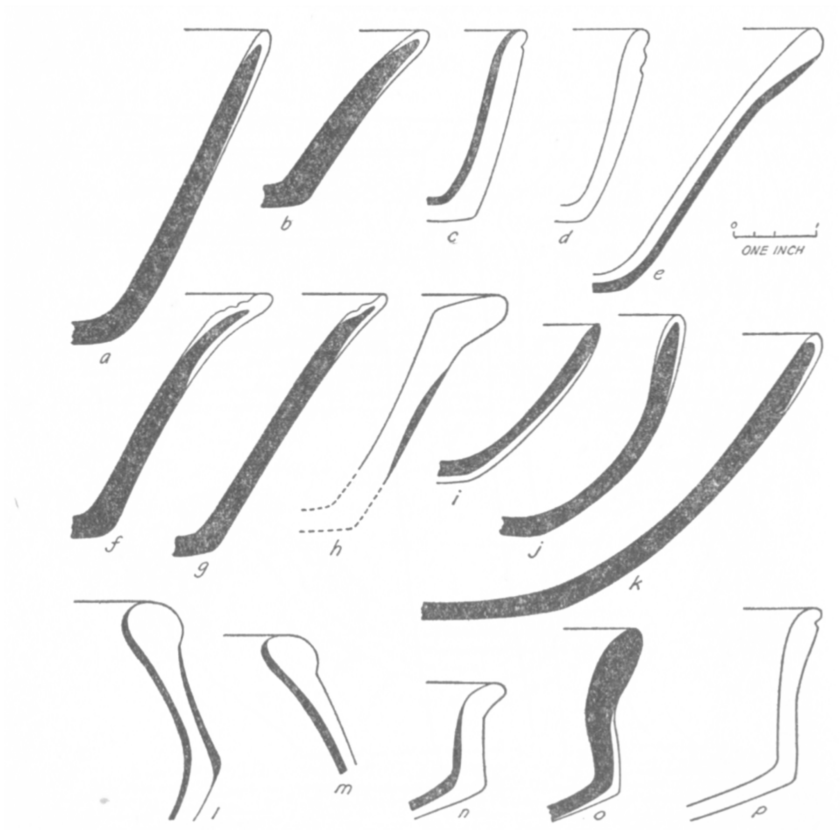

Figure 2.6 Examples of the differential firing type identified by Drucker (Drucker 1943:66; Fig. 38).

Also interesting is Drucker´s description of “Polychrome ware” because it is one of the earliest examples of characterization of Fine Orange-Gray ware in the southern Gulf Coast Mexico. He described the paste as follows:

> “The paste used for polychrome vessels is an extremely finely divided, compact clay, with no visible temper (very rarely sherds, otherwise conforming to these standards, contain a few bits of sand, perhaps accidental inclusions). The appearance of the paste suggests it may have been made of the fine yellow (volcanic) clay that overlies the country rock over most of the site.” (Drucker 1943: 36-37).

Also interesting is that after his analysis, he hypothesized that there might be a relationship between Fine Orange and Fine Gray pottery that has to do with firing:

> "In the Gray-slipped examples, the entire sherd is usually of this gray color, suggesting a firing sequence of this clay from orange to gray; the gray sherds may in some cases, at least, be merely overfired pieces." (Drucker 1943: 37)

Drucker also analyzed figurines. As he considered that it could be difficult to assign function, he preferred to divide figurines in accord to technique of manufacture, style, and ware. His classification clustered the figurines into three groups: The "Tres Zapotes hand-made, the "San Marcos" hollow-molded, and the "Lirios" large, hollow-modeled types.

For having a more fine-grain division of the most abundant group –Tres Zapotes hand-made-type – Drucker followed Stirling´s 1939 figurine classification for heads. Stirling made six classes. These six clusters are divided into two broad technological groups: I) Punctated forms in which facial features are indicated by punched holes; and II) Modeled and Incised forms. Subtypes A, B, and C were punctated; and subtypes D,E, and F were molded and were better fired. Subtype E corresponded to the famous "baby-face" type

Drucker also grouped in miscellaneous types: candeleros, effigy pots, musical instruments (including pan pipes).

Chronology

Drucker, after correlating the stratigraphic trenches 13, 19, 1, and 26 wrote that he was able to define the evolution of phases of occupation of Tres Zapotes from the early to the last pre-Hispanic ceramic materials. He quantified the types and showed how they varied over time. He preferred to use the term "phases" rather than periods because he considered that it was the same population which experienced gradual evolutionary change, without disruptions, and he defined the “Soncautla complex,” the different ceramic tradition which Weiant found in burials, as an intrusion. I want to provide an example of the kind of quantification that he made in the case of Trench 26, and a very important diagram where he correlated the different stratigraphic trenches and how they correlated over time. These examples are in the following image and table:

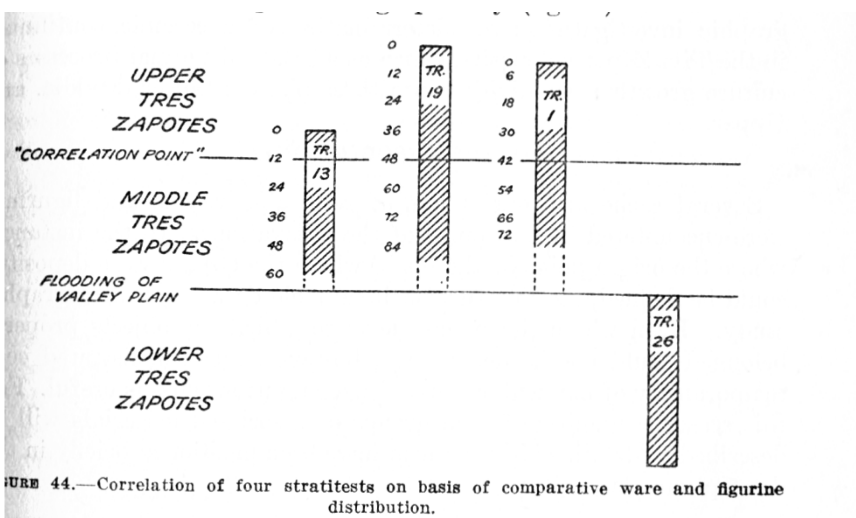

Figure 2.7. Correlation among trenches in 1943 Drucker´s ceramic analysis (Drucker 1943: Fig. 44, p. 101).

Table 2.2 Example of quantification of types in Trench 26. (Drucker 1943: Fig. 44, p. 101)

TABLE 5.-Depth distribution of major wares in Trench 26

Ware	Distribution at depht of (inches) -														Total number of sherds
	189-201		201-213		213-225		225-237		237-249		249-261		261*		
	No.	Per-cent	No.	Per-cent	No.	Per-cent	No.	Per-cent	No.	Per-cent	No.	Per-cent	No.	Per-cent	
Polychrome…	3?	2	---	---	---	---	1?	(1)	5?	1	---	---	---	---	9
Brown………	99	66	79	66	165	66	127	73	191	59	181	61	66	[2]84	908
Bisck………..	46	31	40	33	84	33	45	25	126	39	112	38	12	[2]15	465
Total……….	148	---	119	---	249	---	173	---	322	---	293	---	78	---	1,382

[1] Occurrence under 1 percent

[2] The relative values of the wares in this level is probably slightly askew owing to the smallness of the sample. If the sherds are grouped with those of the overlying level, we find 66 percent Brown and 35 percent Black for the combining levels, figures more in keeping with those of the other layers

Philip Drucker, 1952, Middle Tres Zapotes and the Pre-Classic Ceramic Sequence, *American Antiquity*

There was a debate some years after the publication of the ceramic reports of Tres Zapotes by Weiant and Drucker. This debate was published in *American Antiquity*. The main reason was the publication of *A Tentative Sequence of Pre-Classic Ceramics in Middle America* by Robert Wauchope. Wauchope misunderstood Drucker´s report and Drucker tried in 1952 to clarify the confusion in the names for the periods/phases that were assigned for both ceramic sequences. Basically, Drucker criticized the procedures of excavation and classification made by Weiant. He argued that Weiant did not apply stratigraphic excavations and only classified by a typological method looking for external influences rather than a local development. Drucker also wrote that even though the sequences seemed similar in their division of three occupations with the terms "Lower, Middle A, Middle B, and Upper periods" by Weiant and "Lower, Middle, and Upper phases" by Drucker, they are completely different. Drucker asserted that there was no material basis for dividing Middle A and Middle B periods because there was continuity, a slow development which had a minimum impact from exterior influences. And Drucker wrote that Weiant´s Upper Tres Zapotes was an occupation after Tres Zapotes was abandoned during the Early Post-Classic period. Drucker found similarities with the excavations conducted by Strebel in the surroundings of Jalapa referred to these materials excavated in tombs in Tres Zapotes as the Soncautla Complex. In this brief writing published in the section "Facts and Comments" of *American Antiquity*, Drucker called the pottery of the Middle Tres Zapotes phase and the pottery of La Venta as "Olmec". His point of view about the social development of the Olmec sites infered from his analysis of ceramic sequences was:

> In short, all the evidence, when critically reviewed, indicates that the Middle phase at Tres Zapotes was a continuum, with gradual development and change in ceramics, but no break whatsoever. Weiant's division of it into "A" and "B" subphases is not in accord with the facts. What this means, in terms of Wauchope's synthesis, is simply that the Tres Zapotes (and the La Venta) region-the Olmec area, as I prefer to call it was culturally isolated during this time, pursuing its own trends in ceramics in response to internal stimuli only. The Proto-Classic patterns never reached it, so that in effect, the culture jumped from a prolonged Urban Formative into a full-blown Classic pattern. As pointed out in the Tres Zapotes report, the sudden appearance of a host of the new elements that distinguish the Upper phase very forcibly suggests the sudden opening up of new lines of cultural influences, after a period of isolation." (Drucker 1952: 260).

Clarence Weiant, 1952, Reply to "Middle Tres Zapotes and the Pre-Classic Ceramic Sequence", ***American Antiquity***

Some months later, Clarence Weiant responded to Philip Drucker in the same section "Facts and Comments" in American Antiquity. He said that he was not able to deny the Drucker´s vast experience in field methods in archaeology. But Weiant disagreed with Drucker when he tacitly said that Weiant´s analysis and division in periods was useless. Weiant criticized Drucker´s concept of ware because he did not consider surface elements such as color. He asserted that Drucker´s pottery analysis made the ware category too wide, and Weiant found in Drucker´s report inconsistencies in his use of color differences as a criterion for clustering ceramic groups. Inconsistencies were found by Weiant between the forms described in the text and the forms which were illustrated in the images.

Weiant argued in favor of a Proto-Classic occupation in Tres Zapotes and actually quoted Stirling´s field notes in which he discusses Proto-Classic features in Tres Zapotes. Finally, Weiant quotes Gordon Ekholm´s review published also in *American Antiquity*.

Ekholm highly recommended Drucker´s report first to get a general idea of the sequence of the site and then to read Weiant´s report for comparing ceramic relationships of other sites. Ekholm actually also criticized the wide categories of wares created by Drucker because it was impossible to compare with other ceramic sequences in Mesoamerica.

Robert Squier, 1964, A Reappraisal of Olmec Chronology

Robert Squier, who participated in the excavations at La Venta in 1955, wrote his PhD dissertation about the issue of Olmec chronology. He re-analyzed the published reports and studied some of the collections stored at Smithsonian Institution. The ceramics pertained to the projects conducted in Tres Zapotes, La Venta, San Lorenzo, Cerro de las Mesas, and the survey in the Uxpanapa river. In the first part of his dissertation, Squier focused on the stratigraphic trenches excavated by Philip Drucker and the ceramics obtained from these excavations and analyzed also by him in Tres Zapotes.

Taking into account the differences between Drucker´s and Weiant´s pottery analysis for Tres Zapotes, he decided to divide the ceramic sequence of Tres Zapotes in three phases based on certain quantities of potsherds considered from the Drucker´s stratigraphic trenches, these were the phases which he proposed:

Table 2.3. Quantification of Tres Zapotes´s potshers re-analyzed by Squier recovered by Drucker in 1940 (Squier 1964: 106).

	LOWER TRES ZAPOTES (all wares):		
	Trench 26	1459	
	MIDDLE TRES ZAPOTES		
	Trench 1	4914	
	Trench 13	4629	
	Trench 19	3464	
	total	13,007	
	UPPER TRES ZAPOTES (all wares):		
	Trench 1	5202	
	Trench 13	394	
	Trench 19	1746	
	total	7342	
	Grand total	21,808	

Squier´s most important critique of the terminology used by Drucker that has implications for chronology and the characteristics that are considered for clustering ceramic wares was the use of "Polychrome" ware. In "Polychrome" ware Drucker included all of the fine paste pottery from the Tres Zapotes deposits (Squier 1964: 102)

Drucker divided all pottery into some groups. He made a basic differentiation between pottery having a fine and in some cases apparently untempered paste and those which were tempered with various amounts of medium to coarse size nonplastic materials. The first group was subdivided in "subwares", and the second group was subdivided into all of the other Tres Zapotes wares. Less than 1% was true "Polychrome" ware. Drucker supposed that fine paste obtained both from Mound cuts and from trenches had a different preservation and all potsherds made of fine paste were once painted (Drucker 1943: 36, Footnote 15), he said:

> As a matter of fact, sherds from stratitests that still retain their original painted designs form an incredibly low proportion, probably less than 1 percent of the total, not of all sherds from the cuts, but of this technological class alone. Most of the painted examples come from mound-cuts, probably because of better drainage conditions.

Drucker also divided into subwares this fine paste ware on the basis of different "slips" (five different slip colors) (Drucker 1943: 44-45). He was not consistent with the statements of his classification because the potsherds which could be eroded did not show any different slip at all, nor did the potsherds that only were polished or smoothed without being treated with slip or painting.

Also, Squier proposed a new division of ceramic phases based on these critiques of the classification made by Philip Drucker:

Squier argued that the Drucker´s Lower phase was composed in the vast majority by types of the Middle phase. Also, trench 26 was excavated in an area that could represent a low social status, therefore the types varied in respect to trenches 13, 19, and 1. Scarcity in trench 26 of fine pastes might have to do with societal differences. Squier estimated that there is not a sharp difference between the Lower and the Middle phases in Tres Zapotes.

Squier also argued that analyzing the Upper levels of the Middle phase, he discovered that a number of changes occurred in these levels such as: upward slanting triangular lugs; two-tone whistles; vessels with externally rolled, flared rims; Brown ware bowls with unslipped bases; and stamped-circle design element (Squier 1964: 140). Squier found analyzing the trenches that "Los Lirios hollow figurines" occurred earlier than "San Marcos complex" (Squier 1965: 140). In terms of wares, Drucker himself found that Black ware had a slight peak which occurred just before a marked upswing in Fine Paste Ware.

Drucker also criticized Weiant for dividing the Middle phase into A and B. Drucker wrote that there was not a technological break. However, in the publication of his 1952 report of La Venta, he had called fine paste ware to the former "Polychrome" and provided results of the petrographic analysis made by Ann Shepard (Drucker 1952: 324-239). Even though the sample was small (40 sherds, Upper Tres Zapotes, and 25 sherds Middle Tres Zapotes), Shepard found differences between the two phases:

> Comparison of these pasted with those of the later phase is based entirely on examination with the binocular microscope. All the Middle phase pastes are silty. the dense micaceous one of the Upper Tres Zapotes being unrepresented. Also the silt of the two phases does not appear identical. The earlier paste is more porous, slighly finer in texture and less homogeneus in mineralogical composition. (Drucker 1952: 238)

In order to summarize the trait differences Squier in his Tres Zapotes IIa Subphase and Tres Zapotes IIb Subphase, he provided these lists:

Tres Zapotes IIa Subphase:

Introduction of:

Incensario ware

Comales

"Lirios"-type hollow modeled figurines

Upward slanting, triangular lugs on vessels

Externally rolled, flared rim form

Brown ware bowl with unslipped base

Stamped-circle design element

Two-tone whistle of clay

Frequency decline of:

Brown ware bowl with incurved, tappered everted rim

Brown-slipped Brown ware composite silhouette bowls and dishes

Black ware composite silhouette bowls and jars

Black ware concave side jar

Brown ware olla with simple neck form

Heavy annular vessel base

Punctuate face on olla necks (Squier 1965: 147).

And Tres Zapotes IIb Subphase:

Frequency increase of Fine paste ware, reflecting a sharp quantitative increase in all subwares of this ware. Fine paste ware for the first time becomes the dominant ware at the site.

Frequency decline of Black ware. This ware now for the first time falls in frequency far behind both Brown ware and Fine Paste ware.

Introduction of:

"San Marcos"-type moldmade figurines

Hollow slab legs

Solid slab legs

Moldmade spindle whorls

"Vertical zoomorphic lugs" on vessel rims ("rimheads") (Squier 1965: 150).

Squier provided a profile of the trenches comparing the division by Drucker and by him after revising ware distribution:

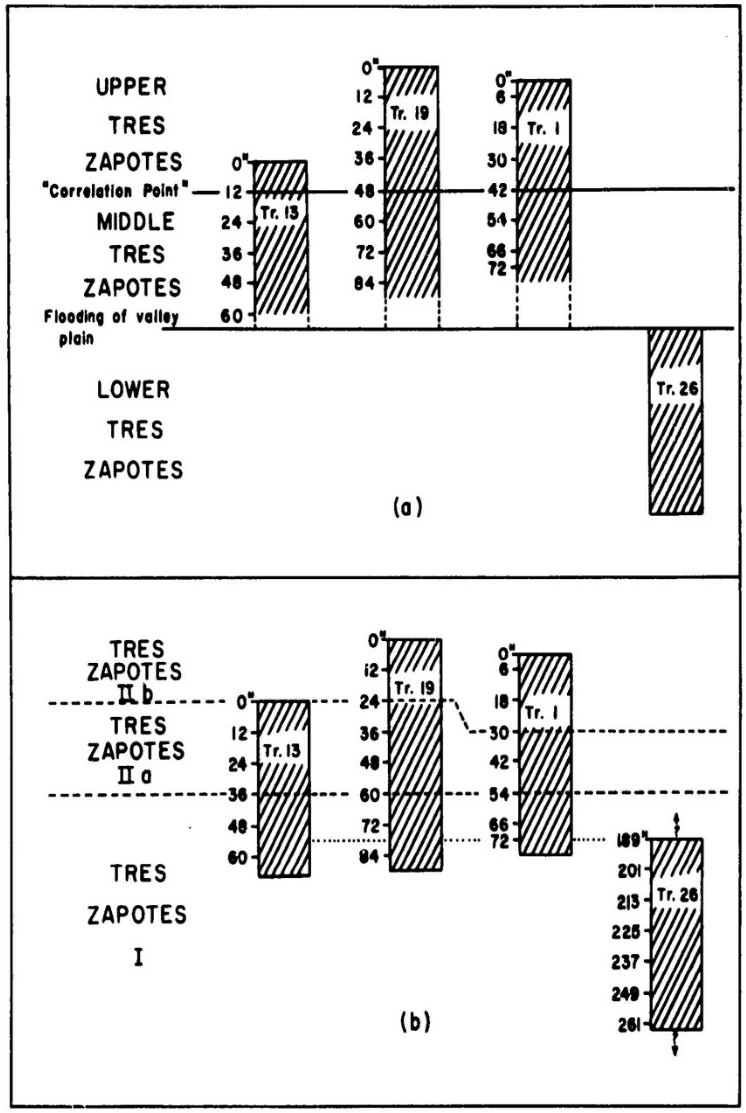

Figure 3. Comparative correlations of Tres Zapotes stratigraphic trenches; a, after Drucker, 1943a, p. 101; b, this paper.

Figure 2.8 Profile made by Squier where he compared Drucker´s correlation and Squier´s correlation after his revision (Squier 1964: Fig. 3, p. 87a)

Finally, a very interesting contribution by Squier to Tres Zapotes chronology is that he assigned the building of mounds and carving of associated monuments to each phase that he proposed.

Squier suggested that the site was initially occupied by bearers of the Phase 1. Mound Group 2 and probably Group 1 were laid out according to the northeast-southwest pattern of orientation, before the volcanic eruption that probably caused a temporary abandonment (Squier 1965: 182). Then, he interpreted that after the return of the inhabitants to the site Mound Group 3 during Phase 2 was laid out in a north-south orientation (Squier 1965: 183). He said that Stela A and Monument A were erected during Phase 1. Probably Stela C and Monuments F and M dated this phase[3].

Subphases IIa and IIb corresponded with the introduction of a foreign tradition. During phase 2, there was an increased building of earth-mound architecture and Stela D and Monument C were assigned by Squier to this phase (Squier 1965: 185).

Squier summarized the assigned phases for both architecture and monuments in Tres Zapotes in the following table:

[3] It is important to comment that both Squier (1964) and Christopher Pool had come to a similar conclusion independently. However, Pool during the development of his project discovered that the site was not abandoned, but Group 3 was reoriented N-S).

Table 2.4 Suggested architectural development in Tres Zapotes in each phase proposed by Squier (Squier 1964: Table 6, p. 68)

Mound Group	Year Excavated	Mound	Phase Association
1	1939	E	I
2	1939	C	I[1]
		F	I (?)[2]
		G	I (?)[2]
		I	"Soncautla" (?)
		J	"Soncautla" (?)
	1940	Trench 22 Mound	I
3	1940	Trench 16 Mound (Mound 32)	I (lower mound) IIb (upper mound) "Soncautla" (Surface)
Ranchito	1939	A	IIb
		C	IIb
		D	IIb
		F	IIb
	1940	Trench 4 Mound	IIb
Burnt Mounds	1940	Trench 23 Mound	IIb
		Trench 24 Mound	IIb[3]

[1] Refers to lower mound levels; upper levels probably either Phase I or Phase IIa construction using Phase I occupation debris

[2] Possibly Phase IIa construction using Phase I occupation debris.

[3] Refers to mound itself; underlying sub-phase deposits are Phase I.

Cabeza de Nestepe

Tillie Smith, then a graduate student at University of California, Berkeley, and a participant in a research program designed by Robert Heizer for studying the Olmec culture, published in the paper titled "The main themes of the "Olmec" art tradition (Smith 1963 128-129; Fig. 78 and 79) the colossal head of Nestepe. At the time, she thought it was found near the archaeological site of Tres Zapotes. Some years later, in 1965, Heizer, Smith, and Williams published in *American Antiquity* providing more details of this second Colossal Head from Tres Zapotes (Heizer, Smith and Williams 1965: 102-104). Alfonso Medellín Zenil told them that the monument had been transported from Tres Zapotes to Santiago Tuxtla in 1951. Heizer, Smith, and Williams named it Tres Zapotes Colossal Head No. 2.

Figure 2.9 Robert Heizer, William Clewlow, Howel Williams, and John Graham in Tres Zapotes measuring Cabeza de Hueyapan (Courtesy Giancarlo Ligabue).

Howel Williams and Robert Heizer, 1965, Sources of Rocks used in Olmec Monuments

During two weeks in January, 1960 and two brief visits to Museums in Mexico, Howel Williams and Robert Heizer conducted a pioneer study of sourcing the provenience of rocks which were obtained by the Olmecs in order to sculpt monuments. In the case of Tres Zapotes, they analyzed three monuments which were in the Plaza of Santiago Tuxtla: the Colossal Head of Nestepe, Monument F, and a rectangular basin ornamented with "Pecten" shells[4]. Both the Cabeza de Nestepe and Monument F were shown through the use of petrograhic analysis of thin sections to be manufactured from boulders obtained in El Vigía Volcano. Meanwhile, Stela C and the rectangular basin ornamented with "Pecten" shells are simiar to the rock used to sculpt Stela 3 of La Venta and the basalt columns of the "court" of La Venta. The only difference which occurred between Stela C and the rectangular basin is that this last one is darker (Williams and Heizer 1965:15-16).

The Olmec project in Los Tuxtlas, Robert Squier and Francisco Beverido, 1970-1972.

This project was conducted from January, 1970 to March, 1972. It was a binational collaboration between the researchers Robert Squier (Kansas University) and Francisco Beverido (Universidad Veracruzana) who were co-directors. The project was sponsored by the National Science Foundation, the University of Kansas, and the Universidad Veracruzana. The main purpose of the project was the study of the origins and development of the Olmec culture in the Tuxtla Mountains.

The main reasons that encouraged the study of this area were in described in Ortíz Ceballos´s Master thesis (1975: 13):

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[4] Although the basin has been attibuted to Tres Zapotes, it is from near Catemaco (Stirling 1965). Christopher Pool notes that it has been identified as coming from Matacanela. (Christopher Pool, personal communication, March 2014).

a) The ecology of the area could be favorable for the origins of the Olmec culture; it was thought that it could have similar conditions with other Olmec sites such as the cases of San Lorenzo-Tenochtitlán and La Venta.

b) The availability of outcrops of basalt in the area which were used by the Olmecs as quarries for obtaining raw material for making monuments and grinding tools.

c) The high density of Pre-Columbian archaeological sites and the suggestion of a long sequence of occupation.

The original plan was to divide the area with an imaginary line which should begin at Juan Díaz Covarrubias, pass through Catemaco and end in Santecomapan, on the seashore of the Gulf Coast. The area west of this line would be studied in the first year. In the second year, the project would study the eastern part. The purpose was to conduct a settlement pattern study with the aid of aerial photographs, excavation of selected sites with Olmec occupations, sourcing studies of basalt, and botanical analysis as well as C14 dates derived from the excavations (Ortíz Ceballos 1975: 12-14).

However, during the first year of the project, some events obliged the team change plans. The discovery of Cabeza de Cobata focused the attention on the quarry from from which it was originally transported. Efforts were made in the study of “Conjunto dos Mangos” that was located at a distance of 2 km from the Cabeza de Cobata. Paul Katz and Susan Katz (then Squier´s graduate students) originally were going to conduct the sourcing study, but plans changed, and they excavated the Cabeza de Cobata instead (Paul Katz, personal communication, 2011). The samples that they collected in the Tuxtlas were not studied.

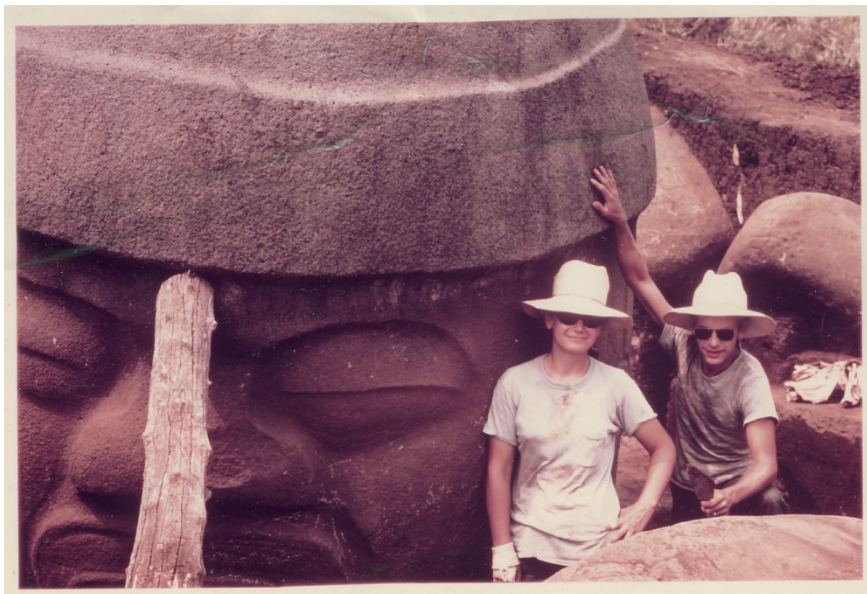


Figure 2.10 Discoverers and archaeologists who excavated the Colossal Head of Cobata, Paul and Susan Katz (Courtesy Paul Katz).

Figure 2.11 Francisco Beverido and Robert Squier in front of Cabeza de Cobata, 1970 (Robert Squier personal library).

Also found in this first year was the second part of Stela C of Tres Zapotes. The history of Olmec archaeology has some examples that should be written by novelists. Exactly thirty years after the discovery in 1939 of the lower portion south of structure 23, Esteban Santos found the upper part of Stela C in the same parcela ejidal (ejido smallholding). The upper part contained the missing cycle (or baktun) 7 coefficient. With the aid of his neighbors, Esteban Santos moved this Stela fragment to the settlement of Tres Zapotes and deposited it in front of the city hall where it was first seen by Francisco Beverido during the first days of March, 1970. When Beverido identified this second fragment of the monument, he asked Esteban Santos to visit the area where the monolith was recovered. He acknowledged that was the same place where Stirling found the other part. However, there were problematic relationships with the community which came from bad communication, and Beverido was run out town. Fortunately, later Beverido and Squier were able to negotiate with the community of Tres Zapotes in order to continue their project, and an agreement was reached. Francisco Beverido was able to take pictures of the Stela and some rubbings the following year, in 1971, with the assistance of Juan Sánchez Bonilla (Beverido, 1971).

Figure 2.12 Picture and rubbing made by Francisco Beverido of the upper part of Stela C (Beverido Ms 1971).

During the second year, the project continued with some of the original objectives. There was a reconnaissance of both west and east sides of the line proposed. After recording some ideal sites to be excavated, some test excavations were conducted in El Picayo, Matacapan, Matalapan, Bezuapan, Arroyo de Lisa, La Victoria, La Mechuda, Tres Zapotes, Matacanela, and others (Ortíz Ceballos 1975: 15).

During the period from September, 1970 to March, 1971, Paula Krotser and Ponciano Ortíz Ceballos analyzed ceramics obtained from Pit 3 of El Picayo, Pit 4 of Matacanela, and excavations at Matalapan. Also, they began sorting pottery from the NE quadrant of Pit 3 of Tres Zapotes. The method employed in the classification was a combination of Rouse´s modal analysis and the type-variety system (Ortíz Ceballos 1975: 15).

In this chapter, only Pit 3 of Tres Zapotes will be described. This pit was located approximately 4 m to the East of Drucker´s Trench 26 on the North bank of the Arroyo Hueyapan. Its dimensions were 6 m East-West by 5 m North-South (see map below). The quantity of potsherds was 9,349. The vast majority of materials were obtained from a relatively sealed context under a layer of volcanic ash which was found at a depth of 4 m (this layer was found at about the same depth by Drucker in Trench 26). Therefore, until the depth of 4 m, the arbitrary levels were thick, measuring 40 cm. When the depth of 4 m was reached, the excavation proceeded in levels of 20 cm and the pit was divided into four quadrants: NW, SW, NE, and SE. The excavation continued until the depth of 7 m, when the phreatic level was reached and sandstone was at the bottom. The Pit 3 of Tres Zapotes had 10 natural strata including the humus layer and small lenses of sand (see stratigraphic profile below). The stratum with the highest density of materials was number 8. This layer included three burials which pertained to the end of the Late Preclassic period (Hueyapan A and B phases) which were primary and were in right lateral decubitus position. Another was an infant burial which consisted of infant human remains in fetal position set inside of a Polished Black tecomate with igneous rock and quartz temper.

The materials contained in stratum 9 constituted a smaller sample but pertained to the Middle Preclassic period (Tres Zapotes A, B phases(see below)).The volcanic ash layer corresponded to strata 5 and 6 and the materials pertained to the Late Preclassic and Proto-Classic periods. The materials obtained in the other two upper strata were not analyzed but they were just a small quantity, a difference with the same level in the Trench 26 excavated by Drucker.

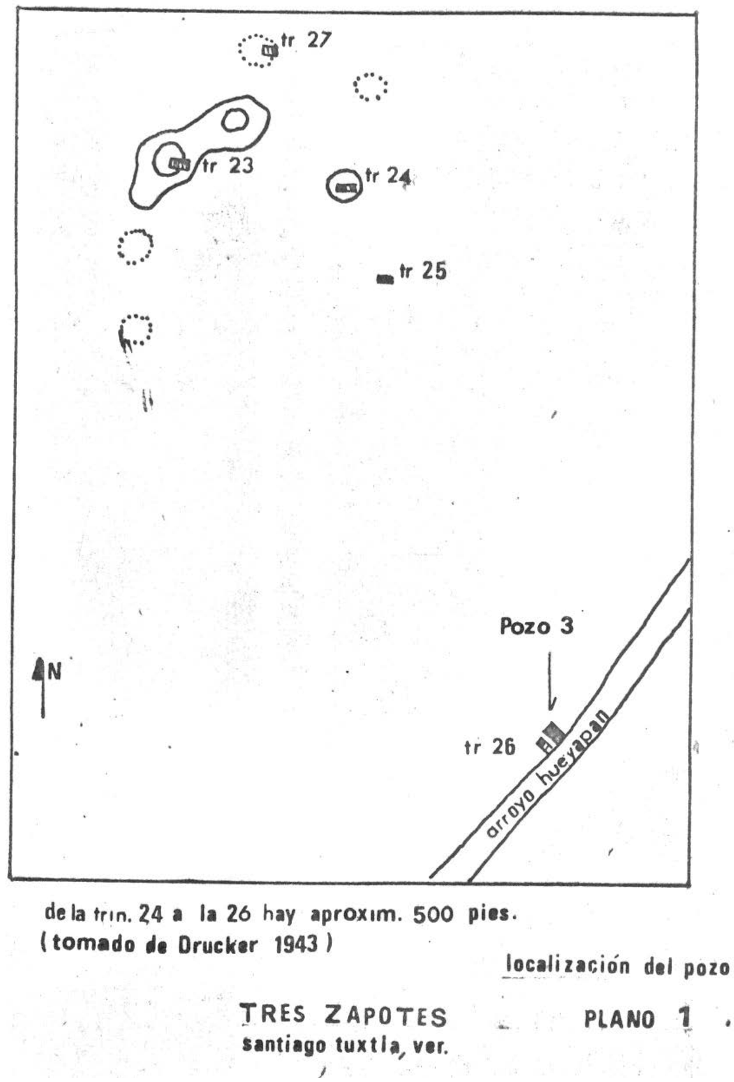


Figure 2.13 Location of Pit 3 of Tres Zapotes by Ponciano Ortíz (Ortíz Ceballos 1975: Plano 1)

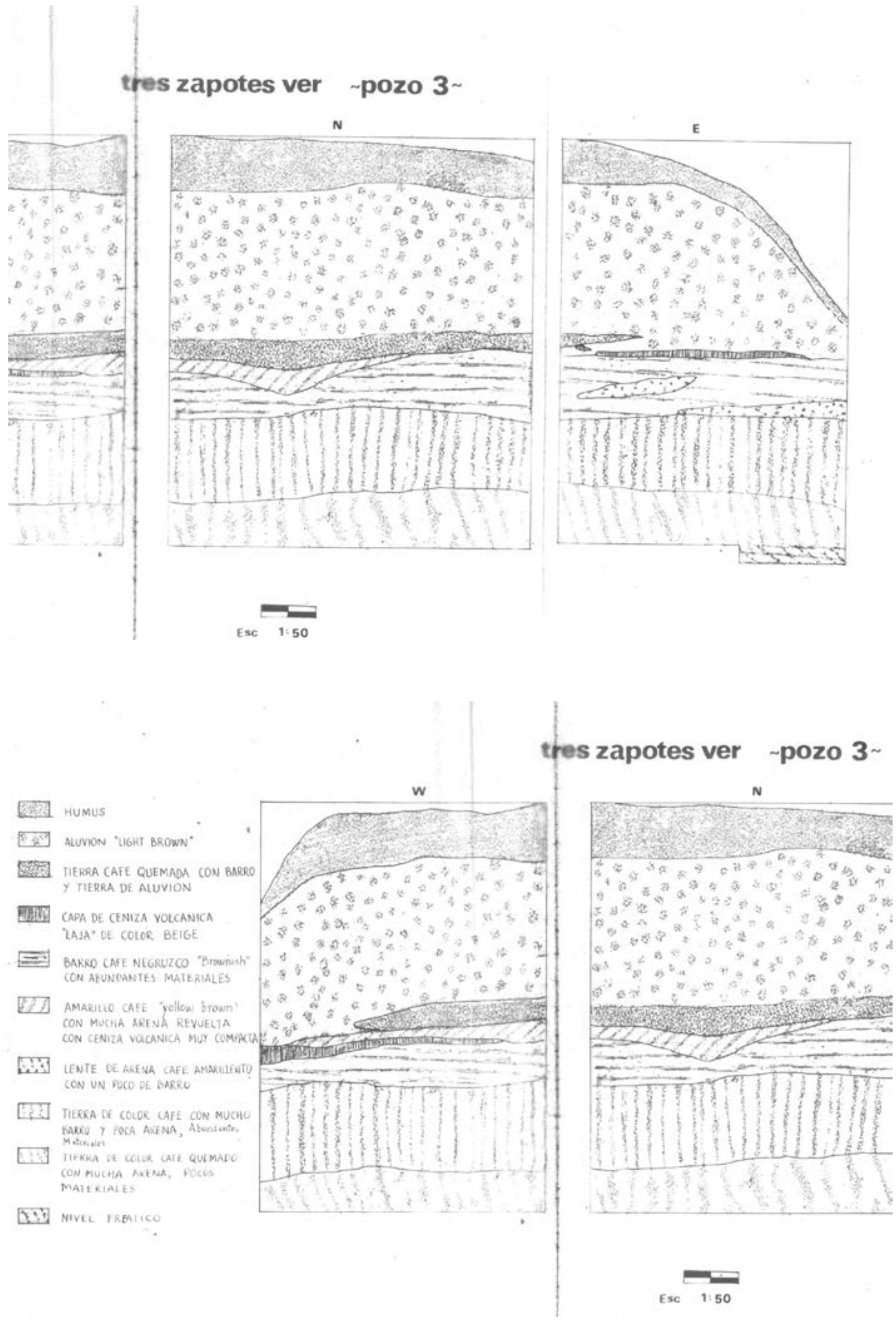


Figure 2.14 Stratigraphic profile, Pit 3 of Tres Zapotes by Ponciano Ortíz (Ortíz Ceballos 1975 V.II: Fig. 30)

Pottery classification of Pit 3 of Tres Zapotes followed these steps:

1) A first sorting of the potsherds took into account: surface finish, texture, and color. These characteristics allowed the creation of preliminary general groups.

2) The general groups were classified again in order to look for variation in paste and temper. Preliminary types were obtained.

3) Shapes and decorative motifs were classified.

4) Tables were built in order to do data entry and retrieve the features which were considered as the most important such as the following:

a) Paste color was recorded for exterior, interior, and core of the sherd. A Munsell table was used for coding color.

b) A numeric system was employed for every different shape and general characteristics such as: monochrome, bichome by firing, if interior or exterior or both, etc.

c) The presence and kind of plastic decoration such as carved, incised, gadrooned, etc.

d) Painted decoration was recorded on another sheet.

5) The recorded information was grouped for every stratum.

6) The information was transformed into percentages

7) Graphs for comparison of all information were made.

8) The ceramic phases were constructed.

9) Types, sub-types, and varieties were described and compared with other sub-regions and regions.

10) A selection of potsherds was made in order to draw and picture them (Ortíz Ceballos 1975: 66-68)

The phases defined were: Tres Zapotes A (800-550 a.C.), Tres Zapotes B (550-300 a.C.) (Middle Preclassic period); Hueyapan A (300-100 a.C.), Hueyapan B (100 a.C.-100 d.C) (Late Preclassic period);Nextepetl A and B (100 - 300 d.C.) (Protoclassic period) (see chronological table below [Christopher Pool and Ponciano Ortíz revised these dates slightly, in accord with more recently obtained radiocarbon dates]).

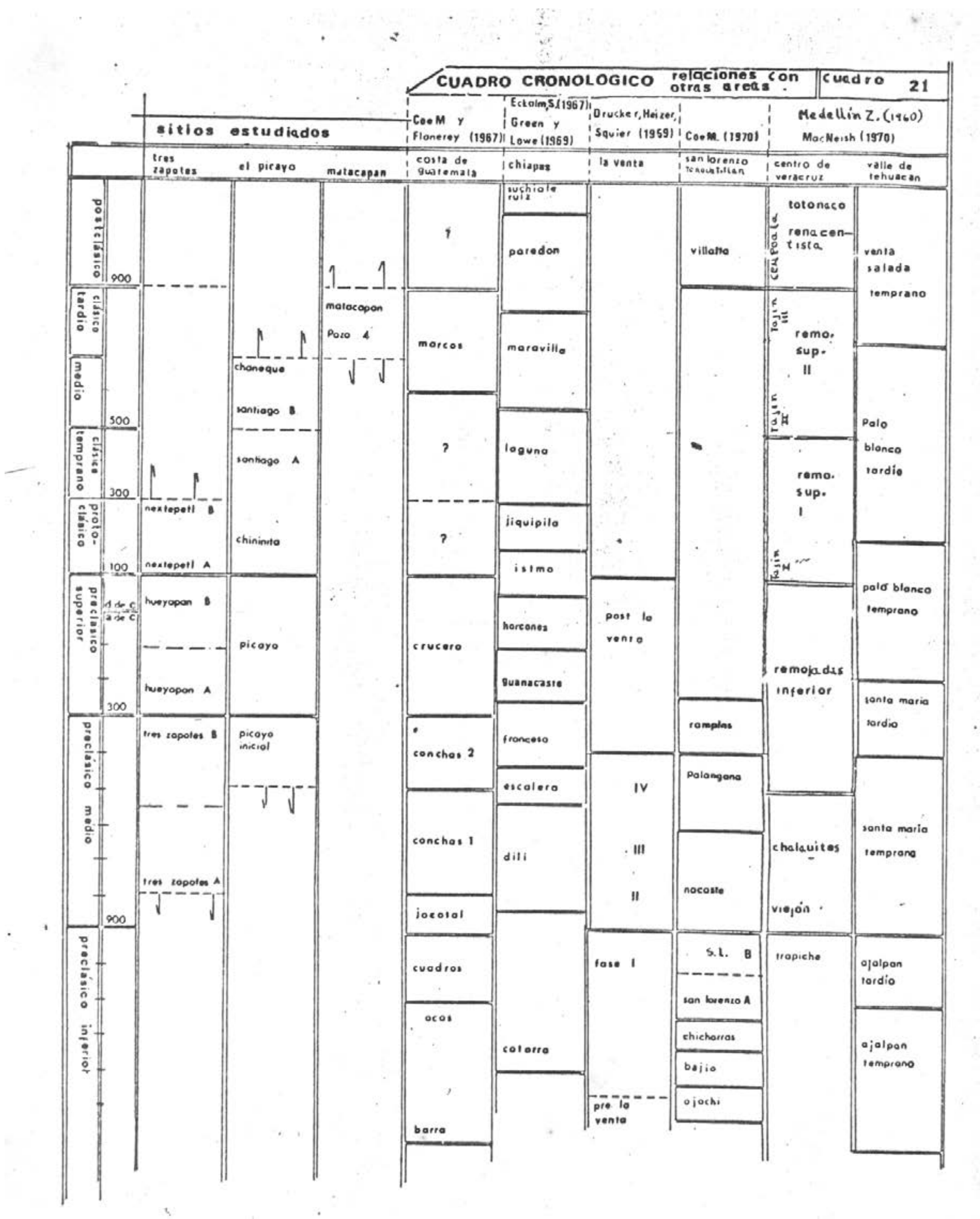


Figure 2.15 Chronological chart, Tres Zapotes ceramic phases are in the left column
(Ortíz Ceballos 1975: Vol. II Cuadro 21)

The Tres Zapotes A sub-phase is characterized by the abundance of the following sub-types: Black & White with quartz temper; Black and White with igneous rock & quartz temper; Polished Black Coarse; and Natural Cream with quartz & mica temper.

The Tres Zapotes B sub-phase is characterized by the abundance of the sub-types Black & White of fine paste; Polished Black with quartz temper; Polished Black of compact reddish paste; and White wash with quartz temper. Both Tres Zapotes A and B sub-phases correspond to the Middle Preclassic Period.

The Hueyapan A sub-phase is characterized by Polished Orange; Polished Orange with clouds; and Natural Cream with igneous rock temper.

The Hueyapan B sub-phase is characterized by sub-type Black & white of reddish paste; Polished Orange painted in zones; Effigy neck Ollas; and it is the maximum popularity of White Brush with igneous rock temper. Hueyapan A and B sub-phases corresponded to the Late Preclassic period.

The Nextepetl A sub-phase is a transition between the Late Preclassic and Protoclassic periods, It is characterized by the types Variant White and black of gray paste; Black Polished of fine paste; Rastreado; Reddish Brown Polished; hemispheric bowls of white rim and black body very well delimited.

The Nextepetl B sub-phase is the Protoclassic period in Tres Zapotes. It is characterized by radical new shapes and Fine Orange and Fine Gray wares (Ortíz Ceballos 1975: 79-81).

In the conclusions of his ceramic analysis Ponciano Ortíz wrote that there is very likely an earlier occupation in the site (Early Preclassic period) because he found evidence of potsherds like Centavito Red or Macaya Scored in re-used contexts of the Middle Preclasic period. There is evidence of Ocós ceramic types. And in regard to societal information, he estimated that the boom or splendor of Tres Zapotes occurred at the end of Middle Preclassic and during the Protoclassic periods (Ortíz Ceballos 1975: 230).

Luis Millet, Rescate arqueológico en la región de Tres Zapotes, Ver., 1979

In 1978, INAH and PEMEX signed an agreement for collaboration in an archaeological salvage project which covered the areas near the construction of a natural gas pipeline in Veracruz. The project´s director was Ángel García Cook. The archaeologist who was in charge to direct the salvege project in the Tuxlas was Luis Millet Cámara. He made a reconnaissance of the area, recording and mapping sites, which corresponded in the vast majority to the Classic period. During the survey, on the surface he found evidence of basalt columns in a geometric array; three basalt columns were partially buried in an upright position, on the south side of the Plaza Group 2, the largest mound group. Luis Millet and his team conducted excavations with the wide pits that were enlarged.

They discovered an enclosure of eight basalt columns which were surrounding by a low platform that had steps made of basalt boulders. At the center of the platform was a flat rectangular basalt slab with a circular hole in the center. A column of serpentine was set up at the central hole. This column had as a decorative treatment on one of its surfaces the design of a mat. Millet wrote that at one end of the serpentine column there were remains of feet of a scupture, probably mutilated (Millet 1979). However, Millet was speculating in his interpretation by analogy with Monument 12 of La Venta, but there is no evidence that there were feet on the serpentine column. On the contrary, Christopher Pool asserts that the battered upper part clearly looks to be a cleft. He wrote: "The short serpentine column is carved with the crisscrossing lines of a mat design and has a cleft in its upper extremity; thereby combining symbols of political and ideological authority." (Pool 2010: 116). Pool´s interpretation is accord with representations of fertility and earth symbolism that were common in important places in Olmec sites during the Late Formative period. Only one of the basalt columns of the enclosure had one face decorated with three carved skulls on the surface. When the platform was excavated, there was an offering containing the skeletons of a howler and a spider monkey, one stone celt of serpentine, one celt of green schist, another celt or pseudocelt of fossilized wood, hematite, pottery, skeletal remains of birds, and a shark's tooth.

Ann Cyphers, Tres Zapotes and the Olmec chronology, 1982

In the activities conducted by the Archaeological Project of Chalcatzingo, Ann Cyphers carefully re-analyzed the stratigraphic Trench No. 1 which Philip Drucker excavated in Tres Zapotes. She analyzed carefully the published data and analyzed again the ceramic potsherds at Smithsonian Institution. She had experience with the ceramic sequence of Chalcatzingo and she found important differences and similarities with potsherds that were excavated in Chalcatzingo and which corresponded to the Cantera Phase. In the stratigraphy of Trench No. 1 she noted that there was a humus layer; a layer that was a mixture of yellowish and brownish clays; a layer which was a floor; and finally a layer which was a mixture of dark brown earth and remains of a dump (basurero).

The differences were in paste and in technological aspects of manufacture. The similarities were in a variety of characteristics of Cantera Phase (700-500 a.C.) pottery, which were: miniature dishes; the white rim on black ware; the black ware with surface zoned decoration (incised "rayitas, escaleras, y cruces) (Cyphers 1982: 15); composite silhouette in forms, Ollas without engobe; and vessels with vertical modeled lugs.

This paper was important at the time, published in a special issue *of Revista Mexicana de Estudios Antropológicos* because it allowed comparisons between Cantera phase of Chalcatzingo and Trench No. 1 of Tres Zapotes (Cyphers, 1982).

Recorrido Arqueológico en Tres Zapotes, Christopher Pool (1995-1997)

Christopher Pool began a project in order to answer basic questions of this important archaeological site of Mexico. What was the extent of Tres Zapotes and how did it change over time? How were the mound groups related each other? The project produced a detailed topographic map and determined the limits of the site. Also, he asked questions about the political economy of Tres Zapotes. In this initial project, and having substantial experience in the study of pottery production, he conducted the survey, taking into account the record of archaeological correlates of craft production (particularly kilns) as well as the documentation of changes in the site organization through time.

The Recorrido Arqueológico de Tres Zapotes used a multi-stage research design. In the 1995 season, the topographic survey was implemented, intensive surface collection was conducted in the central and western parts of the site, the boundaries of Tres Zapotes were defined, and sites and landforms detected in aerial photographs were ground-truthed. The 1996 season was focused on intensive surface collection of the north, south, and east margins of the site. Also, during this season Pool began an auger testing program to investigate the buried occupation which was in very deep levels across the terraces and alluvial flood plains of Arroyo Hueyapan. The 1997 season was focused on acompleting the auger testing program (Wendt 1998; 2003) and material analysis. Derived from this project, Charles Knight studied the site of Palo Errado focusing on obsidian production, and he was able to analyze the obsidian obtained on the surface of Tres Zapotes. Another spin-off project was Mark Kruszczynski's (2001) survey on Cerro el Vigía focused on basalt acquisition and implement production.

Other additional important results from Pool's survey contributed to a better understanding of Tres Zapotes´s organization during the Formative period. Marcie Venter (2001) studied motif decoration in pottery recovered on the surface and found a degree of internal differentiation in the transition from Tres Zapotes phase to Hueyapan phase.

In the case of the auger testing program, Carl Wendt (1998) conducted a very important study in the flood plains of Arroyo Hueyapan. It was possible to test deep occupations which cannot be studied from the surface. Wendt was able to augment the results of the intensive surface collection with the results obtained from the auger tests. He also found that Tres Zapotes reached its apogee during the Late to Terminal Formative period. Deposits dating to the Hueyapan phase were the densest in ceramic contains. In accord with these results, the major activity of building mounds and terraces on the plains occurred during this time. The results also showed that during the Nextepetl phase, deposits were only found on cultural terraces, buried mounds, and the first terrace stair. All evidence suggested that population began to withdraw from the lower parts of the floodplain during the Terminal Formative period.

Another relevant activity during the 1997 season was the excavation of Monument 44 and its associated offerings by Christie Lee (Pool 2010: 118).

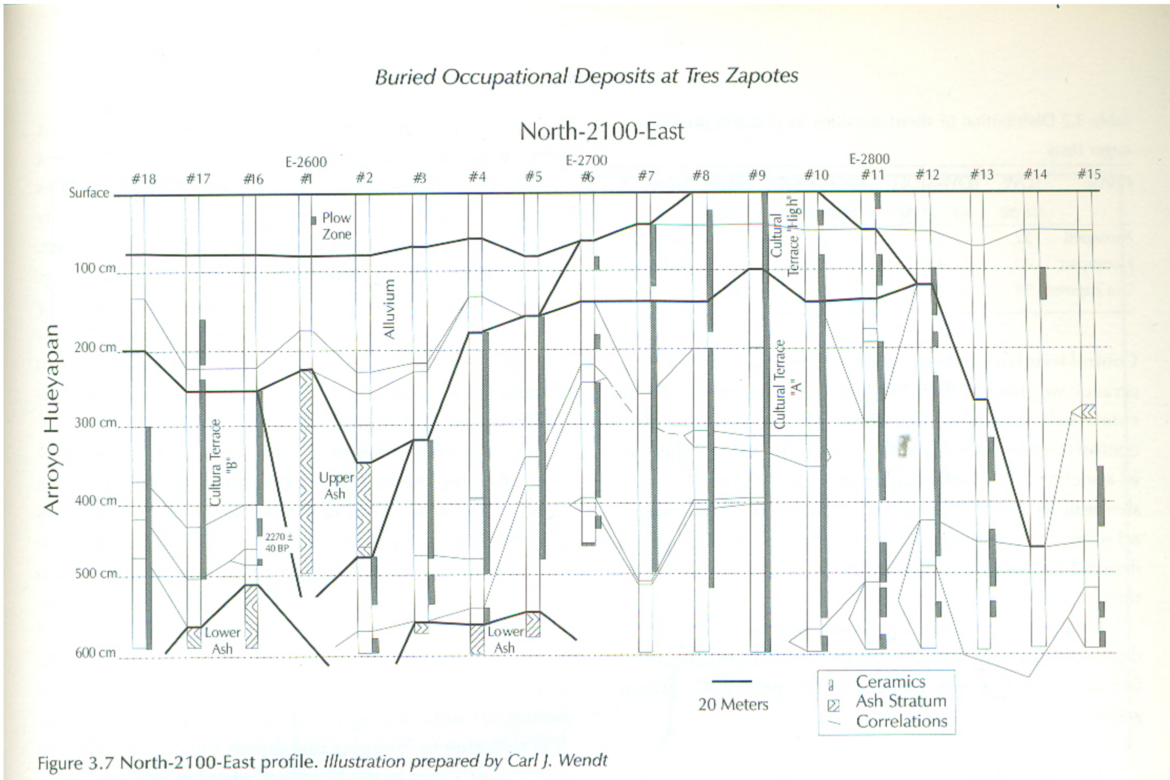
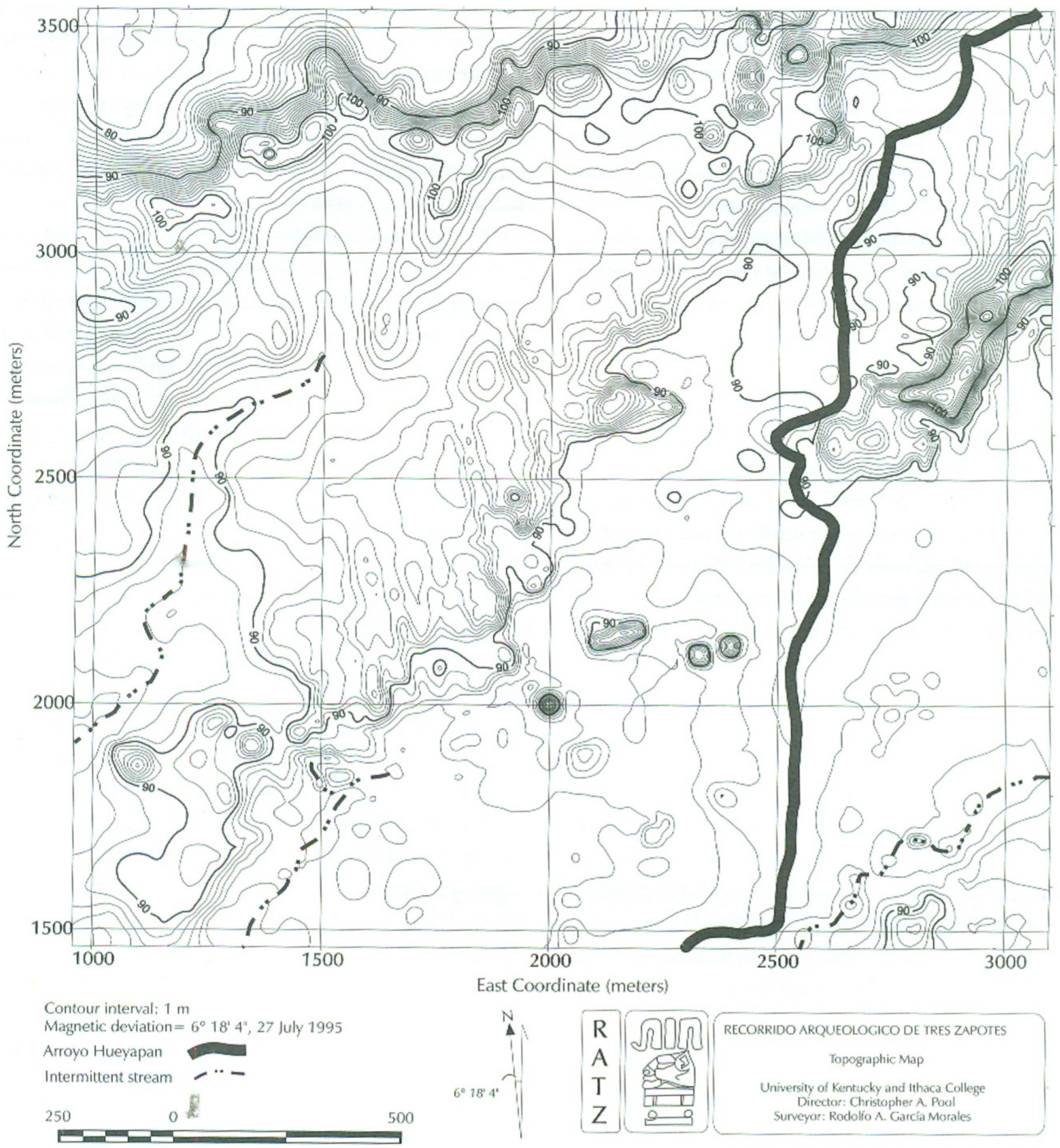


Figure 2.16 Example of auger testing profile in Tres Zapotes made by Carl Wendt (Wendt 2003: Fig. 3.7, p.41)



Figuere 2.17 Topographic Map of Tres Zapotes by Christopher Pool (Pool 2003:Fig. 2.1, p. 6)

Excavations at Tres Zapotes during the 2003 Field Season (University of Kentucky)

The fieldwork of this project was funded under the National Science Foundation grant BCS-0242555 and has been directed by Christopher Pool. This field season was undertaken from February through August, 2003. The analysis in the laboratory ran concurrently with field work (excavations, geophysical survey, auger testing) and continued every summer until August, 2007. In the 2003 field season also participated Mexican archaeologists such as Ponciano Ortíz Ceballos (Instituto de Antropología de la Universidad Veracruzana), Carmen Rodríguez Martínez (Centro Regional INAH - Veracruz), Luis Barba Pingarrón (Instituto de Investigaciones Antropológicas - UNAM) and undergrate archaeologists from the University of Kentucky and Mexican institutions such as the Universidad Veracruzana and ENAH.

Theoretical Issues That Were Tested

The 2003 fieldseason of the Tres Zapotes archaeological project was planned for testing three models regarding the political-economy of the Epi-Olmec occupation of an important archaeological site of Veracruz : the confederation model, the centralized model, and the sequential model.

1. The Confederation Model. Pool (2005) writes: "The Confederation Model proposes rule by an alliance of elite groups, represented in Epi-Olmec times by four formal plaza complexes. Under this model, the elite groups would have retained separate identities, and exclusionary principles may have operated within these groups, but corporate strategies would have been implemented to reduce competition among members of the ruling assembly".

In regard to this model, the archaeological correlates include: "contemporaneous use and functional redundancy among the formal complexes. Differences in the sizes of the formal complexes would reflect variation in the size of their supporting factions and differing lengths of their participation in the confederation" (Pool 2005: 5) This model implies, in general terms, similar access among the elite groups to strategic resources and prestige goods. As this model is also less vertically differentiated, differences between elite and non-elite contexts are expected to be less pronounced. Public symbolism might represent more communal themes and decrease the discourse related to individual achievement, while symbolism directed to the internal realm of a faction may emphasize individual achievement and patrimonial rhetoric (Blanton et al. 1995).

2. The Centralized Model suggests rule by a single paramount group or lineage, with peripheral complexes which correspond to subordinate groups. This model implies greater hierarchical differentiation among elite groups and non-elites. Dominance of exclusionary political strategies is expected. The archaeological correlates would include contemporaneity among formal complexes. However some variation in their size is expected in accord with their relative positions in the social and administrative hierarchy. Subordinate complexes should have less access to strategic resources and prestige goods. Non-elite households would have less access to such goods.

3. The Sequential Model. This model suggests that the formal complexes at Tres Zapotes were seats of successive rulers. The implication of this model is that there was a very low level of political centralization and hierarchical differentiation in the Tres Zapotes polity and a high level of factional competition, and that authority was cycling among

aspirants to power (Pool 2005: 5). The archaeological correlates that could be found in the field would include minimal contemporaneity among the formal complexes as active seats of power. There may be variation in sizes of the formal complexes. Access to different kinds of goods between elites and commoners should be less differentiated than in the centralized model. Public symbolism should emphasize rhetoric of elite individuals pursuing exclusionary strategies as a result of heightened factional competition (Pool 2005: 5). Pool also acknowledges that the organization of political economy may have shifted in Tres Zapotes between two or more of the abovementioned models over time.

Chapter 3. Archaeological Theory.

The main contribution of this dissertation is the study of the productive process of ground stone technology used by the Olmecs in the archaeological site of Tres Zapotes and contemporary Olmec sites in the Southern Gulf Coast of Mexico during the Formative Period. In order to address this important topic from an anthropological archaeological framework it is necessary to take into account the contributions made by the anthropology of technology, the technological choice approach, behavioral archaeology, and practice theory. In this chapter, I want to show how close these different perspectives are and how they are useful for a better understanding of the answer to my research question.

Middle-range and observational theories

In this section, before discussing the role of basalt ground stone in the political economy of Tres Zapotes, it is important to take into consideration assumptions about technology. technological choice, chaîne opératoire, and behavioral systems.

The anthropology of technological systems, or the study of material culture in a social and economic context, is a relative young specialty in archaeological thought, even though Marcel Mauss (1935), showed over 80 years ago that some of our most casual acts, in which our body alone is involved, such as walking, cooking, speaking, or reading, and in general all quotidian or ritual activities, are culturally determined. All these "natural" behaviors are or were highly socialized; it then seemed obvious to Mauss that more complex actions which involved tools or other objects were the product of social learning processes. Perhaps Mauss thought his demonstration was clear enough to involve anthropology into the study of technological behavior. But this has not been the case until recently.

As Conklin (1982:16) stated, technologies are the “material expression of cultural activity”. And yet the social dimension of technological action –that is, why and how a given society uses a particular technology and not another – was rarely taken into account by anthropologists in the past. Currently, anthropologists ask questions such as what is the social context of a technological “choice”? or in what respect is a technology, any technology, a social production?. These might be the first questions anthropologists should ask about action on matter. Other important questions would be: why do societies adopt certain technological features and reject others; to what extent do these technological choices influence transformation of technological systems and societies; and how are these choices compatible with other social choices.

In my personal life, after surviving a heat-stroke, I realized that thousands of operations and choices that we have learned in different cultures, in which we have lived, are stored in our nervous central system. Even though, when our body does not have an immediate reaction to the messages of our brain, in our mind, all the learned operations are sent to our body. Thanks to this relationship between mind and human body, recovery, resilience, and rehabilitation are possible. Contemporary perspectives in neurosciences rely on these principles.

I consider that one groundbreaking publication in anthropology for understanding the relationship between cultures and material cultures is Marcel Mauss's (1935) "Les Techniques du Corps" (On Body Techniques"), in this paper, Mauss wrote: "I call technique an action which is effective and traditional (and you will see that in this is no different from a magical, religious or symbolic action). It has to be effective and traditional. There is no technique and no transmission in the absence of tradition. This above all is what distinguishes man from the animals: the transmission of his techniques and very probably their oral transmission." (1973: 75).

"Action" here refers to purposeful body movements. "Traditional" means that these movements are inherited from the past and diversely "learned" by people. It follows that techniques are social phenomena, which may vary from one culture to another. "Effective" means that the material result obtained through technological action sometimes differ and it is the way that we see it. (Since everyday life shows that results sometimes differ from what was anticipated, maybe it is more accurate to say that "effective" merely means that the gesture seeks some physical result). It has to be noted that Mauss's reference to the physical world does not mean that religious or magical thoughts or gestures are excluded from the technological domain. This raises the question of rituals, which are often aimed at, and linked to, effects in the physical world.

First used by André Leroi-Gourhan in his lectures in the 1950´s, the concept of "operational sequence" (*chaîne opératoire*) has been defined as "a series of operations which brings a raw material from a natural state to a manufactured state" (Creswell 1976:6). As there are many techniques which do not lead to the making of a product, Lemmonier (1982) considers that an operational sequence is more simply the series of operations involved in any transformation of matter (including our own body) by human beings. According to CNRS (Centre National de la Recherche Scientifique) there are many factors that should be taken into consideration for describing the context of an operational sequence. One of the best applications of the concept of chaîne opératoire has been that of Pierre and Anne-Marie Pètrequin, in ethnoarchaeological research as well as in the archaeology of wetlands of Switzerland and Neolithic jade quarries (Pètrequin and Pètrequin 2000; Pètrequin and Pètrequin 2006; Pètrequin et al 2008; Pètrequin and Pètrequin, 2012).

Leroi-Gourhan's two volumes of *Evolution et Techniques – L'Homme et la Matière* (1943) and *Milieu et Techniques* (1945) – contain data that are still crucial to an anthropology of technological systems, from both a theoretical and a methodological point of view. He defined categories of "elementary action on matter" (percussion, use of fire, water, air, and forces) and indices for measuring the dynamic features of artifacts in order to construct a classification of primitive (or "traditional") technologies. Divided into "transportation", "manufacture", "acquisition technologies", and "consumption technologies", such classifications and descriptions comprise the bulk of the two books. But it must be stressed that these classifications were not made for their own sake: they were created in order to ask anthropological questions of technologies. Leroi-Gourhan's concern was to identify and understand where and how other social phenomena interface, and interfere, with technological evolution, specifically with innovation and borrowing. For this purpose, he first postulated the existence of technological determinism "comparable to biological determinism, with as much overlap, as many exceptions, but with as much clarity, in the ensemble" (1945: 338), and defined the concepts of "tendency" (*tendance*) and "fact" (*fait*).

By "tendency", Leroi-Gourhan meant the characteristic of technological evolution by which, independent of any direct connection, processes and tools appear to make use of the same forces and exhibit the same mechanical, chemical and other properties in response to technological problems posed in identical terms. It is what causes roofs to be peaked, axes to have handles, and arrows to balance at a third of their length from the head (1945: 338).

The "fact", he continues, as opposed to the tendency, is unforeseeable and particular. It is quite as much the encounter of the tendency and the thousands of coincidences of the environment (i.e., invention), as pure and simple borrowing from another people. It is unique, unextendable, an unstable compromise established between the tendencies and the milieu. (Leroi-Gourhan 1941: 28). In *Milieu et techniques* (1945), Leroi-Gourhan also defines milieu. According to him, human groups behave like organisms, taking in its exterior environment by means of "a curtain of objects" that he also call an "interposed membrane" and an "artificial envelope", which is, technology. The milieu of the organism is divided into the exterior milieu (geography, climate, animals and vegetation) and the interior milieu (the shared past of the group, which is "culture").

Following a general tendency, ethnic groups produce objects whose morphology or mechanical properties differ to the degree that the observer is meticulous in observing them. As a result, the facts present "degrees", which correspond to their progressive individualization. In other words, the more cases expressing (objectifying) the same tendency differ from each other, the more they correspond to particular subgroups.

For Leroi-Gourhan (1945:336), the external milieu (*milieu extérieur*) provides that which could potentially be used by a given society for its technological action. It comprises geographical, zoological, and botanical features as well as other neighboring societies. The internal milieu (*milieu intérieur*) is made up of mental traditions of a given human group. A part of the internal milieu is the technological milieu (*milieu technique*), or the mental traditions that more specifically deal with action on matter (1945:340). When in contact with a given mental tradition, the tendency materializes itself in a particular material culture, or, as Leroi-Gourhan states (1945:339, 346) in a particular "technological group" (*groupe technique*).

The "degrees of the fact" are the steps by which a classification of a given technology becomes more and more detailed. Thus, the first degree of fact corresponds to the main function of a given technology, and can be identified with the tendency. The tendency, for example, is to use a hammer, harpoon, or spear-thrower (Leroi-Gourhan 1943:34). The subsequent degrees of the fact correspond to secondary physical aspects of the technology in question. The last degrees of the fact correspond to the last branches of a tree diagram. They are those details having little or nothing to do with physical efficiency and which can be explained by their relationships to the internal milieu. They can have technological, religious, and decorative explanations at the same time (1945:342).

Leroi-Gourhan's last degrees of the fact are related to the realm of what is today called style, and his technological milieu is exactly what is called in contemporary French ethnology representations of technologies. Most of his ideas and conclusions remain basic to modern anthropology of technological systems. These two books still are current for technological analysis.

Leroi-Gourhan demonstrated that the technological milieu is continuous. Technological actions or artifacts have to be related to ones already existing in order to take shape. In other words, a particular technological trait has to link up with or build on other technological traits which already exist. This conclusion has important consequences: at a given time, the technologies of a particular human group are tied together by a common underlying technological tradition (Leroi-Gourhan 1945: 344-345).

He developed the hypothesis that as technology evolves, the success of a borrowing depends on its coherence with the internal milieu (Leroi-Gourhan 1945: 356-357), and for this purpose he defined the concept of "favorable milieu" (1945:359, 375 ff). Invention too, is a result of evolution of the internal milieu, and Leroi-Gourhan (1945:376-395) gave us what is still the best, though still far from complete, anthropological account of this crucial phenomenon. He states that an invention is necessarily linked to the already existing technological system, and that we also could know a lot about the conditions of adoption of an invention; but we don't know much about the processes which cause individuals and groups to get out of the routine and invent a new technique.

Later methodological and theoretical approaches continue within the tradition of Leroi-Gourhan. Concepts such as technique, *chaîne opératoire* and technical system of exploitation of mineral resources provide valuable frameworks for understanding socio-economic, cognitive, and cultural aspects of artifact manufacture (Creswell 1983; Balfet 1991).

Schematic representations have been developed of the technical system of exploitation of mineral raw materials that was implemented in order to obtain artifacts, and which also interacted with other subsystems such as the socio-economic or the symbolic (Vigne 1998). In recent years, these systemic approaches "consider societies as adaptations of human beings to environments (Cleziou 1998) while incorporating symbolic and structural archaeology that propose to re-introduce the symbolic dimension in the analysis of archaeological materials", which in turn is complemented by experimental archaeology through individual artifact replication (Perlés 1988) and reconstruction of structures from spread residues (Perlés 1988).

The purpose of my research is to be focused on changes in the production and consumption of basalt stone tools from Olmec to Epi-Olmec times. Agency can be understood and operationalized when we analyze variation in the design of material culture. Every stone specialist is faced with the raw material and he/she applies a repertoire of techniques that were learned and are shared by the community. An item's life history is an important heuristic and theoretical concept for analyzing individual and collective agency because there are choices in every step of the operational sequences of the manufacture of artifacts. Conducting a systematic technological, geochemical and contextual analysis, it may be possible to begin to address issues such as agency, the ancient choices that individuals and collectivities made for crafting artifacts and monuments. I want to detect agency reflected in varied ways: how the acquisition of raw materials was established, how every community applied a particular sequence of operations, what series of steps in production performed in similar or different places in Tres Zapotes varied from Olmec to Epi-Olmec periods, and how the unfinished and finished objects were used in the archaeological contexts.

Taking into consideration agency and it relationship to technology as well as relying on the works of Letchman, Lemmonier, and others, Dobres and Hoffman (1999:2) broadly define technology as “a pervasive and powerful complex of mutually re-inforcing socio-material practices structured by self- and group-interests, expressions of agency, identity and affiliation, cultural ways of comprehending and acting on the world, practical and esoteric knowledge, symbolic representations, and skills.”

In order to address this relationship between agency and technology in an important moment in the development of contemporary archaeological theory and lithic studies, it is necessary to define concepts that categorize aspects of life history such as tool design, tool manufacture, and tool use, as well as the kinetics involved in manufacture and use, and the patterns of use-wear. After defining and integrating them in a framework it becomes possible to standardize observations about artifacts. Other methods recently adopted in artifact analysis have been developed in the field of tribology, which studies friction, lubrication and wear. (Blau 1989; Czicos 1978; Dowson

1979; Kraglesky et al. 1982; Quinn 1971; Szeri 1980; Dowson 1979; Teer and Arnell 1975).

Design and manufacture

In order to have a better understanding of ground stone technological process it is important to address design, which involves the kind of raw material chosen as well as the intended function of the artifact. Decisions made at the design stage generally begin with choosing lithic material for appropriate size and texture (Hornsfall 1987:340). Choice is a behavioral construct that we can interpret on the basis of quantifiable variables relating to raw materials and manufactured features.

The variables of raw materials include granularity and rock size. Manufactured features include specific shapes, decorations, handles, grooves, or other features that make the tool comfortable to hold (collectively referred to as comfort features). Lithic material has a natural *granularity* (a measurable analytical construct: fine-grained, coarse-grained, and others) that is sensed as *texture* (a relational construct: smooth, rough, and so on). Texture is an important attribute for manufacturing tools. In our classification of ground stone artifacts from Tres Zapotes, these features were recorded. Vesicular material can be categorized by large, small, or a combination of vesicle sizes (*vesicles* are cavities in volcanic rock left by bubbles of air or gas that escaped as the molten rock molten hardened). Durability, which is defined as a material's ability to withstand wear is an important attribute for processing tools that alter the texture of an intermediate substance through grinding. Especially when grinding food, it may be more important that the material is durable enough to not erode into the food than it is for it to be coarse- or fine- grained (Adams 1999).

The behavioral constructs of design can be assessed in terms of complexity (Adams 1995:45). Jenny L. Adams (2003:21) has distinguished two general kinds of design for ground stone artifacts. If the natural shape of the rock was altered only through use, the item is considered to have an *expedient design.* Modifications that make the item easier to hold or to achieve a specific shape indicate a *strategic design.* Analyzing design allows us to determine whether strategically designed items were used or treated differently from those of expedient design.

Those that never made it past the initial stages of manufacture are *blanks* that could have been shaped into any number of implement types.. *Unused* items are those that were manufactured with all the necessary attributes to be specific tools but never were used. For analyzing ground stone production these categories such as blanks or unused items are important because their presence in association with by-products and tools can provide a stronger interpretation of the production sequence.

Use

The way an artifact was used or re-used can be evaluated in terms of primary and secondary uses (Adams 1995, 1994a; Schiffer 1987:27-46 has a little different perspective)[1]. Jenny L. Adams (2002: 21-25) has classified some categories which help to classified items in accord to the diverse uses which have had during its life-cycle. *Primary use* is that for which the item was originally designed. Ground stone tool designs most commonly accommodate a single function. Any secondary use is usually a later addition to that for which it was originally designed.

There are two types of secondary use: concomitant and sequential. Artifacts that can function in two or more activities are of *concomitant secondary use*, whereas those whose secondary use precludes their ability to function in their primary use are of *sequential secondary use*.

Use categories employed for this study are the following: single use, reused, redesigned, multiple use, and recycled (Adams 1995, 1994a, and summarized by Adams 2003: 21-25).

1) A **single use artifact** is employed only in the activity for which it was designed. It seems that it had only one function.

[1] Michael Schiffer in his study of use-life factors which can be identified on traces of artifacts and help to determine the kind of formation processes of specific deposits, in the category that he named "simple properties of the artifacts" he stated that: "Artifact types ordinarily go through manufacture and use, to deposition in archaeological context. Especially during use and subsequent stages, traces are formed that furnish evidence on cultural formation processes. One of the simplest, most frequently observed traces is whether the artifact is fragmentary or whole. Determining if an artifact was usable at the time of cultural deposition helps to indicate the responsible processes....This contrasts markedly with deposits of secondary refuse, where scarcely an intact item is found (Schiffer 1983: 681). This perspective differs from Jenny L. Adams (2002) who takes into account the design of the artifact as the primary function, and also she is able to identify secondary functions on the traces of the artifact which was used for a purpose different from the original design. Furthermore, Adams has discovered cases of re-cycled items in which the artifacts were not physically transformed.

2) A **re-used artifact** is designed for a specific primary function, but is used in a second activity without altering the original design.

3) **Redesigned artifacts** are designed for a primary activity and either are transformed, or altered during its life-cycle, a second activity to the extent that the item not longer functions in the first. The original function changed at some point of its use as an artifact.

4) A **multiple-use artifact** is designed for a specific primary function, but another area or surface is also used in a second activity. In some cases, three or more surfaces of the same item were used for using it in distinct activities.

5) **Recycled artifacts** are originally designed and used in one activity. In other cycle of its item´s history, a re-cycled artifact is but ultimately employed in a radically different context that may or may not have physically altered the tool. This is somewhat different from Schiffer's (1987:29-30) definition of recycling, which requires physical alteration of the artifacts. Manos and metates used during ancient times in Mesoamerica as building stones or as kiln components

   rocks are examples of recycled tools. The firing activities physically alter the items, whereas their recycling as building stones does not require alteration. In the case of Tres Zapotes, I have found both cases, ground stone recycled in a kiln and as a part of fill of structures.

Wear

Wear is the progressive lost of substance from the surface of a stone artifact as a result of the relative motion between it and another contact surface (Adams 1993b:63, 1998:310; Czichos 1978:98; Szeri 1980: 35; Teer and Arnell 1975: 94). Wear is an important characteristic in ground stone technology because the grinding process is the most relevant function, either for sculpting a monument or preparing maize (corn) dough. Loss of substance molded artifacts or, at some point, determine the final of their useful life when tools are discarded.

In order to measure wear on ground stone artifacts, the concept of use intensity is best illustrated by the use of behavioral constructs of *intensive use* and *extensive use*. Scholars such as Jenny Adams (2003) or John E. Clark (1988: 96-102) have suggested that it is possible to distinguish them through an assessment of design. If an artifact was manufactured with handles or other comfort features, it seems reasonable to infer that the tool was designed to be comfortable to hold during tasks of long duration. A heavily worn tool that does not have comfort features was probably not designed for intensive use, and a case can be made for inferring that the wear accumulated because of extensive use.

Use-wear analysis

Use-wear analysis is the examination of an item for macroscopic and microscopic evidence that allows us to understand how it was altered through use (Adams 1998; 1989a; 1989b; 1993b; 2003). For research on ground stone, four mechanisms are helpful in describing and understanding the formation of specific damage patterns: adhesive wear, abrasive wear, fatigue wear, and tribochemical wear (a combination of mechanical and chemical interaction). These mechanisms are not mutually exclusive in how they change the surface, nor is each the result of a single, independent event. The four mechanisms interact, and one becomes dominant over the others depending on the characteristics of the contacting surfaces and the nature of any intermediate substances (Adams 1988, 1989a, 1989b, 1993b, 1994a). These concepts have been developed for application to ground stone by building upon the research of tribologists who study friction, lubrication, and wear. (Blau 1989; Czichos 1978; Dowson 1979; Kragelsky et al. 1982; Quinn 1971; Szeri 1980; Teer and Arnell 1975). In the specific case of ground stone artifacts from Tres Zapotes as both macroscopic analysis and microscopic study (heavy fractions which are microartifacts) has been conducted, it has been possible to identify the four mechanisms. These are important concepts for ground stone use-wear analyses because they provide a means for evaluating wear patterns without having to create an experimental example of every possible use situation. Use wear on specific artifacts should always be evaluated against an area on the stone that is unused or broken so that the natural condition of the stone is known. For instance, in the case of the micro-artifacts of Tres Zapotes, in the basalt micro-debitage, it is possible to see with the use of a Bausch and Lomb folding pocket magnifier in 20 or 30 x that there are examples of micro-artifacts which show evidence of adhesive, abrasive, fatigue, and tribochemical wear. Due to physical and chemical reactions, it is possible to find this evidence of cultural transformation of a raw material. These small residues support the interpretation of activity areas of production. And the macro-artifacts also show evidence of wear because the surfaces have evidence either adhesive, abrasive, fatigue, tribochemical or together all kinds of wear.

For analytical purposes, Adams (2003:28-30) suggest that ground stone surfaces can be described in terms of asperity. "Asperity is a combination of material granularity and surface texture, and is influenced by material durability." The artifacts made from coarse-grain material have surfaces which are more asperous than the surfaces of artifacts made from fine-grain material.

In summary, the characteristics mentioned above, help to classify ground stone artifacts, by-producs, unused stones, as well as micro-artifacts in order to infer behavioral aspects that can identify functions in activity areas and have a better understanding of the ancient political economic processes developed in the Olmec polity of Tres Zapotes.

Style

Style in anthropology and archaeology has a long history. One of the first meanings is that of style as a label attached to a culture as a whole (Kroeber 1957, *Style and Civilization*), or referring to an aesthetic aspect of a culture.

In America, one important approach considers style as non-functional which I describe the main contributions to this position.

Style as Non-Functional Variation

Culture-Historical Approach

During the 20th century, archaeologists around the world used multiple methods for keeping track of time through the analysis of material culture. The vast majority of academic traditions considered time as a continuum. It was supposed that it could be possible to segment time by identifying historical disjunctions. Style, which referred principally to decorative motifs, particularly on pottery, was useful for chronological purposes in archaeology. In 1936 James A. Ford seriated of pottery types to order 103 archaeological sites that he had surface collected some years before in the Southeastern area of the United States . According to O'Brien and Lymman (1999: 209) Ford's 1936 effort is "well characterized as artifact (bio) stratigraphy for purposes of cross-dating". Ford found the most abundant marker type in each collection, determined which decoration complex was most frequently represented by marker types, and finally placed each collection in its appropriate decoration complex.

Ford's 1936 study is important because he contributed the first archaeological chronology for the lower Mississippi Valley. And beyond the Mississippi Valley, Ford´s legacy had broader importance in terms of demonstrating the usefulness of the method to archaeologists throughout the U.S.

However, Albert C. Spaulding wrote a paper titled "Statistical techniques for the discovery of artifact types" (1953) in which challenged Ford´s conceptual framework. He described a statistical classification for identifying real inherent types. He argued that artifact types were real, discoverable, and emic entities, whereas Ford (Ford and Steward

1954) considered types as imposed by the archaeologist, using whatever traits seriated best.

Another approach to the archaeological types types that differs from Ford´s framework was Irving Rouse´s Modal Analysis (Rouse 1960) which saw modes as components of producers' mental templates regarding artifact design.

Interaction Theory (Ceramic Sociology)

James Deetz

Understanding of the causality of shifts in style changed over the years in American archaeological theory. Ford, for instance, by his own admission, was not so concerned with why style changed, as that such change could be used to construct useful chronologies. One important contribution came from the practice of historical archaeology. James Deetz (1977) synthesized in *Small Things Forgotten* his research on archaeological material analysis and his approach to style. He analyzed historical archaeological materials and underscored the importance of technological improvements in the daily life of communities: shifts in fashion, mass-produced artifacts such as cream ware, and the shift from the use of wooden trenchers to ceramic vessels, among others. Deetz discovered ideological causes that were behind the change in ceramic style because he said that there were Puritan restrictions on the production and variety of styles of ceramic vessels. One of the advantages is that he described foodways when he was defining ceramic use.

Also, he found ideological causes for changes in the treatment of the dead: Deetz showed us that styles in some cases depend on the strength of Puritan ideology in a given community. He demonstrated that shifts from death's head gravestones to urns, willows or cherubs designs can show the maintenance or decline of Puritan values which varied in every region in New England.

However, the most important work for "ceramic sociology" in published books by James Deetz has been considered *The Dynamics of Stylistic Change in Arikara Ceramics* (1965). In this work, Deetz made a contribution in the purpose of linking the chronological changes in social structure with changes in ceramics, particularly in decorative motifs. In this book, using Willey and Philips´s system for a description of the events related with the period called the Coalescent Tradition, he was interested in the movement of Arikara peoples from Nebraska into South Dakota in their settlement along the Missouri River. Deetz thought that around the 17th century a group of the Skidi Pawnee in Nebraska divided and emigrated to Nebraska. The Arikara and the antecedents of the Pawnee (the protohistoric Lower Loup phase) had pottery similarities as well as language and tribal locations. In the Arzberger site´s ceramics, in South Dakota, Deetz found similarities with the Upper Republican and Lower Loup phases. As in the Central Plains after the Askarben phase there was a period in time unknown from A.D. 1550-1650, followed by the Lower Lupe phase (A.D. 1650-1700) and finishing with the historic Pawnee, therefore Deetz postulated a hypothesis that in ancient times, there was an original Crow type kinship system for both the Pawnee and Arikara. Due to several events (village relocation due to wooden shortages; population decline due to smallpox) Arikara social structure changed and its culture almost disintegrated within a period of two hundred years. Deetz cited Murdock's idea (1949) that patrilocality is encouraged by the accumulation of movable of wealth, the increase in social status of men at the expense of women, disappearance of matrilocality through the institution of bride pricing, and patrilineal inheritance. Also, Murdock stated that patrilocal residence could be a result of factors such as warfare and slavery.

In the following section of his study, he attempted to demonstrate that the reduction in attribute patterning was a result of the breakdown in matrilocal residence. His analysis was based on the analysis of ceramics of the site of Medicine Crow and materials obtained from a surface collection from the Lower Loup Brukett site.

Taking into account decorative motifs, he concluded that there was a change in social structure, in the kinship system which is reflected in pottery decoration. Deetz considered that initially there was an interaction of females and the resulting higher degree of standardization of pottery in matrilocal households in comparison to residence patterns where mother and daughter are separated. Deetz asserted that breakdown in matrilocal residence was a consequence of an increase of non-sororal and rapid population decline.

William A. Longacre

William Longacre is also a pioneer in the so-called Ceramic Sociology Approach; he focused on the Southwest region of United States. Since his PhD dissertation he was interested on how the painted design elements used in ceramic decoration to identify Pueblo rooms occupied by matrilocal post-marital residence groups, mainly in Carter Ranch Pueblo. In his book *Archaeology as Anthropology: A case study* in Chapter 4

“Sociological Implications of the Ceramic Analysis” Longacre discusses the hypotheses of Cronin, Deetz and others that in a matri-lineal and/or a matrilocal society, the ceramic training models would involve mother teaching daughter or other local lineage and/or residence group mates. As a consequence there will be a high degree of association of ceramic stylistic elements and residence areas. The residence and/or descent would then form the channeling devices in learning, and ceramic design and other clusters would reflect this normative pattern of social groups. In Chapter 5 “The formal and spatial correlational analysis” and Chapter 6, “Burial Analysis” of this classic book, Longacre explains the implementation of multiple regression analysis of 14 pottery types found in fill and floor contact and their correlation of 4 major types of room units, trash areas, burials, and kivas at the Carter Ranch Site. The results suggest that there is no temporal variability, that room fills resulted from “stable activity areas”, and that the 4 to 5 clusters result from functional variability of pottery and room types. The most amazing results are that certain ceramic clusters suggest ritual activity because the contexts are associated with kivas and individual design elements (from a list of 175) clustered with unqualified success with at least 3 room block areas and associated kivas, and burials in three areas of trash. The explanation given for these clusters is that there were at least 3 prehistoric social groups represented in the Pueblo, these being corporate matrilocal residential groups, and probably matrilineal descent groups. Status differences were also inferred from variability in the burial cluster.

Some years later, Longacre began and directed the Kalinga Ethnoarchaeological Project, with the Kalinga in the Philippines, where he discovered that the learning frameworks were more complex than he and other ceramic sociologists thought.

James N. Hill

In his book *Broken K Pueblo: Prehistoric Social Organization in the American Southwest* James N. Hill presented the results of his analysis of material culture, mainly ceramic style. After using different indices of stylistic differences, Hill showed the presence of 5 stylistic clusters at Broken K Pueblo. Also, these clusters fell into two major groups. This result was different from the earlier Carter Ranch Site where only two localized stylistic clusters were isolated. Hill hypothesized that these clusters resulted from the division of the pueblo into social groups based on post-marital residence rules. Therefore, the spatial continuity in plausibly female traditions such as ceramics suggests that women remained in close proximity to other women who had learned their ceramic styles in the same micro-tradition. This interpretation suggests that adult women remained in the mother's vicinity, that there was a rule of matrilocal residence for women and it seems unlikely that men in Broken K lived separately from their wives; Hill concludes that a matrilocal/uxorilocal residence pattern was held at Broken K Pueblo.

Michelle Hegmon (1992) summarizes and has made a critical comment to the "Ceramic Sociolgy Studies." She wrote that a basic hypothesis of these studies was that material similarity is directly related to social interaction and shared learning contexts (Hegmon 1992: 526). Even though many of the methods and results have been criticized, these studies have inspired valuable research in pursuit of the sources of material culture variation. One particular research question which has received more attention is the effect of learning and production on material culture variation.

Several studies had published their results and suggest that the association between style and learning or production context is variable and context dependent (Hegmon 1992: 526). In different case studies around the world, it has been found that there is only a weak association between work groups and design similarity (Graves 1981, 1982, 1985; Hardin 1984), that similarity of pottery designs varies with the context of learning within the same society (DeBoer 1990), that different styles of design are strongly associated with individual teachers (Hardin 1984), and that different communities may have distinctive decorative "microstyles" (Dietler 1989). And it is very important to see that the relationship between style and social structure depends on the kind of social organization. In complex societies there are multiple contexts in their settlements that deserve to be studied specifically and carefully analyze this important relationship between style variation and social structure that the "Ceramic sociology" group pointed out some decades ago.

The information-exchange theory of style

Another approach is to consider that style carries information about social identity. This view has been developed by Wobst (1977), Sackett (1982), and Wiessner (1984).

Wobst's paper (1977) on Yugoslavian folk costumes is very important for being a seminal study of the informational content of material culture. He focused on the fact that material culture has functions that relate to the exchange of information as well as matter and energy. His contribution shows how particular items of material culture –parts of costumes- can express different social identities of the wearer, in accord with the distance at which these differences can be perceived (1977: 328-329, 337). Furthermore, he hypothesized that information expressed in folk costumes played a role in boundary maintenance.

However, a critique of Wobst´s concept of style is that he does not pay much of attention to the use of material culture within a given social group to express gender, age, or status among people that share similar interests (Wobst 1977). He focused only on visual and symbolic aspects of dress that identified affiliation within and difference between groups.

Wobst did not mention the previous work on costumes in Yugoslavia by Bogatyrev during 1940’s (1971), *The Functions of Folk Costume in Moravian Slovakia.* Borgatyrev, influenced by the functionalist linguistics of the Prague School had a more holistic approach to communication. For him, a costume was both an object and a sign, and the informational function of a costume was secondary. He distinguished internal meanings of a costume such as occupation, status, wealth as well as regional and national identity.

Another important scholar who had contributed to the information-exchange theory of style and continued with a theoretical orientation similar to Wobst's in regard to style is Polly Wiessner (1982, 1983, 1984, 1989). As a result of her ethnoarchaeological research, stated that there is a behavioral basis of many variations of material culture that have been called “style”. She also considers that style not only carries information about ethnic identity, but also is an active tool used in social strategies (1984: 193).

Wiessner asked a very important question: What are the “social circumstances” in which the artifacts are used? Her ethnoarchaeological research provided valuable information focused on artifacts on which people make comments. She compared the way that they make and decorate those artifacts and found an active role of material culture, discovering conscious and unconscious uses of stylistic variation.

In the Kalahari region, arrows are used in *hxaro* exchanges (Wiessner 1982). These take place between individuals from distant communities in the Kalahari, and at least half of them have kinship relations. These hxaro relationships take the form of help, sharing, and visits. Exchanged items can be anything that is not edible. Arrows are visible and exchanged. The arrows are made by male hunters. The !Kung, for example, are able to talk about 3mm variations in width and in 2mm indentations, as well as on the shape of arrowheads. They can identify the identity of the hunter and his values about territory, hunting, and behavior in general.

Wiessner (1983. 269) also found that !Kung arrows and !Xo and G/wi arrows are different. The !Kung like !Xo and G/wi arrows. !Xo and G/wi arrows are similar because these two groups are in contact during the dry season. However, they are different from those of the !Kung. And it is very interesting that both G/wi and !Xo said that !Kung arrows are pathetic and unskillfully made. Weissner concluded that arrowheads are used as identity markers in the Kalahari region.

She also studied the glass beads headbands made, worn, and exchanged by women (Wiessner 1984). Female individuals keep them from two months to two years. Women compare and comment about decoration. Decorative designs are shared by different linguistic groups. The !Kung women say that they made beautiful artifacts on purpose “to impress the opposite sex” (Wiessner, 1984: 204). Wiessner says that headbands participate in “strengthening relationships of loose but positive affiliation with kindred members and affinal kin” (Wiessner, 1984: 210). These headbands participate in negotiating identity relationships which are done “consciously or unconsciously” (Wiessner, 1984:209). Style for Wiessner has a function (as it did in Wobst´s orientation), either as an identity marker (arrows) or used to impress other people (headbands). Her definition of style has a “behavioral basis”.

I think that she synthesized succinctly her results in the paper published in 1983 mentioned above where she defined two kinds of style: Emblemic and assertive styles.

Emblemic style is:”formal variation in material culture that has a distinct referent and transmits a clear message to a defined target population (Wobst 1977) about conscious affiliation or identity, such as an emblem or a flag” (Wiessner 1983: 257). Assertive style is: “formal variation in material culture which is personally based and which carries information supporting individual identity, by separating persons from similar others as well as by giving personal translations of membership in various groups (Wiessner 1982c). It has no distinct referent, as it supports, but does not directly symbolize, individual identity and may be employed either consciously or unconsciously (Wiessner 1983:258).

Some years before her publications James Sackett (1982; see also Sackett 1973, 1977) defined style as:

1) Isochrestic variation, which refers to ranges of shapes or forms that are adapted, with equivalent efficacy, to a given (physical) function.

2) The craftperson makes choices in these ranges.

3) The probability is small of finding similar combinations of choices in two different societies.

4) These choices are socially transmitted.

Sackett (1982: 105) also mentioned: "This last means that style need not to be simply a matter of conventional artifact typology, let alone any single dimension of it such as shaping. For it resides wherever isochrestic variation exists. Thus it may be found in the choice of raw materials, knapping techniques for reducing cores and producing tool blanks, alternative types of marginal retouch and burin spalling, and varying edge angles and wear patterns. It may be reflected in the distinctive ways in which tools are used and rejuvenated before being discarded." Therefore, according to Sackett, isochrestic style involves everything.

Sackett concluded in this way after years of studying Paleolithic stone tools and his paper has been interesting for addressing style in lithic artifacts. But some years after Wiessner published her paper in 1983, as he was interested in lithics during the Paleolithic period, he questioned the conclusions obtained by Wiessner concerning the San tool makers. He stated that isochrestic style better interprets the choices made between variants that are functionally equivalent. He asserted that the decisions of individuals are shaped by the traditions within which peoples are raised. They have learned the knowledge from the previous generation. The technologies changed over time because the ways of manufacture artifacts changed, and they did not change because intentional or conscious transmissions of information about group affinity (Sackett 1985).

The response by Wiessner in 1985 was very important. She distinguished between style and isochrestic variation: "Style as isochrestic variation will be influenced differently by social contact. Social contact should have the potential to affect style due to regular stylistic and social comparison. Exactly how it will affect style depends on history, cultural context, and the nature of relations. In contrast, social contact should have little effect on isochrestic variation once a standard procedure has been established, because it is based on object-object or object-ideal type comparison (Wiessner 1985: 162). This discussion between Wiessner and Sackett was productive because the archaeologists obtained a better understanding of characteristics of style and differentiate it from other categories such as isochrestic variation. It is important for the focus of my dissertation. This discussion was about variation in lithic technology, and I am focused on lithic classification. There is variation that has to do with style and variation which is related to isochrestic (behavioral) issues.

Technological choice and *chaîne-opératoire* frameworks

In order to consider the ground stone artifacts from Tres Zapotes, I realized that different theoretical orientations converge on many points. One of the advantages in contemporary social thought is that we are in post-structural times, after the emergence of practice theory which enables us to distinguish variation in material culture and focus on agency processes that analyze identity, gender, status. Contributions made by Pierre Bourdieu (1977;1984; 1992) , Anthony Giddens (1986), Arjun Appadurai (1988), Bruno

Latour (1986;1996;1999;2013), and others, transformed our frameworks for a better understanding of social life.

Pierre Bourdieu, focusing on the masses, on populations, that involve taking into account traditions, habitual practices, costumes, routines, and social inertias. He analyzed the French elites, the bodily practices that are established in *Distinction: A Social Critique of the Judgement of Taste* (1984). He conducted ethnography in order to challenge the Structuralism of his predecessor Levi-Strauss, targeting one of his principles -- kinship rules. In the Kabyle ethnographic case of Morocco, he found that the traditions were strong, but the practitioners have some choice in the negotiations of bride wealth. The practices were a main trend, but not totally determined behavior. There are unconscious practices, but there is also a pursuit of transformation through the use of economic values that change as a result of changes in social fields: from the symbolic realms to the economic ones. In *Outline of a Theory of Practice* and *The Logic of Practice* he elaborated his theoretical assumptions concerning social change, primordial concentration of symbolic capital, the hegemony of the *doxa* that naturalizes differences, and the ever-presence of *habitus* that determines the social life. The social agency that we can see in this social thinker is group agency that corresponds with general classes, with elites, with groups of youth (*The Inheritors: French Students and Their Relation to Culture (1979)*). As a French scholar, he addresses interesting topics that were developed by a French phenomenologist philosopher: Maurice Merleau-Ponty. Merlau-Ponty, in a response to German Phenomenology, addresses the human body and all the aspects that are not reflexive: all the non-cognitive aspects that are reserved in the memory of the body, in the mechanics of the interaction of the bodies in movement. Bordieu takes over this notion and emphasizes its material qualities. Bordieu explores the possibilities of explanation through the study of non-cognitive properties (if the German tradition is proud of rationalism and reflexivity of the mental acts, the French tradition addresses the non-reflective acts in the study of bodily facts). Bordieu analyzes aesthetics and art from a very bodily perspective in *Distinction*.

In England, Anthony Giddens applies principles from German philosophy (Heidegger) and the French tradition (Bourdieu, Durkheim, Mauss), in an empiricist framework. Giddens takes into consideration intended and unintended practices, reflexivity, intentionality, and how practices modify structure (the English signature, in the pursuit of the transformation of reality by the choice of the individual).

Interestingly, there is a new generation of scholars that overcome the relationship of agency and structures from the study of material culture with respect to practice. In philosophy of science, Bruno Latour analyzes the changes in social agency, in the small groups or individuals, in scenarios of contestation. He has applied a framework which studies power relationships in the social life (an important characteristic in post-structural philosophy after Foucault used it in French philosophy). Bruno Latour synthesizes this search for the conflict.

Latour, in *Laboratory Life* (1986), *Pandora's Hope* (1999), *We have never been Modern* (1993), and in his studies on technology (*De la préhistorie aux missiles balistiques. L'intelligence sociale des techniques* (1994)), tries to show that in spaces of contestation it is possible to see the identity and ascription of agency groups. Latour focuses on the representation of material culture and technology as an active role signifying differences through the use of material things. He proposes the term hybrids for understanding cultural monsters that conglomerate opposite versions of society in order to have multi-vocal representations of different factions within social formations (1993). Latour overcomes the structuralist influence of the French tradition. Through his practice, he is continuously interacting with different cultural matrixes. One semester he teaches in France and one semester in California, bringing back and forth ideas between both traditions. His proposal is interesting because he addresses agency in a context of struggle and conflict; also, he operationalizes slippery concepts such as ethnicity and identity. At the ontological level, he de-essentializes the Western tradition, by analyzing laboratories and traditions of doing science, he exemplifies in his books the diversity of epistemes, in chaîne-opératoires within the same cultures.

In the works witten by Pierre Lemonnier (1992), Michael Schiffer (1999) and Sillar and Tite (2000), we can see all the authors concide on the basics:

Pierre Lemonnier (1982) suggests the following definitions of all the factors involved in artifact production:

1) Matter – The material, including one's own body, on which a technique acts (clay, stone, iron, vegetables).

2) Energy –the forces which move objects and transform matter.

3) Objects, which are often called artifacts, tools, or means of work. These are "things" one uses to act upon matter.

4) Gestures, which move objects involved in a technological action. These gestures are organized in sequences which, for analytical purposes, may either be subdivided into “sub-operations” or aggregated into “operations” and then into “technological processes”, also called *chaînes opératoires*.

5) Specific knowledge, which may be expressed or not by the actors, and which may be conscious or unconscious. This specific technological knowledge is made up of “know-how” or manual skills. The specific knowledge is the end result of all the perceived possibilities and the choices, made on an individual or a societal level, which have shaped that technological action. Some examples of social representations which shape a technology or technological action are: 1) the choice to use or not to use certain available materials; 2) the choice to use or not to use certain previously constructed means of action on matter; 3) the choice of technological processes; 4) The choice of how the action itself to be performed.

Michael Schiffer (1999) states (see also Schiffer and Skibo, 1987) that in order to study carefully material culture, we have to study "discrete interactions" which are observational units of the material medium. An interaction is any matter-energy transaction taking place between two or more interactors. There are five majors interaction modes: mechanical, chemical, thermal, electrical, and electromagnetic.

Sillar and Tite assert that there are five main areas of "choice" within any technology:

1) raw materials

2) tools used to shape the raw materials

3) energy sources used to transform the raw materials and power the tools

4) techniques used to orchestrate the raw materials, tools, and energy to achieve a particular goal

5) the sequence (or *chaîne opératoire*)

As we can see, there are many commonalities in approaches to material culture in spite of the diverse philosophical orientations. I realized that *chaîne opératoire* approach is something deterministic, society defines almost everything and it sometimes seems that there is no space for agency, individual or collective. For this reason, it is important to consider practice theory and post-structural thought because those frameworks remind us that there is variation in the material record, there is variation in the way of making and using artifacts. Actually, a technological choice framework helps complement the *chaîne opératoire"* approach.

On color

As we are analyzing artifacts from a preindustrial civilization, we need to carefully record variation in synchronic and diachronic aspects of materiality, all features that were sensorially immediate. Above, I have defined characteristics such as porosity, hardness, and others that are physically touched by hands. But one important sensorial characteristic is before our eyes: color. In pottery analysis in Mesoamerica, since the early 20th century, color has been relevant for identification of types, wares, and horizons. Since the mid-20th century in the Mesoamerican archaeological literature, there has been an accurate record of color with the aid of color tables (e.g. Ridgway, Munsell Soil Color Chart, etc) and a useful record of this variable through the use of black and white drawings with symbology, paintings, watercolors, and photography with the use of standards (IFRAO tables, macbeth color chart, color checker rendition card, Kodak Q-12, Kodak Q-13 and many new software programs used for color calibration in digital pictures). Also, color is an important variable for ethnography and ethnology in the study of material culture, for instance in the emic classification among native speakers of Mesoamerican languages and contemporary urban populations in countries such as Mexico, Guatemala, Honduras, and Nicaragua where color is so important for a better understanding of other cultural categories. As social scientists, valuable information about variation would be omitted if color is forgotten from the reports, publications, or records, especially, if our research is looking for variation in material culture in order to identify status, identity, or factional issues.

Goethe (1790-1807 (1985)) provides us a relativistic theory about color. His *Zur Farbenlehre* presented his theory of color and a critique against Isaac Newton's theory of color. Goethe considered that Newton only took into consideration light and the analytical composition of color, the subject who perceives different colors was absent. He suggested that every human being or group of individuals see colors in a different way. Goethe was interested in different boundary conditions of multiple experiments that he wrote in his book in order to understand better many situations in which the perception of color was involved. His work was the foundation for the psychology of color as well was influential for scientists specialized in optics, philosophers and artists.

In American anthropology, color has been an important characteristic since its founding father Franz Boas. Before being an anthropologist, when he wrote his PhD dissertation in physics (optics) (*Beiträge zur Erkenntnis der Farbe des Wassers* (Contributions to the Understanding of the color of Water)) he studied the color blue of the water. His later work on the diverse names for tones of white among the inhabitants of the northern latitudes is well known (Boas 1885). Derived from these seminal works, he developed little by little his innovative cultural relativistic approach. Later, during the 1950s, Whorf (1956) proposed a causative linkage between the linguistic naming of color terms and its perception. Languages were considered to divide color space arbitrarily and define the perception in which their speakers perceived colored objects or artifacts. This relativistic approach to color has been challenged twice by a more universal approach.

Berlin and Kay (1969) proposed an opponent process theory of color. That theory suggests that color perception is defined by a series of elementary colors, divided into achromatics (black and white) and chromatics (red, green, blue, and yellow). Their theory asserts that we can't see mixtures of colors because color vision is divided neurophysiologically in an antagonistic system, with red opposed to green. As color perception is based neurophysiologically, it is therefore universal. In order to test their assumptions of perceptual universality against theories of linguistically determined color perception, they proposed to distinguish the basic (elementary) color terms from the non-basic within a cross-section of languages.

The final results of Berlin and Kay's study can be synthesized by an analysis of their synchronic and diachronic features. They proposed that languages varied synchronically according to the number of basic color terms they use with some languages using just two color terms while other languages used as many as eleven. Whatever the number of terms used in a given language, the foci for color clustered in discrete areas of the chart. The diachronic conclusions of their research are more interesting. They proposed that, if languages were ordered by numbers of basic color terms, therefore the sequence by which these are encoded should also be ordered sequentially. If a language has two basic color terms (a Stage I language), those terms will be black and white. If a language has three basic colors (a Stage II language) the terms will be black, white, and red. If it has four terms (a Stage III language) then those terms will be black, white, red and either yelllow or green, and so until a Stage VII language. This scheme proposed an evolutionary sequence from Stage I languages typified by the Dani of Papua New Guinea to Stage VII typified by Modern English.

Later, MacLaury (1997) continued this framework, incorporating concepts such as agency, vantage theory, and others. Robert MacLaury began working on color research in the 1970s at California, when he worked with Berlin and Kay on many studies in Latin America. Later, MacLaury and his team finished the Mesoamerican Color Survey, a research that studied 116 languages in Mexico and Guatemala. This works provided him a large and comparative data set to obtain a very detailed analysis of the ambiguities of color nomenclature. In *Color and Cognition in Mesoamerica: Constructing categories as vantages*, MacLaury carries color theory to its most anthropologically theoretical point in Mesoamerica. MacLaury examined in depth the semantic relation of "extension", an association "that did not fit our preconceptions of synonymy, near synonymy, inclusion, or complementation". During his fieldwork, MacLaury found that respondents would use different words to label the same color. Although that is not surprising, sometimes the speakers would use these two terms in rather peculiar ways that would become apparent only in mapping tasks.

This is not just a case of two terms being applied to the same referents; rather, it suggests the two experiences are, psychologically or experientially, somewhat different. Although this kind of phenomenon is found in many languages of the world, it is, for instance prevalent in the Mesoamerican WARM (red and Yellow) category, where most of these colors are used coextensively. The ethnography and experiments show that coextension in this case shows a "dominant-recessive" pattern, with one range generally larger and more centrally focused than the other.

MacLaury interpreted these results by what he terms "vantage theory," which focuses on the method by which "a person makes sense of some part of his world by picking out specific points of reference and plotting their relation to his own position, a process that is spatial and temporal in the first order but INCIDENTALLY visual (MacLaury 1997:138-139). Synthesizing, MacLaury concludes:

1) the processes of categorization are constructed by analogy to space or time dimensions.

2) Color categorization itself ultimately is predicated on various shifting figure-ground relations (as in the famous optical illusions where either a face or a table

may appear to an on-looker, depending on which part of the picture is being attended to at any given time).

Color categories arise, therefore, by alternating shifts of emphasis: First, colors are grouped together with an elemental hue on the basis of similarity (for example, it is very common in Mesoamerica that yellows are included in the category RED because many yellowish colors seem similar to some light reds. Later, the category YELLOW may be developed on the basis of how distinctly different these hues appear to be from the reds. MacLaury's contribution is important because some researchers around the world have argued that taxonomies and other methods of classification are based on spatial analogies. MacLaury provided a more complex case with evidence.

MacLaury's work is very important for my dissertation: I have analyzed a basalt corpus composed by a wide variety of grays, blacks, reddish grays, and all materials were obtained from archaeological excavations, they pertain to different contexts and epochs, different kinds of artifacts: from quotidian artifacts and pebbles for building to monumental sculpture (actually, some sculptures were painted (Drucker 1952). I contend with color variation in space and time and with color categorization that was predicated on various figure-ground relations. I was dealing with choices that were taken about color of a raw material and I can see the variation in decisions in every context. Finally "vantage Theory" addresses agency, and multiple kinds of agency.

The role of ground stone technology in the political economy of Tres Zapotes during Olmec and Epi-Olmec times

In this dissertation, theoretical concepts such as agency, practice theory, *chaîne opératiore*, and agency in color in the prehistory are taking into consideration in the analysis the basalt ground stone of Tres Zapotes. This approach may shed light of aspects that involved daily life activities of diverse societal groups of this Olmec/Epi-Olmec polity.

In this study, following these theoretical perspectives, it could be possible to see variation in the processes of production which were performed in distinct contexts. Practice theory, technological choice, and *chaîne opératiore* will guide the observations in the observation of how different it was the repertoire of techniques used in each case, the tools needed, and the selection for specific kinds of raw materials. There theoretical frameworks will be important also for studying how these productive practices change over time. The advantage of this study is that these concepts will not take production as a static and monolithic phenomenon. On the contrary, the practices of making ground stone artifacts will be seen as dynamic and contextualized in particular contexts that are related to social status (elite or domestic units), specialization (administrative or civil-ceremonial), productive functions (domestic production, independent production, multi-crafting units, attached production to elite residences), religious beliefs (burial-ritual offerings). In regard to the theoretical concept of the agency for prehistoric societies, it will be very important for taking into consideration the selection of types of basalt in different Groups and contexts in Tres Zapotes, as well the selections of kinds of basalt over time. Although it was not recorded color for every artifact with the aid of a rock-color table, I recorded the type of basalt, and depending on the minerals contained in every kind of basalt, it is possible to figure out the colors which were selected and preferred in every case.

Considering all these theoretical concepts, it is may be possible to achieve a general image of the political-economic models that developed in Tres Zapotes over time.

Chapter 4. Ethnoarchaeological studies, ethnographic observations, and ethnohistorical information.

"Everything spoke: their water jars, their tortilla griddles, their plates, their cooking pots, their dogs, their grinding stones, each and every thing crushed their faces. Their dogs and turkeys told them: "You caused us pain, you ate us, but now it is you whom we shall eat."

And this is the grinding stone:

"We were undone because of you.
Every day, every day,
in the dark, in the dawn, forever,
r-r-rip, r-r-rip,
r-r-rub, r-r-rub,
right in our faces, because of you.

This was the service we gave you at first, when you were still people, but today you will learn of our power. We shall pound and we shall grind your flesh," their grinding stones told them". Popol Vuh (1996), Dennis Tedlock,pp 72

In this chapter, I discuss multiple datasets that can contribute to a comprehensive analysis of the ground stone artifacts from Tres Zapotes. The information covers the steps of the *chaîne opératoire* of Olmec Basalt: acquisition, transportation, quarrying, roughing out, thinning, polishing, smoothing, and engraving.

Methodologically, I wanted to look for evidence concerning the technological processes involved in the production, distribution and consumption of ground stone, working from the known to the unknown that is, from the known processes recorded ethnographically to the correct reading of the ethnohistorical accounts that could shed light on ancient Olmec basalt technology. Mesoamerican ethnohistorical accounts contain valuable technological information that can be better understood with the aid of ethnographic research that recovers processes still present among different indigenous communities in México and Guatemala. Previous comparative research (Jaime-Riverón 2003) indicates that the Olmecs and other archaeological cultures implemented technologies that were preserved by peoples of the Classic, Post-Classic, Colonial and contemporary times. Therefore, I analyzed the ethnoarchaeological and ethnographical studies conducted in Mesoamerica, especially the case studies where ground stone technology was approached as the main topic and for its role as a key factor played in indigenous communities. Then, I supplement this information with personal ethnographic information that that I collected while I was a Master's student at the Universidad Nacional Autónoma de México. This long-term internal dialogue, a movement back and forward in my thoughts every time that I read a new Colonial account or an ethnographic record, allows me to build stronger tools for conducting an exegesis of anthropological sources that helped me to see in a different way the archaeological record: by-products, basalt production debris, unfinished and discarded artifacts as well as monumental monuments and building materials.

Ethnographic and Ethnoarchaeological Studies of Ground Stone Production, Distribution, and Consumption in Mesoamerica

In Mesoamerica only a handful of ethnoarchaeological studies concerning ground stone production, distribution, and consumption have been conducted. These ethnoarchaeological studies are supplemented by ethnographic descriptions, experimental archaeology, and inferences made by early archaeologists who were interested in ancient economic processes and provided robust interpretations from the archaeological record. The following ethnoarchaeological, ethnographic, and experimental archaeological studies have been conducted by archaeologists and anthropologists in order to understand behaviors associated with ground stone artifacts.

Scott Cook*, Zapotec Stoneworkers: The Dynamics of Rural Simple CommodityProduction in Modern Mexican Capitalism* (1982)

Cook wrote one of the most complete ethnographic studies on the production and exchange of grinding tools, manos and metates in Mesoamerica. His research focuses on Zapotec metate production in the Valley of Oaxaca as a pre-capitalist craft industry which has survived in a capitalist economy. Cook comprehensively described the process of producing manos and metates as well as the complex market system in which these ground stone artifacts are sold. The metates produced by Zapotec artisans described in Cook's monograph are three-legged with an unrestricted surface. The mano is held with two hands and extends over the edges of the metate grinding surface.

Cook recorded productive activities in three manufacturing villages of the Oaxaca Valley: San Sebastian Teitipac, San Juan Teitipac, and Magdalena Ocotlán. In each village lived a number of people involved in the production of manos and metates. Of the total population in these villages, 24 percent worked stone in San Sebastian, 11 percent in San Juan and, 19 percent in Magdalena Ocotlán (Cook 1982:129). In regard to the division of labor, Cook says that specific tasks correspond with individual titles: *metateros* are the specialists who remove stone from the quarries and make metates. *Finishers* are specialized artisans who complete metates from purchased blocks of stone or clean up crudely-shaped manos and metates. And *traders* are persons who sell the final product. Sometimes trade is established in a long-distance exchange with remote communities (as far as Guerrero and Puebla).

During Cook´s research, extraction of stone involved the use of explosives, steel wedges, sledge hammers, and heavy steel pinchbars (5-6 feet long) (Cook 1982:185). The stone the *metateros* in this region exploit is metamorphosed granite or granite–gneiss (Cook 1982:187-188). The process of production begins with the removal of stone from quarries. First, the raw stone is cleaned of dirt and debris. If a boulder is too large to be cut into pieces by wedge and sledgehammer or with the use of a pinchbar, then holes are bored into the stone using the pinchbar or a smaller crowbar. These holes are filled and packed with a mix of explosive powder and wet dirt. A fuse is also inserted into the hole along with paper wadding and more damp earth (Cook 1982:192). There is variation in the blasting final result. There are times that this step needs to be repeated to obtain an appropriate stone block. Later, a *plancha* (large block of stone) is removed and the *metateros* continue to cut *trozos* (blocks of stone of the size of one metate) (Cook 1982: 192). This process is performed by cutting into the stone with a *barreta* (a four foot pick) in order to create a hole where a wedge is inserted. . The wedge is struck with a sledgehammer until the trozos are broken away from the "parent slab" (Cook 1982:193).

Cook (1982:193-195) records the processes involved in shaping *trozos* into metates. First, metateros use green leaves to make guide marks for cutting on the stone. Then the bottom of the *trozo* is truncated, which involves the lopping off of large pieces to form the bottom of the metate. Next, the areas around the proposed legs are "emptied" and within thirty to thirty-five minutes after truncating the *trozo*, the crude form of a metate is visible. This stage in the metate productive process is crucial: the percussion needs to be precise, avoiding mistakes; if not the preform is lost for getting a metate.

The last steps are refining and finishing in the record made by Scott Cook. Refining involves "thinning out the body and legs" (Cook 1982:195). After the refining process, the metateros take the metate to a home workshop to finish it. It is relevant to underscore a change in the location of this task of manufacturing a metate. There, metateros use a small hand pick to chip away at the surface area of the metate until it is smooth. In addition to pecking, some metates are decorated with low relief sculpture and painting. These decorated metates are sold at a higher price than undecorated ones (Cook 1982:195).

In this kind of studies where productive processes are detailed, time investment is recorded. Time recorded for every activity is important not just for comparison in quantitative terms, but also for estimations about craft specialization, division of labor, partial/full time specialization and other aspects relevant to economic anthropology and political economic perspectives in archaeology.

Scott Cook (1982:198) describes the time generally allotted to each step in working the stone as follows: One day for quarrying ("*la sacada*"), one day for manufacturing the semifinished metate ("*la echura*"), and one day for finishing the metate ("*la labrada*"). The metateros know that if quarry conditions are favorable or if they are successful with a blast on any given day, they can produce a finished metate in ten or twelve working hours – but this is not a predictable situation. In summary, given a combination of subjective and objective estimates, we can reasonably assume that the 'social average' for labor-time required to produce a standard metate lies between an absolute minimum of ten hours and a maximum of 24 hours (3 work days). Scott also calculated two additional hours for the manufacture of "companion manos" (due to the smaller size and shape of manos, they can typically be produced quickly) (Cook 1982:198). One of Cook's informants summarized the work week as follows: Monday, blasting of stone; Tuesday, blast again if Monday's work was unsuccessful; Wednesday and Thursday, sculpt metates at quarry; Friday (or Thursday and Friday if Monday's blast was productive), finish manos and metates; Saturday, take final products to market to sell (Cook 1982:204).

Cook (1982) also described the marketing of manos and metates in Oaxaca, Mexico. He presents an extremely detailed analysis of the structure of this marketing system, which includes information on competition, transportation costs, spatial patterns, circulatory routes, price determination, and other significant aspects.

The marketing of grinding stones in the Oaxaca Valley involves several different persons with distinct roles. First, there is the *propio.* He is an "individual producer who sells products which he personally has manufactured" (Cook 1982:253). The *regatón* is "an individual who is not a native of the producing village and who buys metates for resale in his home village or elsewhere" (Cook 1982:253). *Regatones* are middle men who distribute finished products. Cook further explains that *regatones* can also be finishers of metates and manos. They purchase crudely finished products from *metateros* and complete the final stages of smoothing, making them ready to sell. On the consumer side of the market, *regatones* are those who buy finished products in big or small lots and resell them either at a local market, at "hinterland marketplaces", or in their permanent "stall" or "shop" located within a market (Cook 1982:253-254).

Scott Cook (1982:252) also identified several routes of circulation through which manos and metates pass. For example, *propios*, from their home workshops, can sell directly to an end buyer, to a *regatón*, or transport his product to the marketplace to do the same. The end of this exchange arrives when the metate and mano "enter into the process of utilization in the individual consumer household" (Cook 1982:251). A few instances of barter were also observed among the Zapotec metateros. Some of these cases included the trade of semi-finished metates in exchange for prepared food, dried beans, the use of an ox team, a crowbar, and even for "finishing services on three unfinished metates" (Cook 1982:256). There are also times in which the metateros do not sell or exchange their manos and metates at all, but rather give them to a bride who is a "relative or godchild" (Cook 1982:254).

Land, Livehood, and Civility in Southern Mexico. Oaxaca Valley Communities in Mexico. Scott Cook (2014)

Scott Cook´s book addresses the subsistence of rural communities in Oaxaca and focuses on the relationship among land property, livehood, and civility. He studies the activities performed in households and how there is a complementarity between agricultural tasks and craft manufacture. He analyzed peasants/artisans who specialize in embroidery, metate production, back-strap loom weaving, basketry, and other activities which facilitate an extra income for making a living.

In regard to ground stone artifacts, in this work Scott Cook expands upon his research of metate makers in Oaxaca at the Teitipac cluster of three communities (San Juan, San Sebastián, and Magdalena). This publication provides a detailed cultural and historical background of these communities from the Colonial times to the 1990s, which supplements his previous monograph concerning metate production. In this new document, the author develops in chapters one, three, four, and ten, the continuity and transformation of this process of production.

Cook mentions that metates were noticed by Malinowski and De la Fuente´s classic study of the Oaxaca market system titled *La economía de un sistema de mercados en México; un ensayo de etnografía contemporánea y cambio social en un valle mexicano,* (1957) (translated as *Malinowski in Mexico : the economics of a Mexican market system*) where they explained the utilitarian and cultural importance of the metate, an artifact which recalls its pre-Hispanic origins and continues in use in spite of technological changes, including its specific role in gender relations and marriage ceremonies as witnessed by the authors.

Cook is able to describe the dynamics of these three communities, and he provides interesting interpretations which were not noticed in his previous work on this topic. In respect to San Juan Teitipac he observes that this town was important since Colonial times when a church was built. The metate production has a long tradition. However, as maestros (bosses in workshops) try to maximize time and earnings, the author sees that Sanjuaneros are middlemen (regatones) who buy unfinished metates and manos and also produce their own artifacts. They are also peasants. Metate makers from San Juan buy unfinished metates from producers from San Sebastián, which is a less developed town and depends on San Juan.

In regard to the topic of acquisition of raw material for the manufacture of grinding tools, the author notes that there is a different location of quarries in San Juan and San Sebastián. San Juan has a series of lots for quarrying that are concentrated in one place in the surroundings of the town. This situation causes the place to flood during the rainy season and quarrying activities stop during this part of the year. In contrast, the quarries of San Sebastian are dispersed in different places near town, so the problem of flooding during the rainy season is not as complicated as San Juan´s quarries because the topography varies and quarries are distributed in distinct locations.

Cook writes that land ownership of quarries differs from arable land. In the traditional habits of quarry workers, the metatero who has use-rights for the property of the quarry, for which he pays fees to the community, heis the one who directs assistants and conducts the whole cycle of acquisition (clearing vegetation, blasting, making slabs, detaching stone, and other steps before transporting the raw material). The maestro metatero pays some fees to the community and there is no private ownership of quarries at all.

The case study of Magdalena Ocotlán shows a different history of specialization in manufacture of grinding tools. During the 1880´s a metate maker migrated from San Juan to Magdalena. In this town, the maestro metatero began to manufacture grinding tools, selling them, and teaching a group of apprentices. In only a few decades, this town was famous for the manufacture of ground stone tools. Metateros had a titular head of their craft who used to be the eldest metatero, and who had to deal with internal disputes and serve as a liaison between metate makers and the community authorities. Since the 1940s, Magdalena metateros participated in a civil-religious organization focused around the cult of Nuestro Señor de las Peñas celebrated every fifth Friday of Lent. This organization celebrates civil-religious ceremonies that are sponsored by members of this group of specialists.

Cook says that the first scientific description of metate industry among the Zapotecs of Oaxaca Valley was included in one page of the monograph Los Zapotecos (Mendieta y Nuñez 1949: 560) in a section on "Zapotec Industries" written by Carlos H. Alba and Jesús Cisterna under the heading "Metates." The essay is the result of fieldwork conducted in 1941 by a research team from Instituto de Investigaciones Sociales at Universidad Nacional Autónoma de México directed by Lucio Mendieta y Nuñez, and focuses exclusively on metate production in Magdalena Ocotlán. However, this essay did not mention that the origins of metate manufacture were located in San Juan Teitipac.

An interesting ethnographic description which is provided by Cook consists of the account of a metate maker from San Juan, who was quarrying raw material in a quarry exploited by his ancestors and suddenly found a tomb. The tomb was covered by several layers of by-products of grinding tool manufacture and it seems to contain ancient Zapotec ground stone makers.

In regard to the continuity of the use of metates for the future, Cook writes:

> There is no systematic empirical evidence to support a twentieth-century decline in metate output and sales corresponding to a hypothetically reasonable decline in metate use in the Oaxaca Valley.
>
> There are several reasons why diminished use of metates for food processing does not translate into diminished demand. First, diminished use does not equate to not use; metates continue to be used to regrind masa and to grind foodstuffs other than corn. This may result in a reduction in replacement demand but not necessarily overall demand. Second, metates are culturally significant in gifting and gender relations. Third, demographic growth in indigenous communities creates new demand for metates (Cook 2014: 290-291).

Brian Hayden, "Traditional Metate Manufacturing in Guatemala Using Chipped Stone Tools". In *Lithic Studies Among the Contemporary Highland Maya*, edited by Brian Hayden (1987)

Brian Hayden's study about metate production was a part of The Coxoh Ethnoarchaeological Project, which was a large-scale ethnographic study of Mayan material culture. The main goal of this survey was to collect information on "manufacture, use, and discard of various classes of artifacts" (Hayden 1988:1). The data were to be used to understand the Colonial houses that were excavated at the Coxoh sites of Coapa and Coneta in Chiapas, Mexico. Brian Hayden conducted a detailed study with Ramón Ramos Rosario, a very important metate maker, in the Municipality of Malacatancito, in the Guatemalan Department of Huehuetenango, in the Highlands of Guatemala. This study is very important for lithic studies in Mesoamerica due to the impressive corpus of information that he obtained. The most amazing discovery was that a metate maker still produces and uses chipped-stone tools to manufacture manos and metates. Brian Hayden began his research in the area because he came into contact with Ramón Ramos Rosario in Malacatancito. Ramón Ramos Rosario was the only informant for this specific lithic study. Ramos was 50 years old at the time. He was a former member of the army of Guatemala and he learned how to make different crafts and indigenous technologies across Guatemala when he was assigned to different areas. He learned those technologies in different indigenous communities. Ramos is a *ladino* citizen, but he has lived many years among different Mayan communities. Ramos showed Brian Hayden the productive process of producing manos and metates using stone tools.

The first step recorded by Hayden (1987:21-22) was the quarrying of metate blanks from the main quarry, 12 km away from the village of Malacatancito, or finding “suitable boulders for making manos and metates” in the riverbed, 3 km away. It is important to notice that color as well as physical (tactile) characteristics are constraints in the choice of a blank. Locally, the ideal rock (raw material) for manufacturing metates is vesicular basalt, especially the varieties with low densities of vesicles:

> Users state that the vesicular basalt is not as "grainy" as the andesite; that is, not as many mineral grains become incorporated in the maize dough as it is being ground. The vesicular basalt also is viewed as resharpening itself, or not needing resharpening as often as the andesite metates. The popularity of vesicular basalt metates is attested by their wide prehistoric and Colonial distribution in the area (Hayden 1987: 14).

And color is an important characteristic:

> Within the class of vesicular basalt metates, users in San Mateo (one of the villages in the Malacatancito metate market area) generally recognized two further subdivisions of rock type: "white stone" and "black stone". Black stone was much preferred because it had fewer vesicles and, therefore, lasted much longer. Fewer vesicle fragments also may have been incorporated into the maize dough with the black type, although this was never explicitly stated". (Hayden 1987: 14).

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Because Hayden and Ramos did not locate boulders suitable for producing a metate, they had to go to the quarry where they decided to use steel tools for the removal of raw material. Steel wedges and chisels were employed to extract large pieces of stone from the bedrock. Hayden (1987:22) was told that before metal chisels were introduced “it was necessary to excavate until a naturally suitable block of basalt was uncovered, which then could either be directly shaped or split into two smaller blocks for further processing.” The process of splitting such a block using stone tools was described by Hayden’s informant, Ramos. Splitting a stone that would yield two metates would generally take one-half to one day (Hayden 1987:24). The large stone was elevated onto a smaller stone that acted as an anvil. A groove was cut using smaller stone pics that would end up being several centimeters deep. The large basalt block would then be split by striking it on top with another boulder.

In his study, Hayden and Ramos decided to use metal chisels to cut a metate blank from the bedrock at the quarry after spending much of one day searching for suitable material in the riverbeds. They only found two blocks that were the appropriate size, but both were internally flawed (Hayden 1987:24).

The next step was the procurement of pics from nearby riverbeds. A half a day (4 hours) was dedicated to this process. Ramos tested potential boulders for a number of important qualities. Testing for flaws was achieved by tapping specimens lightly and listening to the “ring” of the rock. Chips were removed to test the flaking quality, coarseness, and internal homogeneity of prospective pics. Once a sharp edge was created, it often was tested for penetration and durability by indenting some nearby vesicular boulders. Sharpness was tested by running finger tips along edges. Specimens were further tested for adequate grip and for porosity by wetting freshly exposed surfaces. If there was the slightest indication of a flaw on the surface of a piece, Ramos would hammer away at it repeatedly until the piece broke apart (Hayden 1987:25). After collecting 10 one-handed pics and 9 two-handed pics (only a few of which were used during the manufacture of the metate Hayden recorded), the metate blank was formed into a metate during three distinct reduction phases: rough cut of metate form (*estillar*), thinning (*repellar* or *adelgazar*), and smoothing (*afinar*) (Hayden 1987:26). Large two-handed pics were used for the roughing out of a metate. Substantial pieces of stone were removed to expose the dorsal side of the metate first and then the ventral. To do this, “acute- to right-angled platforms are used for points of impact”(Hayden 1987:27).

Hayden (1987:28, 30; Figures 2.8 and 2.9) also witnessed Ramos cut his own platform into the side of a protuberance on the dorsal side (grinding surface) and remove the piece as a large flake with a few heavy blows to the platform. After roughing out the metate, Ramos transported the stone to his residential workshop to be completed.

There, Ramos began the next stage of thinning. Hayden (1987:36) says that few recognizable flakes were produced during this process because pulverization was common. Ramos also began using one-handed pics because the work was significantly more delicate, especially when thinning the ventral side around the legs of the metate. This stage included flattening the grinding surface, straightening the edges, and sculpting out the feet of the metate. An interesting behavior observed at this point was the use of the pointed edges of the pics to grind in a linear motion, creating a groove with "sharp angles at the junction of the support with the body of the metate" (Hayden 1987:38-39). The groove was used as a "stopline for subsequent chipping" (Hayden 1987:39). Ramos then carefully chipped away unwanted material around and between the two distal legs. The last stage of manufacturing a metate with stone tools is smoothing. Hayden (1987:41) explained how this was completed in two stages. First, one-handed pics were used along with "smaller, specialized smoothing stones" to abrade the surface of the metate in a swiping motion. Then, a mano was used to grind on the grinding surface for a few minutes to create a smoother surface. Finally, the metate was washed of any small, loose pieces of stone and fine powder (Hayden 1987:41).

Hayden (1987:44-46) also briefly recorded the production of a mano. It entailed searching for raw material in the riverbed, and after roughing out one boulder that had broken due to flaws, other suitable boulder was found and roughed out. Two boulders used as pics were found in the same riverbed, one was pointed naturally, and the other of greenstone broke during roughing, but Ramos continued to use it for light pecking. After roughing, the mano was taken to a riverside workshop where it was thinned and smoothed, in a manner similar to that of the metate.

The travel to and from the quarry, procurement of material, and roughing out the preform metate took one day (Hayden 1987:31). As mentioned, Ramos transported the metate preform to his home workshop after the first stage of reduction. In this step there is variation because the metateros of Oaxaca (Cook 1982) take the metate to a home workshop only after initial roughing and thinning. This practice in Oaxaca is similar to that of modern metateros of at least two other quarries in Guatemala. In contrast, Hayden (1987:27) saw that manos were generally finished at the workshops by the riverbed quarry rather than in a home workshop.

The extraction of a metate blank from the bedrock quarries located in the hills above Malacatancito took only 24 minutes (using steel tools), while the time for "roughing out" the blank, also while at the quarries, took approximately four minutes (Hayden 1987:24-25). Thinning and smoothing in the home workshop was the longest process; it took ten hours and twelve minutes, and producing one mano next to the riverbed quarries required five hours and seventeen minutes (procurement time included). Hayden estimated an addition of one to two days in the procurement of raw material for metates if stone tools were used. In Hayden's estimate, the total time to produce a finished metate was approximately 20 hours. These 20 hours of work were distributed over four to six days to make one mano and metate using only stone tools (Hayden 1987:48). This corresponds remarkably well with Cook's estimated average of 17.75

hours during five days to produce one mano and metate using modern steel tools(1982:198).

Margaret Nelson, in this research, conducted the marketing portion of the study (Hayden 1987:148-159). She detailed the contemporary specialization in marketing of both manos and metates. She says that Ramón Ramos Rosario sold directly to "store owners, *finca* owners, and the native population" (Nelson 1987:155). The majority of his product has been sold at fiesta markets, usually in Chiantla, which is a short distance from his home in Malacatancito, Guatemala. He has also traveled to several other fiesta markets in towns in the highlands of Western Guatemala (Nelson1987 :154).

Brian Hayden also showed that grinding stones were used for much more than just grinding maize. They were also used to process "coffee, sugar, cacao, pigments, spices, salt, chiles, vegetables, and other foods" (Hayden 1987:188). Furthermore, he also recorded (1987:191) a few uses for broken manos and metates which include the following: temper grinders for pottery-making and grinding salt, pigments, sugar, coffee, and cacao. It has also been reported that broken manos can be used as hammerstones, stones for walkways, supports for tables, and structural fill (Hayden 1987:191).

In regard to footed metates, Brian Hayden found that the choice of large feet has to do more with socio-economic values rather than functional reasons. Making supports of a metate is the most difficult step because breakage is very likely to happen. Many unfinished and broken preforms of artifacts were thrown into dumps in local wokshops in this stage of the productive process. During pre-Hispanic times, mainly since the Classic period, only the single proximal support of tripod metates was pronounced; the two distal supports usually were simple nubbins. Hayden thought (1987: 40) that it seems probable that the use of steel chisels has enabled stone workers to make modern metates with much higher supports more easily and without great risk of breakage, in contrast to the poorer control and higher angles of the working edges characteristic of the stone pics. In his study of metate design, Hornsfall (1987:354-356), found that supports were not necessary for the function of the artifacts. Rather, women using metates without supports improvise with cobbles, wooden supports, and tables at different heights to achieve the correct angle. The reasons for supports lie in the political economic context. Hornsfall noted that supports on a metate convey status, a variation that made a distinction. The specialists who manufacture footed metates live in remote villages and other communities must import this kind of artifact. If the cost of distance is add to the specialized task of making supports, the final product is expensive.

Ramón Ramos Rosario also says that transporting footed metates increases their price because there is the risk of breakage. Metate supports and manos are the most vulnerable parts of the tool kit for processing maize or other food that are pulverized. The implications of these very valuable information is relevant for the Formative period of the Gulf Coast of Mexico, due to the occurrence of both footed and unfooted metates depending on the settlement hierarchy in the area. In the Olmec area, specifically in Olman, it has been important to see the ratio of those groups of metates over time as well as the internal distribution in sites. During the Early and Midddle Formative periods, several legged metates have been found in San Lorenzo (Coe and Diehl 1980: 228; in Ann Cyphers's project, there have been reported some legged metates or legs found during the sub-phases San Lorenzo A and B (Parra Ramírez 2002:56-59, Fig. 85, pag. 154; pp. 152-155). Coe and Diehl (1980: 228) said that legged metates were found in levels which corresponded to phases Chicharras throught Nacaste and Villa Alta. They distinguished three different foot shapes represented in the sequence:

> One is a simple, flat-bottoned protuberance which is rounded on the sides. The second is a simple, flattened extension of the dorsal surface; and the third is a square foot from a square metate, somewhat like the foot on some Victorian furniture. The third type is represented by a single example from the Chicharras phase. The Chicharras metates are somewhat curved, with an upraised lip somewhat like that of a saucer-lipped metate. The Villa Alta metates are wedge-shaped, while the other footed metates are fragmentary but were probably plano-convex.

This feature could be related not only to the kind of substances that were ground, but also a demonstration of prestige, status, feasting or ceremonial practices. Mark Miller Graham (1985) noticed, when he was analyzing stone sculpture of Costa Rica,that the elaborated pre-Hispanic metates found in the region could have a technological influence from the legged metates in the Olmec area in San Lorenzo and he hypothesized that they might be related to prestige:

> The footed metate in Mesoamerica thus appears from the beggining to have intended for the preparation of maize for the elite and/or in a ceremonial context, and the special-purpose nature of the footed metate would thus suggest that relatively more labor in metate production is correlated with elite/ceremonial maize preparation. The subsequent formal and symbolic elaboration of footed metates, predominatly tripod, thus appears to have been firmly grounded in the maintenance of elite households and/or ceremonial food preparation (Graham 1985: 51).

Graham´s economic anthropological perspective on footed metate production was one of attached (elite-sponsored/patronized) craft specialization because at the time the models were taken from the Mayan area. He considers that footed metates in San Lorenzo, although undecorated, were special-purpose tools and used for ceremonies by the elites. He hypothesizes that footed metates were produced in San Lorenzo, distributed to its support settlements, and this basalt technology was controlled by political leaders which foster an increase in social complexity (Graham 1985: 54).

Graham also stated that footed metates appeared first in Olman and later in Central Mexico. He notices that footed metates did not appear in the Basin of Mexico until the Middle Preclasic Zacatenco phase (dated by Tolstoy 850-400). Graham also mentioned that some Tlatico metates are footed and are Middle Preclassic in date (Graham 1985:55).

In a later paper, Graham (1992) provided insightful ideas concerning the relationship between quotidian artifacts and special objects, and in the particular case of metates. He says that maize-grinding tools, with their meaning as useful artifacts in daily life activities, change from signs to symbols of power, and metates were incorporated in the paraphernalia of power by political leaders. The artifacts obtained some features in the manufacture that symbolizes power such as feet (Graham 1992: 174-175).

In regard to the correlation of metates with supports and level of political hierarchy, it is important to mention that in the site of San Andrés, a secondary site near to La Venta, no footed metate was recovered in excavations. Jeffrey Du Vernay noticed:

> In addition, Coe and Diehl recovered several legged metates that dated to Formative period San Lorenzo (Coe and Diehl 1980:228). Such metates are currently unknown to both San Andrés, Formative period Chiapa de Corzo (Lee 1969: 117-119), and La Libertad (Clark 1988: 99-113). These facts serve to contrast the manos and metates of San Andrés, Chiapa de Corzo, and La Libertad to those of San Lorenzo (Du Vernay 2002: 78)

Raúl Ernesto García Chávez, "Etnografía de un taller de metates y molcajetes en el barrio de Xochiaca, Chimalhuacán, Estado de México". (2002)

Raúl Ernesto García Chávez (2002) studied the metateros and quarries of Xochiaca, Chimalhuacán, Mexico, which is located just east of Mexico City. He also recorded the process of metate production, which started with clearing dirt away from the area where the andesite is extracted. Using large sledgehammers, wedges, and chisels, blocks of andesite are removed and then transported back to a residential workshop (Garcia Chavez 2002:138). This process is different from Hayden's and Cook's descriptions of metateros. In their monographs, rock blocks were at least roughed out before being transported back to a home workshop. As in Chimalhuacán there is transportation with modern cars to and from the quarries, it may contribute to the fact that those in Chimalhuacán do not rough out their metate preforms before they return to their workshops. At their *taller* (workshop), García Chávez explains that the block goes through three phases of reduction. First, the general shape of the metate is marked on the block, and large pieces of andesite are removed with a chisel called a *punzón* (Garcia Chavez 2002:138). Second, another *punzón*, one with a finer edge, is used to take off smaller pieces stone. Third, the metatero uses a *máquina*, or a chisel with a wide edge, to smooth the surface (Garcia Chavez 2002:138-139). This three step process is very similar to Hayden's observations at Malacatancito.

One molcajete is manufacture during one day and a half. One metate is produced during two to three days. These time periods consider that the preform is ready for being transformed and take into account the time involved in the manufacture of *tejolote* (pestle) and *metlapil* (mano or stone roller pin). The artisans sell their ground stone artifacts themselves in their workshops, in local or regional markets. They supplement their income with agricultural activities, and so are part-time specialists. However, in the case of the ones who are the most skilled artisans in manufacturing andesite, they emigrate from the familiar workshop to a place where they establish their own workshop for manufacturing sculptures that are sold for decorative purposes in Mexico City. They transform into full-time specialists. It is important to say that the toolkit used for manufacturing metates is basically the same that was used in Oaxaca as recorded by Scott Cook, the examples in which Ramón Ramos Rosario used metal tools as reported by Brian Hayden, and other examples on which I comment below.

Claudia Dary and Aracely Esquivel. "Los artesanos de la piedra. Estudio sobre la cantería de San Luis Jilotepeque". (1991).

Claudia Dary and Aracely Esquivel (1991) conducted a brief investigation of mano and metate production in San Luis Jilotepeque, Jalapa, Guatemala. The meaning of the place name "Jilotepeque" means "hill of maize cob" from Náhuatl "xílotl": maize cob and "tepetl": hill. The population has Pokoman ancestors and they had strong relationships with the Chortís and the Quichés. This is one of the few existing production centers of grinding stones left in the western part of Guatemala today.

Dary and Esquivel also recorded the stages of excavation of the selected rock, the manufacture of a preform, and the finishing process of a metate. The artisans use powder for obtaining blanks after blasting the surface. The tools used for reducing the blanks are basically three: a *barra* (pich bar or crowbar, a metal bar with a pointed projection at one end); a *partidor* (chisel); and *manero* (chisel). The major difference from the previous examples is the style of metate manufactured in San Luis Jilotepeque. The metateros of this town make a restricted (trough) metate with an accompanying two-handed mano that fits within the trough, which is pecked out of the grinding surface of the metate. This distinctly manufactured style is rarely found among archaeological artifact collections and may be an exclusive product of modern metate producers in the western portion of

Guatemala. The “canteros” can also make building materials of the same stone such as “ladrillos” or small crafts, such as ashtrays.

Dary and Esquivel write that the metate makers sell their products to middlemen who spread the products to the neighboring communities as well as Cobán (Alta Verapaz), Honduras and El Salvador. The metates are also sold in Guatemala City.

Michael T. Searcy, *The life-giving stone: Ethnoarchaeology of Maya Metates* (2011)

In his book, Michael T. Searcy wrote the results of his M.A. Thesis research. He spent two field seasons in Guatemala recording the life histories of manos and metates used by the Q’eqchi’ and K’iche’, two ethnic groups of the Mayan ethnolinguistic family. He studied the productive process which is basically the same as described in the other ethnographic cases discussed above. He conducted surveys with 97 people who detailed the biography of their grinding stones, associated cultural beliefs such as taboos related to gender issues, their physical descriptions, and metate use-location. Searcy also interviewed several men who manufacture manos and metates at two of the few existing metate quarries in Guatemala. After analyzing the information gathered, he found new approaches for interpretation of manos and metates found within the archaeological record.

In particular, very interesting results are related to the identification of wear patterns and the behaviors that cause these patterns, such as the cross-section of the manos (circular, rectangular or ellipsoidal) depending on the motion and the kind of substance that is transformed into dough. Also, he found that a “dog bone mano” results from both ends of the mano extending beyond the surface of the metate. Searcy shows that manos and metates can be multigenerational, as they are often passed from one generation to the next. Taboos such as sexual division of labor are addressed because in both Mayan communities men never use metates for transforming maize into “masa.”

A very interesting contribution of Searcy´s research is his comparison of the use-location of manos and metates among the modern Mayan communities[1] and the published information of grinding tools found in domestic contets in the pre-Columbian Mayan site of El Cerén, El Salvador. El Cerén is a site which was abandoned suddenly after volcanic hazards in the region and was covered by volcanic ash. Searcy was able to see continuity in the location of grinding tools inside domestic households like the communities in Guatemala in his ethnographic research. Another contribution of his monograph is its demonstration of a correlation between the size and function of manos and metates. Big metates are used for maize and the small for coffe, cacao, chili peepers and achiote, as well as natural dye.

Finally, this study provides some ethnographic data that are the result of the manifestation of economic changes as well as transformation of gender roles through grinding stones and the gradual loss of cultural traditions due to the integration to globalization. For instance, Searcy began his research choosing three communities which showed different levels of economic development. Pantoc is a village and smallest community, lacking electricity, a market, and a Catholic church (characteristics of a town). Chicojil is a village that is transitioning into a town in which electricity was recently introduced, but which still lacks running water. However, a new major road was built and resulted in increased tourist traffic. The third settlement is Santa Catarina

[1] Use- location of manos and metates refers to the places inside households where Mayan people use to grind maize, and in those places are found manos and metates

Ixtahuacán which is a town center and has a technological innovation: it has three grinding mills where people can take their nixtamal to be ground, allowing them to organize their lives in a different way for making crafts, performing chores, and having free time. The interaction with external communities facilitates the introduction of grinding mills and changes in the amount of time spent in different activities. The cultural choices made by women are oriented to activities different to grinding maize in the metates.

Ricardo Pozas, *Chamula: un pueblo indio en los Altos de Chiapas*, 1959

In the history of Mexican Anthropology, there are very important examples of ethnographic descriptions of the process of manufacturing grinding tools. One such description occurs in *Chamula*, by Ricardo Pozas. In this book he described a process with similar steps that are shared by other regions of Mesoamerica. The raw material for making metates, a sedimentary rock, is acquired from surface boulders. Chamula metate makers from Tzajalchén select the rock by color: black, white or pink are the correct choices and hardness and granularity as well as sound are tested in order to proceed with the design of the artifact. They make the preform in the place where they found a blank. Chamula metate makers only use a crowbar and a hammer for making the grinding surface, defining supports, and roughing out the rest of surfaces. Before moving the roughed-out metate to his house in order to finish his craft, the metate maker chooses a small boulder for making the mano.

A Chamula metate maker can manufacture three metates every week or a small metate every day. It takes a day finding the blank and hauling the preform to his home, and one day more for finishing the grinding tool. The metate makers sell the final products directly and this money is a supplement to their income (Pozas 1959: 99-100) which is based on an agricultural system (cultivation of maize-beans-squash, fruit-trees), chickens, sheep industry and on the making of clothing, pottery, baskets, furniture, lumber, and a few metal tools.

***Las Canteras de Mitla*, Nelly Robles García (1994)**

Nelly Robles conducted research concerning quarries where the ancient inhabitants of Mitla extracted the rock and the artifacts they used to work it, and supplements her study with ethnographic observations that she recorded with a traditional stone sculptor, Wilfrido Moreno.

The same quarries were studied by William Holmes (1859), and then revisited by Howell Williams and Robert Heizer (1965). Holmes made some hypotheses about the extraction of large boulders based on the evidence of abandoned places where quarrying activities were conducted in the past near the archaeological zone of Mitla, and he recovered some stone tools which he found on the surface close to the boulders. He shows some drawings of the artifacts (1895). Williams and Heizer analyzed the kind of rock (ignimbrite) which was used for building jambs in Mitla. They sourced some potential quarries visited before by Holmes and they compared densities with the rock used in the buildings of Mitla (1965).

Figure 4.1 Stonehammer found in quarries near Mitla (Holmes 1895: Plate XLVI)

Robles took into account these previous studies and expanded her research, adding more data sets. She recorded and described eight quarry sites, collected and analyzed stone tool artifacts associated with the quarries, inferred function based on her ethnographic observations, and identified the quarried sources with the aid of petrographic analysis. She quantified and described the context of the boulders, provided their dimensions and the stage that they have at the moment of the abandonment. In order to have a better understanding of quarry sites, she made three excavations, and she was able to compare both surface and excavation materials. Using García Cook's classification scheme for analyzing stone tools, Robles found that the tools are clustered in five groups: picks (mazos), scrapers (raederas), scratchers (raspadores), abraders (alisadores), and polishers (pulidores).

Robles interpreted the uses of different stone tools used in quarrying and cutting activities taking ethnographic observations that she recorded in the surroundings of Mitla. Her one informant was Wilfrido Moreno who used essentially the same tools as in the other ethnographic cases described above. According to Robles, Moreno designed his tool kit himself, including axes, hammers, a variety of chisels, and organic polishers such as plants, leather or sand for obtaining polished surfaces, crowbars, axes, burins, drills, wooden boxes, and a wooden anvil.

Robles (1994) identified the following steps in the manufacture process of crafts made of ignimbrite: 1) quarrying (*extracción*). In this step Mr. Moreno uses a crowbar for choosing the veins with the appropriate color, granularity, and texture. He splits off into pieces the rock quarried in order to facilitate transportation to his workshop at his home. 2) Outline (*bosquejo*) At his workshop, Moreno studies the pieces of rock, with the aid of an axe he reduces the stone to the dimensions which he needs and finds the appropriate small sculpture of craft that could be obtained. Then, with the aid of pencils, he marks the lines to be followed by the tools for flaking and reducing. 3) Flaking (*tallado*). First, he introduces the stones in water. Later, he uses different burin sizes for decorating a wide variety of motifs. For boring holes, he uses electric drills. Wooden platforms are employed as anvils. 4) Finishing (*acabado*). This is the last step. Once that Mr. Moreno has flaked the stone until the preform is obtained in accord with the design that he chose, he used a burin for polishing. The burin is passed over the surface of the preform until the irregularities disappear. Later on, the artifact is polished with sandpaper, and the final burnishing is obtained by rubbing the piece with a piece of leathe

“Observaciones sobre las canteras en El Petén, Guatemala.” María Elena Ruíz (1986).

As a lithic analyst for the archaeological Project “Mundo Perdido, Tikal,” María Elena Ruiz studied the limestone quarries that are around the archaeological site of Tikal, comparing them with the limestone quarries at the nearby site of Uaxactún.

Ruíz observes that it is very difficult to distinguish ancient traces of quarrying from modern extraction, and the quality of the limestone did not leave permanent evidence after exposure to a tropical rainforest.

However, she recorded the folk classification that is employed for choosing the stones which could be used in building restoration. This is the classification that she recovered:

1) Black hard stone: This is the cortex or outer surface of the rock which produce sparks when is hit by a hammer. 2) Hard porous stone: This is the intermediate layer of the limestone and it is of bad quality for cutting or to carving it because this kind of stone falls to pieces. 3) High quality white stone: This stone is also called “salt stone” (*piedra de sal*) in the Petén area. It is used for restoration and it is believed that the ancient Maya builders chose it for architecture. The folk name refers to its color, fine grain and hardness. The quarry men identify the appropriate stone by the sound. It is after excavating approximately 60 to 70 cm from the surface. 4) Rotten stone: this kind of stone is not useful for restoration or for making artifacts, and it is found below the deposit of the high quality white stone.

Ruíz found that the workers of El Petén think of a quarry as a group of "islands" that have a series of "nails" (*clavos*) or "patches" (*parches*), which are spots of bad quality stone. The steps in quarrying in the surroundings of Tikal are the following: First, deforestation, which means to clear all herbs and plants that cover the surface of the limestone quarry. Second, the workers begin to peck a grid into the surface of the limestone, where the block size depends on depth of the limestone at every point. Then, they proceed to detach blocks from the surface by pressure using different tools such as a crowbar, wooden wedge, sledgehammer, and a metal saw. Finally, different block sizes are obtained, they are transported and piled in another place where are finished. The final flaking and smoothing is done with hammer, adzes, and plant fibers. The workers standardize different sizes of blocks depending of the different kinds and quantities that are required.

In terms of organization, a coordinator directs workers regarding specifications for the blocks, and also he is following orders of an architect of engineer who is restoring buildings n in the archaeological site.

In regard to transportation, Ruíz (1985:31,) taking into consideration the availability of the limestone in the same site of Tikal, considers that human beings with the aid of a tumpline were able to transport the building material for decorative purpose. And in the case of the stones required for monuments, Ruíz (1985: 32) suggests that the ancient Mayas might use tree trunks and ropes for hauling larger stones.

Stone tool use at Cerros, a Late preclassic Mayan site on the North Coast of Belize, Suzanne Lewenstein (1984).

This is a very important work in experimental archaeology of a Preclassic Mayan site. The author analyzed the function of chipped stone (chert and obsidian) from materials recovered in excavations. She used use trace analysis in the artifacts and conducted experiments using replicas to identify stone tool use patterns. Lewenstein (1984) discovered a wide range of native substances was processed with stone tools such as wood, animals, hides, shells, plant fibers, bone, and stone. She also found that there was no craft specialization at all. She only noticed differences in the kind of artifacts as well as the substances which were processed if residential and non-residential contexts were compared. Lewenstein's research contributed also to an insightful interpretation of the manufacture of stone donuts. She conducted experiments using chert bifaces in order to grind fresh limestone. Finally, she obtained two stone donuts (Lewenstein 1984: 133-134). This information is important because in Southern Veracruz, during the Formative period, the stone donuts are present in different sites, and I have had the opportunity of documenting the productive process, finding all the sequence of manufacture from the blank to the preforms and finished artifacts. Chert could be used for grinding different kind of rocks.

Personal observations on the manufacture of grinding artifacts in Mesoamerica

In this section I describe observations on ground stone manufacture I made under the sponsorship of Mexico's National School of Anthropology and the National Autonomous University of Mexico while I was a student at those institutions. The research was conducted in order to obtain geological samples as well as visit and interview individuals in their communities. Permissions to conduct the study were granted by the Instituto Nacional de Antropología e Historia at the federal level as well as by state and county (municipio) governments. Permissions from the Army and local religious authorities facilitated relations with the communities as well. Permission to visit communities in Guatemala were granted by the federal Instituto de Antropologia e Historia (IDAEH) of the Ministerio de Cultura y Deportes. This information complements and expands upon the ethnograpic and ethnoarchaeological studies cited above.

In the case of Malacatancito, Huehuetenango, Guatemala, I observed Ramón Ramos Rosario has a work space that fits very well with the concept of a multi-crafting and part- time workshop. Ramos performs agricultural activities both in milpa and corn fields. Ramos explains that in the milpa he plants a few crops which are used in the daily life: squash, tomatoes, chili peepers, beans, and other plants which complement the diversity of the diet. Milpa is located on his houselot, close to the place where he finishes ground stone artifacts, in the yard (patio). And the corn fields are located far way from the house, outfields. These fields provide mainly maize and represent a significant component of the annual diet and an important source of annual income His wife, daughters, and sons participate in all the activities. This is very important because this ethnographic observation allows us to take into account models of production in multi-crafting households for example Pool (2009) as well as Killion´s (1990) ethnoarchaeological model identified in the Tuxtla Mountains, which analyzes the complementarity of different agricultural activities that are involved in subsistence at the level of domestic activities (Killion 1987; 1990). These models are necessary for a better understanding of household economies because it is possible to assert that craft specialization in some cases was not a full time activity, such as sponsorship by elites like in the production models created for the ancient Mayas. When an ethnographic study is developed in the field, it is important to take into consideration different aspects associated with craft specialization. The questions to the communities can be directed to the association with other activities such as cultivation, different kinds of agricultural systems which are used at the same time, and other crafts or economic activities that are performed at home.

Regarding the productive process, it is interesting that both manos and metates are manufactured in the same production unit. In other regions of Mesoamerica, some domestic workshops only make metates, or molcajetes, or manos. In the case of Malacatancito the set of mano and metate are finished in the same workshop. Furthermore, it is important to mention that Brian Hayden only recorded Ramón Ramos Rosario´s family workshop, but when I visited Malacatancito, I observed that at least eight families continue the tradition of traditional metate making. All these families are related and they help each other when they have to travel to sell their products.

Another aspect of production little commented on by Hayden (1987) is the gendered organization of labor in Malacancito workshops. At Ramos Rosario's home, men choose blanks in the quarry, rough out the preforms there, and haul the products to the home workshop. They continue with fine flaking. Women, however, participate actively in the finishing steps of polishing and shining the manos and metates. Women know a repertoire of polishing techniques, and each woman has a particular signature in her finishing of grinding stones.

Another important aspect that attracts my attention was the distribution of manos and metates. Most studies focus on production and distribution. However, after the product is bought in the market, we don´t know much about the final destination, other than the utilitarian function of processing meals. The grinding tools are important gifts that circulate through kinship networks. They are paid as an important component in the bride price or bride wealth that the groom or his family gives to the parents of a woman upon the marriage of their daughter to the groom. For the couple, those items are important for quotidian activities, but they also express ties with relatives. The artifacts last generations and maintain in some cases, long-distance relationships. In the case of these metates and manos, they cross ethnic boundaries. Social and symbolic dimensions of artifacts are relevant for a better understanding of the flow of information among communities which share an identity. These aspects are considered in my study because during the Preclassic period in Olman, ground stone artifacts served as markers reinforcing an adscription to Olmec culture in daily life. This materiality also reproduced artifacts that transformed basic ingredients in the diet and that were used in activities that allowed adaptation to the tropical forest, among them stone axes, hammers, blades, pestles, basins, and small sculptures.

The artifacts are sold in regional markets that are the hubs of complex commercial networks. It is very important to keep in mind the whole process of distribution for understanding ancient exchange networks that may not be taken into account when grinding tools are treated simply as utilitarian implements. Behind the appearance of a utilitarian function though, there are other dimensions of things such as their important roles in the symbolic, political-economic, and social life.

San Nicolás de los Ranchos and El Seco, Puebla

Two communities in Puebla that have a long term tradition of manufacturing metates and molcajetes illustrate variation in the organization of production in andesite ground stone artifacts. This variation is related to differences in the history of production because these technological sequences have been developed in Central Mexico with a cultural history associated with adaptation to Highlands and andesite geological setting. San Nicolás de los Ranchos has barrios that are specialized in making stone grinding tools such as metates and molcajetes as well as sculptures and architectural features that are sold to building companies in Puebla and Mexico City. All barrios depend on the local andesite quarries. The quarries are owned by different families that exploit the raw material and manufacture grinding tools and sculptures. The families live in barrios and specialize in manufacturing a component of grinding activities (for example, they make only metates or manos). They use gun powder and metal tools to extract the stone. Metal tools are also used to shape the material.

The artisans are part- time specialists, who divide their work between agriculture, trade (some families have "tiendas" where they sell a wide variety of products), and manufacture of grinding tools. Also in town are middle-men who buy from different families their particular products: metates, manos, molcajetes, and tejolotes. Middle-men have additional work: they have to "finish" the artifacts. Finishing involves curing or seasoning the artifacts (*curar*), as well as finishing their surfaces in order that the products should be ready to use for maize processing. They also have to match the pairs: mano to metate, molcajete to tejolote, so they have to use them briefly in order that the surfaces of both artifacts can work correctly together. The middle-men distribute grinding tools in regional markets. As the artifacts are bought mainly by Nahuas, the people that pertain to this ethnic group in the states neighboring Puebla such as Morelos, Estado de México, Mexico City, and Guerrero see not only functional value in them, but additional significance having to do with ethnolinguistic identity and kinship.

The case of El Seco is very interesting; production there is carried out at almost an industrial scale. There are four big workshops in the downtown area, each with more than twenty permanent workers. They manufacture grinding tools as well as small crafts (ashtrays, toys, hand carved chess sets, religious images, and many others) and sculptures. Also, in the margins of the town, are family workshops that manufacture the same products as the big workshops, but which also produce stone mills for tortillerías in Mexico City. There is an agreement between the regional political organizations that pertain to PRI (Partido Revolucionario Institucional) and the association of "tortillerías" in Central Mexico for the use of stone mills produced in El Seco. The workshops, both small and big ones, use metal tools for manufacturing andesite grinding tools. However, they still use the basic steps of reduction that are used in other parts of Mesoamerica.

Summary of contemporary techniques for manufacturing ground stone artifacts in Mesoamerica.

In the collected information on contemporary manufacturing techniques showed above, it is possible to summarize the following phases in the production of artifacts which are shared by different and distant communities. In spite of differences that the Mesoamerican peoples have as a consequence of adscription to diverse ethnolinguistic affiliations, technological development, ecological zones or geological settings, all the communities preserve a repertoire which corresponds to a very ancient pattern of making grinding tools, probably since the beginning of sedentary and agricultural way of life in Mesoamerica.

Acquisition of raw material

This phase in the production of ground stone artifacts is crucial because the design of the tool starts from the decision made for choosing a stone. Dimension, color, hardness, color, sound, granularity, and density are among other features that are in the mind of the stone tool maker who was also the collector of raw materials.

The acquisition of material has two general variations: 1) if the design is expedient, the stone tool maker should be looking in river beds or on the surface of outcrops for the appropriate stone; 2) if the design is systematic, the stone tool maker probably needs more people who could help him quarry the stone from an outcrop. Learned skills should be necessary to maximize energy and time for finding appropriate veins in the geological setting which facilitate the extraction of blanks. These quarrying activities could be done with the aid of black powder, wooden or metal tools, and chipped stone tools. However, during pre-Hispanic times, tool-makers use only fire for cutting boulders in the outcrops and the human labor for the reduction of the raw material in useful macro-cores using pics and stone-hammers.

Roughing

In this stage the stone tool maker is reducing the raw material in order to obtain a blank which could be transformed into an artifact. This phase could have two variations in the way that is performed depending on the site where the operations are conducted.

1) Roughing on the outcrop. In this case, the stone which has been chosen for making a stone tool is flaked until a uniform surface is obtained. Then a basic outline is followed for obtaining a preform.

2) Roughing in a workshop. In this other case, the stones which were obtained either from a river bed or from a quarry, are transported to a workshop for continuing the productive process of ground stone artifacts. In the workshop the stones are flaked until a useful preform is obtained and then an outline would define the specific stone tool the stoneworker plans to obtain.

In this phase, steel tools or chipped stone tools are employed for flaking and obtaining the preforms. Other resources which could be used are wooden artifacts, thermal shock to soften stones, or water to facilitate the flaking.

Fine Flaking and Pecking

This phase of the process of production is performed mostly in workshops. In some cases such as "metlapiles" or short manos, this stage could be done in a river bed.The goal in this stage is fine flaking and pecking carefully in order to define details of the artifact. In the case of metates, in this phase are defined the supports or some details, including carved decorative motifs. The stone tool makers use to employ hammers of different sizes either stone hammers or metal hammers, brushes, sand and polishers. In order that the stone makers could obtain flatter and smother surfaces, in some cases, they employ different substances such as oil, ashes, bitumen, sap, rubber, and gravel.

Polishing and Shining

In this last phase of the process of production, the stone tool makers polish all the surfaces with the aid of leather, corncobs, or stone polishers. In order to produce a shine on the artifact, the artisans may add wax or rub the surface with powdered "toasted" tortilla. In some cases, the ground stone tool is painted as well.

Transportation

In regard to transportation of large stones, there is an important record in a cross-cultural perspective in the study of early civilizations around the world. An important book concerning this topic was written by Robert Heizer titled*: L' Eta dei gigantic. I transporti pesanti nel l'antichita*[2], where he synthesized all the cultural variation in transportation of monumental stones taking into account ancient sources, excavations, historical records of movement of monuments during the modern world, and experimental archaeology. He found a common pattern in all cultures: the concern in the reduction of stones for transport. He recorded that in pre-industrial societies, transportation was limited to human or animal power, water transport, or in some societies harnessing of the wind for water transport. For this reason he also documented that in the design and choices of manufacture, an estimation of the weight that should be hauled from the quarry to the final destination was an important point that was included in the ancient projects which involved monumental stones. Reducing a block of stone for transportation reduced the weight almost in half to accommodate either transport over land (with human force aided by ropes, tree trunks, or wooden sledges) or water (in rafts).

Experience with transport of tonnage taught Olmec stoneworkers and sculptors to reduce the weight of stones in order to move them large distances through tropical forests, as experience has taught stoneworkers in other cultures. Thermal-shock was an

[2] This book written by Robert Heizer was published posthumously. Rebecca González-Lauck told me that John Graham had once heard of Heizer´s manuscript and she highly recommended that I learn what happened with that work (personal communication, 2004). Heizer planned to publish his book and gave a copy to Giancarlo Ligabue. The original idea was to publish it in different languages. However, Heizer died, and Ligabue with the aid of Thomas Hester published a very elegant Italian edition of the book.

important technique which reduced weight and some Olmec monuments still show evidence on their surfaces of the use of it.

For stone transport, the use of log rollers, or logs rigged up as a sledge to reduce friction are methods believed to have been employed in other societies, including Egypt and Peru, and is another suggested method for Easter lsland. In New Guinea, Bilder (1943) ethnographically recorded hauling of big stones by these two methods and took pictures of both. The movement of monumental stones was accompanied by rituals and chants. But in other cases, the information was recorded without ceremonies, such as the case of the Spanish Jesuit missioner and chronicler Bernabé Cobo who wrote in *Historia del Nuevo Mundo* that among the Incas, in Perú:

> The stone tools which they have for cutting and dressing stones were black and hard cobbles found in the rivers, with them they were dressing, they were crushing instead of cutting. They brought up the stones where necessary, hauling them; and as they did not have cranes, wheels or tools for uploading them, the blocks were raised into position by building a ramp of earth and stones up to the height of the wall and running the blocks up on their rollers, I saw this building method in the construction of the cathedral of Cuzco...(Cobo, 1890-1895, Book 14, Chapter 12: 262, Translation by the author).

The evidence of wooden rollers was reported by John Rowe: "Sr. Luis Llanos informs me that a treasure hunter at Ollataytambo dug under a large Inca block abandoned between the quarry and the site and found remains of wooden rollers" (Rowe, 1946:226). Stone and earthen ramps are also believed to have been used for erecting Egyptian pyramids (Heizer 1966: 821-830;1991: 23-75). Ramps also might be used for Olmec monuments associated with earth architecture in sites such as Tres Zapotes, San Lorenzo or La Venta (Velson and Clark 1975: 1-39).

Ethnohistorical information concerning ground stone production from the quarries to the activity areas

As an important part of this chapter, I was able to identify the different steps in the chaîne opératoire of the production of ground stone artifacts in the Colonial sources. After taking into account ethnoarchaeological works, ethnographic observations, and experimental archaeology, I have a better understanding of the reading of the early Colonial accounts.

Quarrying and transportation

Friar Bernardino de Sahagún and Friar Toribio de Benavente ("Motolinía") recorded some aspects related to the skills of quarrymen and the transport of large stones.

Sahagún writes, "The good quarryman is a skilled worker, expert, and handy for working, smoothing down, squaring off the stone, and in the wedge cleaving method". (Libro X, ch. VIII).

In regard to the process of hauling monumental stones, Motolinía reports:

> The timber beams and huge stones are dragged by means of ropes and as they were ignorant and they were a lot of people, the stone or beam required the human force of about one hundred men, so they bring four hundred men and their custom was that dragging the materials, and they were a lot of people, they were singing and speaking aloud, and their voices did not stop, neither during day or night because they were very enthusiastic when they were building the city during the first days. (Motolinía 24, 1969 , Translated by the author).

The specialists in quarrying were skilled craftsmen who knew all the repertoire of techniques for maximizing the raw materials and avoiding the loss of stone. Also, they knew how to reduce weight for transport and performed all the steps in the quarry for making a preform. In Book 11 of the Florentine Codex there is a pictorial representation of these quarrying activities, and I was able to identify this quarry in the State of Mexico. In the andesite quarry still it is possible to identify the extraction process. I was able to identify varied techniques which are common in pre-industrial societies in the Ancient World. In this site there are cutting marks, evidence of quarrying such as remains of squared blocks which were extracted, and marks made with stone picks, stone mauls, and stone hammers.

In spite of the fact that this was an andesite quarry and the example pertains to the Late Postclassic period in the Mexican Central Highlands, the comparison is valid because this place allotted the necessary quantity of stone for manufacturing monumental masterworks as well as raw material for quotidian artifacts.

The ground stone productive process: grinding and smoothing in the Colonial Sources

Taking into consideration the ethnographic accounts, it is possible to hypothesize that ancient ground stone tool makers used abrasives to shape or finish an artifact through rubbing. This process is slow and in the case of monumental art they employed a variety of other techniques.

In order to know more about these techniques that were implemented in the manufacture of stone tools, I was able to recover valuable information recorded by Spanish chroniclers who arrived during the 16th century. The most important author is Friar Bernardino de Sahagún, in particular for this study, ethnohistoric data contained in Book 10, and the information that he omitted in Book 9, but which was recovered and translated into Spanish by Mac Affe and Garibay in"Adiciones al Libro IX" (Sahagún, 1956 (translated by Garibay and Mc Affe).

I attempt to obtain a better understanding of the early chronicles, including many written in Nahuatl, with the aid of "Vocabulario en lengua castellana y mexicana" by Friar Alonso de Molina, and a review of the documents in the original language.

Durán recorded important aspects about the use of abrasives:

> The lapidaries in Mexico City and Santiago (Tlatelolco) and the other provinces knew how in the provinces of Tototepec and Quetzaltepec there was an appropriate sand for carving stones and there was also emery for burnishing them and the lapidaries made the stones very smooth and shining; they disclosed this secret information to the king Moctezuma and they told him how it was difficult to convince them for giving the raw material and the how high the set price was for selling it" (Durán, 1867.Ch. LVI, p.442, V.1 (Ch. LVI, p. 442, V.1, Translation by the author).

According to Durán, this was the reason for the conquest of that zone by the Mexicas. However, it is hard to believe that a war occurred between Southern Mexico and the Mexicas solely to acquire abrasives; perhaps there were multiple motives for establishing a war, and this information can be interpreted as reflecting the great value that abrasives held in ancient Mesoamerica. Also, it is relevant to know that at least two kinds of abrasives were used: sand and emery.

The other quotes are from Sahagún's Florentine Codex, which say about emery and other abrasives:

> The emery is made in the provinces Anáhuac and Tototépec, these are small stones, some stones are red, and some stones are different, and the lapidaries crush, polish, and smooth the precious stones with sand. There is a kind of black margaret which is made of various components; another kind of emery is composed of some cherts or hard stones that are made in Huaxtepec, in the streams, and are transported here, they powder them and use them for grinding precious stones, and then purify the stones with the aid of the other emery mentioned above. (Sahagún 1830: Book XI, ChX, pp 305-306, Translation by the author).

And it is clear that the abrasives were applied crushed or in grains, both sand and emery, and it´s evident that they knew diverse kinds of abrasives:

> But the so-called "green-ball", which is hard, also requires emery. If emery, this stone can be abraded, carved on its surface, and made as smooth as lead; also, emery is used for polishing, and bamboo is used for shining, then it is possible to obtain a smooth and glossy surface. (Book IX, adiciones, V. III, Translation by the author).

> "Lapidary craftsmen cut with the aid of siliceous sand and a hard metal, the white or red crystal, jade and emerald. And they smooth, drill, and bore with a metal burin. Later, little by little they carve the surface, polish it and altered it with lead and give to the stones the finishing touch with a wooden stick; with the stick smooth and perfect them and finishing their artifact the lapidary craftsmen" (Adiciones al libro IX, Vol. III, Translation by the author).

It is possible to identify in the ethnohistoric sources three steps in the ground stone productive process: The cut with siliceous sand and a hard metal (or something with similar hardness); Smoothing, with a hard stone; and polishing or glazing, with a soft material like wood. The first step flattens the surface and produces rough planes; the second step removes irregularities, smoothing and obtaining a dull or matt surface, as a fine sanding on wood; the third step removes microscopic irregularities, and a shining surface is obtained.

The whole process could be summarized as follows:

> The red crystal rock is worked, it is manufactured perfectly. First, it is roughed down, it is broken into small pieces with a piece of metal, the lapidary craftsmen... then they smooth them, carve the surface of them and soften them as if they were made on lead and polish them with a wooden stick, this is "the cleaning" (Adiciones al libro IX, Vol. III, Translation by the author).

The important steps for manufacturing precious stones can be summarized as:

a) Rough down: Breaking the stone into small pieces the stone with a metal chisel or hard artifact; b) Flattening the surface: shaping with emery, crushed hard stone which is a rough abrasive. c) Smoothing with fine abrasive. d) Shining with a wooden stick, removing microscopic irregularities.

> But the so-called "bloodstone flint" is named in that way because is very hard and solid and it is not possible to cut it with emery, instead it only breaks into pieces. It is struck by a stone. Just the good part is taken, the one that is useful for smoothing, the part that is red like blood...it is scratched with water and a hard stone that is obtained in Matlazinco (Valle de Toluca), because it works very well with that precious stone; "bloodstone flint" is a very hard stone, and in that way, "they kill each other". Then the surface is polished with emery. And it is improved and polished with fine bamboo... (Adiciones al Libro IX, Translation by the author).

The employed techniques corresponded to a developed empirical technology. The Mesoamerican stone craftsmen knew the appropriate abrasive which should be used for a specific stone. Analyzing the written sources during the XVI century, it is possible to discover the use of water as lubricant in abrasion techniques. Today, like water, also other liquids are used such as petroleum or different kinds of oils which have distinct densities. The wooden stick used for getting shiny surfaces was known as otate, as can be read in the following text:

> The one who sells mirrors is part of lapidary craftsmen because he also cut carefully the stones of the mirror, and he scrapes with the instrument called TEXUALLI, and he saws the stones with bitumen made of bat guano, and polish them with a strong canes which are called quetzalcóatl (Book X, Vol. III, Translation by the author).

In regard to the text where says "he scrapes with the instrument called TEXUALLI", it seems that Sahagún refers to an instrument made for that purpose, as today a file is made or an emery stone. The etymologies of the word teuxalli could be "teutli", which means "dust", and "xalli", which means "sand", therefore, it could be interpreted that they have two kinds of abrasives. Molina, in his Vocabulario.., has a similar name of TEXALLI which means "the stone for grinding stone tools" (etymologies, "tetl", stone and "xalli" sand). Therefore, the instrument was only a piece of sandstone, but there were a wide variety of them with different consistencies; there were only selected the ones that do not disintegrate faster.

Cobbles and Pebbles in the Florentine Codex

In the ethnohistorical sources such as the Florentine Codex, information concerning religious ceremonies and ideology related to ground stone is also found. These valuable data are relevant for this dissertation because the archaeological site Tres Zapotes had burials with associated offerings composed of pebbles. During the Middle Formative period in Mesoamerica, there was a shared tradition at Olmec sites of pebbles associated with mortuary offerings. The relevance of these small stones last into the Colonial period when it is possible to find in Book IX of Florentine Codex the diversity of small stones which were useful for different purposes:

> Metlatl. Stones from which metates are made. It is black, dark, hard; it is hard, very hard; it is ground. It is solid, round, wide; asperous, scabrous, unpleasing, blemished. It is (material) which can be fashioned well, worked, pecked, smoothed, abraded, sculptured. I work a metate. I work a mano. I hammer out a metate.

Iztac Tetl. Another kind of Tenayuca stone. Iztac tetl is white, spongy, buoyant, light, weightless, flinty, airy. It is made cool; it is made airy.

Iztac Tetl. Another kind of Tenayuca stone. It is also called Tenayuca stone. It is whitish; some is a little chili-red on the surface, some white on the surface. It is wide, thick, thin.

Iztapaltetl. Another kind of slate stone. It is dark,thin, wide; it is small; quite cold. I break itztapaltetl. I use itztapaltetl. I remove itztapaltetl.

Teçontli. Another kind of black pumice stone. It is black, chili-red rough; it has holes. It is broken up, pulverized.

Tetlayelli. Another kind of pebble. Another kind of pebble. It is a rock which is nowhere regarded: a wreched round, twisted (stone), scabrous, asperous, pitted, full of holes.

Tetlaquactli. Another kind of pebble. It is the same as tlayetl – like itztapaltetl. It is round. Metlatetl is round, hard, hard.

Tenextetl. Another kind of limestone. It is (a rock) which may be broken up; which is broken up, which is burned. It is like tepetate, like cacalotetl; hard.

I break up tenextetl, I burn tenextetl, I pulverize tenextetl.

Tenextetl. Another kind of burned limestone. This also means limestone, which is not pulverized, which is yet whole. It is white – very white; it is burning to the mouth – very burning, exceedingly burning.

Tlaquauac Tetl. Another kind of coarse black stone. This means the same as tetlaquactli.

Cacalotetl. Another kind of stone which is not worked. It is clear, fine, smooth, very smooth; that which is to be burned to make lime.

Tecacayatli. Another kind of clumsy stone. These are small stones; they are fragmented stones.

Tepitzactli. Another kind of clumsy stone. These are tiny rocks. I gather up tepitzactli.

Tepopoçoctli. Another kind of clumsy stone. It is whitish, spongy, light; not heavy; honeycombed. It is honeycombed.

In these examples above mentioned, it is evident that the ancient Mesoamerican peoples had very detailed emic taxonomies for classification of nature, and pebbles and cobbles were classified for different uses. It provides insight into.the high frequency of these artifacts in Tres Zapotes. Depending on the context (architectural features, offerings, activity areas, households, hearths, cooking areas, eco-facts, etc.), there was the choice of a kind of cobble or pebble. They represented this reality symbolically in offerings, mirroring a stone landscape in the Tuxtlas.

Technological choice in basalt ground Stone production

Selection and quarrying

In this section I synthesize what is known or currently believed concerning monument manufacture. All the interpretations have been written by archaeologists with the aid of ethnography, geology, and petrography.

The first step in manufacturing ground stone sculptures, as in the case of quotidian artifacts, is the choice of stone considered appropriate for a project that involves a significant part of the community. The Olmecs implemented a strategic design insofar as was possible, depending on the size of the project, availability of the means of production, and the availability of a work force adequate for hauling large rocks. Most of the time they combined strategic and expedient design when they had to face and solve different problems related to logistic issues. In this decision-making process, many constraints are involved: not only physical and geological variables, but also cultural and ideological values.

The Olmecs were a preindustrial society, which developed in a tropical environment where it is crucial to differentiate variations in vegetation, climate, soil, fauna and in all subtle natural signs that are perceived in the surroundings to perform well in diverse activities. For this reason, preindustrial peoples focused on the physical attributes which differentiate persons, animals, plants, beings, and things such as color, sound, weight, size, and smelt which constitute a haptic technology.

Haptics is relevant in the decision-making process when a choice is made in the selection between optional raw materials for manufacturing artifacts. In the case of ground stone technology, the choice of rock color was important because color was an identity marker for the identification of neighboring communities. The Olmec artifacts which have been recovered from different archaeological sites had a particular selection of rock color and other haptic characteristics that show their unique identity and also communicate the adscription to a shared system of attributes called the Olmec culture. In Mesoamerica in its cultural development from the Preclassic period to the Colonial sources it is possible to see how the ancient Mesoamericans employed emic taxonomies for the identification of raw materials (stones, clays, bones, etc) useful for manufacturing artifacts.

Lawrence Feldman (1965) conducted a study about emic categories of rock color in Ancient Mesoamerica through the analysis of Spanish Colonial documents. He found that rock color was essential and played an important role in the choice of stone because the ancient stone tool makers based on color was an essential feature guiding choices among raw materials for manufacturing artifacts. For instance, he documented important information concerning greenstones and how graduations in tones and hues of color determined the stoneworkers' selection for manufacturing a stone artifact. Having surveyed and excavated jade workshops in the Motagua Valley, Feldman (1975) had the advantage of practical knowledge in interpreting the Spanish chronicles and applying them to archaeological questions.

In spite of the time elapsed, during the Formative period in the Olmec area, greenstone was important for the Olmecs in their ethnogeology, including the choice of stones for carving large monuments. In La Venta, Rebecca González Lauck (González Lauck 1997) has noticed this color preference in a group of large greenstone monuments at the base of Building C (Stela 5, Monument 25/26 and Monument 86) the stone for which was procured at Tehuitzingo, Puebla and Cuicatlán, Oaxaca (Jaime-Riverón 2009; 2012). Also, in La Venta , a green schist stela fragment bearing a stylized jaguar mask (Monument 58) similar to the large monuments set in front of Building C was excavated on top of Platform B-4 (Clewlow and Corson 1968: 179, pl. 13b). Another monument made of green schist was discovered in situ in 1942 (Monument 35) and was recorded in 1968 (Clewlow and Corson 1968: 174, pl. 10c).This monument was set at the top of an earthen mound associated with a basalt column and the Altars 4 and 5. The mound pertained to the group B and Gareth Lowe (Lowe 1989:62) suggested that this group could have an astronomical function in the past.

At La Venta, the selection of greenstone by the Olmecs was systematic. How systematic was it? In quantitative terms each massive offering contained more than 1,000 tons of serpentinite (Drucker, Heizer and Squier 1959: 97), and the raw material was obtained from the same sources that they used for sculpting monuments and stone axes. The color of the stone had a positive correlation with geochemical composition (Jaime-Riverón et al 2012; 2013).

Greenstone was also chosen for special offerings in San Lorenzo-Tenochtitlán such as the offering of serpentine stone axes deposited underneath Monument 21, and the raw material came from Cuicatlán, Oaxaca (Coe and Diehl 1980: 102-103; Jaime-Riverón et al. 2009). Another large monument made of serpentinite, Monument 16, the "Stone of the Sun," was found in San Lorenzo by Alfonso Medellín Zenil (Medellín 1960: 76-77).

In Tres Zapotes, Millet (1979) excavated an “altar”, a similar structure to Monument 7 from La Venta (the tomb made of columnar basalt). In the structure of Tres Zapotes, the central column was made of serpentinite and on two faces has a crossed-line pattern similar to the representation of a mat in the Classic Maya glyphs (Millet 1979: 38).

In Takalik Abaj Monument 27, is a plain slab of gneiss with carved grooves and it was associated with Altar 48. Stela 18 is also made on gneiss and weighs 4-5 tons and measures 4 m long (Schieber and Orrego 2010: 187).

Taking into consideration this systematic pattern in the choice made by the Olmecs for stone of green color in important contexts such as offerings; special features in building materials; or monuments, now it is possible to explore this color preference in relation to other stones such as basalt.

A preference in stone color has been noticed for the vast majority of colossal sculptures and stone drainages in San Lorenzo-Tenochtitlán. This stone color is related to different basalt types where Cerro Cintepec Type A basalt constituted 84% and Cerro Cintepec Type B basalt only 16 % according to a petrographic study conducted by Louis

A. Fernandez and Michael Coe (Coe and Diehl 1980: 398-404). In contrast, they found that for manufacture of ground stone artifacts, producers chose mostly Cerro Cintepec Type B basalt (64%), Cerro Cintepec Type C (27 %) and only one example of Cerro Cintepec Type A basalt (9%). Fernandez and Coe observed that there was slightly more heterogeneity in grinding tools because a few grinding tools were made of Cintepec Type C basalt. In regard to basalt fragments the choice for types of basalt was the following: Cintepec Type A basalt was 29%; and Cintepec basalt Type B was 71 % (Table 4.1). These latter percentages are closer to the proportions of ground stone artifacts and Coe suggested that:

> The fragments, most of which predate the destruction of San Lorenzo and its monuments at the close of San Lorenzo B, more closely match the proportions of the metates - 71 percent being Type B, 29 percent of Type A. We thus believe that most of these chips, flakes, and chunks were associated with the manufacture and/or destruction of metates rather than of monuments. Quite probably the "workshop" discovered by the magnetometer survey near Laguna 5 was a factory site for the working of metates and manos (Coe and Diehl 1980: 404).

Table 4.1 Percentages of Cerro Cintepec basalt types used in San Lorenzo which corresponded to the samples analyzed by Fernandez and Coe.

	Monuments	Metates and Manos	Basalt Fragments
Cerro Cintepec Type A basalt	84 %	9 %	
Cerro Cintepec Type B basalt	16 %	64 %	71 %
Cerro Cintepec Type C basalt		27 %	29 %

Some of the main characteristics that differentiate Cintepec basalt Types A and B are color and texture (physical characteristics which involve porosity, hardness, and resistance, as defined in the theoretical framework of this dissertation). Some time ago, Patrick Hunt (2000) wrote about the criteria that the Olmecs used for the selection of basalt in order to sculpt monuments, especially colossal heads. Hunt suggested that the Olmec sculptors chose basalt as the raw material for making colossal monuments because the Olmec rock carvers took into consideration two main criteria:

1) Physical characteristics of the stone such as color; natural shaping; and cleavage; and workability; and 2)Metaphysical associations such as the association of this igneous rock, which was obtained in the area of volcanoes that were sacred places in Mesoamerican ideology, with the importance of making colossal sculptures with a sacred stone and replicating natural Tuxtla Mountains in Colossal public projects like monuments and drainages and associating them the powerful forces of volcanic events. These criteria could be useful for the selection of raw materials in Olmec times. It is important to underscore some aspects concerning variation in the choice of basalt in San Lorenzo-Tenochtitlán by the Olmecs during the early Formative period in order to provide a more complete interpretation. For colossal sculptures, monuments, and drainages, Cintepec Type A basalt was selected, and a few were made on Cintepec Type B basalt. Many specialists had noticed before that stone color preference for these monumental sculptures was for a medium-grained groundmass and lighter-colored basalt with a texture was diktytaxitic texture (containing abundant angular interstitial gas cavities between the plagioclase laths). For quotidian grinding tools, the choice was Cerro Cintepec Type B basalt, and a few examples in Cerro Cintepec Type A basalt as well as

Type C basalt. The difference between Cintepec Types A and B relies on the granularity and texture: Type B is a fine-grained basalt more attractive for ground stone artifacts and therefore it is more massive of a darker color. Type A is a basalt with large and abundant plagioclase phenocrysts, abundant micro-phenocrysts of idingsitized olivines, medium-grained groundmass, lack of pronounced zoning in the clinopyroxene phenocrysts, and well developed dikytaxitic texture. Mainly this texture, which in thin section shows abundance of vesicles and indicates a myriad of angular interstitial gas cavities (these gas cavities make this type of basalt lighter in weight as well) and the development of iddingsite (in light colors: from yellowish brown to greenish) around the olivine result in a lighter-colored basalt. These differences complement other kinds of information such as geochemical information. Geochemically both Type A and Type B basalts are similar, but there are differences in petrographic sections, these differences caused differences in color. Fernandez (Fernandez and Coe 1980: 398) suspects that this variation may be related to the location where the basalt boulders were obtained, either top or bottom of a lava flow (hence its finer-grainer texture) and may have weathered into smaller boulders.

Quarrying

Robert Heizer and Howell Williams (1965: 3-5) suggested that basalt boulders were not quarried in the strict sense from lavas *in situ* because there are many smooth-faced boulders (aprox. 2-3 m high x 3 m in diameter) on the slopes of Cerro El Vigía and Cerro Cintepec. Instead, they thought that the sculptors selected stones of the same basic form as the sculpture or monument they intended to carve from among the detached boulders

Susan Gillespie´s and David Grove´s (Gillespie 1994; Grove and Gillespie 1992; Grove 1994; Grove et al., 1993; Gillespie 2000) survey and excavations at Llano del Jícaro and the site of La Isla confirm Williams and Heizer's (1965) expectations. At Llano del Jícaro Grove and Gillespie (1992; Grove 1994), continuing Medellín Zenil´s study (1960) found that the unfinished monuments were made on Cintepec basalt and that the Olmecs found a required preform shape; Llano del Jícaro was an Olmec period quarry where basalt boulders where selected, and the scattered boulders and excavated by-products suggest that it was a delimited activity area. The researchers found as tools for carving mainly hammers made of local and non-local basalt. They identified two techniques used in the manufacture of monuments: percussion (to remove large portions of basalt such as flakes and chunks) and pecking (the surfaces of the preforms). Gillespie and Grove say that:

> While a probable habitation area for the stonecarvers was located at the site, Llano del Jícaro was not a secondary Olmec center with an elite group directing the manufacture of its own monuments. Formative artifacts were few and the house remains ephemeral, indicating a small population here for both the Formative and Classic periods. Thus, the carvers were more likely operating under the auspicies of Laguna de los Cerros, only 7 KM away, as Medellín Zenil first suggested in 1960 (Gillespie 1994: 240).

Michael Coe, Richard Diehl and Louis A. Fernandez inferred that Olmec basalt monuments from San Lorenzo were made in another place or at most finished in the site. They based their hypothesis on the kind of basalt flakes and by-products that they found in excavations. They also suggested that basalt debris could correspond to production of ground stone artifacts, i.e., manos and metates (Coe and Diehl 1980: 404).

James Porter (1989) reported evidence that some colossal heads were re-carved from thrones, maybe to continue legitimating the ruler’s lineage. This is a very interesting issue: it is not based on the western economic idea of re-cycling monuments because of a scarcity of raw materials. Rather, it suggests there was a powerful ideological force behind the act of re-carving monuments. The life cycles of some monuments had to do with the life cycle of rulers. Their properties needed to be transformed after they died. David Grove (1981) wrote an excellent study about mutilation of Olmec monuments. Using cross-cultural ethnographic analogy, he established that the mutilation of monuments springs from a religious ideology concerning succession of chiefs:

> The Canelos Quichua analogy can be used to view Olmec monument mutilation. If the Canelos Quichua see danger in uncontrolled supernatural power at the death of a shaman,consider the situation at an Olmec center at the death of a semi-divine chief, when his vast supernatural power became uncontrolled. The altar of the deceased chief, as well as all his other power objects incluiding portrait and supernatural carvings, had to be "neutralized". Neutralization was accomplished through mutilation. It is not surprising, in light of this belief system, that the greatest amount of attention and labor was directed toward the destruction of altars. The altar was the main symbol (and repository) of the chief´s supernatural power. This is particularly evident in its complex iconography and its niche entrance to the underworld (Grove 1981: 64-65).

Ann Cyphers Guillén (1996; 1997) reported the excavation of areas where there were identified activities related to manufacture of basalt monuments. In the D-group, located at the central area of the San Lorenzo plateau, a place where Coe and Diehl (1980: 103-116) excavated seven monuments (23, 37, 38, 40, 41, and 43), Cyphers conducted a research in order to obtain more information about contextual data. From Stirling´s excavations to Cyphers´s research in 1993, there were found 39 broken monuments, six rounded sculptures, twelve rectangular flat stones (stelae, slabs, flat stones), eleven architectural features (columns, benches, and sedimentary rock slabs), and ten big fragments of basalt. Cyphers inferred that the monuments were stored in this area while awaiting recycling.. Flakes, stone tools, and abrasives were associated, and Cyphers suggested that basalt re-carving was performed in this area, which was located approximately 100m to the west of the "Basalt workshop" C3 named by Coe and Diehl 1980: Map 1).

Cyphers (1997: 183) reported important information concerning the architectural context of the monuments. There was a group of three structures located at a distance of 25 meters from one another. To the west of B3-17, where the sculptures and monument fragments were found, there is a structure of earthen walls with a red floor and well delimited by a cobble pavement. To the east of B3-17 there is the "Red Palace which has a decorated basalt column and there are remains of architectural features made on a variety of stones. Finally, there is a feature that may be a confinement which is located inside of a long wall that extends from the west corner of the "Red Palace" to B3-17 which was interpreted a place attached to the elite residence (Red Palace) where re-carving basalt activities and some sculpting tasks were developed.

Cyphers notes that evidence of activities of primary stages of monument manufacture still need to be found. She emphasizes the importance of recycling and re-carving taking into consideration the scarcity of raw material and the long-distance procurement (Cyphers 1997: .184).

Cyphers (2012) provided more information about basalt monument recycling in San Lorenzo. She reports that the Red Palace (GD-1) measured approximately 2000 m². This building was an elite residence located in a compound of domestic buildings around a courtyard (Cyphers 2012: 57, 59). Some features differentiated this building from other constructions. This structure had large architectural elements, i.e. a column and drains, as well as a storage room of monuments, and a basalt monument recycling workshop. After recovering more data, Cyphers (Cyphers 2012: 57) reports that the recycling workshop was not a separated building; it was inside the Red Palace instead.

In regard to basalt monument production, she contributed with a hypothesis concerning the raw material acquisition (Cyphers 2012 : 89-92). The author observed that basalt was not a scarce resource in the Olmec area, but the preferred type of basalt for sculpting monuments was distributed in a few outcrops/quarries. Cyphers stated that Llano del Jícaro was an interesting site which had two important characteristics for extracting basalt useful for sculptures. One important characteristic was the lower hardness of basalt available there in comparison to other types of basalt from the Tuxtlas, as was observed by Williams and Heizer (1965). The second characteristic was that in this area were available basalt boulders, and there was no evidence of Olmec mining of deeper layers of harder basalt. She agreed with the idea about seasonal activities of this site.

She hypothesizes the role of Llano del Jícaro over time during the Early Formative. Cyphers (2012: 93-93) thinks that Laguna de los Cerros at its founding headed a less complex settlement hierarchy. Due to its proximity, Laguna de los Cerros did not needed a permanent population at Llano del Jícaro, and the low population may implied that San Lorenzo needed to transport and manufacture basalt about 1,400 BC.

The scenario probably changed between 1,200-1,000 BC when Laguna de los Cerros was more complex and could exploit Llano del Jícaro. The increased production provoked the decline of available boulders. As a consequence, the monuments in San Lorenzo were recycled. The elite who inhabited the Red Palace had an attached workshop for re-carving the symbols of power.

Cyphers (2012:94) stated that accumulation and recycling of monuments had two purposes. On one hand, there was an economic pragmatism in recycling the raw material which was not easily available On the other hand, monuments were resculpted to create new political-ideological messages, changing older discourses. It is important to mention that she wrote that the recycling workshop was also a multi-crafting place of activities because metates were also recycled (Cyphers 2012: 96).

Pebbles and Cobbles in ethnography and the archaeological record

As pebbles and cobbles were obtained in 2003 excavations in different contexts in a significant quantity at Tres Zapotes, not only as a building material or polishers, but also as ideological component in depositions of pebbles associated to Olmec burials, I decided to explore in ethnographic and archaeological literature their non-functional use in order to have a better understanding of the meaning. I will provide the information that I recovered and in the end present a preliminary interpretation.

The Mixtecs

Leonhard Schultze-Jena in his book titled: *Bei den Azteken, Mixteken und Tlapaneken der Sierra Madre del Sur von Mexiko* (1938) recorded a rain petition ceremony performed by inhabitants in Cahuatachi, Guerrero, in a cult place at the foot of the mountain. Large stones are piled to form a small shrine called "The stone of the rain" (wé'e sáwi) that contains a rough stone idol whose large head is buried in the ground up to its mouth (Schultze-Jena 1938: 65; Table XVI and Fig. 12).

Behind the head, there were set four large rounded stones. In accord to recorded information by Schultze-Jena, these rounded stones represent raindrops. An offering is deposited which is composed of a row of bunches of thirteen leaves, each of which is placed in front of the idol. The participants in the ceremony kill a chicken and its blood is spread over the offering; then, they set chicken parts beside copal incense, over bunches of leaves. The rain petition ceremony is dedicated to the "Lord of the Rain" (Sáwi ká'no) (Schultze-Jena 1938 65-67).

In addition to the large image of the Lord of the Rain, Schultze-Jena describes the use of small stone idols which also received worship in Cahuatachi. Frequently, they were ancient idols that the Indians excavated and obtained from archaeological sites, and they were worshipped as heirlooms of the ancestors along with archaic artifacts. Three of them were buried at the top of a hill and the Mixtecs unearthed them only for performing the most important rain petition ceremony. In accord with Johanna Broda (Broda 2010: 132) it is very likely that the day was Saint Mark's feast day or the feast of the Holy Cross.

The part of the book that made a reference to the Tlapanec texts is the largest in the volume (pp 111-373, that is 262 pages). This part consists of stories and tales (pp 114-140), prayers or traditional petitions (pp 156-212), and 161 pages of linguistic analysis with a Tlapanec language dictionary. The prayers come with a study about the main deities of the ancient Tlapanec religion. Schultze-Jena conducted this research on the basis of the information that he recovered while he was in Malinaltepec, during three and a half months.

He writes about Aku, the God of the earth. This ancient deity is considered "father and mother of humankind", and the owner of the life. He relieves the pain of sick persons and is the owner of agriculture and fertility in general. Aku is also the owner of the hill, God of wild animals and hunting. The image of the Earth's God is a large stone idol which is located at the top of a hill. The Tlapanecs of Malinaltepec, like the Mixtecs of Cahuatachi, have built a house (go'ó in Tlapanec), made of large unworked natural stones. This idol is buried up to its waist in order that it could be in contact with seeds and roots of the plants. So when they plant, they say that seeds are set "underneath of the ribs" of the God of the Earth. There are many small idols and stone objects which are used in the cults to the God of the Earth and to the God of Thunder, or are set in the cornfield when the rites are performed there (Schultze-Jena 1938: 142). Wuigó, the God of the Thunder is an important deity related to Aku. His roaring is the thunder; also, he lives at the top of the mountains where shrines are built for him similar to the ones for Aku. In addition, an ancient deity, the God of Fire, also received offerings and sacrifices.

Schultze-Jena (1933-1947) compared the Tlapanec ceremonies with those of the Quichés from Chichicastenango, Guatemala, who continued to worship Pascual Abaj (or Turuk aj) at the top of the mountain of the same name. This idol has his lower extremities buried in the earth, in a similar way as Aku among the Tlapanecs and the Lord of the Rain of the Mixtecs, and his sacred place is at the top of a mountain which is surrounded by a pile of large rocks and rough stone objects.

The Zapotecs

As he reported in *Calendar and Religion among the Zapotecs*, José Alcina Franch (1993) found in the Archivo General de la Nación, México, some very important documents that described how cobbles were important in religious ceremonies, in particular in the area of Northern Oaxaca and Villa Alta, neighboring regions of the Mixe.

. Mountains are regarded in the same way in all northern regions of Oaxaca, and perhaps for the whole area of Zapotec culture. In the town of Yazona, they used to make offerings of guayacachi stones, roosters of the earth and little dogs "to the same hill where, in accord to the tradition is said, he was the God that was worshipped by their ancestors. (Alcina Franch 1993:112)

In order to supplement the information about the Zapotec world of beliefs in the Villa Alta region, Alcina Franch (1993: 116) refers, as a last point, to the worship of a "box" which contained sacred objects in the town Lachihiro. "The other bundle of the same shape had another wrapping in a black cloth and many little bunches of ojatal leaves and two stones described before and feathers and a small shell".

In the same text it is said that the other box contained, among other things, "four small stone idols with different shapes and other shinning stones, that in their language they call guzagacachi".

Also, Alcina Frach found that a Colonial document, the Santo Domingo Roayaga's report, specifies that the hill (the one of contributions) is used for little dogs, roosters, leathers and one stone that in their language is called "guiacachi” the half and the other half in wax that is burned in the church the same day that the sacrifice is made. These offerings were deposited before the Zapotec deities.

The Maya Quiché

According to Schultze-Jena (1947), the Quichés from Chichicastenango call cobble size stone idols *alxik*, and these are associated with the Turuk'aj, the great stone idol that is found at the top of the most important mountain in the region. The ritual specialist in the community uses small idols as intermediaries in prayers and offerings dedicated to Turuk' aj. These small idols are kept for a year and are wrapped in cloth by the priest, who receives offerings periodically. Schultze-Jena (1947: 56-59, figures 2 and 34) suggests that in the past these small idols were considered aj ixim, "The keepers of the corn grains", aj chóch, "keepers of the house", and aj súts, "Lords or beings of the clouds".

The Lacandon Maya

I was able to compare two different ethnographic records which were recorded by two scholars in different epochs concerning the same practice in regards to pebbles among the Lacandon Maya.

Alfred Tozzer wrote in 1907:

> These idols of the Lacandones are sometimes of stone other than jade. They all are guarded with the greatest secrecy. They have been handed down from generation to generation, and are believed, originally, to have come each from the home of the respective god whom it represents.
>
> An ancestor of the family is supposed to have made a pilgrimage to the home of each god. There is therefore the strongest feeling for the gods of the family, although new idols are made from time to time. Now, as it was explained, it is almost impossible to obtain a carved stone as representing a god whose presence is desired in the encampment, but pilgrimage must be made, and a stone, usually nothing more than a pebble, is brought back from the home of the god and placed in the incense-burner.
>
> The Lacandones of the present time, judging from their utter lack of artistic skill and execution as seen in the decoration of their gourds and other religious utensils, as well as in the modeling of their *braseros*, are practically incapable of fashioning any images in stone. Consequently, when an entirely new idol is desired, a stone is employed with little or no artificial shaping. In one instance, in place of the usual incense-burners, pieces of unworked stone about eight inches square were used on which to burn the incense. These had been brought from the ruins of Yaxchilan. They seemed to be more in the nature of incense-burners than of idols.
>
> A renewal of the incense-burners takes place at frequent intervals, and the idols of stone are then taken from the old and placed in the new *ollas*. We do not encounter these idols in the ruins at the present time as we do the incense-burners. The latter which are found are either "dead", and thus have had the stone removed, or they are in the nature of servants who are supposed to carry out the demands of the gods, and these never contain the stone (p. 87).
>
> In spite of the fact that the idol proper is deposited inside the *brasero*, this latter in itself has a twofold function, that of idol and bowl for burning incense. It is to the head of the *olla* that the offerings are made in behalf of the god represented by the idol behind and inside the bowl. The grotesque head of clay is an idol in itself, in that it is a representation of a god of a much inferior capacity, whose duty it is to carry the offerings to the main deity to whom he is dependent. In the rite where the incense-burners are renewed, there are also made a large number of smaller *ollas* of the same shape as the larger ones, but not containing any stone as representing a god. This is the class of ollas that are usually found in the ruins. They are in the nature of offerings to the gods to aid in carrying out their demands (Pl. XVIII, Fig. 2).

For convenience, I shall call the large ollas containing the idols of stone *braseros*, the term used by Landa, and the smaller incense-burners *braseritos*. Each of the latter belongs to a certain one of the gods represented by the idols in the larger ollas. (Tozzer 1907: 88-89)

Some decades later, Didier Boremanse found a very interesting relationship among cobbles, caves, Gods of rain, and censers which contained cobbles which were the bridge between deities and the Lacandon. He described this ritual association in a religious ceremony:

> Deep inside the rocky interior walls of the cave is a stone altar belonging to a god and a goddess (his spouse), owners of the cave and a nearby lake. The stone representing the god stands taller than the stone of the goddess. lt is impossible to distinguish the original shape of the stones, because they are completely covered with soot and the residue left by the burnt copal. The True People burn the incense on the head (u ho"or) of the stone, inside a circle of small pebbles glued onto a resinous substance. When they decide to make an incense-burner for the deity whose home they have come to in order to pray, they take sorne of these small stones to their home and deposit them at the bottom of a clay pot (u laki k'uh, "the pot of the god"), which serves as a censer. The pot has a stylized anthropomorphic head, whose lower lip protrudes like a spout and receives the offering of ritual food and drink. From this moment on, the god is present in the temple and humans may communicate with it through the sacred stones (ukanche' k'uh, "the seat of the god") contained in the censer, on top of which they burn copal resin. (Boremanse 1993:328).

The Maya Mam

In his ethnographic monograph titled *Hombre y el maíz: etnografiía y etnopsicología de Colotenago* (1957), León Valladares described a Mam Maya village close to the frontier of Mexico and Guatemala. He noticed a relationship between kinship, waterhole, agriculture, deities of water, and pebbles:

> At the birth of a baby in Colotenango, Chiapas, the father places a stone in the family waterhole. The waterhole is a sacred feature and the focus of familial ritual because a supernatural Dueño, or owner, dwells within it. In placing the stone, the father addresses the Dueño and says that he is "planting" (sembrando) the child and asks the Dueño's protection from illness. At marriage, a man is required to sponsor two ceremonies. During the second ceremony, a chimán removes a stone from the wife's waterhole and it is placed in the waterhole of the husband, symbolic of her taking up residence with his kin group (Valladares 1957:203-206). In one case where a man had failed to undertake the required marriage ceremonies, the stones of his children were planted in the waterhole of his wife´s family. Thus, the stone represents the individual and its placement is a statement of

group membership. Having stones represent individuals may be a more common type of symbolism than previously suspected (Brady 2012: 134).

The Chortí Maya

The Chorti Maya used to travel to a sacred spring to collect five stones that are to be placed on the altar for the New Year ritual. They are selected from this place because it is where the rain gods drink. Ideally, the stones should be spherical or at least ovoid and a bit smaller than the size of a fist. A cosmogram is formed by placing four stones of very similar size in each of the cosmic directions, while the fifth, and largest, stone occupies the center (Girard 1962:23)

The Ñahñú (The Otomí).

Small, cobble-sized, stone idols of rude manufacture seem to be a common heritage of Mesoamerican Cosmovision, and they are the result of syncretic transformations after the Spanish conquest. According to Sergio Sánchez´s recent study (2003), the Otomies from the Valle del Mezquital also know the ritual use of small idols called cangandho. Sometimes these are natural stones of conspicuous shapes that they collect in the planted fields, and returning to bury them again "for getting better harvests" or they set them on fruit-bearing trees in gardens "in order that they will bear a lot of fruit. Interestingly, the Otomíes call them the "antedioses" ("former gods") because "They have existed before God (Jesus Christ) came to these lands" (Sánchez 2003: 191-197).

Preliminary interpretation of the use of pebbles and cobbles based on information from contemporary indigenous groups in Mesoamerica

Based on the ethnographic and ethnohistoric information on the non-utilitarian uses of pebbles and cobbles by indigenous peoples in Mesoamerica, I can hypothesize that similar offerings at Tres Zapotes were associated with rain, water, agriculture, fertility, and ancestors or animate natural forces. Ethnographic analogy also suggests that small stones may have served as a conduit for communication between gods and humans. Sometimes the pebbles and cobbles themselves constituted the most important part of the offering. It is important to remark that, despite a very deep history and a wide geographic distribution, this important tradition survives in Mesoamerica until now. Over the course of cultural development in Mesoamerica, different ethnolinguistic groups adapted this ritual to different circumstances. Nevertheless, similarities in ritual practices involving small stones persist.

Cobbles and Pebbles in Archaeological Contexts in Formative period sites in Mesoamerica

In the following section I provide examples of pebbles and cobbles present in offerings found in Formative period archaeological sites in Mesoamerica, including some sites with an Olmec presence.

San Lorenzo-Tenochtitlán, Southern Veracruz

In Stratum H in Cut 5 (near the finding of Monuments 40, 41, and 43), was found an unusual feature: a concentration of small river pebbles which formed a projectile point facing east. The Olmecs used two kinds of river pebbles for representing this artifact. They used black pebbles for the base of the point, and white pebbles for the stem and blade. The point was one pebble layer thick, and the right shoulder was missing (Coe and Diehl 1980: 111; figs. 75 and 76).

Preclassic Chiapas

In Chiapas in San Isidro, Chiapa de Corzo, and Ocozocuautla many excavated offerings contained vessels which held variable quantities of small whitish rounded tuffaceous stones. In Guamoña phase (300 - 100 BC) offerings in San Isidro, many unrestricted vessels contained 1,3,4, or 5 white stones (specifically Offerings 15 and 16 in Pit 17; see Figure 44) (Lowe 1999). In Offering 13, pit 5, of the earlier Dzewa phase (750-600 BC), 14 small, oval, white stones were found piled in two black plates. Only one plate with a single white stone was found in Offering 1 of the Ipsan phase (100-200 AD), located at the top of the pyramid, Mound 20

In Chiapa de Corzo , plates and vessels that contained whitish tuffaceous volcanic stones were found in twenty eight offerings in the mounds 1,4, 5, 13, 40, and 67, which pertain to the Horcones (150 BC- AD 100) and Istmo (100-200 AD) Phases (18 cases) and Jiquipilas/Laguna (250-700 AD) (in 9 offerings) (Lowe 1999). The stones are smooth, plain pebbles, and the size is almost uniform in each group. Their frequency in each vessel varies from 1 to 86 (the precise reported quantities are 1, 1, 2, 2, 3, 4, 5, 6, 6+, 6+, 7, 8, 9, 10, 10, 12, 13, 13, 16, 16, 43, 48, 73, and 86, and three were not counted). These offerings were found almost on the surface, which suggests that they were deposited before the abandonment of some platform or building (or maybe during some final modification of the place, after it had been eroded).

In Ocozocuautla, Mound 1, there were found similar stones in ten "dedicatory" offerings, mainly in the Late Jiquipilas or Laguna Phases (Agrinier 1992: 246).

In accord to Agrinier, the number of stone in every vessel was the following: 1, 1, 1, 1, 1, 3, 3, 7, 7, 10, 11, 12, 13, 13, 13, 13,17, and 17.

Based on available evidence, the custom of stone offerings in plates began in San Isidro during the Dzewa phase and continued during the Istmo phase, while in Chiapa de Corzo and Ocozocuautla it lasted until the Laguna phase during Middle Classic period.

Gareth Lowe (1999) writes that it seems that the precise number of stones in the offerings is not relevant, but perhaps it corresponds to an unknown metric system. Lowe suggested that the stones were projectiles for slings. Therefore, in a burial, the stones are symbolic projectiles, a sign of peace dedicated to the Gods. He hypothesized that the stones had an equivalent meaning to that of Olmec stone axes. In other words, the stone offerings that the Zoques made, may replace the mosaics of Olmec stone axes for a similar purpose: to beg forgiveness due to the damage caused to nature (in the case of the Olmecs) or to the neighbors in wars; due to abandonment of a construction; due to beg for protection and benefits in favor of a new adventure.

Ceibal, Guatemala, the excavations conducted by Takeshi Inomata and Daniela Triadan

Inomata (2012: 42-44) writes that many caches excavated at Ceibal including the ones that did not have ceramic vessels, contained stone spheres approximately golf ball-sized. Many are made on limestone and some appear burned. Also, there were a small number of river pebbles. Many were placed in vessels, in particular in pairs of vessels placed rim-to-rim (in the manner of many Preclassic lip-to-lip caches). For instance, each pair in the CB107 Cache contained seven spherical stones. In other cases nine or more small stones were found. The upper plate of the CB110 cache had 155 stone spheres. Inomata writes (2012: 43-44) that he does not know their function or meaning, but possible interpretations could include implements for divination or calendar estimations, projectiles for slings, representations of tamales and stones for boiling water. Similar artifacts have been reported in Chiapas, in the Mayan Highlands, as well as the region of Chijoy, in the Pacific Coast, including the sites of La Blanca and Takalik Abaj (Schrieber 2002) and apparently are absent in the most part of the Mayan Lowlands.

Takalik Abaj, Guatemala, the excavations by Christa Schieber and Miguel Orrego Corzo

During the 2000 field season at Takalik Abaj, two fragments of Stela 13 were found in Structure 7. Associated with the monument was an offering of 542 artifacts, incluiding 493 vessels. One of the unique characteristics of this offering was the number of cobbles: 1,137; 902 were in the surroundings of the vessels and 235 were inside 44 vessels which contain between 1 and 14 pebbles. Some of the cobbles were made of basalt and they measured from 1 to 5 cm, a size similar to the Tres Zapotes pebbles (Schieber, 2002).

Chalchuapa, El Salvador

Robert Sharer's excavations at Chalchuapa, El Salvador in the 1970s found three caches that contained small stones. In the excavations was found Cache 1,“two small, unworked volcanic stones” which were found under an inverted, Terminal Preclassic ceramic bowl (Sharer 1978: 181). In Cache 5, “three small volcanic rocks” overlay an inverted Late Preclassic ceramic vessel (Sharer 1978: 183). Finally, in Cache 12 “33 closely packed, round to oval, smooth, white stones” were found as the only offerings in a “round pocket of loose earth (Sharer, 1978: 183).

El Portón, Alta Verapaz, Guatemala, Robert Sharer and David Sedat

Robert Sharer´s and David Sedat´s excavations at El Portón, Salamá Valley, Alta Verapaz, Guatemala, found ten caches which contained pebbles. In El Portón´s Structure J7-2C were found Cache 15 (66 pebbles), Cache 17 (282), Cache 29 (12), Cache 30 (35) Cache 31 (12), Cache 32 (31),Cache 33 (12) and Cache 5 (22). In the Structure J7-4 the Caches 8 (78) and 12 (3). Another 9 pebbles were found in a midden deposited in the same structure: 1 was burned and 8 were unburned. All pebbles were quartz and date to Tol, Uc, and Qucj Ceramic Complex equivalents, ca. 800 B.C. –A.D. 200). Therefore this tradition was present during the Preclassic occupation.

Tlatilco, Field season IV (1962-1969).

During the largest field season conducted in Tlatilco, many burials were recovered underneath domestic units using modern excavation methods.

The following burials had pebbles associated with mortuary offerings:

Burial 62 (García Moll et al. 1991: 42-43, 105, 204); Burial 65 (García Moll et al. 1991: 44, 106, 205); Burial 67 (García Moll et al. 1991: 44, 106, 206); Burial 70 (García Moll et al. 1991: 45, 107, 207); Burial 82 (García Moll et al. 1991: 48, 111, 213); Burial 88 (García Moll et al. 1991: 49-50, 113, 218); Burial 93 (García Moll et al. 1991: 51, 115, 220); Burial 94 (García Moll et al. 1991: 51, 115, 221); Burial 101 (García Moll et al. 1991: 53, 117, 226); Burial 103 (García Moll et al. 1991: 54, 117, 227); Burial 107 (García Moll et al. 1991: 55, 119, 231-232); Burial 108 (García Moll et al. 1991: 55-56, 120, 233); Burial 116 (García Moll et al. 1991: 58, 122, 237); Burial 127 (García Moll et al. 1991: 61, 126, 243); Burial 145 (García Moll et al. 1991: 66, 131, 252); Burial 147 (García Moll et al. 1991: 67, 132, 253); and Burial 148 (García Moll et al. 1991: 67, 132, 253).

Olmec burials excavated in Chilpancingo, Guerrero by Rosa Reyna-Robles

During salvage excavations in Chilpancingo, Guerrero, Rosa Reyna-Robles (1998) discovered Olmec tombs, crypts, and burials. Some features had pebbles as a component of the offerings.

In these mortuary contexts, a vessel contained salt (vessel 3 of crypt 2), and other contained copal residues (vessel 6 excavated in Tomb 1). Also, frequent in the offerings was red pigment, alone or for sealing the offerings, as it was the cases of vessels 7 and 8 of crypt 2.

When the soil the vessels contained was screened, significant quantities of mica fragments turned the water to a gold color. In addition, vessel 2 from burial 4 contained pebbles. Therefore, Rosa Reyna-Robles suggests that the offered pebbles were covered with pulverized mica

Chalcatzingo, Morelos, Mexico, excavations by David Grove

In the Plaza Central (PC) Structure 1 at Chalcatzingo, at the levels which correspond to the Middle Formative period, was found Burial 33 (a crypt) that contained a few pieces of human skeletal remains which were associated with a polished cantarito that had been placed within a shallow Amatzinac White composite bowl, a serpentine figurine in were-jaguar style, a jade awl and five groups of small rounded pebbles numbering five, nine, ten, and eleven, respectively (Grove 1987:103,104: Fig.8.9).

Final remarks

Based on the information recorded in different archaeological sites during the Formative period of Mesoamerica, it is possible to observe a common tradition of depositing in offerings in burials containing pebbles and cobbles associated with human skeletal remains. Taking into consideration ethnohistorical and ethnographic datasets which consider cobbles and pebbles as symbols of fertility, raindrops, water or conduits between gods and humans, I can to say that those offerings which contain pebbles and cobbles migh had have a similar meaning associated with life after the death. I also underline that the spread of this tradition in the past coincides with historical linguistic studies which suggest the expansion of Zoque language since the end of the Early Formative period.

Chapter 5. Analytical Methods

In this chapter, I operationalize the archaeological theory presented in Chapter 3. The definitions for the artifact categories and their descriptions were created for assigning membership to a set, keeping in mind how the artifacts functioned, how they were used, how they were made, and tracking their distribution over time and across space.

First, I will define the characteristics which were selected for recording the information. I employed the classification and variable codes that were originally developed by Christopher Pool, and refined by him and Mark Kruszczynski over the course of analysis of survey from Cerro El Vigía (Pool, 1997; Kruszczynski, 2001).

Second, I will define the artifact types, remains of the basalt productive process, and discarded artifacts that were considered for assigning membership to sets.

Third, I will describe the procedure for identifying the archaeological assemblages or artifact groups identified by my ground stone analysis, and which provide us valuable information about function and productive process

Fourth, I will explain in detail the use of a visual database, and how it is useful for managing datasets in an efficient way. I will explain the entry of data, the kind of database, as well as its use for archaeological interpretation.

Much of the behavioral and functional meaning of ground stone artifacts from Tres Zapotes was possible with the aid of published ethnoarchaeological information, ethnohistorical documents (codices, indigenous maps, colonial accounts), and my own experimental archaeological work and prior observations of stone workers. In the following chapter, I will explain more about this important dataset for a better understanding of archaeological contexts.

All artifacts were examined under fluorescent light with a Bausch & Lomb Hastings Triplet Loupe 10X and 20X magnifier. Each artifact was also photographed against a white background with a label identifying the artifact and IFRAO color scale. For taking pictures which show technological details, I used a copy stand with light set. The light set was composed of two bright lamps mounted on either side of the device at 45º angles. This provides uniform lighting. Artifacts were assigned to categories in the RATZ classification based on their morphology and presumed function. I also recorded the kind of raw material, the weight of each artifact, and counted the number of each type of item. Finally, I selected a sample of artifacts for the identification of the provenience of the raw materials. I selected the sample of basalt artifacts from Tres Zapotes taking into consideration chronology, context, kind of artifact (i.e., by-product, finished artifact, discarded artifact, etc). In Chapter 8 I will describe the implementation of a geochemical study (x-ray Fluorescence) and its results.

Current Ground Stone Classification

This study is derived from the Kruszcynski-Pool classification (Kruszcynski 2001). I recovered from it all categories which were considered for recording contextual information that provide data about production, use, function, discard or recycling. If the ground stone specimen was a preform, a used metate, or a discarded flake, these characteristics help to associate this artifact with its context and other artifacts and then to interpret the activities which were performed in a place as well as chronological issues that are useful for studying the technological evolution of ground stone technology and variation in each archaeological phase.

In the first place, the record of information takes into account all the data which corresponds to provenience of artifacts.

The project recorded every ground stone bag and a progressive bag number **(Bolsa)** was assigned. It is important to mention that each bag for obsidian, ceramics, and other artifacts has a different number. Also, every bag has a tag with all contextual information and inside of the bag another tag within a little plastic bag contains the same information in order to prevent the information loss during storage.

Contextual information is composed of the following data: Op. (Número de Operación/Operation number); U (Número de Unidad/Unit Number); C (Número de Cuadro/Cuadro Number, the cuadro, referring to a 1x1 m square within a unit).; Z (Número de Zona/Zone Number); N (Número de Nivel/Level number); and SN (Número de Subnivel/ Sublevel Number).

Op. (Número de Operación/Operation number). This number refers to the operation from which the materials were obtained. Operations in the 2003 field season of the Tres Zapotes Archaeological Project were the following: Op. 2A, Op. 2B, Op. 2C, Op. 2D, Op. 2E, Op. 3A, Op. 3B, Op.4, Op.5, Op. 6 and Op. 7.

U (Número de Unidad/Unit Number). In every operation there were units or pits. In order to have a better control of the excavations, each operation was divided as follows: Op. 2A: Units 2,3,4, and 5; Op. 2B: Units 6,7,8, 13 and 14; Op. 2C: Unit 12; Op.2D: Units 9, 10 and 11; Op. 2E: Units 15, 16 and 29; Op. 3A: Units 17, 18, 24, 33, 36, and 37; Op. 3B: Units 21, 22, 23, 26, 27, and 28; Op.4: Units 19, 20 and 25; Op.5: Units 30, 31, 32, and 41; Op.6: Units 34, 35, and 40; Op.7: Units: 38 and 39.

C (Número de Cuadro/cuadro Number); Z (Número de Zona/Zone Number); N (Número de Nivel/Level number); SN (Número de Subnivel/ Sublevel Number). These information fields correspond to very useful data which provides us the location and context of ground stone artifacts within every excavation pit. Cuadro 1 is in the southwest corner and is the screening square. The others are cuadro 2 (southeast), 3 (northwest), 4 (northeast). Cuadro 0 designates the entire area outside of the screening square, for those cases where the unit was not divided into 4 1x1 m squares. **N (Número de Nivel/Level number)** refers to arbitrary 10 cm levels; **Z (Número de Zona/Zone Number).** Every level was subdivided into "zones" (depositional units) as dictated by natural and cultural stratigraphy. Zones may represent discontinuous features or continuous strata. Occasionally levels were divided into sublevels; **SN (Número de Subnivel/ Sublevel Number)** in order to have better provenience information, although, division into zones was usually sufficient to control provenience.

In regard to chronology, **Period** was recorded and it refers to the specific phase in the cultural sequence of Tres Zapotes to which the ground stone artifacts pertain. The Period assigned to every context was determined by pottery analysis and radiocarbon dates provided by Christopher Pool. These are the identified phases: EF (Early Formative Period), MF (Middle Formative Period), MF? (Middle Formative Period?), LMF (Late Middle Formative Period), MF/LF (Middle Formative/Late Formative Periods), LF (Late Formative Period), LF? (Late Formative Period?), TF (Terminal Formative), TF/EC (Terminal Formative/Early Classic Period), TF/C (Terminal Formative/Classic Period), C (Classic Period), EC (Early Classic Period), C/H (Classic/Historical Period), C or H? (Classic or Historical Period?), H (Historical Period), Mixed.

Date. I recorded the date when my analysis of every ground stone artifact was conducted in the on-site Laboratory of the Archaeological Project of Tres Zapotes. The format was day/month/year. For example: 8/8/2004.

In regard to function of the location, the information fields **Context**, **Specific Context, Additional Information, Stratum, and Heavy Fraction Weight** provide complementary information which is relevant for assigning activities that are better understood with the quantification and identification of ground stone types. **Context** refers to the general function of the location that was inferred after studying the association of artifacts, debris, and the place within the archaeological site. Also, some geoarchaeological conditions and cultural post-depositional transformations are mentioned and helped to shed light about the remains. These are the contexts that were observed: Alluvium, Natural Deposit, Plow Zone, Disturbed, Surface, Mixed, Domestic, Civic Ceremonial, Elite-Residential-Administrative, Elite-Residential-Administrative/Craft Production, Burial-Ritual, Platform-Fill; Mortuary.

Specific Context refers to specific conditions that describe architectural features, material culture, past behavioral activities that were performed or discrete depositional events. The specific contexts that were recorded were the following: post mold; burial; platform-clay cap; platform stepped face; deposits outside platforms; platform fill; laja and clay layer with plant remains; ramp; fill below the ramp; floor; gray clay platform; pit or platform fill; plaza fill; plaza floor; floors and fill; sand floor-intrusive pit?; troncoconical pit; volcanic ash layer (thin); mixed; surface; plow zone; sandstone platform; laja and burned laja concentration; concentration of metate fragments; burned earth concentration; black soil with carbon; burned earth layer; sherd concentration; daub concentration/midden; cremation; area of ceramic and basalt concentration; area of ceramic production; plow zone and rodent burrows; concentration of burned earth and artifacts; midden.

Stratum refers to analytical units of stratigraphy that were identified after a careful analysis of the occupational sequence. An alphanumeric designation was used for strata (e.g., A1, A2, B, C1, C2, etc.) in order from top to bottom.

Additional Information refers to specific depositional and contextual characteristics of strata and features. Some examples of the comments are the following:Concentration of burned earth with ceramics and carbon; contains basalt sand, pyroxene, and olivine crystals; Child burial with offerings, etc.

In the second place, I decided to retain from previous analyses of the project, all the information related to the qualities and quantities of artifacts.

Qualitative information

Type of artifact refers to the kind of ground stone artifact that is described. I decided to maintain the following categories, which were coded with a number. Code Numbers 1 to 19 are finished or fragmented artifacts; Code Numbers 20 to 27 refer to artifact tools for manufacture; Code Numbers 50.1 to 50.8 refer to by-products of the initial operations for manufacturing basalt ground stone tools.

Material types correspond to raw materials different from basalt that were culturally modified. Code Numbers 60 to 76 refer to these types of materials.

The reason for this new classification taking and integrating the previous one is to separate different sets of artifacts/raw materials that are relevant for graphing and visually have a better understanding of the major activities that were performed in particular contexts. The codes are the following:

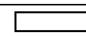
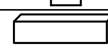
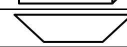
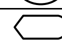
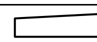
Code Number	Type of artifact / Raw material
1	Metate
2	Mano (Metlapil)
4	Vessel
5	Polisher
7	Pestle (Tejolote)
8	Mortar (Molcajete)
9	Unidentified Groundstone
10.1	Chisel
10.2	Axe
10.3	Adze
11	Bark Beater
12	Abrader
13	Donut
14	Cylinder
15	Sphere
16	Disc
17	Cube

18	Tejo (Stone ball)
19	Mushroom stone
20	Flake
20.1	Macro-Flake
20.2	Micro-Flake
20.3	Blade
21	Cobble (Canto)
22	Cobble with thermic shock
24	Pebble (Guijarro)
25	Pebble with thermic shock
26	Pic
27	Hammerstone
50.1	Macro-Core
50.2	Core
50.3	Block
50.4	Nodule
50.5	Basalt Fragment
50.6	Quarter
50.7	Preform
50.8	Anvil
60	Laja (Limestone)
61	Flint
62	Serpentine
63	Schist
64	Ilmenite
65	Magnetite
66	Hematite
67	Lutite
68	Pyroclast
69	Tuff
70	Concretion
71	Calcite
72	Sandstone
73	Jadeite
74	Mica
75	Gneiss
76	Quartz

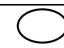
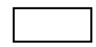
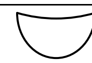
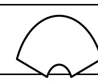
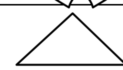
Every category will be defined below.

The Shape of grinding tools through their Cross-Sections

In order to see changes over time or in different parts of an archaeological site it is important to record the shapes in cross-sections of ground stone artifacts. Some shapes have to do with the use of the specific artifact, for instance cobble shape or flake shape correspond more with the specific function and these characteristics usually do not change. But in the case of grinding tools such as metates, manos, metlapiles, cultural variation could be detected. These are the code numbers for every type of metate cross-section:

Code Number	Shape in cross-section of groundstone artifacts
10	Bi-Planar 
11	Cuboid 
12	Quadrilateral 
13	Paralelogram 
14	Trapezoidal 
20	Ovoid 
21	Lenticular 
30	Plano-Convex 
31	Concave 
36	Polygonal 
99	Unknown 

And these are the code numbers for every shape of manos:

Variable Number	Shape in cross-section of manos
15	Circular 
32	Rectangular 
33	Convex-Concave 
34	Plano-Concave 
35	Convex 
50	Triangular 

The artifact completeness

In the codes for completeness of artifacts, I followed the previous classifications:

Whole= 0 Fragment= 1

Use-wear

I also used the previous codes for use-wear:

Absent= 0 Present=1

Raw material

Some non-basalt raw materials were mentioned above. Among the kinds of basalts, they were the following and their codes: Massive Pyroxene Porphyritic Basalt

(10.1), Massive Olivine Porphyritic Basalt (10.2), Massive Fine-Grained Basalt (10.3), Vesicular Pyroxene Porphyritic Basalt (11.1), Vesicular Olivine Porphyritic Basalt (11.2), Vesicular Fine-Grained Basalt (11.3). All raw materials were identified with the aid of Bausch & Lomb Magnifier Hastings Triplet Loupe lens 10X and 20X Mag. In the case of basalts, I paid attention to the presence of phenocrysts, such as olivine or pyroxene, and texture, whether it was massive or vesicular. For the analysis of all non-basalt rocks and minerals, I also used Bausch & Lomb Magnifier Hastings Triplet Loupe lens 10X and 20X Mag was helpful.

Quantitative Information

Frequency. The frequency of each set of artifacts sharing characteristics of type, shape, and material was recorded for each provenience.

Weight. The weight of each set of artifacts sharing characteristics of type, shape, and material was recorded for each provenience in grams.

I cope with two categories of basalt culturally transformed:

- Remains of basalt productive process: divided in:
    - macro-artifacts
    - Finished ground stone artifacts

Macro-artifacts

In this section the concept of *chaîne opératoire* will be very useful because I recovered information on different steps of the basalt productive process. In spite of the fact that other authors have used similar theoretical frameworks for addressing sequences of production such as Michael Schiffer's concept of behavioral chains or processual analysis (e.g., Sheets on obsidian reduction), I decided to use the concept of *chaîne opératoire* because this framework takes into consideration cultural and social issues embedded in the process of manufacturing artifacts. Behavioral and processual models are important for approaching an archaeological technology, but for a better understanding of the cultural variation in a series of industries, it is necessary to apply models which address how different cultures transform raw materials into artifacts, and how these artifacts circulate in the social life of a community in accord to particular cultural decisions. In the material analyzed in this dissertation, there have been identified this sequence in the following order:

Macro-nodule (macro-nódulo)[1]. These large remains of the productive process were brought from the site of acquisition where they were chosen by natural shape, having an expedient design, and only had a little modification. They show on their surface evidence of thermic shock, pecking, and flaking. In some cases they show evidence of cortex.

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[1] The meaning of terms of this typology are different from the geological terms. In geology, most of the stones of this size would be called cobbles (64-256 mm) or boulders (>256 mm). Nodule refers more specifically to a rounded concretions that form within a matrix of another material. Here, macro-nodule and nodule are large boulders of basalt which have been quarried, transported, and little modified

Nodule (Nódulo). Following the process of reduction, nodules have evidence of having being treated by pecking, roughing, and flaking. They don't show evidence of cortex. They have some surfaces that would be used as platforms for the next step in the reduction process.

Macro-flake (Macrolasca). In the basalt reduction process, macro-flakes were removed to be shaped into smaller artifacts. The macro-flake has a platform where the impact was received as well as a bulb of percussion. The dorsal face has scars from previous flake removals and the ventral face has lines radiating from the point of impact which represent removal from a nodule by percussion

Quartered stones (Cuatripartitas). These production residues were abundant in Tres Zapotes. Quartering rocks is an efficient way to maximize energy, taking advantage of the breakage due to flaws in the rock, and useful for the manufacture of many artifacts. This kind of lithic residue is recorded in the ethnoarchaeological literature. Callahan (1979) writes:

> After extraction with crowbar-like antler prongs, hammerstones, billets, and antler wedges, large boulders had to be quartered and reduced either to squarish blocks about 4 to 6 in. (10-15 cm) on a side for subsequent spalling of bifaceable flakes or to large biface blanks roughly 6 to 8 in. (15-20 cm) thick. Initial quartering was done by hurling ponderous hammerstones at the more massive nodules, breaking off chunks with at least one flat surface suitable for an initial platform. Alternatively, quartering was done with heavy, hafted hammerstones. This preparation, in addition to crust, or cortex removal, and frost splitting, accounted for the 50% waste. It would seem that some sort of comparative blocking out of cores at the quarry would have to have been done in prehistoric times, no matter what the product and whether or not part or all of the finished work was done at a separate station. Getting a suitable striking platform is essential for any multiple core reduction technique (Callahan, 1979: 40).

Callahan was comparing the by-products left by the act of quartering, which were recorded in the ethnographic record, with the by-products of the experimental archaeology that he conducted with the aid of prehistoric tools, and the residues that he recorded in many archaeological sites where there was evidence of stone tool production.

Also, Holmes (1897) describes the hammerstones used to split stone as larger than those used to shape stone at quarries in Hidalgo, Mexico. In the case of the Maya Highlands of Guatemala, Bryan Hayden (1987:124-125) recorded this step in the basalt productive process. Finally, in Oaxaca, Scott Cook (1982: 193-196) recorded this phase similar residues in Oaxaca, that local stone workers call “trozos” (artifact-size blocks).
Nelly Robles García also identified this stage for Mitla quarries (Robles García, 1994).

Flakes. These are the result of basalt knapping. They exhibit a percussion platform, a bulb, a plain ventral face and a dorsal face with evidence of previous extractions. Unmodified flakes could be used for various cutting activities in domestic contexts as well as other places in the site (e.g., residential elite, administrative, productive contexts, etc.).

Finished Artifacts

The finished artifacts are divided into functional groups and their attributes are described in the following section. The universe of archaeological ground stone artifacts from Tres Zapotes can be sorted into these groups:

- Abrading-Smoothing-Polishing tools
- Grinding and Pulverizing Tools

- Percussion Tools
    - -Hafted Percussion Tools
- Cutting Tools
- Ceremonial Stones
- Statuary Materials
- Building and structural stones (including fire-cracked rock in context of production)
- Containers

Abrading-Smoothing-Polishing tools

POLISHER

Figure 5.1 Abrading, Smothing, Polishing Set

From the point of view of a ground stone tool maker, an emic perspective, abrading, smoothing, and polishing are three different activities that require differently textured tools. But, from my perspective, the etic orientation of an archaeological analyst, they pertain to a series of steps in the process of basalt implement production. My job is to distinguish each stage. A common characteristic that they share is that they alter surfaces through mechanisms of abrasive wear, adhesive wear, and tribochemical wear. These mechanisms I was able to identify with observation of every artifact and with the aid of 10x - 20x hand lens. With white light, **abrasive wear** could be identified as an uneven surface where some vesicles showed wear on the surface due to constant use that reduced the raw material. In my records, I wrote the number 0 = absent use wear and number 1= present. **Adhesive wear** was identified with simple observation of every artifact. The surface shows a luster, shine, gloss or sheen. This feature was recorded in comments. This observed feature means that an organic substance was added to the surface of the artifact, it could be as a part of productive process or as a consequence of its use. The result after the use of organic substance differs from polishing. Polishing is not observed as a shine surface. The adhesive wear seems a thin film which seems to reflect like a mirror. Finally, tribochemical wear is identified on the surface of artifacts. With white light and the use of a 10X-20X hand lens some features that have to do with mineralogy are identified. All these data were recorded in the comments for every form of my analysis.

Abraders remove material from the contact surface through adhesive and abrasive mechanisms.

Abraders are handstones that have one or more rough surfaces useful for removing material from contact surfaces, therefore altering their texture or modifying their design. There are two general groups of abraders: flat abraders and groove abraders. A flat abrader has a broad working surface on stone coarse enough to remove material from the contact surface. Some flat abraders have V- or U-shaped grooves indicating a secondary use. They are called groove abraders and may be used against more than one type of contact, for instance, for smoothing with one surface wood and another bone.

Smoothers transform more though adhesive and tribochemical mechanisms rather than abrasive mechanisms. Less material is loosened and removed than with an abrader. Smoothers are usually made with fine-grained basalt in order to leave a more uniform surface.

Polishers The effect of these tools are a series of tribochemical interactions between the polishers and their contact surfaces that leave a sheen that is visible in both the tool and the surface being polished.

Polishers show a wide variety. As they are recovered from multiple contexts, those contexts help to understand better their hardness, asperity and other physical characteristics. Cobbles were used as polishers for pottery, stone, floors, wood, and hide.

Grinding and Pulverizing Tools

Mano

Footed Metate

Flat metate

Figure 5. 2 Grinding And Pulverizing Set

Molcajete (mortar)

Tejolote (Pestle)

Figure 5.2 Grinding And Pulverizing Set (Continued)

In Formative Olmec times, grinding and pulverizing tools were useful for transforming grains/tubers into edible food, as well as for other kinds of foods or grinding pigments. Among the wide variety**,** ***metates*** and ***metlapiles*** ("manos") were used for grinding maize.

Molcajetes (mortars) and ***tejolotes*** (pestles) were used for pulverizing food and minerals for pigments. In the analysis I found an interesting variety of both metates and metlapiles but molcajetes and tejolotes were rare in the excavations at Tres Zapotes. One could suggest that the use of mortars (molcajetes) and pestles (tejolotes) was more common during the Postclassic period. In other neighboring archaeological sites, only few specimens have been found. Michael D. Coe and Richard Diehl (1980: 232-234) found mortars which date back to the San Lorenzo B (1150-1000 B.C.) and Nacaste (900-700 B.C.) phases; and pestles discovered in levels which date back to Chicharras (1450-1350 B.C.), San Lorenzo A/ San Lorenzo B (1150-900 B.C), and Palangana (600-400 B.C.) phases. In regard to La Venta and Río Bari sites, Rust (2008: 1274-1307) found mortars and pestles in La Venta in Complexes E and H during Late La Venta I sub-phase (800-650 B.C.). Also found those tools in Complex G in contexts which date back to Early La Venta 2 sub-phase (900-800 B.C.). In Isla Yucateca during Late La Venta (800-350 B.C.). In Isla Alor during Early La Venta 2 sub-phase and Late La Venta I sub-phase (800-650 B.C.). Finally, in Isla Chicozapote (900-800 B.C.) were found mortars and pestles during Late La Venta I sub-phase (800-650 B.C.)

In contemporary Mexico, there is the idea of association between chili pepper and mortar/pestle because it is observed the use of those tools for preparing chili pepper sauce. But in Early Mesoamerica that crop was not common. Chili peeper remains had been found in preceramic strata of the archaeological caves of Tehuacan (Puebla) and Ocampo (Tamaulipas) and were roughly dated around 9000-7000 B.P., there are remains from Guilá Naquitz and Silva's Caves in Oaxaca which were dated indirectly by AMS to 1,400-500 B.P. A recent study (Kraft et al. 2014) state that although these chili specimens cannot be identified as cultivated or domesticated, their archaeological association with domestic remains of important crops, such as maize or squash, is strongly suggestive of ancient human interaction with chili peppers in these areas. With domestication and intensification, chili peppers were more important in the Mesoamerican diet, and maybe the scarcity of mortars and pestles before the Post-Classic period could shed light about the consumption of *Capsicum annum*. In the botanical study of Tres Zapotes project there were not remains of chili peppers (Peres, VanDerwarker, and Pool 2010).

In the case of metates, almost all were unfooted metates. The exception was the case of nubbin footing. In Mesoamerica, footed metates have been related to the elites (Miller 1985, 1992). San Lorenzo-Tenochtitlán has footed metates as early as the San Lorenzo phase (1250-1000 B.C.). San Lorenzo Tenochtitlán was a major archaeological site which was at the top of the regional settlement hierarchy. Some features that had been found in the site such as monumental art, stone drains, or a workshop for recycling monuments are absent in the surrounding sites. One of these features is the footed metate. This feature was underlined by Mark Graham Miller (1985, 1992) and Michael D. Coe (1980) and it is important to establish that this characteristic is not related to chronological issues. Instead, it seems to be associated with status. In the ethnoarchaeological literature, Bryan Hayden found that footed metates are more valuable because it is difficult to obtain them, they require a lot of energy investment, and transportation is a very important issue due to fragility and breakage.

For a comparison in the evolution of political-economic features related to symbols of status, it is necessary to mention that during the Formative period, footed metates were also associated with high status in Teotihuacan, Biskowski wrote (2008):

> As is generally the case in archaeology, one needs to proceed to such interpretations with caution. Socioeconomic differentiation in grinding tools also arises from differences in patterns of maize preparation between high and low status households. Reasonably, metate traits intended to communicate high status should include exotic materials and morphological traits such as well-defined corners and feet which required considerable energy and expertise of manufacture. The high frequency of footed metates at the Tlachinolan "palace" (Blucher 1971) on the edge of Teotihuacan probably reflects the high status of its Formative Period inhabitants (Biskowski 2008: 152)

The manos exhibit the following cross-section shapes: elliptical, quadrilateral, lenticular, bi-planar, and dog-bone. According to ethnoarchaeological information, it is possible to hypothesize that depending on the cross-section shape and the longitude of the mano, different substances were ground: for instance, for grinding maize, an elliptical shape is more common due to wear, and for cacao, lenticular and bi-planar cross-sections are chosen. The degree of wear is also reflected in cross-section shapes: unused manos may have quadrilateral or triangular; discarded manos often have a dog bone shape (Dog bone manos overhang the metate. The shape of discarded manos that do not overhang the metate was ovoid, oblong, or circular).

In the case of metates the cross-section shapes were bi-planar and concave. It seems that the use created the concave shape in cases of maize grinding and that shape was useful for containing dough. Bi-planar shape was used for substances that were ground in small quantities such as pigments and there was no danger that the pulverized substance would falling off the metate.

Percussion Tools

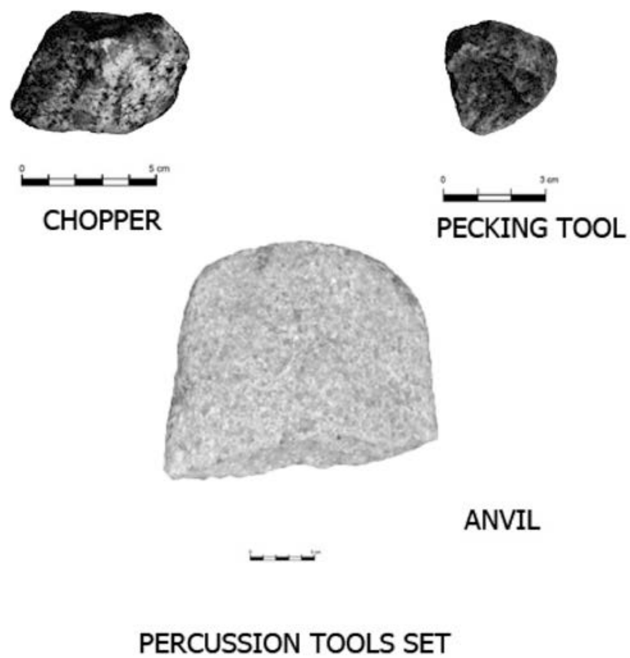

Figure 5.3 Percussion Tools Set

A significant number of artifacts were used for percussion in day-to-day activities. In this set, we can see hammers, picks, pecking stones, choppers, chisels, and lithic anvils.

Hammers are irregularly shaped rocks selected for their useful size and weight; they are expediently designed for use without other modification. Natural edges as well as broad surfaces are used with forceful strokes against other surfaces. In the analysis I was able to distinguish marks that were left by repeated impact over other surfaces such as wood, bone or stone, mainly on the side that impacted the surface that was being worked. These scars were easy to identify because the marks are different in texture and color from the rest of the tool that was not exposed to the strokes.

Picks. Stone picks are used for shaping and finishing stages of mano and metate manufacture. They are heavy, strong and durable. Two-handed picks are used in quarries. In domestic contexts they were shorter. Picks can be distinguished by having a sharper point or end that shape manos and metates. Discarded picks could be identified because the end is broken.

Pecking stones. Pecking stones are handstones using in light-duty percussion activities. They have the basic design of hammers. The main difference is that the pecking stones are used with less force than hammers, therefore the surface used for pecking has less continuous wear. The scars are more dispersed than in the case of hammers.

Choppers are pebbles, cobbles or rocks that have been modified through flaking to create an edge. The sharp edge distinguishes a chopper from a pecking stone or hammer.

Chisels. Chisels are designed with an edge useful for gouging depressions into relatively soft materials. This action requires more force and a slightly sharper edge angle than stone axes (between 20º and 30º), and removes more material than scraping.

Lithic Anvils are used as working surfaces in the production of flaked tools. Lithic anvils were also used in the production of ground stone artifacts. Sometimes, they were altered on the bottom to enhance stability. They can be identified because they have an open and flat area. Shallow holes are visible on the surface where the impact from a hammer striking a nodule or core was received**.**

Hafted Percussion Tools

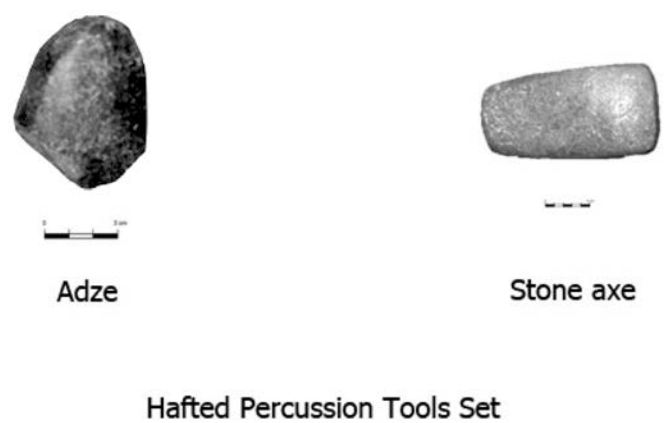

Figure 5.4 Hafted Percussion Tools Set

Included in this set are axes, adzes, and mauls. The main characteristic that distinguishes these subsets is the angle at which the head is seated. The heads of all these tools are hafted perpendicular to the handle, but axes and mauls are hafted with the working edge parallel to the handle to facilitate grabbing or pulling motions. The heads are set at various angles to facilitate chopping and pounding motions

Axes have sharp bit edges. The bit edge angle is between 45º and 60º. Sometimes, they have a groove for hafting the blade to a wooden handle.

Adzes. They are similar to axes in terms of their cutting edges, but differ in the orientation of the groove around the head, and the orientation of the blade to the handle. The blade on an adze sits perpendicular, or at an acute angle, to the handle rather than parallel to it as an axe blade does.

Mauls. Maul heads are large rocks grooved for hafting to wooden handles in much the same manner that axes are grooved. Mauls can function in any activity that requires impact force such as early-stage processing of some food resources (e.g., bone marrow, fruits composed of a hard shell and a seed, etc) and even killing small animals such as rodents.

Cutting Tools

FLAKES

Figure 5.5 Cutting Tools Set

Saws, flakes, and prismatic blades are included in this set and are usually made to cut, slice, or shave material. In order to remove material from the contact surfaces, they use: a) pressure and b) edges points. Pressure for devastating and leaving a clear and sharp cut (This is different from percussion tools, which use impact forces). Edge points are a complement to pressure because the angle facilitates the breakage of particles.

In Tres Zapotes, I distinguished **macro flakes** and **flakes**. Flakes refer to the same size as the obsidian flakes. Macro-flakes are bigger. The making of a macro-flake from a block was the previous step for obtaining a flake. Some flakes may be used as a cutting tool because there is evidence of intensive wear that left striations on both sides of the edge. There is also the result of tribochemical reaction which leaves a patina or different texture and color.

Ornaments

In this category, I include personal paraphernalia that was worn on the body: beads, stone adzes used as pendants, or iron ores that were used as mirrors. This kind of items was elaborated on raw materials exchanged from long-distances such as jadeite, serpentinite, schist, iron-ores. However, not all ornaments were made on exotic materials. Basalt beads or pectorals were done in a local stone.

Ceremonial Stones

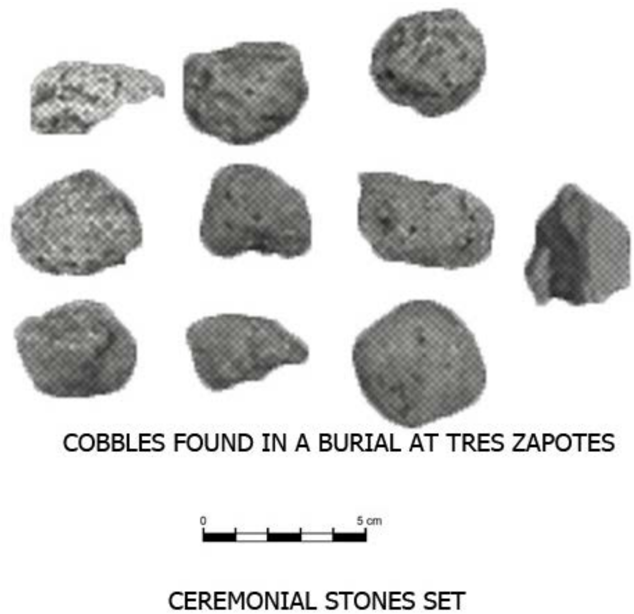

Figure 5.6 Ceremonial Stones Set

Mesoamerican peoples, and the Olmecs as part of Mesoamerica, had been inhabiting landscapes surrounded by rocks since before the beginning of sedentary life. In the case of Tres Zapotes, some of the important offerings in tombs were small pebbles that originally were lying in rivers and streams or in deposits of heavily weathered aggregates. These objects may have been carried by hand or in small containers as highly prized personal possessions. These rocks were transformed into cultural artifacts because they were chosen, sorted, selected and deposited in important ceremonies such as mortuary practices.

Statuary Materials

Colossal Head of Cobata

Small Sculpture

Figure 5.7 Statuary Materials Set

In the corpus of information for this dissertation there are examples of sculpture fragments as well as samples of monumental sculpture from San Lorenzo-Tenochtitlán and the “Cabeza Colosal de Cobata”. There were many techniques implemented in the manufacture of these artifacts:

- The raw material was chosen in accord with a previously determined design. Granularity, texture, resistance, and weight were taken into account.
- In situ, at the quarry, the initial reduction begins. The choice was to select a big boulder which could have the characteristics of the planned monument in order to maximize force of labor, time, and expenses related to the sponsorship of that kind of project (e.g. food, fuel, water, tools for manufacture). The roughing down of the stone continued until a required preform was obtained. A general shaping was the purpose in this stage of manufacture.
- Transport of the large stone to the site where the sculpture was finished was an important stage of the manufacture of a monument. Land transport was discussed above, but also water-based routes using rafts have been considered as an optional strategy (Coe 2000: 68; Diehl 2004: plate iv; 2007; Stuart 1993 : 102; Velson and Clark 1975 : 5-7, 35). But Hazell concludes water-based routes were too risky (Hazell 2011; 2013).
- In the archaeological site, a process of roughing out the rock began in order to leave an area to sculpt the project.
- In the final stage of sculpting an Olmec monument, there was the use of multiple carving techniques for detailing features which reinforce the Olmec ideology. The sculptors were skilled in the use of techniques such as string sawing, wood cutting, the use of special hammers, wooden drills and the implementation of thermic shock for avoiding damage to the final product (on the surface of some

monuments there is evidence of this technique which was not the result of post-depositional events, when the monuments were abandoned or had secondary uses, the thermal shock was an efficient technique for details in the areas located between the eyes, nose, and mouth). Thermal shock was controlled, and this technique allowed achieving precise and clear cuts in basalt. The sculptors were careful in the quantity and quality of fuel used for this purpose as well as the zone of the surface of the rock, where they had to find veins and the matrix with appropriate characteristics. This technique maximized time and avoided fractures of the sculpture.

The specialists were careful for obtaining the final product with the attributes dictated by the political leaders. In order to create an impact of naturalism in the life of the commoners, the specialists used a repertoire of techniques which were not very common to see together on the surface of a stone. Victor Rivera Grijalba (1991: 75-82) suggested that these monuments, which the vast majority were associated with architecture, were sculpted by the Olmec specialists following the principles of an architectural envelope, it means that the process of fine roughing of the basalt block consisted of a stage where all the faces of the rock were polished around the stone, and he supports his hypothesis in the similarity that the top of colossal heads have in spite of being created in different archaeological sites (the top of the colossal heads was not modified until the end of the manufacture). Carolyn Winters (1997: 175-211) who participated with the Mexican sculptor Ignacio Pérez Solano in the replication of an Olmec colossal head, suggests that a model (a small clay head) was used and the measuring points were maintained during the making of a sculpture (also Terrence Grieder (n.d.: 10) suggested that the small clay heads were used as models for colossal heads of the Early Formative period after he re-analyzed the ceramic material from Trench 14 excavated by Alfonso Medellín Zenil at Laguna de Los Cerros).

Justino Fernández (1968: 6-8) was one of the first scholars who suggested that the Olmec monuments follow a singular canon. He took pictures and marked with pencil the proportions which were constant in the manufacture. Beatriz de la Fuente (1977), in her book titled *Los Hombres de Piedra: Escultura olmeca*, wrote that she tried to find the golden ratio, used in the Western European art, in the corpus of Olmec sculptures. However, she found that only the colossal heads 4 and 7 from San Lorenzo fit the canon of the golden ratio. The rest of the colossal heads and monuments exhibit a variation in canons and she divided the sculptures in a variety of schools. Esther Pasztory (2005: 179-186) discovered a very important pattern in Olmec colossal heads that has to do with naturalism in portraits and its relationship to political power. Esther Pasztory writes that the Olmec portraits like the colossal heads have no known prototypes. They appeared in the archaeological record of the cultural sequence of Olman as sudden inventions. Pasztory made cross-cultural comparisons with chiefdom-level polities and found a similar social phenomenon in the cases of the Ife/Benin in Africa and the Moche in the Andes. The terracotta and brass heads of the Ife were dressed with regalia of the *oni* (king) and presented as an effigy on a funerary occasion whereas the Moche vessels have been found in burials, but in burials of men other than the ruler itself, since they exist in mold- made multiples. Both examples appear suddenly in the archaeological record. In these three cases, the scholars studying each art style think that that the portraits represent rulers despite a wide variety of contexts. Pasztory suggests that an answer for the development of naturalism in the sociopolitical integration of the three case studies may be that the chiefdoms were highly stratified and focus on chiefs and the elites which surrounding them, but the rulers may rule by consensus only and not have absolute power. Therefore, such rulers often play important ceremonial roles, and set up large monuments such as the Easter Island heads in order to show political power. And the control of sculpting monuments was a very important way to demonstrate an absolute power over the community. One key aspect was to make large naturalistic portraits in basalt. The specialists developed many tricks to create the illusion of the real for the commoners. The viewing audience of the colossal heads during the Formative period in Olman was probably amazed by the effect of naturalism and the impact must have been correspondingly greater. The secret of naturalism relies on the illusion which is created by well-known means (the same repertoire of ground stone techniques), but there is an important aspect which is pointed out by Pasztory:

> Conceptual art focuses on the denotative features of the face -the eyes, nose, and mouth- but however detailed they are, they remain abstract if the intervening areas are not developed. The illusion of reality is created by modulating and developing the "insignificant" intermediate areas of the cheeks and eye sockets and situating the features withim them. In Norman Bryson´s (1983) terms, such images are overarticulated and informationally expensive. Olmec artists also understood that strict symmetry and regularity read as pattern and not as "life." The eyes and lips of San Lorenzo Monument 1 (Fig. 14.1) are all slightly asymmetrical, the figure emerging from the niche on La Venta Monument 4 has asymmetrically arranged arms, and so on. The illusion of Olmec realism is but a bag of artistic tricks, and their purpose might have been to astonish and overwhelm. Naturalistic rendering, as such, is a form of mysterious and miraculous knowledge and therefore also a form of power. Such power belonged to the ruler and his circle and was not available to others. (Pasztory 2005: 186).

In order to make naturalistic traits on the surface of these intermediate areas of the sculptures, the sculptors produce a palimpsest of ground stone techniques and achieve realism. An important factor for obtaining a replication closer to natural features of the human face was to produce asymmetrical details like many things or beings in the nature. In regard to this issue, it is necessary to mention that in 1959, Román Piña Chán excavated in Complex B at La Venta and discovered Monuments 63 and 68. Monument 68 was an unfinished monument, the preform of a colossal head. The general shaping had the outline of eyes, mouth, and nose. The intermediate area shows more evidence of the implementation of many ground stone techniques.[2]

Francisco Beverido Pereau (1996) wrote in *Estética Olmeca* that he agreed with Beatriz de la Fuente because she considered that in the case of colossal heads, only the frontal part of the sculpture was carved in high relief and the rest of the sides were carved into low reliefs. This kind of sculpture was a series of reliefs rather than round sculptures. He concluded like Pasztory that the Olmec specialists used in the representation of human figures curvilinear features and avoided straight lines and angles. The purpose was to obtain "realistic representations" (Beverido 1996: 150) Beverido also added that Justino Fernández focused on the canon for the representation of the colossal heads and asserted that the Olmec artists after observing the variation in human faces were careful to

[2] Rebecca González-Lauck observed that asymmetrical sizes in groups of colossal sculptures were a pattern in the array of groups of monuments associated with earthen mounds. The effect produced to the ancient Olmec viewers was not only considered in the carving techniques applied to asymmetrical features of some of the monuments, but also asymmetrical proportions were pursued in the setting of groups of monuments (González-Lauck 2004:102).

carve in accord to the measuring points, but he did not conclude that was the golden ratio.

Building and structural stones

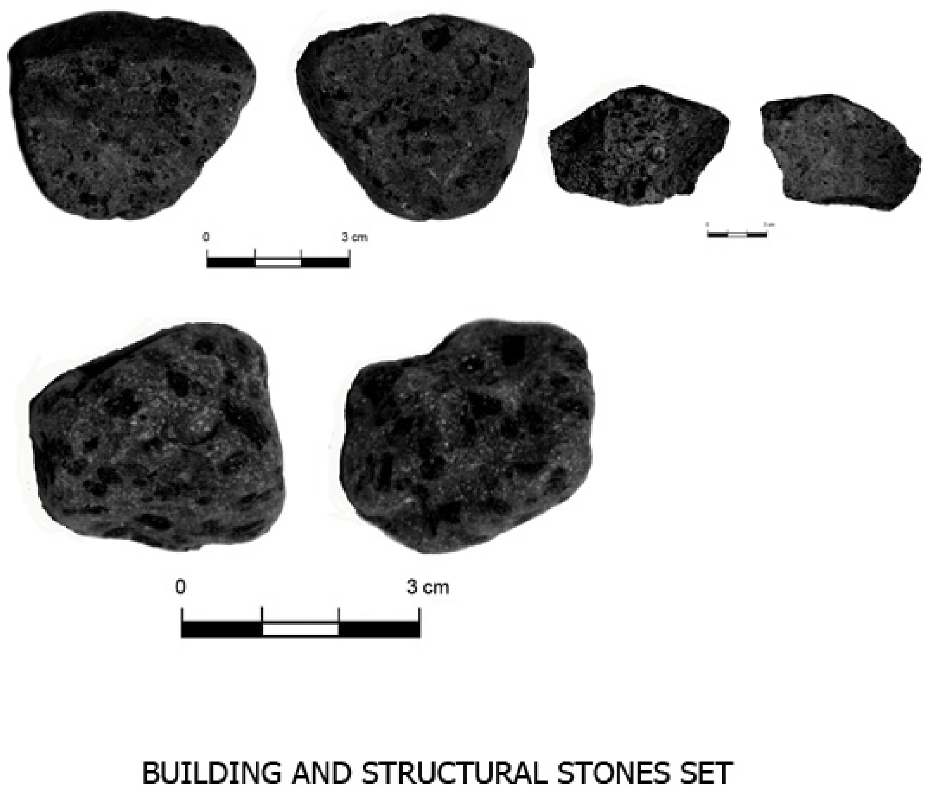

Figure 5.8 Building and Structural Stones Set

This category of structural stones includes pieces of basalt ground stone built into structures such as wall-footings, floors, and part of kilns.

Containers

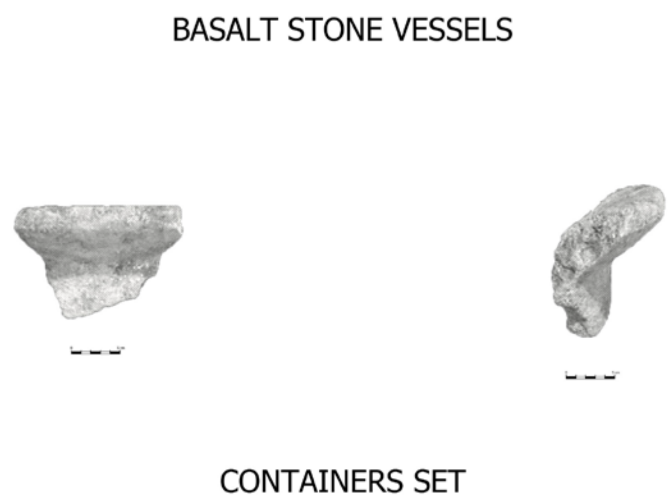

Figure 5.9 Containers Set

A ground stone container is a hollow utensil in which material is held or carried. In Tres Zapotes there are examples of fragments of vessels made of basalt. They are close to mortars, however, the investment of energy for elaborating them and its association to elite residences, oblige us to keep them as a separate category.

Assemblages Identified in the Analysis

This analysis of ground stone artifacts revealed assemblages that reflected multiple activities and functions.

Activity areas

- Ground stone production. In these contexts, many artifacts for production have been identified such as macro-nodules, nodules, macro-flakes, flakes, picks, preforms of metates, metlapiles, molcajetes as well as debris production and by-products.
- Pottery Production. In these contexts, there were remains of kilns that recycled ground stone artifacts. Also, there were polishers represented by hard pebbles.
- Food production. In some contexts, there is evidence of remains of maize in association with grinding tools. In other contexts, even though maize evidence did not survive, the assemblage suggests food production.
- Also, some contexts show evidence of multi-craft production (Pool, 2009)

Structural ground stone

- Ground stone artifacts were recycled as fill for some structures
- Cobbles, depending on their characteristics, were used for floors, walls, and diverse features.

Mortuary Practices

- The Olmecs of Tres Zapotes reflected their daily life in the offerings that they dedicated, including caches of pebbles associated with human skeletal remains. This tradition was shared by different Olmec communities across Mesoamerica.

The systematic use of database

For managing the dataset of information, I decided to enter all the information (Contextual information: Operation Unit, Pit, Cuadro, Level, Sublevel, context, specific context, chronology; qualitative information: raw material, type, cross-section, color; quantitative information: weight, quantity) in an Excel spread sheet. However, an Excel spread sheet is not a database, it is only a tool that helps us to store information. For managing datasets with multiple kinds of information it is necessary to create a database. A database helps us to recover immediately information about an artifact or a context with all the required conditions for a specific inquiry. For instance, if I request the quantity and weight of metates as well as the kind of rock for domestic contexts during the Late Formative Period in Tres Zapotes, the database helps me to retrieve this specific enquiry.

Anthropology and archaeology are visual disciplines, and for the case of material analysis, it is important to record pictures to support the interpretation concerning the function that one could suggest. The behavioral inferences which the analyst could obtain from the study of an artifact can be analyzed again when the materials are in the laboratory and it could be possible to add more information when a picture is associated with the contextual information and with other items which were found in either the same context or a closer place. Therefore, I decided to record pictures of every ground stone artifact and to manage all textual and visual information in the same database. Therefore, I decided to design a visual database. I began with a Flat file database, which is exploratory and which does not utilize a hierarchy of variables. In accord with Database Theory, a simple architecture is best as an initial step. This Flat file database is better than an Excel spread sheet, which has limitations. For instance, you cannot request an inquiry with multiple required conditions at the same time. Another disadvantage is that you cannot manage a great quantity of pictures, or have an immediate response to your request for information from the database.

In order to build first a Flat file database, you need to think about the kind of data that you will enter in each field. For this dissertation, I established in the layout of the database fields for storing words, numbers, and pictures. The fields that contained words were the following: Op. (Operation), Comments, Period, Context, and Specific Context. The fields that contained numbers were the following: U (Unit), Z (Zone), N (Number), SN (Sublevel) Type, X-Sec (Cross-Section), Frag (Fragment), Mat (Material), UseW (Use Wear), Freq (Frequency), Wt (Weight), and Heavy Fraction Weight. Picture was the container of images.

Later, pictures were added. Fields were indexed and now we have a relational database. I used the software FileMaker Pro Extended Version 11. Exportation of variables for statistical analysis is possible.

Chapter 6. Contexts of Ground Stone Production and Use in Tres Zapotes

In this chapter I will provide a summary of the excavations conducted in Tres Zapotes during the 2003 field season of the project directed by Christopher Pool. Also, I will provide the contextual information about where basalt ground stone artifacts were found. At the end of the chapter, I will interpret the contexts where I have evidence for assigning function and for which it is possible to analyze the change of activities over time during different occupations (phases) in the cultural chronology of the site. This analysis provides information about political-economic aspects of the ancient life of the inhabitants of Tres Zapotes, in regard to basalt ground stone production, consumption, distribution, and discard.

One of the most important priorities in this study has been to examine the contextual conditions where the basalt ground stone specimens where obtained through controlled excavations. The goal is to interpret past behaviors related to the life cycle of basalt ground stone at Tres Zapotes and shed light on the role it played in the ancient political economy of this Olmec polity. In the following sections, a summary of a geophysical survey and excavations conducted in the 2003 field season in Tres Zapotes is provided, underlining the association with basalt artifacts..

Geophysical Survey

During the 1997 and 2003 field seasons, Luis Barba Pingarrón and the Geophysical survey team of the Instituto de Investigaciones Antropológicas - UNAM participated in the Tres Zapotes Archaeological Project. Using a Geoscan FM36 fluxgate gradiometer, this survey was effective in identifying rectilinear magnetic patterns and other anomalies created by buried structures. In Mound 15/16, Group 2, excavations showed that rectilinear patterns were created by blocks of volcanic tuff and basalt stone facing of a low platform (Pool 2005: 6). In Group 3, plaza B, the anomalies detected corresponded to iron-rich clays used as building materials for architectural details.

For the purpose of obtaining evidence of basalt stone tool production and debris, two tests provided evidence after excavations were conducted. First, an area of moderate dipole anomalies in Group 2 (Operation 2A) hypothesized to represent basalt fragments in a monument recycling workshop produced mano, metate fragments, and basalt flakes, as well as micro-debitage evidence of basalt production. And second, two modest dipoles associated with rectilinear anomalies proved to be unworked basalt stones at shallow depth.

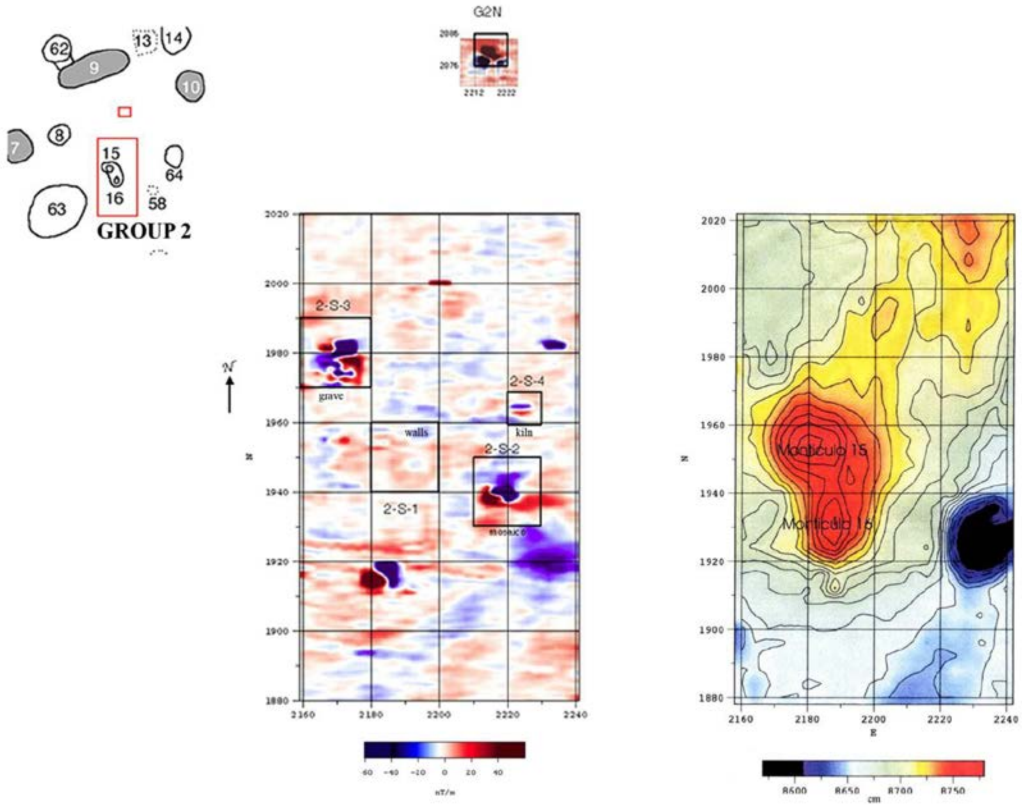

Figure 6.1 Map of the geophysical survey conducted in Group 2 during the 2003 field season (Barba et al. 2014: 38).

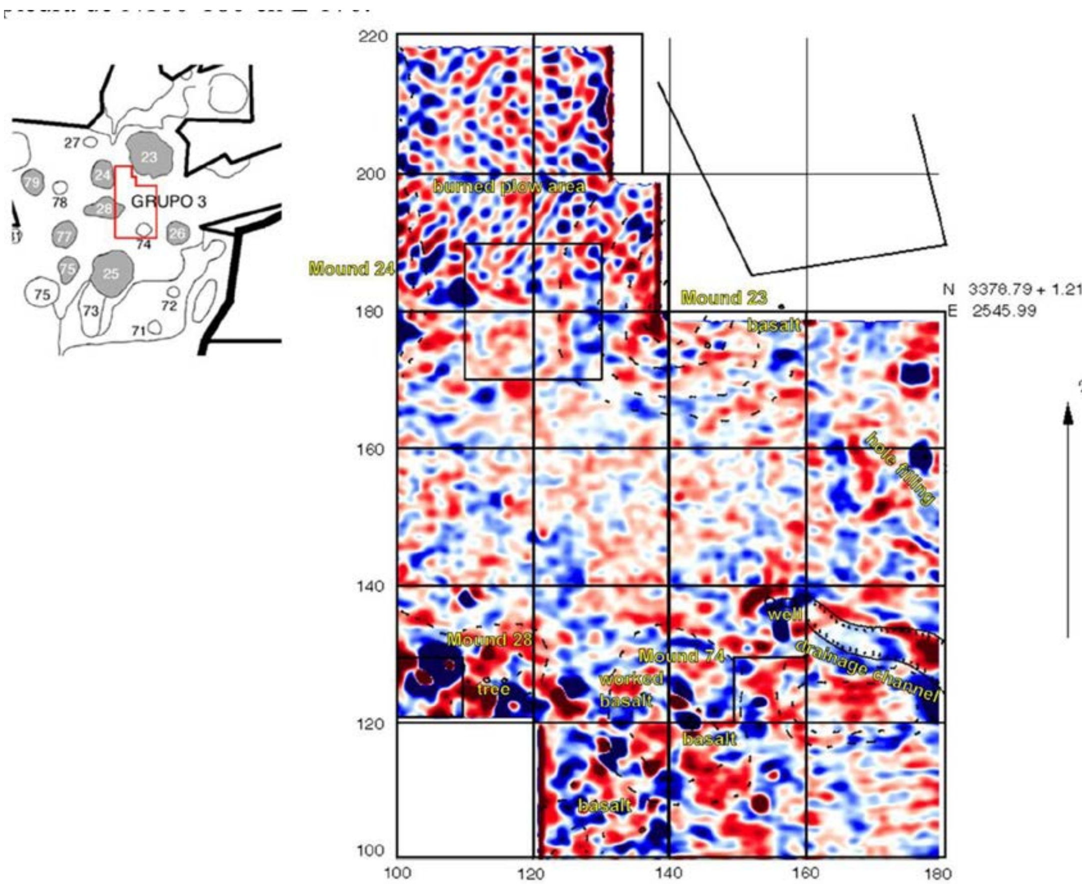

Figure 6.2 Map of the geophysical survey conducted in Group 3 during the 2003 field season (Barba et al. 2014: 45).

Excavations

In Tres Zapotes, the excavations were conducted in six areas. Each area of excavations was identified as a numbered operation, and contiguous or closely spaced excavation units within Operations were identified with letters as sub-operations (Figure 6.3). Operation 1 (Op. 1) consisted of a single pit in Group 3, excavated in 1997 and is not discussed here. Operation 2 (Op.2) consisted of five sub-operations in in Group 2 (Op. 2A, Op. 2B, Op. 2C, Op. 2D, Op. 2E) which contained evidence of elite-residential-administrative activities as well as attached craft production. The Operation 3 excavations were conducted on an area of non-elite residential occupation and independent craft production associated with mounds 110 and 111 (Op. 3A focused on Mound 111, Op. 3B focused on Mound 110). Op. 4 consisted of three excavation units placed in Group 1 to the north of the elite residential Mound 1 and on the attached Mound 113. Op. 5 focused on Group 3, which has a complex layout consisting of five large mounds and several smaller mounds grouped around two intersecting plazas (Plazas A and B). A third plaza (Plaza C) lies to the east of Mound 24. Op. 6 was located in the Nestepe Group, around Mound 50. Op. 7 was excavated to the north of Operation 3, at the south end of Mound 107, which lies on a long ridge that extends southward from the upper fluvial terrace between Groups 1 and 2.

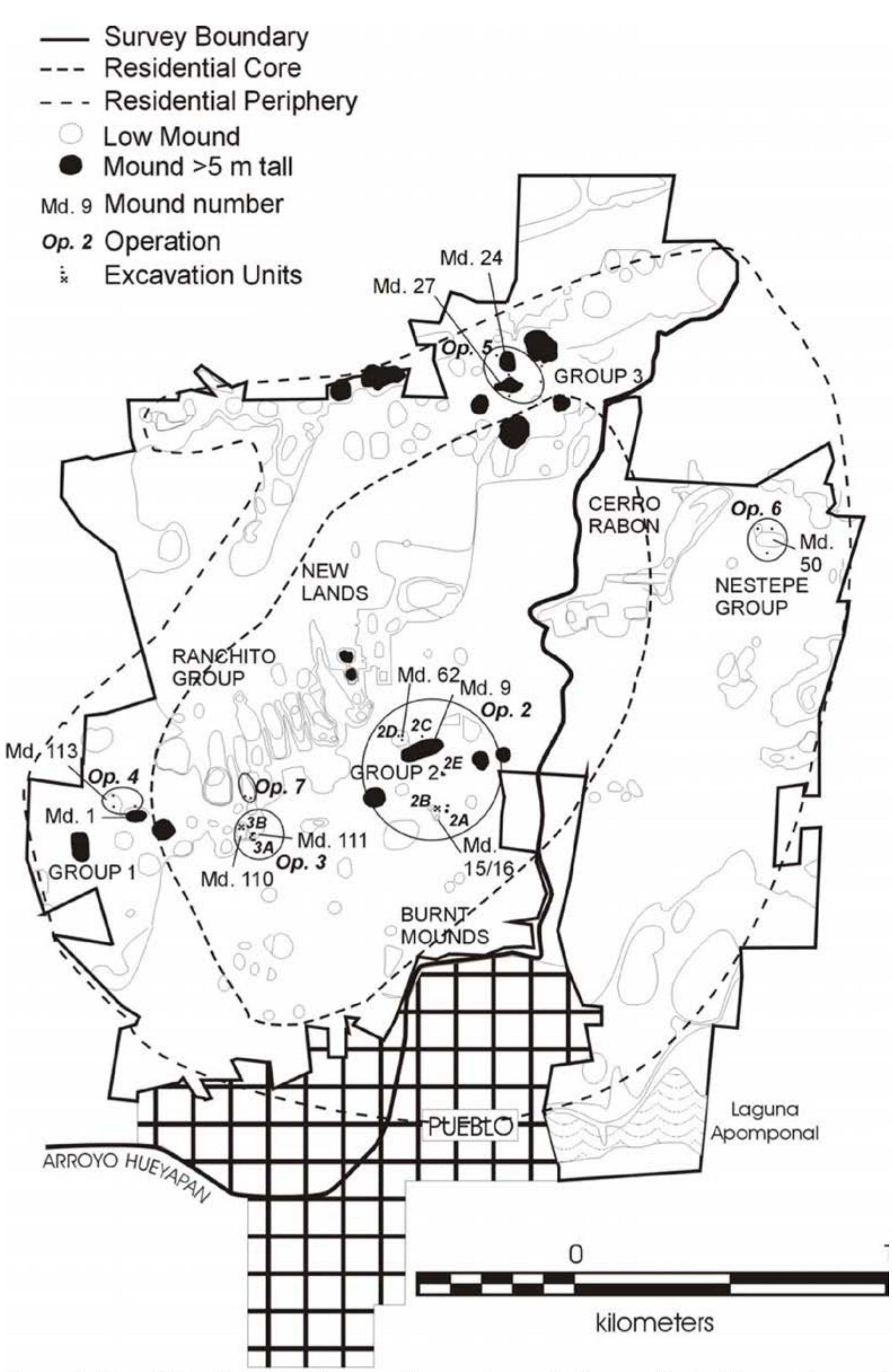

Figure 6.3 Map showing the operations which were excavated during the 2003 field season (Pool 2014: 12, Figure 2.3)

Op. 2A (Units 2, 3, 4 and 5) consisted of a group of five excavation units on the south side of the plaza of Group 2. This Operation comprised a 2x4 m trench (Units 2 and 3) and a 4x4 m pit (Units 4 and 5), which were conducted to test two magnetic anomalies that could be a potential ceramic kiln and a ground stone production area located on the southern side of the Group 2 plaza. In Units 2 and 3 the plaza floor was found at 140-150 cm below the datum (cmbd) and its sloping edge at 90-100 cmbd. In regard to production debris, only lumps of clay, underfired sherds and figurines as well as overfired sherds were found in the vicinity of Units 2 and 3, but it was not possible to identify the source of the magnetic anomaly. The plaza surface was littered with basalt flakes and broken manos and metates.

Function: for the purpose of this dissertation, Units 4 and 5 supported the inference of basalt production. In regard to the results obtained in Units 2 and 3, the level of plaza floor (Group 2 and its sloping edge) the function was civic-ceremonial (Pool 2005: 6; Pool 2014: 13-14;).

Chronology: Ceramics associated with the Plaza surface in both groups of units suggest that the contexts correspond to a date in the Terminal Formative period. Lower deposits in Unit 2 and 3 also include occupations which extended back from the Late Formative to the late Middle Formative period (Pool 2005: 6; Pool 2014: 13-14; Stoner et al. 2014: 49-57).

Operation 2B (Units 6, 7, 8, 13 and 14) comprised five 2 x 2 m pits (Units) arranged in checkerboard fashion at the northwest corner of the 30 x 40 m rectilinear anomaly on

Mound 15/16. The excavations discovered the source of the magnetic anomaly as blocks of volcanic tuff on the sloping face of a low platform. Below this construction phase was an earlier platform of sandstone rubble and a series of floors and domestic refuse.

Function: taking into consideration the platforms, the contexts correspond to elite residential administrative functions. In an earlier occupation domestic functions are interpreted from evidence of floors and domestic deposits (Pool 2005: 6; Pool 2014: 14).

Chronology: a low platform which had volcanic tuff on its slopping face corresponded to the Early Classic period. Below this construction phase was an earlier platform of sandstone rubble and a series of domestic refuse contexts which corresponded to the Early/Middle Formative transition at a depth of 550 cmbd (Pool 2005: 6; Pool 2014: 14; Salazar Buenrostro and Pool 2014: 58-66).

Operation 2C (Unit 12) This Unit was a 3 x 3 m pit which provided the longest cultural sequence at Tres Zapotes. This pit was excavated 15 m north of Mound 9. It identified a late construction phase associated with Mound 9, and recovered refuse apparently generated by the occupants of the mound.

Function: taking into consideration architecture and the kind of materials recovered, the interpreted function was that this long structure was elite residential/administrative (Pool 2005: 6; Pool 2014: 14).

Chronology: Below the recent alluvium were found Late to Terminal Formative Period deposits which included a trash pit and a long, sloping ramp of clay and rubble rising toward Mound 9. Cultural materials of the Late and Middle Formative periods continued to a depth of 3.5 m. Below this occupation there was a thick deposit of gray clay. In this layer there were a few redeposited Early and Middle Formative sherds, suggesting that the clay layer represented a construction fill. The gray clay sealed another a 50 cm of Middle Formative deposits and 1 m of Early Formative deposits containing a partly articulated dog, a human skull, a Limon Incised plate containing a catfish spine, and other Early Formative sherds (Pool 2005: 6; Pool 2014: 14; Venegas Durán, Rodríguez Martínez, and Pool 2014: 67-72).

Operation 2D (Units 9, 10, and 11) was placed on Mound 62, a low rise that projects from the NW corner of Mound 9. Previous surface collections there recovered high densities of pottery, overfired sherds, fragments of highly fired mud, and fragments of ceramic kilns- correlates which suggested a case of attached ceramic production. An alternative hypothesis was that the mound could represent a massive trash accumulation similar to "palace dumps".

Function: the excavations discovered a stepped platform, raised in two constructions events, which was surrounded and covered later by refuse. Taking into account the following cultural materials, overfired sherds, raw clay chunks, and vitrified kiln debris, it can be confirmed that ceramic production was performed in the vicinity. Furthermore, basalt flakes and micro-debitage indicated groundstone production. All evidence suggests that Mound 62 supported a diversity of elite-attached craft activities. There was also evidence of mica production. This space may be described as part of a multi-crafting production unit. (Pool 2005: 6; Pool 2014: 14).

Chronology: Ceramics document deposition of elite residential waste and production debris from the Late Formative into the Terminal Formative (or Protoclassic). Middle Formative contexts were also encountered in Unit 11, which probed depths below the level of the platform (Pool 2005: 6; Pool 2014: 14; Bautista García, Stockdell, and Pool 2014: 73-78).

Operation 2E (Units 15, 16, and 29) was located south of the eastern end of Mound 9 on the centerline of the Group 2 plaza to test two magnetic anomalies which were interpreted as possible stone monuments. However, no clear source of the anomalies was uncovered. The excavation found a construction phase of the plaza, which was preceded by an earlier domestic occupation. The excavations also found one of Matthew Stirling´s test pits in the eastern wall of Unit 16.

Function. A later occupation corresponded to a part of a plaza which indicates civic-ceremonial activities. And an earlier occupation corresponded to a domestic occupation (Pool 2005: 6; Pool 2014: 15).

Chronology: Evidence was recovered for identifying a Late Formative occupation in the construction of the Plaza and a Middle Formative domestic occupation (Pool 2005: 6; Pool 2014: 15; Venegas Durán and Morales Flores 2014: 79-86).

Operation 3A (Units 17, 18, 24, 33, 36, and 37) The purpose of Operation 3 was to investigate an area of nonelite residential occupation and independent craft production associated with Mounds 110 and 111. Operation 3A comprised six pits located at the summit and southern slope of Mound 111. The excavations found a small, probably historic, platform of sandstone blocks. This platform was underlain by earlier deposits containing debitage reflecting low levels of obsidian and basalt implement production. Lower levels contained domestic refuse of Early/Middle Formative occupation as well as one adult burial and two child burials of the Middle Formative period; the adult and one child were associated with grave goods: greenstone beads, obsidian blades, ceramic vessels, and concentrations of small and rounded pebbles.

Function: the latest platform which pertained to the Historic period was domestic, as were the underlying deposits which corresponded to the Formative period. There were burials with offerings which were Middle Formative. Therefore, the context was ritual-domestic. Domestic refuse was recovered from the Early, Middle, Late, and Terminal Formative periods (Pool 2005: 6; Pool 2014: 15).

Chronology: this operation had essentially continuous occupation from the Early-Middle Formative transition into the Early Classic. There was a hiatus which appears to come between the Early Classic and the Historic period. There are mixed Classic and Historic materials (mixed due to plowing). (Pool 2005: 6; Pool 2014: 15; Stoner and Pool 2014: 87-97).

Operation 3B (Units 21, 22, 23, 26, 27, and 28) comprised six contiguous units which were set on the summit of Mound 110 in order to study an area of nonelite ceramic production in a domestic context. Two small firing pits (also called "pit kilns", e.g. Feinman and Nichols 2007) were found associated with vitrified fragments of mud, burned earth, charcoal, and high densities of pottery, including overfired sherds. Other crafts which were identified were obsidian blade production as well as basalt ground stone production. Among other basalt by-products, there was found an octagonal disk fashioned from a recycled metate. These features and remains were stratigraphically correlated with a pavement composed of sandstone blocks set in a mortar of clay and sand. Mound 110 was formed by a natural sandstone layer. A rectangular depression was excavated into the sandstone to provide a level surface, then, the mortar was laid in the depression to receive paving irregular pieces of sandstone.

This operation recovered the best-preserved burial excavated by the project. It was the skeleton of a male, laid in supine extended position directly atop the natural sandstone layer, south of the artificial pavement. No grave goods were associated with the burial.

Function: at the top of Mound 110 Units 21, 22, 23, 26, 27, and 28 recovered evidence of nonelite pottery, basalt and obsidian production in a domestic context. This kind of context could be interpreted as a multi-crafting area (Pool 2009) and shows information which argues against elite patronage of attached specialists for crafting of these goods (Pool 2005: 6-7; Pool 2014: 15).

Chronology: the associated pottery indicated a Terminal Formative period occupation as did a radiocarbon date, Beta-199256 (1910±60BP; cal. 40 BC-AD 240) (Pool 2005: 6-7; Pool 2014: 15; Salazar Buenrostro and Pool 2014: 98-107).

Operation 4 (Units 19, 20, and 25) was conducted in Group 1 in order to test deposits north of Mound 1 and on Mound 113. The excavations at Mound 113 discovered that it was originally a natural sandstone formation, and later was covered by a Terminal Formative to Classic period occupation.

Function: Cultural materials which were recovered seem to represent slope wash from Mound 1. However, there were very low ceramic densities, and other remains were practically absent. Therefore, the evidence suggests less of a residential focus for Mound 1. (Pool 2005: 7; Pool 2014: 15-16).

Chronology: Mound 113 had a light Terminal Formative to Classic period occupation. Late Formative artifacts were recovered north of Mound 1, as were a few Middle Formative sherds and one diagnostic Early Formative potsherd (Pool 2005: 7; Pool 2014: 15-16; Torres González and Pool 2014: 108-111).

Operation 5 (Units 30, 31, and 41). This operation was conducted in Group 3. The project discovered that the complex had a complex layout which comprised five large mounds and several smaller mounds grouped around two plazas. Plaza A was located in the southern end and runs east-west and had an elongated structure (Mound 28) on its northern edge. This pattern was similar to other plaza groups at Tres Zapotes. It was intersected at its eastern edge by Plaza B, which runs north-south. Plaza B was delimited at its northern edge by Mound 23, the largest conical temple mound at the site, and on its western side by Mound 24 (an elongated platform). A third plaza (Plaza C) lies to the east of Mound 24.

Unit 30 was behind and north of Mound 28. The excavation found a complex series of packed earth and clay surfaces and primary refuse deposits containing pottery, figurines, animal bone, obsidian, ground stone, and burned daub. Due to the location of the pit with respect to the orientations of the adjoining mounds, these deposits were probably associated with occupation of Mound 28.

Function: The remains found suggested its use as the platform for an elite residential structure (Pool 2005: 7; Pool 2014: 16).

Chronology: The evidence shows a Late Formative period occupation (Pool 2005: 7; Pool 2014: 16; Torres González and Pool 2014: 112-116).

Unit 31: This pit was located east of Mound 24. The excavation discovered sandstone flags at 200 cmbd, which were covered by 30 to 40 cm of calcareous deposit, possibly degraded plaster.

Function: These sandstone flags represent the construction of the previously hypothesized Plaza C (Pool 2005: 7; Pool 2014: 16).

Chronology: The evidence recovered suggests that at some point during the Late Formative period the plaza fell into disuse and was covered by refuse deposits (Pool 2005: 7; Pool 2014: 16; Torres González and Pool: 116-118).

Unit 32: This pit was placed at the toe of a ramp extending south of the midline of Mound 28 into Plaza A. The ramp was formed of about 40 cm of sandstone and tepetate rubble in a sandy clay matrix. Intruding into the ramp was found a hole 50cm wide and 80 cm deep, inclined toward the south.

Function: The interpretation for the hole was that it may have received one of the tenoned monuments or basalt columns which were very common at Tres Zapotes. This context was on the more public side of Mound 28. Therefore, the function could be a civic-ceremonial (Pool 2005: 7; Pool 2014: 16; Torres González and Pool 2014: 118-119).

Unit 41 was set in Plaza B to identify source of a magnetic dipole. The source of the anomaly appeared to be an irregular piece of basalt measuring 30 x 40 cm, which was associated with the construction of a low platform which pertained to a later period and was built over the sandy clay surface of the plaza. Below the plaza floor were found refuse deposits containing obsidian, basalt, and pottery.

Function: the episode which corresponded to the low structure and the sandy clay surface of the plaza was a civic-ceremonial context. Below the plaza floor were refuse deposits which corresponded to a domestic context (Pool 2005: 7; Pool 2014: 16).

Chronology: The construction of the low platform pertained to the Terminal Formative period (Protoclassic period). The previous excavation of Unit 1 produced a radiocarbon date of 1870+/- 50 BP (cal AD 55-250) (Pool 2005: 8) from a pottery offering associated with a plain stela. The refuse deposits discovered below the plaza floor contained pottery of Late Formative date. Therefore, the surfacing and use of the plaza appears to date to the Terminal Formative period (Pool 2005: 7; Pool 2014: 16; Torres González and Pool 2014: 119-121).

Operation 6 (Units 34, 35, and 40). This operation tested deposits around Mound 50 (the long mound of the Nestepe group). The excavation strategy was similar to the one implemented in other plaza groups.

Unit 34 was placed on a low spur that projected from the NW corner of Mound 50. The excavations discovered three episodes of platform construction and refuse deposits containing pottery, figurines, burned daub, oxidized sandstone, and animal bone.

Function: Elite residential/administrative (Pool 2005: 7; Pool 2014: 16-17).

Chronology: The refuse deposits containing material culture pertained to the Late Formative period (Pool 2005: 7; Pool 2014: 16-17; Morales and Pool 2014: 122-124).

Unit 35 was placed north and behind Mound 50 to test the area of highest artifacts density indicated by auger tests. This unit discovered a thick stratum containing numerous large sandstone and tepetate blocks, some worked, between 60 and 160 cmbd. These blocks may represent a ruined ramp or apron, but it is more likely that they fell from Mound 50 or were discarded in a late construction episode. Artifact fequencies increased below the irregular lower contact.

Function: Civic-administrative (Pool 2005: 7; Pool 2014: 16-17).

Chronology: Late and Terminal Formative periods (Pool 2005: 7; Pool 2014: 16-17; Morales Flores and Pool 2014: 124-126).

Unit 40 was placed over a magnetic anomaly in the plaza to the south of Mound 50. Steadily increasing rainfall and rising groundwater forced to project to finish Units 35 and 40 at 2m below the current surface of the alluvial floodplain. However, the plaza floor was represented by a compact deposit of sandy clay and tuff beneath 136 cm of alluvial deposits. Throughout the excavation cultural materials were scarce and crawfish burrows were numerous.

Function: Civic-Ceremonial context (Pool 2005: 7; Pool 2014: 16-17).

Chronology: Late and Terminal Formative periods (Pool 2005: 7; Pool 2014: 16-17; Morales Flores and Pool 2014: 126-127).

Operation 7 (Units 38 and 39) was located north of Operation 3 at the south end of Mound 107, which lies on a long ridge that extends southward from the upper fluvial terrace between Groups 1 and 2. Previously, surface collections on this ridge contained high ceramic densities, overfired sherds, and kiln debris over an extensive area suggesting specialized nonelite ceramic production. Auger tests were implemented in this operation. Auger tests ran north-south the 80 m length of the summit of Mound 107 and extended east, south, and west down the slopes of the 6 m high ridge. No firing features or other evidence of ceramic production were found in these two pits.

The auger tests found that the substrate of Mound 107 was a natural sandstone ridge. Cultural deposition raised the ridge another 5.5 to 2.5 m (depending on the elevation of the sandstone) to its current height.

Unit 38 contained dense deposits of household refuse and a postmold. Also, ceramic and figurines were found.

Function: Elite Residential context (Pool 2005: 7; Pool 2014: 17).

Chronology: Late to Terminal Formative period, and some examples of earlier occupation which corresponded to the Middle Formative period (Pool 2005: 7; Pool 2014: 17; Salazar Buenrostro and Pool 2014: 128-129).

Unit 39. In this unit at 80 cmbd was discovered a feature which appears to be the top of a retaining wall on the edge of the mound. As in Unit 38, ceramics and figurines were found.

Function: Perhaps elite residential context (Pool 2005: 7; Pool 2014: 17).

Chronology: Late to Terminal Formative period and some evidence of earlier ceramics (Middle Formative Period) (Pool 2005: 7; Pool 2014: 17; Salazar Buenrostro and Pool 2014: 129- 130).

Radiocarbon Dating

The chronological assignments of the excavations are based on charcoal samples dated by radiocarbon assay and their association with diagnostic ceramic types. The project submitted 18 samples to Beta Analytic Radiocarbon Dating Laboratory. Only three samples could be dated with standard radiometric methods; the rest could only be dated with more expensive extended counting and AMS methods. Sixteen samples were the total for the field season 2003-2004. Combined with four dates that were obtained in the research conducted during the 1996-1997 activities a total of twenty samples provide chronometric dates for the site.

According to the final report of the PATZ (Pool 2014: 132-133), these are the radiocarbon dates in chronological order:

Early Formative period

The sample Beta-199248 (3010±40 AP, 1310 BC cal. σ) was obtained from Unit 8, Operation 2B, in Group 2.

Middle Formative period

Three radiocarbon dates correspond to the Middle Formative period: Beta-199241 (2410± AP, 2710-2580 BC, 2510-2430 BC cal 2σ); and Beta -199251 (2450±40 AP, cal 2σ 780-400 BC) bracket the gray clay layer F in Unit 12, Operation 2C, Group 2; Beta-199245 (2510±40, cal. 2σ 770-400 BC) was obtained from the floor called E2 in the level 33, Unit 8.

Late Formative period

Seven samples correspond to the Late Formative period: Beta-261023 (2180±50, cal. 380-90 BC) was obtained from Zone 25 which was associated with Burial 2 of this operation; Beta-199240 2220± 40 BP , cal 2σ 390-180 BC) and Beta-199243 (2060±40 BP, cal. 2σ 180 BC-30 AD) bracket the platform and underlying series of floors in Unit 9, Operation 2D; Beta-199246 (2090±50 BP, cal. 2σ 340-320 BC and 210 BC-AD 20) dates domestic contexts underlying plaza construction in Unit 15, Operation 2E, Group 2; Beta-199257 (2180±40 BP, cal 2σ 370-110 BC) dates elite residential debris in Unit 30, Operation 5, behind Mound 28, in Group 3; Beta-199253 (2380±90 BP, cal. 790-350 and 310-210 BC) from overlying levels in the same Unit is apparently redeposited from a preceding occupation.

Beta-199255 (2090±40 BP, cal. 200-10 BC) dates a floor sealing the platform and residential deposits in the spur adjoining Mound 50, in the Nestepe Group.

Together, these seven late Formative dates, together with ceramic associations, indicate the contemporaneous occupation of the Nestepe Group and Groups 2 and 3 in the Late Formative period, with initial construction of the Nestepe Group possible postdating the other two.

Post- Late Formative period dates

Beta-115434. It was obtained from charcoal within a lip-to-lip ceramic vessel and this date pertains to the Terminal Formative (Protoclassic) period, which we now date to AD 1-300. Beta-199256 (1910±60 BP, cal. 40 BC-AD 240) was associated with the Terminal Formative ceramic production context in Unit 28, Operation B. Beta-199247 (300±60 BP, cal. AD 1450-1670, 1770-1800, 1940-1950) lay immediately below the sandstone pavement in Unit 17, Operation 3A, and indicates its probably Colonial period age. Finally, Beta-199250 from Unit 19 in Operation 4 behind Mound 1 produced a date within the last 50 years.

Chapter 7. Technological and Contextual Analysis

In this analysis, I show the distribution of artifacts over time in every Group. First, in Group 2, which corresponds to Operation 2, I will show similarities and differences among the sub-operations 2A, 2B, 2C, and 2D in order to see in detail how different kinds of contexts in the same Group differed from each other depending on varied activities that were performed. Using battleship curves that represent the percentile distribution of artifacts in every stratum is a synthetic and visual representation which is supported by data in Appendix. A second question that is analyzed is the distribution of raw materials which were used in every stratum in the different sub-units, and the Group as a whole. This issue is important for studying the choice of raw materials depending of the kind of Group, context, epoch, status, and other political-economic differences.

This analysis is presented also for Group 3, which corresponds to Operation 5. For the case of Nestepe Group the data correspond to the Operation 6. For Group 1 the data which were analyzed correspond to Operation 4. And finally, a very important opportunity is the comparison among elite contexts in Groups 1, 2, 3, and Nestepe, and the results of non-elite contexts which are represented in the study of the Units 3A, 3B, and 7.

In the analysis of every Group, the distribution of artifact types and raw materials is analyzed over time as well as with regard to internal differences depending on the varied activities.

This study allows synchronic comparison of variation of activities performed in the different Groups of Tres Zapotes and shows how the differential use of ground stone technology can shed light on the political-economic exchanges in the interior dynamics of this pre-Colombian polity. Also the results of this study can tell us about the external relationships of Tres Zapotes with neighboring sites in Olman.

Group 2. Analysis of Operation 2A (Units 2 and 3)

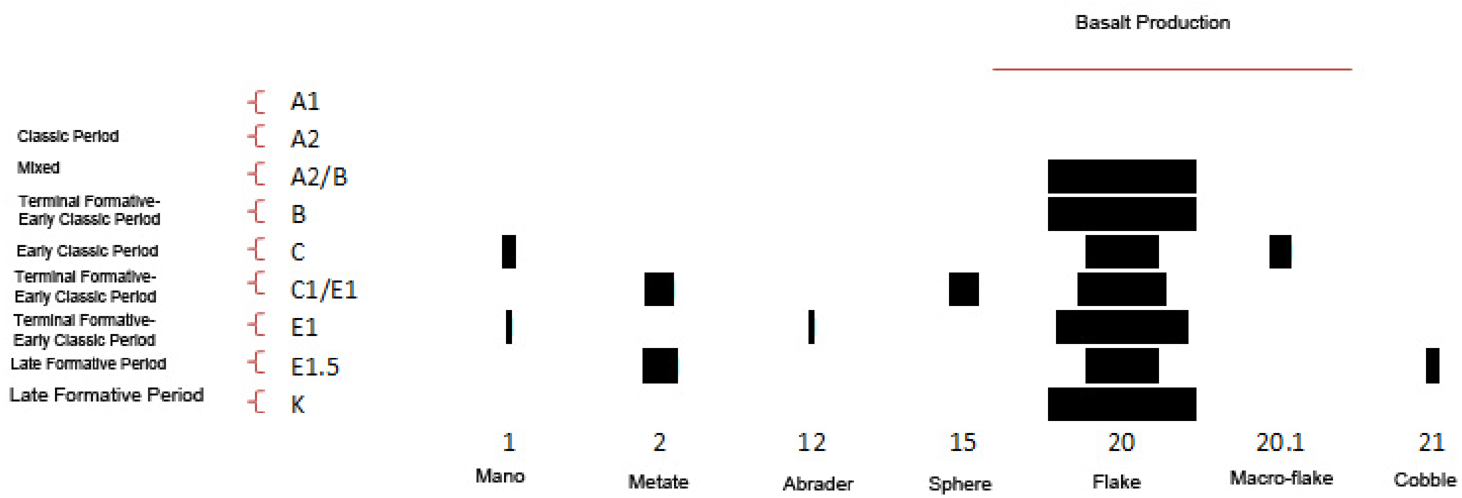

Figure 7.1 Battleship curve graph of the percent distribution of ground stone artifacts in Units 2 and 3 Op. 2A

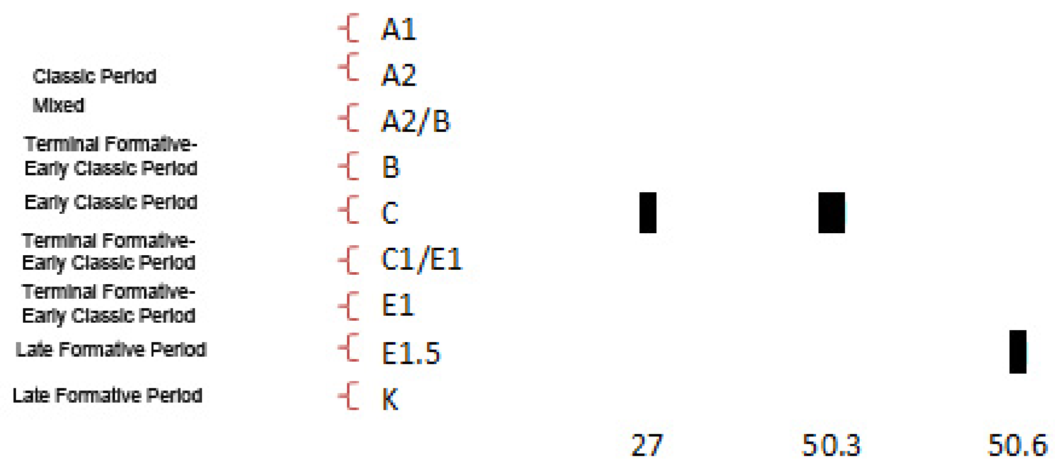

Figure 7.1 Battleship curve graph of the percent distribution of ground stone artifacts in Units 2 and 3 Op. 2A (continued

These two units (2 and 3) which pertain to Operation 2A show the changes in the history of use of this place. In stratum K there are few remains of the domestic production of artifacts (primarily flakes [20] as end-product) during the Late Formative Period (Stoner et al. 2014: 53). Then, in the upper levels E1.5, E1, C1/E1, C, and B, it is possible to observe that during Terminal Formative and Early Classic Period, as a consequence of natural factors (alluvial formation) and cultural factors (re-use of ground stone materials for filling the construction of a plaza), evidence of the process of manufacture of artifacts ended up in these contexts. Actually the *chaîne opératoire* is incompletely represented. (There were blocks [50.3] and quarters [50.6] ("quarters" also result from (early stage) reduction, "quarters" refer to quartered blocks) that pertain to the middle part of the basalt manufacture process). And the occurrence of both limestone and sandstone in the upper levels show important information concerning the building materials used in the construction of the plaza later abandoned and altered by contemporary rural activities.

This distribution of types of artifacts corresponds to the history of changes in context. Op. 2A is located in what was a civic-ceremonial space but the ground stone remains are from the Late Formative period occupation. The remains were littered on the surface of the plaza as a result of the deterioration of the ground and the fill constituted by ground stone material was dispersed. The information is useful because tell us about the techniques used in the Late Formative period and the selection implemented by the builders of the plaza during Terminal Formative-Early Classic Period: unfinished artifacts were chosen for the fill because these by-products had more raw material than finished or discarded tools. Furthermore, size and density were characteristics which were considered in the selection for an efficient and fast construction. This is also evidence of the cultural continuity of Tres Zapotes during the Early Classic Period. It is noticed as well that the occurrence of manos [2] and metates [2] in this Operation 2A was very low.

The use of kinds of raw materials in Units 2 and 3, Operation 2A over time

Table 7.1 Types of raw materials found in Operation 2A, Units 2 and 3 (the figures are weights in grams)

A1	0	0	0	0	0	0	0	0	10.5	0
A2	0	0	135	0	0	0	0	0	0	0
A2/B	28	0	129	0	0	0	0	0	0	31
B	194	0	275	0	0	0	0	0	17.3	3.2
C	2192	0	2517.8	0	0	0	237	47	0	33
C/E1	330	52.9	461.9	92.8	0	65.6	31.5	0	325.8	6.2
E1	324.7	0	435.6	0	0	0	61	0	0	72
E1.5	594.4	0	245.5	378.9	0	0	0		0	0
K	0	0	155.1	0	0	0	0	0	0	0
	10.1	10.2	10.3	11.1	11.2	11.3	60	70	72	76
	massive	massive	massive	vesicular	vesicular	vesicular	limestone	concretion	sandstone	quartz
	pyroxene	olivine	fine-grained	pyroxene	olivine	fine-grained				
	porphyritic	porphyritic	basalt	porphyritic	porphyritic	basalt				
	basalt	basalt		basalt	basalt					

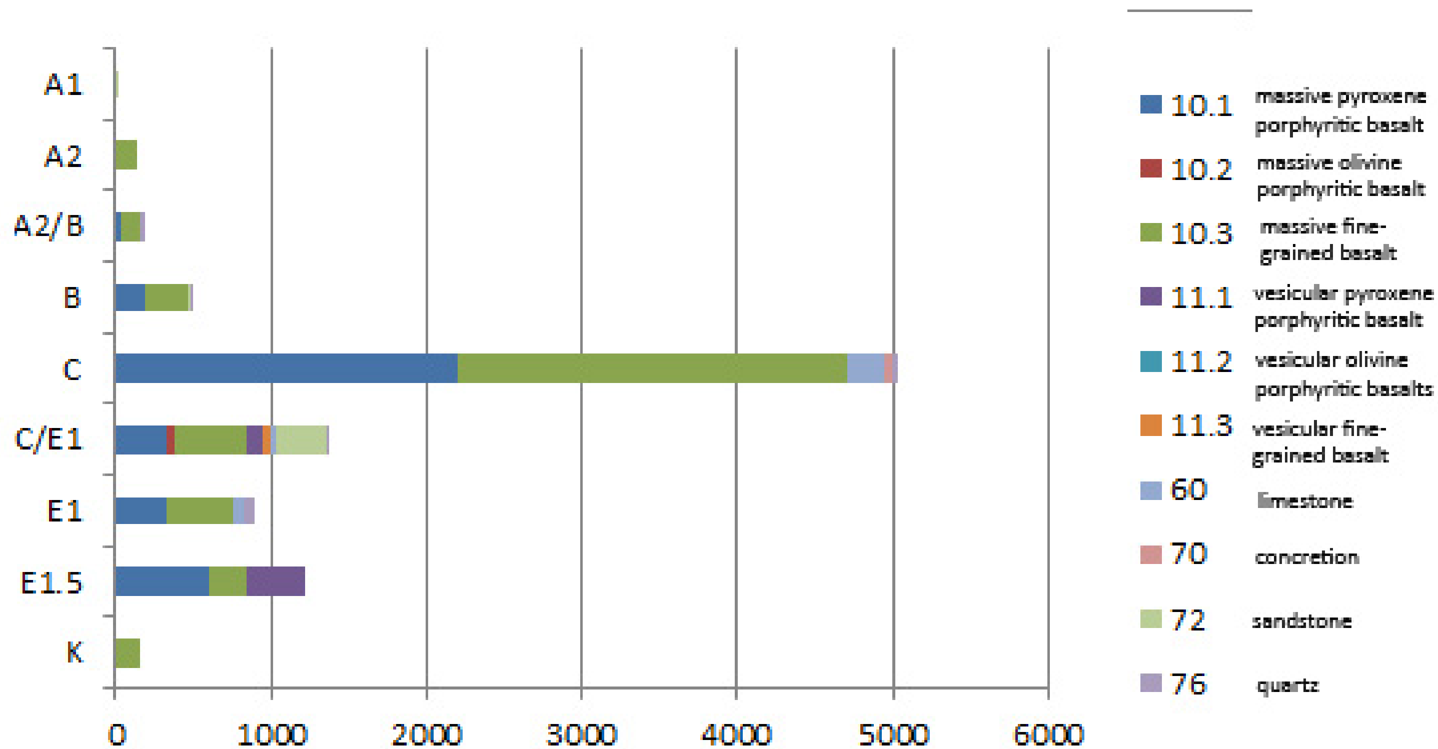

Figure 7.2 Stacked bar showing total weight in grams of material types between strata and the relative amount of each type of raw material within each stratum in Operation 2A, Units 2 and 3

Based on the results of the analysis of raw materials which were obtained in the excavations of Units 2 and 3, Operation 2A, we can compare with the occurrence of types of raw materials in every stratum.

For instance, during the Late Formative Period occupation, there was the choice of massive fine-grained basalt (10.3), vesicular pyroxene basalt (10.1), and vesicular pyroxene porphyritic basalt (11.1) (Table 7.1; Figure 7.2). These varieties of raw materials were used in domestic units for the manufacture of items used in an independent level of production.

However, the remains found in the strata which correspond to the Early Classic/Terminal Formative occupation show evidence of an increase of varieties of raw materials which were used (Table 7.1; Figure 7.2) such as massive pyroxene basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine-grained basalt (11.3) which suggest that the raw materials obtained for the fill of the plaza were acquired not only from the domestic previous occupation but also from other parts of Tres Zapotes. The occurrence of limestone (60), sandstone (72) and quartz pebbles (76) indicates that these raw materials were used in the building of the ground of the plaza.

During the Early Classic period (Table 7.1; Figure 7.2) there is continuity in the use of raw materials used since the Formative Period such as massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3). They could re-use raw materials from the Formative period, or re-cycle artifacts. At the end those raw materials were used broadly in domestic activities because are useful the adaptation to a tropical forest. The presence of limestone (60), concretions (70), sandstone (72), and quartz pebbles (76) indicates that modification and building and maintenance of construction activities were conducted in that place.

The chronologically mixed stratum (Table 7.1; Figure 7.2) shows raw materials that occurred in previous epochs and keep a consistent use of massive pyroxene basalt (10.1) and massive fine-grained basalt (10.3).

At the end of this stratigraphic story of this place (Table 7.1; Figure 7.2) there was evidence of abandonment and erosion of the ancient construction. In the upper level there were only found sandstone remains (72)

Group 2. Analysis of Operaion 2A (Units 4 and 5)

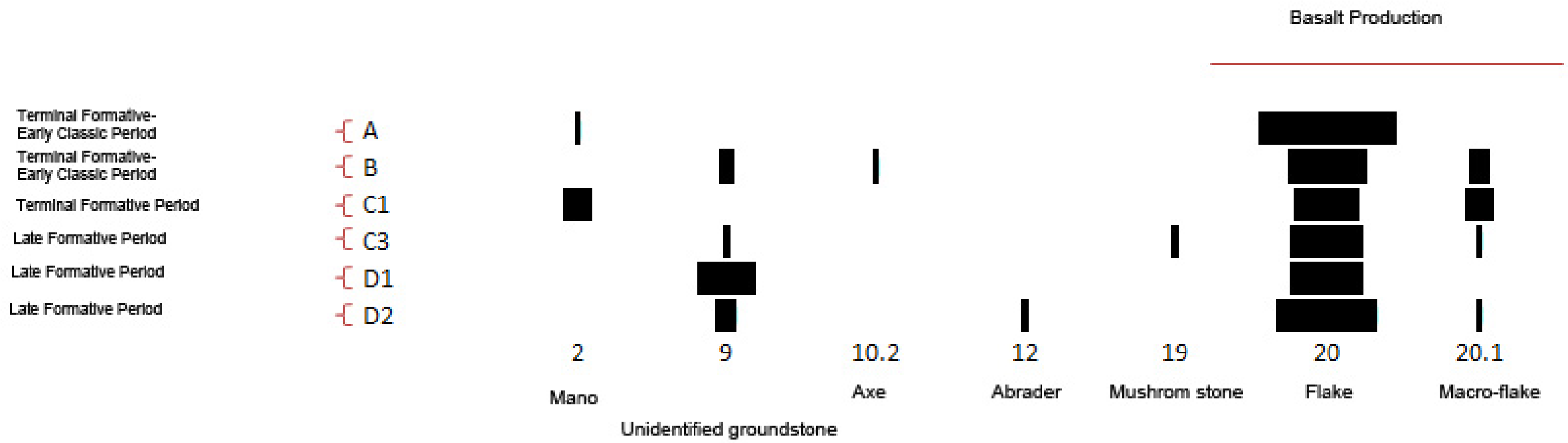

Figure 7.3 Battleship curve graphic of the percent distribution of ground stone artifacts in Units 4 and 5 Operation 2A.

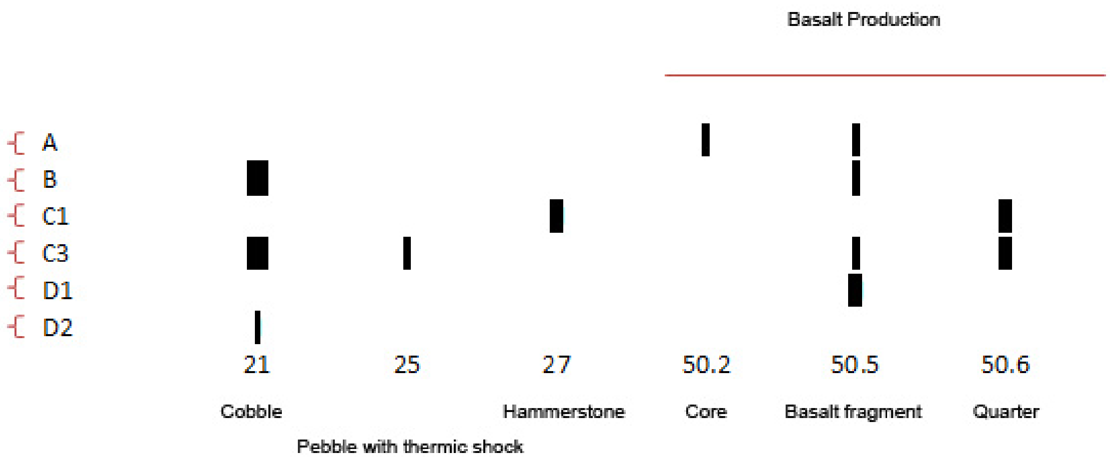

Figure 7.3 Battleship curve graphic of the percent distribution of ground stone artifacts in Units 4 and 5 Operation 2A (continued)

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These two units 4 and 5 which are part of Operation 2A represent, as in the case of Units 2 and 3, the changes in the use of space over time. Also, Units 4 and 5 represent one of the best examples of basalt production contexts recovered in Tres Zapotes. During the Late Formative Period this place shows evidence of domestic production of basalt ground stone artifacts (Figure 7.3, D2, D1, and C3)) in the production of items used for quotidian activities such as flakes [20], macro-flakes [20.1], an abrader [12], and a small sculpture (a mushroom stone [19]) as well as evidence of another important component of the *chaîne opératoire* which was identified in this context that correspond to basalt fragments [50.5]. But this scenario changed during the Terminal Formative (Figure 7.3, stratum C1) when the place was used as a plaza. As previously mentioned (Stoner et al. 2014: 53) there is evidence that the artifacts were used as a raw material for the fill in the construction of the plaza floor. It is possible to see that the choice in the selection of material was directed to obtain greater density (there are remains of manos [2], hammer stones [27], quarters [50.6] , flakes [20], macro-flakes [20.1]) and sandstone [72] was also used for the construction of the plaza floor. This wide variety of artifacts indicates that remains of artifacts were acquired from other places and not only from the previous domestic context used during the Late Formative Period.

Finally, in the strata that correspond to the Early Classic/Terminal Formative Period transition artifacts were used as part of the fill or the result of alluvial action on the space used as plaza ground. A wide variety of artifacts were deposited such as manos [2], flakes [20], macro-flakes [20.1], cobbles [21], axe fragments [10.2], cores [50.2], etc. The inhabitants of Tres Zapotes continued re-cycling artifacts as building materials. The unfinished artifacts occupied more space and were useful as a fill for the plaza ground. It is important to notice that the toolkit which was very useful in domestic contexts (mano-metate) is incomplete in these units 4 and 5. And there are remains which were found in the public plaza such as tuff (69)and schist (63).

The use of kinds of raw materials in Units 4 and 5, Operation 2A over time

Table 7.2 Types of raw materials found in Operation 2A, Units 4 and 5 (the figures are weights in grams)

A	443	0	784.9	1459.8	0	81.2	0	0	0	0	108.8
B	335.2	0	373	102.9	0	256.7	146.3	30.1	0	70.6	11.2
C1	221.7	0	1356.8	77.5	0	20.6	0	0	0	63.4	0.7
C3	295.4	0	2155.8	64.5	0	24.5	0	0	0	33.8	56.4
D1	73.5	0	877.2	59.3	0	0	0	0	0	1030	0
D2	274	0	657.4	62.3	0	12.5	0	0	29.7	250	13.1
	10.1	10.2	10.3	11.1	11.2	11.3	63	69	71	72	76
	massive pyroxene	massive olivine	massive fine-	vesicular pyroxene	vesicular olivine	vesicular fine	schist	tuff	calcite	sandstone	quartz
	porphyritic basalt	porphyritic basalt	grained basalt	porphyritic basalt	porphyritic basalt	grained basalt					

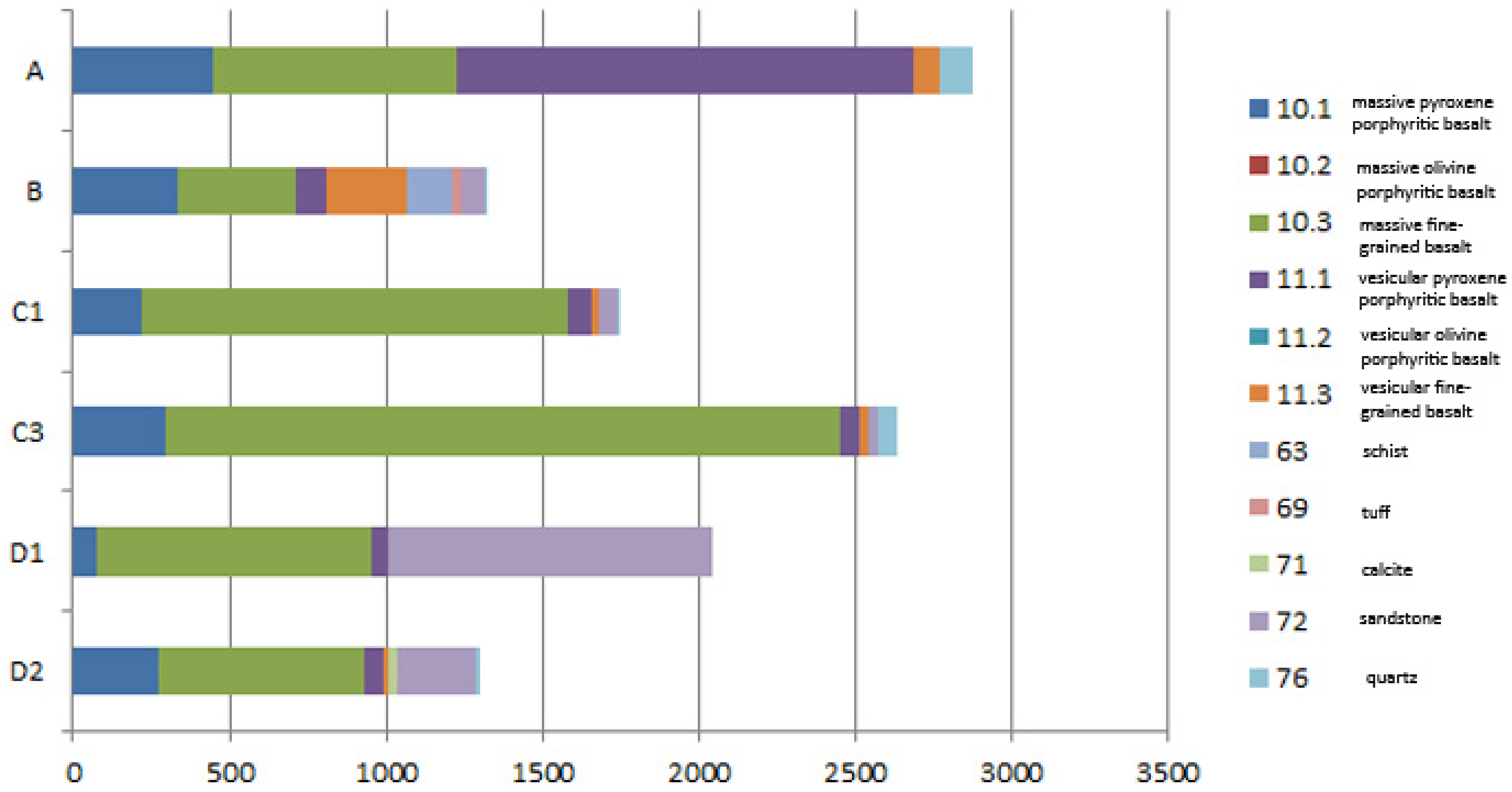

Figure 7.4 Stacked bar showing total weight in grams of material types between strata and the relative amount of each type of raw material within each stratum in Operation 2A, Units 4 and 5

Based on the results of the analysis of raw materials which were obtained in the excavations of Units 4 and 5, Operation 2A, it is possible to compare the different choice of materials used over time in the same place. The occurrence of these types of raw materials are the result of changes in the selection of rocks over time due to distinct functions that were performed in this space, as well the result of particular natural transformations which happened in this place.

During the Late Formative occupation (Table 7.2; Figure 7.4) basalt workers selected massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine-grained basalt (11.3). In all cases the most used was massive fine-grained basalt (10.3), as a second choice was massive pyroxene porphyritic basalt (10.1), and in the third option was vesicular fine-grained basalt (11.3). The three Late Formative strata with occupation (C3, D1, and D2; Table 7.2, Figure 7.4) also contain remains of calcite (71), sandstone (72), and quartzite pebbles (76) which could have been used for construction of the floor of the plaza.

During the Terminal Formative Period (Table 7.2; Figure 7.4, Stratum C1) the main raw material which was selected was massive fine-grained basalt (10.3), followed by massive pyroxene porphyritic basalt (10.1), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine-grained basalt (11.3). There are remains of sandstone (72) which could pertain to the fill for the building of the floor of the plaza.

The strata that correspond to the Terminal Formative-Early Classic Period (Stratum A and B; Table 7.2, Figure 7.4) indicate a different selection of raw materials. Vesicular pyroxene porphyritic basalt (11.1) was the most selected raw material in the upper stratum, followed by massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1) (in the stratum B was the second option of selection) and vesicular fine-grained basalt (11.3). There are remains of sandstone (72), and quartzite pebbles (76) which could pertain to the construction of the floor of the plaza. And there are also remains of tuff (69). The tuff fragments may be derived from lower levels. The cultural deposits here lay atop a tuff deposit.

Group 2. Analysis of Operation 2B (Units 6, 7, 8, 13 and 14)

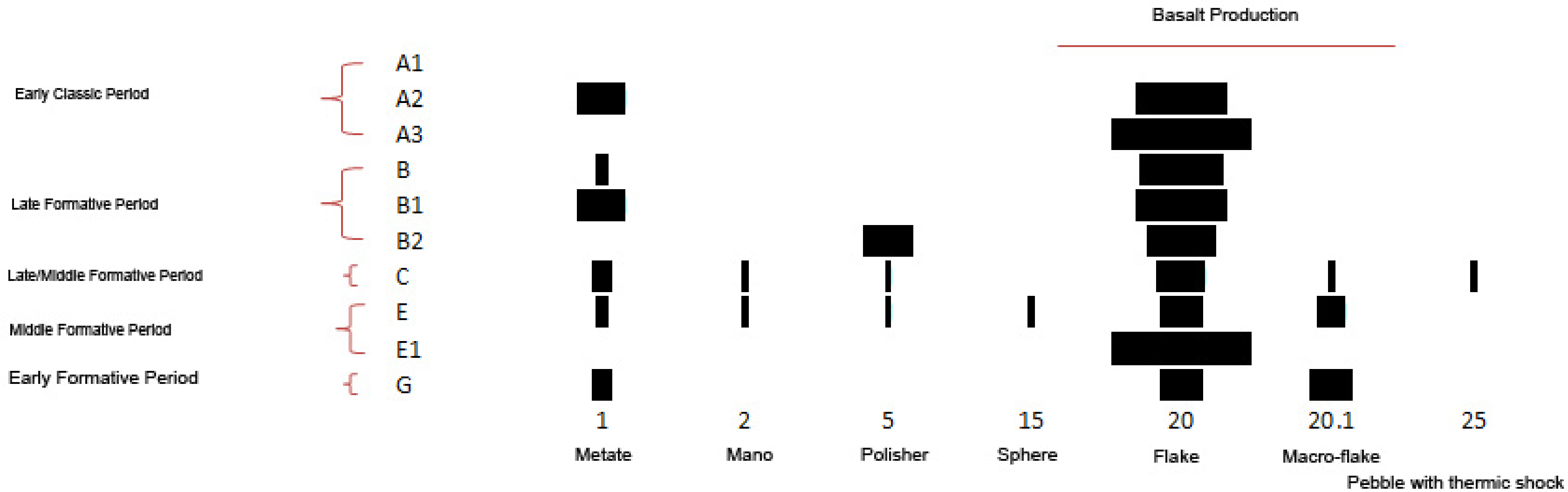

Figure 7.5 Battleship curve graphic of the percent distribution of ground stone artifacts in Units 6, 7, 8, 13 and 14, Operation 2B .

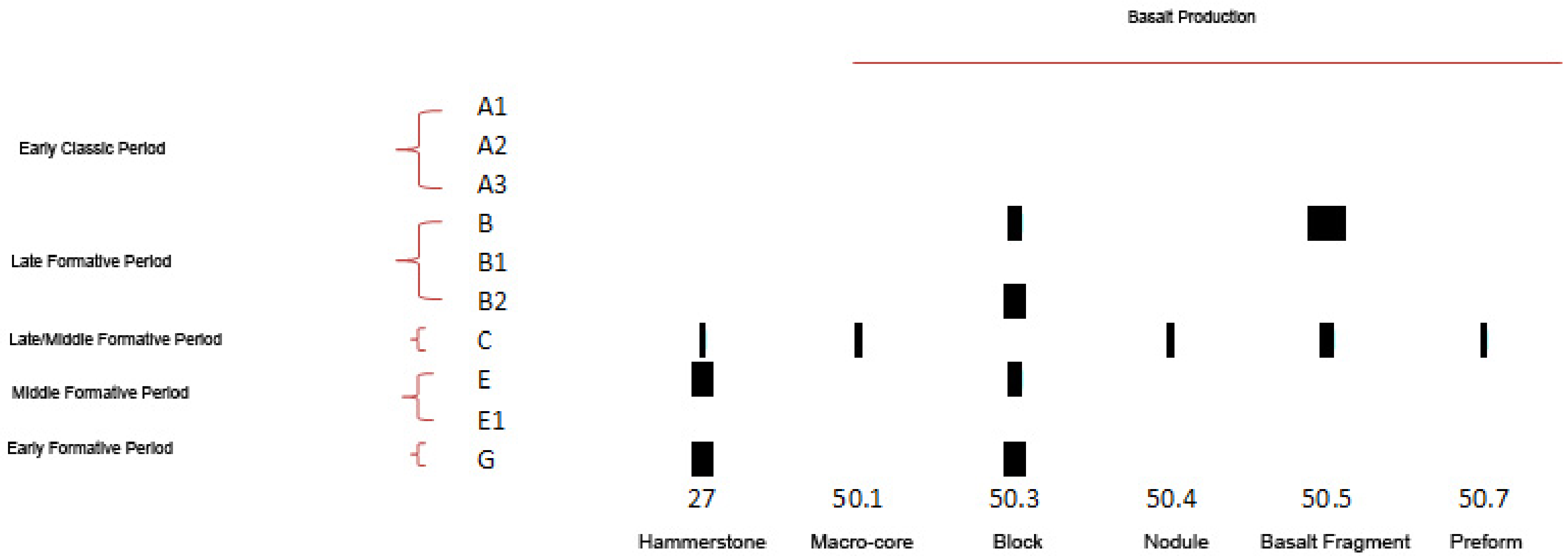

Figure 7.5 Battleship curve graphic of the percent distribution of ground stone artifacts in Units 6, 7, 8, 13 and 14, Operation 2B (Continued)

Operation 2B provides two important data sets: one that shows the remains of an Early Classic Period platform which was a context with elite residential administrative functions. An earlier component corresponds to domestic contexts which inhabited the space during the Middle and Early Formative Periods (Pool 2014: 14). This is an amazing opportunity to see the variation and the kind of artifacts necessary for diverse activities in both kinds of functional contexts. For the early occupation that corresponds to the Formative Period is interesting for understanding the local production and use of artifacts and the items for daily life. It also provides information on the repertoire of tools present in different stages of the Formative Period.

The analysis of ground stone artifacts in Stratum G (Figure 7.5) indicates the performance of domestic activities using metates [1] as well as ground stone production using hammer stones [27], which resulted in basalt blocks [50.3], macro-flakes [20.1], and flakes [20] as by-products. This repertoire of items in a domestic context indicates that the production was independent at the household level

During the Middle Formative Period (Strata E and E1) the recovered material evidence was more complete (Figure 7.5). There were remains of manos [2] and metates [1]. The ground stone tools required for producing artifacts were present such as polishers [5], basalt spheres [15], and hammer stones [27]. The by-products of production were present: flakes [20], macro-flakes [20.1], and blocks [50.3]. In respect to this evidence of by-products it is important to note that is very similar to the evidence of production that was obtained in stratum F with remains of the Early Formative Period. This occupation of the Middle Formative Period also shows remains of hematite [66], pyroclasts [68], sandstone [72], gneiss [75], and quartzite pebbles [76]. These kinds of raw materials are related to the production of ground stone tools. Remains of hematite [66] pyroclasts [68], sandstone [72], gneiss [75], and quartzite pebbles [76] could be used as polishing materials after the fine flaking left rough surfaces on the unfinished tools. Actually hematite [66] is called "jewelers' rouge" (Christopher Pool, personal communication, January, 2016) and hematite remains has been found in archaeological contexts associated with polishing of ground stone artifacts in Olmec and Maya sites (El Manatí, San Andrés-Tabasco, Kaminaljuyú). Hematite could be also related with the use of color for artistic or ritual purposes at the domestic level.

In Stratum C, which corresponds to the Middle-Late Formative transition (Figure 7.5) there is a marked increase in the steps of the *chaîne opératoire* that were recovered. It seems that there was an increase at the local level in the production of ground stone artifacts. The by-products which were found consist of flakes [20], macro-flakes [20.1], pebbles with thermic shock [25], macro-cores [50.1], nodules [50.4], basalt fragments [50.5], and preforms; [50.7]; the tools found and used in the production were polishers [5] and hammer stone [27]. In this stratum also there was the complete tool-kit used for grinding maize: manos [2] and metates [1]. In the Late Formative occupation (Figure 7.5, Strata B2, B1, and B) the variety of ground stone production indicators was reduced: only flakes [20], macro-flakes [20.1], blocks [50.3] and basalt fragments [50.5]. The function of this space had a change. Stratigraphic evidence suggests the Late Formative plaza was established by this point and that stratum B was largely fill for the platform; the marked change in the ground stone assemblage may reflect this change in depositional context.

The occurrence of metate remains [1] and quartzite pebbles [76] corresponded to construction fill.

During the Early Classic Period (Figure 7.5, Stratum A3 and A2) it is possible to observe that there was a change in the use of the space. The materials obtained correspond to a re-use as a building material in the fill of a structure. There were metates [1], flakes [20], and macro-flakes [20.1]. Also, there were remains of limestone (60) needed in the construction of the structure.

The use of kinds of raw materials in Units 6, 7, 8, 13 and 14, Operation 2B over time

Table 7.3 Types of raw materials found in Operation 2B, Units 6, 7. 8. 13, and 14 (the figures are weights in grams)

A1	23	0	0	0	0	0	0	0	0	0	0	0	0
A2	5	0	993	51	0	0	0	0	0	0	0	0	1
A3	65	0	78	0	0	0	71	0	0	0	0	0	0
B	299	0	1917	3	0	0	0	0	0	0	0	0	9
B1	234	0	50	0	0	0	0	0	0	0	0	0	0
B2	599	0	0	0	0	0	0	31	0	0	0	0	0
C	5989	6.1	2335	0	0	0	0	0	0	0	0	0	54
E	610	0	3836	0	0	0	0	0	24	60	20	12	3
E1	0	0	39	0	0	0	0	0	0	0	0	0	0
G	0	0	1062	0	0	0	0	0	0	0	0	0	0
	10.1	10.2	10.3	11.1	11.2	11.3	60	63	66	68	72	75	76
	massive pyroxene porphyritic basalt	massive olivine porphyritic basalt	massive fine-grained basalt	vesicular pyroxene porphyritic basalt	vesicular olivine porphyritic basalt	vesicular fine-grained basalt	limestone	schist	hematite	pyroclast	sandstone	gneiss	quartz

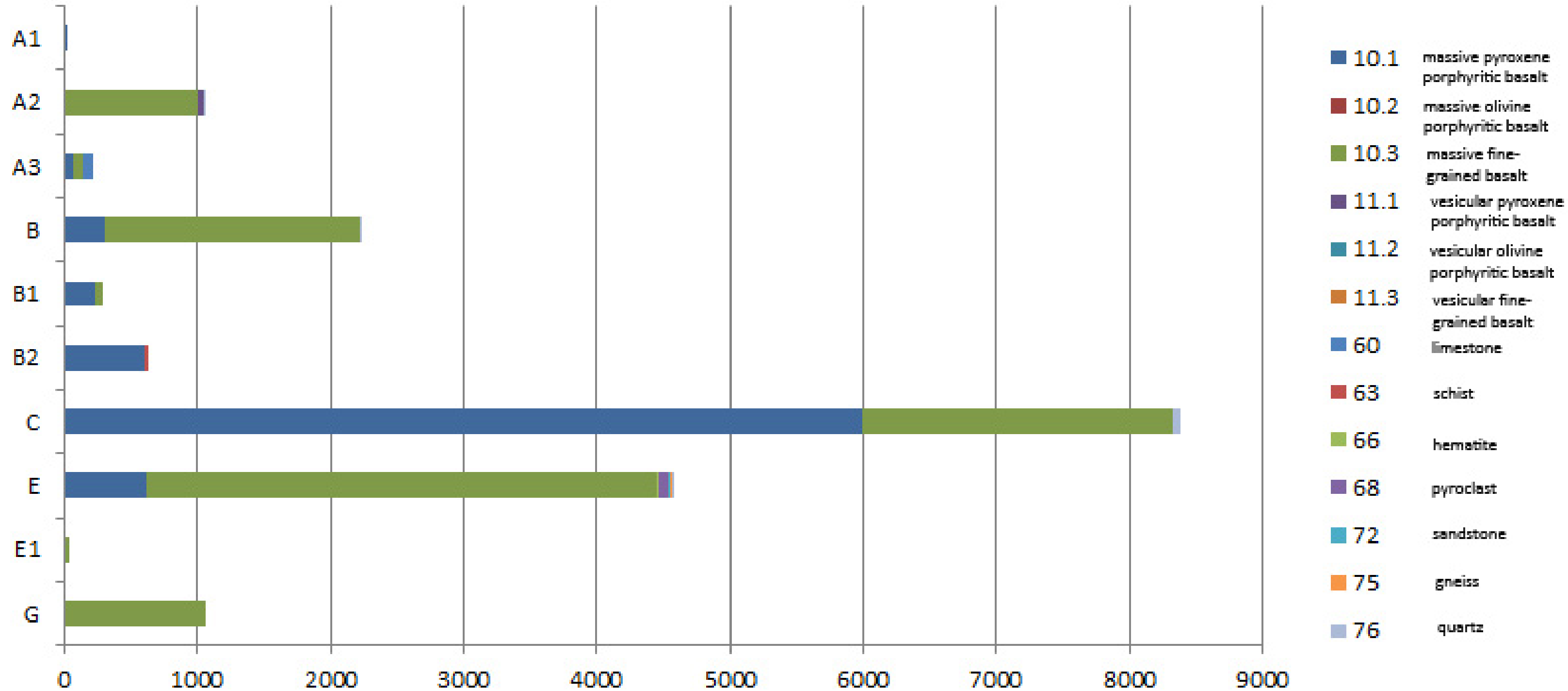

Figure 7.6 Stacked bar showing total weight in grams of material types between strata and the relative amount of each type of raw material within each stratum in Operation 2B, Units 6, 7, 8, 13, and 14.

Based on the results of the analysis of raw materials which were obtained in the excavations of Units 6, 7, 8, 13 and 14, Operation 2B, it is possible to identify different kinds of raw materials used over time for this place located in Group 2. This excavated units that pertain to Operation 2B provide information concerning several important stages in Tres Zapotes: an earlier occupation represented by domestic floors, then during the Late Formative period an elite residential/administrative as occupation, and finally a later occupation during the Early Classic period represented by a structure with elite residential/administrative function.

In Stratum G, which contains Early Formative remains, the massive fine-grained basalt (10.3) was the only kind of raw material used for ground stone artifacts.

During the earlier occupation of the Middle Formative Period (Stratum E1) there was only the presence of massive fine-grained basalt (10.3).

During the later occupation of the Middle Formative Period massive fine-grained basalt was selected as the primary material (10.3); and less abundant was massive pyroxene porphyritic basalt (10.3). In this stratum E there were also remains of hematite (66), pyroclasts (68), sandstone (72), gneiss (75), and quartz (76). These remains might represent ritual production associated with the basalt column enclousre and altar.

During the transition from the Middle Formative to the Late Formative period, (Stratum C) the raw materials that were selected included massive pyroxene porphyritic basalt (10.1) (the most abundant) and massive fine-grained basalt (10.3). There were remains of quartz (76) probably related to the remains resulted from polishing and grinding tools during manufacture.

During the Late Formative Period (Table 7.3 and Figure 7.6; Strata B, B1, and B2) there were selected for part of the platform fill massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3), and the selection of these materials probably had to do with the need for the construction of fill for a Late Formative elite residential/administrative platform.

Finally, during the Early Classic period (Table 7.3 and Figure 7.6; Strata A1, A2, and A3) there were selected massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3). This selection was made as a process of re-cycling artifacts from other places for building the fill of the structure. There was also the presence of vesicular pyroxene porphyritic basalt (11.1). And also, a raw material used for building platforms occurred in these strata: limestone remains (60) (which are properly marls (muddy limestones)).

Group 2. Analysis of Operation 2C (Unit 12)

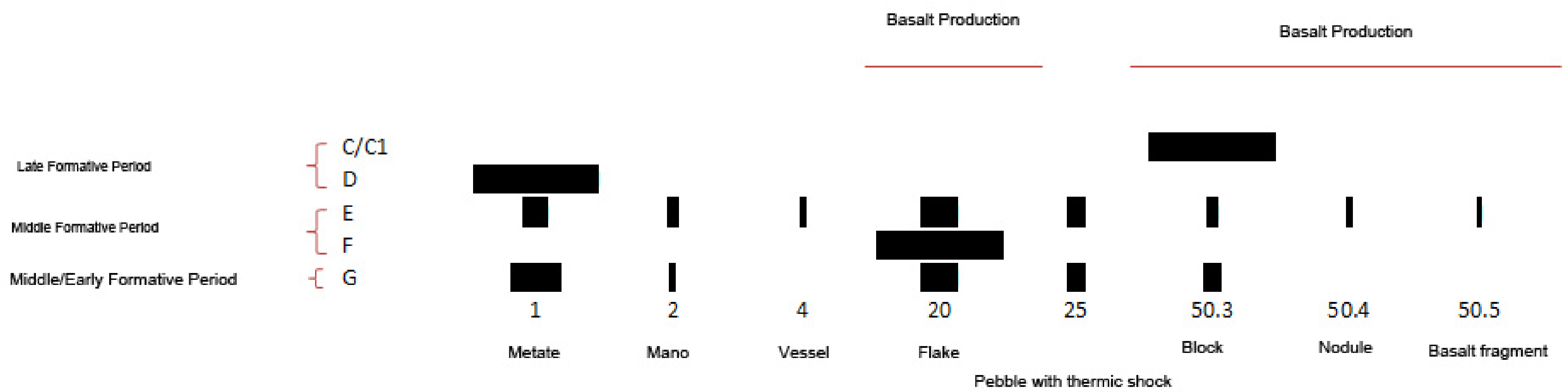

Figure 7.7 Battleship curve graphic of the percent distribution of ground stone artifacts in Unit 12, Operation 2C.

The Operation 2C (Unit 12) provides interesting data sets because this excavation obtained the longest cultural sequence. At the top, Late Formative deposits (a trash midden (Strata B and C) and a ramp (Stratum D)) were found below recent alluvium. The function was elite residential/administrative. An earlier deposit (Stratum E) contained Late and Middle Formative cultural materials. Below it, there was a layer (Stratum F) which contained re-deposited Middle and Early Formative materials in the clay fill of a low platform. An earlier deposit that was sealed by the aforementioned layer contained a deposit of Middle Formative materials and at the bottom of the unit were Early Formative sherds as well as a human skull, an articulated dog skeleton, and a Limón Incised plate. Therefore, according to the recovered data, the use of the place changed over time from domestic and mortuary functions to civic/ritual functions represented by the clay platform, a site of construction for a ramp leading to Mound 9, an elongated elite residential/administrative structure, ultimately becoming an area of refuse deposition for material evidently generated on Mound 9 or Mound 62, which extends from the former.

The analysis of ground stone artifacts in Stratum G (Figure 7.7) indicates an assemblage containing manos (2) and metates (1) consistent with a domestic context. Small-scale production is suggested by the presence of basalt blocks (50.3), pebbles with thermic shock (25), and flakes (20). The steps of the *chaîne opératoire* recovered in this context are just a few; therefore, I suggest that it might be possible that fewer steps imply less specialization. But an alternative interpretation might be suggested with this question:

What if labor becomes specialized with regard to specific steps in the sequence (e.g., Fordian systems)? My point of view is that this context corresponds to the Early and Middle Formative periods when in the local history of Tres Zapotes this level of specialization did not take place yet. This might occurred during the Late Formative Period, during the florescence of the polity. However, I acknowledge that there is the possibility that some additional steps could be accomplished near to this context due to the kind of domestic production. And finally in this space were recovered remains of limestone (60), which could be used in the process of grinding maize, in the elaboration of *nixtamal* (slaked lime is used in *nixtamalization* (as opposed to actual grinding)).

Stratum F corresponds to a clay platform with very little material, but which included redeposited Early Formative and Middle Formative ceramics. The basalt flake (20) which was found there probably is redeposited as well. Stratum E represents the accumulation of material in the late Middle Formative period and early Late Formative period as Group 2 was emerging as a civic-ceremonial center with Mound 9 as the seat of administration and/or residence of elites. In this context were found both manos (2) and metates (1), and there were remains of a basalt vessel (4). In respect to the ground stone production, an increase of the steps of the *chaîne opératoire* was found: flakes (20), pebbles with evidence of thermic shock (22), blocks (50.3), nodules (50.4), and basalt fragments (50.5). In this example it is possible to see an evolution of lithic technology in the transition between Late Middle Formative to Late Formative Period. Also, the context shed light on the uses of ground stone in Stratum E which, throughout, is an elite residential-administrative context.

In the strata which contain Late Formative remains (C/C1, and D) a change can be observed: the ground stone artifacts were re-cycled as a fill for constructive purposes: metates (1), blocks (50.3), and remains of limestone (60) were found. These remains could be residues of this raw material for building purposes.

The use of kinds of raw materials in Unit 12, Operation 2C over time

Table 7.4 Types of raw materials found in Operation 2C, Unit 12 (the figures are weights in grams)

C	0	0	189	0	0	0	0	0
C/C1	284	0	0	0	0	0	470	0
D	785	0	159	0	0	0	530	0
E	2263	0	1707	0	0	0	116	6
F	0	0	101	0	0	0	0	0
G	1777	0	3487	0	0	0	431	44
	10.1	10.2	10.3	11.1	11.2	11.3	60	76
	massive	massive	massive	vesicular	vesicular	vesicular	limestone	quartz
	pyroxene	olivine	fine-grained	pyroxene	olivine	fine-grained		
	porphyritic	porphyritic	basalt	porphyritic	porphyritic	basalt		
	basalt	basalt		basalt	basalt			

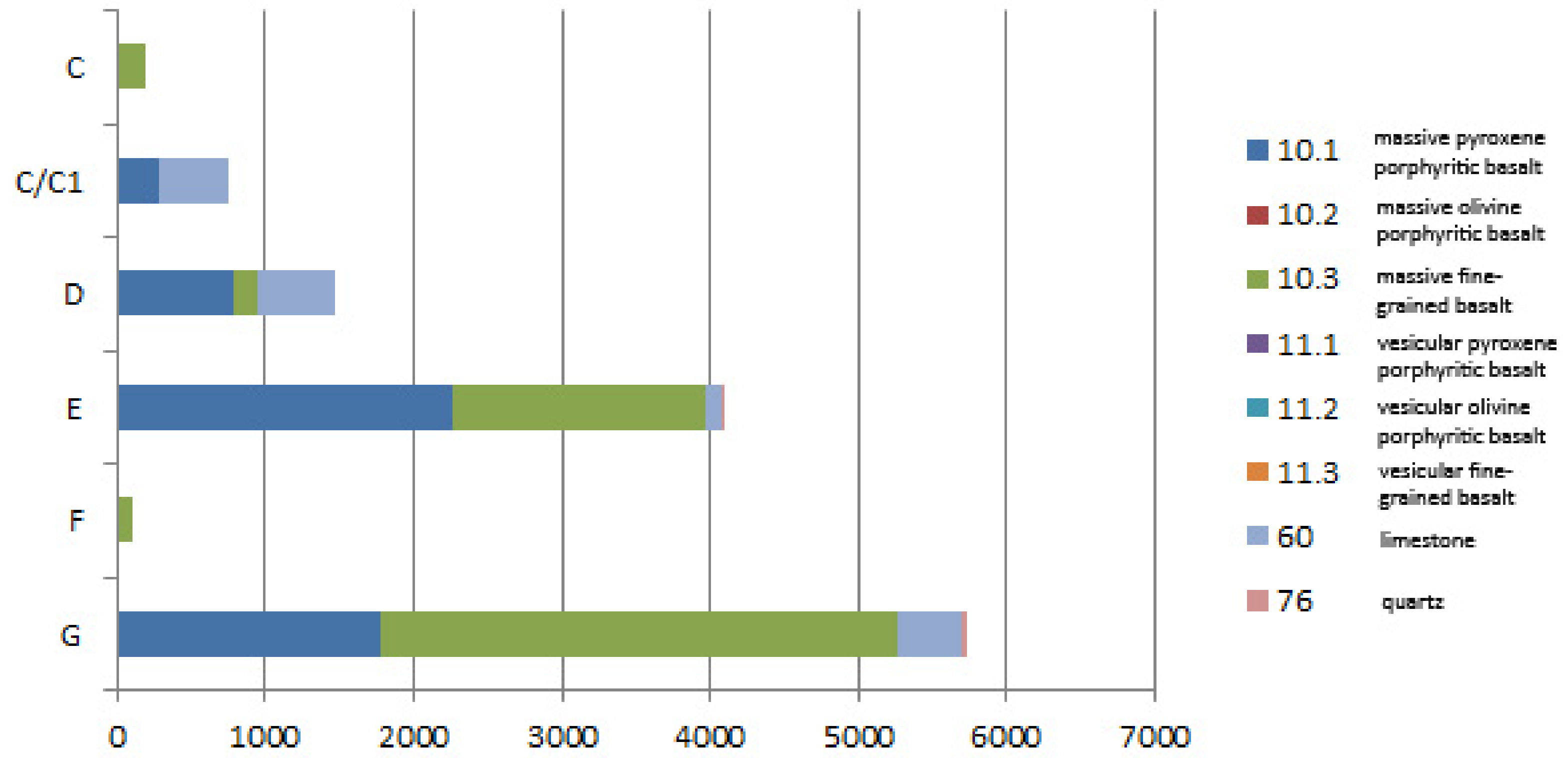

Figure 7.8 Stacked bar showing total weight in grams of material types between strata and relative amount of each type of raw material within each stratum in Operation 2C, Unit 12

Based on the results of the analysis of the kinds of raw materials found in Unit 12, Operation 2C it is possible to identify the use of different types of rocks in every period of occupation of this place at Tres Zapotes. The changes occurred over time in terms of function of the space were not the only ones. There were also changes in the use of types of rocks. During the Middle/Early Formative Period occupation (Table 7.4, Figure 7.8 Stratum G) there was the most frequent use of massive fine-grained basalt (10.3), followed by the use of massive pyroxene porphyritic basalt (10.1). Limestone (60) was also present. But during the Middle Formative Period there was a change. In Stratum F (Table 7.4, Figure 7.8) only massive fine-grained basalt (10.3) was recovered and in the Stratum E (Table 7.4, Figure 7.8) the most frequently used material was massive pyroxene porphyritic basalt (10.1) followed by massive fine-grained basalt (10.3); remains of limestone (60) were also present.

Finally, during the Late Formative Period the results correspond to the changes noticed in the kind of artifacts which determined the function in this last occupation. In the Stratum D (Table 7.4, Figure 7.8) there was the most frequent use of massive pyroxene porphyritic basalt (10.1) followed by the use of massive fine-grained basalt (10.3) and the presence of the remains of limestone increased (60). But in the Stratum C/C1 (Table 7.4, Figure 7.8) the basalt assemblage consisted only of massive pyroxene porphyritic basalt (10.1) and the amount of limestone (60) increased. The increase of limestone could correspond to the use of this raw material in the building of the ramp of a Late Formative Period structure. And in the Stratum C (Table 7.4, Figure 7.8) there was only the presence of massive fine-grained basalt (10.3).

Group 2. Analysis of Operation 2D (Units 9, 10, and 11)

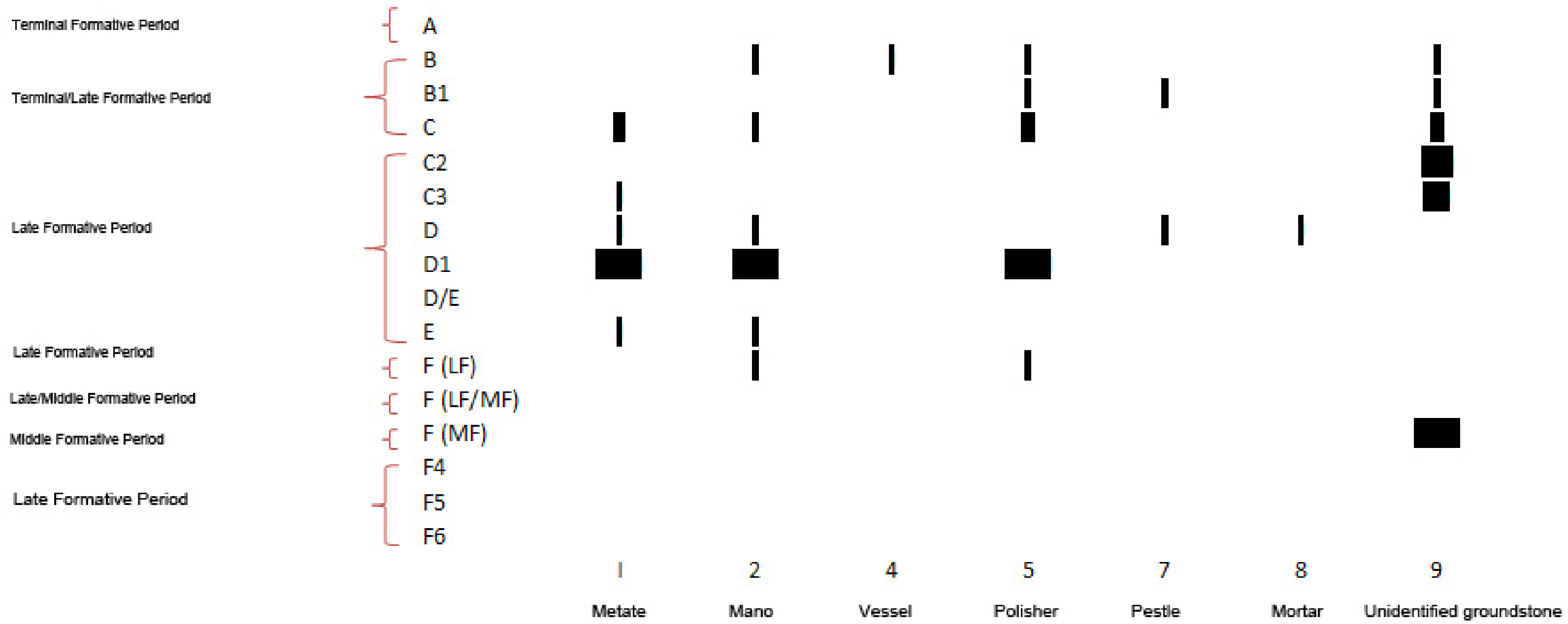

Figure 7.9 Battleship curve graphic of the percent distribution of the ground stone artifacts in Units 9, 10, and 11, Operation 2D.

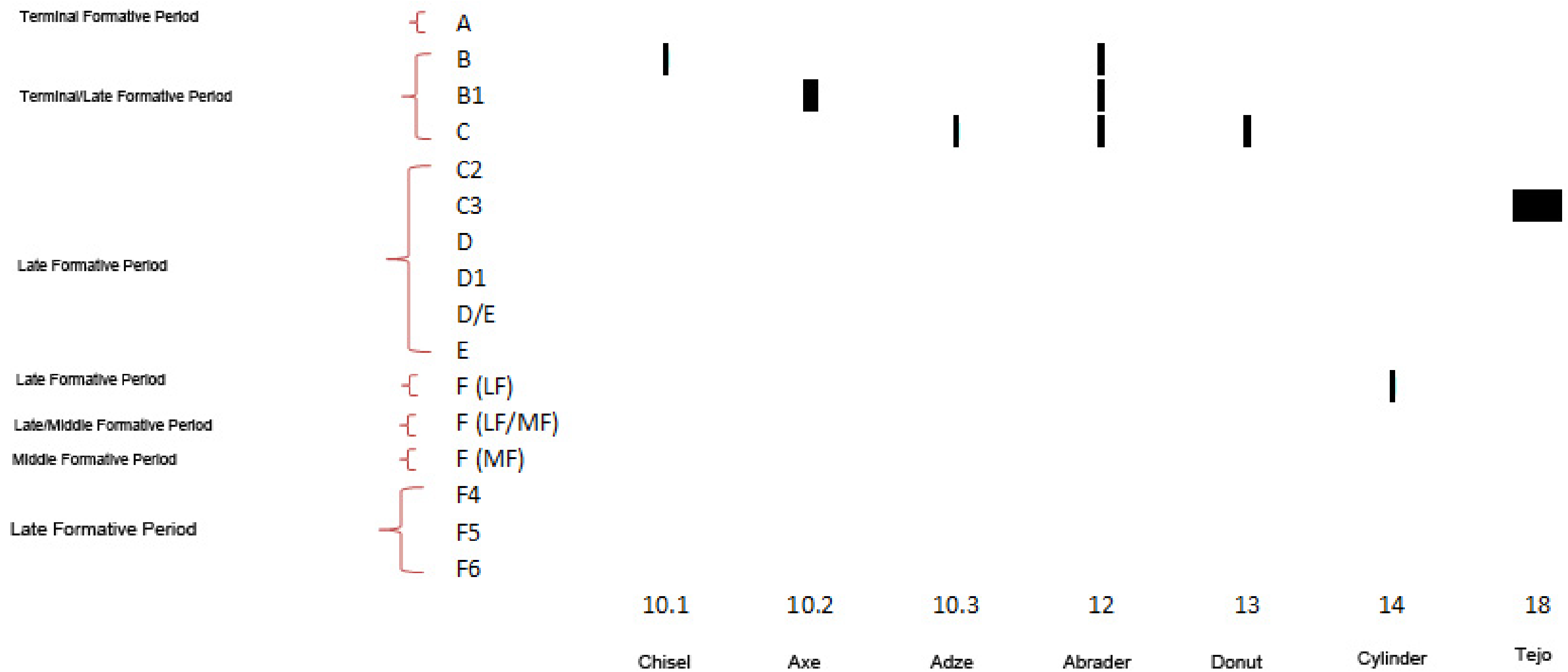

Figure 7.9 Battleship curve graphic of the percent distribution of the ground stone artifacts in Units 9, 10, and 11,Operation 2D (Continued).

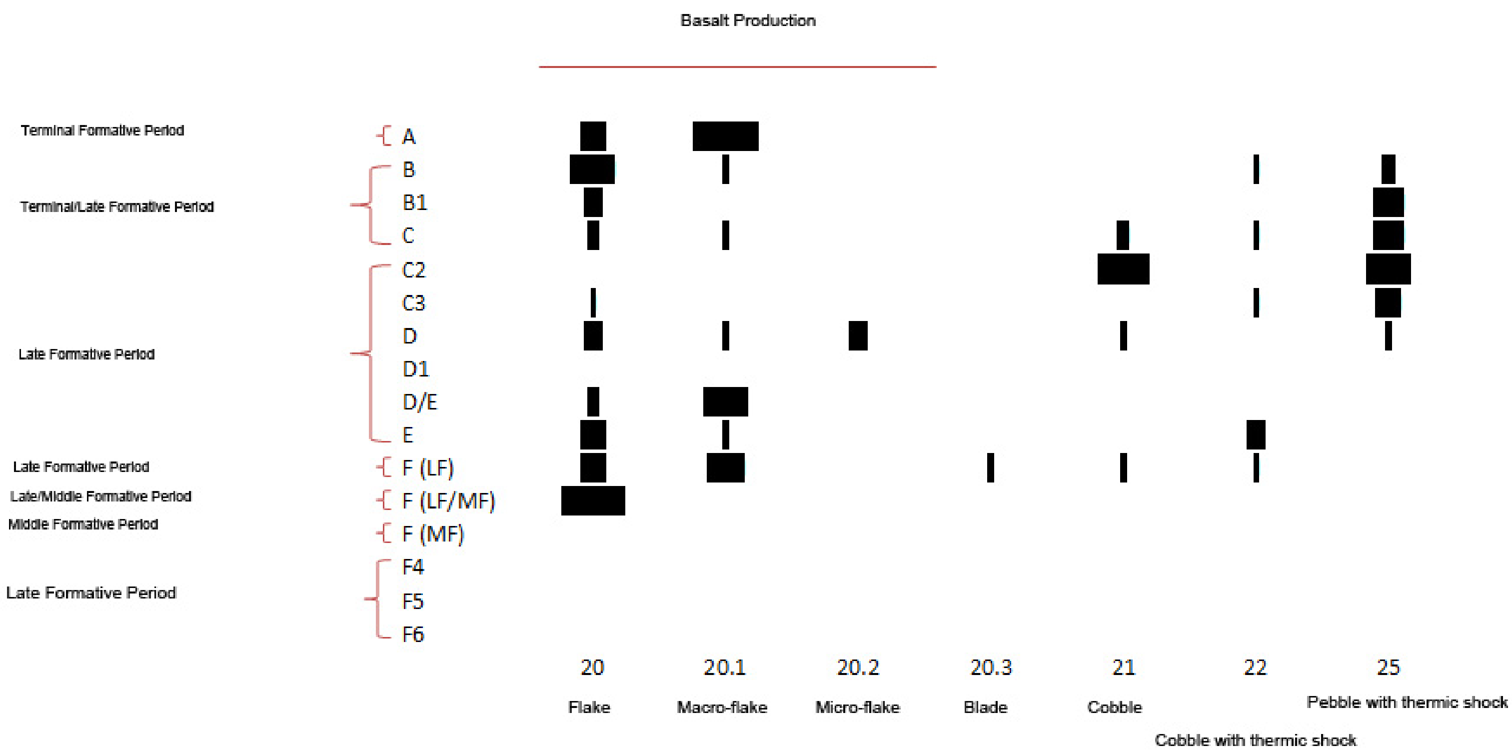

Figure 7.9 Battleship curve graphic of the percent distribution of the ground stone artifacts in Units 9, 10, and 11, Operation 2D (Continued).

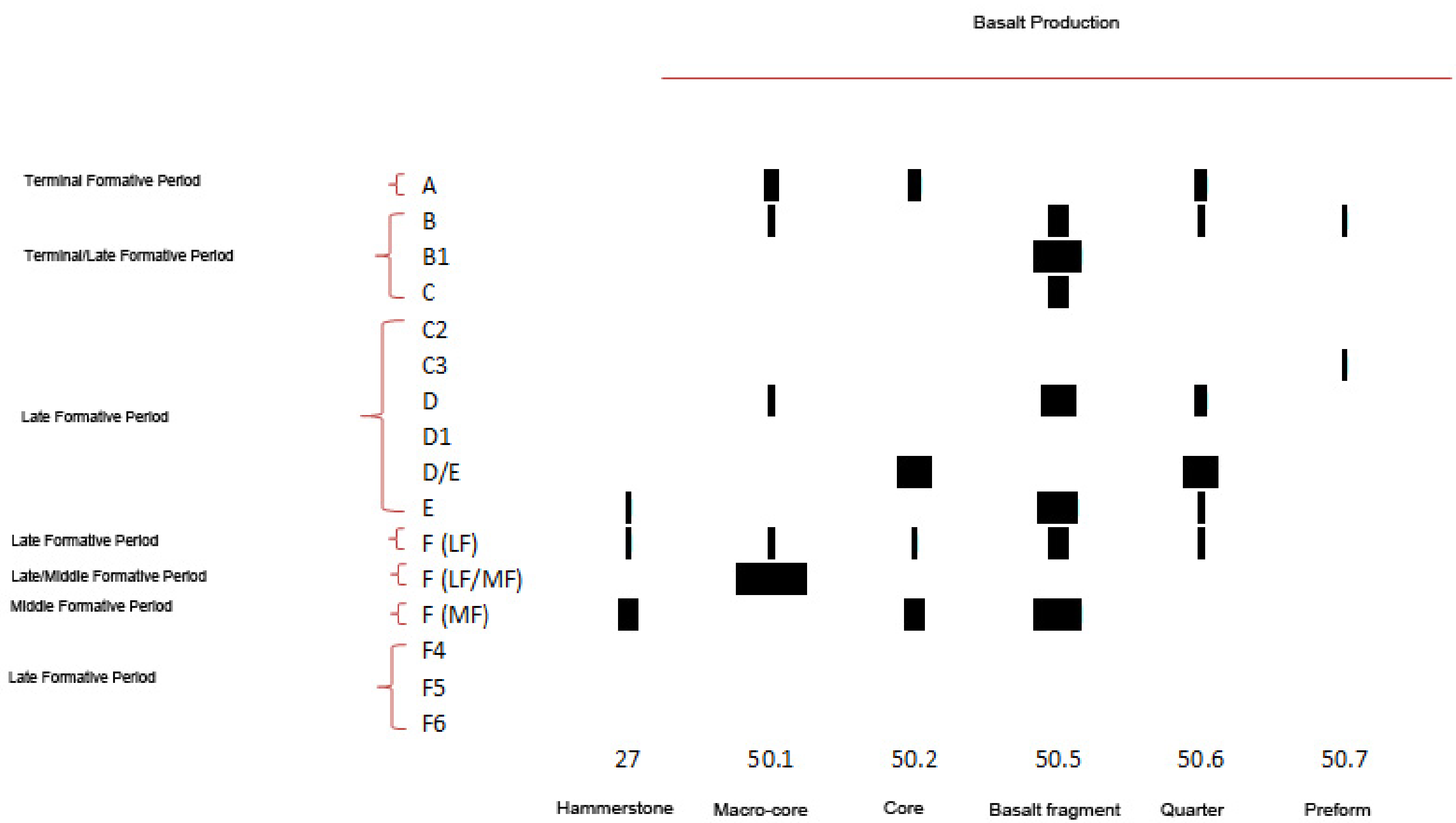

Figure 7.9 Battleship curve graphic of the percent distribution of the ground stone artifacts in Units 9, 10, and 11, Operation 2D (Continued))

The excavations in Mound 62 discovered a stepped platform (raised in two events of construction) which was covered later by refuse. There were remains which suggest production of pottery, ground stone, and mica. This could be a good example of multi-crafting unit in Tres Zapotes. Also, this is an example of attached production supported by the elite who used and lived on Mound 62 and the long mound (Mound 9) from which it projects. Therefore, this analysis obtained important information concerning a different kind of production.

The remains which were obtained in Strata F (LF), F (LF/MF), and F (MF) (Late Formative, Middle Formative, Late/Middle Formative) (Figure 7.9) constitute an assemblage which recalls the evidence of domestic production from earlier periods recovered in other operations. There was the occurrence of manos (2) as well as tools used in the production of ground stone artifacts such as polishers (5) (polishers may be associated with ceramic production in Units 9 and 10), hammer stones (27), and by-products such as macro-cores (50.1), cores (50.2), basalt fragments (50.5), quarters (50.6), and an uncommon artifact: a little basalt cylinder (14). So, the *chaîne opératoire* was very incomplete in these strata (there were few steps of the productive process) and could correspond to the earlier periods and maybe to domestic contexts. Also, there were interesting remains of raw materials such as ilmenite (64), lutite (67), and sandstone (72). These types of remains may be associated with the independent production of ground stone artifacts as abraders or polishers.

In the strata C2, C3, D, D1, D/E and E which contain remains that date to the Late Formative Period, there were artifacts needed for grinding maize and other edible substances such as manos (2), metates (1), mortars (8), and pestles (7). In regard to the production of ground stone artifacts, there was an increase in the steps of the production that were found. The tools used for making artifacts were tejos (18) and stone hammers (27). The by-products found were flakes (20), macro-flakes (20.1), cores (50.2), basalt fragments (50.5) (blocky basalt debitage) obtained from the knapping, and quarters (50.6). During the Late Formative Period the intensity of basalt production appears to increase. There were also remains of other raw materials such as schist (63), lutite (64), tuff, and concretions (70), and mica flakes (74) probably related to the production of different crafts. The case of lutite (64) (mudstone) is useful as an abrader for the manufacture of ground stone tools and was found in other domestic contexts such as stratum F.

In strata B, B1, and C , dating to the Terminal/Late Formative Period there were remains of manos (2), metates (1) , stone donuts (13) (a component of the mano and metate tool-kit) and pestles (7). Even though many functions have been suggested for stone donuts, including door hinges, digging stick weights (Kidder et al. 1946:141), spear shaft weights (Willey 1972:136), mace heads (Moholy-Nagy 2003:48), target for rolling and throwing spears through, or as dibble stick weights (Coe and Diehl 1980: 240-241), perforated mortars (Inomata 1995:578–579; Sheets 2006:70), and most recently thigh-supported spindle whorls (Tomasic 2012), in the contemporary ethnography of Mexico and Guatemala indigenous communities use stone donuts as supports for metates (the main foot of the metate is introduced in the center of the stone donut). This device facilitates the stability for grinding maize because the weight of the donut helps to hold the metate against the force of rolling the mano over the surface of the metate. These stone donuts are found more in the Southern Gulf Coast and Eastern Guatemala.). In respect to the production of ground stone artifacts, there were tools needed for making the artifacts such as polishers (5) and abraders (12), and there was a concentration of pebbles with evidence of thermic shock, which may correspond with pottery production. There is a lot of evidence of intense burning, including vitrified kiln fragments, in Op 2D, especially in the basurero (trash pit) in Stratum D of Unit 10 and Stratum E of Unit 9. Christopher Pool (personal communication, January, 2016) suspects the pebbles with thermic shock derive from these ceramic production contexts, where they may have been placed in kiln walls, as is done today in San Isidro. The by-products found were unidentified debris of basalt production (9), flakes (20), macro-flakes (20.1), basalt fragments of reduction (50.5), quarters (50.6), and preforms (50.7). In terms of production, these strata shed light on various steps in the *chaîne opératoire* which were obtained from a context of attached production. In the same place it can be noticed the detailed process of reduction of the basalt stone from the macro-flakes (20.1) and blocky basalt debitage (50.5) to the preforms of ground stone artifacts (50.7), and the by-products which resulted from the manufacturing process: flakes (20) and quarters (50.6). All this evidence allows this context to be interpreted as a space where there was an intense and continuous production of basalt tools. This context is more complex in terms of production than domestic independent units. It is important to mention that there were items that could be used within a multi-crafting workshop (chisels (10.1), adzes (10.3)), and/or in the field (the axe (10.2), which could be used for felling trees or for heavy woodworking - or even as a weapon).

The context suggests that this was a locus of production by specialists retained by the elites occupying Mound 9. In terms of the ceramic production, the products of which don't differ greatly from other parts of the site. Christopher Pool (2009) has characterized this as "elite household production", implying that the products were mainly utilitarian and used by the elite household. I share this interpretation that the same would be true of the ground stone production. This is an example of attached specialization not oriented toward manufacture of prestige or wealth items. Other kinds of raw materials were limestone (60), serpentine (62), pyroclasts (68), and tuff (69). Those remains could correspond to other crafts made in this multi-crafting workshop. In regard to additional evidence that support the production of ground stone artifacts, in the report of the excavations were noticed high frequencies of basalt flakes (Pool 2014: 14; Bautista García, Stockdell, and Pool 2014: 77; also Jeffrey Young reports the presence of high frequencies of basalt micro-flakes and pyroxene crystals dislodged from basalt in his analysis of micro-artifacts of contexts of activity areas in Operation 2D (personal communication, January 2011)).

In Stratum A, which dates to the Terminal Formative Period the frequency of evidence of activities related to production of ground stone artifacts diminished. There were only remains of flakes (20), macro-flakes (20.1), macro-cores (50.1), and quarters (50.6). It is probable that some production of basalt artifacts continued, but knowing the cultural modifications of the place where there were two events of construction, those materials could be used as a fill and were selected in accord to their size. Another raw material found was sandstone (72) probably also used for construction.

The use of kinds of raw materials in Units 9, 10, and 11 12, Operation 2D over time

Table 7.5 Types of raw materials found in Operation 2D, Units 9, 10, and 11 (the figures are weights in grams)

A	462.7	0	497.7	494	0	0	0	0	0	0	0	0	43.3	0	0
B	2554.8	147	2005.7	440	0	18.6	84.1	0	0	0	0	0	50.4	0	159.2
B1	597.2	210.5	268.2	350.8		56	0	0	0	0	0	0	0	0	0
C	1707.9	195	2262.8	2085	32	330.5	0	2.4	0	0	22.9	16	3	0	122.56
C2	147	0	382	160	0	0	0	2.9	0	0	0	0	0	0	1
D	600.1	106	3802.5	380.4	0	162.7	0	0	11.5	0	0	6	0	0	106.4
D/E	0	0	691.9	440.9	0	0	0	0	0	0	0	0	0	0.53	0
D1	87	0	0	730	0	0	0	0	0	0	0	0	0	0	0
E	578.6	18.3	186.2	297.6	0	189.3	0	0	0	0	0	0	9.3	0	0
F	3257.2	0	6908.5	1931.5	0	0	0	0	0	20.1	0	0	93.3	0.1	386
F4	158.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F5	36.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F6	0	0	37.6	0	0	0	0	0	0	0	0	0	32.4	0	0
	10.1	10.2	10.3	11.1	11.2	11.3	60	62	63	64	68	69	72	74	76
	massive	massive	massive	vesicular	vesicular	vesicular	limestone	serpentine	schist	ilmenite	pyroclast	tuff	sandstone	mica	quartz
	pyroxene	olivine	fine-grained	pyroxene	olivine	fine-grained									
	porphyritic	porphyritic	basalt	porphyritic	porphyritic	basalt									
	basalt	basalt		basalt	basalt										

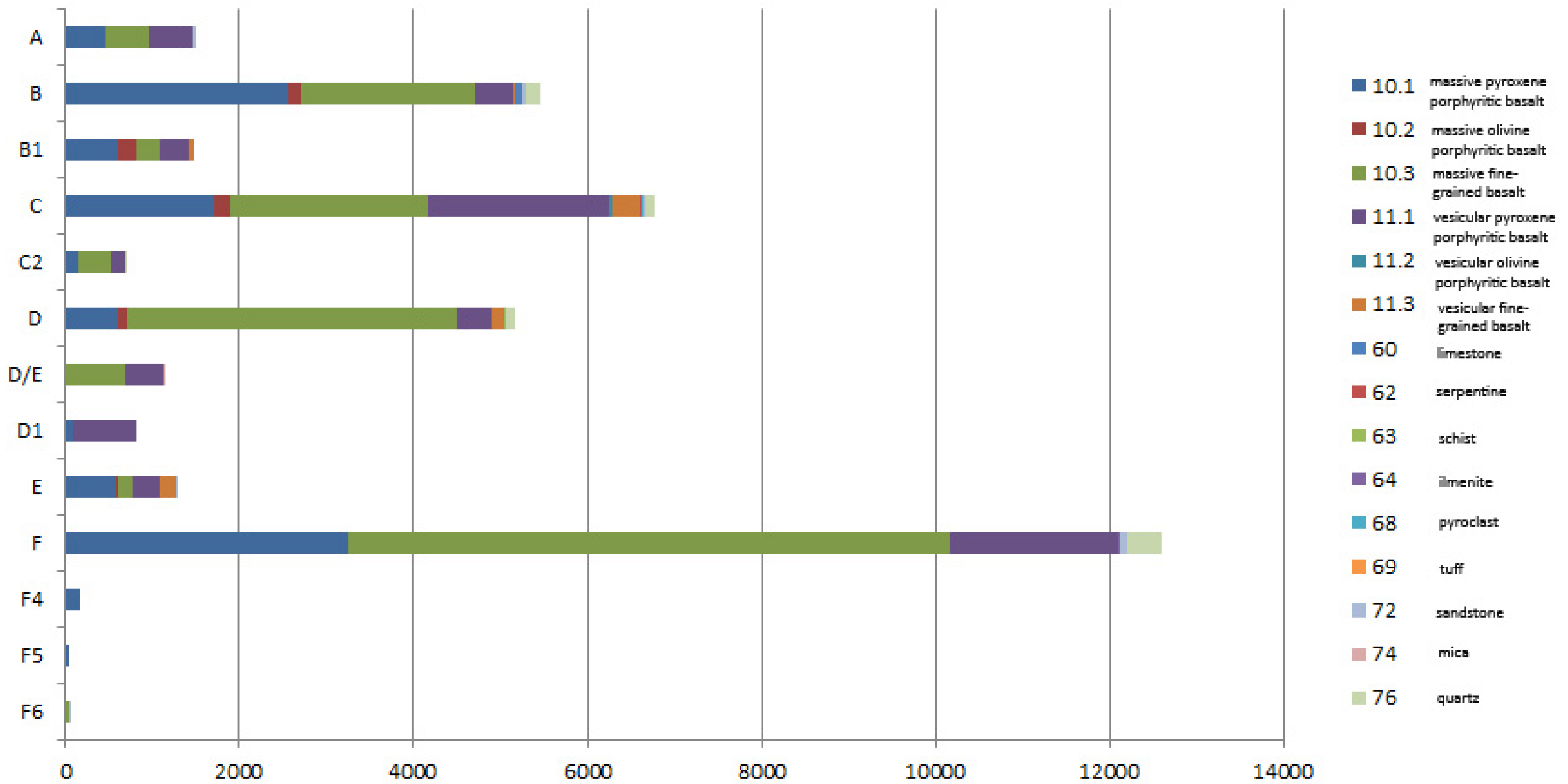

Figure 7.10 Stacked bar showing total weight in grams of material types between strata and the relative amount of each type of raw materials within each stratum in Operation 2D, Units 9, 10, and 11

Based on the results of the analysis of raw materials recovered in the excavations of Units 9, 10, and 11, Operation 2D, there was an interesting variation over time. In the lower strata that correspond to the Late Formative Period (Table 7.5 and Figure 7.10: Strata F6, F5, and F4) volcanic stone consisted of massive pyroxene basalt (10.1) or massive fine-grained basalt (10.3) and sandstone (72) was also recovered. This information could shed light on the first stage of an attached workshop to the local elite. These strata (F4, F5, and F6) are part of construction of the Mound 62 platform. This was all used as construction material, although some could have been recycled artifacts.

However, in the upper strata which correspond to the Late Formative period, there was an increase of diversity of raw materials used for manufacture of basalt artifacts (Table 7.5 and Figure 7.10: Strata E, D/E, D1,D, C2). The used raw materials were massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1) and vesicular fine-grained basalt (11.3). This increase in the diversity of raw materials corresponds with the increase in the production of artifacts in this attached workshop and the increase in the diversity of produced tools. Also, there were remains of raw materials associated with the production of ground stone tools such as sandstone (72) and quartz (76). But the most interesting remains of raw materials were mica (74), serpentine (62), and schist (63), which are important for the manufacture of other crafts; this evidence suggests that this attached workshop to elite was a multi-crafting unit.

In the strata which contain remains that correspond to the Terminal/Late Formative Period, it is possible to notice an increase of variation of the raw materials that were used (Table 7.5 and Figure 7.10: Strata C, B1, and B). Some of the raw materials were not used in earlier periods. The raw materials were massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular olivine porphyritic basalt (11.2), and vesicular fine-grained basalt (11.3). This occurrence of all the types of basalts probably has to do with the refuse that covered the platform (Strata F4, F5, and F6) and was generated as by-products of craft production. An important component of these ground stone remains was used as a fill for the platform and also there are remains which correspond to the refuse pit. It is necessary to mention that there were found remains of raw materials which could correspond to the construction of the stepped platform such as limestone (60), tuff (69), and sandstone (72) as well as remains that pertained to the refuse pit such as serpentine (62), pyroclast debris (68), and quartz (76).

Group 2. Analysis of Operation 2E , Unit 15

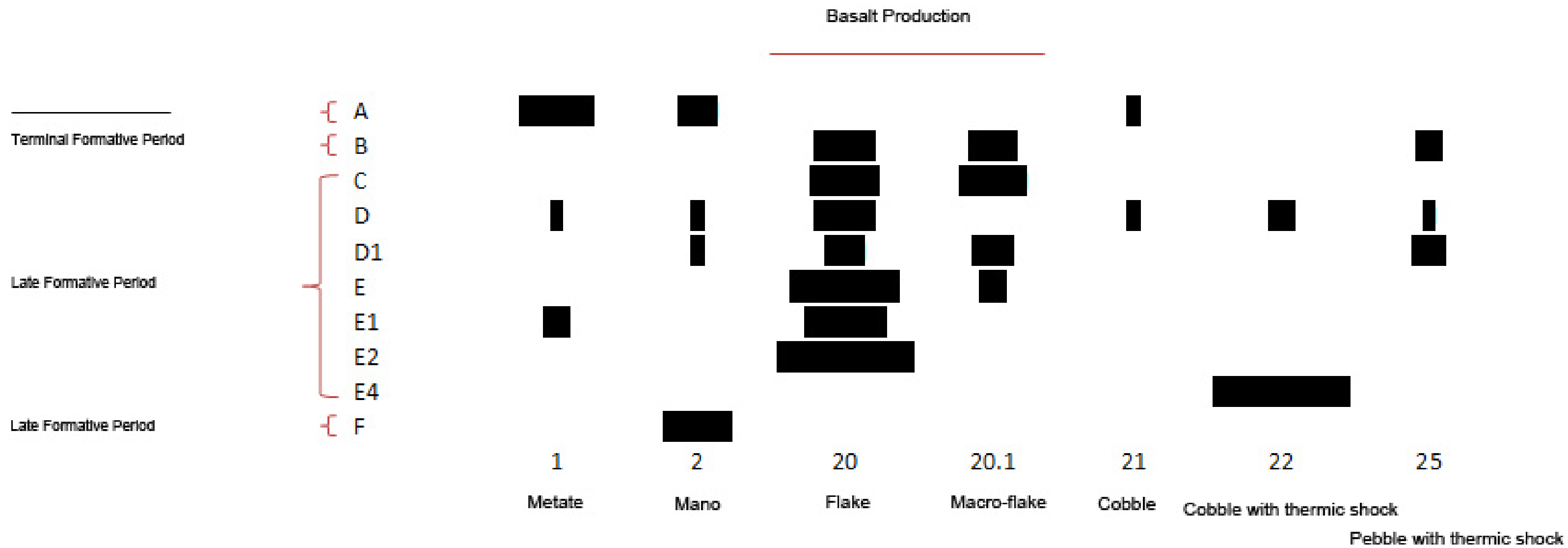

Figure 7.11 Battleship curve graphic of the percent distribution of the ground stone artifacts found in Unit 15, Operation 2E.

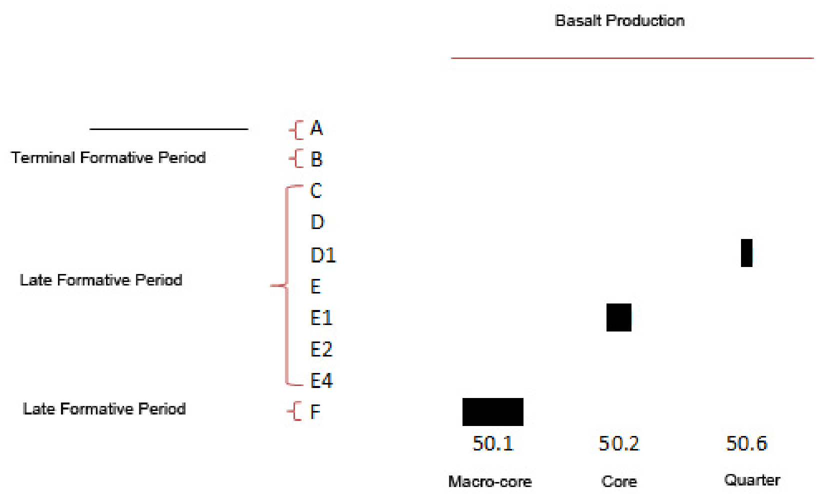

Figure 7.11 Battleship curve graphic of the percent distribution of the ground stone artifacts found in Unit 15, Operation 2E (Continued).

The analysis of the ground stone remains found in Operation 2E was only focused on Unit 15 due to the disturbance noticed in Unit 16 which was mainly occupied by a former test pit excavated by Matthew Stirling. In spite of the fact that the sample for analysis was reduced, this is an important opportunity to observe changes in the use of space over time in the plaza of Group 2. The plaza was constructed at some point in the Late Formative period (Stratum C, C1). It continued in use in the Terminal Formative period (Stratum B). Prior to the plaza's construction, this was a Late Formative domestic context D-F, but especially D-E4, in which the domestic occupation was most intensive. Stratum F appears to be mainly alluvial with some domestic-derived materials included. Earlier the area was affected by a light volcanic ash fall, which sealed a light Middle Formative occupation of unknown character.

As a result of the analysis of ground stone tools found in Operation 2E it is possible to say that during the lowest stratum which correspond to the Late Formative Period: Stratum F (Figure 7.11) there was evidence of ground stone remains that correspond to domestic functions such a mano (2) for grinding maize and a by-product resulted from a production for quotidian needs, such as a macro-core (50.1) (Stratum F seems to be mainly alluvial with some domestic-derived materials included). Stratum C is plaza fill and shows a pronounced change in diversity of artifact types (Figure 7.11). In Strata D, D1, E, E1, E2, and E4 (Figure 7.11) there is evidence that the place has domestic functions. There was the tool-kit needed for grinding maize: manos (2) and metates (1). There was evidence of more steps performed of the *chaîne opératiore* such as the occurrence of flakes (20), macro-flakes (20.1), pebbles (22) and cobbles with evidence of thermic shock (25), cores (50.2), and quarters (50.6) resulted from the basalt reduction process. These by-products show evidence that the production was at domestic scale. Another raw material present was remains of limestone (60).

In the strata which correspond to the Terminal Formative Period (Fig. 7.11: Strata A and B) and also it is noticed a change in the distribution of ground stone artifacts: there were manos (2), metates, flakes (20), macro-flakes (20.1), cobbles (22) and pebbles with evidence of thermic shock (25). It is necessary to recall that the plaza construction phase is represented by stratum C. Stratum B is most similar to Stratum C in its ground stone assemblage, reflecting continued use of the plaza. Concretion remains (70) were also found in this context.

The use of kinds of raw materials in Unit 15, Operation 2E over time

Table 7.6 Types of raw materials found in Operation 2E, Unit 15 (the figures are weights in grams)

A	77	0	970	152	0	0	0	0	0
B	443	265	1138	905	0	0	0	145	0
C	250	0	314.8	127	0	0	0	0	0
D	153	0	1545.7	196	0	0	0	0	0
D1	286.3	0	895.6	0	52	0	232	23	0
E	0	0	447	0	0	0	1537	0	0
E1	0	0	448	0	0	0	0	0	0
E2	32	0	37	0	0	0	5	0	0
E4	0	0	0	66.5	0	0	0	0	0
F	0	0	536	0	0	0	0	0	0
	10.1	10.2	10.3	11.1	11.2	11.3	60	70	76
	massive	massive	massive	vesicular	vesicular	vesicular	limestone	concretion	quartz
	pyroxene	olivine	fine-grained	pyroxene	olivine	fine-grained			
	porphyritic	porphyritic	basalt	porphyritic	porphyritic	basalt			
	basalt	basalt		basalt	basalt				

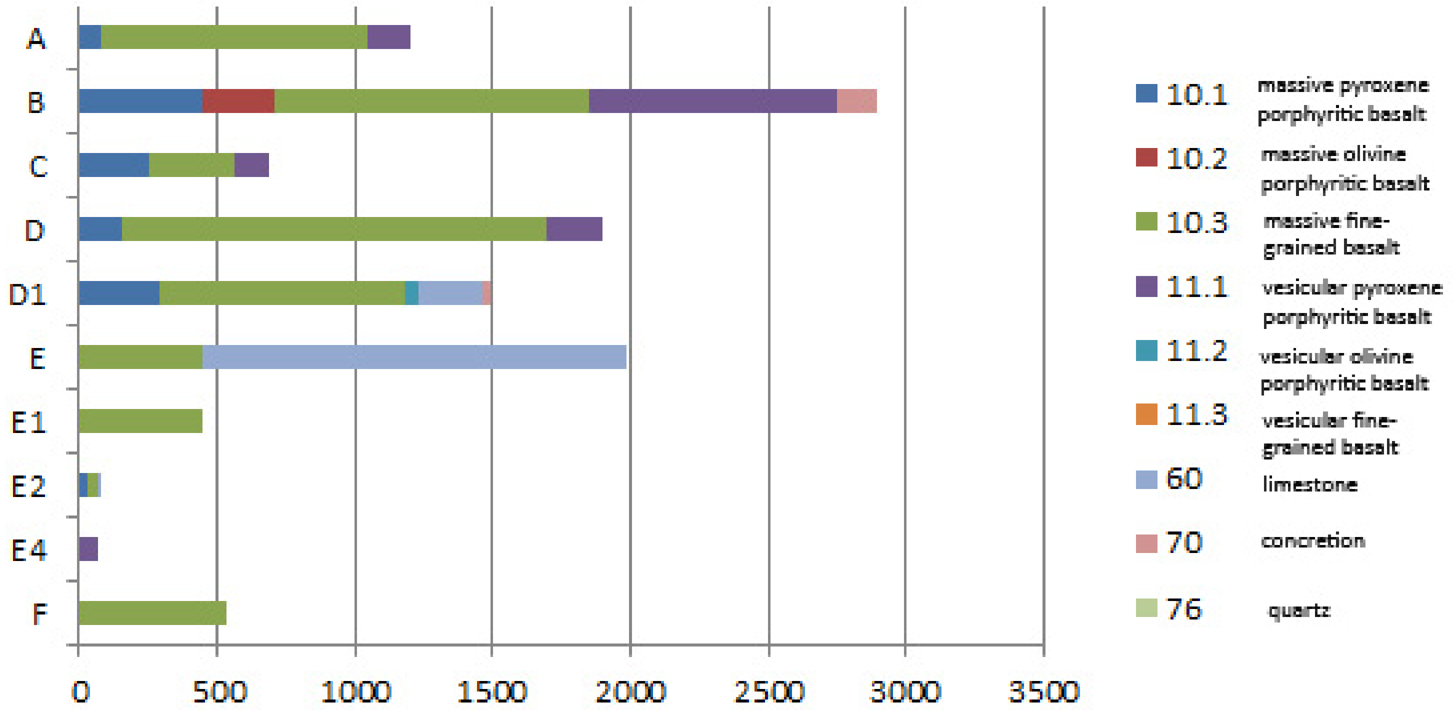

Figure 7.12 Stacked bar showing total weight in grams of material types between strata and the relative amount of each type of raw materials within each stratum in Operation 2E, Unit 15

The analysis of raw materials for ground stone artifacts recovered in the excavations of Unit 15, Operation E demonstrated variation in the use of raw materials over time.

In the two deepest strata which corresponded to the Late Formative Period (Table 7.6 and Figure 7.12: Stratum F and Stratum E4) there was the use of only one kind of basalt: vesicular fine-grained basalt (11.3) in Stratum F; and vesicular pyroxene porphyritic basalt (11.1). The sample size was small and only these types were found.

In the strata which corresponded to the Late Formative Period (Table 7.6 and Figure 7.12: Strata E2, E1, E, D1, and D) there is evidence that suggests that leveling and filling of the initial stage of plaza construction incorporated domestic refuse. The character of the fill then changes in Stratum C. Stratum C marks the construction of the plaza, and so functionally it is very different. There was the evidence that, in some cases, increased the types of raw materials used for making artifacts such as: massive pyroxene porphyritic basalt (10.1); massive fine-grained basalt (10.3); vesicular pyroxene porphyritic basalt (11.1); and vesicular olivine porphyritic basalt (11.2). This increase in the number of types of basalts used for making artifacts probably is related with the increase of ground stone artifacts which were manufactured and re-cycled in this context. Also, I identified remains of limestone (60) and concretion debris (70) maybe remains of building materials of this civic-ceremonial context.

In the strata that correspond to the Terminal Formative Period (Table 7.6 and Figure 7.12: Stratum B and Stratum A) there was found an increase in types of basalts used during the last part of the Late Formative Period. Taking into account that the place changed from a domestic context to a new one for performing civic-ceremonial activities, it is possible that the ground stone artifacts used during the Late Formative Period were re-cycled during the Terminal Formative Period as a fill for the construction of a plaza. The types of basalts which were used were: massive pyroxene porphyritic basalt (10.1); massive olivine porphyritic basalt (10.2); massive fine-grained basalt (10.3); and vesicular pyroxene porphyritic basalt (11.1). There were concretions (70) probably used in the construction of the plaza.

General comments on the results of ground stone analysis of Group 2

The excavations in Group 2, which were named Operation 2, provided important data on ground stone artifacts for a better understanding about the changes over time in the use of the place (i.e., changes in function inferred from the ground stone residues and their contextual association with stratigraphy, depositional contexts, and other materials such as the shift from domestic to civic-ceremonial or from elite residential-administrative activities), variation in terms of ground stone production (for instance, the difference between a domestic production unit and an attached workshop in an elite residential setting which engaged in multi-crafting, taking into account the identified by-products and remains of production tools). These excavations offered the possibility to learn about technological changes that occurred in different periods as well as the diverse repertoire of lithic techniques found in different contexts which were related to socio-economic status. Also, it was possible to identify the variation in the use of raw materials over time and between different kinds of economic contexts. It was surprising to see that the changes in the use of raw materials varied within the same Group 2, it means that the changes were not uniform contexts in the Group. The changes were related to economic differences in this part of Tres Zapotes and also the variation in the use of types of raw materials increased over time. In Group 2 what is particularly notable is the ubiquity of ground stone manufacturing residues – in domestic contexts, elite residential/administrative contexts

Changes of function noticed in different contexts in Operation 2

Operation 2A, Units 2 and 3, Units 4 and 5, and Operation 2E

In these three cases it is possible to see the changes in the use of space. In these examples, during the Late Formative Period, there were domestic units which show evidence of remains of ground stone artifacts used for quotidian activities and remains of by-products which indicate domestic production of basalt tools. In the upper strata of Operation 2A, in spite of the fact that recovered basalt artifacts were in a context of plaza fill, there were assemblages that suggest their initial use in domestic contexts. Therefore, there is an example of recycling basalt tools originally used in domestic contexts which were later used as a fill. And in the case of Operation 2E (Unit 15) the assemblage of basalt artifacts that corresponds to a Late Formative Period domestic context, exhibits similar characteristics to the contexts found in Operation 2A (Units 2, 3, 4, and 5). Domestic contexts contained manos (2) and metates (1), as well as by-products that indicate a local production of basalt tools needed for use in households. The production indicators included flakes (20), macro-flakes (20.1), quarters (50.6), cores (50.2), blocks (50.3), etc.

In Operation 2A (Units 2 and 3, Units 4 and 5) and Operation 2E (unit 15), the strata which date to the Terminal Formative Period and the Terminal Formative - Early Classic Period in Units 4 and 5, and Stratum C in Unit 15 show more similarity among them, and it is possible to say that these contexts correspond to the fill of the plaza. The function changed in these places from domestic activities to civic ceremonial ones. And in the archaeological record it is possible to identify the differences in the two types of functions. The assemblages which were obtained from a plaza fill context show these characteristics: low occurrence of manos (2) and metates (1), the absence of this tool-kit, or the presence of only one component (mano (2) or metate (1)); occurrence of by-products which were re-cycled due to their similar size (hammer stones (27), quarters (50.6), macro-flakes (20.1), flakes (20), cores (50.2), etc.) and this homogenous size allowed an easier piling; and the occurrence of raw materials used in construction of structures similar to the ones found in plazas such as limestone (60), sandstone (72), tuff (69), etc.

In all these examples, the changes that happened in the type of activities which were performed in these places were also associated with an increase in the kind of raw materials that were used. In Operation 2A (Units 2 and 3) during the Late Formative period were used massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), and vesicular pyroxene porphyritic basalt (11.1). But during the Terminal Formative Period were used massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular fine grained basalt (11.3), sandstone (72), and quartz (76). In the same Operation 2A (Units 4 and 5) during the Late Formative Period were used massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), vesicular fine grained basalt (11.3), calcite (71), sandstone (72), and quartz (76). During the Terminal Formative period the use of variety of utilized raw materials has a subtle increase in respect to the Late Formative Period, there were used massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), vesicular pyroxene porphyritic basalt (11.1), vesicular fine grained basalt (11.3), sandstone (72), and schist (63). And during the last stratum which correspond to the Early Classic-Terminal Formative there were used vesicular pyroxene porphyritic basalt (11.1), massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), vesicular fine grained basalt (11.3), tuff (69), sandstone (72), schist (63), and quartz (76).

The increase of the number of types of raw materials used also was noticed in Operation 2E, Unit 15. In the Late Formative Period strata there was only the occurrence of massive fine-grained basalt (10.3). During the Late Formative Period were used vesicular pyroxene porphyritic basalt (11.1), massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular olivine porphyritic basalt (11.2), limestone (60), and concretion debris (70). And during the last event that corresponded to the Terminal Formative Period, there also was an increase of the types of raw materials used which were massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), massive olivine porphyritic basalt (10.2), and quartz (76).

Operation 2B Units 6, 7, 8, 13, and 14; and Operation 2C Unit 12

In Group 2 there was also another type of change in the use of the place. In the cases of Operation 2B (Units 6, 7, 8, 13, and 14) and Operation 2C (Unit 12) a change occurred from domestic activities to elite residential administrative ones. This change can be inferred from the archaeological record because the remains of ground stone artifacts and their association with changes in depositional context, the character of the ceramic assemblage, and more contextual information suggest a transformation of activities that were performed in those places. In the case of the contexts found in Operation 2B which correspond to the strata that date back to the Early Formative, Middle Formative, and Late-Middle Formative periods, it is possible to say that the evidence of ground stone artifacts and by-products could be interpreted as domestic contexts. The archaeological correlates are: the presence of manos (2) and metates (1); tools for manufacturing artifacts such as hammer stones (27) and polishers (5); by-products which show the steps followed in the *chaîne opératoire* such as flakes (20), macro-flakes (20.1), cores (50.2), macro-cores (50.1), nodules (50.4), basalt fragments resulted from reduction (50.5), preforms (50.7); and different kinds of raw materials used in domestic contexts as well as other kinds of contexts such as hematite (66), quartz (76), sandstone (72), (75) gneiss, etc. In the domestic contexts abovementioned, the *chaîne opératoire* may have the same number of steps, but only certain steps are represented (and potentially were carried out), here. The implication is that households are engaging in all stages of production.

However, it is important to show the differences in domestic contexts between Operation 2B and 2C which were noticed. The domestic contexts found in the excavations of Operation 2B showed a gradual increase in the evolution of a local production unit. Artifacts associated with the the Early Formative period, included metates (1) tools for manufacturing artifacts such as stone hammers (27), and the by-products macro-flakes (20.1), flakes (20), and blocks (50.3). Then, during the Middle Formative Period there were found together manos (2) and metates (1); by-products such as macro-flakes (20.1) and flakes (20); and evidence of remains of raw materials used for manufacturing crafts such as hematite (66) and gneiss (75). In the later occupation which corresponded to the Late/Middle Formative periods there was evidence of an increase in the production of basalt artifacts, specifically manos (2) and metates (1). Tools used in production were recovered from these levels, such as hammer stones (27) and polishers (5); as well as more by-products such as macro-cores (50.1), basalt fragments of the reduction process of knapping (50.5), nodules (50.4), preforms (50.7), flakes (20) and macro-flakes (20.1). In the observations regarding this specific context there was information concerning the evidence of production of basalt artifacts. But during the Late Formative period there was a change in the use of this space where elite residential administrative functions were performed. The remains of ground stone artifacts seem to reflect this change in functions of the place. There was a smaller quantity of types of by-products than in the earlier period: metates (1), flakes (20), macro-flakes (20.1), blocks (50.3) and basalt fragments resulted from reduction (50.5). Finally, during the Early Classic Period it appears that the basalt artifacts were re-cycled for the fill of the construction. The selection of metates (1), flakes (20), and macro-flakes (20.1) indicates that specific sizes, weights, and qualities of materials were required for construction.

In the case of the contexts recovered in the excavations of Operation 2C, there was a different path of the changes in the use of the place. During the Middle/Early Formative activities included ritual associated with burial. In this context the domestic activities were represented in the ground stone artifacts which were associated with a human skull and pottery such as remains of manos (2), metates (1), flakes (20), and pebbles (24). During the following occupation in the Middle Formative period there is evidence of manos (2) and metates (1); by-products such as nodules (50.4), basalt fragments resulting from reduction and knapping, and cobbles with evidence of thermic shock (22). However, the occurrence of fragments of a basalt vessel in this space suggests that this domestic unit may have had somewhat higher status. It is not until the Late Formative period that there was an occupation with evidence of elite residential and administrative functions. The metates (1) and by-products such as blocks (50.3) were re-cycled as fill for the construction that could be defined more broadly as civic-ceremonial.

It is necessary to underscore that the occurrence in the types of raw materials used for manufacturing ground stone artifacts did not increase as much over time in Operation 2C (Unit 12) and Operation 2B (Units 6, 7, 8, 13, and 14) when these cases are compared with the results from the analysis made in Operation 2A. In Operation 2C, during the Early Formative period was used massive fine-grained basalt (10.3). During the Middle Formative period were employed massive fine-grained basalt (10.3) and massive pyroxene porphyritic basalt (10.1); additionally there were remains of pyroclast debris (68), sandstone (72), hematite (66), gneiss (75), and quartz (76). In the Late-Middle Formative stratum was found the use of massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and quartz (76). During the Late Formative period utilized raw materials included also massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and remains of quartz (76). And it was during the Early Classic period the used raw materials were when there were: massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and limestone (60). It is possible that the differences in the variation in the occurrence of raw materials between Operation 2A and Operations 2B-2C has to do with the acquisition of a greater diversity of raw materials by elites involved in civic-ceremonial functions.

Operation 2D , Units 9, 10, and 11

The excavations in Operation 2 obtained a wide diversity of contexts where ground stone artifacts were recovered and it was important to infer the past activities which were performed there. A key discovery which shed light about political-economic organization in the polity of Tres Zapotes is the identification of an elite-attached multi-crafting workshop on Mound 62 in Operation 2D (Units 9, 10, and 11).

Operation 2D also exhibited differences from other operations conducted in Group 2. There was evidence of a specialized workshop where different artifacts and goods were manufactured. And it is very important to underline that in this operation were found the most complete examples of the *chaîne operatoire* of the manufacture of ground stone artifacts, making this excavation particularly important for understanding the process of ground stone tool production.

Furthermore, there were differences among the strata which correspond to the evolution of complexity in ground stone technology and the increase in size and organization of production over time. It is necessary to observe the most evident changes which occurred in the stratigraphic story of this place. The Late Formative/Middle Formative occupation included manos (2), as well as tools for manufacture such as polishers (5) and hammer stones (27). There also were by-products such as macro-cores (20.1), cores (50.2), basalt fragments resulted from the reduction (50.5), and quarters (50.6). There was a unique small basalt cylinder as an example of one of the crafts which were produced. Also notable is the occurrence of raw materials such as ilmenite (64) and mica (74) that could correspond to the remains of other crafts which were produced in this workshop. During the Late Formative period there was a complete set of artifacts needed for grinding maize and other edible substances such as manos (2), metates (1), mortars (8), and pestles (7). The occurrence of this complete set of artifacts is unique and it could be related to the rate of activities which were performed there. Also recovered were tools for manufacturing basalt artifacts such as tejos (18) (polishers) and stone hammers (27). The by-products identified were cores (50.2), macro-flakes (20.1), flakes (20), basalt fragments (50.5), and quarters (50.6). There also were raw materials which could be used for making other crafts such as mica (74) and schist (63).

During the transitional Late-Terminal Formative period, there was evidence of the most productive stage in the story of this workshop. There was also the most complete set of artifacts for grinding maize which consists of manos (2), metates (1), basalt donuts (a support which was set underneath the metate) (13), mortars (8), and pestles (7). These items suggest that the people who live and work here had access to more types of food. There were tools for manufacturing basalt artifacts such as stone hammers (27), polishers (5), and abraders (12). The by-products were flakes (20), macro-flakes (20.1), unidentified debris of production (9), basalt fragments of the reduction process (50.5), preforms (50.7), and quarters (50.6). A very interesting example of tools that could be used for woodworking in a multi-crafting workshop are fragments of chisels (10.1), adzes (10.3), and axes (10.2). There were also remains of raw materials which could correspond to other crafts produced in this production unit such as mica (74) and serpentine (62).

Finally, during the Terminal Formative, the construction of the platform of Mound 62 was to facilitate the elite-residential and administrative activities of Mound 9. Therefore, the remains of ground stone artifacts could be recycled for obtaining materials for the fill. There are other features that suggest that this construction was more complex. There was evidence of a post mold as well as remains of a burial context. The ground stone remains diminished: flakes (20), macro-flakes (20.1), macro-cores (50.1), and quarters (50.6) were identified.

In regard to the use of raw materials over time, it very interesting to say that the types used, increased in each period. It seems that the workshop produced more kinds of artifacts. During the Late Formative Period were used massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1). There were also remains of mica (74). During the Late Formative Period were used massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3). In addition, the excavations of Operation 2D recovered mica (74) and schist (63) for the crafting of other goods, as well as sandstone (72), concretions (70), and tuff (69). During the Late-Terminal Formative transition were used massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt

(10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular olivine porphyritic basalt (11.2), and vesicular fine grained basalt (11.3). There were also remains of mica (74) and serpentine (62). Sandstone (72), pyroclasts (68), tuff (69), quartz (76), and limestone (60) also occurred. This abundance of diverse types of raw materials is related to increased intensity of production and diversification of products. Finally, during the Terminal Formative Period there was a decline in production, a process of re-cycling artifacts, and the construction of architectural features. The raw materials recovered included massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1) and remains of sandstone (72).

Operation 5. Group 3. Analysis of Operation 5 (Units 30, 31, 32 and 41)

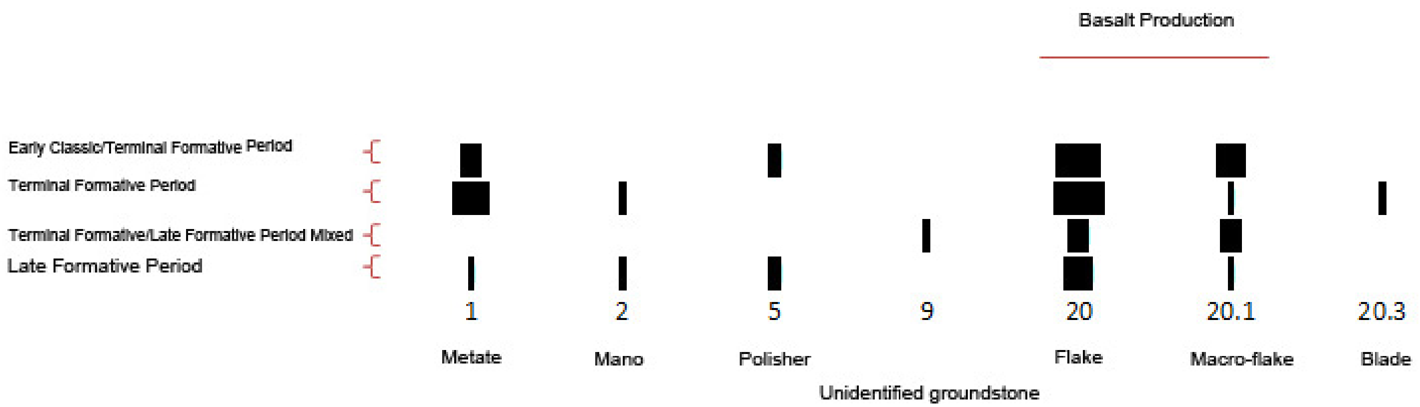

Figure 7.13 Battleship curve graphic of the percent distribution of the ground stone artifacts in Units 30, 31, 32, and 41, Operation 5

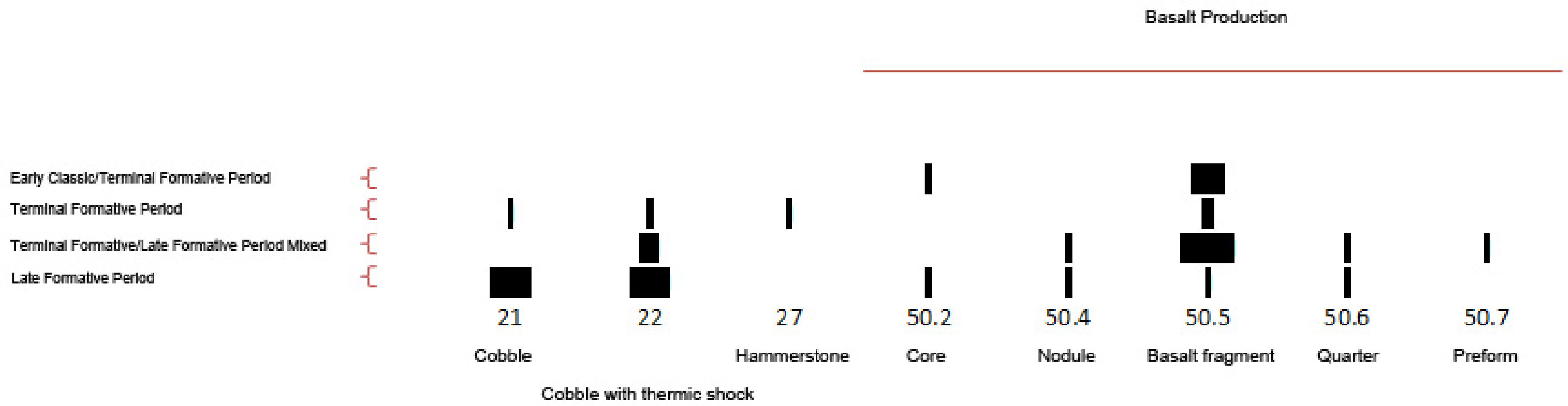

Figure 7.13 Battleship curve graphic of the percent distribution of the ground stone artifacts in Units 30, 31, 32, and 41, Operation 5 (Continued)

The analysis of the remains of the ground stone artifacts found in Operation 5 is made up of the materials obtained in Units 30, 31, 32 and 41 which were excavated in Group 3. This study is important for comparing its results with the findings discovered in other Operations which corresponded to other Groups in Tres Zapotes. Group 3 has a complex layout which comprises five large mounds and several smaller mounds grouped around two plazas. Plaza A was located in the southern end and runs east-west and had an elongated structure (Mound 28) on its northern edge. It was intersected at its eastern edge by Plaza B, which runs north-south. Plaza B was delimited at its northern edge by Mound 23, the largest conical temple mound at the site, and on its western side by Mound 24 (an elongated platform). Plaza C lies to the east of Mound 24. The different excavated units showed contexts which correspond to the Late Formative period and events that date to the Terminal Formative period. The assigned functions, resulted from preliminary observations, were an elite residential structure; remains of the construction of a plaza; some civic ceremonial spaces; and, below the floor of a public space, a possible domestic occupation.

In Operation 5 in Unit 30, during the Late Formative period (Figure 7.13), there was evidence of a trash pit (basurero) and a secondary refuse deposit which contain evidence of basalt production as well as residential activities such as grinding maize. There were polishers (5) flakes (20), macro-flakes (20.1) basalt fragments (50.5) quarters (50.6), cobbles (21) cobbles with evidence of thermic shock, pebbles (24), pebbles with evidence of thermic shock (25), metates (1), and manos (2). In the deeper levels of this occupation associated with the floors, there were sandstone (72) and limestone (60). The interpretation of this context is that during this period, this place was used as an elite residential administrative unit where ground stone production and maize grinding activities were performed. All the items were discarded in the small trash pit and the secondary refuse deposit.

In Unit 41, also during the Late Formative period, on the surface of a floor were found maize grinding tools: metates (1), and manos (2), as well as a polisher (5). In the same period, Units 31 and 32 (Figure 7.13) show evidence of the use of ground stone artifacts for the fill of the plaza. There were manos (2), flakes (20), macro-flakes (20.1), cobbles (21), cobbles with evidence of thermic shock (22), pebbles (24), pebbles with evidence of thermic shock, cores (50.2), nodules (50.4) basalt fragments (50.5), and remains of limestone (60), lutite (67), pyrosclast (68), and tuff (69). There were also remains of hematite (66) in association with a ceramic concentration, which may be an offering included in the construction of the plaza (Figure 7.13). In the plaza fill below the clay floor, there were pebbles (24), and pebbles with evidence of thermic shock (25). In the plow zone where there were Late Formative ceramics, there were manos (2), polishers (5), and, flakes (20) (Figure 7.13).These Units 31 and 32 show evidence of a fill for the plaza which was a civic-ceremonial context.

In regard to Unit 30, to the contexts which contain ceramics which corresponded to the Late Formative/Terminal Formative periods (Figure 7.13) there is evidence of slope wash which shows evidence of basalt production and maize grinding activities from elite residential administrative contexts. There were found manos (2), unidentified ground stone artifacts (9), flakes (20), macro-flakes (20.1), pebbles (24), nodules (50.4), basalt fragments (50.5), quarters (50.6), and preforms (50.7). In the plow zone with ceramics of the same period there were pebbles (24) and stone hammers (27) (Figure 7.13).

In Unit 41, during the Terminal Formative (Figure 7.13), there was found evidence of both basalt production and maize grinding activities which were performed in the plaza floor that correspond to a civic-ceremonial context. There were flakes (20), macro-flakes (20.1), pebbles (24), pebbles with evidence of thermic shock (25), stone hammers (27), as well as manos (2), and metates (1). In the fill, there were used cobbles (21), micro-flakes (20.3), and limestone remains (60). In the plow zone there were cobbles with evidence of thermic shock (22).

Finally, in Unit 41, in the plow zone (Figure 7.13), where there ceramics which date to the Terminal Formative-Early Classic periods, there were remains that pertained to the fill of a civic-ceremonial context. There were metates (1), polishers (5), macro-flakes (20.1), pebbles (24), cores (50.2), and basalt fragments (50.5), and residues of limestone (60).

The use of raw materials found in Units 30, 31, 32, and 41 (Operation 5) over time

Table 7.7 Types of raw materials found in Operation 5, Units 30, 31, 32, and 41 (the figures are weights in grams)

EC/TF	1258	0	1311	2009	0	0	8
TF	1808	0	6722	1890.8	0	224	64
TF/LF	702	0	98.1	345.8	0	199.1	48.6
LF	12826.1	143	8677.9	0	0	0	0
	10.1	10.2	10.3	11.1	11.2	11.3	60
	massive pyroxene porphyritic basalt	massive olivine porphyritic basalt	massive fine-grained basalt	vesicular pyroxene porphyritic basalt	vesicular olivine porphyritic basalt	vesicular fine-grained basalt	limestone

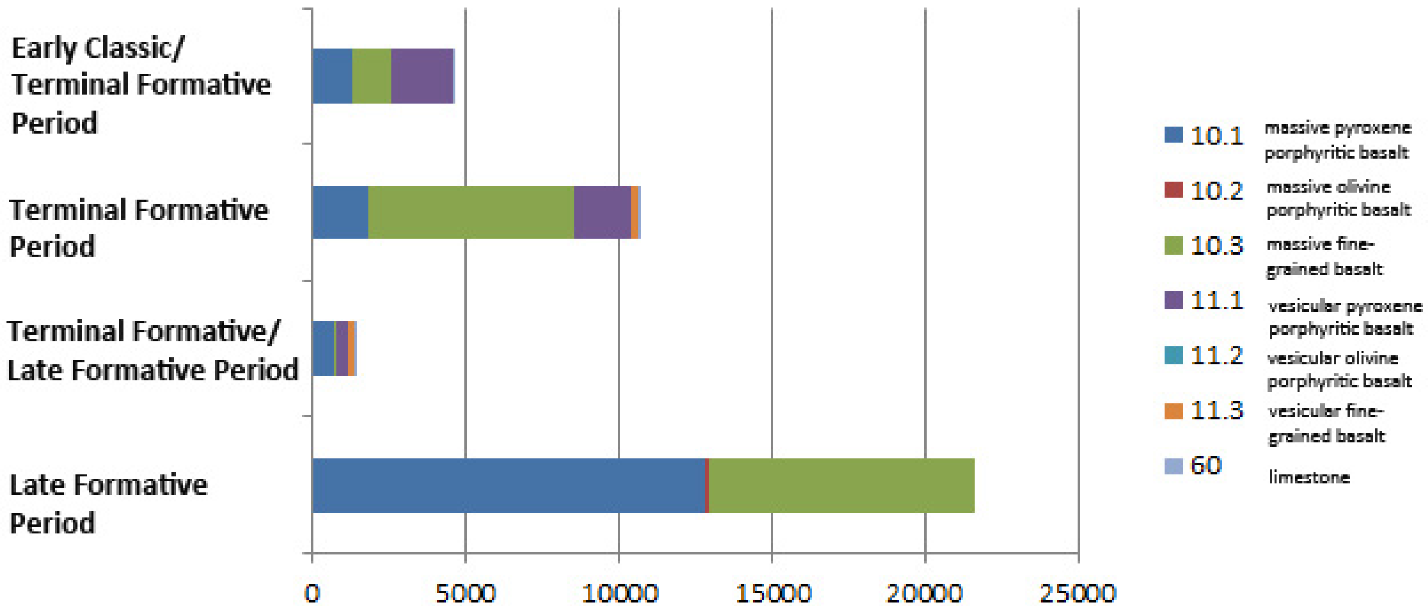

Figure 7.14 Stacked bar showing total weight in grams of material types between strata and the relative amount of each type of raw material within each stratum in Operation 5, Units 30, 31, 32, and 41

Based on the analysis of the types of raw materials used in Group 3, Operation 5, the following results were obtained: during the Late Formative period (Table 7.7 and Figure 7.14) in Unit 30, in the small trash pit and in the secondary refuse deposit, there were used massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1) and remains of limestone (60). The raw materials which were the most used were massive fine-grained basalt (10.3) and massive pyroxene porphyritic basalt (10.1). in the same period, in Unit 41 (Table 7.7 and Figure 7.14), there were items which were found on a floor and corresponded to the most used raw materials which appeared in the trash pit and the secondary refuse deposit: massive fine-grained basalt (10.3) and massive pyroxene porphyritic basalt (10.1). And also in the same period of Unit 32 (Table 7.7 and Figure 7.14), the raw materials which were used for the fill of the plaza were vesicular pyroxene porphyritic basalt (11.1), massive pyroxene porphyritic basalt (10.1), and massive fine-grained basalt (10.3). The preferred raw materials for this context were vesicular pyroxene porphyritic basalt (11.1) and massive pyroxene porphyritic basalt (10.1). In regards to Unit 31 (Table 7.7 and Figure 7.14), during the Late Formative period, the use of raw materials for the fill of the plaza was the following: massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3). Also were used limestone (60), lutite (67), pyroclast (68), tuff (69), and quartz (76). There were remains of hematite (66) which were associated with a ceramic concentration, which may be residues of an offering dedicated to the construction. In this Unit 31 the most used raw materials were vesicular pyroxene porphyritic basalt (11.1) and massive fine-grained basalt (10.3).

In Unit 30, in contexts of slope wash and plow zone which contain Late Formative/Terminal Formative ceramics (Table 7.7 and Figure 7.22), there were massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular fine grained basalt (11.3) and sandstone (72). These materials came from elite domestic administrative contexts.

During the Terminal Formative period, in Unit 30 (Table 7.7 and Figure 7.14) were used massive pyroxene porphyritic basalt (10.1) and vesicular pyroxene porphyritic basalt (11.1) and the artifacts were associated to ceramic concentrations. In the case of Unit 41 (Table 7.7 and Figure 7.14) the items found on the plaza floor (civic-ceremonial context) were made out massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3). In the fill of the plaza were used massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and hematite (66).

In Unit 41, in contexts which contain Terminal Formative/Early Classic pottery (Table 7.7 and Figure 7.14), there were used massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and limestone (60).

Finally, in Unit 32 (Table 7.7 and Figure 7.14), in mixed contexts in the plow zone, there were used massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1).

Nestepe Group, Analysis of Operation 6 (Units 34, 35, and 40)

Figure 7.15 Battleship curve graphic of the percent distribution of the ground stone artifacts in Units 34, 35, and 40, Operation 6.

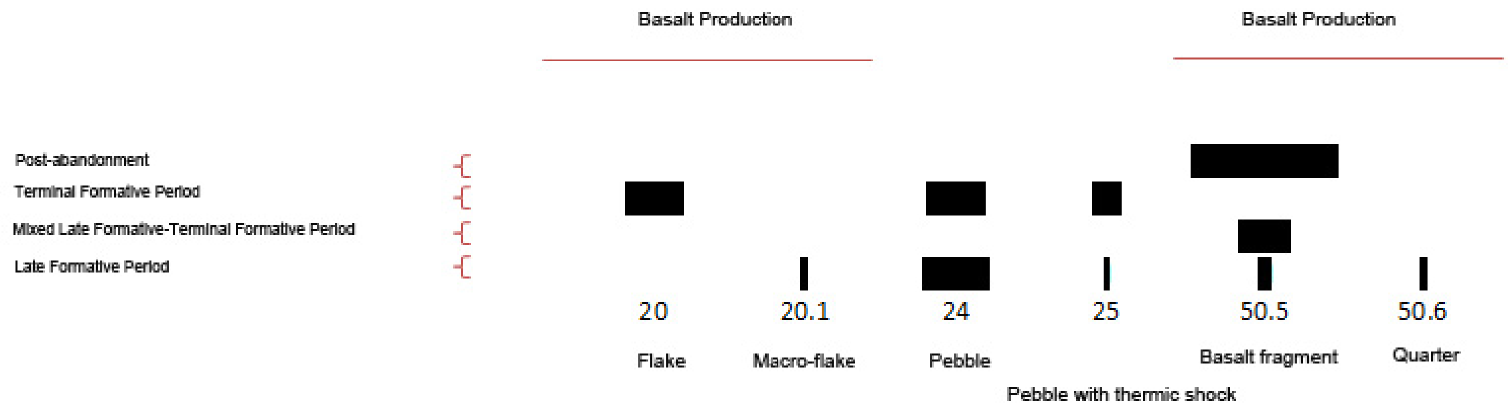

Figure 7.15 Battleship curve graphic of the percent distribution of the ground stone artifacts in Units 34, 35, and 40, Operation 6 (Continued)

The ground stone remains which were found in Operation 6 consisted of materials recovered in Units 34, 35, and 40, which were excavated in the Nestepe Group. In the Nestepe group, excavations tested deposits around Mound 50. Unit 34 was placed on a low spur that projected from the NW corner of Mound 50. Unit 35 was placed north and behind Mound 50 in order to test the area of the highest artifact density indicated by auger tests. And Unit 40 was placed over a magnetic anomaly in the plaza to the south of Mound 50. Some features of Mound 50 were similar to Mound 62 in Group 2 and Mound 113 in Group 1. The excavations in Unit 34 found similar remains to those encountered in Mound 62, including 3 episodes of platform construction and Late Formative refuse deposits. Unit 35 discovered a thick stratum which contained large sandstone and tepetate blocks that may have fallen from Mound 50 or may have been discarded in a late construction episode. Unit 40 found the plaza floor represented by a compact deposit of sandy clay and tuff.

Based on the results of the analysis of types of ground stone artifacts found in the Nestepe Group, Operation 6, Units 34, 35, and 40, it is possible to discuss the occurrence of tools and their association with distinct contexts.

The only materials recovered from Late Formative deposits in Unit 40 were pebbles with thermic shock (25). Unit 34 (Figure 7.15), in a refuse deposit were discarded manos (2), metates (1), and pieces of lutite (67). On the floor were found flakes (20) and pebbles (24). In a context of feasting in association with semi-complete vessels, there were unidentified artifacts of ground stone (9) and some steps of the manufacture of basalt stone artifacts such as macro-flakes (20.1), basalt fragments (50.5), and basalt quarters (50.6). This context of feasting (Figure 7.15) is interesting because the process of production was present in a ceremony and perhaps is related to the transformation from raw material to a manufactured item, a metaphor for the creation of life, while at the same time, the sacred death of the ceramic vessels was represented in this place. In the fill, there were flakes (20) and limestone (60). In Unit 35 (Figure 7.15), in a context of slope wash, there were mortars (8), flakes (20), and pebbles (24). The mound fill contained flakes (20).

In the plow zone of Unit 35 (Figure 7.15) in levels which contained ceramic materials that correspond to the Terminal Formative/Late Formative periods axes (10.2), flakes (20), basalt fragments (50.5), and sandstone (72) occurred.

In the plow zone in Unit 34, which contained Terminal Formative materials, were found flakes (20), pebbles (24), and cobbles (25). Limestone (60) was recovered from the fill of the structure.

Finally, in Unit 40 (Figure 7.15), basalt fragments (50.5) were recovered from the alluvium in a post-abandonment context.

The use of raw materials found in Units 34, 35, and 40 (Operation 6) over time

Table 7.8 Types of raw materials found in Operation 6, Units 34, 35, and 40 (the figures are weights in grams)

post abandonment		170	0	0	0	0	0	0	0	0	0	0
TF		106.4	0	58.9	92.5	0	13.2	273.2	0	0	0	0
mixed LF-TF		37.4	0	18.3	14	0	0	0	0	0	22	0
LF		241.1	13	2080	761.7	0	0	361.6	191.5	154.3	0	1.3
		10.1	10.2	10.3	11.1	11.2	11.3	60	61	67	72	76
		massive	massive	massive	vesicular	vesicular	vesicular	limestone	flint	lutite	sandstone	quartz
		pyroxene	olivine	fine-grained	pyroxene	olivine	fine-grained					
		porphyritic	porphyritic	basalt	porphyritic	porphyritic	basalt					
		basalt	basalt		basalt	basalt						

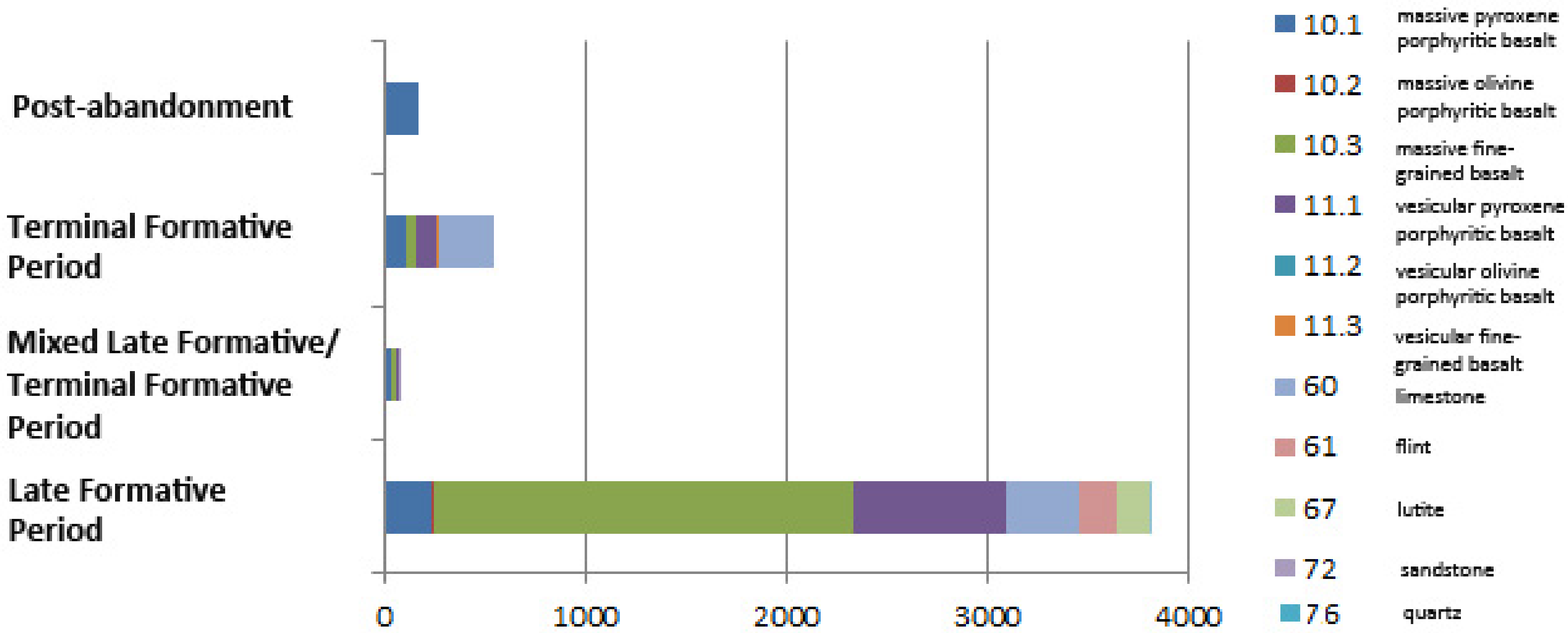

Figure 7.16 Stacked bar showing total weight in grams of material types between strata and the relative amount of each type of raw material within each strata in Operation 6, Units 34, 35, and 40

In Unit 40 (Table 7.8 and Figure 7.16), during the Late Formative period, in the fill of the structure was found massive pyroxene porphyritic basalt (10.1). In respect to Unit 34 (Table 7.8 and Figure 7.16) on the floor were found massive olivine porphyritic basalt (10.2) and massive fine-grained basalt (10.3). In the context which corresponded to feasting activities, there were recovered massive fine-grained basalt (10.3) and flint (61). In Unit 35, in a context of slope wash, there were found massive pyroxene porphyritic basalt (10.1) and vesicular pyroxene porphyritic basalt (11.1). And in the fill massive fine-grained basalt (10.3) occurred.

In Unit 35 (Table 7.8 and Figure 7.16), in contexts which contained mixed ceramic materials that date to Late Formative/Terminal Formative periods, were found in the plow zone massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and sandstone (72).

In Unit 34, during the Terminal Formative period, in the plow zone were found massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and limestone (60).

Finally, in Unit 40 (Table 7.8 and Figure 7.16), in the plow zone, in a context of abandonment was found massive pyroxene porphyritic basalt (10).

Group 1. Analysis of Operation 4 in Group 1 (Units 19, 20, and 25)

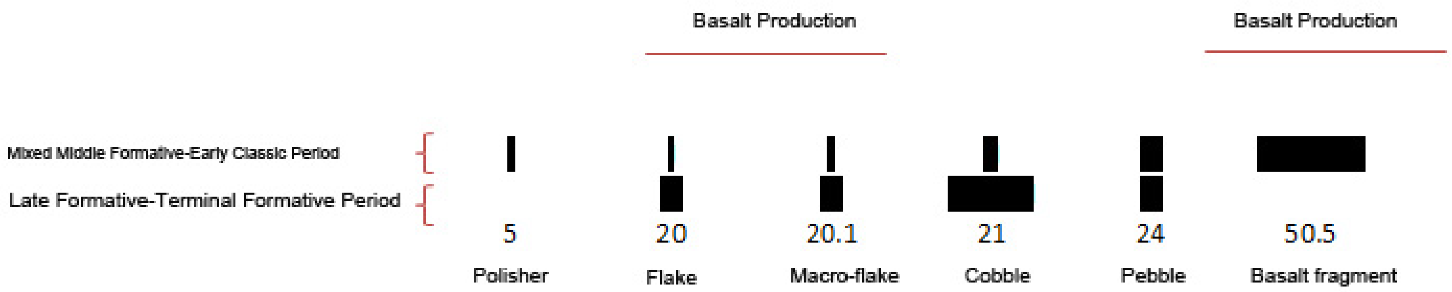

Figure 7.17 Battleship curve graphic of the percent distribution of the ground stone artifacts in Units 19, 20, and 25, Operation 4

Operation 4 tested deposits north of Mound 1 and Mound 113, a low spur similar to Mound 62 in Group 2. The excavations in Mound 113 showed that it was a natural sandstone formation covered by light Terminal to Classic period occupation. The excavation north of Mound 1, which yielded mainly Late Formative remains as well as Middle Formative pottery and one diagnostic Early Formative sherd. The cultural deposits appear to be the result of slope wash from Mound 1, and suggest a less residential focus for Mound 1 due to the low density of archaeological remains.

Based on the analysis of ground stone artifacts found in Group 1 that were recovered in excavations of Operation 4 (which comprises Units 19, 20, and 25) it is possible to discuss some observations in regard to the different contexts where the artifacts occurred.

The plow zone of Unit 25 (Figure 7.17), which contained ceramics dated to the Late to Terminal Formative periods, yielded basalt flakes (20), macro-flakes (20.1), cobbles (21), pebbles, (24), limestone (60) and serpentine (62).

In Unit 20 (Figure 7.17), slope-wash deposits containing mixed Middle Formative to Early Classic ceramics contained basalt pebbles (24). Slope-wash deposits in Unit 19 (Figure 7.17), contemporary with those in Unit 20, contained polishers (5), flakes (20), cobbles (21), pebbles (24), basalt fragments (50.5), and sandstone (72). The plow zone of Unit 19 contained flakes (20), macro-flakes (20.1), pebbles (24), basalt fragments (50.5), and sandstone (72).

The use of raw materials found in Units 19, 20, and 25 (Operation 4) over time

Table 7.9 Types of raw material found in Operation 4, Units 19, 20, and 21 (the figures are weights in grams)

Mixed MF-EC										
	1181.9	819.6	399.9	244.4	0	0	0	0	54.3	47
LF	74.2	0	133.7	0	0	0	15.7	7.2	0	0
	10.1	10.2	10.3	11.1	11.2	11.3	60	62	72	76
	massive	massive	massive	vesicular	vesicular	vesicular	limestone	serpentine	sandstone	quartz
	pyroxene	olivine	fine-grained	pyroxene	olivine	fine-grained				
	porphyritic	porphyritic	basalt	porphyritic	porphyritic	basalt				
	basalt	basalt		basalt	basalt					

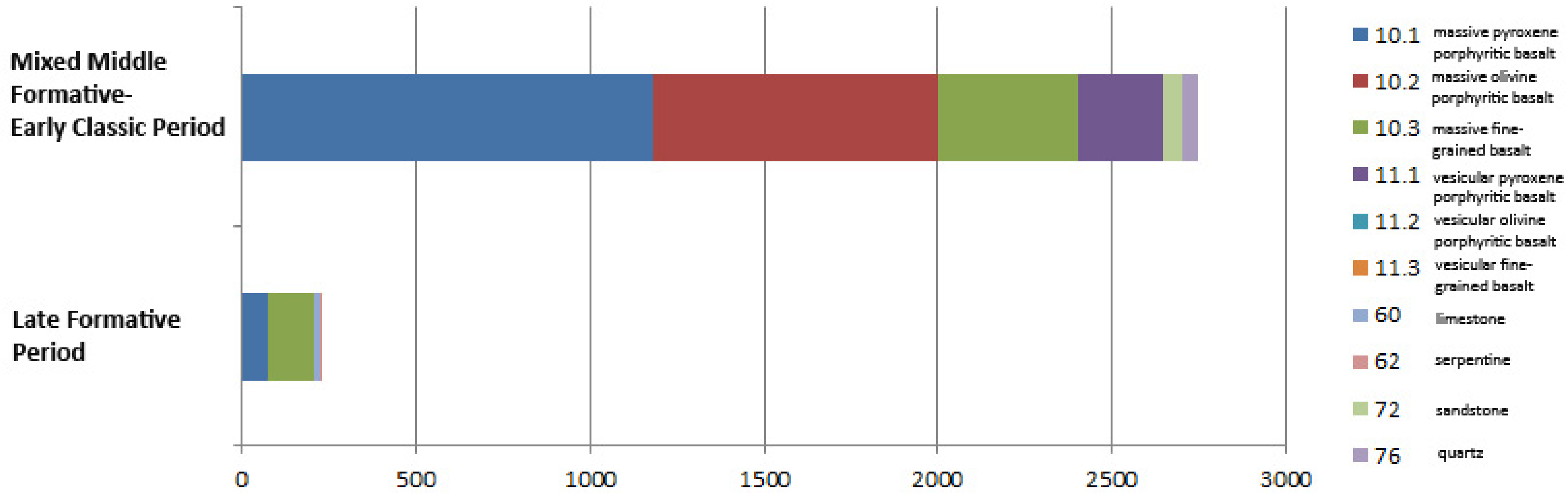

Figure 7.18 Stacked bar showing total weight in grams of material types between strata and the relative amount of each type of raw material within each stratum in Operation 4, Units 19, 20, and 25

Raw materials from Late to Terminal Formative period deposits in Unit 25 (Table 7.9 and Figure 7.18) included pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), limestone (60), and sandstone (72).

In the slope wash of Unit 20 (Table 7.9 and Figure7.18), which contained ceramics spanning the Middle Formative to Early Classic period, were found massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), and vesicular pyroxene porphyritic basalt (11.1). In a contemporary deposit in Unit 19 (Table 7.9 and Figure 7.18) also in slope wash, there were found massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1), sandstone (72) and quartz (76). In the same Unit 19, but in the plow zone, there were found also pyroxene porphyritic basalt (10.1), massive olivine porphyric basalt (10.2), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1), sandstone (72) and quartz (76).

Operation 3A - Area of non-elite residential occupation and independent craft production, Units 17, 18, 24, and 33

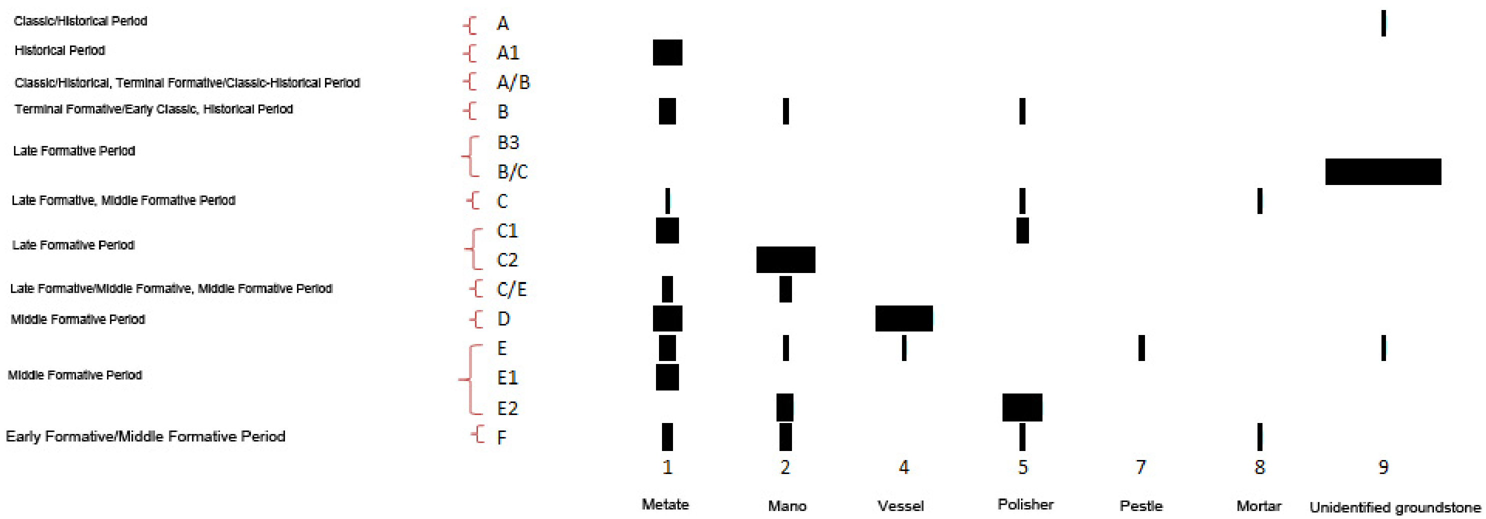

Figure 7.19 Battleship curve graphic of the percent distribution of ground stone artifacts found in Units 17, 18, 24, and 33, Operation 3A

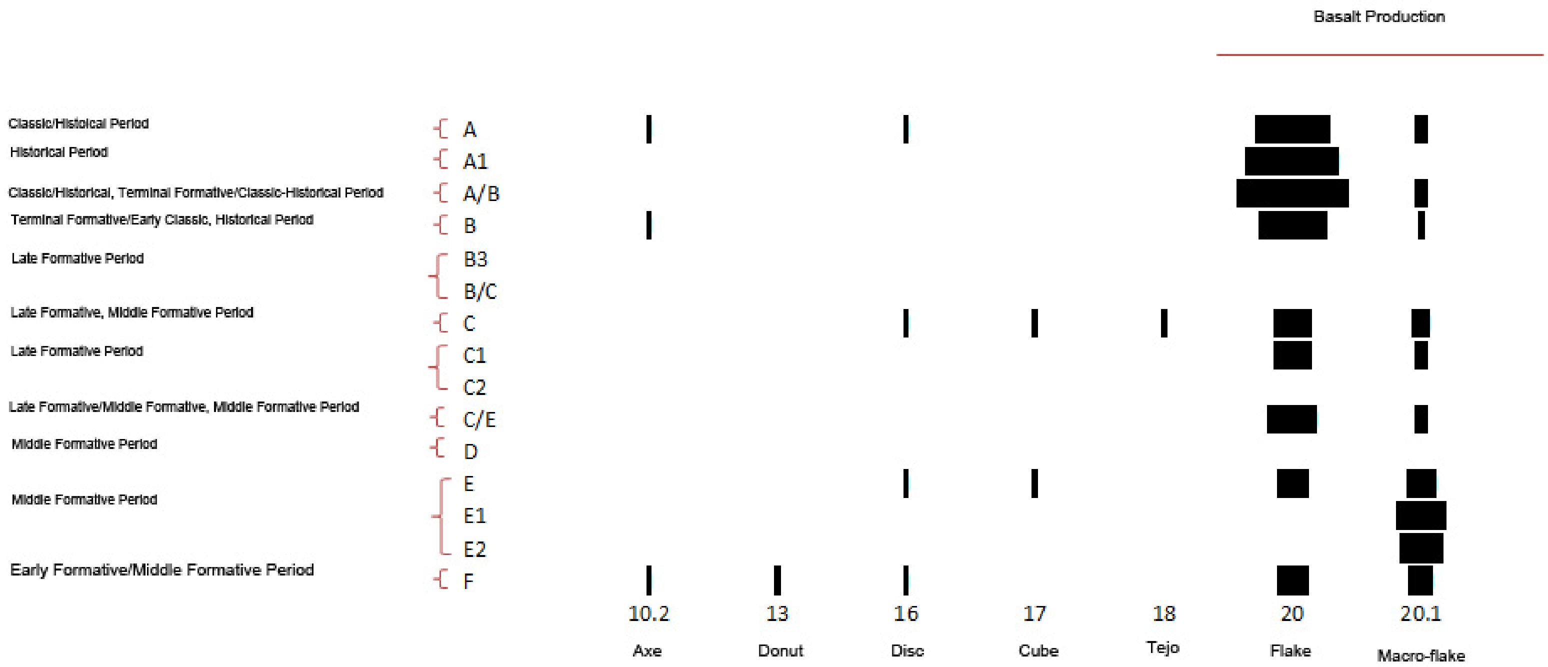

Figure 7.19 Battleship curve graphic of the percent distribution of ground stone artifacts found in Units 17, 18, 24, and 33, Operation 3A (Continued)

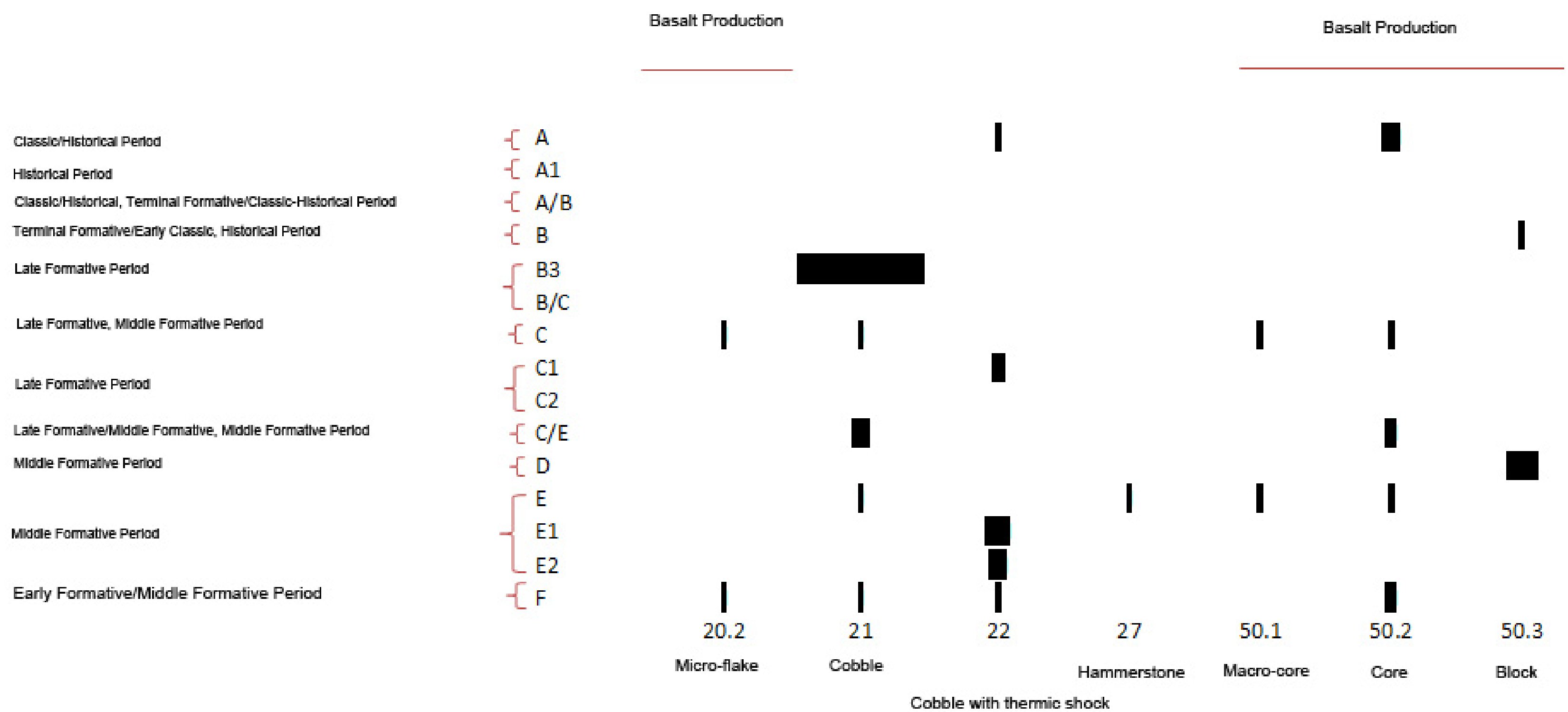

Figure 7.19 Battleship curve graphic of the percent distribution of ground stone artifacts found in Units 17, 18, 24, and 33, Operation 3A (Continued)

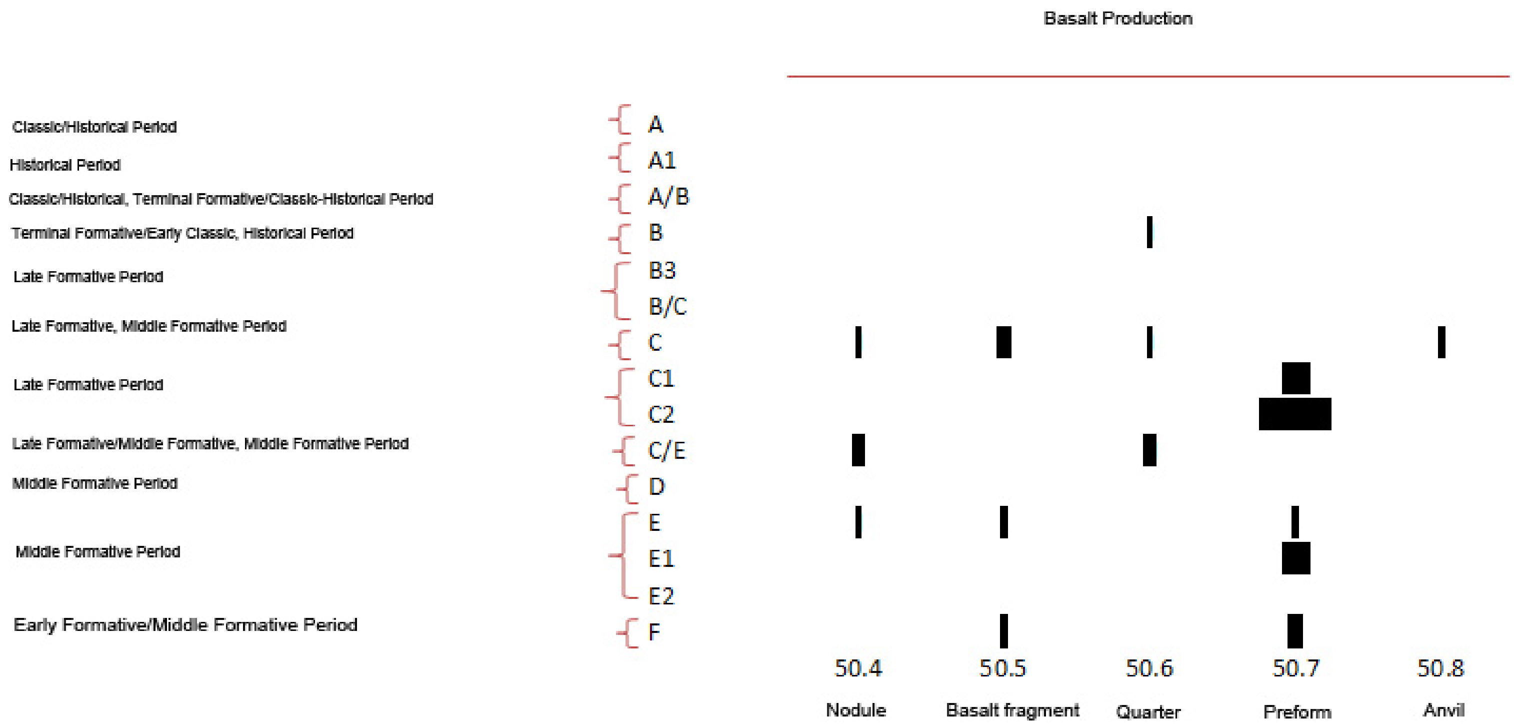

Figure 7.19 Battleship curve graphic of the percent distribution of ground stone artifacts found in Units 17, 18, 24, and 33, Operation 3A(Continued)

Sub-operation 3A consisted of six excavation pits placed on the summit and southern slope of Mound 111. The excavations found: a small Colonial period platform of sandstone blocks underlain by Late to Terminal deposits containing debitage reflecting low levels of obsidian and basalt artifact production. Lower levels contained domestic refuse extending back to the Early/Middle Formative transition as well as one adult burial and two child burials of the Middle Formative period. The adult and one of the child burials were associated with grave goods that included serpentine beads, obsidian, blades, ceramic vessels, and a concentration of small, rounded pebbles. In Units 17, 18, 24, and 33, the following results were obtained:

In Stratum F, which dates back to the Early/Middle Formative transition (Figure 7.19), there was evidence of domestic activities for grinding maize and production of ground stone artifacts. In this stratum there were artifacts for grinding maize such as metates (1), mortars (8), and basalt donuts (13) (basalt donuts may been used to hold footed metates in place) (Figure 7.20). Also, there was evidence of tools for manufacturing ground stone artifacts such as polishers (5) and discs (16). There were remains of production such as macro-flakes (20.1), flakes (20), cobbles (21), cobbles with evidence of thermic shock (25), cores (50.2), basalt fragments (50.5), and preforms (50.7). Additionally, there were remains of stone axes (10.2) which suggest wood working in the surroundings of domestic units. And finally, there were remains of tuff (69) and calcite (71).

Figure 7.20 The basalt donuts as a component in the tool kit for grinding maize used in contemporary Mayan communities at Guatemala (Searcy 2005:70)

In regard to the strata E2, E1, and E (Figure 7.19), which date back to the Middle Formative period, there also was evidence of domestic activities that involved grinding maize as well as production of basalt ground stone tools. Grinding implements include manos (2), metates (1), and pestles (7). Tools for manufacturing basalt artifacts consisted of hammer stones (27), polishers (5), and discs (16). Also recovered was debris of basalt production such as macro-flakes (20.1), flakes (20), cobbles (21), cobbles with evidence of thermic shock (25), macro-cores (50.1), cores (50.2), basalt fragments (50.5), and preforms (50.7). Discarded finished products included fragments of basalt vessels (4) and basalt cubes (17). Finally, there were remains of sandstone, possibly used as raw material for making abraders (12). In the comparison between the Early Formative-Middle Formative transition stratum and the Middle Formative strata, it is possible to observe that there was an increase in the level of independent production of ground stone artifacts; the *chaîne opératoire* has evidence of more steps which were performed in the same place. In regard to the tools needed for grinding maize, there was a higher absolute frequency during the Middle Formative period.

In Stratum D which dates back to the Middle Formative Period there was evidence of domestic tools for grinding maize, discarded artifacts such as remains of a basalt vessel (4) and evidence of production such as remains of a basalt block (50.3). The specific context where those artifacts were found corresponded to a daub concentration/midden.

In regard to Stratum C/E which dates back to the Middle Formative period, there is very interesting evidence concerning domestic debris as well as burial contexts (Burial 1 and an Adult burial). It is possible to observe that the remains found corresponded to domestic activities which involved basalt tools for grinding maize and an independent unit of production of ground stone artifacts. These material remains are mirrored in the offerings associated with the burials. The interpretation is that the ground stone artifacts incorporated in the offerings in burials represented the activities performed in domestic units. In both contexts there were remains of: metates (1), manos (2), macro-flakes (20.1), flakes, cobbles (21), cores (21), nodules (50.4), and quarters (50.6).

In regards to the Strata C1 and C2, which date back to the Late Formative period, there are remains of ground stone artifacts that suggest domestic activities that comprise grinding maize and the independent production of ground stone artifacts. There were remains of: metates (1), manos (2), macro-flakes (20.1), flakes (20), cobbles with evidence of thermic-shock (22), and performs (50.7).

In the case of Stratum C which dates back to Late Formative period, it is possible to observe that domestic activities were performed in this place. Those activities involved tools for grinding maize, by-products resulting from production of ground stone artifacts, and some discarded artifacts which were used in the domestic unit. There were remains of: metates (1), mortars (8), polishers (5), macro-flakes (20.1), micro-flakes (20.2), cobbles (21), macro-cores (50.1), cores (50.2), nodules (50.4), basalt fragments (50.5), quarters (50.6), an anvil (50.8), discs (16), a cube (17), and tejos (18) (rounded artifacts, with a central hole, polished in both sides, which were used for polishing ground stone artifacts in units of production). It is important to mention that this context provided many steps of the *chaîne opératoire*, where it is possible to see residues from early reduction (macro-core (20.1) through the tiny by-products (micro-flakes (20.2)). This assemblage supports the existence of independent production of ground stone artifacts in domestic contexts.

In regard to the Strata B3 and B/C which dates back to the Late Formative period, and correspond to a domestic context, there were scarce ground stone artifacts consisting of unidentified remains of ground stone artifacts(9) and cobbles (21).

In Stratum B, dating to the Terminal Formative period, domestic activities are identified from the residues of ground stone artifacts. The domestic activities comprised grinding maize and independent production of ground stone tools. There were remains of: metates (1), manos (2), polishers (5), macro-flakes (20.1), blocks (50.3), and quarters (50.6). It seems that the production of artifacts declined. In levels of Stratum B that contained Early Classic ceramics, there were pebbles (24), which suggest that productive activities seem to have changed. And during the Historic period, in the upper levels of Stratum B, there occurred fragments of a stone axe (10.2) and a metate (1) which were re-cycled as fill in a sandstone platform.

Stratum A1 consists of a hearth dating to the Historic period. The context is evidently a domestic one, which contained remains of metates (1), macro-flakes (20.1), and flakes (20).

Finally, in Stratum A, which contains mixed Classic and Historic period deposits, there was a diverse concentration of ground stone remains. The context corresponded both to the surface and plow zone. There were remains of unidentified ground stone fragments (9), axes (10.2), macro-flakes (20.1), flakes (20), cobbles with evidence of thermic shock (22), and cores (50.

The use of raw materials found in Units 17, 18, 24, and 33 (Sub-operation 3A)

Table 7.10 Types of raw materials found in Sub-Operation 3A, Units 17, 18, 24, and 33 (the figures are weights in grams).

A	777.4	0	692.9	0	0	0	21	0	0	0	0
A/B	0	0	167.9	0	0	28.3	11.1	0	0	0	0
A1	0	0	16.7	1835.9	0	0	0	0	0	0	0
B	33.8	0	4711.7	636.2	121.5	210	0	0	0	0	0
B/C	0	0	78.7	0	0	0	0	0	0	0	20.9
B3	0	0	0	172.2	0	0	0	0	0	0	0
C	311.6	127.6	2261.32	729.44	86.5	46	0	0	0	0	2
C/E	201.8	0	399.4	593.1	0	0	0	0	0	0	0
C1	0	33	117	121	217	287	0	0	0	0	0
C2	0	0	914.8	0	0	0	0	0	0	0	0
D	0	0	341	244	0	0	0	0	0	0	0
E	1304.6	0	4292.2	619	0	736	0	0	0	45.3	0
E1	186.2	0	522.1	172.9	0	0	0	0	0	0	0
E2	90	0	1165	56	0	0	0	0	0	0	0
F	341.21	0	2098.51	407.8	0	351.2	0	23.1	93.1	26.3	0
	10.1	10.2	10.3	11.1	11.2	11.3	61	69	71	72	76
	massive	massive	massive	vesicular	vesicular	vesicular	flint	tuff	calcite	sandstone	quartz
	pyroxene	olivine	fine-grained	pyroxene	olivine	fine-grained					
	porphyritic	porphyritic	basalt	porphyritic	porphyritic	basalt					
	basalt	basalt		basalt	basalt						

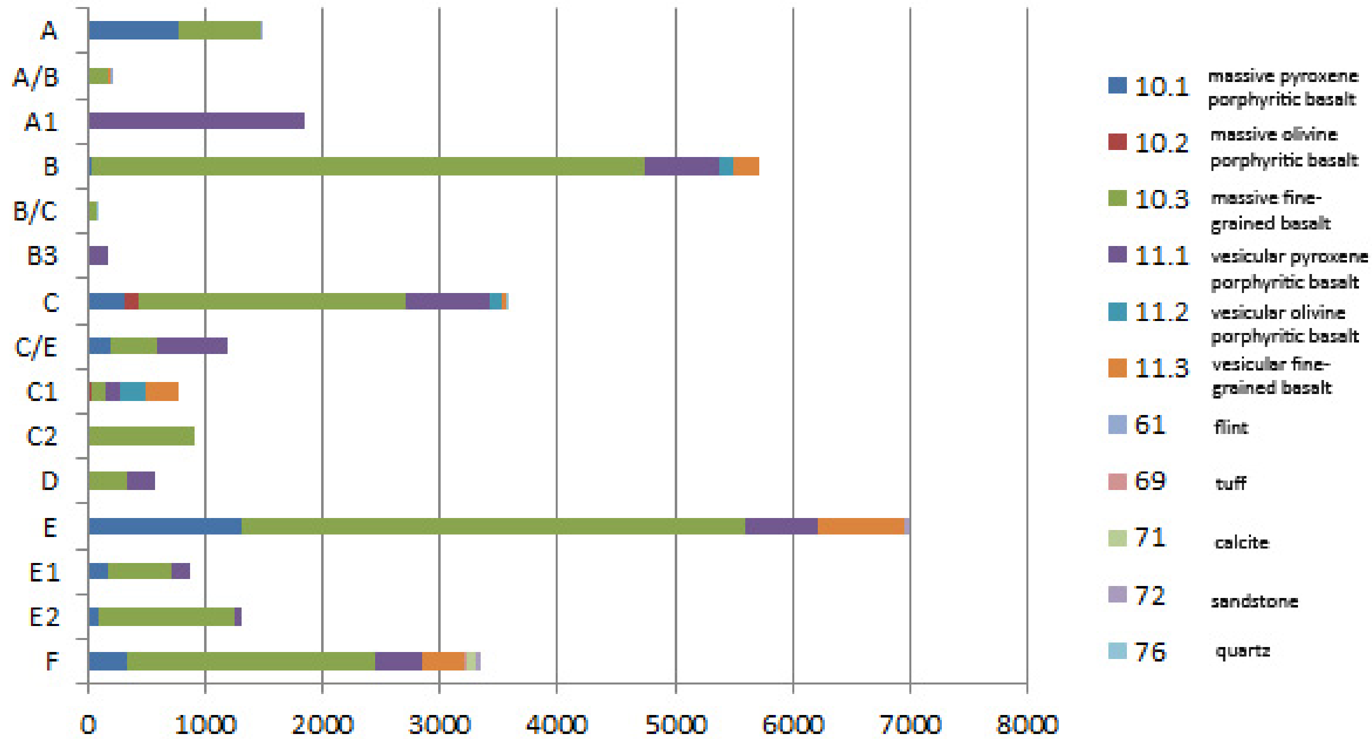

Figure 7.21 Stacked bar showing total weight in grams of material types between strata and the relative amount of each type of raw material type within each stratum in Sub-Operation 3A, Units 17, 18, 24, and 33.

The analysis of the types of raw material used in domestic contexts, reveals a very interesting selection over time that differs from other Groups in Tres Zapotes where domestic units were replaced by elite or civic-ceremonial places. During the transition from the Early Formative to the Middle Formative period were used massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3) as well as tuff (69), calcite (71), and sandstone (72) (Table 7.10 and Figure 7.21).

The materials used during the Middle Formative period (Table 7.10 and Figure 7.21) were similar to those used during the transitional Early/Middle Formative period: massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3) as well as remains of sandstone (72). The relative proportions are similar, with massive fine-grained basalt (10.3) predominating.

During the Late Formative period however, in this domestic area there was a greater variation between strata in the amounts of different material types. Particularly notable is the greater amount of vesicular pyroxene porphyritic basalt (11.1) in the transitional D and C/E strata and prevalence of vesicular olivine porphyritic basalt (11.2) and vesicular fine-grained basalt (11.3) in Late Formative Stratum C1 (Table 7.10 and Figure 7.21). There were used massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular olivine porphyritic basalt (11.2), and vesicular fine grained basalt (11.3) as well as quartz (76).

Finally, from the Terminal Formative to the Classic and Historical periods, there was a decline in the types of raw materials that were used (Table 7.10 and Figure 7.21). The material represented were restricted to massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3, vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3) as well as flint (61).

Operation 3A - Area of non-elite residential occupation and independent craft production, Units 36 and 37

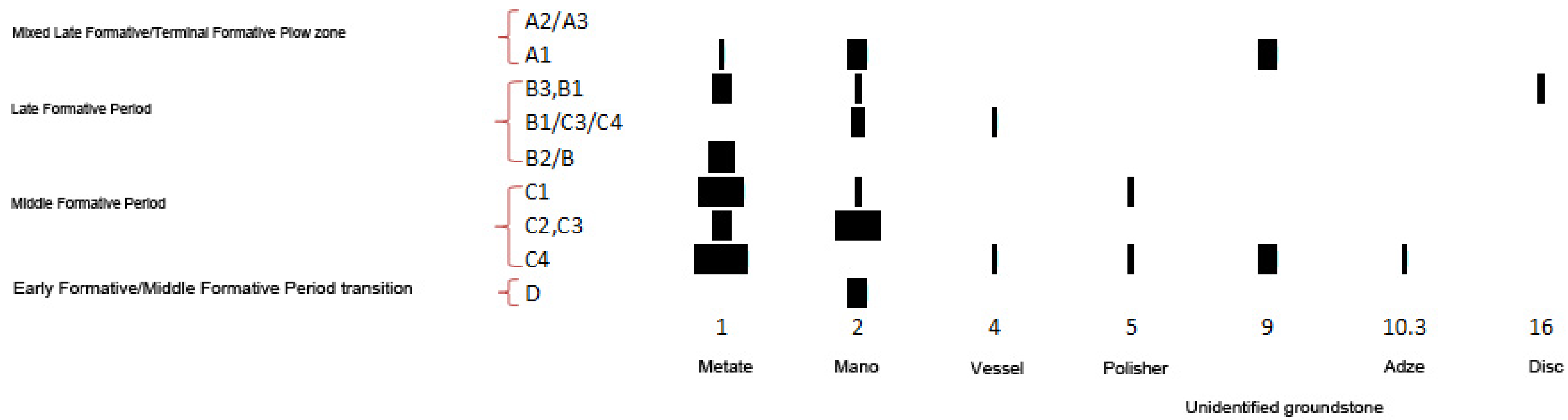

Figure 7.22 Battleship curve graphic of the percent distribution of ground stone artifacts in Units 36 and 37, Sub-Operation 3A.

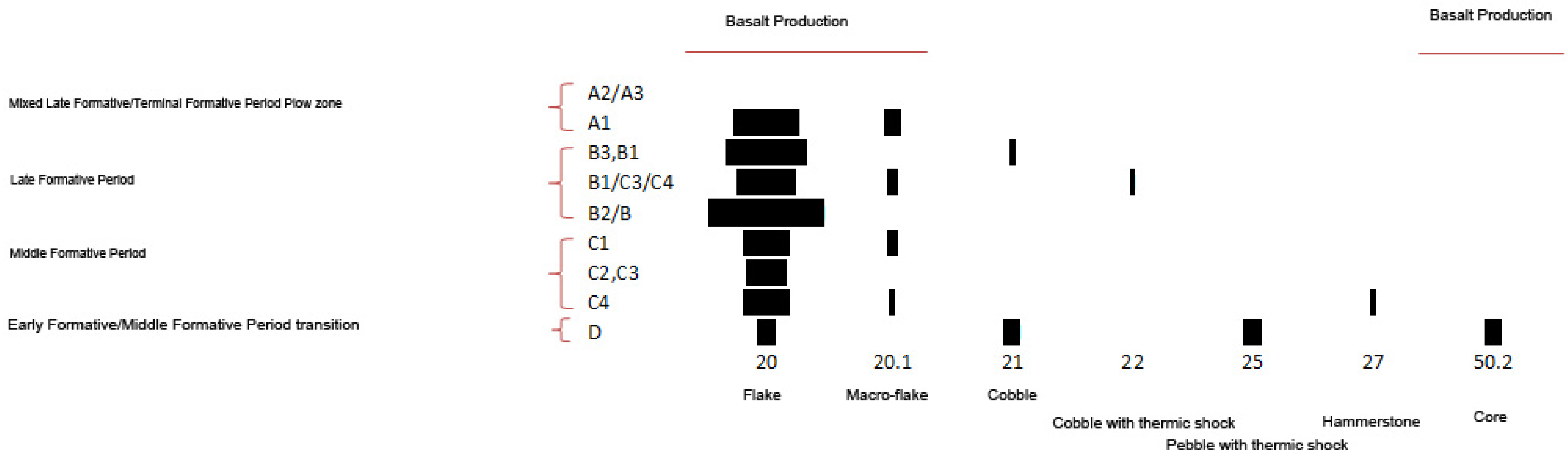

Figure 7.22 Battleship curve graphic of the percent distribution of ground stone artifacts in Units 36 and 37, Sub-Operation 3A (Continued)

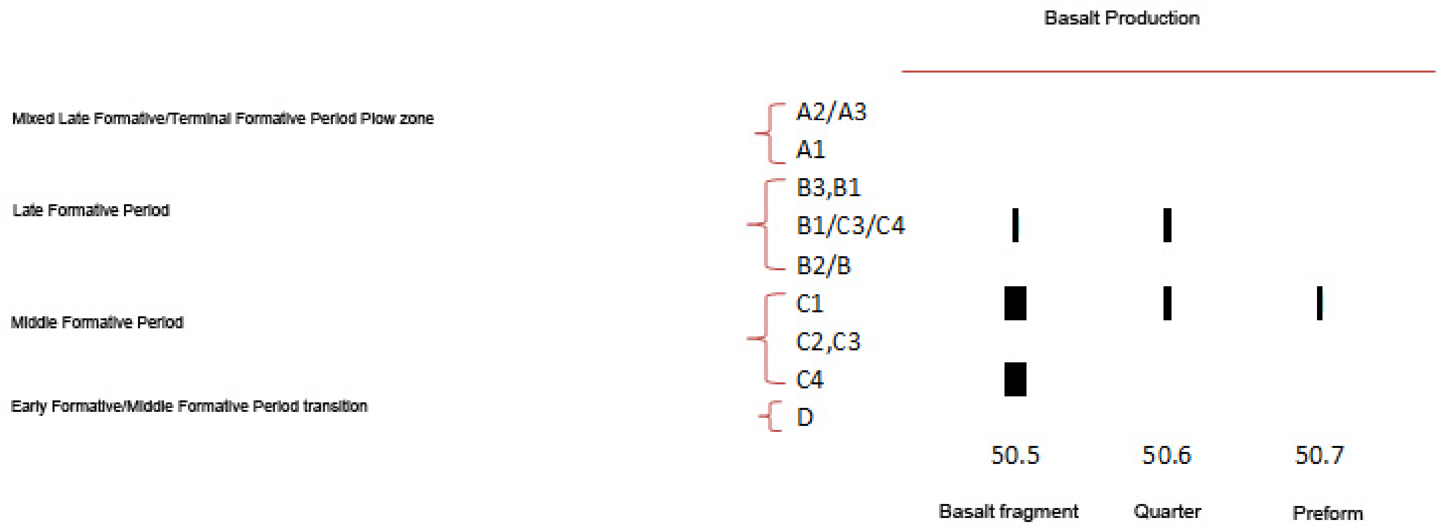

Figure 7.22 Battleship curve graphic of the percent distribution of ground stone artifacts in Units 36 and 37, Sub-Operation 3A (Continued)

In respect to the Units 36 and 37 of Sub-operation 3A, the following results were obtained: in stratum D (Figure 7.22), which may date as early as the Early Formative period, there were remains that corresponded to domestic activities which involve grinding maize and production of ground stone artifacts. There were remains of: manos (2), flakes (20), cobbles (21), pebbles (24), and cores (50.2).

In strata C1, C2/C3 and C4, which date back to the Middle Formative period, there is more evidence of production as well as the use of artifacts for grinding maize. There were remains of: metates (1), manos (2), basalt vessel fragments (4), polishers (5), adzes (10.3), flakes (20), cobbles (21), stone hammers (27), and basalt fragments (50.5). The steps found of the *chaîne operatoire* were just a few, but increased in respect to the previous period.

Strata B3-B1, B1/C3/C4, and B2/B which contained Late Formative materials, yielded remains that suggest that this domestic context continued activities of independent production and grinding maize. However, it is noticed that the production decreased in comparison to previous periods. There were remains of: manos (2), metates (1), discs (16), flakes (20), and cobbles (21).

Finally, in regards to Strata A1 and A2/A3, which corresponded to the plow zone, it is very interesting to observe remains of artifacts usually found in domestic units for grinding maize as well as debris from production of basalt artifacts. Those remains of artifacts were not used as a fill for administrative or elite places. In this place domestic units continued since the Early Formative to the Late Formative period. There were remains of metates (1), manos (2), unidentified ground stone fragments (9) (eroded in the plow zone), flakes (20), and macro-flakes (20.1).

The use of raw materials found in Units 36 and 37 (Sub-operation 3A) over time

Table 7.11 Types of raw materials found in Sub-Operation 3A, Units 36 and 37 (the figures are weights in grams)

A1	50.7	0	685.31	150.4	0	440	0	0
A2/A3	0	77.8	230.8	0	0	0	0	0
B	0	0	4541.4	97.01	0	0	0	2.4
B1	108	25	1694.48	148.4	0	0	0	0
B1/C3/C4	0	0	172.6	33.1	0	0	0	0
B2	292	58.6	3179.9	1886.3	269	0	0	0
B3	0	0	259	760	136	0	0	0
C1	345	0	355.6	0	0	0	0	194.2
C2	64.7	22.6	2185.2	399.9	0	115	0	33.6
C3	48.66	401.4	1722	124.4	0	0	0	0
C4	45.19	211.4	611.6	109.1	30.5	0	113.3	22.3
D	0	0	15.1	0	0	0	0	0
	10.1	10.2	10.3	11.1	11.2	11.3	72	76
	massive	massive	massive	vesicular	vesicular	vesicular	sandstone	quartz
	pyroxene	olivine	fine-grained	pyroxene	olivine	fine-grained		
	porphyritic	porphyritic	basalt	porphyritic	porphyritic	basalt		
	basalt	basalt		basalt	basalt			

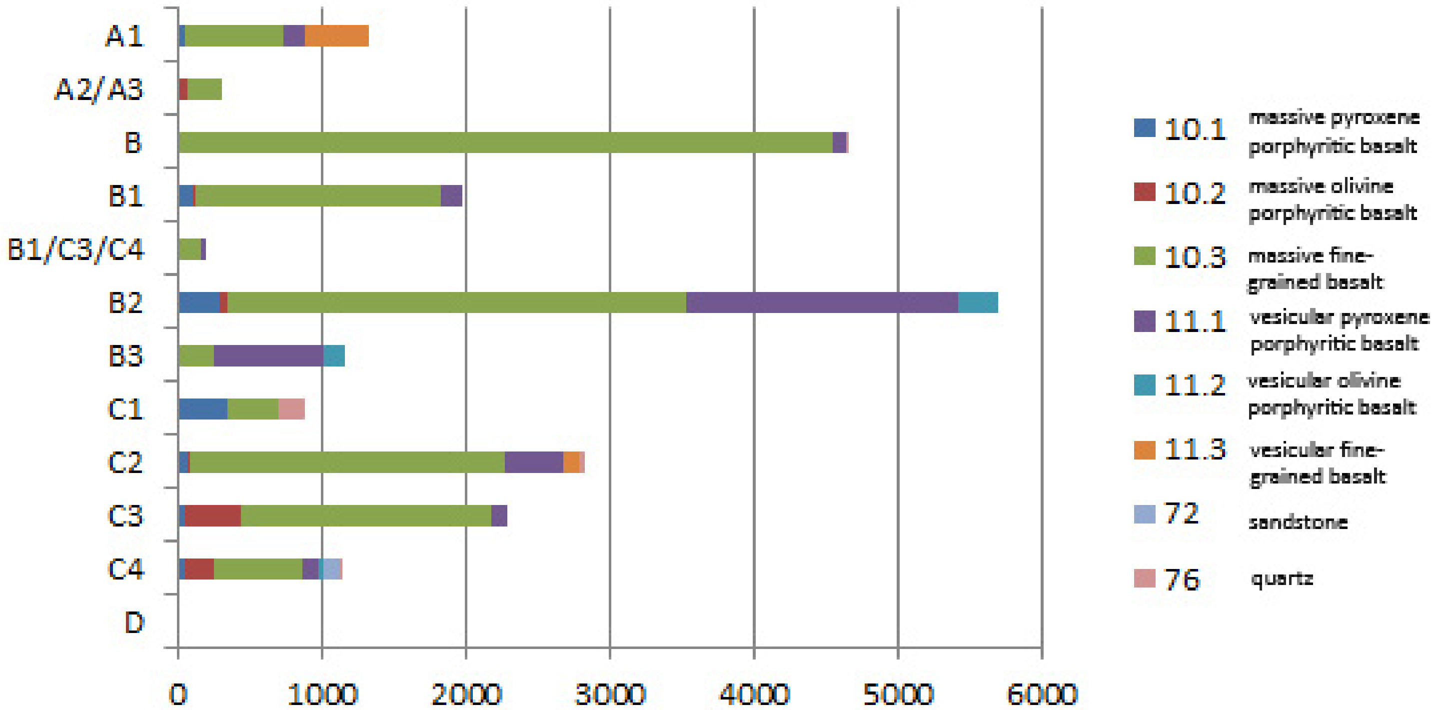

Figure 7.23 Stacked bar showing total weight in grams of material types between strata and the relative amount of each type of raw material type within each stratum in Sub-Operation 3A, Units 36 and 37

The analysis of raw materials in Units 36 and 37 (Sub-Operation 3A) shows that the diversity of raw materials used for domestic activities changed over time. In Stratum D, which dates back to the Early Formative period (Table 7.11 and Figure 7.23) there was only massive fine-grained basalt (10.3). However, during the Middle Formative period (Table 7.11 and Figure 7.23) there was an increase of the diversity of types of raw materials. The following raw materials were used: massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular olivine porphyritic basalt (11.2) as well as sandstone (72) and quartz (76).

In Strata B, B1, B2, B3, and C1, which correspond to the Late Formative period, (Table 7.11 and Figure 7.23) massive fine-grained basalt (10.3) was preferred for manufacturing artifacts. This type of basalt was followed in frequency by vesicular pyroxene porphyritic basalt (11.1), massive pyroxene porphyritic basalt (10.1), and vesicular olivine porphyritic basalt (11.2). Also, sandstone (72) was found.

Finally, in the upper strata A2/A3 and A1, disturbed by plowing, there were raw materials which continued the diversity found during the Late Formative period. These raw materials included massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular olivine porphyritic basalt (11.2), and vesicular fine grained basalt (11.3).

Operation 3B – Area of non-elite residential occupation and independent craft production, Units 21, 22, 23, 26, and 27

Figure 7.24 Battleship curve graphic of the percent distribution of ground stone artifacts found in Units 21, 22, 23, 26, 27, and 28 Operation 3B

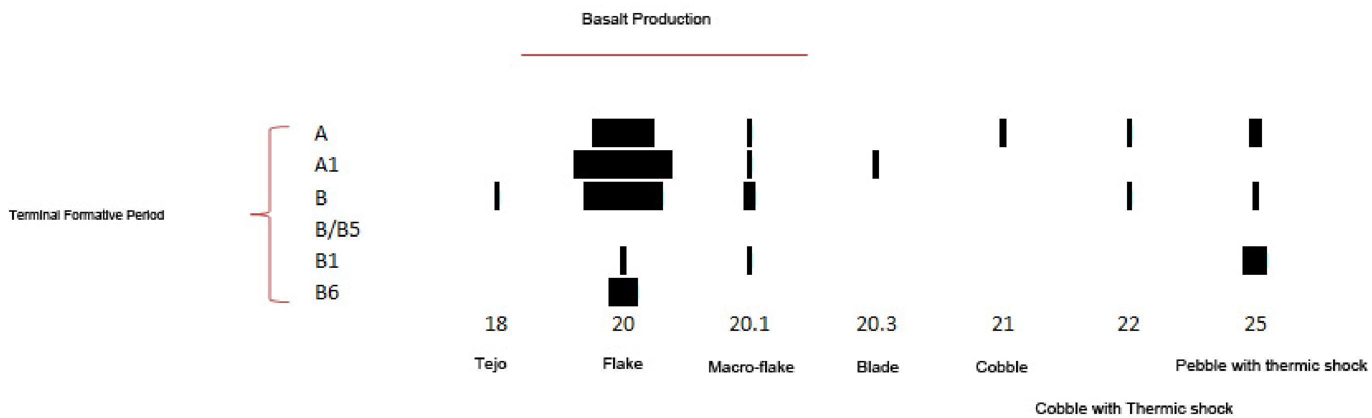

Figure 7.24 Battleship curve graphic of the percent distribution of ground stone artifacts found in Units 21, 22, 23, 26, 27, and 28, Operation 3B (Continued)

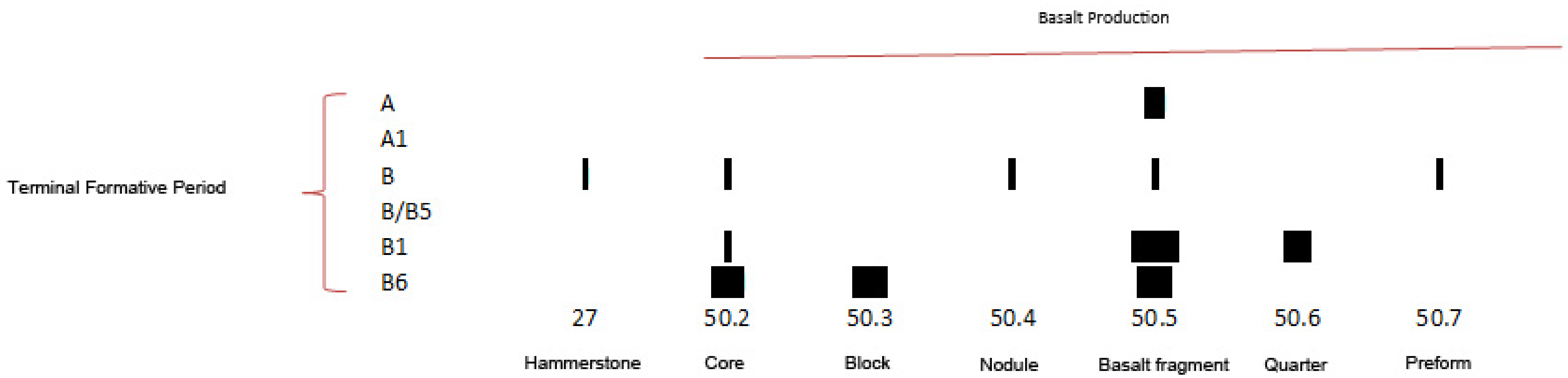

Figure 7.24 Battleship curve graphic of the percent distribution of ground stone artifacts found in Units 21, 22, 23, 26, 27, and 28 Operation 3B (Continued)

Operation 3B comprised six contiguous pits placed on the summit of Mound 110 in order to study an area of non-elite ceramic production in a domestic context. Two small pit kilns containing vitrified fragments of mud, burned earth, charcoal, and high densities of pottery, including overfired sherds were found in this operation. The associated ceramics indicate a Terminal Formative date for all strata in Operation 3B (Figure 7.24). Other crafts consisted of obsidian blade production and basalt working, including an octagonal disc fashioned from a recycled metate (1) made out of columnar basalt. Stratigraphically these features were correlated with a pavement composed of sandstone fragments set in a mud and sand mortar (argamasa).

In the whole sequence the place was domestic space where activities for grinding maize and producing ground stone implements occurred. However, there were strata where there was evidence of an increase of production as well as tools needed for grinding maize.

The analysis of the artifacts from Operation 3 turned out to be very important for a better understanding of independent units of production in a domestic area of Tres Zapotes. An important discovery is that such production units could be multi-crafting units, and not only workshops attached to elite residences or administrative units. The excavations here also provided the opportunity to see similarities and differences among distinct types of productive areas.

Stratum B shows the most varied types of activities based on the kinds of artifacts. There were fragments of manos (2), polishers (5), stone axes (10.2), small basalt cylinders (14), basalt discs (16), flakes (20), macro-flakes (20.1), cobbles (21), stone hammers (27), cores (50.2), nodules (50.4), basalt fragments (50.5), and preforms (50.7). This stratum provided the most steps of the *chaîne opératoire* found in a domestic unit at Tres Zapotes. There are also remains which indicate that other crafts were made there. There were pieces of flint (61), schist (63), and in Stratum A1 there was a small piece of jadeite (73). There were also remains of tuff (69) and sandstone (72).

Stratum A also provided evidence for a wide variety of activities. There were remains of metates (1), a bark beater (11), tejos (18), flakes (20), macro-flakes (20.1), cobbles (21), pebbles (24), and basalt fragments of the basalt (50.5). In this Stratum the occurrence of a bark beater (11) suggests the production of another craft, paper. Although paper is perishable material, there is evidence that people in Tres Zapotes used an elaborated graphic system, sometimes recorded in monuments. This is particularly interesting. Some of the earliest bark beaters have been reported by Thomas Lee from Chiapa de Corzo since the Istmo Phase - Late Protoclassic period - 100 AD-250 AD (Lee 1969: 129-131). David Grove found an oval bark beater in context in Chalcatzingo which dates to Cantera phase (700-500 B.C.). Rectangular bark beaters are later in that site, though .Two rectangular bark beaters were found in Classic deposits (Grove 1987:333-334). As the bark beater in question was found it is a relatively pure Terminal Formative locality in Tres Zapotes, it might suggest this is earlier than the norm. Unfortunately, Stratum A is plow zone, so there is a possibility that it is later. Interestingly, written inscriptions disappeared in the Eastern Lower Papaloapan Basin after the Terminal Formative (although they continue in the Western Lower Papaloapan Basin at Cerro de las Mesas) (Christopher Pool, personal communication February, 2016).

The use of raw materials found in Units 21, 22, 23, 26, 27, and 28 (Operation 3B) over time

Table 7.12 Types of raw materials found in Operation 3B, Units 21, 22, 23, 26, 27, and 28 (the figures are weights in grams)

A	633.8	0	1038.5	562.3	0	566	0	228.1	0	0	103.5	0	35.8
A1	195.8	0	1039.5	737.6	0	0	3.1	1.3	0	0	0	380	0
B	1671.5	1738	3221	2155	0	73.3	0	54.71	232	7	1098	0	110.5
B1	490.6	45.6	346.4	123.2	113.3	0	0	0	0	0	0	0	0
B6	4	0	185	0	0	0	0	0	0	0	0	0	0
	10.1	10.2	10.3	11.1	11.2	11.3	61	63	68	69	72	73	76
	massive	massive	massive	vesicular	vesicular	vesicular	flint	schist	pyroclast	tuff	sandstone	jadeite	quartz
	pyroxene	olivine	fine-grained	pyroxene	olivine	fine-grained							
	porphyritic	porphyritic	basalt	porphyritic	porphyritic	basalt							
	basalt	basalt		basalt	basalt								

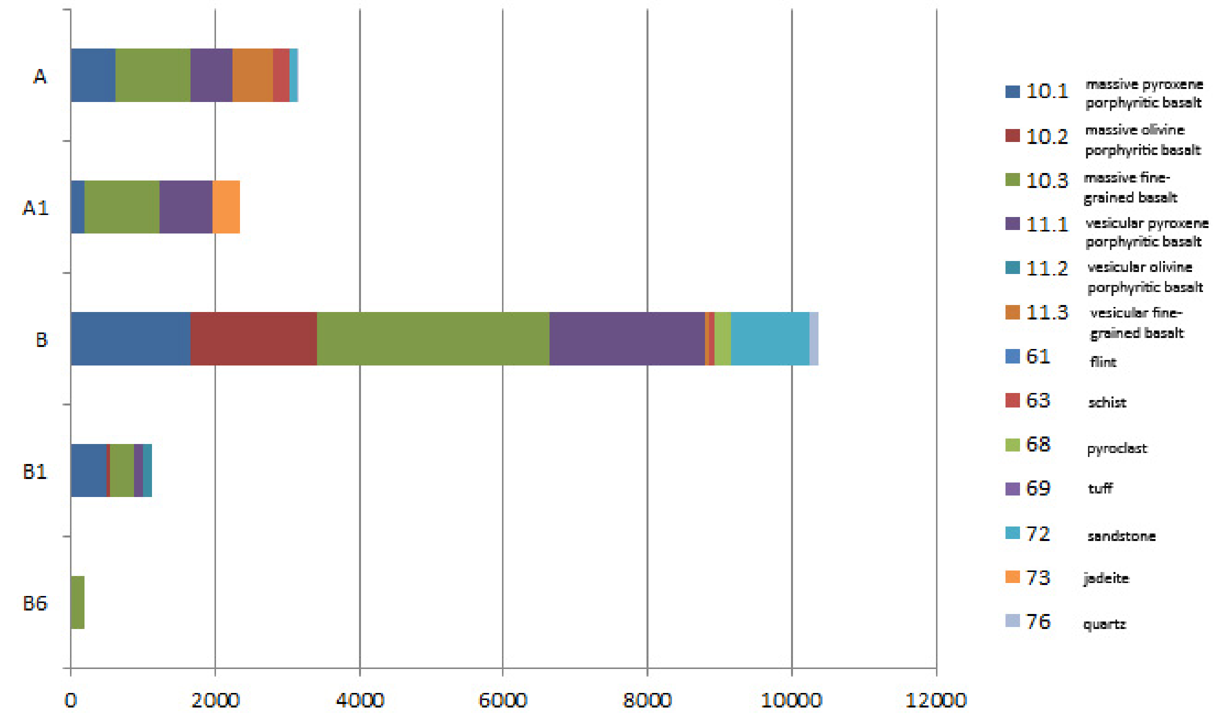

Figure 7.25 Stacked bar showing the total weight in grams of material types between strata and the relative amount of each type of raw material type within each stratum in Operation 3B, Units 21, 22, 23, 26, 27, and 28

The analysis of raw materials in artifacts obtained from excavations in Operation 3B (Table 7.12 and Figure 7.25), identified a great variety of stone used in the Terminal Formative. In the vast majority of strata were found the use of massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular olivine porphyritic basalt (11.2), and vesicular fine grained basalt (11.3). However, the use of massive olivine porphyritic basalt (10.2) was very limited in comparison with other types of basalt.

Finally, other raw materials suggest that this place was a multi-crafting production unit. There were remains of flint (61), schist (63), jadeite (73), and scoria (overfired pottery). There were remains as well as of sandstone (72) and quartz (76).

Operation 7 - Area of non-elite residential occupation and independent craft production. Units 38 and 39

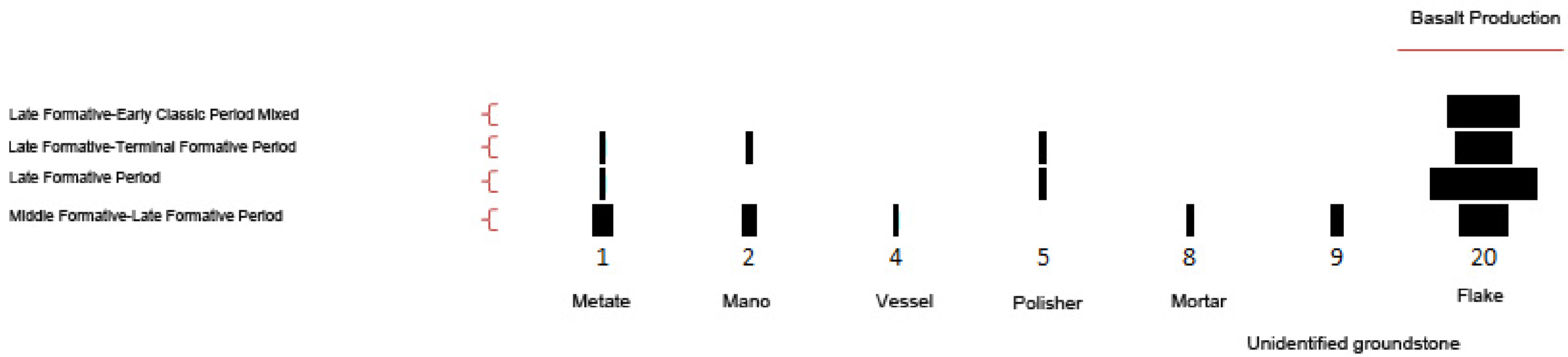

Figure 7.26 Battleship curve graphic of percent distribution of ground stone artifacts found in Units 38 and 39, Operation 7.

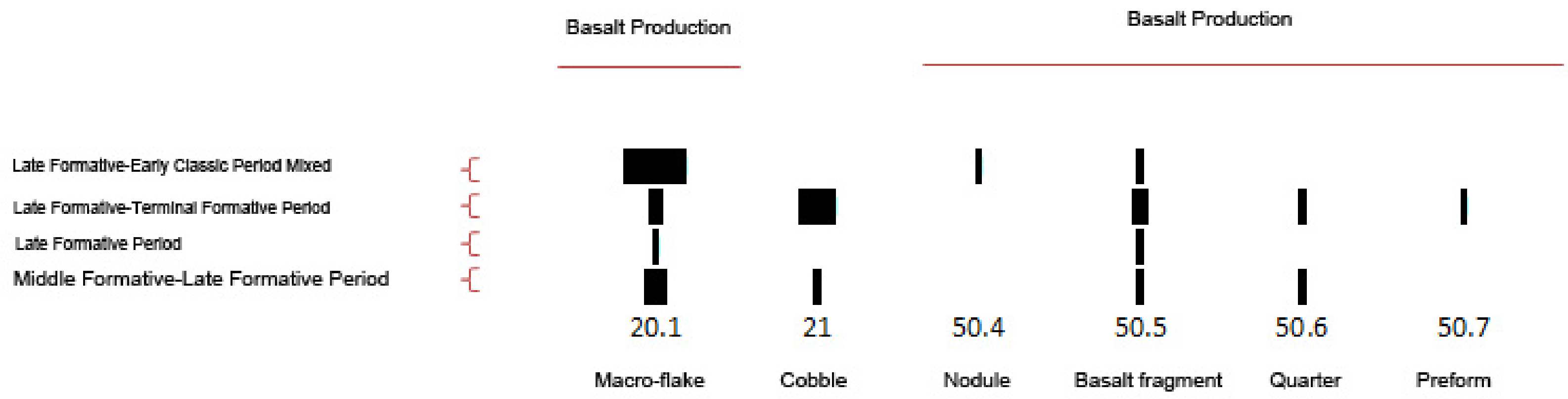

Figure 7.26 Battleship curve graphic of percent distribution of ground stone artifacts found in Units 38 and 39, Operation 7 (Continued)

Operation 7 was located north of Operation 3 at the south end of Mound 107, which it is a long ridge that extends southward from the upper fluvial terrace between Groups 1 and 2. This Operation comprised Units 38 and 39. Unit 38 contained dense deposits of household refuse and a postmold, which support its interpretation as a residential context. In Unit 39 was found a feature composed of irregular but carefully laid sandstone blocks, which appear to be the top of a retaining wall on the edge of the mound. In both pits, diagnostic ceramics and figurines were primarily Late to Terminal Formative, but also included Middle Formative examples derived from an earlier Olmec occupation.

The analysis of types of ground stone artifacts found in the excavations of Operation 7 supports the functional interpretation of the locality as a setting for domestic activities. In levels (Figure 7.26), which dates back to the Middle Formative period, there was evidence of activities which involved grinding maize and the independent production of ground stone artifacts. There were remains of metates (1), polishers (5), flakes (20), macro-flakes (20.1), basalt fragments (50.5), and quarters (50.6).

The transition from the Middle to the Late Formative period documents a subtle decrease of ground stone production. Nevertheless, maize grinding activities continued to be performed in the place. There were remains of manos (2), basalt vessel fragments (4), mortars (8), flakes (20), macro-flakes (20.1), cobbles (24), and pebbles with evidence of thermic shock (25).

In levels which date to Late Formative/Terminal Formative, exhibit an increase in the basalt production and maize grinding activities that continued to be performed in this space. There were fragments of manos (2), metates (1), flakes (20), macro-flakes (20.1), basalt fragments (50.5), quarters (50.6), and preforms (50.7). Also, there were remains of tuff (69).

In levels which date back to the Late Formative/Early Classic Period Mixed, there was a decrease in evidence of remains of production. The tools needed for grinding maize were absent. There were flakes (20), macro-flakes (20.1), nodules (50.4), and basalt fragments (50.5).

Finally, Zona 4 is an intrusive pit in Unit 38, which begins in the plow zone. It seems likely that any large artifacts were removed, leaving only in flakes (20) and macro-flakes (20.4).

The use of raw materials found in Units 38 and 39 (Operation 7) over time

Table 7.13 Types of raw materials found in Operation 7, Units 38 and 39 (the figures are weights in grams)

LF-EC Mixed	442.2	0	263.7	621	0	397.2	0	0	24	130	14
LF-TF	2368.8	539	1539.8	862.4	0	0	374	15	435	0	0
LF	356.7		565.4	1448.2	0	0	0	0	11.4	0	3.4
MF-LF	808.7	0	1923.8	835		46	0	0	79	0	0
	10.1	10.2	10.3	11.1	11.2	11.3	69	70	72	75	76
	massive	massive	massive	vesicular	vesicular	vesicular	tuff	concretion	sandstone	gneiss	quartz
	pyroxene	olivine	fine-grained	pyroxene	olivine	fine-grained					
	porphyritic	porphyritic	basalt	porphyritic	porphyritic	basalt					
	basalt	basalt		basalt	basalt						

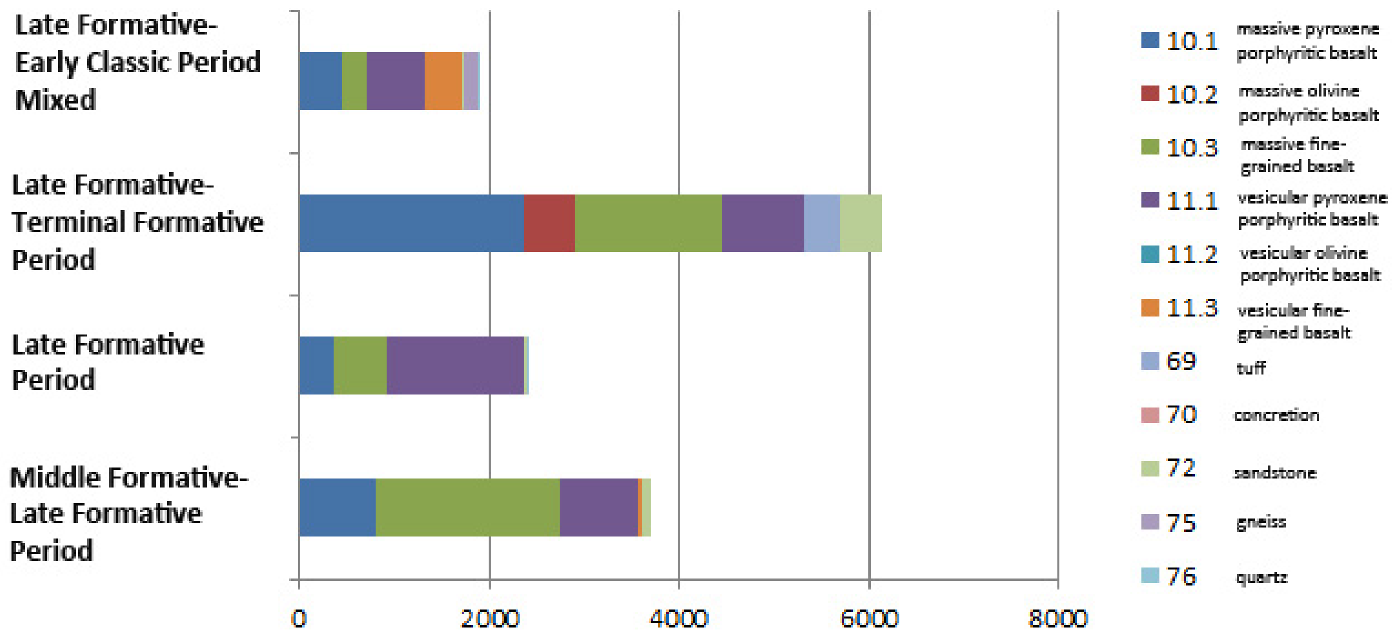

Figure 7.27 Stacked bar showing total weight in grams of material types between strata and the relative amount of each type of raw material within each stratum in Operation 7, Units 38 and 39

As in other parts of Tres Zapotes, the analysis of raw materials recovered in the excavations of Operation 7, indicates an increase in of the raw materials which were used.

In levels which dates back to the transition Middle Formative/Late Formative period, only massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt were used (10.3) (Table 7.13 and Figure 7.27).

Levels which date back to the transition Middle Formative/Late Formative period show an increase in the types of raw materials that now included massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3). There were also remains of sandstone (72) and quartz (76) (Table 7.13 and Figure 7.27).

Contexts that included ceramics which date to the transition from the Late Formative to the Terminal Formative period showed a subtle increase in the types of raw materials that were used. The basalts included massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1). Also, there were remains of tuff (69) and sandstone (72) (Table 7.13 and Figure 7.27).

Levels which contained mixed Late Formative/Early Classic period ceramics had the highest variety of types of raw materials. There were massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt

(10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3). There were also remains of flint (61), concretions (70), sandstone (72), gneiss (75), and quartz (76) (Table 7.13 and Figure 7.27).

Finally, "Zona 4", which is an intrusive pit that has pottery which dates back to the Late Formative and Early Classic periods, contained only massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3) (Table 7.13 and Figure 7.27).

The *chaîne opératoire* in ground stone artifacts of Tres Zapotes

In general terms, the series of steps followed for manufacturing a ground stone artifact was shared by the inhabitants of Tres Zapotes. The technological knowledge for making basalt ground stone tools needed either for maize grinding or other artifacts used in the quotidian life (wood-working, tools for cutting, sawing, grinding, pecking) was a repertoire of techniques applied every day - a series of practices necessary for the reproduction of the economic life in the Olmec area. In every polity in Olman, there was variation within sites and among sites, as well as differences over time. However, the basic set of techniques for creating basalt artifacts constitutes an important feature of the Olmec culture; this *chaîne opératoire* underlies the variation which had to do with socio-political status, economic specialization, or factionalism.

The *chaîne opératoire* of ground stone artifacts found in Tres Zapotes comprises these steps:

1) Acquisition of raw material. The chosen rocks in quarries or river beds were flaked in those sites until the needed stones were obtained which exhibited all the characteristics necessary for having ground stone artifacts. Size, weight, and density may be taking into consideration for moving basalt from the source to the domestic or elite residential contexts, where the artifacts were produced. In the archaeological record were identified macro-cores, cores, and nodules which are the archaeological correlates of this initial step of the *chaîne opératoire* of basalt artifacts. Macro-cores, cores, and nodules show surfaces which were obtained for having better angles useful for fine flaking. First, macro-cores are reduced and cut

in manageable sizes called cores. Then, nodules have more flat surfaces, without cortex, for continuing the reduction process. In this step anvils and hammerstones were necessary for fragmenting larger rocks into smaller stones. By-products are

2) Roughing. In this step, the stone tool maker continues reducing by flaking on the sides of the rock. This technique removes surface irregularities of the raw material. The obtained by-products were blocks, quarters, and basalt fragments. Blocks are fragmented again and quarters are obtained. Basalt fragments, macro-flakes, and flakes are the production debris that sometimes may be recycled. In this step, tools which were used were hammerstones and discs.

3) Pecking. In this step, the surface is pecked in order to facilitate fine flaking and avoiding fractures. Fine-flaking requires precision in the use of chisels, therefore, the pecked sides allow more control to the tool maker and he is able to obtain detailed finishes. Chisels and hammerstones are required in this step.

4) Fine-flaking and polishing. Using chisels on the surfaces which were prepared with pecking, the tool maker was able to use polishers for smoothing the sides of preforms

5) Smoothing. The final step corresponds to the use of polishers on the surfaces of the preform treated previously with fine-flaking. The use of polishers, abraders, tejos, canes, strings, leathers, cotton fabrics, etc. provides good results for finishing ground stone artifacts. This stage is very important for maize grinding tools to avoid that corn dough may contain crystals or basalt fragments.

After pecking, fine-flaking and polishing vary in accord of different types of preforms which will end up in distinct artifacts.

In Figures 7.28 and 7.29 I synthesize the basic steps of the *chaîne opératoire* of basalt artifacts found in this study.

There were differences between the production of ground stone artifacts in households (domestic level of production) and in a multi-crafting unit attached to an elite, represented by Operation 2D, or the case of a multi-crafting unit in a domestic context (Op. 3B). In the domestic unit of production, the acquisition of macro-cores and the initial steps of reduction are conducted in the river beds, then, small cores are transported to the household. And as the available space for performing the production activities is small, the locus of production changes. For this reason, I hypothesize that some steps of the process of production seem to be missing, but those steps could be find in future excavations around households.

In regard to multi-crafting workshop units attached to elites where there may have been full time specialists who perform the vast majority of steps of the process of production for diverse types of basalt artifacts and other crafts. There are found more tools used such as stone hammers, polishers, abraders, anvils, etc

In regard to multi-crafting units in a domestic context, like the case found in Op. 3B, even though they may not have full time specialists and the number of artifact types produced is lesser than workshop in Op. 2D, however, those units have access a wide variety of types of basalt.

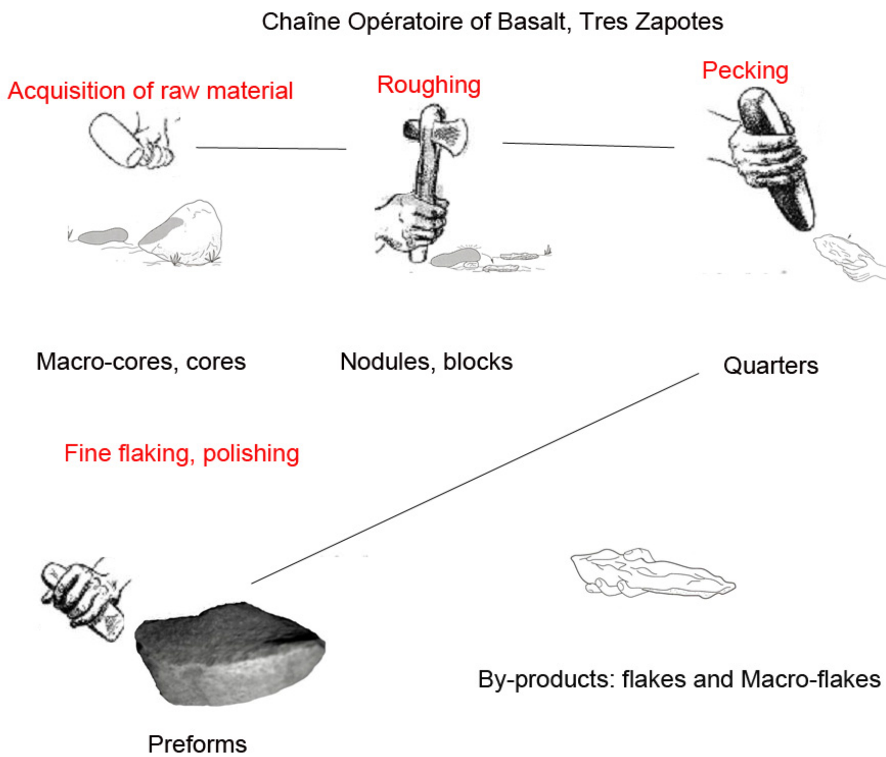

Figure 7.28 *Chaîne opératoire* of basalt ground stone artifacts in Tres Zapotes, Part 1

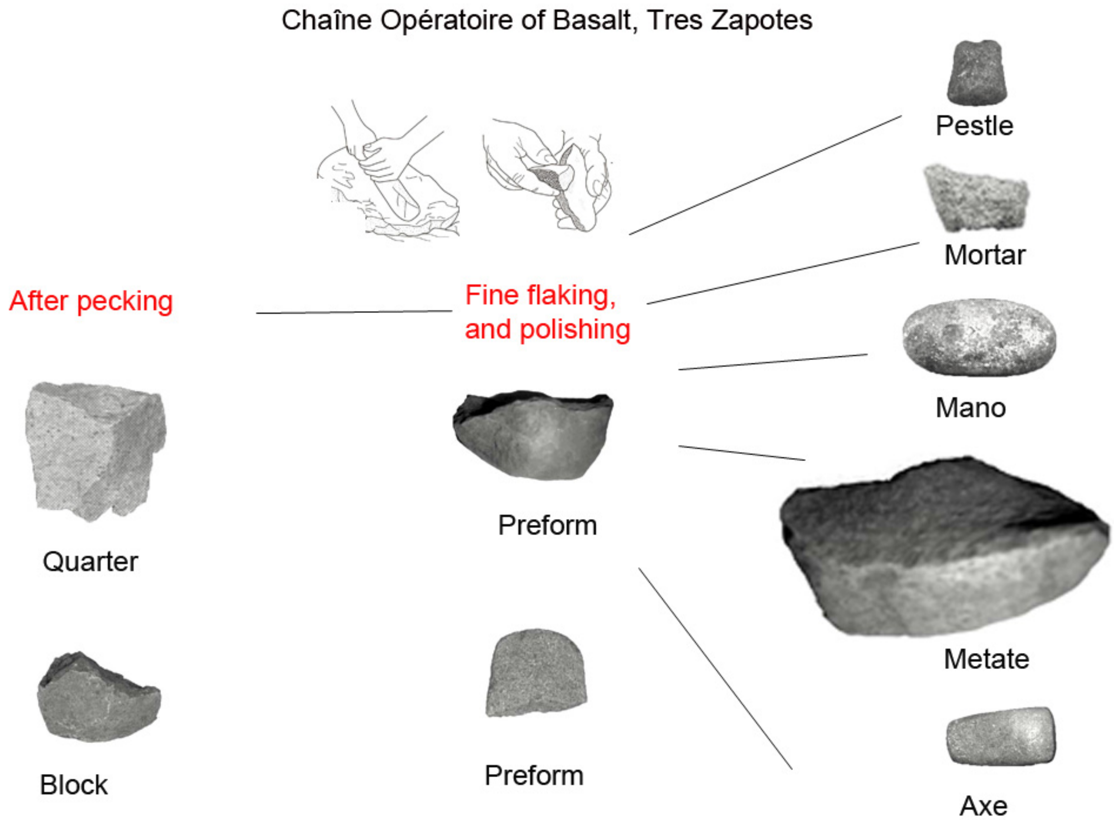

Figure 7.29 *Chaîne opératoire* of basalt ground stone artifacts in Tres Zapotes, Part 2

Artifact types and raw materials

After the analysis of the corpus of basalt artifacts which are part of this dissertation, a question was raised: Are there any patterns of use of specific raw materials for particular kinds of artifacts?

In order to respond to this question, a cross-tabulation of artifact type by raw material could reveal such patterns. Therefore, tables that indicate Period, Artifact type, and Material were made, and are presented below. The tables are separated by Operation 2A, 2B, 2C, 2D, 3A, 3B, 4, 5, 6 and Op. 7.

The tables allow comparing the types and what kind of raw materials were used for the manufacture. These data shows changes in Operations, over time, and different materials which were selected for the types of artifacts. The contextual information is useful for a better understanding on the choice of raw materials depending the social status, or specialization in activities in diverse groups in Tres Zapotes.

Operation 2A

In Operation 2A occurred changes over time in the materials used for making artifacts (Table 7.14). During the Late Formative period, manos [2] were made out of massive pyroxene porphyritic basalt (10.1) and vesicular pyroxene porphyritic basalt (11.1). In respect to flakes [20] and other by-products, the materials used were massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), and vesicular pyroxene porphyritic basalt (11.1). And an abrader was made of sandstone (72). But during the Terminal Formative and Early Classic periods metates [1] and manos [2] were made only of massive fine-grained basalt (10.3).Tools for manufacturing artifacts such as a hammerstone [27] and a sphere [16] were also made of massive fine-grained basalt (10.3), an abrader made of massive pyroxene porphyritic basalt (10.1), and an axe made of schist (63). Another change that is noticed in the latter periods is the subtle increase of one more type of material in by-products, vesicular fine-grained basalt (11.3). Finally, during the Classic period, it was found a hammerstone made of massive pyroxene porphyritic basalt (10.1). These changes observed in the use of materials for manufacturing artifacts over time had to do with the acquisition that it was able to have this locality and it is not related to status. Since the Late Formative to the Classic Period this place had elite residential administrative functions.

Operation 2B

In Operation 2B there were changes over time in the use of materials for manufacturing ground stone tools (Table 7.15). Those changes are associated with transformation in function of the locality. During the Early and Middle Formative periods metates [1], manos [2], flakes [20]. macro-flakes [20.1], hammerstone, and the vast majority of by-prodcuts were made out massive fine-grained basalt (10.3). Only one by-product was made of massive pyroxene porphyritic basalt (10.1). A polisher was made of sandstone (72). These occupations were domestic. A change began at the end of the Middle Formative period when metates [1] were made out of massive pyroxene porphyritic basalt (10.1), as well as some by-products. Still flakes [20], macro-flakes [20.1], and a hammerstone were made of massive fine-grained basalt (10.3). During the Late Formative period, there was a change in function of the locality which was elite residential administrative, and occurred a change in the materials used for making artifacts. For instance, metates [1] and manos [2] were more commonly manufactured in massive pyroxene porphyritic basalt (10.1) rather than those made of massive fine-grained basalt (10.3). Polishers [5] and the vast majority of by-products were made of massive fine-grained basalt (10.3), and a less quantity was made of massive pyroxene porphyritic basalt (10.1). Finally, during the Early Classic period, also an occupation with elite residential administrative characteristics, metates [1] and flakes [20] were made mainly of massive fine-grained basalt (10.3), and few specimens made out of massive pyroxene porphyritic basalt (10.1). It is important to underline that in Operation 2A and 2B have a similar tendency in the use of materials since the Late Formative to the Classic periods and both cases had elite residential administrative functions.

Operation 2C

This operation shows changes over time in the use of materials for making ground stone tools (Table 7.16). Also, there was a transformation in the function of the locality from the Early to the Late Formative periods. During the Early Formative period the function was domestic and metates [1] were made of massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3). Flakes [20] and other by-products were made out massive fine-grained basalt (10.3). During the Middle Formative period the functions of the place were elite residential administrative, and metates [1] were made mainly of massive fine-grained basalt (10.3), and a few made out of massive pyroxene porphyritic basalt (10.1). Manos [2] and other by-products were made mainly of massive fine-grained basalt (10.3), and just a few were made of massive pyroxene porphyritic basalt (10.1). During the Late Formative period the place continued with elite residential administrative functions and there was a change in the materials used for making artifacts. In regards to metates [1] more were made of massive pyroxene porphyritic basalt (10.1) and less were made of massive fine-grained basalt (10.3). Fragments of a basalt vessel [4] and flakes [20] were made out of massive fine-grained basalt (10.3). Other by-products were made of both massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3). In Operation 2C there is a similar use of materials for making metates that the cases found in Late Formative contexts with elite residential administrative functions.

Operation 2D

Operation 2D shows changes in the use of materials for making ground stone tools over time in spite of the fact that this place remains an attached productive multi-crafting unit to an elite residential administrative building since the Middle Formative to the Terminal Formative period (Table 7.17). The changes observed in the use of types of material for manufacturing artifacts are related with an increase of power of the elites of Tres Zapotes whom acquired a wide diversity of raw materials for producing their own tools in this specialized unit.

During the Middle Formative period and the transition from the Middle to the Late Formative period the by-products were made of massive pyroxene porphyritic basalt (10.1), vesicular fine-grained basalt (11.3), and massive fine-grained basalt (10.3). A hammerstone [27] was made of massive fine-grained basalt (10.3). But during the Late Formative period it is noticed a great change where metates [1] were made of four types of basalt such as vesicular pyroxene porphyritic basalt (11.1), massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), and massive fine-grained basalt (10.3). In regard to manos [2] were made mainly of vesicular pyroxene porphyritic basalt (11.1) and massive fine-grained basalt (10.3), and few specimens were made out of massive pyroxene porphyritic basalt (10.1) and vesicular fine-grained basalt (11.3). Polishers were made of four varieties of basalt such as massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine-grained basalt (11.3). Pestles [7] and cylinders [14], and hammerstones were made of massive pyroxene porphyritic basalt (10.1) and vesicular pyroxene porphyritic basalt (11.1). An axe [12], and an adze [10.3] were made of massive pyroxene porphyritic basalt (10.1). A mortar [8] was made of massive olivine porphyritic basalt (10.2) and a basalt donut [13] was made out of vesicular fine-grained basalt (11.3). Flakes [20] show a wide variation in types of materials such as massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine-grained basalt (11.3). Macro-flakes [20.1] and the rest of by-products found were made of massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine-grained basalt (11.3).

Finally, during the Terminal Formative period is noticed another change in this place. There was a reduction in the types of artifacts, materials, and tools employed in this productive unit. Some types of artifacts were made in different kinds of material. A vessel [4], a polisher [5], and a chisel [10.1] were made of massive pyroxene porphyritic basalt (10.1). A mano [2] was made of massive fine-grained basalt (10.3). Hammerstones

[27] were made of massive fine-grained basalt (10.3) and vesicular pyroxene porphyritic basalt (11.1). There was a wide variety of materials noticed in by-products such as massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), vesicular pyroxene porphyritic basalt (11.1), vesicular fine-grained basalt (11.3), and massive olivine porphyritic basalt (10.2). In levels which correspond to this period was found an abrader [12] made of sandstone (72).

Operation 2E

This operation shows the remains of tools and by-products in a domestic context (Table 7.18). During the Late Formative period metate [1] and mano [2], as well as production debris were made from massive fine-grained basalt (10.3). In respect to the Terminal Formative occupation, which was a civic-ceremonial context, a subtle change is noticed in the materials used in the construction fill such as flakes [20] and macro-flakes [20.1] which were made of massive fine-grained basalt (10.3) and one specimen made of massive olivine porphyritic basalt (10.2).

Operation 3A

Changes over time in the use of material for making artifacts occurred in this locality even though the place had a domestic use from the Early Formative to the Classic period (Table 7.19). The changes are related to the different acquisition of raw materials that this space had in distinct periods and associated with the expansion of Tres Zapotes in the Tuxtlas. However, this operation found a unique use of diverse materials by domestic occupations.

During the transition from the Early Formative to the Middle Formative period, a metate [1], a polisher [5], and an adze [10.3] were made of massive fine-grained basalt (10.3). But flakes [20] and other by-products were made out of massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine-grained basalt (11.3). During the Middle Formative period a change occurred in the use of materials for making artifacts. In regard to metates [1], the materials use for manufacturing these artifacts were massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), and vesicular pyroxene porphyritic basalt (11.1). A mano [1], a vessel [4], a pestle [7], and a cube [17] were made of massive fine-grained basalt (10.3). A polisher [5] was made of vesicular pyroxene porphyritic basalt (11.1), and a hammerstone [27] was made of massive pyroxene porphyritic basalt (10.1). Flakes [20] and other by-products were made of massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), and vesicular pyroxene porphyritic basalt (11.1).

In levels that contained ceramics which date back to the Middle Formative/ Late Formative period, it is noticed a change in the variety of materials which were used for making artifacts. Metates [1] were made of massive fine-grained basalt (10.3), massive olivine porphyritic basalt (10.2), massive pyroxene porphyritic basalt (10.1), and vesicular olivine porphyritic basalt (11.2). The materials for making manos [2] were massive fine-grained basalt (10.3), massive olivine porphyritic basalt (10.2), and vesicular pyroxene porphyritic basalt (11.1). A vessel [4], a polisher [5], and a hammerstone [27] were made of massive fine-grained basalt (10.3). And the materials used in flakes [20] and other by-products were massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), vesicular pyroxene porphyritic basalt (11.1), and vesicular olivine porphyritic basalt (11.2). Flakes [20], by-products, and metates [1] coincide in the types of materials, therefore, I suggest that the production debris might correspond to rejuvenation of the metate surface and domestic production of grinding tools.

During the Late Formative period there was a change in the selection of materials for making artifacts. Metates [1] were made of massive fine-grained basalt (10.3) and vesicular olivine porphyritic basalt (11.2). Polishers [5] were made of varios materials such as vesicular pyroxene porphyritic basalt (11.1), vesicular olivine porphyritic basalt (11.2), and vesicular fine-grained basalt (11.3). Tejos [18] were made of massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3). A disc [16] was made of vesicular pyroxene porphyritic basalt (11.1) and a cube was made out of massive fine-grained basalt (10.3). Flakes [20] represent all the materials which were used for the artifacts found such as massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), vesicular pyroxene porphyritic basalt (11.1), massive olivine porphyritic basalt (10.2), vesicular olivine porphyritic basalt (11.2), and vesicular fine-grained basalt (11.3), and it might possible that correspond to the process of rejuvenation of the artifacts used in this context as well as the production debris of the manufacture of tools.

In respect to the levels that contain ceramics which date back to the Terminal Formative, Terminal Formative/Early Classic, and Classic/Historical periods, it is noticed a change in the materials used for manufacturing artifacts. A metate [1], an axe [10.2] and a disc [16] were made of massive fine-grained basalt (10.3). A polisher was made of vesicular pyroxene porphyritic basalt (11.1). Flakes [20] and other by-products were made of massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), vesicular pyroxene porphyritic basalt (11.1), and flint [61]. It is observed that in this locality decrease production and variety of raw materials for making artifacts. In levels that date back to the Historical period, probably the material were recycled and there was a metate [1] and an axe [10.2) made of vesicular pyroxene porphyritic basalt (11.1). Flakes [20] were made of massive fine-grained basalt (10.3) and vesicular pyroxene porphyritic basalt (11.1).

Operation 3B

This operation (Table 7.20), which dates to the Terminal Formative period, shows a wide variety of materials in flakes [20], macro-flakes [20.1] and other by-products made of massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), vesicular fine-grained basalt (11.3), and vesicular olivine porphyritic basalt (11.2). In regard to metates [1], manos [2], and cylinders [14] the materials used for making those tools were massive fine-grained basalt (10.3) and vesicular pyroxene porphyritic basalt (11.1). A polisher [5] and a hammerstone [27] were made of quartz. A disc [16] and an axe [10.2] were made of massive fine-grained basalt (10.3). A tejo [18] was made of vesicular pyroxene porphyritic basalt (11.1) and a bark-beater was made of schist (63). It is necessary to underline that this context has domestic functions.

Operation 4

This operation (Table 7.21), which corresponds to a place with elite residential administrative functions, during the transition from the Late Formative to the Terminal Formative period exhibits flakes [20], macro-flakes [20.1] made of massive fine-grained basalt (10.3) and cobbles [21] made of massive pyroxene porphyritic basalt (10.1). The use of these types of materials for elite residential administrative contexts during the Late Formative period also was replicated in Operations 2A, 2B, 2C, and 2E.

In levels that contained mixed ceramic materials which date to the Middle Formative to the Early Classic period, polishers [5] and macro-flakes [20.1] were made of massive pyroxene porphyritic basalt (10.1). Flakes [20] were made of massive fine-grained basalt (10.3) and massive pyroxene porphyritic basalt (10.1). And other by-products were made of massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1).

Operation 5

This operation was a context that exhibits elite residential administrative functions Table 7.22). During the Late Formative period metates [1], manos [2], polishers [5], macro-flakes [20.1], and flakes [20] were made of massive fine-grained basalt (10.3) and massive pyroxene porphyritic basalt (10.1). Other by-products were made of massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), and vesicular pyroxene porphyritic basalt (11.1). It is necessary to underline that this pattern in the use of these types of basalt are replicated in contexts during the Late Formative period in places with elite residential administrative functions in Op. 2A, 2B, 2C, 2E, and 4.

Operation 6

In this Operation (Table 7.23), in which the discovered contexts show that elite residential administrative functions were performed, there was an occupation which dates back to the Late Formative Period, other contained mixed ceramics which date back to the Late and the Terminal Formative, and another date back to the Terminal Formative period. During the Late Formative period, a metate [1] and a mano [2] were made of vesicular pyroxene porphyritic basalt (11.1). A mortar [8] and by-products were made of massive fine-grained basalt (10.3). Flakes [20] show the use of diverse types of basalt such as massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), and vesicular pyroxene porphyritic basalt (11.1). There was a quarter [50.6] made out of flint (61). In respect to the context which contained mixed ceramic materials which date back to the Late and Terminal Formative periods, it exhibits an axe [10.2] made of massive pyroxene porphyritic basalt (10.1), flakes [20] made of massive fine-grained basalt (10.3), and by-products made of vesicular pyroxene porphyritic basalt (11.1). During the Terminal Formative period there were flakes [20] made of massive fine-grained basalt (10.3) and vesicular pyroxene porphyritic basalt (11.1). Finally, in the level which corresponds to post-abandonment there was found a by-product made of massive pyroxene porphyritic basalt (10.1).

In Operation 6, during the Late Formative period, there was a similar use of materials for making artifacts like in the cases of elite residential administrative contexts in Operations 2A, 2B, 2C, 2E, and 5.

Operation 7

This operation shows four occupations in which elite residential administrative activities were performed: one during the transition from the Middle to the Late Formative period, a second during the Late Formative period, a third one which contained mixed ceramics that date back to the Late and Terminal Formative periods, and a fourth one which contained mixed ceramic materials of Late Formative and the Early Classic periods (Table 7.24). In levels which date back to the transition from the Middle Formative to the Late Formative periods were found a mano [2], a vessel [4], and a mortar [8] made of massive fine-grained basalt (10.3). Metates [1] were made of massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3). Flakes [20], macro-flakes [20.1] and by-products were made of massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), and vesicular pyroxene porphyritic basalt (11.1). In levels which date back to the Late Formative period, a metate [1] was made of vesicular pyroxene porphyritic basalt (11.1), a polisher [5] made of massive pyroxene porphyritic basalt (10.1), flakes {20] and by-products made of massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), and vesicular pyroxene porphyritic basalt (11.1).. In levels which contained mixed ceramic materials that date to the Late and Terminal Formative periods occurred metates [1] made of massive pyroxene porphyritic basalt (10.1) and vesicular pyroxene porphyritic basalt (11.1). A mano [2] was made of massive pyroxene porphyritic basalt (10.1), a polisher [5] made of massive fine-grained basalt (10.3). Flakes [20], macro-flakes [20.1], and by-products were made of massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), and vesicular pyroxene porphyritic basalt (11.1).

Some comments about materials and types of artifacts

In regards to grinding tools such as *metates*, it is observed that during the Early Formative period in domestic contexts, for their manufacture, were used massive pyroxene porphyritic basalt (10.1) or vesicular pyroxene porphyritic basalt (11.1). In one case (Op. 2C) were used both two kinds of basalt. However, during the Middle Formative period, metates made of massive fine-grained basalt (10.3) were more produced than the ones made of massive pyroxene porphyritic basalt (10.1). And during the Late Formative period, in elite residential administrative contexts, metates made of massive pyroxene porphyritic basalt (10.1) were more common than the ones made of massive fine-grained basalt (10.3) (Op. 2B and 2C). During the Late Formative period manos and metates found in elite residential administrative contexts were made of massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1), in some cases production debris show similar kinds of basalts in which the by-products were made. The exceptions to this trend are Operations 2D and 3A where metates were made of massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular olivine porphyritic basalt (11.2). These exceptions might be related to the type of specialized working units. One (Op. 2D) was an attached workshop to an elite residential administrative locality and another (Op. 3A) was independent working unit at domestic level.

Hammerstones were made of massive fine-grained basalt (10.3) or massive pyroxene porphyritic basalt (10.1) during the Middle Formative period in domestic contexts. But during the Late Formative period in elite residential contexts were more than one stone hammer made of massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), or vesicular pyroxene porphyritic basalt (11.1). In a case of a domestic context during the Terminal Formative period, a hammerstone was made of quartzite.

Basalt vessels were made of massive fine-grained basalt (10.3) during the Middle and Late Formative periods, and they were made of massive pyroxene porphyritic basalt (10.1) during the Terminal Formative period.

Axes were made of massive pyroxene porphyritic basalt (10.1) during the Late Formative period. During the Terminal Formative period, they were made of massive fine-grained basalt (10.3) and schist (63). During the Claasic period one axe was made of massive fine-grained basalt (10.3), and in a context that dates to the Historical period was found an axe made of vesicular pyroxene porphyritic basalt (11.1). In regard to *adzes* in the Middle Formative one was made of massive fine-grained basalt (10.3) and one which dates back to the Late Formative period was made of massive pyroxene porphyritic basalt (10.1). In regard to *chisels*, one which dates back to the Late formative period and another which corresponds to the Terminal Formative period were made of massive pyroxene porphyritic basalt (10.1)..

Polishers show that over time increased the materials used for making them. During the Early Formative period was used massive fine-grained basalt (10.3). During the Middle Formative period were used sandstone (72), massive pyroxene porphyritic basalt (10.1), vesicular pyroxene porphyritic basalt (11.1), and massive fine-grained basalt (10.3). During the Late Formative period were used massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular olivine porphyritic basalt (11.2), and vesicular fine-grained basalt (11.3)..

One *abrader* found in levels which date back to the Late Formative period was made of sanstone (72) and another made of massive pyroxene porphyritic basalt (10.1) was found ia a context which dates to the Terminal Formative period.

Two *mortars* manufactured during the Late Formative period were made of massive olivine porphyritic basalt (10.2) and massive fine-grained basalt (10.3). Two *pestles* manufactured during the Late Formative period were made of massive pyroxene porphyritic basalt (10.1) and vesicular pyroxene porphyritic basalt (11.1), and one which dates back to the Middle Formative period was made of massive fine-grained basalt (10.3).

Cubes, spheres, and discs were made were made of massive fine-grained basalt (10.3) during the Middle, Terminal Formative, and Classic periods. The exceptions were a disc made of vesicular pyroxene porphyritic basalt (11.1) during the Late Formative period and another disc made of massive pyroxene porphyritic basalt (10.1).

Cylinders which date back to Late Formative period were made of massive pyroxene porphyritic basalt (10.1) and vesicular pyroxene porphyritic basalt (11.1).

Tejos were made of massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3) during the Terminal Formative period and a tejo was found in levels which date to the Terminal Formative period.

Two *basalt donuts* were found. One made during the transition from the Early to the Middle Formative was of massive fine-grained basalt (10.3), and one made during the Late Formative period was of vesicular fine-grained basalt (11.3).

One *bark-beater* was made of schist (63) during the Terminal Formative period

Table 7.14 Cross-tabulation of Types and Materials found in every Period in Operation 2A

Operation 2A														
Period	Type	Material												
		10.1	10.2	10.3	11.1	11.2	11.3	60	61	63	66	72	75	76
C	20	1		2										
EC	20	1		3										
EC	20.1			2										
EC	27	1												
EC	50.3							1						
TF/EC	1			2										
TF/EC	2			1					1					
TF/EC	10.2									1				
TF/EC	12	1												
TF/EC	15			1										
TF/EC	20	8		15	4									
TF/EC	20.1	1		2			1							
TF/EC	50.5			1			1							
TF	2			2										
TF	20	1		2			1							
TF	20.1	2												
TF	27			1										
TF	50.6	1												
LF	2	1			1									
LF	12											1		
LF	19			1										
LF	20	4		29	3									1
LF	20.1			3										
LF	50.5	1		1										
LF	50.6			3	1									

Table 7.15 Cross-tabulation of Types and Materials found in every Period in Operation 2B

Operation 2B													
Period	Type	Material											
		10.1	10.2	10.3	11.1	11.2	11.3	61	63	66	72	75	76
EC	1			1									
EC	20	1		3									
LF	1	1		1									
LF	2	2		1									
LF	5			2									
LF	20	2		14					1				
LF	50.3	1		1									
LF	50.5	1	1										
LMF	1	4											
LMF	20			2									
LMF	20.1			2									
LMF	27			1									
LMF	50.1	1		1									
LMF	50.4	2											
LMF	50.5	1											
LMF	50.7	1											
MF	1			3									
MF	2			1									
MF	5										1		
MF	15			1									
MF	20			11									
MF	20.1			5									
MF	27			4									
MF	50.3	1		2									
EF	1			1									
EF	20.1			1									

Table 7.16 Cross-tabulation of Types and Materials found in every Period in Operation 2C

Operation 2C													
Period	Type												
		10.1	10.2	10.3	11.1	11.2	11.3	61	63	66	72	75	76
LF	1	3		1									
LF	4			1									
LF	20			2									
LF	50.3	1		1									
LF	50.4	1											
MF	1	3		5									
MF	2			2									
MF	20	2		10									
MF	50.3	3											
MF	50.5			1									
EF	1	1		1									
EF	20	1		3									
EF	50.3			2									

Table 7.17 Cross-tabulation of Types and Materials found in every Period in Operation 2D

Operation 2D													
Period	Type	Material											
		10.1	10.2	10.3	11.1	11.2	11.3	61	63	66	72	75	76
TF	2			1									
TF	4	1											
TF	5	1			1								
TF	9	1											
TF	10.1	1											
TF	12										1		
TF	20	1		8	2		1						
TF	20.1	1		3	2								
TF	27			1	1								
TF	50.1			1									
TF	50.2			1									
TF	50.5	1		3			1						
TF	50.6	1		1									
TF	50.7		1		1								
LF	1	3	2	2	5								
LF	2	1		2	2		1						
LF	5	2		1	2		1						
LF	7	1			1								
LF	8		1										
LF	9	5		4	2	1							
LF	10.2	1			1								
LF	10.3	1											
LF	12	1									1		
LF	13						1						
LF	14	1			1								
LF	18			1									
LF	20	5	2	21	3		1						
LF	20.1	3		8	3		1						
LF	20.2			1									
LF	20.3			1									
LF	27	2			1								

Table 7.17 Cross-tabulation of Types and Materials found in every Period in Operation 2D (continued)

Operation 2D													
Period	Type	Material											
		10.1	10.2	10.3	11.1	11.2	11.3	61	63	66	72	75	76
LF	50.1	1		1									
LF	50.2			2									
LF	50.3	8		6	2								
LF	50.6	1		5	2								
LF	50.7			1									
LF/MF	20			1									
LF/MF	50.1			1									
MF	9	1											
MF	27			1									
MF	50.2				1								
MF	50.5			1	1								

Table 7.18 Cross-tabulation of types and materials found in every Period in Operation 2E

Operation 2E														
Period	Type	Material												
		10.1	10.2	10.3	11.1	11.2	11.3	61	63	66	72	75	76	
TF	20		1	1										
TF	20.1			2										
LF	1			2										
LF	2			3										
LF	20			16										
LF	20.1			4										
LF	50.1			1										
LF	50.2			1										
LF	50.6			1										

Table 7.19 Cross-tabulation of Types and Materials found in every Period in Operation 3A

Operation 3A													
Period	Type	Material											
		10.1	10.2	10.3	11.1	11.2	11.3	61	63	66	72	75	76
A	20			1									
H	1				2								
H	10.2				1								
H	20			1	1								
C/H	9	1											
C/H	10.2			1									
C/H	16			1									
C/H	20			4				2					
C/H	20.1	1		2									
C/H	50.2	1		2									
TF/C/H	20						1						
TF/EC	1			2									
TF/EC	2						1						
TF/EC	5				1								
TF/EC	20	1		6	1								
TF/EC	50.3			1									
TF/EC	50.6			1									
TF	2			1									
LF	1			2		1							
LF	5				2	1	1						
LF	9			1									
LF	16				1								
LF	17			1									
LF	18	1		2	1								
LF	20	2	1	10	2	1	1						

Table 7.19 Cross-tabulation of Types and Materials found in every Period in Operation 3A (continued)

Operation 3A													
Period	Type	Material											
		10.1	10.2	10.3	11.1	11.2	11.3	61	63	66	72	75	76
LF	20.1	1		6	3								
LF	20.2			1									
LF	50.1			1									
LF	50.2			2									
LF	50.4		1	1									
LF	50.5			2		1							
LF	50.6			1									
LF	50.7			1	1		1						
LF	50.8				1								
LF/MF	2				1								
LF/MF	20			2									
LF/MF	20.1	1											
LF/MF	50.4				1								
LF/MF	50.6				1								
MF or LF	1	2	3	3	2	1							
MF or LF	2		1	2	1								
MF or LF	4			2									
MF or LF	5			1									
MF or LF	9		1										
MF or LF	20	6	1	13	1								
MF or LF	20.1			2									
MF or LF	27			1									
MF or LF	50.2			1									
MF or LF	50.5			3	2	1							
MF or LF	50.6			1	2								
MF or LF	50.7			1									

Table 7.19 Cross-tabulation of Types and Materials found in every Period in Operation 3A (continued)

Operation 3A													
Period	Type	Material											
		10.1	10.2	10.3	11.1	11.2	11.3	61	63	66	72	75	76
MF	1	2		7	3								
MF	2			3									
MF	4			2									
MF	5				2								
MF	7			1									
MF	9	1		1									
MF	16	1		2			2						
MF	17			1									
MF	20	4		4							1		
MF	20.1	2		8	4								
MF	27	1											
MF	50.1			1									
MF	50.2			2									
MF	50.3				1								
MF	50.4			1									
MF	50.5			2									
MF	50.7				1								
EF/MF	1			1									
EF/MF	5			1									
EF/MF	9			1									
EF/MF	10.3			1									
EF/MF	20	1	1	3	1								
EF/MF	20.1				1								
EF/MF	50.5			1			1						

Table 7.20 Cross-tabulation of Types and Materials found in every Period in Operation 3B

Operation 3B													
Period	Type	Material											
		10.1	10.2	10.3	11.1	11.2	11.3	61	63	66	72	75	76
TF	1			2	1								
TF	2			1	4								
TF	5												1
TF	10.2			1									
TF	11								1				
TF	14			1	1								
TF	16			1									
TF	18				1								
TF	20	8	1	44	9		1						
TF	20.1	3	2	7	3								
TF	20.3							1					
TF	27												1
TF	50.2			3									
TF	50.3			1									
TF	50.4	1											
TF	50.5	5		5	3	1	1						
TF	50.6			1									
TF	50.7			1									

Table 7.21 Cross-tabulation of Types and Materials found in every Period in Operation 4

Operation 4													
Period	Type	Material											
		10.1	10.2	10.3	11.1	11.2	11.3	61	63	66	72	75	76
mixed MF-EC	5	1											
mixed MF-EC	20	2		2									
mixed MF-EC	20.1	1											
mixed MF-EC	50.5	8	5	1	3								
LF-TF	20			1									
LF-TF	20.1			1									
LF-TF	21	1											

Table 7.22 Cross-tabulation of Types and Materials found in every Period in Operation 5

Operation 5													
Period	Type	Material											
		10.1	10.2	10.3	11.1	11.2	11.3	61	63	66	72	75	76
EC/TF	1			1									
EC/TF	5			2									
EC/TF	20			3									
EC/TF	20.1			1									
EC/TF	50.2			1									
EC/TF	50.5			1									
TF	1			8									
TF	2			1									
TF	20			4									
TF	20.1			1									
TF	20.3			1									
TF	27			1	1								
TF	50.5				1								
TF/LF mixed	9				1								
TF/LF mixed	20	1		1									
TF/LF mixed	20.1				2								
TF/LF mixed	50.4	1											
TF/LF mixed	50.5			2			2						
TF/LF mixed	50.6	1											
TF/LF mixed	50.7	1											
LF	1	1		2									
LF	2	2		3									
LF	5	1		2									
LF	20			17									
LF	20.1	1		5									
LF	50.2			2									
LF	50.4			1									
LF	50.5	3		2	3								
LF	50.6	1		1									

Table 7.23 Cross-tabulation of Types and Materials found in every Period in Operation 6

Operation 6													
Period	Type	Material											
		10.1	10.2	10.3	11.1	11.2	11.3	61	63	66	72	75	76
post-abandonment	50.5	1											
TF	20			1	1								
mixed LF-TF	10.2	1											
mixed LF-TF	20			1									
mixed LF-TF	50.5				1								
LF	1				1								
LF	2				1								
LF	8			1									
LF	20	1	1	2	1								
LF	20.1			1									
LF	50.5			1									
LF	50.6							1					

Table 7.24 Cross-tabulation of Types and Materials found in every Period in Operation 7

Operation 7													
Period	Type	Material											
		10.1	10.2	10.3	11.1	11.2	11.3	61	63	66	72	75	76
LF-EC mixed	20			2	1								
LF-EC mixed	20.1	1			1		1						
LF-EC mixed	50.4											1	
LF-EC mixed	50.5			1									
LF-TF	1	1			1								
LF-TF	2	1											
LF-TF	5			1									
LF-TF	20	4		10									
LF-TF	20.1	2		1	1								
LF-TF	50.5	2			2								
LF-TF	50.6			1	1								
LF-TF	50.7			1									
LF	1				1								
LF	5	1											
LF	20	1		5	2								
LF	50.5	1											
MF-LF	1	2		1									
MF-LF	2			2									
MF-LF	4			1									
MF-LF	8			1									
MF-LF	9			2									
MF-LF	20	1		6	1								
MF-LF	20.1			2									
MF-LF	50.5				1								
MF-LF	50.6				1								
Mixed	4				1								
Mixed	20	1		2				1					
Mixed	20.1	1			1								
Mixed	50.5			1									

Basalt ground stone production, consumption, and discard in Tres Zapotes over time and in different socio-economic contexts.

In this section, I analyze the evolution of technology of ground stone artifacts in Tres Zapotes. In order to see changes in acquisition, production, consumption, and discard, I prepare a series of tables which synthesize the steps of *the chaîne opératoire* that were identified in distinct contexts in the archaeological Operations conducted in the different Groups at the archaeological site. The tables contain the following information: Period, Operation, Unit, Context (either domestic, or Elite Residential, Civic-ceremonial, etc.), additional information (either fill construction, trash pit, floor, slope wash, etc), grinding maize tools (either (1) metate, or mano (2), Artifact Types that represent Technological Steps of Production (either 20.1 (macro-flake), or block (50.3), or preform (50.7), etc), tools of manufacture (either (5) polisher, or (27) stone hammer, etc), discarded artifacts (either stone vessel (4), or an axe (10.2) or (14) a basalt cylinder, etc). And also, all the types of basalt used as well as other kinds of raw materials. This is an example of a table:

Period	Operation	Units	context	Add info
MF	2B	6, 7, 8, 13, 14	Domestic	
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Metate, mano		Polisher, sphere, hammerstone,		
Artifact Types that represent Technological Steps of Production				
macro-core				
core				
block		X		
nodule				
basalt fragment				
quarter				
preform				
flake		X		
macro-flake		X		
micro-flake				
Basalt types		Other raw materials		
massive fine-grained basalt (10.3), and massive pyroxene porphyritic basalt (10.1)		hematite (66), pyroclast (68), sandstone (72), gneiss (75), and quartz (76)		

First, I will show all the tables that correspond to each Operation. Then, the tables organized over time. I had to select only the contexts which date a specific period or a transition between periods. At the end an interpretation of manufacture of basalt artifacts over time in Tres Zapotes is provided.

Operation 2: Group 2

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF</td><td>2A</td><td colspan="2">2&3</td><td>Domestic</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td></td><td></td></tr>
<tr><td colspan="6" align="center">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1) and massive pyroxene porphyritic basalt (10.1)</td><td colspan="3"></td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>TF-EC</td><td>2A</td><td>2&3</td><td>Civic-ceremonial</td><td>Plaza fill</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td>Abrader, hammerstone</td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2">X</td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2">X</td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)</td><td colspan="2">Limestone (60), sandstone (72), and quartz (76)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>EC</td><td>2A</td><td colspan="2">2&3</td><td>Civic-ceremonial</td><td>Plaza fill</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">metate</td><td colspan="2"></td><td></td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3)</td><td colspan="3">Limestone (60), concretion (70), and sandstone (72)</td></tr>
</table>

Period	Operation	Units	context	Add info
LF	2A	4&5	Domestic	production
Tools for Grinding maize		Tools for manufacture	Other tools	discard
		abrader	Mushrom stone	

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	
nodule	
basalt fragment	X
quarter	
preform	
flake	X
macro-flake	X
micro-flake	
Basalt types	Other raw materials
massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), vesicular fine grained basalt (11.3), and vesicular pyroxene porphyritic basalt (11.1)	Calcite (71), sandstone (72), and quartz (76).

Period	Operation	Units	context	Add info
TF	2A	4&5	Civic-ceremonial	Plaza fill
Tools for Grinding maize		Tools for manufacture	Other tools	discard
mano		hammerstone		

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	
nodule	
basalt fragment	
quarter	X
preform	
flake	X
macro-flake	X
micro-flake	
Basalt types	Other raw materials
massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), and vesicular fine grained basalt (11.3)	sandstone (72)

Period	Operation	Units	context	Add info
TF/EC	2A	4&5	Alluvium-plow zone	
Tools for Grinding maize		Tools for manufacture	Other tools	discard
mano			axe	
Artifact Types that represent Technological Steps of Production				
macro-core				
core		X		
block				
nodule				
basalt fragment				
quarter				
preform				
flake		X		
macro-flake		X		
micro-flake				
Basalt types		Other raw materials		
vesicular pyroxene porphyritic basalt (11.1), massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), and vesicular fine grained basalt (11.3)		schist (63), tuff (69), sandstone (72), and quartz (76)		

Period	Operation	Units	context	Add info
EF	2B	6, 7, 8, 13, 14	Domestic	
Tools for Grinding maize		Tools for manufacture	Other tools	discard
metate		hammerstone		
Artifact Types that represent Technological Steps of Production				
macro-core				
core				
block	X			
nodule				
basalt fragment				
quarter				
preform				
flake	X			
macro-flake	X			
micro-flake				
Basalt types	Other raw materials			
massive fine-grained basalt (10.3)				

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>MF</td><td>2B</td><td colspan="2">6, 7, 8, 13, 14</td><td>Domestic</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td colspan="2">Polisher, sphere,
hammerstone,</td><td></td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3">X</td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive fine-grained basalt (10.3), and massive pyroxene porphyritic basalt (10.1)</td><td colspan="3">hematite (66), pyroclast (68), sandstone (72), gneiss (75), and quartz (76)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>MF/LF</td><td>2B</td><td colspan="2">6, 7, 8, 13, 14</td><td>Domestic</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td colspan="2">Polisher, hammerstone</td><td></td><td></td></tr>
<tr><td colspan="6" align="center">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3">X</td></tr>
<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3">X</td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3">X</td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), and massive fine-grained basalt (10.3)</td><td colspan="3">quartz (76)</td></tr>
</table>

Period	Operation	Units	context	Add info
LF	2B	6, 7, 8, 13, 14	Elite Res Ad	Fill
Tools for Grinding maize		Tools for manufacture	Other tools	discard
metate				
Artifact Types that represent Technological Steps of Production				
macro-core				
core				
block		X		
nodule				
basalt fragment		X		
quarter				
preform				
flake		X		
macro-flake		X		
micro-flake				
Basalt types		Other raw materials		
massive pyroxene porphyritic basalt (10.1), and massive fine-grained basalt (10.3)				

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>EC</td><td>2B</td><td>6, 7, 8, 13, 14</td><td>Elite Res Ad</td><td>Fill</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">metate</td><td></td><td></td><td></td></tr>
<tr><td colspan="5" align="center">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="2">limestone (60)</td></tr>
</table>

Period	Operation	Units	context	Add info
MF/EF	2C	12	Domestic	
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Metate, mano		hammerstone		
Artifact Types that represent Technological Steps of Production				
macro-core				
core				
block		X		
nodule				
basalt fragment				
quarter				
preform				
flake		X		
macro-flake				
micro-flake				
Basalt types		Other raw materials		
massive fine-grained basalt (10.3), and massive pyroxene porphyritic basalt (10.1)		limestone (60)		

Period	Operation	Units	context	Add info
MF	2C	12	Elite Res Ad	Fill
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Metate, mano				vessel

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	
nodule	X
basalt fragment	X
quarter	
preform	
flake	X
macro-flake	
micro-flake	
Basalt types	Other raw materials
massive fine-grained basalt (10.3) and massive pyroxene porphyritic basalt (10.1)	limestone (60)

Period	Operation	Units	context	Add info
LF	2C	12	Elite Res Ad	Fill
Tools for Grinding maize		Tools for manufacture	Other tools	discard
metate				

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	X
nodule	
basalt fragment	
quarter	
preform	
flake	
macro-flake	
micro-flake	
Basalt types	Other raw materials
massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3)	limestone (60)

Period	Operation	Units	context	Add info
LF, L/MF, MF	2D	9, 10, 11	Elite Res Ad	
Tools for Grinding maize		Tools for manufacture	Other tools	discard
mano		Polisher, hammerstone		cylinder
Artifact Types that represent Technological Steps of Production				
macro-core		X		
core		X		
block				
nodule				
basalt fragment		X		
quarter		X		
preform				
flake				
macro-flake				
micro-flake				
Basalt types		Other raw materials		
massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)		ilmenite (64), lutite (67), and sandstone (72)		

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF</td><td>2D</td><td>9, 10, 11</td><td>Elite Res Ad</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano, pestle, mortar</td><td>Tejo, hammestone</td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2">X</td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="2">X</td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)</td><td colspan="2">schist (63), ilmenite (64), concretion (70), and mica (74)</td></tr>
</table>

Period	Operation	Units	context	Add info
TF/LF	2D	9, 10, 11	Elite Res Ad	
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Metate, mano, pestle, donut		Polisher, abrader		

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	
nodule	
basalt fragment	X
quarter	X
preform	X
flake	X
macro-flake	X
micro-flake	
Basalt types	Other raw materials
massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular olivine porphyritic basalt (11.2), and vesicular fine grained basalt (11.3)	limestone (60), serpentine (62), pyroclast (68), tuff (69), sandstone (72), and quartz (76)

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF</td><td>2E</td><td colspan="2">15</td><td>Domestic</td><td>Trash pit</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td colspan="2"></td><td></td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3">X</td></tr>
<tr><td colspan="3">core</td><td colspan="3">X</td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3">X</td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular olivine porphyritic basalt (11.2), and vesicular fine grained basalt (11.3)</td><td colspan="3">limestone (60), and concretion (70)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>TF</td><td>2E</td><td>15</td><td>Civic-ceremonial</td><td>Fill</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="2">concretion (70)</td></tr>
</table>

Operation 5: Group 3

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF</td><td>5</td><td>30</td><td>Elite Res-Ad</td><td>Trah pit</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td>polisher</td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="2">X</td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="2">limestone (60), and sandstone (72)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>TF/LF</td><td>5</td><td colspan="2">30</td><td>Elite Res-Ad</td><td>Slope wash</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td></td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3">X</td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3">X</td></tr>
<tr><td colspan="3">preform</td><td colspan="3">X</td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)</td><td colspan="3">sandstone (72)</td></tr>
</table>

Period	Operation	Units	context	Add info
TF	5	30	Elite Res-Ad	Ceramic concentration
Tools for Grinding maize		Tools for manufacture	Other tools	discard
		hammerstone		
Artifact Types that represent Technological Steps of Production				
macro-core				
core				
block				
nodule				
basalt fragment				
quarter				
preform				
flake				
macro-flake				
micro-flake				
Basalt types		Other raw materials		
vesicular pyroxene porphyritic basalt (11.1)				

Period	Operation		Units	context	Add info
LF	5		31	Civic-ceremonial	Fill
Tools for Grinding maize			Tools for manufacture	Other tools	discard
mano			polisher		
Artifact Types that represent Technological Steps of Production					
macro-core					
core			X		
block					
nodule			X		
basalt fragment					
quarter					
preform					
flake			X		
macro-flake			X		
micro-flake					
Basalt types			Other raw materials		
massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)			limestone (60), lutite (67), pyroclast (68), tuff (69), and quartz (76)		

Period	Operation	Units	context	Add info
LF	5	32	Civic-ceremonial	Fill
Tools for Grinding maize		Tools for manufacture	Other tools	discard
mano				

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	
nodule	
basalt fragment	
quarter	
preform	
flake	X
macro-flake	
micro-flake	
Basalt types	Other raw materials
massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)	

Period	Operation	Units	context	Add info
Mixed	5	32	Civic-ceremonial	Plow zone
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Artifact Types that represent Technological Steps of Production				

macro-core	
core	
block	
nodule	
basalt fragment	
quarter	
preform	
flake	X
macro-flake	
micro-flake	
Basalt types	Other raw materials
massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)	

Period	Operation	Units	context	Add info
LF	5	41	Civic-ceremonial	Plaza floor
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Metate, mano		hammerstone		
Artifact Types that represent Technological Steps of Production				
macro-core				
core				
block				
nodule				
basalt fragment				
quarter				
preform				
flake		X		
macro-flake		X		
micro-flake				
Basalt types		Other raw materials		
massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)				

Period	Operation	Units	context	Add info
TF	5	41	Civic-ceremonial	adoratorio
Tools for Grinding maize		Tools for manufacture	Other tools	discard
metate				
Artifact Types that represent Technological Steps of Production				
macro-core				
core				
block				
nodule				
basalt fragment				
quarter				
preform				
flake				
macro-flake				
micro-flake				
Basalt types		Other raw materials		
massive fine-grained basalt (10.3)				

<table>
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<tr><td>TF</td><td>5</td><td>41</td><td>Civic-ceremonial</td><td>Plaza fill</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="2">limestone (60)</td></tr>
</table>

Period	Operation	Units	context	Add info
TF	5	41	Civic-ceremonial	Plow zone
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Artifact Types that represent Technological Steps of Production				
macro-core				
core				
block				
nodule				
basalt fragment				
quarter				
preform				
flake				
macro-flake				
micro-flake				
Basalt types		Other raw materials		
vesicular pyroxene porphyritic basalt (11.1)				

Operation 6: Nestepe Group

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF</td><td>6</td><td>34</td><td>Elite Res-Ad</td><td>Refuse & fill</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="2"></td></tr>
</table>

Period	Operation	Units	context	Add info
LF	6	34	Elite Res-Ad	Ceramic concentration
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Artifact Types that represent Technological Steps of Production				
macro-core				
core				
block				
nodule				
basalt fragment		X		
quarter				
preform				
flake				
macro-flake		X		
micro-flake				
Basalt types		Other raw materials		
massive fine-grained basalt (10.3)		flint (61)		

<table>
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<tr><td>LF</td><td>6</td><td>34</td><td>Elite Res-Ad</td><td>Structure fill</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2">X</td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
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<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive fine-grained basalt (10.3)</td><td colspan="2"></td></tr>
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<table>
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<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3"></td><td colspan="2">limestone (60)</td></tr>
</table>

Period	Operation	Units	context	Add info
TF	6	34	Elite Res-Ad	Plow zone
Tools for Grinding maize		Tools for manufacture	Other tools	discard

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	
nodule	
basalt fragment	
quarter	
preform	
flake	X
macro-flake	
micro-flake	
Basalt types	Other raw materials
massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)	

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<tr><td colspan="2">mortar</td><td colspan="2"></td><td></td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
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<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="3">limestone (60)</td></tr>
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<table>
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<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>axe</td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
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<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="3">sandstone (72)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF</td><td>6</td><td>40</td><td>Civic-ceremonial</td><td>alluvium</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1)</td><td colspan="2"></td></tr>
</table>

Period	Operation	Units	context	Add info
abandonment	6	40	Civic-ceremonial	Plaza fill
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Artifact Types that represent Technological Steps of Production				
macro-core				
core				
block				
nodule				
basalt fragment		X		
quarter				
preform				
flake				
macro-flake				
micro-flake				
Basalt types		Other raw materials		
massive pyroxene porphyritic basalt (10.1)				

Non-elite residential occupation and independent craft production and associated with Mounds 110 and 111: Op. 3A and 3B

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>EF/MF</td><td>3A</td><td>17, 18, 24, 33</td><td>Domestic</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mortar, donut</td><td>Polisher, disc</td><td>axe</td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2">X</td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2">X</td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)</td><td colspan="2">tuff (69), calcite (71), and sandstone (72)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>MF</td><td>3A</td><td colspan="2">17, 18, 24, 33</td><td></td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano, pestle</td><td colspan="2">Polisher, disc, hammerstone</td><td></td><td>Vessel, cube</td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3">X</td></tr>
<tr><td colspan="3">core</td><td colspan="3">X</td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3">X</td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)</td><td colspan="3">sandstone (72)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>MF</td><td>3A</td><td>17, 18, 24, 33</td><td>Domestic</td><td>Burial-Ritual</td></tr>
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<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2">X</td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2">X</td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
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<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
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<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF</td><td>3A</td><td>17, 18, 24, 33</td><td>Domestic</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano, mortar</td><td>Anvil, polisher, disc, tejo</td><td></td><td>cube</td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2">X</td></tr>
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<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
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<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2">X</td></tr>
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<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular olivine porphyritic basalt (11.2), and vesicular fine grained basalt (11.3)</td><td colspan="2">quartz (76)</td></tr>
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<table>
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<tr><td>TF</td><td>3A</td><td colspan="2">17, 18, 24, 33</td><td>Domestic</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
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<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive fine-grained basalt (10.3)</td><td colspan="3"></td></tr>
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<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>TF/EC</td><td>3A</td><td>17, 18, 24, 33</td><td>Domestic</td><td>Fill</td></tr>
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<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
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<tr><td colspan="3">flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
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<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
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<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive fine-grained basalt (10.3)</td><td colspan="3">flint (61)</td></tr>
</table>

Period	Operation	Units	context	Add info
H	3A	17, 18, 24, 33	Domestic	Sandstone platform
Tools for Grinding maize		Tools for manufacture	Other tools	discard
			axe	

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	
nodule	
basalt fragment	
quarter	
preform	
flake	
macro-flake	
micro-flake	
Basalt types	Other raw materials
massive fine-grained basalt (10.3)	

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>H</td><td>3A</td><td colspan="2">17, 18, 24, 33</td><td>Domestic</td><td>hearth</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">metate</td><td colspan="2"></td><td></td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">vesicular pyroxene porphyritic basalt (11.1) and massive fine-grained basalt (10.3)</td><td colspan="3"></td></tr>
</table>

Period	Operation	Units	context	Add info
EF	3A	36&37	Domestic	
Tools for Grinding maize		Tools for manufacture	Other tools	discard
mano				

Artifact Types that represent Technological Steps of Production	
macro-core	
core	X
block	
nodule	
basalt fragment	
quarter	
preform	
flake	X
macro-flake	X
micro-flake	
Basalt types	Other raw materials
massive fine-grained basalt (10.3)	

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>EF/MF, MF or LF</td><td>3A</td><td>36&37</td><td>Domestic</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td>Polisher, hammerstone</td><td>adze</td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)</td><td colspan="2">quartz (76)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>MF and LF Mixed</td><td>3A</td><td>36&37</td><td>Domestic</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td>disc</td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular olivine porphyritic basalt (11.2)</td><td colspan="2">sandstone (72) and quartz (76)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>Plow zone</td><td>3A</td><td colspan="2">36&37</td><td>Domestic</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td colspan="2"></td><td></td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular olivine porphyritic basalt (11.2), and vesicular fine grained basalt (11.3)</td><td colspan="3"></td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>TF</td><td>3B</td><td colspan="2">21, 22, 23, 26, 27, 28</td><td>Domestic</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td colspan="2">Polisher, disc, hammerstone</td><td>Bark-beater</td><td>cylinder</td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3">X</td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3">X</td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3">X</td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular olivine porphyritic basalt (11.2), and vesicular fine grained basalt (11.3)</td><td colspan="3">flint (61), schist (63), tuff (69), sandstone (72), jadeite (73), quartz (76)</td></tr>
</table>

A long ridge that extend southward from the upper fluvial terrace between Groups 1 and 2: Op. 7

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>MF/LF</td><td>7</td><td colspan="2">38&39</td><td>Elite Res Ad</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano, mortar</td><td colspan="2">polisher</td><td></td><td>vessel</td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="3">X</td></tr>
<tr><td colspan="3">preform</td><td colspan="3">X</td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)</td><td colspan="3">sandstone (72) and quartz (76)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF</td><td>7</td><td colspan="2">38&39</td><td>Elite Res Ad</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">metate</td><td colspan="2">polisher</td><td></td><td></td></tr>
<tr><td colspan="6" align="center">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="3">sandstone (72), and quartz (76)</td></tr>
</table>

Period	Operation	Units	context	Add info
LF/TF	7	38&39	Elite Res Ad	
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Metate, mano				

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	
nodule	
basalt fragment	X
quarter	X
preform	X
flake	X
macro-flake	X
micro-flake	
Basalt types	Other raw materials
massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)	tuff (69) and sandstone (72)

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF/EC mixed</td><td>7</td><td>38&39</td><td>Elite Res Ad</td><td>Plow zone</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2">X</td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)</td><td colspan="2">flint (61), concretion (70), sandstone (72), gneiss (75), and quartz (76)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF/EC mixed</td><td>7</td><td>38&39</td><td>Elite Res Ad</td><td>Zona 4 intrusive pit</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3)</td><td colspan="2"></td></tr>
</table>

Operation 4: Group 1

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>Mixed MF-EC</td><td>4</td><td>19</td><td>Elite-Res Ad</td><td>Slope wash</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td>polisher</td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="2">sandstone (72) and quartz (76)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>Mixed MF-EC</td><td>4</td><td>20</td><td>Elite-Res Ad</td><td>Slope wash</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td></td><td></td><td>pebbles</td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), and vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="2">quartz (76)</td></tr>
</table>

Period	Operation	Units	context	Add info
LF-TF	4	25	Elite-Res Ad	Plow zone
Tools for Grinding maize		Tools for manufacture	Other tools	discard
			Cobble, pebble	
Artifact Types that represent Technological Steps of Production				
macro-core				
core				
block				
nodule				
basalt fragment				
quarter				
preform				
flake	X			
macro-flake	X			
micro-flake				
Basalt types	Other raw materials			
massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3)	limestone (60) and serpentine (62)			

Early Formative Period

Period	Operation	Units	context	Add info
EF	2B	6, 7, 8, 13, 14	Domestic	
Tools for Grinding maize		Tools for manufacture	Other tools	discard
metate		hammerstone		

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	X
nodule	
basalt fragment	
quarter	
preform	
flake	X
macro-flake	X
micro-flake	
Basalt types	Other raw materials
massive fine-grained basalt (10.3)	

Period	Operation	Units	context	Add info
EF	3A	36&37	Domestic	
Tools for Grinding maize		Tools for manufacture	Other tools	discard
mano				
Artifact Types that represent Technological Steps of Production				
macro-core				
core	X			
block				
nodule				
basalt fragment				
quarter				
preform				
flake	X			
macro-flake	X			
micro-flake				
Basalt types	Other raw materials			
massive fine-grained basalt (10.3)				

Middle Formative/Early Formative

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>EF/MF</td><td>3A</td><td>17, 18, 24, 33</td><td>Domestic</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mortar, donut</td><td>Polisher, disc</td><td>axe</td><td></td></tr>
<tr><td colspan="5" align="center">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2">X</td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2">X</td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)</td><td colspan="2">tuff (69), calcite (71), and sandstone (72)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>EF/MF, MF or LF</td><td>3A</td><td>36&37</td><td>Domestic</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td>Polisher, hammerstone</td><td>adze</td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)</td><td colspan="2">quartz (76)</td></tr>
</table>

Middle Formative/Early Formative

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>MF/EF</td><td>2C</td><td>12</td><td>Domestic</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td>hammerstone</td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2">X</td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive fine-grained basalt (10.3), and massive pyroxene porphyritic basalt (10.1)</td><td colspan="2">limestone (60)</td></tr>
</table>

Middle Formative

Period	Operation	Units	context	Add info
MF	2B	6, 7, 8, 13, 14	Domestic	
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Metate, mano		Polisher, sphere, hammerstone,		

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	X
nodule	
basalt fragment	
quarter	
preform	
flake	X
macro-flake	X
micro-flake	
Basalt types	Other raw materials
massive fine-grained basalt (10.3), and massive pyroxene porphyritic basalt (10.1)	hematite (66), pyroclast (68), sandstone (72), gneiss (75), and quartz (76)

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>MF</td><td>2B</td><td colspan="2">6, 7, 8, 13, 14</td><td>Domestic</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td colspan="2">Polisher, sphere,
hammerstone,</td><td></td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3">X</td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive fine-grained basalt (10.3), and massive pyroxene porphyritic basalt (10.1)</td><td colspan="3">hematite (66), pyroclast (68), sandstone (72), gneiss (75), and quartz (76)</td></tr>
</table>

Period	Operation	Units	context	Add info
MF	2C	12	Elite Res Ad	Fill
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Metate, mano				vessel

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	
nodule	X
basalt fragment	X
quarter	
preform	
flake	X
macro-flake	
micro-flake	
Basalt types	Other raw materials
massive fine-grained basalt (10.3) and massive pyroxene porphyritic basalt (10.1)	limestone (60)

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>MF</td><td>3A</td><td colspan="2">17, 18, 24, 33</td><td></td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano, pestle</td><td colspan="2">Polisher, disc, hammerstone</td><td></td><td>Vessel, cube</td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3">X</td></tr>
<tr><td colspan="3">core</td><td colspan="3">X</td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3">X</td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)</td><td colspan="3">sandstone (72)</td></tr>
</table>

Period	Operation	Units	context	Add info
MF	3A	17, 18, 24, 33	Domestic	Burial-Ritual
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Metate, mano				

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	
nodule	X
basalt fragment	
quarter	X
preform	
flake	X
macro-flake	X
micro-flake	
Basalt types	Other raw materials
massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)	

Middle Formative/Late Formative

Period	Operation	Units	context	Add info
MF/LF	2B	6, 7, 8, 13, 14	Domestic	
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Metate, mano		Polisher, hammerstone		
Artifact Types that represent Technological Steps of Production				
macro-core		X		
core				
block				
nodule		X		
basalt fragment		X		
quarter				
preform		X		
flake		X		
macro-flake		X		
micro-flake				
Basalt types		Other raw materials		
massive pyroxene porphyritic basalt (10.1), and massive fine-grained basalt (10.3)		quartz (76)		

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>MF and LF Mixed</td><td>3A</td><td>36&37</td><td>Domestic</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td>disc</td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular olivine porphyritic basalt (11.2)</td><td colspan="2">sandstone (72) and quartz (76)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>MF/LF</td><td>7</td><td>38&39</td><td>Elite Res Ad</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano, mortar</td><td>polisher</td><td></td><td>vessel</td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="2">X</td></tr>
<tr><td colspan="3">preform</td><td colspan="2">X</td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)</td><td colspan="2">sandstone (72) and quartz (76)</td></tr>
</table>

Late Formative

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF</td><td>2A</td><td>2&3</td><td>Domestic</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1) and massive pyroxene porphyritic basalt (10.1)</td><td colspan="2"></td></tr>
</table>

Period	Operation	Units	context	Add info
LF	2A	4&5	Domestic	production
Tools for Grinding maize		Tools for manufacture	Other tools	discard
		abrader	Mushrom stone	
Artifact Types that represent Technological Steps of Production				
macro-core				
core				
block				
nodule				
basalt fragment	X			
quarter				
preform				
flake	X			
macro-flake	X			
micro-flake				
Basalt types	Other raw materials			
massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), vesicular fine grained basalt (11.3), and vesicular pyroxene porphyritic basalt (11.1)	Calcite (71), sandstone (72), and quartz (76).			

Period	Operation	Units	context	Add info
LF	2B	6, 7, 8, 13, 14	Elite Res Ad	Fill
Tools for Grinding maize		Tools for manufacture	Other tools	discard
metate				

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	X
nodule	
basalt fragment	X
quarter	
preform	
flake	X
macro-flake	X
micro-flake	
Basalt types	Other raw materials
massive pyroxene porphyritic basalt (10.1), and massive fine-grained basalt (10.3)	

Period	Operation	Units	context	Add info
LF	2C	12	Elite Res Ad	Fill
Tools for Grinding maize		Tools for manufacture	Other tools	discard
metate				

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	X
nodule	
basalt fragment	
quarter	
preform	
flake	
macro-flake	
micro-flake	
Basalt types	Other raw materials
massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3)	limestone (60)

Period	Operation	Units	context	Add info
LF	2D	9, 10, 11	Elite Res Ad	
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Metate, mano, pestle, mortar		Tejo, hammestone		

Artifact Types that represent Technological Steps of Production	
macro-core	
core	X
block	
nodule	
basalt fragment	X
quarter	X
preform	
flake	X
macro-flake	X
micro-flake	
Basalt types	Other raw materials
massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)	schist (63), ilmenite (64), concretion (70), and mica (74)

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF</td><td>2E</td><td colspan="2">15</td><td>Domestic</td><td>Trash pit</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td colspan="2"></td><td></td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3">X</td></tr>
<tr><td colspan="3">core</td><td colspan="3">X</td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3">X</td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular olivine porphyritic basalt (11.2), and vesicular fine grained basalt (11.3)</td><td colspan="3">limestone (60), and concretion (70)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF</td><td>5</td><td colspan="2">31</td><td>Civic-ceremonial</td><td>Fill</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">mano</td><td colspan="2">polisher</td><td></td><td></td></tr>
<tr><td colspan="6" align="center">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3">X</td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3">X</td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)</td><td colspan="3">limestone (60), lutite (67), pyroclast (68), tuff (69), and quartz (76)</td></tr>
</table>

Period	Operation	Units	context	Add info
LF	5	30	Elite Res-Ad	Trah pit
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Metate, mano		polisher		

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	
nodule	
basalt fragment	X
quarter	X
preform	
flake	X
macro-flake	X
micro-flake	
Basalt types	Other raw materials
massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)	limestone (60), and sandstone (72)

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF</td><td>5</td><td colspan="2">32</td><td>Civic-ceremonial</td><td>Fill</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">mano</td><td colspan="2"></td><td></td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="3"></td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF</td><td>5</td><td>41</td><td>Civic-ceremonial</td><td>Plaza floor</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td>hammerstone</td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="2"></td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF</td><td>6</td><td>34</td><td>Elite Res-Ad</td><td>Refuse & fill</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="2"></td></tr>
</table>

Period	Operation	Units	context	Add info
LF	6	34	Elite Res-Ad	Ceramic concentration
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Artifact Types that represent Technological Steps of Production				
macro-core				
core				
block				
nodule				
basalt fragment	X			
quarter				
preform				
flake				
macro-flake	X			
micro-flake				
Basalt types	Other raw materials			
massive fine-grained basalt (10.3)	flint (61)			

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF</td><td>6</td><td>34</td><td>Elite Res-Ad</td><td>Structure fill</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="2">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="2">core</td><td colspan="3"></td></tr>
<tr><td colspan="2">block</td><td colspan="3"></td></tr>
<tr><td colspan="2">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="2">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="2">quarter</td><td colspan="3">X</td></tr>
<tr><td colspan="2">preform</td><td colspan="3"></td></tr>
<tr><td colspan="2">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="2">macro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="2">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="2">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="2">massive fine-grained basalt (10.3)</td><td colspan="3"></td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF</td><td>6</td><td>35</td><td>Elite Res-Ad</td><td>Slope wash</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">mortar</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="2">limestone (60)</td></tr>
</table>

Period	Operation	Units	context	Add info
LF	6	40	Civic-ceremonial	alluvium
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Artifact Types that represent Technological Steps of Production				
macro-core				
core				
block				
nodule				
basalt fragment				
quarter				
preform				
flake				
macro-flake				
micro-flake				
Basalt types		Other raw materials		
massive pyroxene porphyritic basalt (10.1)				

Period	Operation	Units	context	Add info
LF	3A	17, 18, 24, 33	Domestic	
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Metate, mano, mortar		Anvil, polisher, disc, tejo		cube

Artifact Types that represent Technological Steps of Production	
macro-core	X
core	X
block	
nodule	
basalt fragment	X
quarter	X
preform	X
flake	X
macro-flake	X
micro-flake	X
Basalt types	Other raw materials
massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular olivine porphyritic basalt (11.2), and vesicular fine grained basalt (11.3)	quartz (76)

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF</td><td>7</td><td>38&39</td><td>Elite Res Ad</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">metate</td><td>polisher</td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="2">sandstone (72), and quartz (76)</td></tr>
</table>

Late Formative-Terminal Formative

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>TF/LF</td><td>2D</td><td>9, 10, 11</td><td>Elite Res Ad</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano, pestle, donut</td><td>Polisher, abrader</td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="2">X</td></tr>
<tr><td colspan="3">preform</td><td colspan="2">X</td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular olivine porphyritic basalt (11.2), and vesicular fine grained basalt (11.3)</td><td colspan="2">limestone (60), serpentine (62), pyroclast (68), tuff (69), sandstone (72), and quartz (76)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>TF/LF</td><td>5</td><td colspan="2">30</td><td>Elite Res-Ad</td><td>Slope wash</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td></td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3">X</td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3">X</td></tr>
<tr><td colspan="3">preform</td><td colspan="3">X</td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)</td><td colspan="3">sandstone (72)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>Mixed LF-TF</td><td>6</td><td>35</td><td>Elite Res-Ad</td><td>Plow zone</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td></td><td>axe</td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="2">sandstone (72)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF-TF</td><td>4</td><td colspan="2">25</td><td>Elite-Res Ad</td><td>Plow zone</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>Cobble, pebble</td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3)</td><td colspan="3">limestone (60) and serpentine (62)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>LF/TF</td><td>7</td><td>38&39</td><td>Elite Res Ad</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td></td><td></td><td></td></tr>
<tr><td colspan="5" align="center">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="2">X</td></tr>
<tr><td colspan="3">preform</td><td colspan="2">X</td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="2">tuff (69) and sandstone (72)</td></tr>
</table>

Terminal Formative

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>TF</td><td>2A</td><td colspan="2">4&5</td><td>Civic-ceremonial</td><td>Plaza fill</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">mano</td><td colspan="2">hammerstone</td><td></td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
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<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), and vesicular fine grained basalt (11.3)</td><td colspan="3">sandstone (72)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>TF</td><td>5</td><td colspan="2">30</td><td>Elite Res-Ad</td><td>Ceramic concentration</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td colspan="2">hammerstone</td><td></td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="3"></td></tr>
</table>

Period	Operation	Units	context	Add info
TF	2E	15	Civic-ceremonial	Fill
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Metate, mano				

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	
nodule	
basalt fragment	
quarter	
preform	
flake	X
macro-flake	X
micro-flake	
Basalt types	Other raw materials
massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)	concretion (70)

Period	Operation	Units	context	Add info
TF	5	41	Civic-ceremonial	adoratorio
Tools for Grinding maize		Tools for manufacture	Other tools	discard
metate				
Artifact Types that represent Technological Steps of Production				
macro-core				
core				
block				
nodule				
basalt fragment				
quarter				
preform				
flake				
macro-flake				
micro-flake				
Basalt types		Other raw materials		
massive fine-grained basalt (10.3)				

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>TF</td><td>5</td><td>41</td><td>Civic-ceremonial</td><td>Plaza fill</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="2">limestone (60)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>TF</td><td>5</td><td colspan="2">41</td><td>Civic-ceremonial</td><td>Plow zone</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td></td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">vesicular pyroxene porphyritic basalt (11.1)</td><td colspan="3"></td></tr>
</table>

Period	Operation	Units	context	Add info
TF	6	34	Elite Res-Ad	Structure fill
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Artifact Types that represent Technological Steps of Production				
macro-core				
core				
block				
nodule				
basalt fragment				
quarter				
preform				
flake				
macro-flake				
micro-flake				
Basalt types		Other raw materials		
		limestone (60)		

Period	Operation	Units	context	Add info
TF	6	34	Elite Res-Ad	Plow zone
Tools for Grinding maize		Tools for manufacture	Other tools	discard

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	
nodule	
basalt fragment	
quarter	
preform	
flake	X
macro-flake	
micro-flake	
Basalt types	Other raw materials
massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)	

Period	Operation	Units	context	Add info
TF	3A	17, 18, 24, 33	Domestic	
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Metate, mano		polisher		

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	X
nodule	
basalt fragment	
quarter	X
preform	
flake	
macro-flake	X
micro-flake	
Basalt types	Other raw materials
massive fine-grained basalt (10.3)	

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>TF</td><td>3B</td><td colspan="2">21, 22, 23, 26, 27, 28</td><td>Domestic</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td colspan="2">Polisher, disc, hammerstone</td><td>Bark-beater</td><td>cylinder</td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3">X</td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3">X</td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3">X</td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3">X</td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular olivine porphyritic basalt (11.2), and vesicular fine grained basalt (11.3)</td><td colspan="3">flint (61), schist (63), tuff (69), sandstone (72), jadeite (73), quartz (76)</td></tr>
</table>

Terminal Formative-Early Classic

Period	Operation	Units	context	Add info
TF-EC	2A	2&3	Civic-ceremonial	Plaza fill
Tools for Grinding maize		Tools for manufacture	Other tools	discard
Metate, mano		Abrader, hammerstone		

Artifact Types that represent Technological Steps of Production	
macro-core	
core	
block	X
nodule	
basalt fragment	
quarter	X
preform	
flake	X
macro-flake	X
micro-flake	
Basalt types	Other raw materials
massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)	Limestone (60), sandstone (72), and quartz (76)

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>TF-EC</td><td>2A</td><td colspan="2">2&3</td><td>Civic-ceremonial</td><td>Plaza fill</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">Metate, mano</td><td colspan="2">Abrader, hammerstone</td><td></td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3">X</td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3">X</td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)</td><td colspan="3">Limestone (60), sandstone (72), and quartz (76)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>TF/EC</td><td>2A</td><td colspan="2">4&5</td><td>Alluvium-plow zone</td><td></td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">mano</td><td colspan="2"></td><td>axe</td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3"></td></tr>
<tr><td colspan="3">core</td><td colspan="3">X</td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">vesicular pyroxene porphyritic basalt (11.1), massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), and vesicular fine grained basalt (11.3)</td><td colspan="3">schist (63), tuff (69), sandstone (72), and quartz (76)</td></tr>
</table>

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>TF/EC</td><td>3A</td><td>17, 18, 24, 33</td><td>Domestic</td><td>Fill</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3)</td><td colspan="2"></td></tr>
</table>

Early Classic

<table>
<tr><td>Period</td><td>Operation</td><td>Units</td><td>context</td><td>Add info</td></tr>
<tr><td>EC</td><td>2A</td><td>2&3</td><td>Civic-ceremonial</td><td>Plaza fill</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td>Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2">metate</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="2"></td></tr>
<tr><td colspan="3">core</td><td colspan="2"></td></tr>
<tr><td colspan="3">block</td><td colspan="2"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="2"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="2"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="2"></td></tr>
<tr><td colspan="3">preform</td><td colspan="2"></td></tr>
<tr><td colspan="3">flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="2">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="2"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="2">Other raw materials</td></tr>
<tr><td colspan="3">massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3)</td><td colspan="2">Limestone (60), concretion (70), and sandstone (72)</td></tr>
</table>

Period	Operation	Units	context	Add info
EC	2B	6, 7, 8, 13, 14	Elite Res Ad	Fill
Tools for Grinding maize		Tools for manufacture	Other tools	discard
metate				
Artifact Types that represent Technological Steps of Production				
macro-core				
core				
block				
nodule				
basalt fragment				
quarter				
preform				
flake			X	
macro-flake			X	
micro-flake				
Basalt types			Other raw materials	
massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1)			limestone (60)	

Classic-Historic

<table>
<tr><td>Period</td><td>Operation</td><td colspan="2">Units</td><td>context</td><td>Add info</td></tr>
<tr><td>C/H</td><td>3A</td><td colspan="2">17, 18, 24, 33</td><td>Surface</td><td>Plow zone</td></tr>
<tr><td colspan="2">Tools for Grinding maize</td><td colspan="2">Tools for manufacture</td><td>Other tools</td><td>discard</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>axe</td><td></td></tr>
<tr><td colspan="6">Artifact Types that represent Technological Steps of Production</td></tr>
<tr><td colspan="3">macro-core</td><td colspan="3">X</td></tr>
<tr><td colspan="3">core</td><td colspan="3"></td></tr>
<tr><td colspan="3">block</td><td colspan="3"></td></tr>
<tr><td colspan="3">nodule</td><td colspan="3"></td></tr>
<tr><td colspan="3">basalt fragment</td><td colspan="3"></td></tr>
<tr><td colspan="3">quarter</td><td colspan="3"></td></tr>
<tr><td colspan="3">preform</td><td colspan="3"></td></tr>
<tr><td colspan="3">flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">macro-flake</td><td colspan="3">X</td></tr>
<tr><td colspan="3">micro-flake</td><td colspan="3"></td></tr>
<tr><td colspan="3">Basalt types</td><td colspan="3">Other raw materials</td></tr>
<tr><td colspan="3">massive fine-grained basalt (10.3)</td><td colspan="3">flint (61)</td></tr>
</table>

Historic

Period	Operation	Units	context	Add info
H	3A	17, 18, 24, 33	Domestic	Sandstone platform
Tools for Grinding maize		Tools for manufacture	Other tools	discard
			axe	
Artifact Types that represent Technological Steps of Production				
macro-core				
core				
block				
nodule				
basalt fragment				
quarter				
preform				
flake				
macro-flake				
micro-flake				
Basalt types		Other raw materials		
massive fine-grained basalt (10.3)				

Interpretation

After the analysis of the steps of the *chaîne opératioire* identified in the contexts of production, the types of basalt found, the tools of manufacture, the kinds of grinding tools which were present, other associated minerals, and discarded artifacts, I identified some patterns in the ground stone remains that correspond to periods, social status, and intra-site diversity which is associated with diverse Groups in the archaeological site of Tres Zapotes

Some important issues were taken into consideration. The first one was to see social status identified in basalt remains. One assumption could be that if more social status is acquired, then more types of basalt are present. Even though since the Middle Formative period inhabitants of each of the plaza groups appear to have similar access to different types of basalts, the difference relied on the quantity of each type of basalt that is associated with high status. A second issue resulted from this difference in the number of types of basalt is the change over time in terms of value of the types of basalt that represented social status. This change seems to be associated with the acquisition of basalt from distinct outcrops over time as well the physical characteristics needed for the manufacture of artifacts and that could be found in some basalt types. Quantities of different basalt types differed in the plaza groups. And the degree of production of diverse units may be associated with each social context (i.e. production for consumption in low status households, or attached production to elite residential units, or multi-crafting household units of production). The association of the quantities and types of basalt, with the steps of production identified, the tools used, discarded artifacts, and the chronological period, allow us to notice changes in evolution of technology through the study of ground stone remains of Tres Zapotes.

Early Formative period

The Early Formative deposits excavated at Tres Zapotes pertained to domestic contexts. These contexts show the kind of ground stone production which supplied artifacts for quotidian needs: there were artifacts used for grinding maize such as metates (1) and manos (2). And also there were by-products which suggest that grinding tools were produced in these contexts and may have been rejuvenated. The by-products that support this interpretation are macro-flakes (20.1), flakes (20), cores (50.2), and blocks (50.3). The excavated samples consisted only of fine-grained basalt (10.3). One reason for this low variability in types of basalt used could be the small sample of Early Formative contexts excavated. Another reason is that massive fine-grained basalt (10.3) were chosen for manufacturing grinding tools and at the time it appears that Tres Zapotes was a village, then the inhabitants acquired raw materials of from outcrops, and the effort for transporting rocks was invested in the rocks that were more durable for manufacturing grinding tools.

In the analysis of the Early Formative domestic contexts of Operation 2B and 3A there was a subtle difference: it seems that the production unit found in Op. 3A contained more by-products. In spite of this difference, both contexts had the same type of basalt.

Early/Middle Formative transition

In the excavated domestic contexts which date to the Early/Middle Formative transition, it is noticed a significant change in the by-products identified in the activity areas, as well in the increase of the types of basalt used for making ground stone artifacts. Also, it is observed a subtle increase in the tools used for grinding maize and other food stuffs. There were metates (1), manos (2), and mortars (8). In respect to the by-products a subtle increase of diversity is observed. There were macro-flakes (20.1), flakes (20), cores (50.2), blocks (50.3), nodules (50.4), basalt fragments (50.5), and preforms (50.7).

The tools of manufacture which were found were polishers (5) and basalt discs (used for a fine polishing) (16). The polishing tools and the occurrence of cobbles (22) and pebbles with evidence of thermic shock (25) suggest that the produced artifacts had a more complex production sequence and were more completely finished. This additional work invested in produced artifacts could be associated with requirements for artifacts made in newer types of basalt used as compared to the one used in the previous period. Also, more elaborated artifacts could be exchanged among families who inhabited the groups in Tres Zapotes when the site was a village.

An important difference can be observed in the acquisition of types of basalt in the context found in Group 2 and the contexts found in the excavations conducted in Op. 3A. In sub-Operation 2C, the domestic context exhibited the use of massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3). These types of basalt continued as the most used kinds in the successive periods in Group 2. In respect to the domestic contexts found in sub-Operations 3A (Units 17, 18, 24, and 33) and 3A (Units 36 and 37) there were used massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular fine grained basalt (11.3), less frequently, massive pyroxene porphyritic basalt (10.1). This limited use of massive pyroxene porphyritic basalt (10.1) continued in successive periods in the area where Op. 3A was conducted. On the contrary, in spaces in Tres Zapotes where elites emerged, the use of massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3) was much preferred.

Middle Formative period

Domestic contexts

In the domestic contexts which date to the Middle Formative period there is a notable change in complexity of both technology and organization of production as compared to the previous period. In Group 2 (Sub-operation 2B and in the place where Op. 3A was conducted), there were excavated three examples. One was discovered in sub-Operation 2B and the other two in the place where sub-Operation 3A was conducted. Those contexts which were part of sub-Operation 3A one was the space where quotidian activities were performed and the second was a burial-ritual context underneath a domestic unit. The habitational contexts located in Sub-operation 2B and in Op. 3A had almost the same inventory of ground stone remains. There were similar tools for maize grinding such as matates (1), manos (2), and pestles (7). The identified by-products which correspond to domestic production were similar in both places exhibiting macro-flakes (20.1), flakes (20), macro-cores (50.1), cores (50.2), blocks (50.3), nodules (50.4), and basalt fragments (50.5). The types of tools were more: there were polishers (5), basalt spheres (used for polishing) (15), and stone hammers (27). There was hematite (66) used for polishing. Among the discarded artifacts were remains of basalt vessels (4) and basalt cubes (17). The difference between the contexts in sub-Operation 2B and 3A relies on the acquisition of types of basalt. The context of sub-Operation 2B used massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3), whereas in the context in sub-Operation 3A used massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular fine grained basalt (11.3), and massive pyroxene porphyritic basals (10.1) (this basalt type occurred in a small quantity, the opposite situation happen in the 2B context where basalt type 10.1 was the most used). Another subtle difference was that the domestic context in sub-Operation 3A had two types of by-products more than the domestic context in Operation 2B.

In sub-Operation 3A there was also a domestic context that was burial-ritual. The offerings associated to the human remains exhibited the steps of the basalt ground stone productive process. There were macro-flakes (20.1), flakes (20), cobbles (21), pebbles (24), nodules (50.3), and preforms (50.7). All the by-products that composed the associated offerings mirrored the basalt production conducted in households and at the same time had a symbolic meaning which refers to the cycle life/death, the association of raw material with finished and unfinished products. Basalt ground stone remains that were transformed in human entities in offerings. The types of basalt included in this offering were massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1).

Elite Residential /Administrative context

In Group 2, there was evidence of a context that was the place of an Elite Residential Administrative space. In sub-Operation 2C, in levels which date to the Middle Formative period the evidence shows the similarities and differences in respect to the domestic contexts. The inventory of ground stone tools in this context is similar to other Elite Residential Administrative places. There were metates (1) and manos for grinding maize. The by-products that indicate elite residential production were flakes (20), cobbles with evidence of thermic shock (22), blocks (50.3), nodules (50.4), and basalt fragments (50.5). The by-products suggest that the degree of production may be less intense than the domestic units. Probably, a minor quantity artifacts were manufactured/rejuvenated in this place and some others were acquired finished or almost finished. In regards to the types of basalt that were identified in this context were massive fine-grained basalt (10.3) and massive pyroxene porphyritic basalt (10.1).

In Group 1, there were found two examples of Elite Residential Administrative contexts (Op. 4, Units 19 and 20). Although those contexts had mixed ceramic types of both Middle Formative and Early Classic periods, and the specific context indicates an area of slope wash, the analysis of them shed light on the earliest elite residential contexts in Tres Zapotes. Another important reason it is that these elite examples add evidence of ground stone artifacts during a period where the political-economic system was more centralized and exclusionary, where the corpus of monuments exhibits individual leaders. As this study compares both domestic and Elite Residential contexts, it is possible to see the similarities and differences between them. It is possible to see that Units 19 and 20 show evidence of local production. There were by-products such as flakes (20), cobbles (21), pebbles (24), and basalt fragments (50.5). The basalt types used were massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), and vesicular pyroxene porphyritic basalt (11.1). There also were tools for manufacturing basalt such as polishers (5).

Middle/Late Formative Transition

Domestic contexts

There were two cases of domestic contexts which date to the Middle/Late transition. One context was discovered in Group 2 (Sub-Operation 2B) and another one in the area where sub-Operation 3A (Units 6, 7, 8, 13, and 14) was conducted. Both cases show similar tools for grinding maize: metates (1) and manos (2). However, both cases exhibit differences in tools for manufacture and the types of basalt which were used. In regard to the context found in Group 2 (Op. 2B) there were by-products such as macro-flakes (20.1), flakes (20), pebbles with evidence of thermic shock (25), macro-cores (50.1), nodules (50.4), basalt fragments (50.5), and preforms. The tools found in this context were polishers (5) and stone hammers (27). The types of basalt found were massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3). And in regard to the domestic context located in the area of sub-Operation 3A, there were by-products such as macro-flakes (20.1) and flakes (20). The type of tool used for manufacture basalt were basalt discs (used for polishing) (16). In spite of the fact that this place had evidence of only a few of types of by-products, there were used more types of basalt such as massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular fine grained basalt (11.3), massive pyroxene porphyritic basalt (10.1), and massive olivine porphyritic basalt (10.2). In synthesis, the domestic context found in in Group 2 (Op. 2B) shows more types of by-products and only two types of basalt. Whereas, the case of a domestic context in Sub-Operation 3A exhibits only three types of by-products and four types of basalt that were used for making artifacts. Over time, the locality found in the area of Operation 3A had access a wide variety of basalt types.

Elite Residential/ Administrative context

In the area where there were conducted excavations of Operation 7, in levels that date to the Middle Formative/Late Formative period, there was identified a context that corresponded to an Elite Residential/ Administrative place. The basalt tools needed for grinding maize and other foods were metates (1), manos (2), and mortars (8). The inventory of by-products included unidentified remains of ground stone production (9), macro-flakes (20.1), flakes (20), pebbles (24), pebbles with evidence of thermic shock (25), basalt fragments (50.5), basalt quarters (50.6), and preforms (50.7). Manufacturing implements occurred in the form of polishers (5), and a type of discarded artifact such as basalt vessels (4) which were damaged during manufacture. This context exhibits a degree of production to manufacture artifacts used in the same context. The types of basalt that were used, as in other Elite Residential contexts in Tres Zapotes, were massive fine-grained basalt (10.3) and massive pyroxene porphyritic basalt (10.1).

Late Formative period

Domestic contexts

In this study, there were identified four cases of domestic contexts which date to the Late Formative period. The contexts show the variation in degrees of local basalt production and the use of the space for performing quotidian activities such as grinding maize. Three cases were excavated in Group 2 – two in sub-Operation 2A (Units 2 and 3;

and Units 4 and 5) and one in the area where sub-Operation 3A was conducted (Units 17, 18, 24, and 33). The domestic context found in Sub-Operation 2A (Units 2 and 3) was which had less evidence of basalt production. There were by-products such as flakes (20) and cobbles (21) and the types of basalt used were massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1). Whereas the other domestic context found in the same sub-Operation (2A, Units 4 and 5) exhibit by-products such as unidentified ground stone production debris (9), macro-flakes (20.1), flakes (20), and basalt fragments (50.5). The type of tool for manufacture used for manufacture was an abrader and a discarded artifact was a stone mushroom (19). The types of basalt used were massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3). In the case of the domestic context found in sub-Operation 2E, the specific context corresponds to a trash pit, and there were tools for grinding maize such as metates (1) and manos (2). The identified by-products were such as macro-flakes (20.1), flakes (20), cobbles and pebbles with evidence of thermic shock (22 and 25), basalt fragments (50.5), and basalt quarters (50.6). The type found for manufacturing tools was a polisher (5), and the basalt types used in this context were massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and massive olivine porphyritic basalt (10.2). And finally, in regard to the domestic context found in the area where sub-Operation 3A (Units 17, 18, 24, and 33) was conducted, there were found tools for grinding maize such as metates (1), manos (2), and mortars (8). The by-products were diverse such as unidentified remains of basalt production (9), macro-flakes (20.1), flakes (20), cobbles with evidence of thermic shock (22), macro-cores (50.1), cores (50.2), basalt fragments (50.5), basalt quarters (50.6), preforms (50.7), and an anvil (50.8). The identified tools for making ground stone artifacts were polishers (5), discs (16), and tejos (18). The discarded artifacts were basalt cubes (17) and the types of basalt used were massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), vesicular fine grained basalt (11.3), and vesicular olivine porphyritic basalt (11.2).

In these domestic contexts is noticed that increased the types of basalt used. The context found in sub-Operation 3A, as the cases in previous periods, use different types of basalt in respect to the domestic contexts found in Group 2. Also, that context had evidence of more types of by-products and may be had a greater degree of production, probably supply finished artifacts to other domestic compounds in the same non-elite area.

Elite Residential/ Administrative contexts

In respect to the Elite Residential /Administrative contexts which date to the Late Formative period, in this study seven cases have been analyzed: three contexts in Group 2 (Op. 2B, 2C, and 2D), one context in Group 3 (Op. 5), two contexts in Nestepe Group (Op. 6, Units 34 and 35), and one context in the area where Op. 7 was conducted.

The study of Elite Residential /Administrative which existed during the Late Formative period is important for understanding how the elites were acquiring types of basalt; and using, producing, and discarding ground stone artifacts during an epoch when there was a confederacy, when there was not a centralized political-economic model.

Even though some of the cases correspond to specific contexts such as fill (Op. 2B and 2C) or slope wash (Op. 6, Unit 35, the scarcity of remains can provide important data that is observed in the rest of the cases and show the main trend in the characteristics that all the contexts shared such as kind of production, acquisition of certain types of raw materials, and discard of types of artifacts.

Three contexts of Elite Residential /Administrative type were excavated in Group 2. The case excavated in sub-Operation 2B corresponded to a specific context of fill: there was a type of tools for maize grinding such as metates (1) and by-products that suggest local ground stone production such as macro-flakes (20.1), flakes (20), blocks (50.3), and basalt fragments (50.5). The types of basalt used were massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), and massive fine-grained basalt (10.3). It is important to underline that during the Late Formative period these basalt types were the main kinds of basalt that were present in Elite Residential contexts. In previous periods were only massive pyroxene porphyritic basalt (10.1 and massive fine-grained basalt (10.3).

In regard to the context excavated in Group 3 (Op. 5, Unit 30), which specific context is a trash pit, there were artifacts for maize grinding such as metates (1) and manos (2) as well as by-products such as macro-flakes (20.1), flakes (20), pebbles with evidence of thermic shock (25), basalt fragments (50.5), and blocks (50.6), a polisher (5).. The types of basalt used were massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and massive olivine porphyritic basalt (10.2). This trash pit exhibits that maize grinding activities and production of ground stone artifacts were conducted in this high status locality.

In the case of one context found in Nestepe Group (Op. 6, Unit 34), it is noticed that there were recovered several types of specific contexts. In a ceramic concentration which seems to be remains of feasting activities, there were associated basalt by-products such as unidentified basalt production debris (9), macro-flakes (20.1) and blocks (50.3) made of massive fine-grained basalt (10.3) (this could be a metaphor of creation from raw material to finished artifacts, a metaphor of transformation). In the refuse fill there were metates (1) and manos (2) made of vesicular pyroxene porphyritic basalt (11.1). In regard to the structure fill, there were flakes (20), and quarters (50.6) made out of massive fine-grained basalt (10.3), and on the floor there were flakes (20) and pebbles (24) made of massive fine-grained basalt (10.3).

In regard to the other context found in Nestepe Group (Op. 6, Unit 35) which its specific context was slope-wash, there were mortars (8) as well as flakes (20) and pebbles (24) made of massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1).

And in regard to the area where there was conducted Operation 7, the Elite Residential/ Administrative context exhibited metates (1), and several types of by-products such as macro-flakes (20.1), flakes (20), pebbles (24), and basalt fragments (50.5). There was a type of tool for basalt manufacturing: a polisher (5). It is necessary to underline that this context include basalt types used in Elite Residential contexts such as 10.1, 10.3, and 11.1 during the Late Formative period. But also, the place used the types used in the area of 3A operation such as vesicular olivine porphyritic basalt (11.2) and vesicular fine grained basalt (11.3).

Civic-Ceremonial contexts

During the Late Formative period, in Groups such as Group 3 and Nestepe Group had these places which were important arenas for the performance of rites and ceremonies in public spaces. In this type of contexts, there were ground stone artifacts. Even though the production was for the purpose of ceremonies, there were remains that corresponded to small activities of basalt production. In this study there are three examples: one case was excavated in Group 3 (Op.5, Unit31) comprise two specific contexts. One was the fill of the structure and the other was plow zone. The second example was found also in Group 3 (Op.5, Unit 41) and the specific context was the plaza floor. And the third example was excavated in Nestepe Group (Op. 6, Unit 40) which corresponded to the alluvium.

Late/Terminal Formative transition

In this study, five examples of Elite Residential Administrative contexts which date to the transition Late/Terminal Formative were analyzed: one was found in Group 2 (Op. 2D); a second case was found in Group 3 (Op. 5, Unit 30); the third case corresponded to a context found in Nestepe Group; a fourth case was found in Group 1; and a fifth case was excavated in the area where Op. 7 was conducted.

The context found in Op. 2D corresponded to a multi-crafting production workshop attached to an Elite Residential Administrative unit. Several types of maize grinding tools as well as various types of by-products suggest a specialized working unit. The basalt types used were all varieties found in Tres Zapotes. Also, the occurrence of minerals used for manufacturing other crafts such as serpentine (62) and mica (74) suggest that other crafts were made. Finally, there were discarded artifacts such as chisels (10.1), stone axes (10.2), and adzes (10.3) may be used in woodworking activities performed in this multi-crafting unit.

Finally, the case of the context found in Op. 7 exhibits a set of tools for maize grinding such as metates (1) and manos (2). Several types of by-products such as macro-flakes (20.1), flakes (20), basalt fragments (50.5), and preforms (50.7) made of massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), massive olivine porphyritic basalt (10.2), and vesicular fine grained basalt (11.3).

Terminal Formative period

Domestic contexts

This study takes into consideration two cases of domestic contexts which date to the Terminal Formative period. One context was excavated in Op. 3A and the other in Op. 3B. Both contexts comprised several remains which suggest that they had a considerable production degree. For instance, the context found in Op. 3A, there were tools for grinding maize such as metates (1) and manos (2). Different types of by-products such as macro-flakes (20.1), blocks (50.3), and quarters (50.6) and a polisher (5) used for smoothing. The type of basalt used was massive fine-grained basalt (10.3).

In regard to the context found in Op. 3B exhibits tools nedded for maize grinding as well as several by-products and tools for manufacture that suggest local production. This domestic context contained the six types of basalt which were used as a raw material for making tools.

Elite Residential/ Administrative contexts

In this study, it is discussed three cases of contexts which date to the Late Formative period. One case was excavated in Group 2 (Op. 2E); a second case was excavated in Group 3 (Op. 5, Unit 30); and a third case was discovered in Nestepe Group (Op. 6, Unit 34). Due to the type of specific contexts, such as fill, plow zone, or ceramic concentration, there was scarcity of ground stone remains.

Civic-ceremonial contexts

There were three contexts of this type which date to the Terminal Formative period. Two contexts were found in Group 2 (Op. 2A, Units 4 and 5; and Op. 2E) and the other was excavated in Group 3 (Op. 5, Unit 41. The feature that is consistent in this type of contexts as well as Elite Residential Administrative contexts is the use of basalts types 10.1, 10.3 or 11.1.

Transition Terminal Formative-Early Classic period

There were three contexts which date to this transition. One context was Civic-ceremonial and was excavated in Op. 2A (Units 2 and 3). The second context also was found in Op. 2A (Units 4 and 5) which corresponded to the plow zone. And the third context was domestic and excavated in Op. 3A (Units 17, 18, 24, and 33).

In regard to the Civic-ceremonial context found in Op. 2A (Units 2 and 3) corresponded to the Plaza fill and contained tools for maize grinding such as metates (1) and manos (1). Also it included by-products such as macro-flakes (20.1), flakes (20), blocks (50.3), and quarters (50.6). There were also tools for manufacturing basalt such as stone hammers (27) and abraders (12). The basalt types found were massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), vesicular pyroxene porphyritic basalt (11.1), and massive olivine porphyritic basalt (10.2).

Early Classic period

For this period there were two contexts. One was Civic-ceremonial and was excavated in Op. 2A (Units 2 and 3). The specific context corresponded to the Plaza fill.

The other context was found in Op. 2B and the specific context was the fill of an Elite Residential Administrative place.

Mixed Classic and Historical ceramics

There was a context found in Op. 3A (Units 17, 18, 24, and 33) which corresponded to specific context of plow zone. It contained unidentified basalt production debris (9), macro-flakes (20.1), flakes (20), macro-cores (50.1), and stone axes (10.2). The basalt type used was massive fine-grained basalt (10.3).

Historic period

There was an example of a domestic context found in Op. 3A which had two specific contexts. One context corresponded to a sandstone platform which contained a stone axe (10.2) made of vesicular pyroxene porphyritic basalt (11.1). The second specific context corresponded to a hearth where there were metates (1) and by-products such as macro-flakes (20.1) and flakes (20). The basalt types used were vesicular pyroxene porphyritic basalt (11.1) and massive fine-grained basalt (10.3).

General comments

In the study of the technological evolution over time in Tres Zapotes, there are important points which are necessary to underline. The Olmecs and their Epi-Olmec successors who inhabited Tres Zapotes knew since the Early Formative period a repertoire of techniques for making basalt ground stone artifacts, called in this dissertation *chaîne opératoire* (this series of steps which comprised the productive process) shared by this archaeological culture. This concept is neither teleological, nor static, nor essentialist. On the contrary, it is a set of basic techniques which constitutes one of the main features that characterize the peoples which inhabited the geographical area called Olman mainly during the Formative period. This set of basic techniques was very dynamic synchronically and over time. As practice theory is part of the analytical framework of this dissertation, *chaîne opératoire* works in a different way depending on the socio-economic context and epoch, which means it is flexible and adaptable to specific conditions. This is a new meaning for the epithet of the Olmecs also known as "The People of Stone" and this approach helps us understand the ubiquity of basalt production activity areas in archaeological sites like Tres Zapotes.

The case of ground stone artifacts in Tres Zapotes is very interesting in two important aspects: organization of production and acquisition/distribution of types of basalt.

Over time, this polity employed different political-economic models. During the Middle Formative period there was an exclusionary system of organization synthesized by monuments representing individual leaders. And in the following periods such as Late and Terminal Formative, there was a factionalized scenario where different Groups in the site that formed together a confederacy.

In the archaeological record, it is possible to see the evidence that during the Early and Middle Formative period there were contexts which exhibit basic steps of production which were shared among settings of different socio-economic status. Furthermore, a restricted suite of basalt types were widely used (types 10.1 and 10.3).

With the rise of Elite Residential Administrative places during the end of Late Middle Formative, there was a fragmentation in the chain of production. Individual units showed several by-products indicating that almost all the tools were manufactured in each unit.

During the Late Formative period, there was a more evident distinction among different social statuses, the kind of productive units, and the types of basalt used. Elites actually were able to sponsor attached multi-crafting units. A new kind of context also appeared in Tres Zapotes: Civic-ceremonial places developed in accord with new forms of political organization were the arenas for public events where public ritual acts were performed. The *chaîne opératoire* seems more fragmented because multiple loci of production appear in adoratorios, caches, elite residential, and domestic production. During the Late Formative the high status as well as civic-ceremonial contexts were associated with the occurrence of types of basalt 10.1, 10.3, and 11.1. Although domestic units had these types, they used more the types 11.2, 11.3, and 10.2

Chapter 8. Geochemical study of basalt samples of Tres Zapotes obtained from the excavations of 2003 field season of the Tres Zapotes Archaeological Project

In this chapter, I provide geochemical information for the basalt samples obtained from different contexts excavated by the Tres Zapotes archaeological project during the 2003 field season. These samples constituted a small part of the corpus of basalt ground stone artifacts and debitage pieces obtained and analyzed by the project.

This study is different from the previous sourcing studies which have been conducted in the Olmec area. The first difference relies on the stratigraphic provenience from which every specimen was recovered. One of the disadvantages in the previous Olmec ground stone studies is that research has been focused on colossal monuments and finished quotidian artifacts. Unfortunately, monuments and finished ground stone artifacts have complex life cycle contextual histories. Due to their long lives as artifacts in the realm of social practices, these items have been recycled, transformed, or re-used. It is very hard to assign a period or phase when they were manufactured or used in a specific stage of their specific biography and before being used again multiple times. Another disadvantage is that these valuable objects are found, in some cases, on the surface of archaeological sites. The archaeologists and scholars who have studied the basalt ground stone industry in the Olmec area of the Southern Gulf of Mexico have used their skills for identifying stylistic variation. However, most of the statements made with the expert eye of stylistic recognition are based on artifacts which pertain to particular collections and those collections did not recover the archaeological objects with the use of controlled and scientific excavations. Therefore, scholars have applied circular arguments to assign meaning, function, geographical area in Mesoamerica, or chronological period (Fuente 1973, 1977; Joralemon 1971; Pohorilenko 1990).

Another new contribution of this study is the analysis of debitage, unfinished artifacts, basalt debris of production, and discarded artifacts. In the history of Mesoamerican archaeology, these components of the population of ground stone artifacts have often been ignored in the formal analysis and in the geochemical studies.

An additional difference in respect to previous studies is the implementation of the X-ray fluorescence technique to a sample of Olmec ground stone artifacts. Previous studies have applied petrography, scanning electron microscopy (SEM), and X-ray diffraction techniques (Williams and Heizer 1965; Clewlow 1970; Coe and Diehl 1980; Rodriguez Lugo 2000). Furthermore, whereas previous studies implemented only qualitative geochemical techniques, the current study obtained quantitative results[1]. Nevertheless, it is necessary to acknowledge these pioneer investigations in sourcing Olmec basalt in the Gulf Coast of Mexico because they contributed to the acquisition of interesting information in this study and have been inspirational in the continued application of different techniques to acquire more information about a raw material which is a symbol in the core features that have characterized this important archaeological culture.

[1] In Mesoamerica, there are two previous studies which linked metates to probable source outcrops. Mary Louise Spink (1983) used emmision spectroscopy to source metates made of rhyolite in Honduras. Martin Biskowski (2008) applied Implemented Neutron Activation Analysis to a sample of metates of pre-Hispanic Central Mexico.

Geological Setting

This area has been called The Tuxtla Volcanic Field (TVF) by Nelson, Gonzalez-Carver and Kyser (1995; Nelson and González-Carver 1992) and also The Los Tuxtlas Volcanic Field (LTVF) by Verma (2006). In this dissertation, I use the term "The Tuxtla Volcanic Field" (TVF) because the published papers and results obtained by Stephen Nelson provide a better understanding of geoarchaeological processes in this region of Southern Veracruz.

The Tuxtla Volcanic Field is an isolated case of volcanism on Southern Veracruz. The nearest volcanoes are Pico de Orizaba, 230 km to the northwest (which pertains to the Mexican Volcanic Belt (MVB)) and El Chichón, 280 km to the southeast.

The Volcanic rocks of the TVF cover approximately 2200 km, and Nelson and Gonzalez-Carver (1992) estimate the total volume at 800 km^3 (However, Zamora (2007: 54) suggests this figure may be overestimated).

The TVF has four major mountain peaks: San Martín Pajapan (1160m); Sierra de Santa Martha with Santa Martha and Yohualtajapan peaks with elevations around 1460 m; and San Martín Tuxtla volcano with a highest peak of 1650 m. In the south there are two isolated peaks which are under 900 m: Cerro Pico del Águila (also known by archaeologists as Cerro Cintepec) and Cerro El Vigía. Laguna de Catemaco appears to have formed when drainage to the north was blocked by the growth of the volcanic ridge (Figure 8.1).

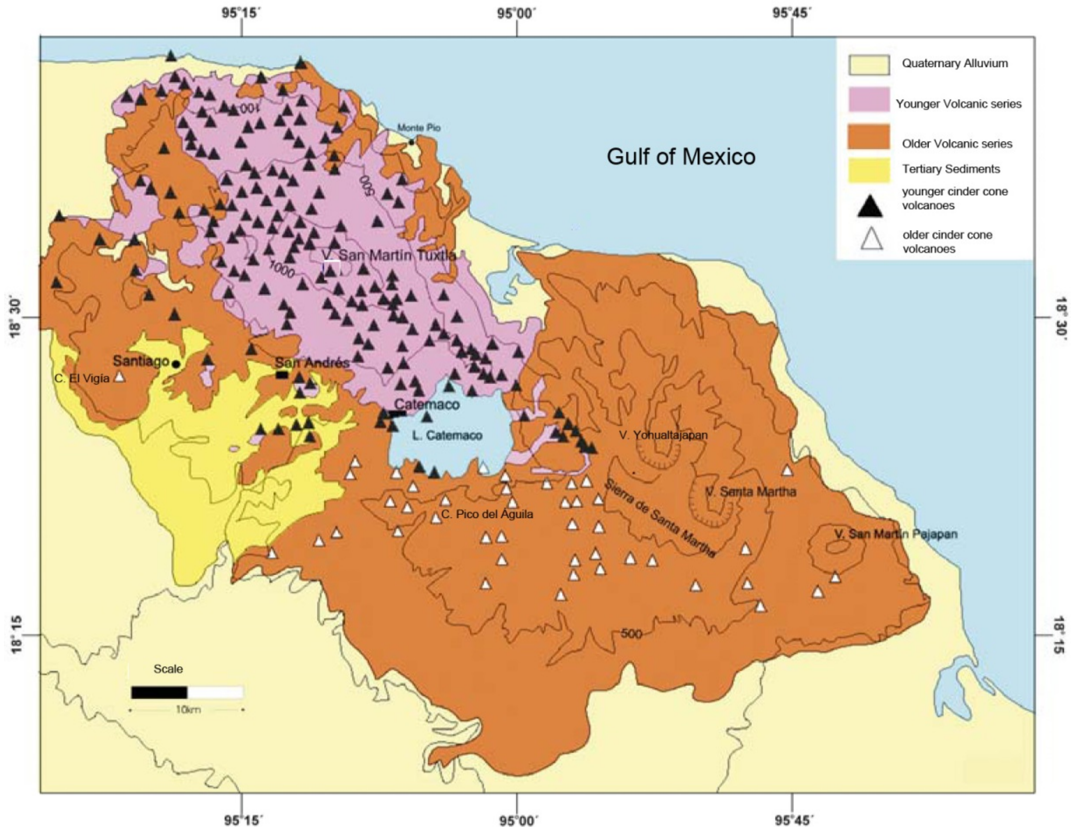

Figure 8.1 Map shows Sierra de Santa Martha; Volcanoes Santa Martha,Yohualtajapan, San Martín, Cerro Pico del Águila (Cerro Cintepec) and Cerro El Vigía; and Laguna de Catemaco (adapted and redrawn from Nelson, Gonzalez-Carver, and Kyser (1995: 192, Figure 1) and Zamora(2007: 8, Figure 2.2)).

Stephen Nelson´s project divided the TVF into an older and a younger volcanic series. The K-Ar dates for every series as well as their geographic distribution have also been described. The volcanic rocks which pertain to the Older Volcanic Series are from 7 to 2.6 Ma old and are located in the SE and W of the TVF, including the volcanoes Santa Marta, San Martín Pajapan and Cerro El Vigía. This kind of rocks is also located on the base of the Younger Volcanic Series. The Younger Volcanic Series are rocks from 0.8 Ma old to the present and include San Martín Volcano and volcanic ash cones and maars in the surroundings of this volcano. The calm period occurred from 2.6 Ma to 0.8 Ma.

Robert Santley (Santley et al. 2000: 148-149) has mentioned that two types of eruptions have predominated in the Tuxtlas Volcanic Field. The most common type is a Strombolian eruption, which consists of explosive ejections of ash and occurs at intervals ranging from minutes to hours. In the TVF, of the approximately 250 satellite vents which have produced recent eruptions, about 210 are cinder cones with associated lava flows. The vast majority of these cones were produced by Strombolian eruptions, as indicated by the bedding of ash and scoria exposed on their flanks.

Strombolian eruptions are characterized by lasting effects of ashfalls that are localized within areas on the order of about 100 km^2, this is a difference in respect to Plinian eruptions which are explosive and distribute ash over large areas (Pool and Britt 2000; Reinhardt 1992).

The second most common eruption type in the TFV has been a phreatic or phreatomagmatic eruption which produces maars, many of which contain crater lakes.

(Santley et al. 2000: 149). Phreatomagmatic eruptions are defined as juvenile forming eruptions as a result of interaction between water and magma.Whereas, a phreatic eruption occurs when magma heats surface water or ground. The extreme temperature of the magma produces immediate evaporation to steam, resulting in an explosion of steam, water, rock, volcanic bombs, and ash. Of the 250 satellite vents in the Tuxtlas volcanic Field, 40 vents are maars or phreatic explosion craters, 13 of which are young enough to still contain crater lakes. The rest have been partially filled by epiclastic sediment or younger lava flows, but are still recognizable by their surrounding circular or arcuate cliffs. The distribution of maars in the TVF is apparently controlled by the depth to the main water table in the underlying Tertiary sediments. Exceptions occur around the Laguna de Catemaco, where the presence of the lake raises the water table. Most deposits produced by the maar-forming eruptions lack juvenile material, indicating that the eruptions were phreatic rather than phreatomagmatic. One example is to the northeast of Tres Zapotes at Laguna Colorada. However, some maars were produced in combination with Strombolian activity, such as at Cerro Puntiagudo and Cerro Nixtamalapan, where both maars and cinder cones were produced.

A synthesis of previous studies on sourcing of the Olmec basalt

The volcanic area of the Tuxtla Mountains has a paradox. Even though it has one of the earliest volcanic events scientifically recorded in the world (Engstrand 1981), for years the area lacked of systematic studies.

In 1793 the natrualist José Mariano Moziño was sent to the Tuxtlas by the authorities of the Spanish Crown in order to document the eruption of the San Martín volcano. In his *Informe sobre la erupción del Volcán de San Martín Tuxtla (Veracruz) ocurrida el año de 1793,* he carefully described every detail of this natural event[2]. He also interviewed the elders of the community, and they told him about a previous eruption which occurred some decades before the one which occurred in 1793:

> According to the accounts from the elders of this neighborhood, last century the mountain of San Martin, located some 2 leagues from the village of San Andrés, threw up flares and sand: they assure me that this happened on a 15 of October, with no memory of the year or any other testimony, except a recollection made by an army commander, a truthful and old neighbor, of having read a property title that incidentally mentions a pledge made to celebrate a religious feast dedicated to the glorious Spanish virgin Santa Teresa de Jesus, to commemorate the event (Moziño 1869: 9-10).

His study has been quoted in a great number of histories of geological sciences in the world as an example of a good description of a volcanic event. His report is also full of ethnographic descriptions concerning religious beliefs of the villagers, but these ethnogeological details lie outside the scope of this chapter.

The second major report that has to do with the geology of the Tuxtlas was 1830 by José Aurelio García in the local newspaper in Xalapa. It was later translated into German in 1835 in *Neues Jarhrbuch für Mineralogie* "Eruptionen des vulkanes on

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[2] There is an account of what is probably the same earlier eruption in the following source:
Anonymous
1664 *Relazione di quanta e occaduto alla citta di Tuxtla in America, per cagione di una voragine apertasi nella sommita della montagna denominata Monoblanco, volgarmente Scimio bianco, eli danni cagionati alla medesima cittaa per tale memorabile disastro. In Roma Con licenza de Superiori*. (Personal communication, Christopher Pool, February 2016). As I was very excited about this information provided by my advisor , I found another book written in 1770, *Continuazione dell'opera L'arte di verificare le date: Introduzione alla cronologia storica dell' America1770, Vennezia* (I got the 1825 edition, though) which in page 107
says: "L'eruzione del piccolo vulcano di Tuxtla, successe il 2 marzo 1792, copri i tetti delle case di Oaxaca, di Vera Cruz ed anche di Perota, lontana cinquantastte leghe ed ove il romore sotterraneo rasomigliava a scoppii di grosso artiglieria." [The eruption of the small volcano of Tuxtla happened March 2, 1792, it covered the roofs of the houses of Oaxaca, Vera Cruz and also Perota [Perote], as far as fifty leagues and where the underground noise looked like to outbursts of heavy artillery, Translation mine]. Italy was part of the Spanish Crown at the time, therefore there are sources in Italian sources about Colonial Mexico.

Tustla in den Jahren 1664 und 1793". García was San Andrés Tuxtla´s mayor, and he found in the Archive of San Andrés some documents which described the volcanic eruption that occurred in January, 15, 1664. This date coincides with the foundation of Tzacoalco, the former name of San Andrés and the reason of its foundation was a secure place from volcanic eruptions (Medel and Alvarado, 1963).

Friedlander and Sonder (1923) published an early report which described the general characteristics of the area and provided the first petrographic and geochemical data. They considered that the rocks were more basaltic than the calc-alcaline volcanics to the west. However, Pychler and Weyl (1976) conducted a new evaluation of their data as well as additional tests of other rocks of the area and concluded that the rocks pertained to the Alkaline province. Friedlander made a reconnaissance in the area. He climbed up to the San Martín Volcano´s crater. He followed an ancient road which passed from San Andrés to Monte Pío, and walking to the west, by passing a point named as "El Vigía", he may have climbed by the same route which was used by Moziño 130 years before. In his map, he notes a series of cones which are aligned toward the SE and have lava flows which descended toward the NE. He suggested that these features indicated a volcanic eruption which occurred in 1664. Near San Andrés they recorded a scoria cone named Cerro Bassin and they found a 4 m thick layer of lapilli and ash that might corresponded to the 1793 volcanic eruption (Figure 8.2). The main concern of the paper was the Quaternary volcanic events, though.

Friedlander also recorded information concerning the indigenous communities, who thought that the point known as El Vigia that Friedlander passed on his way to the summit of San Martín, was sacred. Friedlander suggested that some of the lavas from there were used for sculpting monuments such as two rabbits and a toad which he saw that were kept in Santiago Tuxtla when he visited Los Tuxtlas. Friedlander first called the attention to the coarse-grained nature of the olivine and augite rich basalts which are widespread on the upper slopes of El Vigía volcano (Williams and Heizer 1965:4).

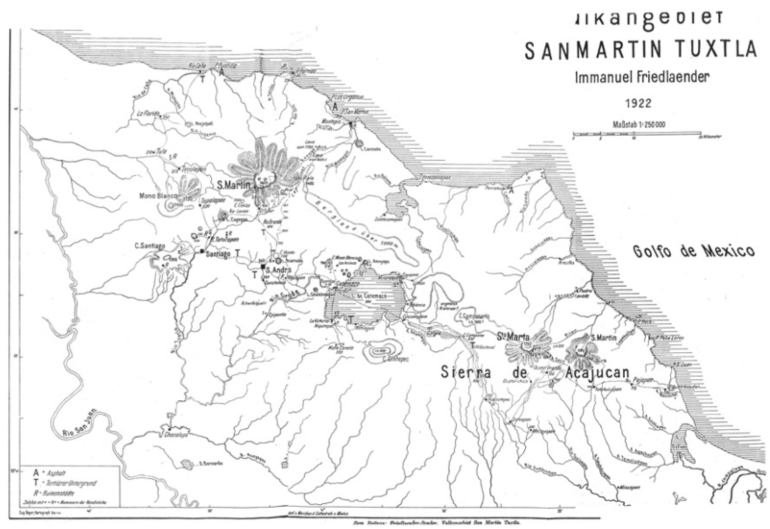


Figure 8.2 Map of the Tuxtlas by Friedlander and Sonder (1923). See that the site named by the authors “El Vigía” was located exactly to the East of the crater. Also, see that the crater´s diameter was overestimated.

Until the 1960s, there was no other study of the Tuxtlas basalts. Howel Williams and Robert Heizer (1965) conducted a study about location of the sources of basalt and other rocks which the Olmecs used for making monuments. They addressed the case of basalt lava flows in the Tuxtla Mountains. For some weeks in 1960 and 1962 they visited both some of the sources of rocks and the museums where the monuments were exhibited.

In their report, they included three maps: Map 1 which provides a general location of rock sources and the Olmec sites (Figure 8.3). Map 2 shows the distribution that the authors named "Mesozoic and Cenozoic sedimentary rocks", Plio-Pleistocene volcanic rocks", and "Recent volcanic rocks" as well as the main volcanoes and the Olmec sites (Figure 8.4). And Map 3 shows the location of "Cenozoic volcanic rocks", "Cenozoic intrusive rocks", "Paleozoic metamorphic rocks", and "Plutonic rocks" at the Tehuantepec Isthmus (Figure 8.5).

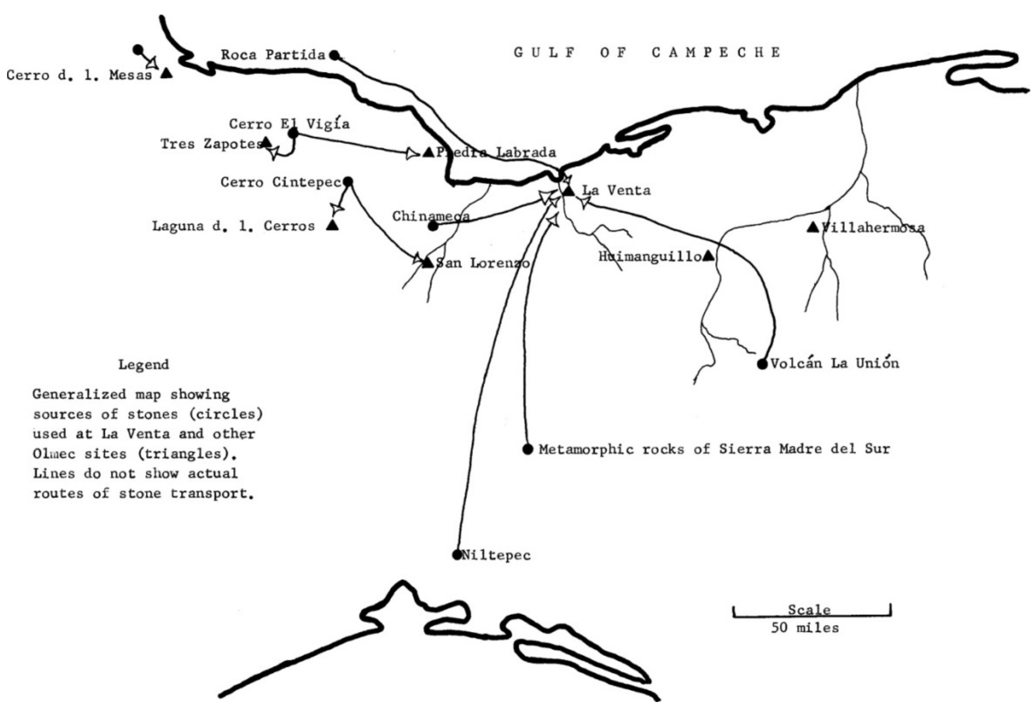


Figure 8.3 General map of the Tehuantepec Isthmus which shows sources of stone used by the Olmecs as well as Olmec sites (Williams and Heizer 1965:I)

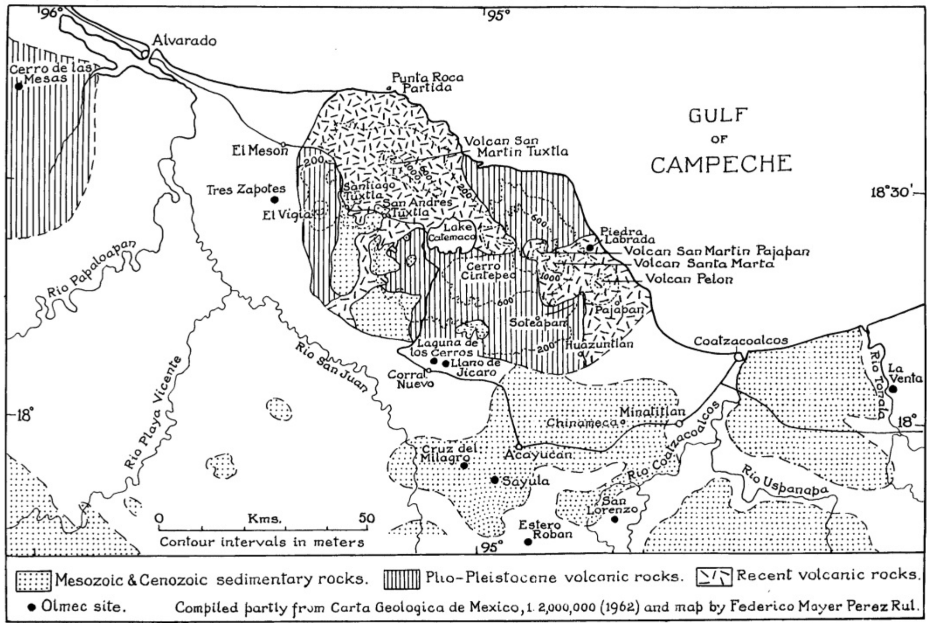


Figure 8.4 Geological map of the Olmec area and its surroundings which shows zones of “Mesozoic and Cenozoic sedimentary rocks”, “Plio-Pleistocene volcanic rocks”, and “Recent volcanic rocks” (Williams and Heizer 1965:11).

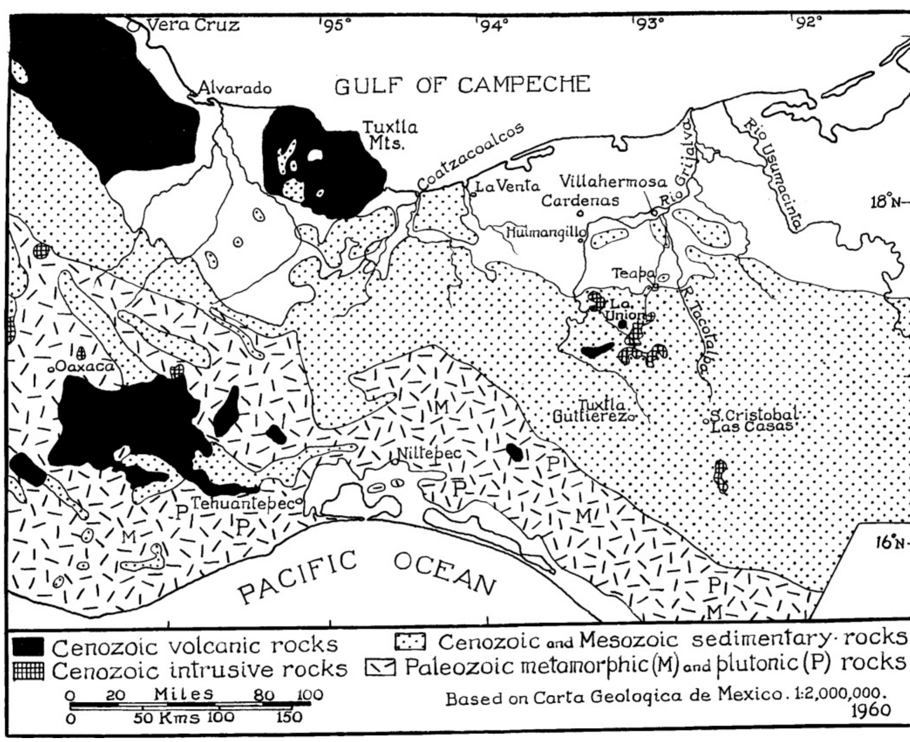


Figure 8.5 Geological map of the Tehuantepec Isthmus which shows the distribution of “Cenozoic volcanic rocks”, “Cenozoic intrusive rocks”, “Paleozoic metamorphic rocks” and “Plutonic rocks” (Williams and Heizer 1965: 13).

In Los Tuxtlas region, they identified two groups of volcanic rocks: One group was composed of a Plio-Pleistocene group of lavas, pyroclastic rocks and tuffaceous sediments. This geological group was mainly distributed on the eastern side of the Tuxtla Mountains. The second group was composed of a younger group of Late Pleistocene and Recent Age that constituted much of the opposite side, an elliptical 400 km^2 area surrounding the composite cone of San Martín Tuxtla. They identified differences in erosive processes: the belt occupied by the younger group was slightly modified by erosion. The belt occupied by the older group did not have original volcanic forms. Therefore, the landscape is a result of erosion (Williams and Heizer 1965).

Plio- Pleistocene volcanic rocks Williams and Heizer estimated that volcanism might have begun as early as during Oligocene times, as they saw marine tuffaceous sediments of that age. Later, the sea retreated during the Miocene, and then subaerial volcanoes began to erupt during the Pliocene period. They explained that due to erosion it is not common to find boulders of that time on the surface. However, they found 4 km west to Santiago Tuxtla, a conspicuous ridge that culminated in the peak of Cerro El Vigía. They thought that this kind of basalt was used for some monuments that they observed: Colossal Head No. 1 from Tres Zapotes (Cabeza de Hueyapan); Colossal Head No. 2 from Tres Zapotes (Cabeza de Nestepe); Monument F; a rectangular stone basin decorated with pecten shells; Monument C from Tres Zapotes; Monument 9 from San Lorenzo; and two monuments from Piedra Labrada (a frog Altar and a jaguar throne).

They also found evidence of a second potential source along the southern flanks of the Tuxtla Mountains on the slopes of Cerro Cintepec and in the surroundings of Soteapan and Huazuntlan. They described large boulders of coarsely porphyritic olivine-augite basalt observed on the alluvial fans, so they speculated that the source "must be on and near the top of Cerro Cintepec". Apparently they also did not actually visit Soteapan and Huazuntlan, or at least did not collect samples there. Rather, they state that Drucker gave them samples of columnar basalt and boulders from these two localities (Williams and Heizer 1965:6). They did not have the opportunity to visit a third source of Plio-Pleistocene lavas reported before by Pérez Rul (Mooser et. Al.1959) in the surroundings of Volcán San Martín Pajapan, however, they thought that was an inaccessible source for the Olmecs.

Late Pleistocene and recent volcanic rocks Williams and Heizer (1965:6) state that the four principal Quaternary volcanoes of the Tuxtla Mountains are San Martín Tuxtla, San Martín Pajapan, Santa Marta, and Pelón. They are aligned in a northwest-southeast axis, parallel to the coastal line. There are many secondary volcanoes, parasitic cinder cones close to San Andrés and Catemaco Lake.

Williams and Heizer thought that the basalt columns which were used in different contexts at La Venta (i.e. tombs, entryways, platforms, and Ceremonial Court) derived from Quaternary lava flows (Williams and Heizer 1965: 6). Alfonso Medellín Zenil told them of the occurrence of columnar basalts near the Hydrolectic Plant in the Canyon of Río Huazuntlan. As mentioned above, Drucker provided them samples of these columnar basalts from both Huazuntal and the Soteapan falls. However, when Williams and Heizer compared those samples with the columnar basalts from La Venta, they noticed different mineralogical characteristics. They described columnar basalts employed at La Venta as "pale gray lavas crowned with large crystals of fresh olivine and are quite devoid of phenocrysts of feldspar" (Williams and Heizer 1965: 6). Instead, They said that the columnar basalts from Huazuntlan and Soteapan "are dark lavas carrying abundant large, subparallel laths of feldspar, almost completely devoid of olivine and augite phenocrysts; moreover, the few olivine crystals which they contain show extensive alteration to greenish serpentine" (Williams and Heizer 1965: 6). They added that Drucker said that most of the columns in the basalts at Huazuntlan and near Soteapan were much larger than those used at La Venta and the diameter was bigger. For this reason, Williams and Heizer suggested that the columnar basalt for La Venta may have been from the islet close to the coast near Punta Roca Partida, which they flew over but did not sample (Williams and Heizer 1965: 7).

Petrography of sources and monuments

Williams and Heizer described Cerro El Vigía source with the following petrographic characteristics:

> There is considerable variation in the proportion of the phenocryststs and in the augite-olivine ratio in the coarse-grained, picritic basalts of El Vigía. Generally, however, the olivine and augite phenocrysts each make up approximately a quarter of the total volume and range in size from 0.5 to 5.0 mm. Exceptionally, some of the stumpy augites measure as much as 2.5 cm across. In hand specimens the olivine crystals appear pale green, in thin sections they are colorless except for thin rims of russet colored iddingsite. The augite crystals, which appear black in hand specimens, generally show a pale yellowish green color in thin sections, though some of them exhibit a beautiful and delicate oscillatory zoning, almost colorless shells alternating rapidly with greenish ones. The optic angles of the augites vary between 55º and 60º, and all show strong inclined dispersion. Plagioclase, which makes up about 40 per cent of the typical basalt, never forms large phenocrysts but occurs as divergent laths, mostly between 0.25 and 0.5 mm in lenght, but occasionaly as much as 1.0 mm long. In composition it varies only slightly from medium labradorite. The remaining tenth of the basalt consists of minute granules of iron ore and augite, fine needles of apatite, and flakes of hematite (Williams and Heizer 1965: 15-16)

One important contribution in this publication was the illustration of selected thin sections which allowed the reader to have an idea of the petrographic descriptions. Below is the illustration of a Cerro El Vigía´s basalt sample, compared with a colossal head (Monument 4) from San Lorenzo (Figure 8.6).

Providing these characteristics, they found the raw material for making Stela C was different from Cerro El Vigía, but similar to Stela 3 from La Venta and the vast majority of the basalt columns from the Court of la Venta. They provided this description:

> Approximately 15 per cent of the dense, intergranular basalt used to make Stela C at Tres Zapotes consists of ovoid crystals of fresh olivine, mostly less than 0.5mm in maximum dimension but occasionaly about 1.0 mm across. The remainder consists of divergent, slender laths of plagioclase, subhedral grains of augite, and iron ore. The fact that Tres Zapotes Stela C is not carved from the same stone as most of the other sculptures at this site (which came from nearby Cerro El Vigía) but is made of a stone which was more abundantly used at the La Venta site is of special interest since its raises the possibility that Stela C may have been carried to Tres Zapotes from another site, possibly from La Venta itself, though it seems to date from after the abandonment of the La Venta site (Williams and Heizer 1955: 16).

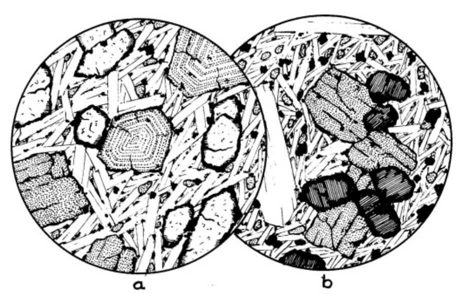


Figure 4. Basalts from Cerro El Vigía (a) and from one of the San Lorenzo giant heads, Monument 4, Museo Jalapa (b). Diameter of each field 3 mm.

a. Zoned phenocrysts of augite, and phenocrysts of olivine with only slight marginal alteration to magnetite and iddingsite.

b. Olivine phenocrysts completely altered to deep russet iddingsite; augite phenocryst unzoned; note also parts of two large plagioclase phenocrysts.

Figure 8.6 Comparison between petrographic thin sections of a sample basalts from Cerro El Vigía and one of the San Lorenzo colossal head Monument 4 (Williams and Heizer 1965:34, Figure 4).

During the 1970´s Robin (1976), Robin and Tournon (1978), and Cantagrel and Robin (1979) were studying the genesis of alkaline volcanic centers in the southeastern part of North America. They noticed that those centers occurred along the Gulf Coast of Mexico, extending from the Rio Grande Province in the United States to the Tuxtlas Volcanic Field (TVF). They took into account K-Ar ages of these alkaline rocks and postulated that the TVF is the youngest in a series of alkaline rocks erupted along NNW trending fractures associated with block faulting along Mexico´s Gulf coast. Furthermore, they suggested that this alkaline magmatism, including that in the TVF, belongs to a separate "Eastern Alkaline Province", unrelated to subduction or magmatism in the Mexican Volcanic Belt (MVB) (which is calc-alkaline). And Thorpe (1977) adds more details to this geological setting who concludes that the alkaline volcanoes of eastern Mexico "may therefore be related to fracturing around the Gulf of Mexico ... and may be located where the MVB intersects these fractures. Therefore, while the Tuxtla volcanic province is geographically separate and petrological distinct from the calc-alkaline MVB, its setting is linked with the destructive plate margin of the MVB as a whole."

Recently, Verma (2006) published a similar idea that coincided with the ideas of these researchers who suggested this hypothesis in the late 1970´s. He found that this kind of rocks corresponded to the data which are similar to rifts, extension-related areas and continental break-up regions, and different from islands and continental arcs. He supported his hypothesis on the basis of trace elements (High Field Strong Elements (HFSE), Rare Earth Elements (REE) and Light Litophile Elements (LILE). He asserted that the TVF source is likely to reside in the lithosphere rather than the asthenosphere. This means that TVF´s magmas did not need a tectonic plate component for their genesis.

But in the history of geological research of the Tuxtlas basalts, Stephen Nelson, Erika Gozález-Carver, and T. Kurtis Kyser ((Nelson and González-Caver 1992; Nelson *et al*. 1995) obtained a different conclusion. According to them, the primitive alkaline magmas show depletion in high field strength elements (HFSE) relative to large ion lithophile, similar to subduction-related basalts, it means that these alkaline basalts correspond to the origins in a heterogeneous mantle which was contaminated by liquids or fluids from the subducted Cocos tectonic plate. They also found (Hy-norm.) alkaline and cal-alkaline rocks which show great depletion of HFSE, high results of LILE/LREE (Light Rare Earth Elements) strontium (Sr) and oxygen (O) isotopes, and low ratios of 206Pb/204Pb in sub-saturated magmas, which suggest that magma either in its source or in its ascending route acquired components both from the mantle and from fluids from the subducted plate and from the crust. These researchers also state that in back-arcs, such as the Palma Sola area, there are similar alkaline lavas, and there have been located alkaline basalts with the signature of subduction in their trace elements. Calc-alkaline volcanic regions are, for instance, Japan and the Southern Andes. The authors agreed that the structural conditions of the crust play an important role in the juxtaposition of alkaline and calc-alkaline magmatism and suggested that an extensional stress field allowed the passage of alkaline partial melt to the surface.

Table 7.1. Chemical analyses of TVF basalts (Nelson, Gonzalez-Caver, and Kyser 1995:194-195)[a]

	Primitive												
Samp. #	27	60	62	82	110	133	144	158	233C	301	304	42	77
Si02	44.8	46.8	46.3	45.5	47.2	47.1	44.0	42.5	43.8	40.8	40.6	45.0	50.6
Ti02	1.30	1.32	1.20	1.44	1.40	1.24	1.59	2.05	1.63	1.91	2.55	1.45	1.44
Alz03	13.6	15.1	14.0	14.7	15.7	13.8	12.8	14.6	13.9	12.2	12.5	15.4	15.7
Fez03	3.02	2.33	4.69	3.20	3.85	3.72	3.17	3.33	1.83	3.72			
FeO	7.82	7.74	5.62	10.42	9.61	9.94	7.94	7.57	6.81	8.69	8.14	8.06	5.80
MnO	0.18	0.17	0.18	0.19	0.17	0.18	0.18	0.19	0.19	0.21	0.19	0.18	0.16
MgO	14.6	11.9	14.7	12.8	11.1	13.1	15.6	11.6	13.9	15.0	12.9	10.8	9.0
CaO	10.71	10.68	10.37	10.93	10.05	10.87	9.96	10.97	10.95	10.83	10.64	11.25	8.75
Na2O	2.4	2.9	2.8	2.4	2.9	2.4	2.4	4.1	3.1	2.5	2.6	3.5	3.8
KzO	0.82	0.93	0.78	0.64	1.09	1.00	0.88	1.32	1.00	0.45	1.42	L.02	1.51
PzO3	0.31	0.34	0.42	0.41	0.46	0.35	0.39	0.92	0.63	0.72	0.66	0.70	0.40
LOI	OJO	0.00	0.27	1.12	0.30	0.00	0.00	1.50	1.57	0.28	0.18		
Total	99.8	100.3	101.4	100.6	99.8	100.0	99.2	99.7	99.7	98.0	97.1	99.3	101.1
	Trace Elements: ppm												
Rb	16	17	15	14	14	15	18	15	14	14	23	20	28
Sr	564	555	606	619	644	595	773	1038	812	784	851	765	686
Y	18	18	18	21	19	18	18	25	22	23	21	24	17
Zr	119	127	132	129	160	129	154	238	180	169	195	175	177
Nb	14	18	17	16	14	13	22	37	22	30	33	20	20
Hf	2.6	2.7	4.9	3.1	2.9	3.1	4.0	5.5	4.0	3.9	5.0	4.3	4.9
Ta	1.0	0.7	0.8	0.6	0.6	0.8	1.4	3.0	0.9	1.8	2.3	1.0	1.3
U	1.1	1.1	2.1	1.3	2.5	2.2	1.5	2.6	2.5	2.3	2.5	1.7	4.0
Th	3.7	4.5	5.8	4.4	8.3	7.4	4.5	8.5	7.4	9.0	8.0	7.1	11.0
Ba	233	251	241	244	323	333	281	383	362	390	438	385	414
Cs	0.6	0.7	0.6	0.4	0.9	0.7	0.7	0.8	0.6	0.7	0.8	1.1	1.2
La	24.9	24.2	32.5	23.0	44.9	25.2	30.0	67.3	47.4	57.9	58.6	45.6	36.0
Ce	46	48	55	47	89	50	60	118	84	97	99	78	65
Nd	22	22	25	23	42	23	27	52	38	44	42	34	28
Sm	4.45	4.42	4.86	4.80	8.19	4.68	5.15	9.78	7.21	8.29	8.08	7.03	5.14
Eu	1.62	1.62	1.81	1.59	2.29	1.44	1.91	3.44	2.56	2.61	3.02	2.31	1.79
Tb	0.5	0.6	0.5	0.6	0.8	0.5	0.6	1.0	0.7	0.9	1.0	0.8	0.6
Dy	3.3	3.4	3.8	3.7	[illegible]	4.3	4.4	4.6	4.9	3.5			
Yb	1.42	1.40	1.54	1.30	1.10	1.53	1.33	1.80	1.48	1.68	1.51	L.83	1.31
Lu	0.20	0.20	0.22	0.18	0.21	0.22	0.18	0.23	0.21	0.24	0.20	0.26	0.19
Cu	84	80	79	60	86	79	82	85	78	75	76	52	60
Co	69	60	63	57	71	52	64	59	59	66	60	53	47
Sc	35	33	34	29	24	28	29	27	31	28	24	31	24
Ni	381	282	374	286	304	277	439	266	297	377	263	205	204
Zn	75	74	73	75	65	64	85	93	79	94	98	75	78
Cr	1249	878	1200	849	742	733	1114	629	716	606	497	668	503
V	232	235	230	255	241	245	260	276	312	412	381	237	240

a Major elements and the trace elements Rb, Sr, Y, Zr, Nb, Ba, Cu, Ni, Zn, Cr, and V by X-ray fluorescence spectrometry at Tulane University, for methods and estimates of error, see Nelson and Livieres (1986). All other trace elements by Instrumental Neutron Activation Analyses by XRAL Activation Services Incorporated, Ann Arbor, Ml, USA. LOI is loss on ignition. Fe0/Fe20 3 determined by titration. For samples with no reported value of Fe20 3 , the values for FeO represents total iron.

Table 7.1. Continued.

	Evolved							Hy-Normative Alkaline				Calc-Alkaline		
Samp. #	42	77	112	117	157	84	316	121B	344	345	44	134	331	338
SiO_2	45.0	50.6	41.7	44.2	49.1	41.3	49.3	52.7	54.6	52.1	50.5	58.9	52.4	54.1
TiO_2	1.45	1.44	2.93	1.68	1.31	2.17	1.27	1.30	1.43	1.31	1.03	0.80	0.84	0.84
Alz03	15.4	15.7	12.1	14.1	16.7	15.7	15.7	17.3	17.8	17.4	16.4	18.6	18.8	18.0
Fez03			4.36	2.99	3.22	-	-	4.42	4.18	5.81	3.33	2.46	2.13	3.27
FeO	8.06	5.80	8.97	7.85	6.23	11.56	8.81	5.26	4.75	3.95	6.06	3.23	6.14	4.44
MnO	0.18	0.16	0.20	0.18	0.18	0.20	0.17	0.17	0.21	0.17	0.15	0.15	0.18	0.23
MgO	10.8	9.0	11.8	14.1	7.7	7.7	9.0	3.8	1.6	4.1	6.8	2.6	4.4	3.8
CaO	11.25	8.75	10.60	10.61	11.51	10.52	9.96	6.96	4.89	8.15	12.23	5.88	9.56	7.65
Na_2O	3.5	3.8	3.5	2.9	3.2	4.1	3.2	4.1	5.3	4.1	2.5	4.6	3.2	3.1
KzO	L.02	1.51	1.76	1.05	0.94	1.52	1.41	2.02	2.99	1.81	1.76	2.49	1.07	3.03
PzO3	0.70	0.40	0.74	0.57	0.40	1.29	0.44	0.45	0.78	0.43	0.40	0.31	0.22	0.32
LOI			0.00	0.23	0.05	-	-	1.50	1.19	0.39	0.12	0.70	0.39	1.80
Total	99.3	101.1	98.6	100.4	100.5	96.0	99.3	100.1	99.7	99.7	101.28	100.8	99.3	100.6
	Trace Elements (ppm)													
Rb	20	28	20	16	16	18	30	40	63	34	19	56	17	93
Sr	765	686	903	722	694	1882	518	549	417	580	876	529	465	543
Y	24	17	24	19	20	29	46	30	58	32	22	26	23	24
Zr	175	177	242	159	146	382	147	185	296	172	126	216	100	142
Nb	20	20	40	23	19	52	16	8	17	12	12	15	11	11
Hf	4.3	4.9	6.2	4.5	3.5	5.9	3.5	5.1	9.2	4.7	3.1	6.7	2.4	4.0
Ta	1.0	1.3	3.3	1.3	0.9	3.8	0.5	0.8	1.0	0.6	0.5	1.0	0.5	0.5
U	1.7	4.0	3.1	2.1	1.6	3.9	1.5	1.7	1.3	2.0	2.3	3.2	0.6	2.2
Th	7.1	11.0	6.4	6.5	5.0	11.0	4.1	7.6	12.0	7.4	9.8	10.0	2.0	6.0
Ba	385	414	356	346	238	673	312	434	622	394	529	494	163	500
Cs	1.1	1.2	0.6	1.0	0.8	0.8	0.9	0.6	0.7	0.8	0.8	1.3	0.9	1.5
La	45.6	36.0	59.0	38.6	31.9	86.0	24.6	33.3	50.4	34.4	34.2	30.5	13.1	20.9
Ce	78	65	105	75	56	159	52	63	99	63	67	58	26	41
Nd	34	28	47	34	26	72	26	30	47	31	33	26	14	20
Sm	7.03	5.14	9.08	6.06	5.03	13.20	5.61	6.09	9.39	6.28	6.88	4.71	3.21	3.92
Eu	2.31	1.79	3.36	2.02	1.84	4.29	1.69	2.27	2.76	2.00	2.32	1.52	1.16	1.30
Tb	0.8	0.6	1.0	0.7	0.5	1.4	0.8	0.7	1.2	0.8	0.6	0.6	*0.5*	*0.5*
Dy			*5.9*	4.0	3.8	5.7	8.4	5.3	3.8	4.2	3.5	4.0		
Yb	L.83	1.31	1.49	1.38	1.81	1.89	1.76	2.81	4.07	2.82	1.59	2.38	1.96	1.90
Lu	0.26	0.19	0.20	0.19	0.27	0.24	0.25	0.42	0.63	0.42	0.22	0.60	0.30	0.28
Cu	52	60	42	31	32	100	90	145	52	137	127	75	98	93
Co	53	47	67	60	41	44	45	28	18	29	44	18	34	33
Sc	31	24	26	30	34	13	28	20	13	24	47	13	29	21
Ni	205	204	144	196	38	207	177	23	14	28	61	12	28	26
Zn	75	78	83	56	50	119	67	83	109	94	59	64	60	62
Cr	668	503	528	909	278	254	507	17	23	226	30	37	29	
V	237	240	341	267	226	315	247	244	282	304	226	147	174	161

a Major elements and the trace elements Rb, Sr, Y, Zr, Nb, Ba, Cu, Ni, Zn, Cr, and V by X-ray fluorescence spectrometry at Tulane University, for methods and estimates of error, see Nelson and Livieres (1986). All other trace elements by Instrumental Neutron Activation Analyses by XRAL Activation Services Incorporated, Ann Arbor, Ml, USA. LOI is loss on ignition. Fe0/Fe20 3 determined by titration. For samples with no reported value of Fe20 3 , the values for FeO represents total iron

In regard to the volcanic activity in the Tuxtlas Volcanic Field over time, Stephen Nelson and colleagues (Nelson and González-Caver 1992; Nelson et al. 1995) conducted a systematic dating by the K-Ar method of diverse rocks in the field. Based on their analysis, they concluded that activity occurred in two periods separated by a calm period. They divided the activity into two series that they named Older Volcanic Series and the Younger Volcanic Series. The following map (Figure 8.7) shows the distribution in the area of Older Volcanic Series and Younger Volcanic Series. Also, the number of each sample and its location:

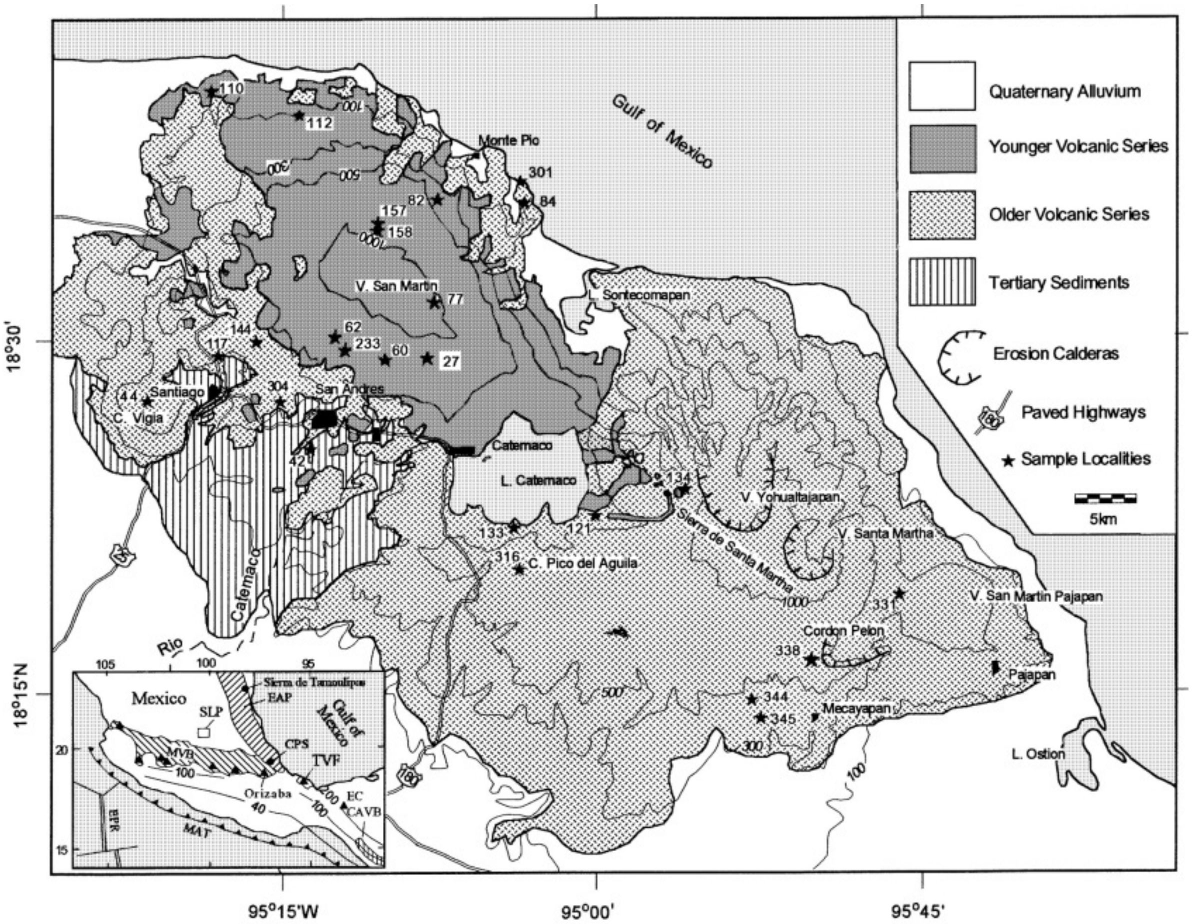


Figure 8.7 Map showing the Older Volcanic Series and the Younger Volcanic Series in the Tuxtla Volcanic Field by Nelson, Gonzalez-Carver and Kyser (1995:192, Figure 1).

Petrography

In 1995, Nelson, Gonzalez-Caver and Kyser published results of a study where they implemented modal analyses of 25 samples, and data on the three major phenocryst phases, olivine, clinopyroxene, and plagioclase for the four major groups which they identified. Above there is the table which they published (Table 8.1)

These were the groups that they identified:

1) *Basanites and alkali basalts of the Primitive Alkaline group.* The characteristics for this group are: porphyritic, with only phenocrysts of olivine and small amounts of augite. Olivine phenocrysts are euhedral, and usually contain inclusions of dark brown spinel. Augites are generally complexly zoned and show "hourglass" sector zoning. The groundmass of these rocks consists of an intergrowth of plagioclase and augite, along with small amounts olivine, titanomagnetite, and glass (Nelson, Gonzalez-Caver and Kyser 1995: 194).

2) *Basanites and alkali basalts of the Evolved Alkaline group*. The characteristics for this group are also porphyritic, with olivine as the dominant phenocryst phase. Augite occurs in higher proportions in these rocks than in the Primitive group. Plagioclase is sometimes observed as a phenocryst phase, but most plagioclase is restricted to the groundmass where it occurs with olivine, augite, titanomagnetite and glass. (Nelson, Gonzalez-Caver and Kyser 1995: 194).

3) *The Hy-normative Alkaline mugearites and benmorites*. The characteristics for this group are: plagioclase is the dominant phenocryst phase. Other phenocryst minerals are olivine and augite in the mugearites and orthopyroxene and augite in the benmorites. Plagioclase phenocrysts show complex oscillatory zoning and broken margins, similar to plagioclase phenocrysts that occur in calc-alkaline rocks. Unlike calc-alkaline rocks, however, augites in this group show the

complex sector zoning typical of augites in alkaline rocks. The groundmass of these rocks consists of plagioclase, pyroxenes, titanomagnetite, and minor glass (Nelson, Gonzalez-Caver, and Kyser 1995: 194).

4) *Calc-alkaline basalts and basaltic andesites*. The characteristics for this group are the following: while highly porphiritic, do not contain the sector zoned augites, and these may be true calc-alkaline rocks. In these rocks the predominant phenocryst phase is plagioclase showing oscillatory zoning, resorption boundaries and broken margins. Euhedral olivine phenocrysts occur in the calc-alkaline basaltic andesites, and occur in much lower proportions in the andesites. The groundmass of these rocks generally shows plagioclase, pyroxenes, titanomagnetite, and rare glass (Nelson, Gonzalez-Caver and Kyser 1995: 196).

Reinhart (1991) conducted a geomorphological study of the ashfalls from volcanic cones and concluded that their age is less than 50, 000 BP. Also, with the aid of radio-carbon dates of carbon samples found in volcanic ash deposits, and stratigraphic correlation between deposits and strata near the archaeological site of Matacapan, he found at least 9 volcanic eruptions occurred between San Andres Tuxtla and the northern shore of Lake Catemaco during the last 6,000 years (See also Santley et al. 2001). These eruptions built the cones: Cerro Mono Blanco, Cerro Nixtalapan, Cerro Puntiagudo, and the maars which correspond to the Nixtalapan and Cocodrilos lagoons.

Another important study concerning basalt provenience between the Tuxtla Mountains and the archaeological site of San Lorenzo-Tenochtitlán was published in 1980 in the report of the excavations conducted by the archaeological project of San

Lorenzo directed by Michael Coe. The book titled *In the Land of the Olmecs* Volume 1: *The archaeology of San Lorenzo Tenochtitlán* includes in *Appendix 2 Petrographic analysis of Rock samples of San Lorenzo,* by Louis A. Fernandez and Michael Coe, a detailed study which combines petrographic studies from basalt outcrops in the Tuxtlas and basalt samples of basalt monuments, basalt metates, basalt drain stones, and miscellaneous basalt artifacts. Some of the artifacts were obtained from stratigraphic excavations. All materials were submitted for analysis to the Department of Geology and Geophysics, Yale University. All the samples were examined in thin section.

After the petrographic analysis Louis A. Fernandez determined that all the basalt samples from San Lorenzo are clustered into three types, and he suggested that probably all are of Cerro Cintepec origin. The types were:

Cerro Cintepec Basalt, Type A - Porphyritic Basalt; Cerro Cintepec Basalt, Type B - Porphyritic Plagioclase Basalt; and Cerro Cintepec Basalt, Type C - Porphyritic Basalt. The Cintepec basalt samples were provided by Robert Heizer.

The general characteristics for every basalt type are the following:

Cerro Cintepec Basalt, Type A: 1) Large and abundant plagioclase phenocrysts; 2) Abundant microphenocrysts of idingsitized olivines; 3) Lack of pronounced zoning in the clinopyroxene phenocrysts; 4) Medium-grained groundmass; 5) Well-developed dikytaxitic texture (Coe and Diehl 1980: 398)

Cerro Cintepec Basalt, Type B: 1) The cloudiness of groundmass felspars, the iron oxides and their alteration products, and the brownish color of the clinopyroxenes coupled with the fine-grained nature of the matrix impart a strongly altered appearance to the groundmass; 2h) The abundance of plagioclase phenocrysts and the marked difference in size between the feldspars and the groundmass give this particular basaltic lava a breccia texture. That is, large and abundant phenocrysts, almost touching each other, are set in a very fine grained matrix. Fernandez found similar characteristics that Type A showed, he thought that differences may be related to the top or the bottom of the lava flow (Coe and Diehl 1980: 398).

Cerro Cintepec Basalt, Type C: 1) Clinopyroxene is the most abundant phenocryst; 2) The groundmass is relatively coarse grained. The study underlined that Cerro Cintepec Type C is only slightly different from Type A. It has a much coarser grained matrix like the El Vigía basalts but contains plagioclase phenocrysts and lacks the delicate zoning in the clinopyroxenes typical of the El Vigía samples (Coe and Diehl 1980: 399).

The monuments which corresponded to Cintepec Basalt Type A are the following: Monument 8 (rectangular altar); Monument 17 (colossal head); Monument 19 (preform of monument); Monument 22 (oval stone); Monument 23 (plain stela); Monument 30 (stela); Monument 31 (bench); Monument 37 (animal figure); Monument 38 (flat altar); Monument 40 (trough stone); Monument 41 (column); Monument 42 (column); Monument 47 (seated figure), Monument 49 (tapered column); Monument 50 (preform of monument); Monument 51 (flat altar); Monument 56 (block with relief); also the U-shape drain stones of the main line as well as the cover stone for the drain.

The monuments which corresponded to Cintepec Basalt Type B were: Monument 20 (Altar); Monument 46 (Bench); Monument 48 (round altar); Monument 61 (colossal head); Monument 62 (circular altar).

In the case of metates, the vast majority was Type B (64%), then Type A (9%) and Type C (27%)). There was more heterogeneity in the choice for metate basalts. And it is important to underscore that no monuments were of type C basalt. Coe (Coe and Diehl 1980: 404) suggest the fine-grained quality of Type B may have made this source more attractive for making metates. He provided a graphic showing the percentages of the use of basalt types from Cerro Cintepec. See below (Figure 8..8):

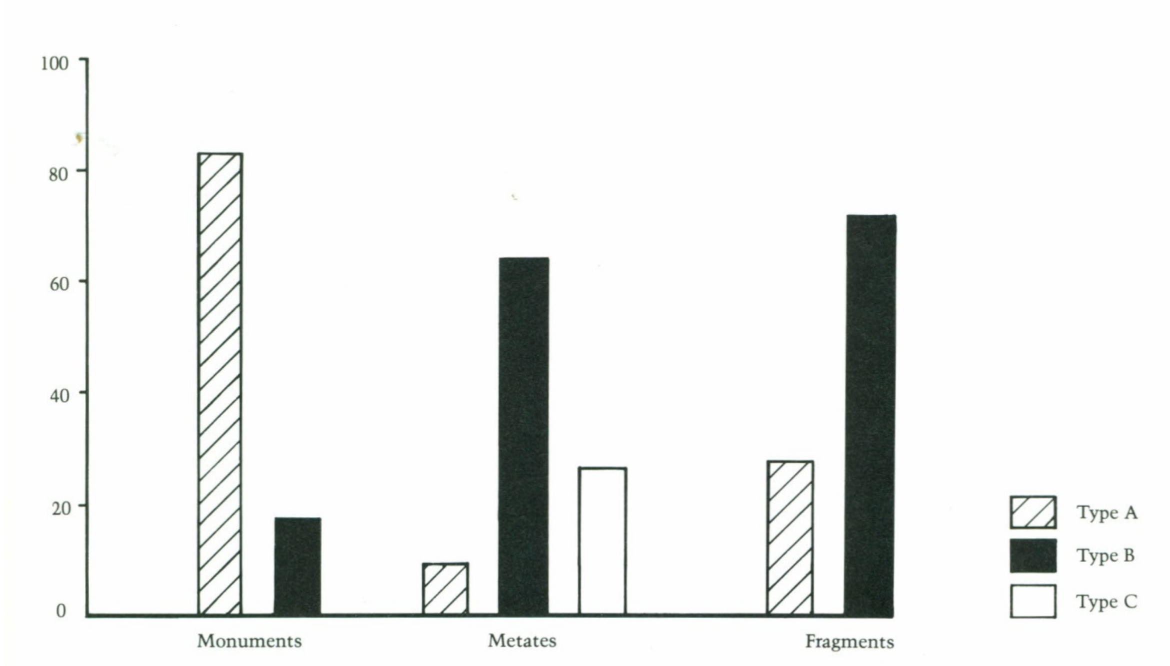


Figure 8.8 Graphic showing distribution of Cintepec basalt types from San Lorenzo (Coe and Diehl 1980: 404)

Finally, the last attempt for characterizing some Olmec basalts had been conducted during 2000 by Ventura Rodriguez Lugo, Demetrio Mendoza Anaya, G. Martínez Cornejo, and Manuel Espinosa Pesqueira . INAH was implementing a small project for determining how environment affects monuments accross Mexico. A first step was the characterization of some monuments exhibited at Parque Museo La Venta in Villahermosa, Tabasco. The "Comisión Nacional de Restauración del Patrimonio Cultural" (CNRPC) collected various samples and classified and submitted them for analysis to Instituto Nacional de Investigaciones Nucleares. The main purpose was the characterization of crystaline phases by the use of X-ray diffraction.

The study concludes that characterization by means of EDS showed the presence of such elements as O, Si, Al, and Fe in significant quantities. Elements such Na, K, Ca, Mg, Ti, and Cr were also present in small quantities. The last element only appears in sample LV-8 where the clinochore phase was identified. The rest of the samples may be corresponded to igneous rocks. Below, the table (Fig. 7.9) shows the results of the characterization of the Olmec monuments. The labels correspond to these monuments: (LV-3) Monument 59, (LV-4) Monument 20, (LV-5) Monument 5, (LV-6) Altar 4, (LV-7) Monument 63, (LV-8) serpetine mosaic, (LV-10) Stele (3)

TABLE III –CHARACTERIZATION OF CRYSTALLINE PHASES BY XRD

Crystalline phases	LV-3	LV-4	LV-5	LV-6	LV-7	LV-8	LV-10
$(Na,Ca),Al(Si,Al)_3O_8$ Albite, Calcian ordered	*		*				*
$(Ca\ Na)(Si,Al)_4O_8$ Anorthite Sodian Disordered	*						
$(Mg,Fe)_6(Si,Al)_4O_{10}(OH)_8$ Clinochlore		*					
$KAl(Fe,Li)(Si_3Al)O_{10}F_2$ Zinnwaldite-1M		*					
$Na(Si_3Al)O_8$ Albite, Disordered			*	*			
$NaAlSi_3O_8$ Albite, disordered				*			*
$(Na,K)(Si_3Al)O_8$ Sanidine, Potassium, Disordered					*		
$K(Li,Fe)_2AlSi_4O_{10}(OH)_2$ Zinnwaldite					*		
$(Mg,Fe,Al)_6(Si,Cr)_4O_{10}(OH)_8$ Clinochlore						*	

:

Figure 8.9 Table showing characterization of crystalline phases by XRD of some Olmec Monuments at Parque Museo La Venta (Rodríguez Lugo et al. 2000:78)

Before finishing this section concerning with petrography of sources and monuments, it is necessary to recall that all the previous studies are related in their results: Heizer and Williams (1965) in their published study identified two groups of volcanic groups: 1) *Plio-Pleistocene volcanic rocks*, composed of a Plio-Pleistocene group of lavas, pyroclastic rocks, and tuffaceous sediments mainly distributed on the eastern side of the Tuxla Mountains such as Cerro El Vigía o Cerro Cintepec; and 2) *Late Pleistocene and recent volcanic rocks* mainly distributed on the western side of the Tuxtla Mountains including four Quaternary volcanos which are San Martín Tuxtla, San Martín Pajapan, Santa Marta, and Pelón, and they are aligned in a northwest-southeast axis.

These two groups identified by Williams and Heizer are also described in the study conducted by Nelson et al. (1995), which were named *Younger Volcanic series* and *Older Volcanic series*, and the analysis provided a more detailed characterization which divided
in four groups the types of rocks:

1) *The Basanites and alkali basalts of the Primitive Alkaline group* (Younger series or *Late Pleistocene and recent volcanic rocks group* identified by Williams and Heizer); 2) *The Basanites and alkali basalts of the Evolved Alkaline group* (Younger series or *Late Pleistocene and recent volcanic rocks group* identified by Williams and Heizer); 3) *The Hy-normative Alkaline mugearites and benmorites* (Older series or *The Plio-Pleistocene volcanic rocks group* identified by Williams and Heizer); and 4) The Calc-Alkaline basalts and basaltic andesites (Older series or *The Plio-Pleistocene volcanic rocks group* identified by Williams and Heizer).

For instance, Nelson et al.'s description of Hy-normative alkaline basalts (which includes their Cerro el Vigía sample) corresponds closely to Williams and Heizer's description of Cerro el Vigía basalt (both are coarsely porphyritic, with zoned phenocrysts of augite and olivine phenocrysts). The coarsely porphyritic olivine-augite basalts described by Williams and Heizer as occurring on the southern flanks of the Tuxtlas ("particularly on the slopes of Cerro Cintepec and the vicinity of Soteapan and Huazuntlan) correspond to the Hy-normative alkaline basalts and Calc-alkaline basalts of the Older Volcanic Series. Their "Late Pleistocene and Recent volcanic rocks," that include finer-grained olivine-augite basalts, would belong to Nelson et al.'s Younger Volcanic Series (those with mainly olivine and small amounts of augite in the Primitive Alkaline group and those with somewhat more pyroxene in the Evolved Alkaline group.

Louis Fernandez and Michael Coe (1980) after conducting a petrographic study suggested that probably all samples analyzed in their project from San Lorenzo are of Cerro Cintepec origin. In fact, three basalt types were distinguished, may be those types are related to the kinds of basalts identified in the Older series by Nelson et al's project. (1995).

And the characterization of the mineral phases made by Rodriguez Lugo et al. (2000) provides an image of the diversity of types of basalts used for monuments in the archaeological site of La Venta.

X-ray fluorescence technique in the analysis of Olmec basalt

The use of X-ray fluorescence for sourcing Olmec basalt has an important precedent. In 1970, Carl William Clewlow published a stylistic analysis entitled

“Comparison of two Unusual Olmec Monuments”. After participating in the 1968 excavations in La Venta in the Stirling Acropolis (Clewlow and Corson 1968: 175-178) he realized that Monument 44 from La Venta bears remarkable similarities to the Idolo de San Martín Pajapan. He decided to employ the X-ray fluorescence technique, and Fred Stross, Shell Development Corp, concluded that both monuments were manufactured with the rock of the same provenience. And Nelson et al. (1995) also used XRF in a systematic study of geological samples recovered in the Tuxtla Mountains.

Sourcing analysis of Olmec Basalt applying X-ray Fluorescence

In this dissertation, a geochemical analysis of a sample of basalt artifacts is included. The purpose was to identify possible basalt sources of a sample of the analyzed artifacts in order to shed light on acquisition of raw materials synchronically and over time. The analyzed artifacts presented in this dissertation were obtained from excavations conducted in the 2003 field season of the Tres Zapotes Archaeological Project, University of Kentucky. Also, the intention was to select a representative sample which would include cases for every chronological period, each one of the main plaza groups, and could represent at least a small proportion of the population of the kinds of artifacts. In the case of Tres Zapotes, artifacts such as: pebbles, flakes, metate and mano fragments were sampled. This selection also focuses on the production and use of quotidian implements, more than monuments.

In order to compare with basalt artifacts of the same chronological periods, I also decided to apply X-ray Fluoresce to artifacts recovered from controlled excavations in the Olmec sites of San Lorenzo-Tenochtitlán and San Andrés (Tabasco). Michael Coe and

Mary Pohl generously provided me samples of artifacts which corresponded to the whole sequence of occupation of both sites. Both archaeological sequences had been supported by ceramic sequences as well as radiocarbon dates, and published.

In a geochemical analysis of Olmec basalt, it is important to include examples of monuments. The same monuments which were analyzed with the aid of petrography and which results were published in *In the Land of the Olmecs*, and now are analyzed with the aid of X-ray fluorescence. A colossal head, a couple of altars, columns, an anthropomorphic jaguar, a stela, drain stones, drain stone covers, and metates from all the archaeological phases. From the region around Tres Zapotes, a sample from "Cabeza de Cobata" was analyzed. It was not possible to sample Monuments of Tres Zapotes for sourcing. The process of obtaining a permission granted by INAH is long and, in the future, I hope to work on the source analysis of Olmec monuments in order to see similarities and differences with the quotidian artifacts which were sampled and analyzed. Those results are presented in this dissertation

The samples and their chronological context were the following:

104 samples from Tres Zapotes: 5 Early Formative (Arroyo Phase 1250-1000 B.C.); 33 Middle Formative (Tres Zapotes Phase 1000-400 B.C.); 37 Late Formative (Hueyapan Phase 400 BC- 1 AD); 27 Proto-Classic (Nextepetl Phase 1 AD-300; and 2 samples from mixed context (plow zone).

A sample of Cabeza de Cobata (Middle Formative Period) was included in this study. This sample was provided to me by Michael Coe, who received this sample from Robert Squier. Squier took a sample when he, Paul and Susan Katz discovered the

Colossal Head of Cobata. He also donated many geological samples from the Tuxtla Mountains to the University of Yale in order that Louis Fernandez and Michal Coe could compare different kinds of basalt and make a more complete analysis.

43 samples from San Andrés-Tabasco: 42 samples of the Middle Formative and 1 sample of the Post-Classic period. There were 2 Molina Phase (1400-1200 B.C.); 5 Early Puente (900-800); 5 Late Puente (800-700 B.C.); 3 Early Franco (700-650/550 B.C.); 15 Late Franco (500/400-350 BC); 12 Mixed (Early/Late Franco); 1 Post-Classic.

39 samples from San Lorenzo: 31 Early Formative and 8 Middle Formative: 1 Chicharras Phase (1250-1150 BC); 30 San Lorenzo Phase (1150-900 BC.); 6 Nacaste Phase (900-700 B.C.); 2 Palangana Phase (600-400 B.C.).

And geochemical information of 25 source samples published by Stephen Nelson, Erika González-Caver and T. Kurtis Kyser (1995). In total for this study there is information for 207 samples both from the outcrops and archaeological artifacts.

Preparation of samples for X-ray Fluorescence analysis

All samples were labeled with an alphanumeric code consisting of an abbreviation of the site name (TZ for Tres Zapotes, SA for San Andrés, and SL for San Lorenzo-Tenochtitlan), followed by a progressive number, (e.g., SA-1, SL-1, TZ-1, TZ-2). In the following lists I provide the whole corpus of basalt samples with their provenience, time period, Munsell color, and artifact type.

Tres Zapotes Basalt Samples

Table 8.2 List of basalt samples from Tres Zapotes. Phases: Arroyo (Early Formative period (EF)); Tres Zapotes (Middle Formative period (MF)); Hueyapan (Late Formative period)); Nextepetl (Proto-Classic period (PC)).

LIST OF BASALT SAMPLES FROM TRES ZAPOTES							
Sample I	Archaeological context			Phase	Peri	Artifact type	Color
TZ1	2B-8-2-9-25-0		domestic	TZ	MF	preform	5Y 6/1 Light olive gray
TZ2	2B-8-2-9-25-0		domestic	TZ	MF	preform	N8 Very light gray
TZ3	2B-8-2-9-25-0		domestic	TZ	MF	preform	5Y 7/2 Yellowish gray
TZ4	2B-8-1-14-51-0		domestic	Arroyo	EF	metate fragr	5YR 8/1 Pinkish gray
TZ5	2B-8-4-4-12-0		domestic	Hueyapan	LF	cobble	5YR 7/2 Grayish orange pink
TZ6	2B-8-2-4-14-0		domestic	Hueyapan	LF	metlapil frag	N8 Very light gray
TZ7	2B-8-4-4-15-0		domestic	Hueyapan	LF	cobble	5YR 7/2 Grayish orange pink
TZ8	2B-8-4-4-15-0		domestic	Hueyapan	LF	cobble	5YR 6/4 Light brown
TZ9	2B-8-4-8-22-0		domestic	TZ	MF	cobble	N5 Medium gray
TZ10	2B-8-4-8-22-0		domestic	TZ	MF	cobble	5YR 6/1 Light brownish gray
TZ11	2B-8-4-8-22-0		domestic	TZ	MF	cobble	5Y 7/2 Yellowish gray
TZ12	2B-8-4-8-22-0		domestic	TZ	MF	flake	5GY 8/1 Light greenish gray
TZ14	2B-8-4-8-22-0		domestic	TZ	MF	polisher	10YR 8/2 Very pale orange
TZ15	2B-8-0-10-28-0		domestic	TZ	MF	flake	5Y 6/1 Light olive gray
TZ16	2B-8-1-13-34-0		domestic	TZ	MF	cobble	5Y 7/2 Yellowish gray
TZ17	2B-8-1-13-34-0		domestic	TZ	MF	cobble	5Y 7/2 Yellowish gray
TZ18	2B-8-1-9-25-0		domestic	TZ	MF	flake	5YR 6/1 Light brownish gray
TZ20	2B-8-1-8-18-0		domestic	TZ	MF	flake	N8 Very light gray
TZ21	2B-8-1-8-18-0		domestic	TZ	MF	metate fragr	5GY 6/1 Greenish gray
TZ22	2B-8-1-11-33-0		domestic	TZ	MF	flake	5GY 6/1 Greenish gray
TZ23	2B-8-1-11-33-0		domestic	TZ	MF	flake	N7 Light gray
TZ24	2B-8-1-13-35-0		domestic	TZ	MF	flake	5YR 6/1 Light brownish gray
TZ25	2B-8-1-13-35-0		domestic	TZ	MF	flake	5Y 6/1 Light olive gray
TZ26	2B-8-1-13-35-0		domestic	TZ	MF	stone hamm	5Y 6/1 Light olive gray
TZ28	2D-9-1-8-18-0		elite res-adn	Hueyapan	LF	cobble	N6 Medium light gray
TZ29	2D-9-1-8-18-0		elite res-adn	Hueyapan	LF	cobble	5Y 8/1 Yellowish gray
TZ30	2D-9-1-8-18-0		elite res-adn	Hueyapan	LF	cobble	5YR 6/1 Light brownish gray
TZ31	2D-9-3-20-22-0		elite res-adn	Hueyapan	LF	flake	5YR 6/1 Light brownish gray
TZ32	2D-9-4-6-14-0		elite res-adn	Hueyapan	LF	flake	5GY 8/1 Light greenish gray
TZ33	2D-9-4-6-14-0		elite res-adn	Hueyapan	LF	flake	5Y 6/1 Light olive gray
TZ34	2D-9-3-1-4-0		plow zone	Mixed	Mix	flake	N8 Very light gray
TZ35	2D-9-3-1-4-0		plow zone	Mixed	Mix	flake	10YR 6/2 Pale yellowish brow
TZ36	2B-8-2-8-17-0		domestic	Hueyapan	LF	metate fragr	5YR 8/1 Pinkish gray
TZ37	2B-8-2-8-17-0		domestic	Hueyapan	LF	cobble	N8 Very light gray
TZ38	2B-8-2-8-17-0		domestic	Hueyapan	LF	cobble	N8 Very light gray
TZ39	2B-8-2-8-17-0		domestic	Hueyapan	LF	flake	5Y 6/1 Light olive gray
TZ40	2B-8-2-8-17-0		domestic	Hueyapan	LF	flake	N8 Very light gray

TZ41	3B-28-0-2-7-0.5		domestic	Nextepetl	PC	flake	5BP 7/2 Pale blue
TZ42	3B-28-0-5-10-0		domestic	Nextepetl	PC	nodule fragn	5YR 7/2 Grayish orange pink
TZ43	3B-28-0-2-4-0.2		domestic	Nextepetl	PC	cobble	5Y 8/1 Yellowish gray
TZ44	3B-28-0-2-4-0.3		domestic	Nextepetl	PC	cobble	5YR 6/4 Light brown
TZ46	3B-28-0-2-5-0.5		domestic	Nextepetl	PC	cobble	N7 Light gray
TZ47	3B-28-0-2-6-0.2		domestic	Nextepetl	PC	flake	N7 Light gray
TZ48	3B-28-0-2-7-0.7		domestic	Nextepetl	PC	flake	10 YR 6/2 Pale yellowish brow
TZ49	3B-28-0-2-6-0.5		domestic	Nextepetl	PC	polisher	5YR 7/2 Grayish orange pink
TZ50	3B-28-0-2-4-0		domestic	Nextepetl	PC	cobble	5YR 7/2 Grayish orange pink
TZ51	3B-28-0-2-5-0.8		domestic	Nextepetl	PC	cobble	5Y 6/1 Light olive gray
TZ52	3B-28-0-2-5-0.2		domestic	Nextepetl	PC	cobble	N8 Very light gray
TZ53	3B-28-0-2-6-0.2		domestic	Nextepetl	PC	cobble	5Y 6/1 Light olive gray
TZ55a	2B-8-0-10-29-0		domestic	TZ	MF	flake	N7 Light gray
TZ55b	2B-8-0-10-29-0		domestic	TZ	MF	flake	N7 Light gray
TZ56	2D-9-3-6-14-0		elite res-adn	Hueyapan	LF	flake	5YR 7/2 Grayish orange pink
TZ58	2D-9-1-6-14-0		elite res-adn	Hueyapan	LF	metate fragr	5Y 7/2 Yellowish gray
TZ59	2D-9-3-17-23-0		elite res-adn	Hueyapan	LF	flake	N7 Light gray
TZ60	2D-9-2-18-23-0		elite res-adn	Hueyapan	LF	flake	5YR 5/2 Pale brown
TZ61a	2D-9-4-8-20-0		elite res-adn	Hueyapan	LF	flake	5YR 6/1 Light brownish gray
TZ61b	2D-9-4-8-20-0		elite res-adn	Hueyapan	LF	cobble	N7 Light gray
TZ61c	2D-9-4-8-20-0		elite res-adn	Hueyapan	LF	flake	5YR 7/2 Grayish orange pink
TZ62	2D-9-3-6-11-0		elite res-adn	Hueyapan	LF	cobble	5GY 8/1 Light greenish gray
TZ64	2B-8-0-9-28-0		domestic	TZ	MF	flake	N7 Light gray
TZ65a	2D-9-3-8-15-0		elite res-adn	Hueyapan	LF	cobble	N7 Light gray
TZ65b	2D-9-3-8-15-0		elite res-adn	Hueyapan	LF	mano fragme	10YR 6/2 Pale yellowish brow
TZ65c	2D-9-3-8-15-0		elite res-adn	Hueyapan	LF	flake	10YR 6/2 Pale yellowish brow
TZ68	3B-28-0-5-12-0		elite res-adn	Hueyapan	LF	flake	10Y 6/2 Pale olive
TZ69	2B-8-4-4-12-0		domestic	Hueyapan	LF	flake	10YR 6/2 Pale yellowish brow
TZ70	2C-12-1-42-38-0		elite res-adn	TZ	MF	metate fragr	N7 Light gray
TZ71a	2C-12-0-41-26-0		burial ritual	TZ	MF	cobble	10YR 6/2 Pale yellowish brow
TZ71b	2C-12-0-41-26-0		burial ritual	TZ	MF	cobble	N8 Very light gray
TZ71c	2C-12-0-41-26-0		burial ritual	TZ	MF	cobble	N8 Very light gray
TZ72	2C-12-0-12-12-0		elite res-adn	Hueyapan	LF	metate fragr	10 YR 6/2 Pale yellowish brow
TZ73	2C-12-0-41-30-0		elite res-adn	TZ	MF	metlapil frag	5GY 6/1 Greenish gray
TZ73a	2C-12-0-41-23-0		elite res-adn	Hueyapan	LF	cobble	N7 Light gray
TZ73b	2C-12-0-41-23-0		elite res-adn	Hueyapan	LF	cobble	5YR 6/1 Light brownish gray
TZ73c	2C-12-0-41-23-0		elite res-adn	Hueyapan	LF	cobble	5YR 6/1 Light brownish gray
TZ74	2C-12-0-41-27-0		elite res-adn	TZ	MF	cobble	N7 Light gray
TZ75	2C-12-0-44-47-0		domestic	TZ	MF	mano fragme	N7 Light gray
TZ76	2C-12-0-40-26-0		elite res-adn	TZ	MF	metate fragr	5YR 6/4 Light brown
TZ77	2C-12-0-41-29-0		elite res-adn	TZ	MF	metate fragr	10 Y 6/2 Pale olive

TZ78a	2C-12-0-41-32-0		elite res-adn	TZ	MF	flake	N8 Very light gray
TZ78b	2C-12-0-41-32-0		elite res-adn	TZ	MF	core fragmer	10Y 6/2 Pale olive
TZ79	2C-12-0-43-36-0		elite res-adn	TZ	MF	flake	N6 Medium light gray
TZ80a	2C-12-1-44-50-0		burial ritual	Arroyo	EF	flake	N6 Medium light gray
TZ80b	2C-12-1-44-50-0		burial ritual	Arroyo	EF	flake	N7 Light gray
TZ80c	2C-12-1-44-50-0		burial ritual	Arroyo	EF	cobble	N7 Light gray
TZ81	2C-12-0-44-51-0.1		burial ritual	Arroyo	EF	flake	N7 Light gray
TZ61a	2D-9-4-8-20-0		elite res-adn	Hueyapan	LF	flake	5YR 7/2 Grayish orange pink
TZ61b	2D-9-4-8-20-0		elite res-adn	Hueyapan	LF	flake	5YR 7/2 Grayish orange pink
TZ61c	2D-9-4-8-20-0		elite res-adn	Hueyapan	LF	cobble	5YR 6/1 Light brownish gray
TZ63a	2D-9-3-4-8-0		elite res-adn	Nextepetl	PC	flake	5Y 6/1 Light olive gray
TZ63b	2D-9-3-4-8-0		elite res-adn	Nextepetl	PC	flake	10YR 6/2 Pale yellowish brow
TZ63c	2D-9-3-4-8-0		elite res-adn	Nextepetl	PC	cobble	5Y 5/2 Light olive gray
TZ63d	2D-9-3-4-8-0		elite res-adn	Nextepetl	PC	cobble	5YR 6/4 Light brown
TZ63e	2D-9-3-4-8-0		elite res-adn	Nextepetl	PC	cobble	5YR 6/4 Light brown
TZ45a	3B-28-0-3-8-0		plow zone	Nextepetl	PC	core fragmer	5Y 6/4 Dusky yellow
TZ45b	3B-28-0-3-8-0		plow zone	Nextepetl	PC	cobble	5Y 6/1 Light olive gray
TZ45c	3B-28-0-3-8-0		plow zone	Nextepetl	PC	cobble	5Y 6/1 Light olive gray
TZ45d	3B-28-0-3-8-0		plow zone	Nextepetl	PC	cobble	5Y 6/1 Light olive gray
TZ46	3B-28-0-2-5-0.5		domestic	Nextepetl	PC	cobble	5YR 6/4 Light brown
TZ46a	3B-28-0-2-5-0.5		domestic	Nextepetl	PC	cobble	10YR 6/2 Pale yellowish brow
TZ46b	3B-28-0-2-5-0.5		domestic	Nextepetl	PC	cobble	5YR 6/4 Light brown
TZ46c	3B-28-0-2-5-0.5		domestic	Nextepetl	PC	cobble	5G 6/1 Greenish gray
TZ46d	3B-28-0-2-5-0.5		domestic	Nextepetl	PC	flake	5Y 6/1 Light olive gray
TZ46e	3B-28-0-2-5-0.5		domestic	Nextepetl	PC	polisher	N6 Medium light gray
TZ65c	2D-9-3-8-15-0		elite res-adn	Hueyapan	LF	mano prefor	5YR 6/1 Light brownish gray

San Andrés-Tabasco basalt samples

Table 8.3 List of samples from San Andrés-Tabasco. MF is Middle Formative period

SAMPLES FROM SAN ANDRES, TABASCO				
Sample	Phase	Period	Artifact type	COLOR
SA-1a	Early Puente	MF	Manuport	10YR 6/2 Pale yellowish brown
SA1b	Early Puente	MF	Manuport	10YR 6/2 Pale yellowish brown
SA-3	Mixed	MF	Manuport	N7 Light gray
SA-5	Early Franco	MF	Metate fragment	5YR 6/1 Light brownish gray
SA-6	Late Franco	MF	Metate fragment	5YR 6/1 Light brownish gray
SA-8	Late Franco	MF	Mano fragment	N7 Light gray
SA-9	Late Franco	MF	Manuport	N9 White
SA-9a	Late Franco	MF	Manuport	N9 White
SA-11	Mixed	MF	Manuport	N8 Very light gray
SA-12	Late Franco	MF	Manuport	5YR 6/1 Light brownish gray
SA-13	Late Franco	MF	Mano fragment	10 YR 6/2 Pale yellowish brown
SA-13a	Late Franco	MF	Mano fragment	10 YR 6/2 Pale yellowish brown
SA-14	Late Franco	MF	Manuport	5YR 6/1 Light brownish gray
SA-15	Mixed	MF	Manuport	5R 3/4 Dusky red
SA-16	Mixed	MF	Mano fragment	5YR 8/1 Pinkish gray
SA-18	Early Puente	MF	Manuport	5YR 6/1 Light brownish gray
SA-19	Mixed	MF	Mano fragment	5YR 8/1 Pinkish gray
SA-20	Late Franco	MF	Manuport	5YR 8/1 Pinkish gray
SA-21	Late Franco	MF	Manuport	5YR 6/1 Light brownish gray
SA-23	Late Franco	MF	Metate fragment	5YR 8/1 Pinkish gray
SA-24	Mixed	MF		5YR 8/1 Pinkish gray
SA-25	Late Franco	MF		5YR 6/1 Light brownish gray
SA-27a	Mixed	MF	Metate fragment	5YR 5/2 Pale brown
SA-27b	Mixed	MF	Metate fragment	5YR 5/2 Pale brown
SA-28	Late Puente	MF	Manuport	N7 Light gray
SA-29	Early Franco	MF	ımerstone fragm	5YR 8/1 Pinkish gray
SA-30	Early Franco	MF	ımerstone fragm	N8 Very light gray
SA-31	Mixed	MF	Mano fragment	N7 Light gray
SA-32a	Late Franco	MF	Manuport	5YR 8/1 Pinkish gray
SA-32b	Late Franco	MF	Manuport	5YR 8/1 Pinkish gray
SA-33	Mixed	MF	polishing stone	5YR 8/1 Pinkish gray
SA-34	Molina	MF	Manuport	N7 Light gray
SA-35	Molina	MF	Manuport	N8 Very light gray
SA-36	Post-Classic	Post	Mano fragment	N8 Very light gray
SA-37	Late Franco	MF	Mano fragment	5YR 6/1 Light brownish gray
SA-39	Mixed	MF	Manuport	5YR 6/1 Light brownish gray
SA-40	Mixed	MF	Manuport	N8 Very light gray
SA-42	Early Puente	MF	Mano fragment	N8 Very light gray
SA-43	Early Puente	MF	Manuport	5Y 8/1 Yellowish gray
SA-44	Late Puente	MF	Metate fragmen	N8 Very light gray
SA-45	Late Puente	MF	Manuport	N8 Very light gray
SA-46	Late Puente	MF	Mano fragment	5YR 8/1 Pinkish gray
SA-49	Late Puente	MF	Manuport	10 YR 6/2 Pale yellowish brown

San Lorenzo-Tenochtitlán basalt samples

Table 8.4 List of basalt samples from San Lorenzo-Tenochtitlán. EF is Early Formative period and MF is Middle Formative period

Sample	context	Phase	Period	Artifact type		Color
SL1		San Lorenzo	EF	Mon.8	Rectangular Altar	5GY 4/1 Dark greenish gray
SL3		San Lorenzo	EF	Mon.17	Colossal Head	N3 Dark gray
SL4		San Lorenzo	EF	Mon.18	Altar, tabletop	N3 Dark gray
SL6		San Lorenzo	EF	Mon.20	Altar, tabletop	N4 Medium dark gray
SL7		San Lorenzo	EF	Mon.22	Oval Stone	N4 Medium dark gray
SL8		San Lorenzo	EF	Mon.23	Plain Stela	N3 Dark gray
SL11		San Lorenzo	EF	Mon.31	Bech	N4 Medium dark gray
SL12		San Lorenzo	EF	Mon.37	Animal (Feline) Figure	N5 Medium gray
SL13		San Lorenzo	EF	Mon.38	Flat Altar	N5 Medium gray
SL14		San Lorenzo	EF	Mon.40	Through stone from drain	N5 Medium gray
SL15		San Lorenzo	EF	Mon.41	Column (giant hands)	N5 Medium gray
SL16		San Lorenzo	EF	Mon.42	Column (giant hands)	N4 Medium dark gray
SL20		San Lorenzo	EF	Mon.51	Flat Altar	N5 Medium gray
SL21	SL-B4-7a	San Lorenzo	EF	Drainstone		N4 Medium dark gray
SL22	SL-B4-7a	San Lorenzo	EF	Drainstone		N5 Medium gray
SL23		San Lorenzo	EF	Drainstone cover		N5 Medium gray
SL24		San Lorenzo	EF	Mon.49	Tapered Column	N5 Medium gray
SL26	A2	Chicharras	EF	metate		5Y 4/1 Olive gray
SL27	A3	San Lorenzo	EF	metate		N5 Medium gray
SL28	A4	San Lorenzo	EF	metate		N4 Medium dark gray
SL29	A6	San Lorenzo	EF	metate		5Y 2/1 Olive black
SL30	A8	San Lorenzo	EF	metate		N4 Medium dark gray
SL31	A9	Nacaste	MF	metate		N5 Medium gray
SL32	A10	Nacaste	MF	metate		N5 Medium gray
SL33	A11	Nacaste	MF	metate		N5 Medium gray
SL34	A12	San Lorenzo	EF	metate		5YR 4/1 Brownish gray
SL35	F5	San Lorenzo	EF	metate		N2 Grayish black
SL36	F6	San Lorenzo	EF	metate		N4 Medium dark gray
SL37	F7	San Lorenzo	EF	metate		N5 Medium gray
SL38	F8	San Lorenzo	EF	metate		N5 Medium gray
SL39	F9	San Lorenzo	EF	metate		N5 Medium gray
SL40	F10	San Lorenzo	EF	metate		N5 Medium gray
SL41	F12	Nacaste	MF	metate		N4 Medium dark gray
SL42	F13	Nacaste	MF	metate		N4 Medium dark gray
SL43	F14	Nacaste	MF	metate		N4 Medium dark gray
SL44	F16	Palangana	MF	metate		N6 Medium light gray
SL45	F17	San Lorenzo	EF	metate		N5 Medium gray
SL46	F15	Palangana	MF	metate		N4 Medium dark gray
SL47	C-3	San Lorenzo	EF	Mon. 56	Block with relief	N4 Medium dark gray
SL48	Cobata, Ver.	Cabeza de Co	MF	Cabeza de Cobata		N5 Medium gray

After labeling, the specimens were broken, crushed, and powdered for analysis. I used a 13" Estwing rock pick for obtaining manageable sample size, especially when the rocks were larger. Later, I put all the pieces which corresponded to the same sample into a plastic cup. Every plastic cup was labeled on the top with the code for every sample.

The next step was to reduce the rock fragments to fine gravel. In the laboratory, located in the building of the Kentucky Geological Survey, I used a rock crusher machine for obtaining a fine "gravel". I returned the complete sample to the same labeled plastic cup.

Following this procedure, I reduced this gravel for every sample to a fine powder. I used in the laboratory the tungsten carbide ring mill for this purpose. I was careful cleaning all the equipment with acetone in order to avoid contamination of samples.

When I finished this process with every sample, I prepared a mixture of powdered rock sample (4.000 g) and Lithium-metaborate flux (4.000 g). I used a Mettler Toledo analytical balance for obtaining the precise weigh.

Each sample was put in a glass disk. Dr. Jason Backus guided me through the preparation of the basalt samples; he also made the glass disks and conducted the X-ray fluorescence analysis in the laboratory of the Kentucky Geological Survey.

The standards used for calibration of the device of X-ray Fluorescence were the following: GBW 07105, BE-N, MRG-1, DNC-1, BIR-1, NIM-N (SARM 50, W2a, BCR-2, BHVO-1, BHVO-2, AVG-2, G-2, OU-3, OU-4, STM-1, GSP-1, SY-2, SY-3, AMH-1, YG-1, and KPT-1.

The major elements were measured in weight percent of oxides and trace elements in ppm.

The major or bulk elements were: Al_2O_3, SiO_2, TiO_2, CaO, K_2O, Na_2O, P_2O_5

And the trace elements were: MnO, Cu, Co, Ni, Cr, Ce, La, Ba, Nb, Zr, Y, Sr, Rb, and Zn.

The results obtained for Tres Zapotes samples were the following:

Table 8.5 Results of XRF analysis showing the concentration of major and trace elements in every basalt samples from Tres Zapotes

Sample	Al_2O_3 (%)	SiO_2 (%)	MnO (PPM	TiO_2 (%)	CaO (%)	K_2O (%)	Na_2O (%)	P_2O_5 (%)	Cu (PPM)	Co (PPM)	Ni (PPM)	Cr (PPM)	Ce (PPM)	La (PPM)	Ba (PPM)	Nb (PPM)	Zr (PPM)	Y (PPM)	Sr (PPM)	Rb (PPM)	Zn (PPM)
TZ 1	10.93	37.72	1782	1.96	9.82	0.89	1.48	0.7	64	68	369	756	73	39	660	30	176	20	767	17	134
TZ 2	16.05	43.98	1792	1.42	11.46	0.96	2.16	0.3	134	47	36	87	48	18	495	10	174	17	1020	20	90
TZ 3	19.41	50.57	1035	0.74	6.82	1.51	3.49	0.54	97	22	128	53	65	29	575	12	241	19	886	16	75
TZ 4	16.07	48.31	1486	0.91	8.68	1.56	3.25	0.34	36	34	58	158	42	30	525	10	205	22	998	29	89
TZ 5	10.66	36.91	2671	1.5	11.44	0.74	1.45	0.57	65	85	363	804	34	26	459	21	153	15	694	20	98
TZ 6	11.77	40.6	1741	1.63	10.39	0.92	2.13	0.49	63	71	349	810	34	17	331	22	184	14	728	13	104
TZ 7	11.58	40.41	1727	1.68	11.19	1.04	2.35	0.33	39	67	158	376	24	15	599	21	173	20	725	22	115
TZ 8	11.54	40.99	1967	0.88	11.47	1.07	1.55	0.36	107	65	238	668	31	15	376	10	141	16	763	18	97
TZ 9	10.71	37.98	1701	1.61	10.4	1.22	2.55	0.58	111	61	344	746	73	36	450	33	225	18	998	21	110
TZ 10	11.9	39.4	1710	1.35	10.13	0.75	2.03	0.45	104	63	344	720	48	20	334	14	183	16	772	13	114
TZ 11	15.63	48.32	1179	0.78	10.3	1.06	2.58	0.33	106	24	65	227	46	18	385	10	173	14	869	11	80
TZ 12	16.63	43.12	1368	0.86	6.34	1.46	3.06	0.35	103	31	61	41	39	22	673	10	205	21	813	24	108
TZ 14	17.26	43.82	1480	0.99	6.61	1.29	2.59	0.4	161	41	103	171	36	23	539	10	172	19	684	16	107
TZ 15	11.46	38.82	1576	1.66	12.13	0.87	1.67	0.63	95	63	321	771	70	29	499	24	163	17	752	20	100
TZ 16	18.92	38.77	3370	1.2	4.37	1.16	1.35	0.6	666	47	117	258	31	22	568	10	138	18	248	8	132
TZ 17	10.35	36.85	1729	2.73	10.58	1.54	2.03	0.84	66	96	327	959	93	31	728	40	269	17	1151	27	121
TZ 18	12.21	37.33	1404	0.92	10.6	1.55	1.81	0.29	126	40	129	231	41	21	886	10	161	22	964	21	116
TZ 20	14.07	46.82	1364	0.73	10.8	0.94	2.12	0.19	65	37	121	375	25	4	289	10	117	14	565	19	71
TZ 21	15.09	49.58	1721	1.44	14.85	0.86	1.56	0.44	79	49	173	400	47	24	397	12	135	19	672	19	105
TZ 22	11.1	40.16	1793	1.96	10.45	0.91	2.37	0.59	75	69	331	727	71	30	485	27	170	15	765	19	124
TZ 23	15.37	44.75	1603	1.28	10.25	1.04	2.57	0.37	120	45	158	232	41	21	383	12	171	16	810	19	99
TZ 24	11.16	41.07	1680	1.78	9.96	1.06	2.36	0.62	44	64	346	704	67	31	421	24	179	16	722	21	117
TZ 25	16.25	47.96	2990	0.82	10.5	1.77	2.64	0.49	68	43	65	187	40	26	421	10	187	17	1006	22	93
TZ 26	12.76	41.54	1813	1.51	11.09	0.96	2.35	0.64	90	86	359	995	62	19	519	18	208	16	927	23	103
TZ 28	10.68	37.85	1743	2.68	10.32	1.65	2.13	0.85	50	69	274	685	70	47	769	39	251	17	1165	33	133
TZ 29	16.77	47.02	1492	0.83	9.03	1.12	2.77	0.31	59	38	114	75	35	24	442	10	172	16	826	16	86
TZ 30	13.91	42.73	1553	1.26	12.3	0.91	1.51	0.41	99	47	142	351	36	20	435	12	144	18	605	20	91
TZ 31	14.99	40.47	1801	1.36	11.32	1.02	2.07	0.32	211	51	41	76	22	8	333	10	137	16	757	24	101
TZ 32	12.49	44.23	1491	0.97	11.67	1.33	1.75	0.26	171	43	72	283	31	15	754	10	187	13	1281	20	92
TZ 33	11.57	39.66	1938	1.66	9.89	0.87	1.15	0.53	71	88	425	884	50	19	462	24	157	19	623	18	108
TZ 34	10.43	38.09	1716	1.92	10.48	0.6	2.06	0.57	91	79	367	858	45	36	1442	31	184	15	932	19	127
TZ 35	12.15	39.69	1519	1	9.6	0.77	1.68	0.33	193	65	426	955	38	22	420	10	124	15	534	6	112
TZ 36	10.9	39.64	1845	2.04	10.38	1	2.4	0.64	83	70	346	732	89	35	519	31	182	15	819	23	126
TZ 37	14.72	41.37	1848	1.31	11.48	0.65	2.42	0.38	111	45	60	153	37	18	318	10	140	16	646	12	106
TZ 38	11.92	39.93	1646	2.09	10.91	1.07	2.07	0.55	81	56	252	551	67	29	490	30	191	16	842	22	121
TZ 39	14.47	46.43	1535	0.81	7.84	1.39	1.94	0.33	143	65	205	538	36	18	507	10	149	18	509	25	92
TZ 40	17.98	49.4	1219	0.72	6.75	1.53	3.56	0.48	36	21	101	102	52	30	539	11	231	17	940	30	80
TZ 41	10.72	34.63	1746	1.36	12.21	0.82	2.42	0.59	125	55	211	567	76	40	566	28	204	17	1087	13	118
TZ 42	12.2	38.15	1832	1.54	12.07	0.78	1.36	0.69	72	52	181	444	72	32	696	22	184	15	856	14	98
TZ 43	15.59	47.71	1344	0.76	10.19	1.24	2.69	0.32	174	47	182	555	51	21	422	10	191	16	856	21	75
TZ 44	12.72	40.61	1704	1.67	8.87	1.28	1.4	0.59	101	94	428	991	52	18	720	19	167	18	556	20	136
TZ 46	12.3	41.48	1654	1.71	10.2	1	2.42	0.52	125	85	352	755	52	21	442	25	185	15	792	18	115
TZ 47	11.24	38.92	1794	2.3	10.26	1.35	2.64	0.67	93	90	335	713	75	29	526	37	212	16	879	30	130
TZ 48	10.11	41.64	1457	0.94	10.98	0.85	1.18	0.32	50	83	441	1124	21	9	397	11	116	20	451	18	97
TZ 49	12.47	41.38	1441	0.99	11.81	1.75	1.75	0.52	72	67	87	410	44	13	450	10	163	19	888	16	112
TZ 50	14.89	44.21	1213	0.83	10.09	1.06	2.48	0.38	85	46	122	328	32	18	465	10	158	17	721	12	93
TZ 51	13.77	46.73	2421	2.46	11.42	0.55	1.22	1.22	48	76	432	835	80	28	1254	31	197	17	899	9	169
TZ 52	12.86	43.49	1539	0.86	8.66	0.9	2.16	0.26	40	74	438	853	30	10	355	10	127	12	622	19	91
TZ 53	14.33	49.55	2207	0.73	12.54	2.87	1.39	0.25	27	26	88	138	47	16	364	18	171	37	440	115	136
TZ 55a	12.14	39.8	2578	1.59	9.94	0.91	2.76	0.59	98	71	284	488	56	24	607	27	193	18	970	23	121
TZ 55b	14.24	44.01	1440	0.76	10.27	0.96	2.24	0.27	62	56	127	410	17	3	264	10	118	11	591	12	91

TZ 56	12.11	41.87	1526	1.23	11.16	1.2	1.92	0.41	125	56	150	446	39	16	412	13	155	16	771	24	96
TZ 58	14.35	44.72	1568	0.97	10.94	0.83	2.06	0.37	141	38	100	242	34	14	423	10	133	15	576	16	95
TZ 59	10.38	36.16	1665	1.45	11.09	0.8	1.66	0.53	95	82	356	783	39	16	405	21	149	16	681	20	94
TZ 60	18.87	54.86	1486	1.18	11.66	1.7	2.68	0.51	45	36	53	154	58	33	567	11	191	18	1133	23	111
TZ 61a	11.02	39.66	1815	1.78	11.49	1.05	1.36	0.59	52	76	353	746	49	18	533	23	168	16	691	22	115
TZ 61b	14.93	43.84	1495	0.79	9.84	0.76	2.14	0.33	60	53	186	222	21	9	470	10	148	15	783	12	80
TZ 61c	13.26	44.98	1281	1.09	10.95	0.85	1.99	0.36	183	51	196	856	35	14	303	11	156	14	660	15	79
TZ 62	10.58	35.95	1724	1.55	12.48	0.52	1.83	0.61	121	95	406	988	59	17	532	31	186	15	879	15	117
TZ 64	11	39.27	1690	1.8	10.07	1	2.11	0.57	86	94	409	889	60	18	437	28	190	16	803	24	119
TZ 65a	14.79	40.65	1261	0.96	9.68	0.98	2.33	0.34	122	46	238	261	35	14	553	10	166	15	741	17	101
TZ 65b	9.55	39.71	1483	0.88	11.52	0.88	1.18	0.31	80	85	426	1112	27	7	623	10	148	15	898	16	87
TZ 65c	16.33	52.01	642	0.69	6.8	1.3	2.59	0.13	30	36	7	109	18	6	342	10	132	17	477	25	71
TZ 68	15.24	53.59	1665	1.35	5.11	0.63	0.91	0.77	96	115	367	1117	57	13	682	16	202	16	472	15	123
TZ 69	15.27	44.12	1915	1.37	11.03	1.22	1.81	0.51	244	67	96	216	46	13	570	11	163	18	768	27	121
TZ 70	11.71	37.12	1803	1.59	12.12	1.12	2.71	0.53	89	64	229	461	52	26	485	25	192	17	1131	30	135
TZ 71a	14.41	45.2	1679	1	11.26	0.88	2.11	0.27	107	50	89	293	27	5	342	10	130	14	608	21	88
TZ 71b	10.19	35.59	1620	1.52	12.07	0.63	1.42	0.58	67	84	376	864	48	16	472	25	164	16	789	18	107
TZ 71c	10.86	40.22	1660	1.67	10.7	0.82	1.99	0.52	40	68	290	702	56	25	551	29	169	16	819	20	111
TZ 72	11.67	41.09	1749	1.83	10.33	1.02	1.5	0.64	65	73	388	732	48	18	534	21	177	17	728	22	111
TZ 73	10.76	37.11	1671	2.61	10.2	0.93	2.85	0.83	82	73	261	545	75	34	744	42	247	15	1146	20	127
TZ 73a	12.26	41.79	1456	1.03	10.27	0.83	2.06	0.37	91	69	321	689	37	10	296	10	146	12	705	19	88
TZ 73b	14.8	42.15	2171	1.58	11.46	1.07	2.06	0.42	116	48	65	189	34	12	606	13	162	17	784	18	96
TZ 73c	11.25	39.99	1684	1.78	10.07	0.87	2.45	0.5	49	68	312	687	52	19	339	22	172	16	760	16	114
TZ 74	15.24	57.4	961	0.61	5.18	1.96	3.48	0.34	16	12	59	120	56	19	712	10	235	23	710	40	78
TZ 75	15.24	44.48	1412	0.9	10.29	1.09	2.75	0.39	112	46	44	150	34	9	325	10	159	14	750	15	96
TZ 76	11.9	40.55	1728	1.63	9.92	1.05	2.07	0.53	66	92	357	807	52	20	442	22	181	16	713	23	118
TZ 77	11.8	41.06	1735	1.61	11.08	0.97	1.26	0.55	83	59	308	700	65	32	647	21	224	16	1355	23	107
TZ 78a	14.52	42.28	1654	1.2	11.49	1.15	2.2	0.44	137	41	48	165	43	16	385	10	179	16	1025	15	103
TZ 78b	10.44	35.24	1696	1.85	10.26	1.19	2.67	0.57	71	70	235	563	57	22	528	30	220	17	1110	24	130
TZ 79	10.52	36.09	1795	2.62	10.76	1.53	2.67	0.8	62	72	252	656	72	31	635	42	250	17	1119	33	143
TZ 80a	10.3	35.42	1772	2.15	11.19	0.69	2.5	0.7	136	93	353	964	84	30	1319	40	271	19	1340	36	149
TZ 80b	9.85	34.92	1774	1.75	10.47	1.02	2.46	0.6	61	76	334	672	51	23	510	31	188	17	976	25	130
TZ 80c	10.15	38.06	1797	2.02	10.33	1.27	2.2	0.74	48	83	385	767	64	22	476	38	194	15	875	20	119
TZ 81	11.15	39.78	1676	1.68	9.64	0.84	2.4	0.46	49	73	325	694	45	19	327	21	164	15	701	13	109
TZ 61a	11.02	39.66	1815	1.78	11.49	1.05	1.36	0.59	52	76	353	746	49	18	533	23	168	16	691	22	115
TZ 61b	14.93	43.84	1495	0.79	9.84	0.76	2.14	0.33	60	53	186	222	21	9	470	10	148	15	783	12	80
TZ 61c	13.26	44.98	1281	1.09	10.95	0.85	1.99	0.36	183	51	196	856	35	14	303	11	156	14	660	15	79
TZ 63a	13.12	45.36	1964	1.55	12.41	1.06	2.55	0.57	110	78	332	738	49	24	557	18	198	15	1043	24	126
TZ 63b	14.33	46.58	1461	0.7	10.64	1.48	2.42	0.44	129	58	182	597	43	22	386	10	186	26	917	16	82
TZ 63c	10.94	39.23	1593	3.03	11.25	0.39	2.93	0.96	86	82	328	691	97	36	858	49	278	17	1087	19	144
TZ 63d	15.03	44.45	1632	0.96	9.79	0.53	2	0.27	207	72	217	452	30	9	370	10	143	14	633	6	99
TZ 63e	15.61	45.85	1636	1	9.3	1.31	2.58	0.43	153	57	138	203	51	22	582	12	176	18	729	23	105
TZ 45a	18.39	45.49	1507	0.9	9.71	0.27	2.12	0.18	128	55	169	153	33	4	326	10	183	12	906	5	106
TZ 45b	16.19	43.72	1921	0.94	7.08	0.95	2.3	0.36	228	69	206	284	31	18	499	10	139	17	560	20	115
TZ 45c	14.04	53.13	1608	0.74	10.39	0.6	1.99	0.15	71	100	522	1335	26	9	270	10	141	11	698	10	98
TZ 45d	15.51	48.03	1882	0.77	10.59	1.19	2.77	0.31	159	54	76	241	38	12	419	10	192	13	983	17	93
TZ 46	12.3	41.48	1654	1.71	10.2	1	2.42	0.52	125	85	352	755	52	21	442	25	185	15	792	18	115
TZ 46a	12.13	40.92	1673	0.94	10.78	1.05	1.38	0.43	88	70	241	689	24	10	395	10	137	14	653	16	90
TZ 46b	13.65	41.96	1545	0.94	11.09	0.97	2.23	0.27	140	49	78	249	28	6	892	10	179	15	1265	24	94
TZ 46c	13.12	52.23	1241	0.81	9.61	0.8	1.42	0.18	81	55	264	711	28	10	324	10	167	15	489	19	89
TZ 46d	14.21	42.26	1326	0.86	10.16	0.94	2.37	0.37	115	46	207	454	35	13	442	10	153	14	771	14	91
TZ 46e	12.05	39.95	1704	1.6	9.13	0.85	2.14	0.47	60	100	540	966	54	16	425	22	170	14	675	19	103
TZ 65c	16.33	52.01	642	0.69	6.8	1.3	2.59	0.13	30	36	7	109	18	6	342	10	132	17	477	25	71

The results obtained for San Andrés-Tabasco basalt samples were the following:

Table 8.6 Results of XRF analysis showing the concentration of major and trace elements in every basalt samples from San Andrés

Sample	Al2O3 (%)	SiO2 (%)	MnO (PPM	TiO2 (%)	CaO (%)	K2O (%)	Na2O (%)	P2O5 (%)	Cu (PPM)	Co (PPM)	Ni (PPM)	Cr (PPM)	Ce (PPM)	La (PPM)	Ba (PPM)	Nb (PPM)	Zr (PPM)	Y (PPM)	Sr (PPM)	Rb (PPM)	Zn (PPM)
SA 1a	14.86	41.86	1709	1.04	7.77	2.6	2.68	1.71	87	48	84	167	51	23	730	15	215	54	748	36	116
SA 1b	15.6	47.12	1499	0.67	7.12	2.14	2.47	0.95	25	20	27	145	53	21	658	15	200	27	726	49	115
SA 3	15.46	49.44	1567	0.6	6.7	2.33	3.73	0.4	20	18	30	56	54	21	716	18	240	30	1299	67	102
SA 5	16.31	50.36	1485	0.86	7.83	4.5	1.97	1.43	45	38	32	98	35	12	816	11	197	31	693	63	94
SA 6	12.35	44.59	1610	0.92	11.94	0.43	1.61	0.73	128	74	151	740	16	31	245	10	100	42	320	13	88
SA 8	16.57	47.64	1751	0.84	7.69	0.95	2.74	0.53	42	40	29	95	35	11	293	10	170	23	583	25	101
SA 9	12.76	70.32	115	0.1	1.06	4.56	3.17	0.14	35	2	30	173	37	10	592	10	120	26	321	79	44
SA 9a	10.39	38.44	1718	1.61	9.65	0.79	2.04	0.86	31	100	491	1134	80	30	415	27	196	18	777	19	115
SA 11	16.5	47.35	1319	1.02	7.94	1.72	2.26	0.77	76	40	73	73	38	11	509	10	175	29	626	47	137
SA 12	17.63	52.47	2010	1.08	10.64	1.33	2.97	0.72	37	55	30	100	39	17	272	11	166	26	608	24	99
SA 13	16.53	50.26	1475	0.55	6.21	2.27	3.63	0.59	23	14	34	34	52	19	795	18	219	29	1186	82	108
SA 13a	14.3	45.87	1280	0.6	5.46	4.91	2.05	1.08	0	5	9	19	77	27	857	20	250	47	718	124	104
SA 14	17.32	54.53	1254	0.79	6.76	2.58	3.02	1.24	34	27	21	67	46	18	696	13	207	54	788	71	110
SA 15	5.07	47.5	340	0.53	0.14	0.39	0.01	0.26	0	0	26	263	22	12	135	11	145	3	0	13	51
SA 16	13.67	39.7	1587	0.89	8.28	3.43	1.75	1.78	21	46	42	76	31	10	767	10	176	25	637	38	99
SA 18	14.29	41.78	1501	0.81	7.43	3.37	1.83	1.64	34	42	29	44	36	11	727	11	190	32	664	79	96
SA 19	14.57	40.71	1723	0.87	8.82	0.54	2.66	0.45	54	57	37	101	28	2	185	10	124	23	414	15	111
SA 20	16.47	49.43	1801	0.75	7.23	3.7	3.09	1.65	35	35	24	40	46	15	777	16	190	31	722	72	96
SA 21	16.14	46.14	1690	0.6	7.16	3.72	3.21	1.27	29	18	56	56	40	12	969	15	206	25	1237	57	97
SA 23	12.41	53.21	509	0.7	9.8	2.97	3	0.42	22	34	449	882	41	12	412	12	256	35	1255	98	82
SA 24	13.19	64.14	555	0.35	1.81	4.36	3.49	0.45	38	6	28	85	58	20	854	12	233	50	335	155	90
SA 25	12.61	41.61	1612	0.96	10.53	1.03	2.03	0.51	44	69	72	352	25	4	225	10	111	16	480	20	86
SA 27a	18.61	55.06	704	0.81	1.44	2.98	1.36	1.66	119	34	347	332	79	24	997	16	184	48	281	114	218
SA 27b	15.81	45.21	1777	0.82	9.41	0.97	2.63	0.34	115	49	25	109	29	7	192	10	135	18	525	21	92
SA 28	16.54	54.31	1669	0.63	6.65	2.82	3.68	0.36	10	14	11	73	66	22	766	19	250	34	1327	72	97
SA 29	10.91	72.65	142	0.2	0.32	6.01	1.61	0.09	32	2	17	183	82	25	864	16	248	98	100	329	56
SA 30	3.95	84.05	56	0.07	0.15	0.22	1.34	0.14	35	1	26	256	7	0	36	10	75	4	48	8	37
SA 31	16.43	49.82	1623	0.65	7.07	3.57	2.55	0.69	21	16	16	47	51	20	806	16	230	31	1200	80	101
SA 32	17.01	52.7	1647	0.71	7.12	2.42	3.75	0.42	63	19	22	121	61	23	744	18	232	26	1299	52	103
SA 32	14.77	48.18	1575	0.57	6.29	2.75	3.6	0.35	17	13	11	62	53	18	755	19	239	33	1232	84	97
SA 33	12.37	69.35	320	0.43	0.86	3.18	4.75	0.2	40	4	20	291	28	7	898	10	217	24	206	31	50
SA 34	14.52	48.14	1594	1.4	7.18	1.45	2.9	0.42	159	41	69	96	58	20	408	14	215	29	505	34	115
SA 35	17.03	56.85	1298	0.52	5.85	2.42	3.56	0.76	16	8	12	53	55	19	861	14	236	29	1159	80	104
SA 36	15.63	48.99	1678	0.57	7.08	2.44	3.39	0.36	35	18	39	39	49	20	770	18	234	31	1035	77	104
SA 37	14.16	42.46	1462	0.92	10.36	0.79	2.61	0.5	81	51	58	283	31	20	186	10	172	29	886	15	107
SA 39	17	52.03	1561	0.65	6.65	4.19	2.73	0.55	24	12	55	65	54	16	754	17	239	33	1271	80	101
SA 40	12.58	69.99	211	0.18	0.75	1.9	3.24	0.61	41	4	155	25	57	18	460	24	243	66	198	182	82
SA 42	16.63	50.83	1355	0.94	6.3	3.06	2.35	0.56	7	17	45	31	80	32	733	22	242	43	678	92	131
SA 43	16.62	53.46	990	0.67	5.21	2.72	3.4	0.52	53	20	44	88	55	26	856	17	235	29	1227	86	124
SA 44	16.33	50.82	1276	0.51	6.22	3.54	3.1	0.68	21	8	15	45	51	16	842	14	241	26	1183	66	107
SA 45	17.23	56.27	1327	0.54	6.47	3.38	3.17	0.76	27	12	18	96	44	16	898	14	246	29	1309	72	109
SA 46	16.66	53.18	1626	0.81	6.1	2.71	2.48	0.97	34	10	32	54	72	28	857	19	260	34	931	68	132
SA 49	14.85	45.7	1112	0.9	6.67	5.39	1.64	1.86	31	37	42	76	36	12	899	10	185	34	641	68	80

The results of the San Lorenzo-Tenochtitlán basalt samples were the following:

Table 8.7 Results of XRF analysis showing the concentration of major and trace elements in every basalt sample from San Lorenzo Tenochtitlán.

Sample	Al2O3 (%)	SiO2 (%)	MnO (PPM)	TiO2 (%)	CaO (%)	K2O (%)	Na2O (%)	P2O5 (%)	Cu (PPM)	Co (PPM)	Ni (PPM)	Cr (PPM)	Ce (PPM)	La (PPM)	Ba (PPM)	Nb (PPM)	Zr (PPM)	Y (PPM)	Sr (PPM)	Rb (PPM)	Zn (PPM)
SL-1	15.98	45.75	1516	1.36	8.33	1.94	3.23	0.51	91	32	98	270	74	32	418	15	217	40	533	43	96
SL-3	16.63	46.74	1427	1.45	7.06	2.01	3.12	0.58	65	26	105	220	126	45	483	17	220	55	480	48	99
SL-4	15.92	46.98	1933	1.42	7.59	2.03	3.25	0.48	82	37	107	234	86	29	498	16	220	39	491	48	99
SL-6	14.63	50.3	1539	0.9	8.21	1.52	2.85	0.4	28	33	58	190	47	12	367	9	168	24	567	33	87
SL-7	16.34	46.62	1730	1.41	7.66	1.97	3.26	0.54	95	36	108	252	98	43	478	16	217	49	516	46	101
SL-8	15.67	45.3	1313	1.31	7.78	1.82	3.22	0.44	58	28	93	235	70	30	382	15	213	35	543	45	93
SL-11	16.26	47.66	1701	1.44	7.45	2.11	3.44	0.47	83	33	88	211	82	38	475	17	232	51	517	51	100
SL-12	15.1	47.64	1744	1.86	6.15	2.61	3.24	0.54	59	40	100	203	93	36	622	20	266	45	364	61	102
SL-13	16.24	46.29	1701	1.37	7.85	1.94	3.3	0.4	88	36	103	239	69	25	493	16	212	39	519	48	93
SL-14	15.82	47.84	1600	1.61	7.58	2.19	3.37	0.46	177	33	95	250	80	31	504	18	237	50	491	48	98
SL-15	16.67	47.96	1604	1.37	8.06	1.85	3.29	0.39	113	31	95	251	76	30	477	15	211	34	546	44	88
SL-16	16.01	47.97	1547	1.44	7.93	1.99	3.31	0.65	85	32	89	225	90	42	504	16	220	51	516	45	96
SL-20	16.56	46.92	1773	1.37	7.39	1.9	3.27	0.42	88	33	101	223	80	30	501	15	212	38	525	46	91
SL-21	15.91	47.4	1405	1.44	7.59	2.01	3.3	0.53	76	29	100	238	87	34	444	16	218	41	502	47	95
SL-22	15.78	46.7	2227	1.35	7.82	1.92	3.29	0.43	43	38	101	227	70	27	539	16	213	41	520	45	96
SL-23	14.82	47.11	1642	1.24	8.76	1.71	3.38	0.48	25	33	113	300	63	26	382	11	172	34	586	29	104
SL-24	15.42	47.01	1560	1.39	8.14	1.75	3.09	0.4	65	34	162	385	61	26	422	15	196	32	485	45	95
SL-26	16.32	46.98	1130	1.41	7.88	2	3.38	0.55	33	23	88	216	75	27	452	16	226	38	535	49	113
SL-27	13.58	43.48	1544	1.21	8.79	1.55	2.84	0.73	37	46	198	425	44	22	417	12	169	28	463	30	100
SL-28	14.21	50.53	1564	0.94	7.8	3.14	2.15	0.61	20	32	28	119	51	15	663	10	172	35	585	53	90
SL-29	15.42	50.97	1385	0.83	7.48	2.72	2.22	0.47	20	29	28	89	50	20	486	9	166	37	517	60	82
SL-30	14.87	50.63	1472	0.88	7.64	2.74	2.14	0.49	26	30	30	112	51	18	498	10	167	37	491	55	85
SL-31	15.25	49.57	1516	0.92	7.36	2.37	2.11	0.77	19	34	29	88	50	17	537	9	161	36	542	56	87
SL-32	15.28	48.69	1456	0.9	8.94	1.53	2.8	0.6	49	31	45	172	42	13	333	9	163	21	610	20	83
SL-33	16.12	50.02	1537	0.87	7.57	2.23	2.42	0.42	34	27	26	92	44	13	542	10	165	36	611	55	98
SL-34	16.36	45.85	1162	1.42	7.61	1.97	3.29	0.49	53	25	69	231	66	30	469	16	226	42	551	49	101
SL-35	15.51	51.85	1745	0.87	8.18	2.16	2.45	0.3	14	24	0	71	49	17	435	9	168	37	572	57	89
SL-36	18.76	62.61	1810	1.04	10.44	1.84	3.76	0.53	53	34	48	172	51	9	444	9	193	25	711	29	94
SL-37	15.75	46.6	2189	1.45	7.71	2	3.27	0.56	83	41	103	224	149	56	494	17	218	62	491	49	109
SL-38	16.41	50.16	1628	0.85	8.41	1.35	3.49	0.35	26	26	12	108	42	13	334	9	170	24	627	23	88
SL-39	14.77	50.31	1527	0.9	7.89	1.57	2.85	0.19	97	35	48	144	40	19	397	9	172	23	556	33	87
SL-40	15.85	47.66	1769	1.48	8	1.99	3.2	0.47	71	38	111	248	80	29	470	16	222	44	488	44	102
SL-41	15.8	48.78	1799	0.95	8.35	2	2.12	0.47	43	40	35	82	40	14	557	9	140	29	503	45	100
SL-42	16.1	47.05	1382	1.35	8.07	1.98	3.26	0.65	54	33	103	336	133	55	445	17	213	67	537	37	90
SL-43	16.34	52.04	1570	0.88	6.79	2.42	2.25	0.62	5	21	12	71	46	19	548	10	176	40	600	65	96
SL-44	15.45	54.64	1389	0.9	5.15	2.64	2.39	0.33	39	32	24	78	290	113	652	20	187	223	486	67	115
SL-45	15.56	52.12	1661	1	7.27	2.49	2.16	0.75	42	29	17	94	47	15	562	10	186	39	614	56	89
SL-46	15.99	52.95	1248	0.9	6.22	2.43	2.52	0.37	15	27	19	76	60	15	631	11	189	41	575	67	135
SL-47	16.05	46.67	1315	1.4	7.76	1.93	3.24	0.5	77	28	100	283	63	24	459	15	214	35	519	47	93
SL-48	11.66	42.86	1548	0.97	10.51	0.68	1.86	0.29	37	66	406	1002	38	17	202	9	134	14	657	11	77

The geochemical information from the outcrops was the following:

Table 8.8 Published results of XRF analysis of basalt outcrops in TVF (Nelson, Gonzalez-Caver, and Kyser (1995)

Sample	Al2O3 (%)	SiO2 (%)	MnO (PPM	TiO2 (%)	CaO (%)	K2O (%)	Na2O (%)	P2O5 (%)	Cu (PPM)	Co (PPM)	Ni (PPM)	Cr (PPM)	Ce (PPM)	La (PPM)	Ba (PPM)	Nb (PPM)	Zr (PPM)	Y (PPM)	Sr (PPM)	Rb (PPM)	Zn (PPM)
TE42	15.4	45	0.18	1.45	11.25	1.02	3.5	1.02	52	53	205	668	78	45.6	385	20	175	24	765	20	75
TE77	15.7	50.6	0.16	1.44	8.75	1.51	3.8	1.51	60	47	204	503	65	36	414	20	177	17	686	28	78
TE112	12.1	41.7	0.2	2.93	10.6	1.76	3.5	1.76	42	67	144	528	105	59	356	40	242	24	903	20	83
TE117	14.1	44.2	0.18	1.68	10.61	1.05	2.9	1.05	31	60	196	909	75	38.6	346	23	159	19	722	16	56
TE157	16.7	49.1	0.18	1.31	11.51	0.94	3.2	0.94	32	41	38	278	56	31.9	238	19	146	20	694	16	50
TE84	15.7	41.3	0.2	2.17	10.52	1.52	4.1	1.52	100	44	207	254	159	86	673	52	382	29	1882	18	119
TE316	15.7	49.3	0.17	1.27	9.96	1.41	3.2	1.41	90	45	177	507	52	24.6	312	16	147	46	518	30	67
TP27	13.6	44.8	0.18	1.3	10.71	0.82	2.4	0.31	84	69	381	1249	46	24.9	233	14	119	18	564	16	75
TP60	15.1	46.8	0.17	1.32	10.68	0.93	2.9	0.34	80	60	282	878	48	24.2	251	18	127	18	555	17	74
TP62	14	46.3	0.18	1.2	10.37	0.78	2.8	0.42	79	63	374	1200	55	32.5	241	17	132	18	606	15	73
TP82	14.7	45.5	0.19	1.44	10.93	0.64	2.4	0.41	60	57	286	849	47	23	244	16	129	21	619	14	75
TP110	15.7	47.2	0.17	1.4	10.05	1.09	2.9	0.46	86	71	304	742	89	44.9	323	14	160	19	644	14	65
TP133	13.8	47.1	0.18	1.24	10.87	1	2.4	0.35	79	52	277	733	50	25.2	333	13	129	18	595	15	64
TP144	12.8	44	0.18	1.59	9.96	0.88	2.4	0.39	82	64	439	1114	60	30	281	22	154	18	773	18	85
TP158	14.6	42.5	0.19	2.05	10.97	1.32	4.1	0.92	85	59	266	629	118	67.3	383	37	238	25	1038	15	93
TP233C	13.9	43.8	0.19	1.63	10.95	1	3.1	0.63	78	59	297	716	84	47.4	362	22	180	22	812	14	79
TP301	12.2	40.8	0.21	1.91	10.83	0.45	2.5	0.72	75	66	377	606	97	57.9	390	30	169	23	784	14	94
TP304	12.5	40.6	0.19	2.55	10.64	1.42	2.6	0.66	76	60	263	497	99	58.6	438	33	195	21	851	23	98
TC134	18.6	58.9	0.15	0.8	5.88	2.49	4.6	0.31	75	18	12	30	58	30.5	494	15	216	26	529	56	64
TC331	18.8	52.4	0.18	0.84	9.56	1.07	3.2	0.22	98	34	28	37	26	13.1	163	11	100	23	465	17	60
TC338	18	54.1	0.23	0.84	7.65	3.03	3.1	0.32	93	33	26	29	41	20.9	500	11	142	24	543	93	62
TH121B	17.3	52.7	0.17	1.3	6.96	2.02	4.1	0.45	145	28	23	17	63	33.3	434	8	185	30	549	40	83
TH344	17.8	54.6	0.21	1.43	4.89	2.99	5.3	0.78	52	18	14	15	99	50.4	622	17	296	58	417	63	109
TH345	17.4	52.1	0.17	1.31	8.15	1.81	4.1	0.43	137	29	28	23	63	34.4	394	12	172	32	580	34	94
TH44	16.4	50.5	0.15	1.03	12.23	1.76	2.5	0.4	127	44	61	226	67	34.2	529	12	126	22	876	19	59

The identification of source outcrops proceeded using the method of K-means cluster analysis. Because four major basalt groups had been identified in the TVF and the sample included artifacts from San Andres, Tabasco that may not have come from the Tuxtlas, I ran the analysis for 5, 6, and 7. However, since there was at least a possibility that not all four of the groups identified in the TVF were utilized for artifact manufacture I also ran the analysis for 3 and 4. At the end, I compared and saw that seven clusters option provided more information concerning variation in uses for artifacts. I used as a measure absolute Euclid distances, and standardized variables. I used the software SPSS 19.0.

These are the results for three, four, five, six, and seven clusters:

Table 8.9 Results obtained from the cluster analysis for 3, 4, 5, 6, and 7 clusters of the basalt samples of archaeological sites and outcrops located in TVF

Case Number	3 Clusters	4 Clusters	5 Clusters	6 Clusters	7 Clusters	Context	Period	Artifact
1 TZ1	1	4	5	1	2	1 domestic	1 MF	1 preform
2 TZ2	1	4	5	4	1	2 domestic	2 MF	2 preform
3 TZ3	1	4	3	4	6	3 domestic	3 MF	3 preform
4 TZ4	1	4	3	4	6	4 domestic	4 EF	4 metate
5 TZ5	1	4	5	1	2	5 domestic	5 LF	5 pebble
6 TZ6	1	4	5	1	2	6 domestic	6 LF	6 metlapil
7 TZ7	1	4	5	1	1	7 domestic	7 LF	7 pebble
8 TZ8	1	4	5	4	1	8 domestic	8 LF	8 pebble
9 TZ9	1	4	5	1	2	9 domestic	9 LF	9 pebble
10 TZ10	1	4	5	1	2	10 domestic	10 MF	10 pebble
11 TZ11	1	4	5	4	1	11 domestic	11 MF	11 pebble
12 TZ12	1	4	3	4	6	12 domestic	12 MF	12 flake
13 TZ14	1	4	3	4	1	13 domestic	13 MF	13 polisher
14 TZ15	1	4	5	1	2	14 domestic	14 MF	14 flake
15 TZ16	1	4	5	4	2	15 domestic	15 MF	15 pebble
16 TZ17	1	4	5	1	2	16 domestic	16 MF	16 pebble
17 TZ18	1	4	5	4	1	17 domestic	17 MF	17 flake
18 TZ20	1	4	5	4	1	18 domestic	18 MF	18 flake
19 TZ21	1	4	5	1	1	19 domestic	19 MF	19 metate
20 TZ22	1	4	5	1	2	20 domestic	20 MF	20 flake
21 TZ23	1	4	5	4	1	21 domestic	21 MF	21 flake
22 TZ24	1	4	5	1	2	22 domestic	22 MF	22 flake
23 TZ25	1	4	3	4	6	23 domestic	23 MF	23 flake
24 TZ26	1	4	5	1	2	24 domestic	24 MF	24 stone hammer
25 TZ28	1	4	5	1	2	25 elite-res	25 LF	25 pebble
26 TZ29	1	4	5	4	1	26 elite-res	26 LF	26 pebble
27 TZ30	1	4	5	1	1	27 elite-res	27 LF	27 pebble
28 TZ31	1	4	5	4	1	28 elite-res	28 LF	28 flake
29 TZ32	1	4	5	4	1	29 elite-res	29 LF	29 flake
30 TZ 33	1	4	5	1	2	30 elite-res	30 LF	30 flake
31 TZ34	1	4	5	1	2	31 plow zone	31 Mix	31 flake
32 TZ35	1	4	5	4	1	32 polw zone	32 Mix	32 flake
33 TZ36	1	4	5	1	2	33 domestic	33 LF	33 metate
34 TZ37	1	4	5	1	1	34 domestic	34 LF	34 pebble
35 TZ38	1	4	5	1	2	35 domestic	35 LF	35 pebble
36 TZ39	1	4	5	4	1	36 domestic	36 LF	36 flake
37 TZ40	1	4	3	4	6	37 domestic	37 LF	37 flake
38 TZ41	1	4	5	1	2	38 domestic	38 PC	38 flake
39 TZ42	1	4	5	1	2	39 domestic	39 PC	39 nodule
40 TZ43	1	4	5	4	1	40 domestic	40 PC	40 pebble
41 TZ44	1	4	5	1	2	41 domestic	41 PC	41 pebble

42 TZ46	1	4	5	1	2	42 domestic	42 PC	42 pebble
43 TZ47	1	4	5	1	2	43 domestic	43 PC	43 flake
44 TZ48	1	4	5	4	1	44 domestic	44 PC	44 flake
45 TZ49	1	4	5	4	6	45 domestic	45 PC	45 polisher
46 TZ50	1	4	5	4	1	46 domestic	46 PC	46 pebble
47 TZ51	1	4	5	1	2	47 domestic	47 PC	47 pebble
48 TZ52	1	4	5	4	1	48 domestic	48 PC	48 pebble
49 TZ53	1	4	3	4	6	49 domestic	49 PC	49 pebble
50 TZ55a	1	4	5	1	2	50 domestic	50 MF	50 flake
51 TZ55b	1	4	5	4	1	51 domestic	51 MF	51 flake
52 TZ56	1	4	5	4	1	52 elite-res	52 LF	52 flake
53 TZ58	1	4	5	4	1	53 elite-res	53 LF	53 metate
54 TZ59	1	4	5	1	2	54 elite-res	54 LF	54 flake
55 TZ60	1	4	3	4	6	55 elite-res	55 LF	55 flake
56 TZ61a	1	4	5	1	2	56 elite-res	56 LF	56 flake
57 TZ61b	1	4	5	4	1	57 elite-res	57 LF	57 pebble
58 TZ61c	1	4	5	4	1	58 elite-res	58 LF	58 flake
59 TZ62	1	4	5	1	2	59 elite-res	59 LF	59 pebble
60 TZ64	1	4	5	1	2	60 domestic	60 MF	60 flake
61 TZ65a	1	4	5	4	1	61 elite-res	61 LF	61 pebble
62 TZ65b	1	4	5	4	1	62 elite-res	62 LF	62 mano
63 TZ65c	1	4	5	4	1	63 elite-res	63 LF	63 flake
64 TZ68	1	4	5	1	2	64 elite-res	64 LF	64 flake
65 TZ69	1	4	5	1	2	65 domestic	65 LF	65 flake
66 TZ70	1	4	5	1	2	66 elite-res	66 MF	66 metate
67 TZ71a	1	4	5	4	1	67 burial-ritual	67 MF	67 pebble
68 TZ71b	1	4	5	1	2	68 burial-ritual	68 MF	68 pebble
69 TZ71c	1	4	5	1	2	69 burial-ritual	69 MF	69 pebble
70 TZ72	1	4	5	1	2	70 elite-res	70 LF	70 metate
71 TZ73	1	4	5	1	2	71 elite-res	71 MF	71 metlapil
72 TZ73a	1	4	5	4	1	72 elite-res	72 LF	72 pebble
73 TZ73b	1	4	5	1	2	73 elite-res	73 LF	73 pebble
74 TZ73c	1	4	5	1	2	74 elite-res	74 LF	74 pebble
75 TZ74	1	4	3	4	6	75 elite-res	75 MF	75 pebble
76 TZ75	1	4	5	4	1	76 domestic	76 MF	76 mano
77 TZ76	1	4	5	1	2	77 elite-res	77 MF	77 metate
78 TZ77	1	4	5	1	2	78 elite-res	78 MF	78 metate
79 TZ78a	1	4	5	4	1	79 elite-res	79 MF	79 flake
80 TZ78b	1	4	5	1	2	80 elite-res	80 MF	80 core
81 TZ79	1	4	5	1	2	81 elite-res	81 MF	81flake
82 TZ80a	1	4	5	1	2	82 burial-ritual	82 EF	82 flake
83 TZ80b	1	4	5	1	2	83 burial-ritual	83 EF	83 flake
84 TZ80c	1	4	5	1	2	84 burial-ritual	84 EF	84 pebble
85 TZ81	1	4	5	1	2	85 burial-ritual	85 EF	85 flake
86 TZ61a	1	4	5	1	2	86 elite-res	86 LF	86 flake
87 TZ61b	1	4	5	4	1	87 elite-res	87 LF	87 flake
88 TZ61c	1	4	5	4	1	88 elite-res	88 LF	88 pebble

89 TZ63a	1	4	5	1	2	89 elite-res	89 PC	89 flake
90 TZ63b	1	4	3	4	1	90 elite-res	90 PC	90 flake
91 TZ63c	1	4	5	1	2	91 elite-res	91 PC	91 pebble
92 TZ63d	1	4	5	4	1	92 elite-res	92 PC	92 pebble
93 TZ63e	1	4	5	4	1	93 elite-res	93 PC	93 pebble
94 TZ45a	1	4	5	4	1	94 plow zone	94 PC	94 core
95 TZ45b	1	4	5	4	1	95 plow zone	95 PC	95 pebble
96 TZ45c	1	4	5	4	1	96 plow zone	96 PC	96 pebble
97 TZ45d	1	4	5	4	1	97 plow zone	97 PC	97 pebble
98 TZ46	1	4	5	1	2	98 domestic	98 PC	98 pebble
99 TZ46a	1	4	5	4	1	99 domestic	99 PC	99 pebble
100 TZ46b	1	4	5	4	1	100 domestic	100 PC	100 pebble
101 TZ46c	1	4	5	4	1	101 domestic	101 PC	101 pebble
102 TZ46d	1	4	5	4	1	102 domestic	102 PC	102 flake
103 TZ46e	1	4	5	1	2	103 domestic	103 PC	103 polisher
104 TZ65c	1	4	5	4	1	104 elite-res	104 LF	104 mano
105 SA1a	1	4	3	3	6	105	105 MF	105 manuport
106 SA1b	1	4	3	3	6	106	106 MF	106 manuport
107 SA3	1	4	3	3	6	107	107 MF	107 manuport
108 SA5	1	4	3	3	6	108	108 MF	108 metate
109 SA6	1	4	5	1	2	109	109 MF	109 metate
110 SA8	1	4	5	4	1	110	110 MF	110 mano
111 SA9	2	3	1	2	4	111	111 MF	111 manuport
112 SA9a	1	4	5	1	2	112	112 MF	112 manuport
113 SA11	1	4	3	3	6	113	113 MF	113 manuport
114 SA12	1	4	3	4	6	114	114 MF	114 manuport
115 SA13	1	4	3	3	6	115	115 MF	115 mano
116 SA13a	1	4	3	3	6	116	116 MF	116 mano
117 SA14	1	4	3	3	6	117	117 MF	117 manuport
118 SA15	3	2	2	5	7	118	118 MF	118 manuport
119 SA16	1	4	3	3	6	119	119 MF	119 mano
120 SA18	1	4	3	3	6	120	120 MF	120 manuport
121 SA19	1	4	5	4	1	121	121 MF	121 mano
122 SA20	1	4	3	3	6	122	122 MF	122 manuport
123 SA21	1	4	3	3	6	123	123 MF	123 manuport
124 SA23	1	4	3	3	6	124	124 MF	124 metate
125 SA24	2	3	1	2	3	125	125 MF	125 metate
126 SA25	1	4	5	4	1	126	126 MF	126 metate
127 SA27a	1	4	3	3	3	127	127 MF	127 metate
128 SA27b	1	4	5	4	1	128	128 MF	128 metate
129 SA28	1	4	3	3	6	129	129 MF	129 manuport
130 SA29	2	3	1	2	4	130	130 MF	130 hammerstone
131 SA30	2	1	4	6	5	131	131 MF	131 hammerstone
132 SA31	1	4	3	3	6	132	132 MF	132 mano
133 SA32a	1	4	3	3	6	133	133 MF	133 manuport
134 SA32b	1	4	3	3	6	134	134 MF	134 manuport
135 SA33	2	3	1	2	3	135	135 MF	135 polishing stone

136 SA34	1	4	3	4	6	136	136 MF	136 manuport
137 SA35	1	4	3	3	6	137	137 MF	137 manuport
138 SA36	1	4	3	4	6	138	138 Pos	138 mano
139 SA37	1	4	5	4	1	139	139 MF	139 mano
140 SA39	1	4	3	3	6	140	140 MF	140 manuport
141 SA40	2	3	1	2	3	141	141 MF	141 manuport
142 SA42	1	4	3	3	6	142	142 MF	142 mano
143 SA43	1	4	3	3	6	143	143 MF	143 manuport
144 SA44	1	4	3	3	6	144	144 MF	144 metate
145 SA45	1	4	3	3	6	145	145 MF	145 manuport
146 SA46	1	4	3	3	6	146	146 MF	146 mano
147 SA49	1	4	3	3	6	147	147 MF	147 manuport
148 SL1	1	4	3	4	6	148	148 EF	148 Mon.8
149 SL3	1	4	3	3	6	149	149 EF	149 Mon.17
150 SL.4	1	4	3	4	6	150	150 EF	150 Mon.18
151 SL6	1	4	3	4	6	151	151 EF	151 Mon.20
152 SL7	1	4	3	4	6	152	152 EF	152 Mon.22
153 SL8	1	4	3	4	6	153	153 EF	153 Mon.23
154 SL11	1	4	3	4	6	154	154 EF	154 Mon.31
155 SL12	1	4	3	3	6	155	155 EF	155 Mon.37
156 SL13	1	4	3	4	6	156	156 EF	156 Mon.38
157 SL14	1	4	3	4	6	157	157 EF	157 Mon.40
158 SL15	1	4	3	4	6	158	158 EF	158 Mon.41
159 SL16	1	4	3	3	6	159	159 EF	159 Mon.42
160 SL20	1	4	3	4	6	160	160 EF	160 Mon.51
161 SL21	1	4	3	4	6	161	161 EF	161 Drainstone
162 SL22	1	4	3	4	6	162	162 EF	162 Drainstone
163 SL23	1	4	3	4	6	163	163 EF	163 Drainstone cover
164 SL24	1	4	3	4	6	164	164 EF	164 Mon.49
165 SL26	1	4	3	4	6	165	165 EF	165 metate (Chicharras)
166 SL27	1	4	3	4	6	166	166 EF	166 metate
167 SL28	1	4	3	3	6	167	167 EF	167 metate
168 SL29	1	4	3	3	6	168	168 EF	168 metate
169 SL30	1	4	3	3	6	169	169 EF	169 metate
170 SL31	1	4	3	3	6	170	170 MF	170 metate
171 SL32	1	4	3	4	6	171	171 MF	171 metate
172 SL33	1	4	3	4	6	172	172 MF	172 metate
173 SL34	1	4	3	4	6	173	173 EF	173 metate
174 SL35	1	4	3	4	6	174	174 EF	174 metate
175 SL36	1	4	3	4	6	175	175 EF	175 metate
176 SL37	1	4	3	4	6	176	176 EF	176 metate
177 SL38	1	4	3	4	1	177	177 EF	177 metate
178 SL39	1	4	5	4	1	178	178 EF	178 metate
179 SL40	1	4	3	4	6	179	179 EF	179 metate
180 SL41	1	4	3	4	6	180	180 MF	180 metate
181 SL42	1	4	3	3	6	181	181 MF	181 metate
182 SL43	1	4	3	3	6	182	182 MF	182 metate

183 SL44	1	4	3	4	6	183	183 MF	183 metate
184 SL45	1	4	3	3	6	184	184 EF	184 metate
185 SL46	1	4	3	4	6	185	185 MF	185 metate
186 SL47	1	4	3	4	6	186	186 EF	186 Mon.56
187 SL48	1	4	5	4	1	187	187 MF	187 Cabeza de Cobata
188 TE42	1	4	5	1	2	188	188	188
189 TE77	1	4	3	3	2	189	189	189
190 TE112	1	4	3	1	2	190	190	190
191 TE117	1	4	5	1	2	191	191	191
192 TE157	1	4	5	1	2	192	192	192
193 TE84	1	4	3	1	2	193	193	193
194 TE316	1	4	3	3	2	194	194	194
195 TP27	1	4	5	4	1	195	195	195
196 TP60	1	4	5	4	1	196	196	196
197 TP62	1	4	5	4	1	197	197	197
198 TP82	1	4	5	1	1	198	198	198
199 TP110	1	4	5	4	1	199	199	199
200 TP133	1	4	5	4	1	200	200	200
201 TP144	1	4	5	1	1	201	201	201
202 TP158	1	4	3	1	2	202	202	202
203 TP233c	1	4	5	1	2	203	203	203
204 TP301	1	4	5	1	2	204	204	204
205 TP304	1	4	5	1	2	205	205	205
206 TC134	1	4	3	4	6	206	206	206
207 TC331	1	4	5	4	1	207	207	207
208 TC338	1	4	3	4	6	208	208	208
209 TH1218	1	4	3	4	6	209	209	209
210 TH344	1	4	3	3	6	210	210	210
211 TH345	1	4	3	4	6	211	211	211
212 TH44	1	4	3	4	6	212	212	212

Basalt Clusters resulted from cluster analysis located in TVF to the samples reported by Stephen Nelson (Nelson, Gonzalez-Caver, and Kyser 1995: 194-195)

Basalt Cluster 1

TP27, TP60, TP62, TP82, TP110, TP133, TP144, TC331

Basalt Cluster 2

TE42, TE77, TE112, TE117, TE157, TE84, TE316, TP158, TP233c, TP301, TP304

Basalt Cluster 6

TC134, TC338, TH1218, TH344, TH345, TH44

Cluster 1 corresponds mainly to Nelson's Primitive group (and some Evolved specimens), Nelson's Evolved falls in Cluster 2; Nelson's Calc-alkaline are mostly Cluster 6 (and one Cluster 1); and Nelson's H-Normative Alkaline are all Cluster 6. More broadly, Clusters 2 and 6 belong to the Older Volcanic Series, and Cluster 1 belongs to the Newer Volcanic Series.

The location of the samples mentioned above is represented in the three following maps:

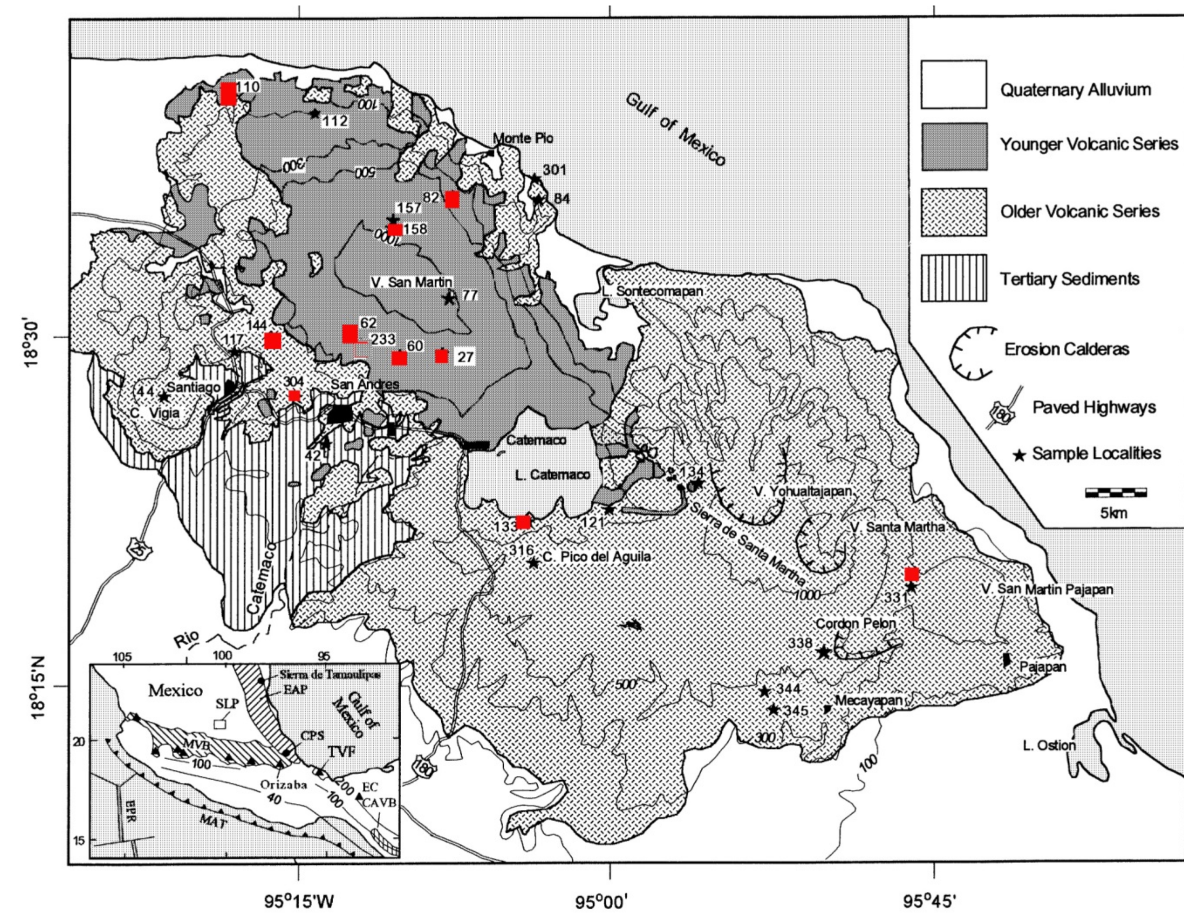


Figure 8.10 Map showing the location of geological samples which are in Basalt Cluster 1 in the cluster analysis for seven clusters (location based on the map elaborated by Nelson, Gonzalez-Carver and Kyser (1995:192, Figure 1)).

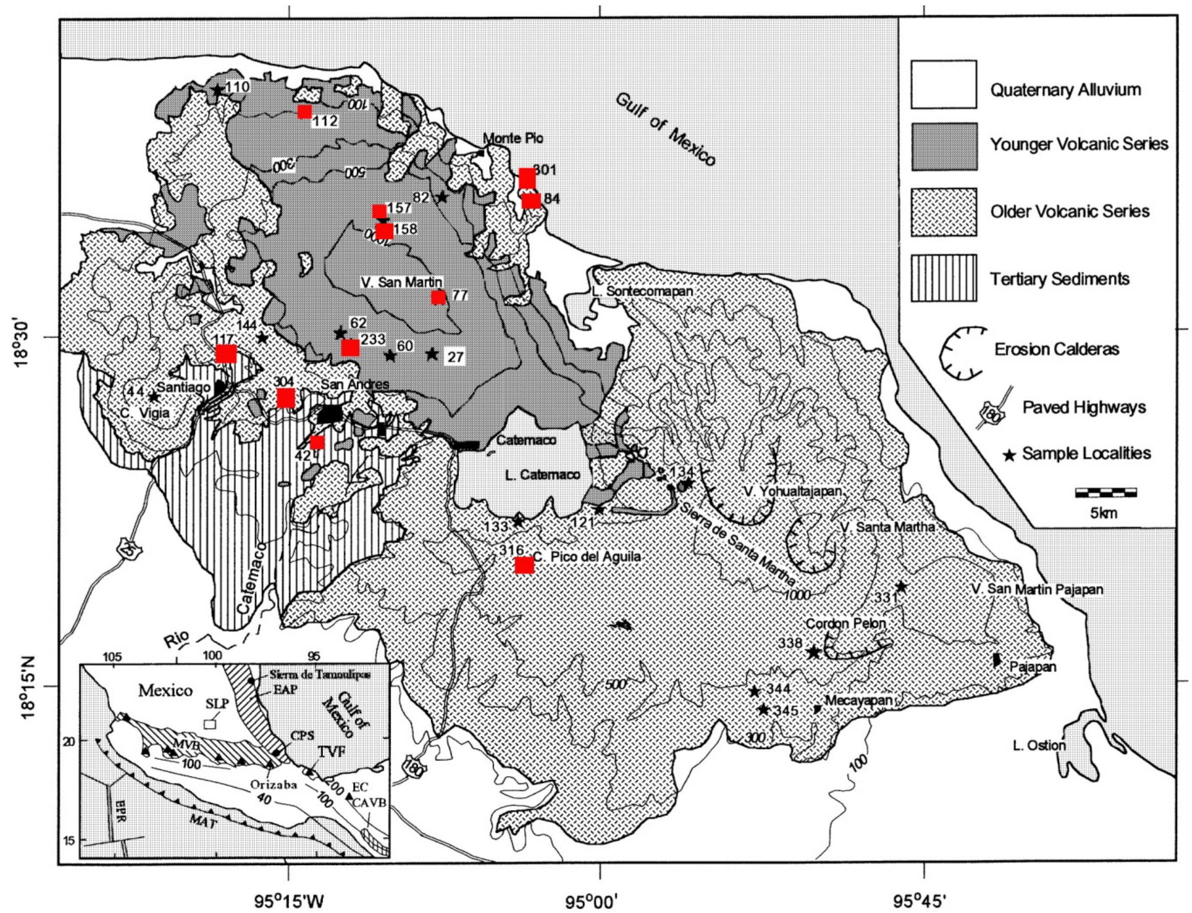


Figure 8.11 Map showing the location of geological samples which are in the Basalt Cluster 2 in the cluster analysis for seven clusters (location based on the map elaborated by Nelson, Gonzalez-Carver and Kyser (1995:192, Figure 1)).

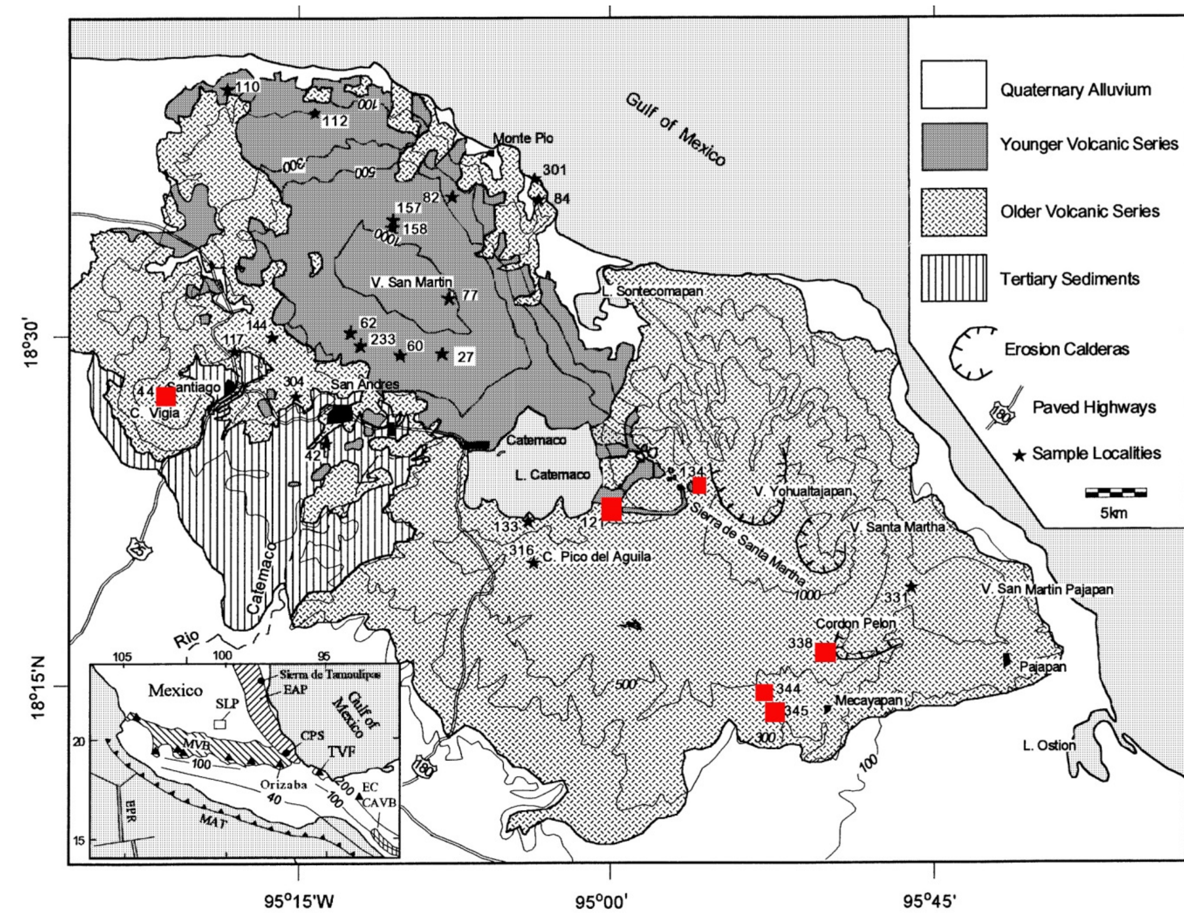


Figure 8.12 Map showing the location of geological samples which are in Basalt cluster 6 in the cluster analysis for seven clusters (location based on the map elaborated by Nelson, Gonzalez-Carver and Kyser (1995:192, Figure 1)).

As I decided to explore the results of the seven clusters, I organized the results of these seven clusters, showing the occurrence of basalt groups in Tres Zapotes in every Period, differences in social context (burial-ritual, domestic or elite-residential-administrative) and the basalt groups related to types of artifacts. Also, I show the occurrence of basalt groups in the sites of San Andrés-Tabasco and San Lorenzo-Tenochtitlán.

Analysis of geochemical information of a sample of basalt artifacts of Tres Zapotes and neighboring Olmec sites

In this section, I will provide an interpretation of the geochemical results obtained from the X-ray fluorescence study. Those results were shown above. First, I present an evaluation and discussion about patterns of resource utilization at Tres Zapotes – for the use over time, the use in different contexts (comparison between elite vs nonelite, burial-ritual vs domestic or production vs non-production areas), and in the manufacture of different artifact types. Next I compare the results obtained for Tres Zapotes with those for groundtsone artifacts from San Andrés, Tabasco and San Lorenzo-Tenochtitlán. Finally, some observations are made in regards to monument samples from San Lorenzo-Tenochtitlán and a sample from the Cabeza de Cobata. It is important to mention that I present the following results, with some caution because none of the samples were randomly selected, even though all of them came from archaeological excavations. I hope that this study could contribute to future projects.

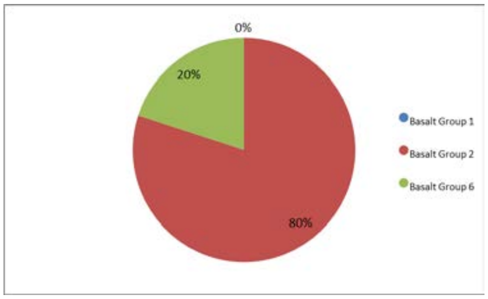
Tres Zapotes

In the following Tables and Figures I show the use of the basalt clusters in every period at Tres Zapotes.

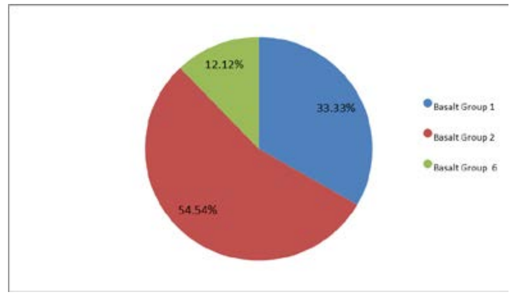
Table 8.10 Frequency of Basalt Clusters at Tres Zapotes over time

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	**Total**
Early Formative		4				1		5
Middle Formative	11	18				4		33
Late Formative	20	15				2		37
Protoclassic	15	10				2		27
Mixed	1	1						2
Total	47	48				9		104

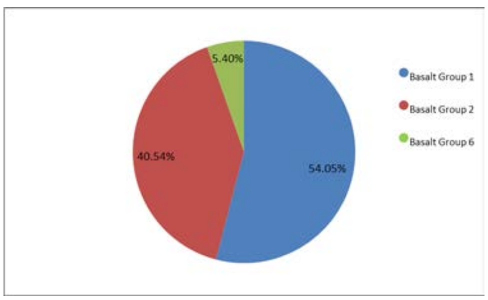
And these are pie charts which show change in the relative frequencies of Basalt Clusters at Tres Zapotes over time (Figure. 8.13 and the Table 8.11 there are frequencies and percentages).



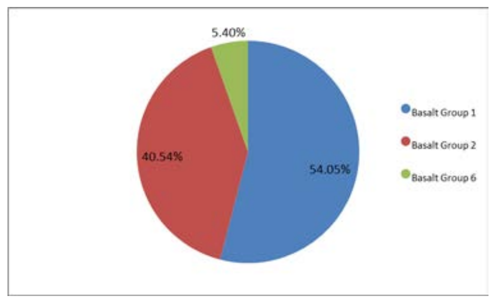
Early Formative Period



Middle Formative Period



Late Formative Period



Proto-Classic Period

Figure 8.13 Change in the relative frequencies of Basalt Clusters at Tres Zapotes over time.

Table 8.11 Frequencies and percentages of Basalt Clusters at Tres Zapotes over time

TRES ZAPOTES		
EARLY FORMATIVE PERIOD		
Basalt Cluste	Frequency	Percentage
1	0	0%
2	4	80%
6	5	20%
	9	100%
Total		
MIDDLE FORMATIVE PERIOD		
Basalt Cluste	Frequency	Percentage
1	11	33.33%
2	18	54.54%
6	4	12.12%
	33	99.99%
Total		
LATE FORMATIVE PERIOD		
Basalt Cluste	Frequency	Percentage
1	20	54.05%
2	15	40.54%
6	2	5.40%
Total	37	99.99%
PROTO-CLASSIC PERIOD		
Basalt cluste	Frequency	Percentage
1	15	54.05%
2	10	40.54%
6	2	5.40%
Total	27	99.99%

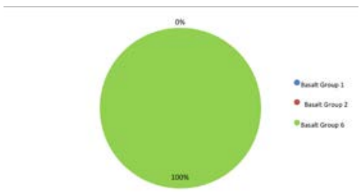
It is noticed in the results that Tres Zapotes exploited the Basalt Clusters 2 and 6 due to the proximity and ease of access (Tables 8.10 and 8.11; Figure 8.13). However, it is also observed that was a gradual decrease in the acquisition of those Clusters and, on the contrary, over time, Basalt Cluster 1 was used more and more. The data support the idea that Tres Zapotes initially exploited nearby sources on and around Cerro El Vigía (the nearest sources of Clusters 2 and 6 to Tres Zapotes), then increasingly obtained basalts from Group 1, the nearest sources of which are farther to the north. This would correspond with the hypothesized expansion of the Tres Zapotes polity in the Late Formative (and possibly the maintenance of politico-economic ties in the Protoclassic).May be is an archaeological correlate of the increase in political-economic organization of a confederacy which could be different from previous forms of organization such as simple and complex chiefdoms.

Tres Zapotes: Contextual and Status differences

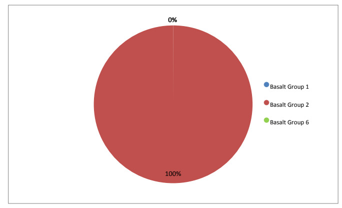
Table 8.12 Frequencies of artifacts in each combination of period, basalt cluster, and context at Tres Zapotes

Period	Context	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	**Total**
Early Formative	Domestic						1		
	Burial Ritual		4						
	Subtotal		4				1		5
Middle Formative	Domestic	9	10				3		
	Elite Residential	1	6				1		
	Burial Ritual	1	2						
	Subtotal	11	18				4		33
Late Formative	Domestic	4	6				1		
	Elite Residential	15	10				1		
	Subtotal	19	16				2		37
Protoclassic	Domestic	8	8				2		
	Elite Residential	3	2						
	Plow zone	4							
	Subtotal	15	10				2		27
Mixed		1	1						
	Subtotal	1	1						2
Total		46	49				9		104

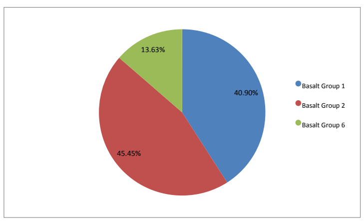
And in pie charts are show the relative frequencies of basalt clusters in different kinds of contexts such as domestic, Burial-ritual, or elite residential at Tres Zapotes (Figure 8.14 and Table 8.13 show frequency and percentage).



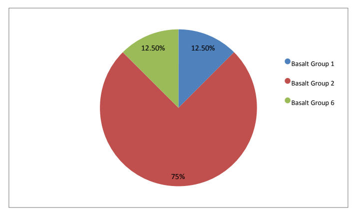
Early Formative – Domestic



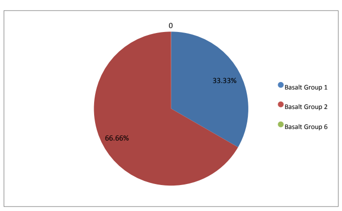
Early Formative – Burial Ritual



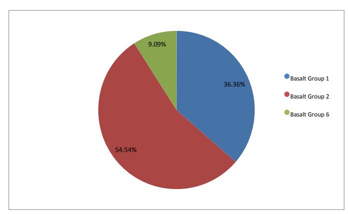
Middle Formative – Domestic



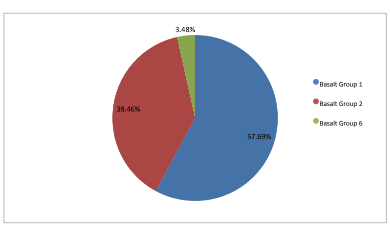
Middle Formative – Elite Residential



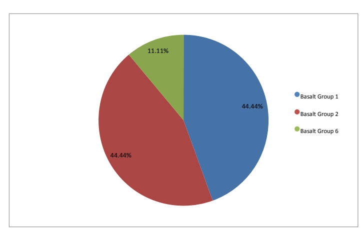
Middle Formative – Burial Ritual



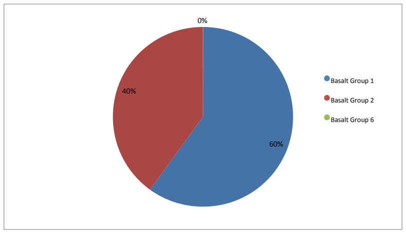
Late Formative - Domestic

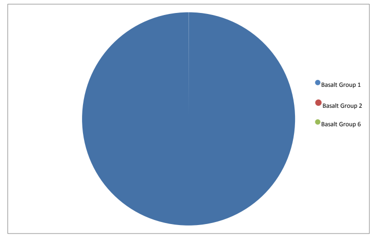


Late Formative – Elite Residential



Proto-Classic Domestic





Proto-Classic Elite Residential Proto-Classic plow zone

Figure 8.14 Relative frequencies of Basalt Clusters by period and context at Tres Zapotes.

Table 8.13 Frequency and percentage of Basalt Clusters and their occurrence in different types of contexts at Tres Zapotes

Basalt Clusters			
TRES ZAPOTES			
EARLY FORMATIVE PERIOD			
Domestic			
Basalt Cluste	Frequency	Percentage	
2	0	0	
6	1	100	
Total	1	100%	
Burial Ritual			
Basalt Cluste	Frequency	Percentage	
1	0	0%	
2	4	100%	
6	0	0%	
Total	4	100%	
MIDDLE FORMATIVE PERIOD			
Domestic			
Basalt Cluste	Frequency	Percentage	
1	9	40.90%	
2	10	45.45%	
6	3	13.63%	
Total	22	99.98%	
Elite Res-Adm			
Basalt Cluste	Frequency	Percentage	
1	1	12.50%	
2	6	75%	
6	1	12.50%	
Total	8	100.00%	
Burial-Ritual			
Basalt Cluste	Frequency	Percentage	
1	1	33.33%	
2	2	66.66%	
6	0	0	
Total	3	99.99%	

LATE FORMATIVE PERIOD		
Domestic		
Basalt Cluste	Frequency	Percentage
1	4	36.36%
2	6	54.54%
6	1	9.09%
Total	11	99.99%
Elite Res-Adm		
Basalt Cluste	Frequency	Percentage
1	15	57.69%
2	10	38.46%
6	1	3.48%
Total	26	99.63%
Proto-Classic Period		
Domestic		
Basalt Cluste	Frecuency	Percentage
1	8	44.44%
2	8	44.44%
6	2	11.11%
Total	18	99.99%
Elite Res-Adm		
Basalt Cluste	Frecuency	Percentage
1	3	60%
2	2	40%
6	0	0%
Total	5	100%
Plow zone		
Basalt Cluste	Frecuency	Percentage
1	4	100%
2	0	0%
6	0	0%
Total	4	100%

In Tables 8.11, 8.13, and Figure 8.14 it is noticed the similarities and differences in the use of Basalt Clusters. The evidence supports the model that every societal group had access to the same raw materials during the Middle Formative period. This uniform distribution of types of basalt shows how it was the acquisition and distribution in a polity with exclusionary and centralized political-economic model. These data suggest pooling of basalt types by some central agency prior to distribution to households, then distribution was centralized. However, the difference relies on the quantity of kinds of basalts. Elite residential contexts had more Cluster 2 than domestic contexts, and domestic contexts had more Cluster 1 than elite residential contexts. Both types of contexts had a similar access to Cluster 6. But during the Late Formative period, there was the opposite situation: domestic contexts had more Cluster 2 than elite residential contexts and elite residential contexts had more Cluster 1. Both kinds of contexts had similar quantities of Cluster 6. And during the Proto-Classic period, the domestic contexts had similar quantities of Clusters 1, 2, and 6 in comparison with domestic contexts dated to the Middle Formative. Instead, elite residential contexts had more Group 1 than Group 2, and those contexts did not have Group 6. These changes may be are related to the increase of complexity of Tres Zapotes polity. The elite residential contexts show an increase of Basalt Cluster 1 from the Middle Formative to the Proto-Classic.

Types of artifacts and the Basalt Clusters used for manufacture found at Tres Zapotes

Artifacts and Basalt Clusters at Tres Zapotes

Table 8.14 Frequency of artifact/Basalt cluster over time at Tres Zapotes

Period	Artifact type / Basalt Cluster	metate	mano	polisher	flake	pebble	Stone Hammer	core	nodule	preform	Total
Early Formative	1										
	2				3	1					
	6	1									
	Subtotal	1			3	1					5
Middle Formative	1	1	1	1	5	2				1	
	2	3	1		6	5	1	1		1	
	6				2	1				1	
	Subtotal	4	2	1	13	8	1	1		3	33
Late Formative	1	1	2	1	7	9					
	2	2	1		6	6					
	6				2						
	Subtotal	3	3	1	15	15					37
Proto-Claasic	1				4	10		1			
	2			1	4	4			1		
	6			1	1						
Subtotal				2	9	14		1	1		27
Mixed	1				1						
	2				1						
	6										
Subtotal					2						2
Total		8	5	4	42	38	1	2	1	3	104

In spite of the fact that the sample size for the analysis is small, it is noticed (Table 8.14) that there were changes in the selection of Clusters for the manufacture of artifacts. A metate found in levels which date to the Early Formative period was made out of Basalt Cluster 6 and during the Middle and Formative periods metates were made of Clusters 1 and 2. Manos show the same trend like metates. And in the case of by-products, flakes changed. Flakes made of Cluster 2 were more than the ones made of Cluster 1 during the Middle Formative and during the Late Formative period happen a different situation: flakes Cluster 1 were more than flakes Cluster 2. During Proto-Classic period there was a similar use of Clusters 1 and 2. This distribution of Clusters over time reflects the changes which occurred in Tres Zapotes as a polity. For quotidian artifact, Tres Zapotes was able to acquire raw materials in more distant places.

In regard to the pebbles and flakes deposited in burial contexts, they correspond to Cluster 2, the most abundant type that occurred in the site. And in the case of the Colossal Head from Cobata, it was made out of Cluster Basalt 1, the same raw material which increased its use over time in Tres Zapotes, and the same material as Nelson et al.´s Samples 144 or 304, Primitive Basalt that pertain to the Newer series, since the Cobata head is expected to have been made from local material. May be the location of this monument is a sign spot in the cultural landscape where it was indicated the expansion of Tres Zapotes.

San Andrés

Table 8.15 Frequency of Basalt Clusters at San Andrés over time

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	**Total**
Middle Formative	5	2	4	2	1	27	1	42
Post-Classic						1		1
Total	5	2	4	2	1	28	1	43

And this is a pie chart which shows the relative frequencies of Basalt Clusters at San Andrés in all the artifacts (Figure 8.15and in Table 8.16 there are frequency and percentage).

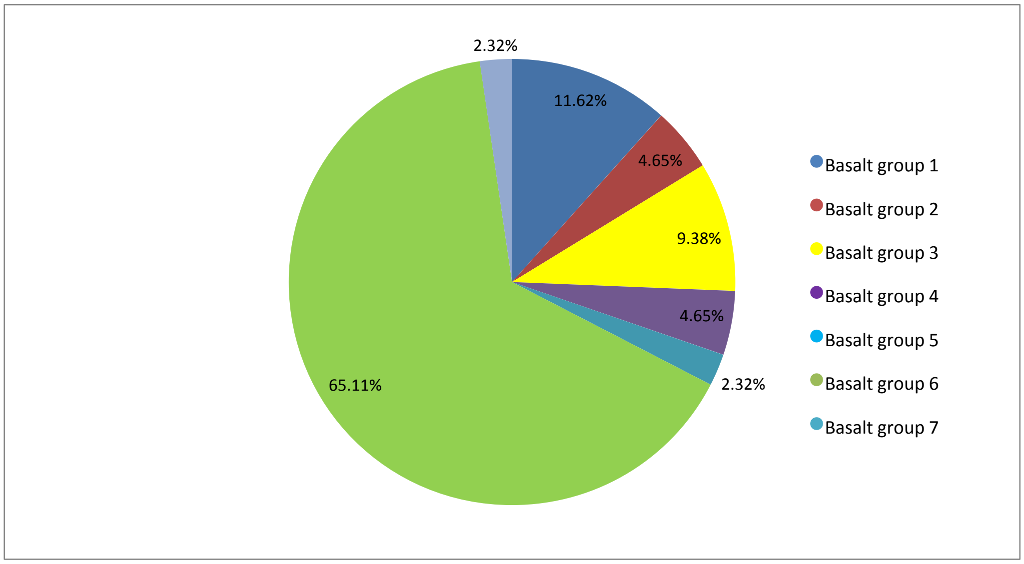


Figure 8.15 Relative frequencies of Basalt Groups at San Andrés

Table 8.16 Frequency and percentage of Basalt Clusters at San Andrés

Basalt Clusters		
San Andrés-Tabasco		
Basalt cluste	Frequency	Percentage
1	5	11.62%
2	2	4.65%
3	4	9.38%
4	2	4.65%
5	1	2.32%
6	27	65.11%
7	1	2.32%

San Andrés-Tabasco: Artifacts and Basalt Clusters

Table 8.17 Frequency of artifact/Basalt cluster over time at San Andrés

Period	Artifact type / Basalt Cluster	Manuport	Metate	Mano	Stone Hammer	Polishing Stone	Total
Middle Formative	1		2	3			
	2	1	1				
	3	1	2			1	
	4	1			1		
	5				1		
	6	18	3	6			
	7	1					
Subtotal		22	8	9	2	1	42
Post-Classic	1						
	2						
	3						
	4						
	5						
	6			1			
	7						
Subtotal				1			1
Total							43

The case of San Andrés is really interesting. This secondary site in the regional hierarchy in the surroundings of La Venta during the Middle Formative period had an impressive variety of Cluster basalts (Tables 8.15-8.17 and Figure 8.15). One might expect that everything is from the Older Volcanic Series (Cluster 6). Although the higher frequency in a local artifact (manuport) and metates were made out of Cluster 6 basalt, Clusters 1, 2, 3, 4, 5, and 7 were used for the manufacture of quotidian artifacts. This availability of raw materials, I think that has to do with strategic location between Tuxtlas and other outcrops located in Tabasco. Also, it shows the evolution of political-economic organization during the Middle Formative period, when Complex chiefdoms transformed into more complex polities in respect to the chiefdoms of the Early Formative period which seem to be centralized. This wide variety in raw materials also is indicated in obsidian (Pool et al. 2014).

San Lorenzo-Tenochtitlán

Table 8.18 Frequency of Basalt Clusters at San Lorenzo over time

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	**Total**
Early Formative	2					29		31
Middle Formative						8		8
Total	2					37		39

And this is a pie chart which shows the relative frequencies of Basalt Clusters at San Lorenzo in all the artifacts (Figure 8.16 and in Table 8.19 there are the frequency and percentage of Basalt Clusters).

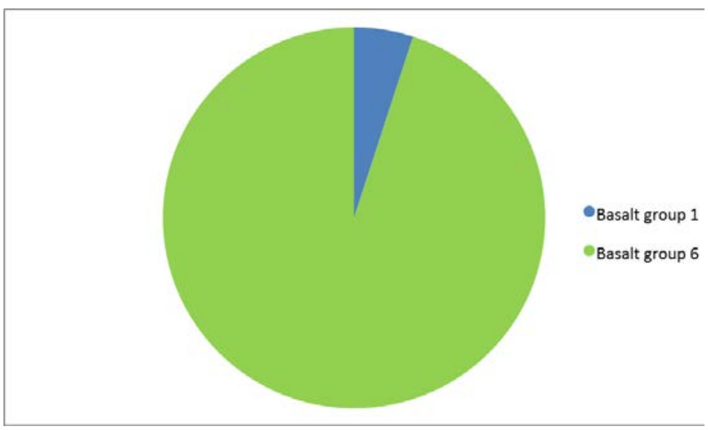


Figure 8.16 Relative frequencies of Basalt Groups at San Lorenzo

Table 8.19 Frequency and percentage of Basalt Clusters at San Lorenzo

SAN LORENZO-TENOCHTITLAN		
Basalt Cluste	Fequency	Percentage
1	2	5%
6	27	95%

San Lorenzo-Tenochtitlán: Artifacts and Basalt Clusters

Table 8.20 Frequency of artifact/Basalt cluster at San Lorenzo over time

Period	Artifact Type / Basalt Cluster	Metates	Monuments	Drain Stones	Total
Early Formative	1	2			3
	6	11	15	3	29
	Subtotal	13	15	3	31
Middle Formative	1				
	6	8			
	Subtotal	8			8
Total		21	15	3	39

San Lorenzo-Tenochtitlán shows a very interesting case in acquisition of raw materials in Olman (Tables 8.18-8-20 and Figure 8.16). Both Monuments and metates were made out of the Cluster 6 during the Early and Middle Formative periods. There are few specimens made out Cluster 1 during the Early Formative. It is noticed that sample 331 in Nelson et al.´s report is closer to San Lorenzo and the other possibility is that this kind of metates are footed and pertained to the elite. In this particular case, basalt was exchanged from distant communities, as the examples that were shown in the ethnographic cases in this dissertation. These artifacts ties communities may be with kinship networks

The reduced variation in Clusters that occurred at San Lorenzo may be had to do with the evolution of political-economic institutions in Olman. Complex chiefdoms like San Lorenzo during the Early Formative period could be more centralized in the acquisition of types of basalt, something different happen during the Middle, Late, and

Proto-Classic periods with more complex institutions. However, it is important to see how attached workshops to elites who sponsored manufacture of monuments and metates could elaborate diverse crafts with a reduced variety of basalts. And the resource was available in distant places. May be the distance contributed that the San Lorenzo´s leaders decided to exploit particular outcrops inside their political-economic landscape. Therefore, artisans had to manufacture artifacts with the available raw material.

Chapter 9. Conclusions

In this dissertation I have analyzed ground stone artifacts in order to better understand a culture known for its skills in carving basalt monuments. This Olmec culture and its immediate successors in the cultural area called Olman (Southern Veracruz and Northwestern Tabasco, Mexico) created a distinctive technological tradition in the work of stone. Accordingly, some have called "the Men [or People] of Stone" (e.g., de la Fuente 1977).

When I saw the opportunity to start a Ph.D dissertation project about a systematic study of basalt ground stone in the archaeological site of Tres Zapotes, I acknowledge that I never imagined the interesting information that it is possible to infer from the archaeological record where there was evidence of multiple past behaviors that together constitute the political-economic dynamic of an ancient polity.

This dissertation started with a hypothesis-oriented project. Three hypotheses emerged from a model of political-economic change. The model for addressing the political-economic change from Olmec (Early-Middle Formative) to Epi-Olmec (Late to Terminal Formative) periods at Tres Zapotes suggests that during the Olmec times there was an exclusionary, centralized, and individualized system which was implemented by chiefs for obtaining more power. But during Epi-Olmec times the leaders in the polity instituted a new, less centralized, and corporate form of government in which a confederacy mediated diverse interests of powerful factions and avoided the disintegration of the political unity. These were the three hypotheses:

1. The sequences of the productive processes, as exemplified in the macro-analysis of basalt artifacts, will be more uniform during the Early and Middle Formative periods than in the Late Formative.

2. There will be an increase in the variation of raw material sources for the manufacture of artifacts as more outcrops were exploited and discretely distributed within Tres Zapotes.

3. There will be greater spatial and social segmentation in the sequence of production as a result of an increase of factionalization and the consequent negotiation of the loci ("loci" in the more abstract sense of "places" of production in the politico-economic system) of steps of production.

In these conclusions, first I want to confront each hypothesis with evidence obtained in my analysis and obtain a synthesis about the new information discovered. Then, I want to discuss several unexpected results raised in the course of this research.

1. The sequences of the productive processes, as exemplified in the macro-analysis of basalt artifacts, will be more uniform during the Early and Middle Formative periods than the Late Formative.

In general terms, the analysis supported this hypothesis. The basic steps of manufacture which constitute the *chaîne opératoire* or productive process are replicated in the contexts which date to the Early Formative period and the Middle Formative period, as well as the cases that presented a transition between those periods (Early Formative: Op. 2B (Domestic context), Op. 3A Units 17, 18, 24, and 33) (Domestic context); Early Formative/Middle Formative: Op. 3A (Domestic), 3A (Units 36 and 37); Middle/Early Formative: 2E (Domestic); Middle Formative: 2C (Elite Residential Adm), 2B (Domestic), 3A (Units 17, 18, 24, and 33) (Domestic and Burial Ritual); Middle Formative-Early Classic: Op. 4 (Unit 19) (Elite Residential Ad.). Each context contained maize grinding tools (metates (1), manos (2), and in some cases either mortars (8), or pestles (7)) and the basic by-products that suggest small scale domestic production either for manufacturing artifacts used in quotidian activities or for rejuvenating those artifacts. In regard to the use of types of basalt, in general terms, it is observed that there was a uniform use of types massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1).

I argue that this pattern of productive processes and basalt acquisition has to do with the political-economic evolution of the Tres Zapotes polity. Over the course of the Early and Middle Formative periods, this site transforms from a village to a chiefdom. An exclusionary economic model emerged in which leaders inserted themselves in diverse acts of social life. The vast majority of the places in the site had a similar access to raw materials, and this type of distribution generated similar ways to produce ground stone artifacts for themselves and for small-scale exchange of grinding tools among households. It is important to underscore that during these initial periods of Tres Zapotes, an exclusionary economic model had to be adapted to the Tuxtla Mountains. It is not an exclusionary model like the basin of Coatzacoalcos, or the Tonalá rivers. It is mentioned again that the sample size of excavated units for these initial periods is small, and more research is needed for making a better interpretation.

However, I did encounter an exception. The intellectual gift of contrasting hypotheses is that we can receive a feed-back from the results obtained from research. In this case, the exception appeared in the pattern of the productive process and access to types of basalt in the contexts excavated in Op. 3A (Units 17, 18, 24, and 33) and (Units 36 and 37). From the Middle Formative period these contexts exhibited several by-products from the macro-core (50.1) to the preform (50.7), and this place had access to a wider variety of types of basalt than the rest of productive units in Tres Zapotes at the time. In terms of material, this locality used more vesicular pyroxene porphyritic basalt (11.1), vesicular fine grained basalt (11.3), or massive olivine porphyritic basalt (10.2) in comparison with the types massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3) that were used in the rest of excavated units. Underneath the domestic context in Op. 3A (Units 17, 18, 24, and 33), there was a burial-ritual context which mirrored the intense degree of production that was performed in this domestic productive unit.

Therefore, it is necessary to suggest an explanation of the different pattern showed in the Middle Formative domestic contexts excavated in Op. 3A. One possible interpretation is that these domestic contexts had to work with more materials that they had at hand. This availability of greater quantities and diversity of basalt allowed the domestic spaces to produce at a higher rate than the productive units in other localities in Tres Zapotes. Taking into account that the basalt types used in Op. 3A were not very often used in other localities of Tres Zapotes, perhaps those basalt types acquired in Op.

3A's contexts produced more debris. Also, it is important to recall that the contexts excavated in this part of Tres Zapotes had a different history of changes in function in the site. Since the Early Formative to the Classic period occupations, the area had domestic contexts.

During the Late Formative period there occurred an expansion and florescence of Tres Zapotes polity. The sample size of the excavation units was larger as well, and so it was possible to observe the variation among the different Plaza Groups in the archaeological site. During this period, we see the expansion and elaboration of civic-ceremonial complexes at Tres Zapotes. Those places were a physical materialization of political practices where leaders performed public rituals and ceremonies. As a result of the proliferation of these seats of power, the hypothesis predicts less uniformity in the basalt assemblage of the Late Formative period than in the more centralized political economy of the Middle Formative period. The reason is that Tres Zapotes evolved into a more corporate polity. The consequences could be seen in the archaeological record, where, for instance, activity areas of basalt production were more diversified. An activity area in a Civic-ceremonial context for performing a public ritual is different in respect to the remains found on the floor of an elite residential/administrative context, or a multi-crafting workshop attached to an elite residential space, or the domestic contexts. The by-products of the productive sequence varied in accord with the diversity in functions such as domestic, elite residential administrative (either trash pit, fill, floor, etc) or civic-ceremonial (structure fill, or feasting remains, "adoratorio", etc.).

In general terms, the domestic contexts during the Late Formative period exhibited almost identical types of tools for maize grinding and by-products (Op. 2A

(Units 2 and 3); Op. 2A (Units 4 and 5); and Op. 2E). This evidence suggests that in these domestic units, the inhabitants of Tres Zapotes were performing a similar set of quotidian activities such as preparing their maize-based diet and producing small quantities of ground stone artifacts or rejuvenating artifacts. The variation in frequencies of types of artifacts and by-products is related to the type of secondary context. For instance, the domestic context found in Op. 2E was a trash pit, which provided several by-products such as macro-nodules (50.1), nodules (50.1), and quarters (cube-shaped blocks) (50.6) as well as maize grinding tools such as metates (1) and manos (2). In regard to the types of basalt used in those contexts, it is observed that the variation increased in respect to the previous period in domestic contexts. There were massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular fine grained basalt (11.3), and massive olivine porphyritic basalt (10.2). This increase may suggest that the Tres Zapotes polity was able to reach more distant outcrops than in the past periods.

However, once again the exception was the domestic context found in Op. 3A (Units 17, 18, 24, and 33) which had more types of by-products than the rest of the Late Formative domestic contexts. This context contained grinding tools such as metates (1), manos (1), and mortars (8). There were by-products such as macro-nodules (50.1). nodules (50.2, basalt fragments (50.5), quarters (50.6), and performs (50.7). The tools used for basalt manufacture were polishers (5), basalt discs (16), *stone tejos* (*tejos* were stone rings which were roughly formed and smaller than stone donuts. In a few examples these stone rings had perforations in the form of cones meeting at the middle; another variety corresponds to incompletely perforated stones in which depressions did not go completely through) (18), and anvils (50.8). In regard to the types of basalt used, there was an increase from the previous period, although the types which were most used were different from the other domestic contexts. The types of basalt used were massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), vesicular fine grained basalt (11.3), and vesicular olivine porphyritic basalt (11.2). The explanation for the distinction of this context in respect to others in the same period is that this place in Tres Zapotes maintained over time the status of an area of domestic spaces. They may have had access to outcrops less exploited by other Groups (Both elite and non-elite domestic contexts found in Tres Zapotes Plaza Groups), and may have been producing for exchange with other domestic units inside the same area.

In regard to the elite residential/administrative contexts, the variation which is observed in the Late Formative period is related to the specific kind of context. In Op. 2B, which was a fill; Op. 2C that also was fill; and Op. 6 (Unit 40), which corresponded to slope wash; those contexts had a fewer types of by-products, however they are important because they allow us to see that there was local ground stone production. Also, the types of basalt were fewer than the other types of specific contexts. The basalt types included massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1).

The excavation of Op. 5 Unit 30, which corresponded to the specific context of a trash pit, provided an important opportunity to observe what kind of grinding tools as well as by-products were produced. There were metates (1) and manos (2), as well as by-products such as macro-flakes (20.1), flakes (20), basalt fragments (50.5), and quarters (50.6). The basalt types found were massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and massive olivine porphyritic basalt (10.2).

In Op. 6, Unit 34 a variety of specific contexts was excavated that show the multiple areas where different steps of basalt production were carried out. The refuse fill contains metates (1) and manos (2) made of vesicular pyroxene porphyritic basalts (11.1); a ceramic concentration, possibly the remains of feasting, was associated with basalt production debris (9), macro-flakes (20.1), and basalt fragments (50.5) made of massive fine-grained basalts (10.3); the structure fill contained flakes (20) and blocks (50.3) made of massive fine-grained basalts (10.3); and on the floor there were flakes (20) and pebbles (24) made of massive olivine porphyritic basalts (10.2).

However, during this period, there also was a multi-crafting production unit attached to an elite residential/administrative context found in Op. 2D in Group 2. It contains several types of grinding tools such as metates (1), manos (2), pestles (7), and mortars (8). Also it contains several by-products such as macro-flakes (20.1), flakes (20), nodules (50.2), basalt fragments (50.5), and preforms (50.7), and tools such as tejos (18) and stone hammers (27). The basalt types were consistent with the ones used in elite residential contexts such as massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3). There also were remains of other rocks and minerals such as serpentine (62), ilmenite (64), and mica, which suggest multi-crafting activities.

Op. 5, Unit 31 and Op.5, Unit 32 excavated construction fill in civic-ceremonial contexts. In spite of the fact that the context was a fill, the information is useful because the data allow us to see the kind of materials used. There were in both contexts by-products such as macro-flakes (20.1), flakes (20), nodules (50.2), and cores (50.4). Whereas in the context excavated in Op.5, Unit 41, there was a plaza floor where there were metates (1), manos (2), and macro-flakes (20.1) which were made out of massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3). Finally, the context excavated in Op. 6, Unit 40 was alluvium where there were cobbles with evidence of thermic shock which were made of massive pyroxene porphyritic basalt (10.1).

The main trend during this period that was noticed is that every unit (domestic or elite) produce artifacts. In some cases such as the domestic context in Op. 3A there were archaeological correlates which suggest more intensive production and access to less used outcrops of basalt. In the case of the multi-crafting unit attached to an elite residential context, there was the evidence of a productive unit that supplied finished products to the elites that sponsored the workshop.

It is important to underline that in general, the types of basalt used increased in respect to the previous period. However, elite residential/administrative precincts and civic-ceremonial contexts contained the basalt types related to the higher status: massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3).

Late Formative to Terminal Formative transition

There were some examples of contexts which date to this transition. They are all in elite resdential/administrative contexts. In two cases, Op. 6, Unit 35 and Op. 4, Unit 25, the Late to Terminal Formative transition was disturbed by the plow zone. However, by-products such as macro-flakes (20.1), flakes (20), and basalt fragments (50.5) made of massive pyroxene porphyritic basalt (10.1), vesicular pyroxene porphyritic basalt (11.1), and massive fine-grained basalt (10.3) indicate ground stone production occurred in the general vicinity. Similarly, the Late to Terminal Formative deposits excavated in Op.5, Unit 30 were displaced from their original context as slope wash derived from Mound 28, the long mound closing the north side of Plaza A in Group 3. The recovery of by-products such as basalt production debris (9), macro-flakes (20.1), flakes (20), cores (50.4), blocks (50.6), and preforms (50.7) suggest that ground stone production was carried out nearby, presumably on Mound 28. The basalt types used were massive pyroxene porphyritic basalt (10.1), vesicular pyroxene porphyritic basalt (11.1), massive fine-grained basalt (10.3), and vesicular fine grained basalt (11.3).

The context found in Op. 2A continued as a multi-crafting productive unit within a civic-ceremonial context. The Late to Terminal Formative deposits contained more kinds of grinding tools, including metates (1), manos (2), pestles (7), and stone donuts (13). There were still several by-products such as basalt production debris (9), macro-flakes (20.1), flakes (20), basalt fragments (50.5), quarters (50.6), and preforms (50.7). There also were discarded artifacts that may have been used in wood-working activities such as chisels (10.1), stone axes (10.2), and adzes (10.3). The number of basalt types used increased, with massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular fine grained basalt (11.3), and vesicular olivine porphyritic basalt (11.2).

The final example corresponds to the context found in Op.7, which exhibited grinding tools such as metates (1) and manos (2). Several types of by-products such as macro-flakes (20.1), flakes (20), basalt fragments (50.5), quarters (50.6), and preforms (50.7). The basalt types used were massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), massive olivine porphyritic basalt (10.2), and vesicular fine grained basalt (11.3)

The major trend that is noticed in the Late to Terminal Formative period as compared to the Late Formative period is that in elite residential/administrative and civic-ceremonial continued the production of basalt artifacts, but the kinds of by-products suggest that the artifacts were produced from basalt fragments (50.5), quarters (50.6), preforms (50.7), and macro-flakes (20.1), and not from larger fragments of raw material such as macro-cores (50.1) and cores (50.2). Larger fragments of raw material occurred in Late Formative contexts. Also, it seems that the use of types of raw materials continued as diverse as during the Late Formative period.

Terminal Formative Period

During the Terminal Formative period Tres Zapotes continued to dominate the Eastern Lower Papaloapan Basin, although it began a slow decline in size and influence. It also appears that a considerable quantity of ground stone materials was re-cycled. This possible beginning of the decline in production of ground stone tools probably was an early symptom of the decline of Tres Zapotes as a regional center in the Eastern Lower Papaloapan Basin.

It is important to consider the character of the contexts belonging to this period. Two of the excavated localities were in domestic contexts, Op. 3A (Units 17, 18, 24, and 33) and Op. 3B. Op. 3A exhibits a decline in the intensity of production from the previous periods. Although there were tools for maize-grinding such as metates (1) and manos (2), the number of types of by-products reduced. There were macro-flakes (20.1), blocks (50.3), and quarters (50.6) as well as polishers (5). Artifacts and by-products were made out the same basalt type 10.3 (massive fine-grained basalt).

A different situation showed the domestic unit excavated in Op. 3B. This context is also different because all the strata corresponded to the whole sub-Operation and dated to the Terminal Formative period. It also differs with respect to the kind of productive unit because this context locality seems to represent a multi-crafting unit in a domestic space. In addition to maize grinding basalt tools such as metates (1) and manos (2), excavations in Op. 3B yielded several by-products such as nodules (50.4), basalt fragments (50.5), and preforms (50.7). There were instead more types of tools for manufacture basalt such as polishers (5), basalt discs (16), and stone hammers (27). The basalt types used were massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), and vesicular fine grained basalt (11.3). It is important to underline that this is a much greater variety in the use of basalt types than in other Terminal Formatie contexts such as in Op 3A. The occurrence of a bark-beater (11) (for making paper), and minerals such as flint (61), schist (63), and jadeite (73), as well as the evidence for ceramic production suggest that several kinds of crafts were also manufactured in this productive unit of domestic status.

Two operations sampled elite residential/administrative contexts. One was found in in Op.5, Unit 30 and corresponded to a ceramic concentration which may be an offering that was associated with stone hammers (27) made out of massive pyroxene porphyritic basalt (10.1) and vesicular pyroxene porphyritic basalt (11.1).The second case of this type of context corresponded to the context excavated in Op. 6, Unit 34 and had two specific contexts. One was structure fill that contains cobbles made of limestone (69) and the second corresponded to plow zone which had flakes (20) and pebbles with evidence of thermic shock (25) made of massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3).

Three operations sampled Terminal Formative civic-ceremonial contexts. The context found in Op. 2A (Units 4 and 5) corresponded to the plaza fill that contains manos (2), macro-flakes (20.1), flakes (20), quarters (50.6), and stone hammers (27) made of the massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), vesicular pyroxene porphyritic basalt (11.1), and vesicular fine grained basalt (11.3). The context excavated in Op. 2E also corresponded to plaza fill that contained metates (1), manos (2), macro-flakes (20.1), and flakes (20) made of massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), massive pyroxene porphyritic basalt (10.1), and massive olivine porphyritic basalt (10.2). Finally, the Terminal Formative deposits excavated in Op. 5, Unit 41 corresponded to three specific contexts.

One context was an “adoratorio” that contained metates (1) made of massive fine-grained basalt (10.3). The second context was plaza fill that contains flakes (20) and micro-flakes (20.3) made out massive pyroxene porphyritic basalt (10.1) and massive fine-grained basalt (10.3). And the third context was plow zone and had manos (2) and cobbles with evidence of thermic shock (22) made out of vesicular pyroxene porphyritic basalt (11.1).

In general terms, the domestic contexts analyzed which date to the Terminal Formative period exhibit a production decline and probably recycling of artifacts for obtaining basalt. The occupants of elite residential/administrative contexts also were using recycled artifacts for construction and the civic-ceremonial places followed the same pattern for acquiring raw materials.

The variety of materials in Op. 3A is so greatly reduced as compared both to previous occupations in that locus and to the elite and civic-ceremonial contexts. In other words, in the Terminal Formative, factional leaders seem to have access to a much wider variety of materials than the non-elite inhabitants of Op. 3A. In regard to Op. 3B, the multi-crafting household that also utilized a wide variety of materials, it was very close to Op. 3A and its assemblage was so different. The organization of production would seem to have something to do with this difference. The diversity of crafts produced possibly was exchanged with other plaza groups. This multi-crafting household could represent a new type of productive unit which appeared during the political-economic evolution of Tres Zapotes. The produced crafts could be acquired by factional leaders and those individuals had accesss to products made in a wider variety of raw materials.

Terminal Formative-Early Classic transition

In the levels which date to this transition, there were found three contexts which were included in this study. One case was a domestic context (Op. 3A, Units 17, 18, 24, and 33) which corresponded to fill and included pebbles (24) made of massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular fine grained basalt (11.3), vesicular olivine porphyritic basalt (11.2), and massive pyroxene porphyritic basalt (10.1). The second case was a civic-ceremonial place (Op. 2A, Units 2 and 3) which corresponded to a specific context of plaza fill, where there were grinding tools such as metates (1) and manos (1). These units also yielded by-products such as macro-flakes (20.1), flakes (20), blocks (50.3), and quarters (50.6). Tools for manufacturing basalt implements included abraders (12) and stone hammers (27). The types of basalt used were massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), vesicular pyroxene porphyritic basalt (11.1), and massive olivine porphyritic basalt (10.2). And the context excavated in Op. 2A (Units 4 and 5) was the alluvial zone and had manos (2), macro-flakes (20.1), stone axes (10.2), and nodules (50.2) made of vesicular pyroxene porphyritic basalt (11.1), massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), and massive olivine porphyritic basalt (10.2).

In the contexts which date to this transition were places modified by cultural transformations (the use of raw materials for construction fill) or natural transformations (alluvium zones), but these disturbed contexts still offer a general sense of the kinds of artifacts and materials made and utilized in different parts of the site. It is necessary to underscore that a sort of canon was preserved of the materials needed for Elite and Civic-ceremonial places, which are different in respect to the materials found in Op. 3A.

Early Classic period

There were two contexts that date to the Classic period which were included in this study. One context excavated in Op. 2A, Units 2 and 3 corresponded to a plaza fill in a civic-ceremonial place, which contained metates (1), macro-flakes (20.1) and flakes (20) made of massive fine-grained basalt (10.3). The second context, found in Op. 2B, was construction fill in an elite-residential/administrative context (mound 15/16 of Group 2). The Early Classic contexts in Op. 2B that contained metates (1), macro-flakes (20.1), and flakes (20) made of out massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), and vesicular pyroxene porphyritic basalt (11.1). The assemblages of both operations suggest a reduction in the range of activities as Tres Zapotes declined in population. However, basalt was recycled, and in the places associated with elites and civic-ceremonial activities basalt types that were present in earlier periods in those contexts continued to be utilized. It is observed the opportunistic recycling of materials that were already present in those localities.

Classic-Historic component

Only one context date to this this Classic-Historic component which represents mixing of Classic and Historic materials in the plow zone. It was found in Op. 3A (Units 17, 18, 24, and 33). The specific context corresponded to the plow zone, the several by-products which were recovered were debris (9), macro-flakes (20.1), flakes (20), and macro-cores (50.1) made out of massive fine-grained basalt (10.3)

Historic period

In the two domestic contexts which date to the Historic period, there were ground stone artifacts that are likely redeposited artifacts. One was a sandstone platform where there was a stone axe made of vesicular pyroxene porphyritic basalt (11.1), and another context was a hearth where there were macro-flakes (20.1) and flakes (20) made out of vesicular pyroxene porphyritic basalt (11.1) and massive fine-grained basalt (10.3).

Summary: During the Olmec period at Tres Zapotes (the Early/Middle Formative occupation), uniformity is noticed in the steps of the *chaîne opératoire* documented in domestic, burial, and Elite Residential Administrative contexts. All of these contained evidence of the performance of maize grinding activities, manufacture of ground stone artifacts, and rejuvenating tasks of basalt tools which suggest household production. This evidence shows a similar access to raw materials that might be little centralized by leaders and it seems that there was a small-scale exchange of ground stone tools among domestic units. It is observed the uniform use of massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), and vesicular pyroxene porphyritic basalt (11.1). There was uniformity in production activities of artifacts and may be partially regulated by elites. This greater uniformity in raw materials in the Early and Middle Formative could also be the result of a smaller population and a more restricted territory.

During the Late Formative period there occurred an expansion and florescence of Tres Zapotes. This period and the Terminal Formative constituted the Epi-Olmec occupation in which there was an increase in construction of elaborated ceremonial complexes in this polity. As a result of proliferation of multiple seats of power, in this site civic-ceremonial spaces were built where leaders of factions performed public ceremonies and rituals in plazas. This hypothesis predicted less uniformity in ground stone assemblages during the Late Formative than during the Olmec Early/Middle Formative period as the political-economic model changed from an exclusionary and centralized one to a corporate system.

In the basalt assemblages, in Groups 1, 2, 3, Nestepe and in Operation 7 the analysis identified diversity of the production sequence that is in accord with the diversity in functions which were performed in elite residential administrative spaces, plazas, adoratorios, multi-crafting workshop units attached to elite residences. With respect to domestic households, it seems that their inhabitants were performing similar activities such as maize grinding and producing small basalt artifacts as well as rejuvenating ground stone artifacts.

During the Terminal Formative period, Tres Zapotes continued to dominate the Eastern Lower Papaloapan Basin, although there was a slow decline in size and influence. There were less steps of the process of production and it seems that the production units were recycling artifacts. The types of basalt used were almost the same used during the Late Formative period such as massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), vesicular pyroxene porphyritic basalt (11.1), vesicular fine-grained basalt (11.3), vesicular olivine porphyritic basalt (11.2), and massive olivine porphyritic basalt (10.2).

After evaluating the evidence relating to my first hypothesis I can say that the analyzed corpus of information of ground stone artifacts support the existence of a transition among *chaînes opératoires* from the Olmec to Epi-Olmec periods in Tres Zapotes, which were embedded in distinct political-economic regimes such as an exclusionary- centralized model during the Early/Middle Formative and a corporate one during the Late-Terminal Formative period. The types of basalt used increased over time.

However, it was noticed that in the locality where Operation 3 was conducted, there was an occupation of domestic households from the Early Formative to the Terminal Formative period, and these contexts showed not only domestic production, but also productive units which produced a high rate of artifacts, and in one case there was a multi-crafting/independent unit. From the Early Formative this locality used types of basalt which were not common in other groups in Tres Zapotes. This case is important because it is possible to see the practices performed by these ancient inhabitants of Tres Zapotes that varied from other localities of the site, and it is possible to observe a case of communal agency, where the producers obtained raw materials from different outcrops and supplied finished artifacts in a small exchange network inside of a polity. The choice of different types of basalt also shed light on the agency of a sector of a population where color, texture, hardness, durability, and other physical characteristics were taken into consideration for the manufacture of basalt tools

Second hypothesis

2. **There will be an increase in the variation of raw material sources for the manufacture of artifacts as more outcrops were exploited and discretely distributed within Tres Zapotes**

In regard to this second hypothesis, I found that two datasets support with empirical evidence the idea that variation of raw material sources for the manufacture of artifacts increased over time as Tres Zapotes expanded as a polity and reach more distant outcrops.

One dataset is composed by the identification of physical characteristics in each artifact which was recorded during the analysis. I divided the observations in the main trend noticed in Groups 1, 2, 3, Nestepe; and the locality where there were conducted excavations of Operation 7; and the observations which correspond to Operation 3 that have a different pattern over time in the kinds of basalt used.

The second dataset correspond to the information obtained from geochemical analysis.

According to the analysis of physical characteristics made in each analyzed artifact from Tres Zapotes, I noticed a main trend noticed in the artifacts found in Groups 1, 2, 3, Nestepe, and the locality where Operation 7 was conducted; and a different trend was observed in the analysis of the materials found in Operation 3.

In the main trend of acquisition of basalt observed in the vast majority of Groups, it was noticed that types of basalt which were used for producing artifacts increased gradually over time. During the Olmec occupation, in the Early Formative contexts, there was evidence of the use of massive fine-grained basalt (10.3). In regard to the Early/Middle, Middle, and Middle/Late Formative contexts, the types used were massive fine-grained basalt (10.3) and massive pyroxene porphyritic basalt (10.1). This uniform distribution of types of materials over time shows how it was the acquisition and distribution in a polity with exclusionary and centralized political-economic model. The evidence supports the model that every societal group had access to the same raw materials during the Middle Formative period. These data suggest pooling of basalt types by some central agency prior to distribution to households.[1]

An abrupt change is observed during the Epi-Olmec occupation that is related to a transformation in the political-economic model which was corporate. During the Late Formative and the transition from the Late to the Terminal Formative periods, there were used a wide variety of basalts such as massive pyroxene porphyritic basalt (10.1), massive fine-grained basalt (10.3), massive olivine porphyritic basalt (10.2), vesicular pyroxene porphyritic basalt (11.1), vesicular fine-grained basalt (11.3), and vesicular olivine porphyritic basalt (11.2). The occurrence of all these types of basalt which were used also reflects the expansion of Tres Zapotes as a polity and the increase of sources that were reached from more distant outcrops than in previous periods. The change was also observed in the factionalization and diversification of functions at the site during the Late Formative period, and there also was a change in the color of rocks used in Tres Zapotes.

[1] This uniform distribution of a utilitarian commodity such as basalt during the Middle Formative period at Tres Zapotes coincides with the third kind of primitive exchange model descibed by Jane Wheeler Pires-Ferreira for Oaxaca during the Middle Formative period called "3. Pooling of utilitarian commodities for later distribution to all members of the community" (Pires-Ferreira and Flannery 1976: 288; Pires-Ferreira 1975: 4).

However, during the Terminal Formative period, there was a subtle decrease in the number of types of basalt used for manufacturing ground stone tools which were massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), and vesicular fine-grained basalt (11.3). This subtle decline in the variety of types of basalt used in Tres Zapotes might indicate the start of the decline of this polity in this area of the Tuxtlas.

In the case of the locality where Operation 3 was conducted, I noticed a distinct trend in the use of types of basalt over time. During the Early Formative period, this locality shows a similar pattern to the one observed in the other Groups, which was the use of massive fine-grained basalt (10.3). But, during the transition from the Early Formative to the Middle Formative and in the Middle Formative period there occurred an abrupt change in the use of basalt types, which were massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular fine-grained basalt (11.3), and massive pyroxene porphyritic basalt (10.1). Then there began a gradual change in the use of raw materials because the basalt types used during the transition from the Middle Formative to the Late Formative were massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), vesicular fine-grained basalt (11.3), massive pyroxene porphyritic basalt (10.1), and massive olivine porphyritic basalt (10.2).

The use of raw materials during the Late Formative period coincides with the main trend noticed in the rest of the Groups. The types used consisted of massive fine-grained basalt (10.3), massive pyroxene porphyritic basalt (10.1), vesicular pyroxene porphyritic basalt (11.1), vesicular fine-grained basalt (11.3), massive olivine porphyritic basalt (10.2), and vesicular olivine porphyritic basalt (11.2).

The Terminal Formative period shows an abrupt decline in the variety of raw materials in Sub-Operation 3A where there was found only massive fine-grained basalt (10.3). Whereas, in Sub-Operation 3B occurred a subtle decrease in the use of raw materials because there were used massive fine-grained basalt (10.3), vesicular pyroxene porphyritic basalt (11.1), massive pyroxene porphyritic basalt (10.1), massive olivine porphyritic basalt (10.2), vesicular olivine porphyritic basalt (11.2), and vesicular fine-grained basalt (11.3).

This interesting variation in the use of types of basalt over time as well as the differential use of these raw materials between the vast majority of the Groups and the locality where Operation 3 was conducted because show us that change over time is not homogeneous. There is evidence of communal agency in the selection of physical properties such as color, hardness, and other characteristics among distinct localities, Groups, and social strata at Tres Zapotes

In regard to the geochemical study, samples from the archaeological site of San Andrés, Tabasco and San Lorenzo-Tenochtitlán, Veracruz were included for comparison. I used cluster analysis for the study of quantitative results of the archaeological samples and included the results obtained from the long-term study of basalt outcrops located in the Tuxtlas, Veracruz, and published by Stephen Nelson and collaborators. Nelson et al. (1992; 1995) identified five groups in the Tuxtlas: TP=Tuxtlas Primitive, TE = Tuxtlas Evolved, TH= Tuxtlas, Hy-Normative alkaline, and TC = Tuxtlas Calc-alkaline.

Because Nelson had identified four major kinds of basalt outcrops and because the sample included artifacts from San Andres, Tabasco which may not have come from the Tuxtlas, I ran the cluster analysis for 5, 6, and 7 clusters. However, since there was at least a possibility that not all four of the groups identified in the Tuxtlas were utilized for artifact manufacture I also ran the analysis for 3 and 4 clusters. The analysis was conducted using the software SPSS 19.0 with absolute Euclidean distance and standardized variables. In the end the seven-cluster solution provided more information concerning variation in the uses of materials for artifacts.

Cluster 1 corresponds mainly to Nelson's Primitive group (and some Evolved specimens), Nelson's Evolved falls in Cluster 2; Nelson's Calc-alkaline are mostly Cluster 6 (and one Cluster 1); and Nelson's H-Normative Alkaline are all Cluster 6. More broadly, Clusters 2 and 6 belong to the Older Volcanic Series, and Cluster 1 belongs to the Newer Volcanic Series.

It was observed in the results that Tres Zapotes exploited the Basalt Clusters 2 and 6 due to the proximity and ease of access during the Early/Middle Formative periods. However, it is also noticed that there was a gradual decrease in the acquisition of those Clusters as Basalt Cluster 1 was used more and more. The data support the idea that Tres Zapotes initially exploited nearby sources on and around Cerro El Vigía (the nearest sources of Clusters 2 and 6 to Tres Zapotes), then increasingly obtained basalts from Group 1, the nearest sources of which are farther to the north. This would correspond with the hypothesized expansion of the Tres Zapotes polity in the Late Formative (and possibly the maintenance of politico-economic ties in the Terminal Formative period). It may also reflect the more complex network of resource acquisition by allied factions in a confederacy as compared to more centralized acquisition in simple and complex chiefdoms.

However, it is important to say again that I presented the aforementioned results, with some caution because none of the samples were randomly selected, even though all of them came from archaeological excavations.

This identified main trend in the acquisition of basalt seems to work for Group 2, Group 1, and the Nestepe Group, but it is also necessary to sample and apply geochemical studies for specimens obtained in Op. 3A because macroscopically the basalt types which were used there were not the commonly acquired types in the other Groups at Tres Zapotes.

Third hypothesis

3. **There will be greater spatial and social segmentation in the sequence of production as a result of an increase of factionalization and the consequent negotiation of the loci of steps of production.**

The third hypothesis is related to the results obtained from testing the first hypothesis. I can say, in general terms, that during the Late and Terminal Formative periods in Tres Zapotes was a segmentation in the sequence of production, mainly because the polity faced a change in the political-economic organization toward a less centralized confederation model. There was factionalization and more complexity in activities such as rituals as well as levels of production. The ubiquity of production was increased, and segmented examples of the sequence of basalt production occurred on plaza floors, in feasting remains, and domestic as well as elite residential contexts. And during the Terminal Formative period there was another step in the fragmentation of the sequence of production. There were processes of re-cycling basalt types of previous periods. Macro-nodules (50.1), nodules (50.2) and anvils (50.8) were not present in any production units, basalt artifacts were reworked, and only small and medium by-products were generated.

The evidence that supports the conclusion that the ubiquity of production increased as well as the occurrence of a segmentation of the production sequence in different contexts it is observed in contexts which date back to the Late Formative period, the transition from the Late to the Terminal Formative period, and the Terminal Formative period.

In regard to the Late Formative period, in Group 2, some domestic contexts (i.e. Op. 2A) show that only a few steps of the productive sequence were performed there such as fine-flaking (some of the last steps). Instead, in other domestic contexts (i.e. Op 2E) there were more steps of the *chaîne opératoire* which correspond to the initial stages in the productive process of basalt artifacts such as roughing and pecking. It seems that every domestic productive unit specialized in a segment of the sequence of production of ground stone artifacts. Probably, they exchanged their by-products for finished tools.

In regard to elite residential administrative contexts during the Late Formative period, it is noticed also a segmentation of the productive sequence. In Group 2 there was found a multi-crafting unit of production attached to an elite residential context. In that workshop were found almost all the steps which comprise the sequence of production. There was evidence of the reduction of boulders which were acquired from the outcrops, pecking tasks, roughing activities, flaking, fine-flaking, and polishing. However, there were found examples of elite residential administrative contexts where a few of steps of the *chaîne operatoire* were performed such as pecking and flaking in Group 2 (Op. 2B and 2C), Group 3, Nestepe Group (where flaking was performed in a feasting context and on a floor), and in Op. 7. In the same period, but in Civic-ceremonial contexts, in Group 3 was found evidence that roughing, pecking, and flaking activities were performed, whereas in the Nestepe Group there were only pebbles with evidence of thermic shock. In regard to Operation 3A, there is evidence for a specialized production unit of ground stone artifacts in a residential setting. The evidence suggests that the vast majority of the steps of the sequence of production were performed there such as reduction of boulders, roughing, pecking, fine flaking, the making of preforms, and polishing.

During the transition from the Late Formative period to the Terminal Formative period, all the cases are elite residential administrative contexts. However, there were two main groups depending on the steps of the sequence of production which were performed in both kinds of contexts. On the one hand, in Group 1 and the Nestepe Group there were identified only flaking activities, but on the other hand, in Groups 2 (Op. 2D), 3, and the locality where Op. 7 was conducted, was identified evidence which suggest that roughing, pecking, fine-flaking, and the making of preforms were performed there.

Finally, during the Terminal Formative period, there was evidence that only flaking and pecking activities were performed in civic-ceremonial contexts(i.e. Group 2 (Op. 2A and 2E) and Group 3), and an elite residential administrative (Nestepe Group) context.

In regard to domestic contexts, in the locality where sub-Operation 3A was conducted, it was noticed that basalt production decreased. Only pecking and fine-flaking activities were performed. On the contrary, in the place where sub-Operation 3-B was conducted there was evidence of a multi-crafting production unit at a domestic level. There were performed several steps of the sequence of production such as the reduction of boulders, roughing, pecking, and fine-flaking.

Final remarks

In addition to its goal of evaluating specific hypotheses, this study produced other results that merit discussion.

In regard to the acquisition of basalt types in Tres Zapotes, it is interesting to see the change from the Middle Formative system of economic organization to the scenario which was developed during the Late Formative period, where the polity reaches the peak of economic development. There were more types of basalt used in every plaza group, and in functionally distinct spaces and places of different statuses. There were not many differences in the kinds of basalt used, but the quantity of the kinds of basalt used varied. Over time the types of basalt associated with elites and political leaders continued until the polity declined. This sequence of production, acquisition, and discard defines a political economic system which occurred at the end of the Formative period, after using the same raw material by polities during the Early and Middle Formative period, and those polities were organized as complex chiefdoms. It seems that those polities changed over time, and they evolved from exclusionary and centralized organization of raw materials to a more decentralized economy. The distance to the outcrops in the Tuxtlas may have been important as a factor in the evolution of technology and the development of distribution systems for basalt of different types. For instance, San Lorenzo-Tenochtitlán acquired basalt types from a few outcrops, and some centuries later in San Andres the acquisition increased the variation, as chiefdoms during Middle Formative expanded along with their networks of exchange. Some centuries later, the inhabitants of Tres Zapotes created a new system of political-economic system of organization. During the Late Formative period in Tres Zapotes their leaders who lived in different plaza groups instituted an innovative and less centralized form of government. A confederacy was able to moderate interests of powerful factions in a ruling assembly and avoid division and collapse. The study of ground stone technology, which comprises distribution, variation, and acquisition in the types of basalt used in the plaza groups and the domestic localities as well as the steps of the *chaîne operatoire* identified in multiple places suggest a decentralized and corporate strategy in the manufacture of ground stone artifacts. In Olman, the collapses of San Lorenzo, and then La Venta, did not interrupt the cultural history of the Olmecs. The Olmecs transformed into the so-called Epi-Olmecs who evolved and innovated with a new political-economic system, and adapted to changing social and natural circumstances. The change to a decentralized and more corporate system transformed the ground stone industry; this dissertation provides archaeological evidence that supports this interpretation.

The significance of this analysis on the study of a quotidian industry in Tres Zapotes -basalt ground stone artifacts- for a better understanding of political-economic changes over time of a polity in pre-Hispanic times in Southern Gulf Coast of Mexico relies on its coverage of issues such as acquisition, production, consumption , and discard of basalt artifacts. The topic has been approached before, but perhaps not in the same detail, and this has been an opportunity to explore this important component of material culture that it is behind the colossal art for which Olmec and Epi-Olmec cultures are known. The purpose of this dissertation is to show that the repertoire of techniques as well as the use of the same types of basalt for the manufacture of ground stone artifacts, the *chaîne opératoire*, was the same as the one used for sculpting monuments. It is possible to assert that the ground stone industry was the socio-technological body that supported the colossal heads and other monuments which were made by Olmec and Epi-Olmec artists.

This repertoire of techniques and use of basalt evolved over time in accord to political-economic changes. In Tres Zapotes, there was a centralized and exclusionary system that is perceived superficially as the Olmec culture during Early and Formative periods. The transformation in the political-economic system occurred during the Late Formative and Terminal periods in a corporate system, and it is perceived as the Epi-Olmec culture. In this work my purpose was to test if in the ground stone industry it could be possible to identify these changes over time as well in distinct societal statuses. Ultimately, I discovered that it is possible to observe changes in the ground stone industry of a polity and I want to call attention to my archaeological community that it is compulsory to study ground stone industries in all sites of the Southern Gulf Coast of Mexico and the rest of Mesoamerica in order to take into consideration these components of ancient polities.

Appendix

Contextual data of Op. 2A Units 2 and 3, 2A Units 4 and 5, Op. 2B, Op. 2C, Op. 2D, Op. 2E, Op. 3A Units 17, 18, 24, and 33, Op. 3A Units 36 and 37, Op. 3B, Op. 4, Op. 5, Op. 6, and Op. 7

Op. 2A Units 2 and 3

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
159	2A	3	2	1	5	0	72	72	1	10.5	A1		plow zone		high sherd density
32	2A	2	4	1	4	0	24	10.3	3	135	A2	C	plow zone		
121	2A	2	2	3	8	0	24	76	3	31	A2/B	mixed	alluvium		bioturbated
121	2A	2	2	3	8	0	24	10.3	4	101	A2/B	mixed	alluvium		bioturbated
121	2A	2	2	3	8	0	24	10.1	6	28	A2/B	mixed	alluvium		bioturbated
121	2A	2	2	3	8	0	20	10.3	1	28	A2/B	mixed	alluvium		bioturbated
24	2A	2	3	2	6	0	20	10.3	1	33	B	C	plow zone		
24	2A	2	3	2	6	0	24	10.1	6	136	B	C	alluvium		
24	2A	2	3	2	6	0	24	10.3	2	24	B	C	alluvium		
69	2A	2	1	2	6	0	24	30	20	99	B	C	alluvium		
69	2A	2	1	2	6	0	24	30	14	59	B	C	alluvium		
69	2A	2	1	2	6	0	20	14	1	4	B	C	alluvium		
92	2A	2	1	2	7	0	30	10.1	5	54	B	C	alluvium		
93	2A	3	3	2	7	0	24	10.3	1	24	B	TF/EC	alluvium	bioturbated	mixed due to rodent activity
93	2A	3	3	2	7	0	24	72	1	17.3	B	TF/EC	alluvium	bioturbated	mixed due to rodent activity
97	2A	3	2	2	7	0	24	10.3	6	36	B	TF/EC	alluvium	bioturbated	mixed due to rodent activity
97	2A	3	2	2	7	0	24	76	2	3.2	B	TF/EC	alluvium	bioturbated	mixed due to rodent activity
154	2A	2	2	3	9	0	24	10.1	8	79	C	EC	civic-ceremonial	plaza	
154	2A	2	2	3	9	0	24	10.1	1	42	C	TF/EC	civic-ceremonial	plaza	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
154	2A	2	2	3	9	0	24	70	1	47	C	EC	civic-ceremonial	plaza	
142	2A	2	1	3	9	0	20.1	10.3	1	506	C	EC	civic-ceremonial	plaza	
142	2A	2	1	3	9	0	20	10.1	1	52	C	EC	civic-ceremonial	plaza	
142	2A	2	1	3	9	0	24	10.1	13	234	C	EC	civic-ceremonial	plaza	
142	2A	2	1	3	9	0	24	10.3	8	17	C	EC	civic-ceremonial	plaza	
158	2A	2	4	3	9	0	24	10.1	6	42	C	EC	civic-ceremonial	plaza	
152	2A	2	3	3	9	0	20.1	10.3	1	963	C	EC	civic-ceremonial	plaza	
152	2A	2	3	3	9	0	27	10.1	1	1287	C	EC	civic-ceremonial	plaza	
152	2A	2	3	3	9	0	24	10.1	9	115	C	EC	civic-ceremonial	plaza	
144	2A	2	3	3	9	0	24	10.1	4	17	C	EC	civic-ceremonial	plaza	
206	2A	2	3	3	10	0	24	10.3	7	84	C	EC	civic-ceremonial	plaza	
206	2A	2	3	3	10	0	24	10.3	2	43	C	EC	civic-ceremonial	plaza	
206	2A	2	3	3	10	0	20	10.3	2	98	C	EC	civic-ceremonial	plaza	
195	2A	2	1	3	10	0	24	10.1	17	175	C	EC	civic-ceremonial	plaza	
195	2A	2	1	3	10	0	20	10.3	1	11	C	EC	civic-ceremonial	plaza	
218	2A	2	3	3	10	0	24	10.3	10	1	C	EC	civic-ceremonial	plaza	
218	2A	2	3	3	10	0	24	10.1	9	51	C	EC	civic-ceremonial	plaza	
218	2A	2	3	3	10	0	20	10.3	2	95	C	EC	civic-ceremonial	plaza	
220	2A	2	4	3	10	0	24	10.3	7	79	C	EC	civic-ceremonial	plaza	
220	2A	2	4	3	10	0	24	76	3	19	C	EC	civic-ceremonial	plaza	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
220	2A	2	4	3	10	0	60	60	1	12	C	EC	civic-ceremonial	plaza	
220	2A	2	4	3	10	0	24	10.3	1	8	C	EC	civic-ceremonial	plaza	
213	2A	2	2	3	10	0	24	76	6	14	C	EC	civic-ceremonial	plaza	
213	2A	2	2	3	10	0	24	10.1	12	53	C	EC	civic-ceremonial	plaza	
213	2A	2	2	3	10	0	24	10.3	2	33	C	EC	civic-ceremonial	plaza	
225	2A	2	2	3	10	0	50.3	60	2	225	C	EC	civic-ceremonial	plaza	
231	2A	2	1	3	10	0	24	10.1	1	45	C	EC	civic-ceremonial	plaza	
323	2A	3	3	7	12	0	1	10.3	1	220	C	TF/EC	civic-ceremonial	plaza	high sherd density
114	2A	3	4	3	8	0	60	60	5	31.5	C/E1	TF/EC	alluvium		high sherd density
124	2A	3	2	3	8	0	24	10.3	1	24.6	C/E1	TF/EC	alluvium		high sherd density
160	2A	3	1	3	9	0	72	72	4	106	C/E1	TF/EC	alluvium		high sherd density
141	2A	3	3	3	9	0	24	10.1	13	111	C/E1	TF/EC	alluvium		high sherd density
148	2A	3	4	3	9	0	24	10.2	1	52.9	C/E1	TF/EC	alluvium		high sherd density
159	2A	3	2	3	9	0.1	72	72	1	52.5	C/E1	TF/EC	alluvium		high sherd density
166	2A	3	1	3	10	0	24	10.3	7	121	C/E1	TF/EC	alluvium		high sherd density
166	2A	3	1	3	10	0	24	10.1	2	26.9	C/E1	TF/EC	plow zone		high sherd density
166	2A	3	1	3	10	0	72	72	1	54.6	C/E1	TF/EC	alluvium		high sherd density
166	2A	3	1	3	10	0	20	10.3	1	8.5	C/E1	TF/EC	alluvium		high sherd density
141	2A	3	3	3	10	0	24	10.1	10	51	C/E1	TF/EC	alluvium		high sherd density
182	2A	3	3	3	10	0	24	10.3	2	12.8	C/E1	TF/EC	alluvium		high sherd density

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
189	2A	3	4	3	10	0	24	11.3	6	65.6	C/E1	TF/EC	alluvium		high sherd density
189	2A	3	4	3	10	0	24	10.3	2	20.2	C/E1	TF/EC	alluvium		high sherd density
246	2A	3	1	3	10	0	2	10.3	1	169	C/E1	TF/EC	alluvium		high sherd density
264	2A	3	1	3	11	0	24	10.1	7	65.3	C/E1	TF/EC	alluvium		high sherd density
264	2A	3	1	3	11	0	24	11.1	9	92.8	C/E1	TF/EC	alluvium		high sherd density
264	2A	3	1	3	11	0	72	72	2	65.2	C/E1	TF/EC	alluvium		high sherd density
264	2A	3	1	3	11	0	24	76	1	6.2	C/E1	TF/EC	alluvium		high sherd density
264	2A	3	1	3	11	0	20	10.3	2	76.2	C/E1	TF/EC	alluvium		high sherd density
245	2A	3	4	3	11	0	24	10.1	6	75.4	C/E1	TF/EC	alluvium		high sherd density
245	2A	3	4	3	11	0	15	10.3	1	30	C/E1	TF/EC	plow zone		high sherd density
245	2A	3	4	3	11	0	72	72	1	75	C/E1	TF/EC	alluvium		high sherd density
256	2A	2	1	3	11	0	1	10.3	1	212	E1	TF/EC	civic-ceremonial	plaza fill	
256	2A	2	1	3	11	0	20	10.3	2	34	E1	TF/EC	civic-ceremonial	plaza fill	
256	2A	2	1	3	11	0	24	10.1	10	95	E1	TF/EC	elite res-admin	plaza fill	
256	2A	2	1	3	11	0	24	76	4	21	E1	TF/EC	elite res-admin	plaza fill	
285	2A	2	2	3	11	0	20	10.1	1	59	E1	TF/EC	civic-ceremonial	plaza fill	
285	2A	2	2	3	11	0	20	10.3	1	8	E1	TF/EC	civic-ceremonial	plaza fill	
285	2A	2	2	3	11	0	20	10.3	6	18	E1	TF/EC	civic-ceremonial	plaza fill	
285	2A	2	2	3	11	0	24	10.1	11	12	E1	TF/EC	civic-ceremonial	plaza fill	
280	2A	2	1	3	11	0	24	60	6	61	E1	TF/EC	civic-ceremonial	plaza fill	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
280	2A	2	1	3	11	0	20	10.3	2	9	E1	TF/EC	civic-ceremonial	plaza fill	
280	2A	2	1	3	11	0	24	10.3	2	14	E1	TF/EC	civic-ceremonial	plaza fill	
239	2A	2	1	3	11	0	24	10.3	12	108	E1	TF/EC	civic-ceremonial	plaza fill	
239	2A	2	1	3	11	0	24	76	3	51	E1	TF/EC	civic-ceremonial	plaza fill	
415	2A	3	3	3	15	0	20	10.3	2	32.6	E1	TF/EC	alluvium		moderate sherd density
415	2A	3	3	3	15	0	12	10.1	1	146	E1	TF/EC	alluvium		moderate sherd density
415	2A	3	3	3	15	0	24	10.1	1	12.5	E1	TF/EC	alluvium		moderate sherd density
459	2A	3	1	10	16	0	24	10.3	1	11.3	E1.5	LF	civic-ceremonial	plaza fill	
521	2A	3	3	10	16	0	24	11.1	1	66.9	E1.5	LF	civic-ceremonial	plaza fill	
468	2A	3	3	10	16	0	24	10.3	1	17.6	E1.5	LF	civic-ceremonial	plaza fill	
468	2A	3	3	10	16	0	20	11.1	1	44.9	E1.5	LF	civic-ceremonial	plaza fill	
1493	2A	3	2	10	16	0	50.6	11.1	1	74.6	E1.5	LF	civic-ceremonial	plaza fill	
578	2A	3	2	10	17	0	20	10.3	1	14.3	E1.5	LF	civic-ceremonial	plaza fill	
613	2A	3	2	10	18	0	2	10.1	1	335	E1.5	LF	civic-ceremonial	plaza fill	
639	2A	3	0	10	19	0	2	11.1	1	193	E1.5	LF	civic-ceremonial	plaza fill	
639	2A	3	0	10	19	0	20	10.3	1	16.5	E1.5	LF	civic-ceremonial	plaza fill	
639	2A	3	0	10	19	0	24	10.3	1	24.2	E1.5	LF	civic-ceremonial	plaza fill	
706	2A	3	0	10	20	0	21	10.1	1	194	E1.5	LF	civic-ceremonial	plaza fill	
676	2A	3	0	10	20	0	20	10.3	1	162	E1.5	LF	civic-ceremonial	plaza fill	
677	2A	3	1	16	21	0	20	10.3	1	149	K	LF	alluvium		
263	2A	2	0	16	22	0	20	10.3	1	6	K	LF	alluvium		

Op. 2A Units 4 and 5

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
7029	2A	5	0	1	1	0	20	11.1	2	65.1	A		plow zone		
7029	2A	5	0	1	1	0	20	10.3	7	276	A		plow zone		
7029	2A	5	0	1	1	0	50.2	10.1	1	230	A		plow zone		
7029	2A	5	0	1	1	0	24	11.1	17	275	A		plow zone		
7029	2A	5	0	1	1	0	24	76	6	28.5	A		plow zone		
7033	2A	5	0	1	1	0	24	11.3	4	81.2	A		plow zone		
7033	2A	5	0	1	1	0	24	10.3	15	150	A		plow zone		
7033	2A	5	0	1	1	0	20	10.3	6	63	A		plow zone		
7033	2A	5	0	1	1	0	2	11.1	1	36.7	A		plow zone		
7039	2A	5	0	1	3	0	24	11.1	31	390	A		plow zone		
7039	2A	5	0	1	3	0	20	10.3	1	108	A		plow zone		
7039	2A	5	0	1	3	0	20	11.1	4	85.6	A		plow zone		
7039	2A	5	0	1	3	0	20	10.1	2	30.3	A		plow zone		
7039	2A	5	0	1	3	0	20	11.1	1	43.1	A		plow zone		
7039	2A	5	0	1	3	0	20	76	2	50.9	A		plow zone		
7039	2A	5	0	1	3	0	24	76	3	29.4	A		plow zone		
832	2	4	0	1	3	0	24	10.3	1	7.3	A		plow zone		
7078	2A	5	0	1	4	0	24	11.1	12	405	A	TF/EC	plow zone		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
7078	2A	5	0	1	4	0	20	11.1	5	117	A	TF/EC	plow zone		
7086	2A	5	0	2	4	0	20	10.3	1	19.1	A	TF/EC	plow zone		
7086	2A	5	0	2	4	0	20	10.3	1	45.4	A	TF/EC	plow zone		
7086	2A	5	0	2	4	0	20	11.1	1	43.3	A	TF/EC	plow zone		
860	2	4	0	2	4	0	20	10.3	1	48.2	A	TF/EC	plow zone		
854	2	4	0	2	4	0	20	10.1	2	104	A	TF/EC	plow zone		
7108	2A	5	0	2	5	0	20	10.1	1	16.8	A	TF/EC	plow zone		
7108	2A	5	0	2	5	0	20	10.3	4	38.2	A	TF/EC	plow zone		
7108	2A	5	0	2	5	0	50.5	10.3	1	29.6	A	TF/EC	plow zone		
887	2	4	0	2	5	0	20	10.1	1	62	A	TF/EC	plow zone		
887	2	4	0	2	5	0	20	10.1	1	34.8	B	TF/EC	plow zone		
7114	2A	5	0	3	6	0	20	10.1	1	70.9	B	TF/EC	alluvium		
7114	2A	5	0	3	6	0	20	10.3	2	34.9	B	TF/EC	alluvium		
7114	2A	5	0	3	6	0	20	11.1	1	40	B	TF/EC	alluvium		
7114	2A	5	0	3	6	0	20	10.3	1	12.4	B	TF/EC	alluvium		
7114	2A	5	0	3	6	0	21	10.1	3	122	B	TF/EC	alluvium		
7114	2A	5	0	3	6	0	24	76	1	11.2	B	TF/EC	alluvium		
7114	2A	5	0	3	6	0	24	10.3	2	12.8	B	TF/EC	alluvium		
7114	2A	5	0	3	6	0	9	72	1	3.5	B	TF/EC	alluvium		
918	2	4	0	3	6	0	63	63	1	92	B	TF/EC	alluvium		deposit outside rodent burrows

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
918	2	4	0	3	6	0	50.5	11.3	1	19.2	B	TF/EC	alluvium		deposit outside rodent burrows
7132	2A	5	0	3	7	0	20.1	10.3	1	99.1	B	TF/EC	alluvium		
7132	2A	5	0	3	7	0	20.1	10.1	1	56.9	B	TF/EC	alluvium		
7132	2A	5	0	3	7	0	20	10.3	5	21.5	B	TF/EC	alluvium		
7132	2A	5	0	3	7	0	20	10.1	2	27.1	B	TF/EC	alluvium		
7132	2A	5	0	3	7	0	21	10.3	1	50.6	B	TF/EC	alluvium		
7134	2A	5	0	3	7	0	9	72	1	67.1	B	TF/EC	alluvium		
937	2	4	0	3	7	0	10.2	63	1	54.3	B	TF/EC	alluvium		deposit outside rodent burrows
7144	2A	5	0	3	9	0	20	10.1	1	23.9	B	TF/EC	alluvium		
7144	2A	5	0	3	9	0	20	10.3	1	24.7	B	TF/EC	alluvium		
7143	2A	5	0	3	9	0	20.1	11.3	1	208	B	TF/EC	alluvium		
7143	2A	5	0	3	9	0	24	11.3	1	29.5	B	TF/EC	alluvium		
968	2	4	0	3	9	0	20.1	10.3	1	100	B	TF/EC	alluvium		deposit outside rodent burrows
968	2	4	0	3	9	0	69	69	1	30.1	B	TF/EC	alluvium		deposit outside rodent burrows
968	2	4	0	3	9	0	24	10.3	1	16.7	B	TF/EC	alluvium		deposit outside rodent burrows
7167	2A	5	3	3	10	0	20	11.1	1	62.9	B	TF/EC	alluvium		
982	2	4	1	6	10	0	50.6	10.1	1	8.6	C1	TF	civic-ceremonial	plaza fill	
7183	2A	5	6	7	11	0	20	11.3	2	20.6	C1	TF	civic-ceremonial	plaza fill	
7183	2A	5	6	7	11	0	24	10.3	2	58	C1	TF	civic-ceremonial	plaza fill	
1027	2	4	0	6	11	0	27	10.3	1	623	C1	TF	civic-ceremonial	plaza fill	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
1046	2	4	0	6	13	0	20.1	10.1	1	64.8	C1	TF	civic-ceremonial	plaza fill	
1046	2	4	0	6	13	0	24	10.1	2	46.5	C1	TF	civic-ceremonial	plaza fill	
1045	2	4	0	6	13	0	72	72	1	63.4	C1	TF	civic-ceremonial	plaza fill	
1070	2	4	0	6	14	0	20	10.3	1	77	C1	TF	civic-ceremonial	plaza fill	
1070	2	4	0	6	14	0	2	10.3	1	122	C1	TF	civic-ceremonial	plaza fill	
1070	2	4	0	6	14	0	20.1	10.1	1	86.3	C1	TF	civic-ceremonial	plaza fill	
1070	2	4	0	6	14	0	20	10.1	1	15.5	C1	TF	civic-ceremonial	plaza fill	
1070	2	4	0	6	14	0	24	10.3	1	37.5	C1	TF	civic-ceremonial	plaza fill	
1070	2	4	0	6	14	0	24	11.1	2	77.5	C1	TF	civic-ceremonial	plaza fill	
1070	2	4	0	6	14	0	24	76	1	0.7	C1	TF	civic-ceremonial	plaza fill	
7849	2	4	1	6	15	0	2	10.3	1	144	C1	TF	civic-ceremonial	plaza fill	
7831	2	4	2	6	15	0	24	10.3	1	72.2	C1	TF	civic-ceremonial	plaza fill	
7969	2	4	7	6	16	0	20	10.3	1	118	C1	TF	civic-ceremonial	plaza fill	
7971	2	4	7	6	16	0	24	10.3	1	105	C1	TF/EC	civic-ceremonial	plaza fill	
1028	2	4	0	7	12	0	24	10.3	5	128	C3	LF	civic-ceremonial	ceramic concentration	
1028	2	4	0	7	12	0	24	76	1	4.6	C3	LF	civic-ceremonial	ceramic concentration	
1053	2	4	0	7	13	0	24	11.1	1	19.6	C3	LF	civic-ceremonial	ceramic concentration	
1072	2	4	0	7	14	0	24	10.3	1	142	C3	LF	civic-ceremonial	ceramic concentration	
12088	2	4	7	7	15	0	19	10.3	1	178	C3	LF	civic-ceremonial	ceramic concentration	
786	2	4	9	7	15	0	20	10.3	1	7.5	C3	LF	civic-ceremonial	ceramic concentration	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
7866	2	4	4	7	15	0	20	11.1	2	44.9	C3	LF	civic-ceremonial	ceramic concentration	
7219	2A	5	2	8	12	0	20	10.3	1	45.8	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7219	2A	5	2	8	12	0	21	10.1	4	224	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7219	2A	5	2	8	12	0	25	10.3	2	3.1	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7209	2A	5	7	8	12	0.1	20	10.3	1	109	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7209	2A	5	7	8	12	0.1	24	76	1	4.5	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7230	2A	5	1	8	13	0.1	20.1	10.3	1	110	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7233	2A	5	1	8	13	0	50.6	10.3	1	99.5	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7237	2A	5	2	8	13	0	20	10.3	1	15.5	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7237	2A	5	2	8	13	0	21	10.3	1	34.9	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7243	2A	5	3	8	13	0	24	76	1	5.1	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7892	2A	5	2	9	15	0	20	10.1	1	14.1	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7896	2A	5	3	9	15	0	20	10.1	1	18.5	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7896	2A	5	3	9	15	0	20	76	1	24.1	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7896	2A	5	3	9	15	0	9	72	1	13.6	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7832	2A	4	3	9	15	0	20	10.3	1	97.7	C3	LF	civic-ceremonial		
7962	2A	4	1	11	16	0	24	10.3	1	14.2	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7950	2A	4	6	11	16	0	50.6	10.3	1	48.1	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7950	2A	4	6	11	16	0	20	10.3	1	3.5	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7950	2A	4	6	11	16	0	24	11.3	1	24.5	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
7950	2A	4	6	11	16	0	24	10.3	1	24	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7960	2A	4	5	11	16	0	50.5	10.3	1	176	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7954	2A	4	4	11	16	0	20.1	10.3	1	91.7	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
12020	2A	4	6	11	17	0	20	10.3	1	12	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
12026	2A	4	2	11	17	0	24	10.3	2	40.5	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
12026	2A	4	2	11	17	0	72	72	1	20.2	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
12026	2A	4	2	11	17	0	24	76	2	17.6	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
12027	2A	4	4	11	17	0	50.6	10.3	1	762	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
12035	2A	4	5	11	17	0	20	10.3	1	4.1	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
12035	2A	4	5	11	17	0	24	10.1	1	39.1	C3	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
12072	2A	4	6	11	18	0	20	10.3	1	5.4	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
12073	2A	4	6	11	18	0	20	10.3	1	4.5	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
12073	2A	4	6	11	18	0	24	76	1	0.5	C3	LF	civic-ceremonial	plaza fill	sandy soil mixed with laja, more sand than laja
7275	2A	5	4	10	9	0	20	11.1	1	59.3	D1	LF	civic-ceremonial	plaza floor: laja	More laja than sand
7277	2A	5	4	10	10	0	50.5	10.1	1	62.5	D1	LF	civic-ceremonial	plaza floor: laja	More laja than sand
7293	2A	5	4	10	10	0	20	10.3	1	833	D1	LF	civic-ceremonial	plaza floor: laja	More laja than sand
7293	2A	5	4	10	10	0	24	10.1	2	9	D1	LF	civic-ceremonial	plaza floor: laja	More laja than sand
7323	2A	5	5	10	12	0	9	72	4	1030	D1	LF	civic-ceremonial	plaza floor: laja	More laja than sand
7317	2A	5	7	10	14	0	24	10.1	1	2	D1	LF	civic-ceremonial	plaza floor: laja	More laja than sand
7922	2A	4	9	10	15	0	20	10.3	1	23.1	D1	LF	civic-ceremonial	plaza floor: laja	More laja than sand

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
12061	2A	4	6	10	17	0	20	10.3	1	16.9	D1	LF	civic-ceremonial	plaza floor: laja	More laja than sand
12076	2A	4	3	14	18	0	20	10.3	1	4.2	D1	LF	civic-ceremonial	plaza floor: laja and volcanic ash	compact sandy deposit with laja and volcanic ash
7331	2A	5	4	12	10	0	24	76	1	13.1	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7331	2A	5	4	12	10	0	24	10.3	1	26.2	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7331	2A	5	4	12	10	0	20	10.3	2	4.9	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7351	2A	5	4	12	12	0	20	10.1	1	14.9	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7351	2A	5	4	12	12	0	21	10.1	1	35.5	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7359	2A	5	5	12	13	0	24	10.3	2	27.9	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7367	2A	5	6	12	13	0	24	10.3	1	54.7	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7387	2A	5	4	12	14	0	24	10.3	6	48.6	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7386	2A	5	5	12	14	0	20	10.3	1	44.2	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7390	2A	5	6	12	14	0	20	10.3	1	51.7	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7390	2A	5	6	12	14	0	20	10.3	1	14.2	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7390	2A	5	6	12	14	0	9	72	1	60.9	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7387	2A	5	6	12	14	0	24	10.3	1	10.6	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7387	2A	5	6	12	14	0	9	72	1	1.4	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7394	2A	5	7	12	14	0	24	10.1	6	159	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7392	2A	5	7	12	14	0	20.1	10.3	1	110	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7905	2A	5	4	12	15	0	9	41	1	29.7	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7912	2A	5	6	12	15	0	12	72	1	132	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
7912	2A	5	6	12	15	0	20	10.3	1	10.7	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7924	2A	5	7	12	15	0	20	10.3	1	4.4	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7924	2A	5	7	12	15	0	20	10.1	1	56.4	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7924	2A	5	7	12	15	0	24	10.3	1	38.4	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
7997	2A	4	5	12	16	0	72	72	1	56.1	D2	LF	civic-ceremonial	plaza fill	soil below laja floor
12003	2A	4	5	12	16	0	24	10.3	3	66.9	D2	LF	civic-ceremonial	plaza fill	soil below laja floor
12037	2A	4	7	13	17	0	20	10.3	1	10.5	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
12037	2A	4	7	13	17	0	24	10.3	1	33	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
12056	2A	4	8	13	17	0	24	10.1	3	8.7	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
12071	2A	4	3	13	18	0	20	10.3	1	43.3	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
12071	2A	4	3	13	18	0	24	10.3	1	28.2	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
12104	2A	4	3	12	19	0	20	10.3	1	16.7	D2	LF	civic-ceremonial	plaza fill	soil below laja floor
12109	2A	4	6	12	19	0	24	11.3	1	12.5	D2	LF	civic-ceremonial	plaza fill	soil below laja floor
12106	2A	4	3	13	19	0	20	10.3	1	30.2	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor
12106	2A	4	3	13	19	0	24	11.1	1	62.3	D2	LF	civic-ceremonial	plaza fill	compact sandy deposit below laja floor

Op. 2B

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
8106	2B	14	0	1	1	0	24	10.1	1	181	A1	EC	plow zone		
1029	2B	6	3	1	3	0	24	11.1	1	121	A2	EC	elite res-admin	fill external to platform	
1029	2B	6	3	1	3	0	24	76	1	55	A2	EC	elite res-admin	fill external to platform	
1082	2B	7	4	3	6	0	20	10.3	1	188	A2	EC	elite res-admin	fill external to platform	
1082	2B	7	4	3	6	0	24	10.1	1	57	A2	EC	elite res-admin	fill external to platform	
1651	2B	6	1	3	6	0.2	1	10.3	1	24	A2	EC	elite res-admin	fill external to platform	
1793	2B	6	4	3	6	0.3	20	10.3	2	12	A2	EC	elite res-admin	fill external to platform	
6257	2B	14	2	1	6	0	20	10.1	1	532	A3	EC	elite res-admin		
1107	2B	7	1	4	6	0	60	60	1	120	A3	EC	elite res-admin	platform - rubble fill/pavement	
6318	2B	14	4	1	7	0	20	10.3	2	237	A3	EC	elite res-admin		
1729	2B	13	4	2	6	0	20	10.3	1	479	B	LF	domestic		
1729	2B	13	4	2	6	0	24	76	1	78	B	LF	domestic		
6306	2B	14	3	2	7	0	20	10.3	1	55	B	LF	elite res-admin		
6306	2B	14	3	2	7	0	20	10.3	1	39	B	LF	elite res-admin		
6306	2B	14	3	2	7	0	20	10.3	2	104	B	LF	elite res-admin		
6148	2B	6	2	8	7	0.1	50.3	10.3	1	7	B	LF	elite res-admin	platform - rubble fill/pavement	
6372	2B	14	4	2	8	0	20	10.3	1	3	B	LF	elite res-admin		
6398	2B	14	1	2	8	0	20	10.3	1	494	B	LF	elite res-admin		
6375	2B	14	3	2	8	0	50.5	10.1	1	30	B	LF	elite res-admin		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
6375	2B	14	3	2	8	0	24	10.1	1	37	B	LF	elite res-admin		
6432	2B	14	2	2	9	0	20	10.3	1	316	B	LF	elite res-admin		
6224	2B	6	2	8	10	0.1	1	10.3	1	1067	B	LF	elite res-admin	platform - rubble fill/pavement	
6178	2B	6	1	7	10	0	24	76	1	3	B	LF	elite res-admin	fill external to platform	
6200	2B	6	2	7	10	0	24	11.1	1	3	B	LF	elite res-admin	platform - rubble fill/pavement	
6200	2B	6	2	7	10	0	24	76	1	3	B	LF	elite res-admin	platform - rubble fill/pavement	
1180	2B	7	3	5	8	0	24	10.1	2	75	B1	LF	elite res-admin	fill external to platform	
1180	2B	7	3	5	8	0	20	10.1	1	46	B1	LF	elite res-admin	fill external to platform	
1239	2B	7	4	5	9	0	1	10.1	1	113	B1	LF	elite res-admin	fill external to platform	
1575	2B	7	4	5	10	0	20	10.3	1	50	B1	LF	elite res-admin	fill external to platform	
1192	2B	7	1	4	7	0	50.3	10.1	1	236	B2	LF	elite res-admin	platform	
1215	2B	7	1	4	8	0	2	10.1	1	71	B2	LF	elite res-admin	platform	
1256	2B	7	1	4	9	0	2	10.1	1	231	B2	LF	elite res-admin	platform	
1253	2B	7	2	4	9	0	20	63	2	31	B2	LF	elite res-admin	platform	
1561	2B	7	2	4	9	0	20	10.1	1	46	B2	LF	elite res-admin	platform	
1485	2B	7	1	4	10	0	24	10.1	1	15	B2	LF	elite res-admin	platform	
6584	2B	14	1	2	11	0	20	10.3	1	15	C	LF	elite res-admin		
1361	2B	7	4	7	11	0	20	10.3	1	9	C	LMF	domestic		
1456	2B	7	3	7	12	0	50.1	10.1	1	630	C	LMF	domestic		
1459	2B	7	4	7	12	0	50.4	10.1	1	83	C	LMF	domestic		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
6295	2B	6	2	8	12	0	20	10.3	3	36	C	LF	elite res-admin		
6252	2B	6	2	8	12	0	24	10.3	5	84	C	LF	elite res-admin		
6252	2B	6	2	8	12	0	5	10.3	1	73	C	LF	elite res-admin		
6252	2B	6	2	8	12	0	24	76	1	9	C	LF	elite res-admin		
1648	2B	7	4	7	13	0	20	10.3	1	53	C	LMF	domestic		
6299	2B	6	1	7	13	0	20	10.3	1	60	C	LF	elite res-admin		
6299	2B	6	1	7	13	0	20	10.3	1	74	C	LF	elite res-admin		
6342	2B	6	2	8	13	0	20	10.3	1	17	C	LF	elite res-admin		
1507	2B	6	4	7	13	0	5	10.3	1	306	C	LF	elite res-admin		
6696	2B	14	2	2	14	0	20	10.3	1	48	C	LF	domestic		
6696	2B	14	2	2	14	0	24	10.3	1	45	C	LF	domestic		
1684	2B	7	3	7	14	0	1	10.1	1	101	C	LMF	domestic		
1754	2B	7	3	7	15	0	20.1	10.3	1	112	C	LMF	domestic		
1754	2B	7	3	7	15	0	25	10.1	1	128	C	LMF	domestic		
1786	2B	7	1	7	15	0	24	10.3	1	35	C	LMF	domestic		
1956	2B	8	2	8	17	0	2	10.3	1	92	C	LF	domestic		
1910	2B	7	1	11	17	0	24	10.1	2	64	C	LMF	domestic	basalt concentration	moved "basalt concentration" to Specific Context
1917	2B	7	3	11	17	0.6	27	10.3	1	137	C	LMF	domestic	basalt concentration	moved "basalt concentration" to Specific Context
1918	2B	7	3	11	17	0.3	1	10.1	1	722	C	LMF	domestic	basalt concentration	moved "basalt concentration" to Specific Context
1920	2B	7	3	11	17	0.4	50.1	10.3	1	446	C	LMF	domestic	basalt concentration	moved "basalt concentration" to Specific Context

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
1920	2B	7	3	11	17	0.4	50.1	10.3	1	446	C	LMF	domestic	basalt concentration	moved "basalt concentration" to Specific Context
1921	2B	7	3	11	17	0.1	50.7	10.1	1	235	C	LMF	domestic	basalt concentration	moved "basalt concentration" to Specific Context
1922	2B	7	3	11	17	0.11	20.1	10.3	1	390	C	LMF	domestic	basalt concentration	moved "basalt concentration" to Specific Context
1924	2B	7	3	11	17	0.13	1	10.1	1	1927	C	LMF	domestic	basalt concentration	moved "basalt concentration" to Specific Context
1919	2B	7	3	11	17	0.6	1	10.1	1	1327	C	LMF	domestic	basalt concentration	moved "basalt concentration" to Specific Context
1916	2B	7	3	11	17	0.5	50.4	10.1	1	707	C	LMF	domestic	basalt concentration	moved "basalt concentration" to Specific Context
13164	2B	14	1	5	18	0	55.5	10.2	2	6.1	C?	LF	domestic		Parece que el nivel debe de ser 18
6028	2B	8	2	8	18	0	24	76	1	45	C	LF	domestic		
6028	2B	8	2	8	18	0	24	10.3	1	96	C	LF	domestic		
6019	2B	7	1	11	18	0	24	10.3	4	207	C	LMF	domestic	basalt concentration	moved "basalt concentration" to Specific Context
6019	2B	7	1	11	18	0	50.5	10.1	1	65	C	LMF	domestic	basalt concentration	moved "basalt concentration" to Specific Context
6284	2B	8	1	8	21	0	27	10.3	1	64	E	MF	domestic		
6284	2B	8	1	8	21	0	20	10.3	1	95	E	MF	domestic		
6487	2B	8	1	8	22	0	1	10.3	1	209	E	MF	domestic		
6487	2B	8	1	8	22	0	15	10.3	1	56	E	MF	domestic		
6311	2B	8	4	8	22	0	24	10.3	2	92	E	MF	domestic		
6311	2B	8	4	8	22	0	24	10.1	2	78	E	MF	domestic		
6311	2B	8	4	8	22	0	5	72	1	20	E	MF	domestic		
6311	2B	8	4	8	22	0	20.1	10.3	1	301	E	MF	domestic		
6311	2B	8	4	8	22	0	20	10.3	1	5	E	MF	domestic		
6666	2B	8	2	8	23	0	20.1	10.3	1	437	E	MF	domestic		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
6593	2B	8	3	8	24	0	2	10.3	1	362	E	MF	domestic		
6600	2B	8	4	8	24	0	68	68	1	60	E	MF	domestic		
6664	2B	8	2	9	25	0	20.1	10.3	1	181	E	MF	domestic		
6650	2B	8	4	9	25	0	27	10.3	1	121	E	MF	domestic		
6650	2B	8	4	9	25	0	20	10.3	1	55	E	MF	domestic		
6650	2B	8	4	9	25	0	20.1	10.3	1	188	E	MF	domestic		
6681	2B	8	1	9	25	0	20	10.3	1	57	E	MF	domestic		
6720	2B	8	1	9	26	0	66	66	1	24	E	MF	domestic		
6720	2B	8	1	9	26	0	75	75	2	12	E	MF	domestic		
6757	2B	8	0	10	27	0	50.3	10.1	1	532	E	MF	domestic		
6747	2B	8	0	9	27	0	1	10.3	1	120	E	MF	domestic		
6747	2B	8	0	9	27	0	27	10.3	2	237	E	MF	domestic		
6747	2B	8	0	9	27	0	1	10.3	1	479	E	MF	domestic		
6799	2B	8	0	10	28	0	20	10.3	1	78	E	MF	domestic		
6794	2B	8	0	9	28	0	20.1	10.3	1	55	E	MF	domestic		
6744	2B	8	0	9	28	0	20	10.3	1	39	E	MF	domestic		
6830	2B	8	0	10	29	0	20	10.3	2	104	E	MF	domestic		
6830	2B	8	0	10	29	0	24	10.3	1	7	E	MF	domestic		
6855	2B	8	1	10	29	0	24	76	1	3	E	MF	domestic		
6854	2B	8	1	10	29	0	50.3	10.3	1	494	E	MF	domestic		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
6901	2B	8	1	11	33	0	20	10.3	1	30	E1	MF	domestic	volcanic ash floor	
6901	2B	8	1	11	33	0	20	10.3	1	9	E1	MF	domestic	volcanic ash floor	
6925	2B	8	1	13	34	0	24	10.3	1	59	G	MF	domestic		
6938	2B	8	1	13	35	0	20	10.3	1	54	G	MF	domestic		
6938	2B	8	1	13	35	0	27	10.3	1	177	G	MF	domestic		
11009	2B	8	1	13	40	0	50.3	10.3	1	14	G	MF	domestic		
11019	2B	8	1	13	41	0	20	10.3	1	43	G	MF	domestic		
11055	2B	8	1	13	44	0	20.1	10.3	2	374	G	EF	domestic		
11067	2B	8	1	13	46	0	24	10.3	1	229	G	EF	domestic		
11096	2B	8	1	14	51	0	1	10.3	1	112	G	EF	domestic		

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BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
3453	2C	12	0	6	7	0	20	10.3	2	189	C	LF	elite res-admin		
3544	2C	12	0	12	12	0	50.3	10.1	1	284	C/C1	LF	elite res-admin	ramp	
3545	2C	12	0	12	12	0	60	60	1	470	C/C1	LF	elite res-admin	fill below ramp	
3526	2C	12	1	21	14	0	24	10.1	11	108	E	LF	elite res-admin	fill below ramp	
3576	2C	12	1	21	14	0	24	76	1	6	E	LF	elite res-admin	fill below ramp	
3576	2C	12	1	21	14	0	24	10.1	4	180	E	LF	elite res-admin	fill below ramp	
3576	2C	12	1	21	14	0	20	10.3	1	9	E	LF	elite res-admin	fill below ramp	
3576	2C	12	1	21	14	0	25	10.1	2	113	E	LF	elite res-admin	fill below ramp	
3576	2C	12	1	21	14	0	25	10.1	2	113	E	LF	elite res-admin	fill below ramp	
3576	2C	12	1	21	14	0	4	10.3	1	24	E	LF	elite res-admin	fill below ramp	
3576	2C	12	1	21	14	0	24	10.3	1	181	E	LF	elite res-admin	fill below ramp	
3590	2C	12	0	27	15	0	60	60	1	530	D	LF	elite res-admin	fill below ramp	
3616	2C	12	0	32	16	0	1	10.1	2	498	D	LF	elite res-admin	ramp	
3616	2C	12	0	32	16	0	1	10.1	1	179	D	LF	elite res-admin	ramp	
3800	2C	12	0	40	26	0	1	10.3	1	159	D	LF	elite res-admin	ramp	
3682	2C	12	1	41	21	0	50.3	10.3	1	191	E	LF	elite res-admin	fill below ramp	
3725	2C	12	0	41	23	2	1	10.3	1	86	E	MF	elite res-admin	floor	or more broadly civic-ceremonial
3721	2C	12	0	41	23	0	50.4	10.1	1	86	E	LF	elite res-admin	fill below ramp	
3721	2C	12	0	41	23	0	24	10.3	3	23	E	LF	elite res-admin	fill below ramp	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
3721	2C	12	0	41	23	0	24	10.3	1	3	E	LF	elite res-admin	fill below ramp	
3736	2C	12	0	40	23	0	1	10.1	1	917	E	LF	elite res-admin	ramp	
3765	2C	12	0	41	25	0	20	10.3	1	71	E	MF	elite res-admin		or more broadly civic-ceremonial
3765	2C	12	0	41	25	0	20	10.3	2	90	E	MF	elite res-admin		or more broadly civic-ceremonial
3765	2C	12	0	41	25	0	20	10.1	1	42	E	MF	elite res-admin		or more broadly civic-ceremonial
3765	2C	12	0	41	25	0	24	10.1	1	251	E	MF	elite res-admin		or more broadly civic-ceremonial
3781	2C	12	0	41	26	0	1	10.3	3	452	E	MF	burial ritual		or more broadly civic-ceremonial
3808	2C	12	0	41	27	0	20	10.3	1	76	E	MF	elite res-admin		or more broadly civic-ceremonial
3892	2C	12	0	41	29	0	20	10.3	3	121	E	MF	elite res-admin		or more broadly civic-ceremonial
3892	2C	12	0	41	29	0	24	10.1	5	19	E	MF	elite res-admin		or more broadly civic-ceremonial
3914	2C	12	0	41	30	0	2	10.3	1	90	E	MF	elite res-admin	fill below ramp	
3914	2C	12	0	41	30	0	50.5	10.3	2	150	E	MF	elite res-admin	fill below ramp	
3914	2C	12	0	41	30	0	24	10.1	1	66	E	MF	elite res-admin	fill below ramp	
3934	2C	12	0	41	32	0	20	10.3	1	124	E	MF	elite res-admin		or more broadly civic-ceremonial
3934	2C	12	0	41	32	0	20	10.3	1	16	E	MF	elite res-admin		or more broadly civic-ceremonial
3934	2C	12	0	41	32	0	50.3	10.1	1	119	E	MF	elite res-admin		or more broadly civic-ceremonial
3959	2C	12	1	41	33	0	50.3	10.1	1	171	E	MF	elite res-admin		or more broadly civic-ceremonial
3959	2C	12	1	41	33	0	60	60	1	116	E	MF	civic-ceremonial		or more broadly civic-ceremonial
3959	2C	12	1	41	33	0	1	10.1	1	186	E	MF	elite res-admin		or more broadly civic-ceremonial
3978	2C	12	0	43	36	0	20	10.3	1	68	F	MF	elite res-admin	gray clay platform	or more broadly civic-ceremonial

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
140007	2C	12	0	43	39	0	20	10.3	1	33	F	MF	elite res-admin	gray clay platform	or more broadly civic-ceremonial
14020	2C	12	0	44	43	0	20	10.3	1	10	G	MF	domestic?		
14039	2C	12	0	44	44	0	25	10.1	1	56	G	EF	burial ritual		
14033	2C	12	0	44	44	0	1	10.3	1	1282	G	EF	burial ritual		
8008	2C	12	1	44	44	0	20	10.3	1	23	G	MF	domestic?		
8008	2C	12	1	44	44	0	25	10.1	2	215	G	MF	domestic?		
8008	2C	12	1	44	44	0	1	10.1	1	151	G	MF	domestic?		
8008	2C	12	1	44	44	0	1	10.3	3	661	G	MF	domestic?		
8008	2C	12	1	44	44	0	24	10.3	1	159	G	MF	domestic?		
14060	2C	12	0	44	45	0	20	10.1	1	103	G	MF	domestic?		
14071	2C	12	0	44	45	0	50.3	10.1	1	288	G	MF	domestic?		
14062	2C	12	0	44	45	0	1	10.3	1	230	G	MF	domestic?		
14074	2C	12	0	44	45	0	24	10.3	1	81	G	MF	domestic?		
14084	2C	12	0	44	46	0	20	10.3	1	84	G	EF	burial ritual		
8023	2C	12	1	44	46	0	1	10.3	1	141	G	MF	domestic?		
8023	2C	12	1	44	46	0	24	10.3	1	51	G	MF	domestic?		
14109	2C	12	0	44	47	0	2	10.3	1	62	G	MF	domestic?		
8033	2C	12	1	44	48	0	24	10.1	8	153	G	MF	domestic?		
8033	2C	12	1	44	48	0	24	76	2	44	G	MF	domestic?		
8038	2C	12	1	44	49	0	60	60	1	431	G	MF	domestic?		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
8038	2C	12	1	44	49	0	1	10.1	1	48	G	MF	domestic?		
8038	2C	12	1	44	49	0	24	10.3	2	84	G	MF	domestic?		
8041	2C	12	1	44	50	0	20	10.3	1	53	G	EF	burial ritual		
8041	2C	12	1	44	50	0	50.3	10.3	1	68	G	EF	burial ritual		
8041	2C	12	1	44	50	0	20	10.3	1	177	G	EF	burial ritual		
8862	2C	12	1	44	53	0	50.3	10.3	1	321	G	EF	burial ritual		
8086	2C	12	1	44	56	0	1	10.1	1	654	G	EF	burial ritual		
14110	2C	12	0	44	57	0	20	10.1	1	109	G	EF	burial ritual		

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BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
4101	2D	11	2	1	4	0	50.1	10.3	1	112	A	TF	elite res-admin	plow zone		
4101	2D	11	2	1	4	0	24	10.1	2	9.9	A	TF	elite res-admin	plow zone		
4078	2D	11	3	1	4	0	24	11.1	3	112	A	TF	elite res-admin	plow zone		
4078	2D	11	3	1	4	0	24	10.3	2	19.2	A	TF	elite res-admin	plow zone		
4078	2D	11	3	1	4	0	72	72	1	43.3	A	TF	elite res-admin	plow zone		
4078	2D	11	3	1	4	0	20.1	11.1	3	310	A	TF	elite res-admin	plow zone		
4090	2D	11	4	1	4	0	20.1	10.1	2	258	A	TF	elite res-admin	plow zone		
4090	2D	11	4	1	4	0	50.6	10.1	1	59.1	A	TF	elite res-admin	plow zone		
4090	2D	11	4	1	4	0	50.2	10.3	1	190	A	TF	elite res-admin	plow zone		
4090	2D	11	4	1	4	0	24	10.3	3	32.5	A	TF	elite res-admin	plow zone		
4144	2D	11	1	1	5	0	24	10.1	3	135	A	TF	elite res-admin	plow zone		
4144	2D	11	1	1	5	0	24	10.3	1	144	A	TF	elite res-admin	plow zone		
4132	2D	11	4	1	5	0	20	11.1	2	71.9	A	TF	elite res-admin	plow zone		
4143	2D	10	2	2	5	0	60	60	1	84.1	B	TF	elite res-admin			
4145	2D	10	4	2	5	0	21	76	1	136	B	TF	elite res-admin			
4171	2D	10	3	3	6	0	20	10.3	1	9	B	LF	elite res-admin			
4200	2D	11	4	2	6	0	24	10.1	2	120	B	TF	elite res-admin			
4286	2D	9	3	3	7	0	2	10.3	1	470	B	TF	elite res-admin			
4293	2D	9	2	4	8	0	24	11.1	1	65.9	B	TF	elite res-admin			

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
4289	2D	9	3	4	8	0	20	10.3	1	33.7	B	TF	elite res-admin			
4289	2D	9	3	4	8	0	20.1	11.1	1	70.8	B	TF	elite res-admin			
4289	2D	9	3	4	8	0	24	10.1	3	40.4	B	TF	elite res-admin			
4417	2D	10	2	4	8	0	20.1	10.3	1	76	B	TF	elite res-admin			
4266	2D	10	3	4	8	0	50.7	10.2	1	147	B	TF	elite res-admin			
4266	2D	10	3	4	8	0	50.7	11.1	1	107	B	TF	elite res-admin			
4266	2D	10	3	4	8	0	10.1	10.1	1	28	B	TF	elite res-admin			
4266	2D	10	3	4	8	0	20	10.3	1	14	B	TF	elite res-admin			
4266	2D	10	3	4	8	0	24	10.3	1	21	B	TF	elite res-admin			
4266	2D	10	3	4	8	0	20	10.3	1	9	B	TF	elite res-admin			
4266	2D	10	3	4	8	0	12	72	1	28	B	TF	elite res-admin			
4348	2D	10	4	4	8	0	4	10.1	1	301	B	TF	elite res-admin			
4348	2D	10	4	4	8	0	5	10.1	1	101	B	TF	elite res-admin			
4347	2D	10	2	4	8	0	25	10.1	2	28	B	TF	elite res-admin			
4347	2D	10	2	4	8	0	5	11.1	1	20	B	TF	elite res-admin			
4309	2D	11	1	4	8	0	24	10.1	1	26.3	B	TF	elite res-admin			
4381	2D	11	1	4	9	0	24	10.1	12	181	B	TF	elite res-admin			
4381	2D	11	1	4	9	0	50.5	10.3	2	17.2	B	TF	elite res-admin			
4339	2D	11	3	7	9	0	24	10.1	5	78.1	B	TF	elite res-admin			
4345	2D	11	3	4	9	0	20	10.3	1	6.7	B	TF	elite res-admin			

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
4345	2D	11	3	4	9	0	24	10.3	1	52.2	B	TF	elite res-admin			
4345	2D	11	3	4	9	0	50.5	10.3	2	73.1	B	TF	elite res-admin			
4345	2D	11	3	4	9	0	24	11.1	1	57.8	B	TF	elite res-admin			
4477	2D	11	1	4	10	0	24	10.1	5	259	B	TF	elite res-admin			
4477	2D	11	1	4	10	0	24	10.1	5	259	B	TF	elite res-admin			
4477	2D	11	1	4	10	0	24	10.3	1	24.4	B	TF	elite res-admin			
5034	2D	11	3	8	10	0	24	10.3	3	90	B-burial	TF	elite res-admin	burial		
4449	2D	11	3	4	10	0	24	10.1	2	40.2	B	TF	elite res-admin			
4449	2D	11	3	4	10	0	20	10.3	1	11.3	B	TF	elite res-admin			
5022	2D	11	1	4	11	0	20	10.3	1	47.5	B	TF	elite res-admin			
5038	2D	11	3	8	11	0	24	72	1	22.4	B-burial	TF	elite res-admin	burial		
5038	2D	11	3	8	11	0	24	11.1	2	12.8	B-burial	TF	elite res-admin	burial		
4489	2D	11	3	4	11	0	20	11.1	1	39	B	TF	elite res-admin			
4489	2D	11	3	4	11	0	27	11.1	1	66.7	B	TF	elite res-admin			
4489	2D	11	3	4	11	0	24	10.3	1	9.6	B	TF	elite res-admin			
5080	2D	11	4	5	12	0	27	10.3	1	226	B	TF	elite res-admin			
5080	2D	11	4	5	12	0	24	10.3	3	41.4	B	TF	elite res-admin			
5092	2D	11	2	5	12	0	20	10.1	4	86.1	B	TF	elite res-admin			
5075	2D	11	3	5	12	0	24	10.1	5	53.6	B	TF	elite res-admin			
5185	2D	11	4	5	13	0	24	10.1	5	98	B	TF	elite res-admin			

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
5218	2D	11	2	12	13	0	24	10.1	4	50.3	B	TF	elite res-admin			
5237	2D	11	1	4	13	0	20.1	10.3	1	360	B	TF	elite res-admin			
5237	2D	11	1	4	13	0	50.5	10.1	1	202	B	TF	elite res-admin			
5237	2D	11	1	4	13	0	50.6	10.3	1	85.4	B	TF	elite res-admin			
5237	2D	11	1	4	13	0	50.5	10.3	1	110	B	TF	elite res-admin			
5301	2D	11	2	10	13	0	9	10.1	1	33.7	B	TF	elite res-admin			
5289	2D	11	4	12	14	0	24	76	3	23.2	B	TF	elite res-admin			
5293	2D	11	3	4	14	0	24	10.1	3	457	B	TF	elite res-admin			
5291	2D	11	4	4	14	0	20	10.3	1	53.2	B	TF	elite res-admin			
5291	2D	11	4	4	14	0	20	11.3	2	8.6	B	TF	elite res-admin			
5333	2D	11	1	4	14	0	24	10.1	2	45.7	B	TF	elite res-admin			
5307	2D	11	2	4	14	0	24	10.3	2	18	B	TF	elite res-admin			
5419	2D	10	3	7	17	0	9	10.1	1	55	B	LF	elite res-admin			
5419	2D	10	3	7	17	0	9	10.3	1	34	B	LF	elite res-admin			
5419	2D	10	3	7	17	0	50.5	10.1	1	12	B	LF	elite res-admin			
5419	2D	10	3	7	17	0	24	10.3	1	42	B	LF	elite res-admin			
5423	2D	10	1	7	17	0	25	11.3	3	10	B	LF	elite res-admin			
5423	2D	10	1	7	17	0	24	10.3	7	71	B	LF	elite res-admin			
4203	2D	11	2	2	6	0	24	10.1	2	86.5	B1	TF	elite res-admin / craft production	basalt working area	sandy lens with pyroxene, olivine	
4252	2D	11	2	2	7	0	24	11.1	1	45.8	B1	TF	elite res-admin / craft production	basalt working area	sandy lens with pyroxene, olivine	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
4343	2D	10	1	4	8	0	5	10.1	1	48	B1	LF	elite res-admin / craft production	basalt working area	contains basalt sand, pyroxene and olivine crystals	
4343	2D	10	1	4	8	0	24	10.1	1	17	B1	LF	elite res-admin / craft production	basalt working area	contains basalt sand, pyroxene and olivine crystals	
4337	2D	10	1	4	8	0	14	10.1	1	33	B1	LF	elite res-admin / craft production	basalt working area	contains basalt sand, pyroxene and olivine crystals	
4337	2D	10	1	4	8	0	20	10.1	1	11	B1	LF	elite res-admin / craft production	basalt working area	contains basalt sand, pyroxene and olivine crystals	
4337	2D	10	1	4	8	0	12	10.1	1	32	B1	LF	elite res-admin / craft production	basalt working area	contains basalt sand, pyroxene and olivine crystals	
4337	2D	10	1	4	8	0	24	10.3	2	85	B1	LF	elite res-admin / craft production	basalt working area	contains basalt sand, pyroxene and olivine crystals	
4277	2D	11	4	4	8	0	24	10.2	1	118	B1	TF	elite res-admin / craft production	basalt working area	sandy lens with pyroxene, olivine	
4277	2D	11	4	4	8	0	24	10.1	1	29.5	B1	TF	elite res-admin / craft production	basalt working area	sandy lens with pyroxene, olivine	
4394	2D	10	1	5	9	0	50.5	10.1	1	60	B1	LF	elite res-admin / craft production	basalt working area	contains basalt sand, pyroxene and olivine crystals	
4353	2D	11	4	4	9	0	24	10.1	4	16.1	B1	TF	elite res-admin / craft production	basalt working area	sandy lens with pyroxene, olivine	
4465	2D	10	2	5	10	0	7	10.1	1	107	B1	LF	elite res-admin / craft production	basalt working area	contains basalt sand, pyroxene and olivine crystals	
4465	2D	10	2	5	10	0	9	10.1	1	78	B1	LF	elite res-admin / craft production	basalt working area	contains basalt sand, pyroxene and olivine crystals	
4465	2D	10	2	5	10	0	20	10.2	1	51	B1	LF	elite res-admin / craft production	basalt working area	contains basalt sand, pyroxene and olivine crystals	
4465	2D	10	2	5	10	0	20	11.3	1	56	B1	LF	elite res-admin / craft production	basalt working area	contains basalt sand, pyroxene and olivine crystals	
4465	2D	10	2	5	10	0	25	10.3	1	12	B1	LF	elite res-admin / craft production	basalt working area	contains basalt sand, pyroxene and olivine crystals	
4469	2D	10	2	5	10	0	50.5	11.1	7	193	B1	LF	elite res-admin / craft production	basalt working area	contains basalt sand, pyroxene and olivine crystals	
4469	2D	10	1	5	10	0	50.5	10.3	1	30	B1	LF	elite res-admin / craft production	basalt working area	contains basalt sand, pyroxene and olivine crystals	
4469	2D	10	1	5	10	0	25	10.3	6	41	B1	LF	elite res-admin / craft production	basalt working area	contains basalt sand, pyroxene and olivine crystals	
4469	2D	10	1	5	10	0	20	10.3	1	6	B1	LF	elite res-admin / craft production	basalt working area	contains basalt sand, pyroxene and olivine crystals	
4474	2D	11	2	4	10	0	24	10.2	1	41.8	B1	TF	elite res-admin / craft production	basalt working area	sandy lens with pyroxene, olivine	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
4437	2D	11	4	4	10	0	24	10.3	1	29.9	B1	TF	elite res-admin / craft production	basalt working area	sandy lens with pyroxene, olivine
4437	2D	11	4	4	10	0	24	10.1	1	21.1	B1	TF	elite res-admin / craft production	basalt working area	sandy lens with pyroxene, olivine
5083	2D	10	2	6	12	0	10.2	11.1	1	112	B1	LF	elite res-admin / craft production	basalt working area	contains basalt sand, pyroxene and olivine crystals
5083	2D	10	2	6	12	0	10.2	10.1	1	58	B1	LF	elite res-admin / craft production	basalt working area	contains basalt sand, pyroxene and olivine crystals
5232	2D	11	2	6	13	0	24	10.3	2	64.3	B1	TF	elite res-admin	postmold	
4399	2D	9	3	6	9	0	24	10.1	4	77.8	C	TF	elite res-admin	rubble platform	
4399	2D	9	3	6	9	0	24	76	1	17	C	TF	elite res-admin	rubble platform	
4404	2D	9	4	6	9	0	24	10.1	8	93.6	C	TF	elite res-admin	rubble platform	
5066	2D	9	3	6	11	0	24	10.3	1	44.6	C	TF	elite res-admin	rubble platform	
5244	2D	9	2	6	12	0	50.5	11.3	1	163	C	TF	elite res-admin	rubble platform	
5412	2D	9	1	6	12	0	25	10.3	1	263	C	TF	elite res-admin	rubble platform	
5412	2D	9	1	6	12	0	20.1	10.3	1	118	C	TF	elite res-admin	rubble platform	
5412	2D	9	1	6	12	0	20	10.3	1	8.4	C	TF	elite res-admin	rubble platform	
5412	2D	9	1	6	12	0	24	76	1	15.2	C	TF	elite res-admin	rubble platform	
5412	2D	9	1	6	12	0	24	76	2	29.3	C	TF	elite res-admin	rubble platform	
5100	2D	9	3	6	12	0	24	10.3	1	18.9	C	TF	elite res-admin	rubble platform	
5100	2D	9	3	6	12	0	24	10.1	2	4.9	C	TF	elite res-admin	rubble platform	
5339	2D	9	3	6	13	0	24	10.3	4	133	C	TF	elite res-admin	rubble platform	
5169	2D	11	3	9	13	0	24	10.1	5	98	C	LF	elite res-admin	platform - clay cap	
5169	2D	11	3	9	13	0	24	76	1	10.1	C	LF	elite res-admin	platform - clay cap	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
5296	2D	11	3	15	14	0	24	10.3	3	12.1	C	LF	elite res-admin	platform - stepped face		
5377	2D	11	2	13	15	0	24	10.1	10	405	C	LF	elite res-admin	platform - clay cap		
5469	2D	10	1	8	17	0	50.5	10.3	1	171	C	LF	elite res-admin			
5469	2D	10	1	8	17	0	9	10.3	1	37	C	LF	elite res-admin			
5469	2D	10	1	8	17	0	21	10.3	1	121	C	LF	elite res-admin			
5469	2D	10	1	8	17	0	24	10.3	3	15	C	LF	elite res-admin			
5469	2D	10	1	8	17	0	24	10.1	1	10	C	LF	elite res-admin			
5463	2D	10	3	8	17	0	1	10.2	1	117	C	LF	elite res-admin			
5463	2D	10	3	8	17	0	1	10.2	1	41	C	LF	elite res-admin			
5463	2D	10	3	8	17	0	25	10.2	8	37	C	LF	elite res-admin			
5496	2D	10	4	9	18	0	13	11.3	1	77	C	LF	elite res-admin	sandy clay layer		
5496	2D	10	4	9	18	0	24	10.3	1	12	C	LF	elite res-admin	sandy clay layer		
5496	2D	10	4	9	18	0	20	10.3	1	6	C	LF	elite res-admin	sandy clay layer		
5499	2D	10	4	9	18	0	20	10.3	1	107	C	LF	elite res-admin	sandy clay layer		
5499	2D	10	4	9	18	0	5	11.1	5	83	C	LF	elite res-admin	sandy clay layer		
5499	2D	10	4	9	18	0	25	11.3	1	15	C	LF	elite res-admin	sandy clay layer		
5837	2D	10	1	10	19	0	24	10.1	4	56	C	LF	elite res-admin	sandy clay layer		
5837	2D	10	1	10	19	0	9	10.3	1	29	C	LF	elite res-admin	sandy clay layer		
5837	2D	10	1	10	19	0	24	76	1	12	C	LF	elite res-admin	sandy clay layer		
5685	2D	10	3	9	19	0	24	10.3	15	85	C	LF	elite res-admin	sandy clay layer		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
5661	2D	10	4	9	19	0	1	11.1	1	57	C	LF	elite res-admin	sandy clay layer		
5661	2D	10	4	9	19	0	20	11.1	1	29	C	LF	elite res-admin	sandy clay layer		
5661	2D	10	4	9	19	0	21	10.3	5	138	C	LF	elite res-admin	sandy clay layer		
5661	2D	10	4	9	19	0	24	10.3	10	34	C	LF	elite res-admin	sandy clay layer		
5661	2D	10	4	9	19	0	24	10.3	2	8	C	LF	elite res-admin	sandy clay layer		
5661	2D	10	4	9	19	0	24	10.3	2	10	C	LF	elite res-admin	sandy clay layer		
5661	2D	10	4	9	19	0	24	76	1	1	C	LF	elite res-admin	sandy clay layer		
5784	2D	10	1	9	19	0	20	10.3	1	99	C	LF	elite res-admin	sandy clay layer		
5784	2D	10	1	9	19	0	1	11.1	1	48	C	LF	elite res-admin	sandy clay layer		
5784	2D	10	1	9	19	0	24	10.3	2	15	C	LF	elite res-admin	sandy clay layer		
5784	2D	10	1	9	19	0	21	10.1	4	115	C	LF	elite res-admin	sandy clay layer		
5784	2D	10	1	9	19	0	24	10.3	8	64	C	LF	elite res-admin	sandy clay layer		
5688	2D	10	3	9	19	0	68	68	1	2.6	C	LF	elite res-admin	sandy clay layer		
5864	2D	10	3	12	20	0	24	10.3	8	24	C	LF	elite res-admin			
5864	2D	10	3	12	20	0	24	10.1	5	47	C	LF	elite res-admin			
5864	2D	10	3	12	20	0	9	10.1	2	70	C	LF	elite res-admin			
5864	2D	10	3	12	20	0	20	10.3	1	23	C	LF	elite res-admin			
5929	2D	10	4	12	20	0	24	10.1	6	12	C	LF	elite res-admin			
5946	2D	10	2	12	20	0	24	11.1	10	53	C	LF	elite res-admin			
5946	2D	10	2	12	20	0	24	10.3	3	19	C	LF	elite res-admin			

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
5946	2D	10	2	12	20	0	9	11.2	2	32	C	LF	elite res-admin			
59416	2D	10	2	12	20	0	24	76	3	29	C	LF	elite res-admin			
59416	2D	10	2	12	20	0	24	11.1	2	4	C	LF	elite res-admin			
5847	2D	10	1	12	20	0	25	10.3	5	6	C	LF	elite res-admin			
5847	2D	10	1	12	20	0	24	10.3	1	9	C	LF	elite res-admin			
5912	2D	10	4	12	20	0	62	62	1	2.4	C	LF	elite res-admin			
2051	2D	10	4	14	21	0	24	11.1	5	26	C	LF	elite res-admin			
2051	2D	10	4	14	21	0	50.5	10.3	3	51	C	LF	elite res-admin			
2051	2D	10	4	14	21	0	10.3	10.1	1	56	C	LF	elite res-admin			
2051	2D	10	4	14	21	0	20	10.3	1	34	C	LF	elite res-admin			
2051	2D	10	4	14	21	0	24	10.3	5	14	C	LF	elite res-admin			
2051	2D	10	4	14	21	0	24	76	2	7	C	LF	elite res-admin			
2051	2D	10	4	14	21	0	25	10.1	6	26	C	LF	elite res-admin			
2051	2D	10	4	14	21	0	24	10.3	3	48	C	LF	elite res-admin			
2051	2D	10	4	14	21	0	20	11.1	2	15	C	LF	elite res-admin			
2051	2D	10	4	14	21	0	24	11.1	2	20	C	LF	elite res-admin			
2051	2D	10	4	14	21	0	24	76	1	2	C	LF	elite res-admin			
2466	2D	10	2	14	21	0	2	10.3	1	218	C	LF	elite res-admin			
2466	2D	10	2	14	21	0	24	10.1	3	42	C	LF	elite res-admin			
2466	2D	10	2	14	21	0	24	10.3	2	7	C	LF	elite res-admin			

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
2069	2D	10	4	14	21	0	68	68	1	1.3	C	LF	elite res-admin			
2481	2D	10	1	14	22	0	5	11.3	1	71	C	LF	elite res-admin			
2481	2D	10	1	14	22	0	5	11.1	1	58	C	LF	elite res-admin			
2481	2D	10	1	14	22	0	22	11.1	1	32	C	LF	elite res-admin			
2481	2D	10	1	14	22	0	24	10.3	1	6	C	LF	elite res-admin			
2487	2D	10	1	14	22	0	22	10.3	1	63	C	LF	elite res-admin			
2208	2D	10	4	14	22	0	24	11.1	15	196	C	LF	elite res-admin			
2208	2D	10	4	14	22	0	24	11.1	7	99	C	LF	elite res-admin			
2208	2D	10	4	14	22	0	24	10.3	7	35	C	LF	elite res-admin			
2208	2D	10	4	14	22	0	24	24	1	5	C	LF	elite res-admin			
2208	2D	10	4	14	22	0	50.5	10.1	4	72	C	LF	elite res-admin			
2208	2D	10	4	14	22	0	50.5	10.1	4	31	C	LF	elite res-admin			
2905	2D	10	2	14	22	0	24	10.3	3	38	C	LF	elite res-admin			
2905	2D	10	2	14	22	0	24	10.3	2	24	C	LF	elite res-admin			
2905	2D	10	2	14	22	0	1	10.3	1	56	C	LF	elite res-admin			
2905	2D	10	2	14	22	0	12	72	1	3	C	LF	elite res-admin			
2180	2D	10	3	14	23	0	68	68	1	19	C	LF	elite res-admin			
2920	2D	10	1	14	23	0	1	11.1	1	905	C	LF	elite res-admin			
2920	2D	10	1	14	23	0	9	11.1	1	460	C	LF	elite res-admin			
2920	2D	10	1	14	23	0	69	69	2	16	C	LF	elite res-admin			

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
2925	2D	10	2	14	23	0	1	10.1	1	485	C	LF	elite res-admin			
2925	2D	10	2	14	23	0	20	10.3	1	38	C	LF	elite res-admin			
10043	2D	10	4	14	25	0	50.5	10.1	1	7	C	LF	elite res-admin			
5815	2D	10	2	10	19	0	21	10.3	5	127	C2	LF	elite res-admin	sand layer with carbon		
5815	2D	10	2	10	19	0	24	11.1	19	160	C2	LF	elite res-admin	sand layer with carbon		
5815	2D	10	2	10	19	0	25	10.1	4	33	C2	LF	elite res-admin	sand layer with carbon		
5685	2D	10	3	9	19	0	24	10.3	6	176	C2	LF	elite res-admin	sand layer with carbon		
5796	2D	10	1	11	19	0	9	10.1	1	56	C2	LF	elite res-admin	sand layer with carbon		
5796	2D	10	1	11	19	0	24	10.3	1	32	C2	LF	elite res-admin	sand layer with carbon		
5796	2D	10	1	11	19	0	9	10.1	1	21	C2	LF	elite res-admin	sand layer with carbon		
5860	2D	10	1	11	20	0	24	10.1	6	37	C2	LF	elite res-admin	sand layer with carbon		
5860	2D	10	1	11	20	0	24	76	1	1	C2	LF	elite res-admin	sand layer with carbon		
5860	2D	10	1	11	20	0	24	10.3	1	29	C2	LF	elite res-admin	sand layer with carbon		
5860	2D	10	1	11	20	0	9	10.3	1	18	C2	LF	elite res-admin	sand layer with carbon		
5968	2D	10	2	10	20	0	62	62	1	2.9	C2	LF	elite res-admin	sand layer with carbon		
2293	2D	10	2	13	20	0	24	11.1	9	93	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2293	2D	10	2	13	20	0	22	10.3	1	10	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2293	2D	10	2	13	20	0	20	10.3	1	20	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
5999	2D	10	3	13	20	0	24	10.1	3	5	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
5999	2D	10	3	13	20	0	24	11.1	5	88	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
2005	2D	10	3	13	21	0	24	10.3	10	39	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2005	2D	10	3	13	21	0	24	76	1	1	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2005	2D	10	3	13	21	0	24	11.1	2	19	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2005	2D	10	3	13	21	0	24	10.3	2	26	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2005	2D	10	3	13	21	0	9	11.1	4	68	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2005	2D	10	3	13	21	0	24	0	1	1	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2298	2D	10	2	13	21	0	1	11.1	1	66	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2298	2D	10	2	13	21	0	24	11.1	1	24	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2298	2D	10	2	13	21	0	18	10.3	7	33	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2298	2D	10	2	13	21	0	24	10.3	1	7	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2076	2D	10	3	13	22	0	24	10.1	4	56	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2076	2D	10	3	13	22	0	24	24	1	3	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2076	2D	10	3	13	22	0	50.7	10.3	1	39	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2076	2D	10	3	13	22	0	24	10.3	1	87	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2076	2D	10	3	13	22	0	24	10.3	1	3	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2076	2D	10	3	13	22	0	70	70	1	18	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2086	2D	10	4	13	22	0	25	10.3	4	23	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2369	2D	10	1	13	22	0	24	10.3	2	40	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2369	2D	10	1	13	22	0	24	10.3	3	93	C3	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
5124	2D	9	4	7	12	0	24	10.3	1	14.8	D	LF	elite res-admin			

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
5212	2D	9	2	7	14	0	2	11.3	1	163	D	LF	elite res-admin			
5487	2D	11	1	17	16	0	50.6	10.3	1	181	D	LF	elite res-admin	platform fill		
5487	2D	11	1	17	16	0	50.1	10.3	1	148	D	LF	elite res-admin	platform fill		
5510	2D	11	1	17	17	0	1	10.1	1	257	D	LF	elite res-admin	platform fill		
5510	2D	11	1	17	17	0	24	11.1	2	117	D	LF	elite res-admin	platform fill		
5510	2D	11	1	17	17	0	24	11.1	3	71.3	D	TF	elite res-admin	platform fill		
5644	2D	11	1	17	18	0	20.1	10.3	2	485	D	LF	elite res-admin	platform fill		
5644	2D	11	1	17	18	0	24	10.3	1	8	D	LF	elite res-admin	platform fill		
5853	2D	11	3	25	20	0	50.6	10.3	1	2256	D	LF	elite res-admin	platform fill		
5853	2D	11	3	25	20	0	50.6	10.3	1	94.4	D	LF	elite res-admin	platform fill		
5853	2D	11	3	25	20	0	20	10.3	1	27	D	LF	elite res-admin	platform fill		
5853	2D	11	3	25	20	0	24	10.3	4	162	D	LF	elite res-admin	platform fill		
5853	2D	11	3	25	20	0	20.2	10.3	4	3.7	D	LF	elite res-admin	platform fill		
5917	2D	11	3	25	20	0	24	76	3	26.4	D	LF	elite res-admin	platform fill		
5917	2D	11	3	25	20	0	24	10.1	4	51.9	D	LF	elite res-admin	platform fill		
5917	2D	11	3	25	20	0	20	10.1	1	21.8	D	LF	elite res-admin	platform fill		
5842	2D	11	1	25	20	0	20	10.3	1	105	D	LF	elite res-admin	platform fill		
5842	2D	11	1	25	20	0	24	10.3	2	67.2	D	LF	elite res-admin	platform fill		
5842	2D	11	1	25	20	0	50.5	10.1	4	115	D	LF	elite res-admin	platform fill		
5842	2D	11	1	25	20	0	50.5	10.3	3	24.6	D	LF	elite res-admin	platform fill		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
5842	2D	11	1	25	20	0	63	63	1	11.5	D	LF	elite res-admin	platform fill		
5899	2D	11	2	25	21	0	24	76	6	54	D	LF	elite res-admin	platform fill		
5899	2D	11	2	25	21	0	24	10.3	2	26.9	D	LF	elite res-admin	platform fill		
5899	2D	11	2	25	21	0	24	10.1	2	78.8	D	LF	elite res-admin	platform fill		
5938	2D	11	4	25	21	0	20	10.3	1	59.4	D	LF	elite res-admin	platform fill		
59938	2D	11	4	25	21	0	20	10.3	1	39.5	D	LF	elite res-admin	platform fill		
59938	2D	11	4	25	21	0	24	10.3	14	92	D	LF	elite res-admin	platform fill		
2396	2D	10	2	16	22	0	1	10.1	1	67	D	LF	elite res-admin			
2396	2D	10	2	16	22	0	69	69	1	6	D	LF	elite res-admin			
2396	2D	10	2	16	22	0	24	76	1	26	D	LF	elite res-admin			
2396	2D	10	2	16	22	0	24	10.1	2	9	D	LF	elite res-admin			
10056	2D	10	4	16	25	0	7	11.1	1	110	D	LF	elite res-admin			
10067	2D	10	3	18	26	0	8	10.2	1	106	D	LF	elite res-admin			
10067	2D	10	3	18	26	0	24	10.3	1	7	D	LF	elite res-admin			
10067	2D	10	3	18	26	0	21	11.1	1	26	D	LF	elite res-admin			
10067	2D	10	3	18	26	0	25	11.1	2	56	D	LF	elite res-admin			
2993	2D	10	4	13	25	0	2	11.1	1	395	D1	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
10020	2D	10	3	13	25	0	1	11.1	1	335	D1	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
10020	2D	10	3	13	25	0	5	10.1	1	87	D1	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
5360	2D	11	3	17	15	0	74	74	1	0.13	D/E	LF	elite res-admin	deposits outside platform		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
5438	2D	11	3	17	16	0	24	11.1	2	38.7	D/E	LF	elite res-admin	mixed platform fill and deposits outside platform	
5438	2D	11	3	17	16	0	20.1	10.3	1	54.2	D/E	LF	elite res-admin	mixed platform fill and deposits outside platform	
5481	2D	11	3	17	17	0	50.6	10.3	1	258	D/E	LF	elite res-admin	mixed platform fill and deposits outside platform	
5506	2D	11	2	17	17	0	20.1	11.1	2	242	D/E	LF	elite res-admin	mixed platform fill and deposits outside platform	
5483	2D	11	3	17	17	0	74	74	1	0.4	D/E	LF	elite res-admin	mixed platform fill and deposits outside platform	
5670	2D	11	2	17	18	0	24	10.3	3	50	D/E	LF	elite res-admin	mixed platform fill and deposits outside platform	
5610	2D	11	3	17	18	0	50.2	10.3	2	174	D/E	LF	elite res-admin	mixed platform fill and deposits outside platform	
5610	2D	11	3	17	18	0	20	10.3	1	6	D/E	LF	elite res-admin	mixed platform fill and deposits outside platform	
5610	2D	11	3	17	18	0	24	10.3	3	84.8	D/E	LF	elite res-admin	mixed platform fill and deposits outside platform	
5318	2D	9	4	6	14	0	20	10.2	1	18.3	E	LF	elite res-admin	refuse dump	
5318	2D	9	4	6	14	0	20.1	11.3	1	90.2	E	LF	elite res-admin	refuse dump	
5278	2D	9	1	6	14	0	1	10.3	1	123	E	LF	elite res-admin	refuse dump	
5342	2D	9	3	6	14	0	20	11.1	1	68.7	E	LF	elite res-admin	refuse dump	
5363	2D	11	4	17	15	0	50.6	10.1	1	266	E	LF	elite res-admin	deposits outside platform	
5363	2D	11	4	17	15	0	24	10.1	5	69.6	E	LF	elite res-admin	deposits outside platform	
5363	2D	11	4	17	15	0	24	11.1	3	53.3	E	LF	elite res-admin	deposits outside platform	
5359	2D	11	3	17	15	0	24	11.3	2	99.1	E	LF	elite res-admin	deposits outside platform	
5359	2D	11	3	17	15	0	50.5	10.1	4	55.6	E	LF	elite res-admin	deposits outside platform	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
5359	2D	11	3	17	15	0	2	10.1	1	107	E	LF	elite res-admin	deposits outside platform		
5640	2D	11	4	17	18	0	24	10.1	2	62.8	E	LF	elite res-admin	platform fill		
5640	2D	11	4	17	18	0	72	72	2	9.3	E	LF	elite res-admin	platform fill		
5763	2D	11	4	17	19	0	20	10.1	1	17.2	E	LF	elite res-admin			
5803	2D	11	4	17	19	0	24	10.3	4	63.7	E	LF	elite res-admin			
5803	2D	11	4	17	19	0	27	11.1	1	176	E	LF	elite res-admin			
5570	2D	9	2	8	15	0	24	10.1	6	90.5	F	LF	elite res-admin			
5570	2D	9	2	8	15	0	24	76	1	3.6	F	LF	elite res-admin			
5570	2D	9	2	8	15	0	20	10.1	1	11.6	F	LF	elite res-admin			
5535	2D	9	1	8	15	0	24	11.1	9	147	F	LF	elite res-admin			
5520	2D	9	4	8	15	0	24	76	2	60	F	LF	elite res-admin			
5520	2D	9	4	8	15	0	24	10.3	5	84.2	F	LF	elite res-admin			
5520	2D	9	4	8	15	0	20	10.3	1	32	F	LF	elite res-admin			
5615	2D	9	4	8	16	0	24	10.3	5	182	F	LF	elite res-admin			
5627	2D	9	1	8	16	0	24	10.3	3	201	F	LF	elite res-admin			
5768	2D	9	3	8	18	0	24	10.1	6	59.3	F	LF	elite res-admin			
5768	2D	9	3	8	18	0	24	76	1	20.4	F	LF	elite res-admin			
5768	2D	9	3	8	18	0	24	10.3	1	53.8	F	LF	elite res-admin			
5889	2D	9	2	8	19	0	24	10.3	13	306	F	LF	elite res-admin			
5889	2D	9	2	8	19	0	20.1	10.3	3	255	F	LF	elite res-admin			

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
5884	2D	9	4	8	19	0	24	10.3	17	330	F	LF	elite res-admin			
5884	2D	9	4	8	19	0	20	10.3	1	60.6	F	LF	elite res-admin			
5975	2D	9	4	8	20	0	20	10.3	2	97.3	F	LF	elite res-admin			
5975	2D	9	4	8	20	0	24	11.1	2	56.5	F	LF	elite res-admin			
5971	2D	9	3	8	20	0	24	76	1	18.2	F	LF	elite res-admin			
5971	2D	9	3	8	20	0	2	11.1	1	47.2	F	LF	elite res-admin			
5971	2D	9	3	8	20	0	50.6	11.1	1	62.6	F	LF	elite res-admin			
5971	2D	9	3	8	20	0	20.1	10.1	1	128	F	LF	elite res-admin			
2038	2D	9	2	8	21	0	24	72	4	66.1	F	LF	elite res-admin			
2038	2D	9	2	8	21	0	24	76	1	2	F	LF	elite res-admin			
2055	2D	9	2	8	21	0	24	10.1	8	190	F	LF	elite res-admin			
2055	2D	9	2	8	21	0	20.1	10.1	1	153	F	LF	elite res-admin			
2019	2D	9	4	8	21	0	20.1	11.1	1	228	F	LF	elite res-admin			
2019	2D	9	4	8	21	0	20.1	11.1	1	475	F	LF	elite res-admin			
2019	2D	9	4	8	21	0	24	11.1	1	271	F	LF	elite res-admin			
2193	2D	9	4	19	22	0	20.1	10.3	1	172	F	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2193	2D	9	4	19	22	0	50.2	10.3	1	465	F	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
5951	2D	11	1	25	22	0	20.1	10.1	1	178	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
5951	2D	11	1	25	22	0	24	76	7	48.1	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
5951	2D	11	1	25	22	0	24	10.3	9	63.8	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
5951	2D	11	1	25	22	0	50.5	10.3	2	40.5	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
5986	2D	11	0	25	22	0	24	10.3	42	316	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
5986	2D	11	0	25	22	0	24	76	8	72	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
5986	2D	11	0	25	22	0	20	10.3	1	3.3	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
5986	2D	11	0	25	22	0	27	10.1	1	39.6	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
5986	2D	11	0	25	22	0	24	10.3	1	179	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
5986	2D	11	0	25	22	0	14	11.1	1	48	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2259	2D	9	2	18	23	0	20	10.1	1	71.3	F	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2254	2D	9	3	17	23	0	20	10.3	1	98.9	F	LF	elite res-admin / craft production	refuse dump with ceramic production indicators	"basurero"	
2094	2D	11	1	25	24	0	24	10.3	23	152	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2094	2D	11	1	25	24	0	50.5	10.1	1	520	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2102	2D	11	0	25	24	0	24	76	5	121	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2102	2D	11	0	25	24	0	24	11.1	36	230	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2102	2D	11	0	25	24	0	72	72	2	27.2	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2102	2D	11	0	25	24	0	50.1	10.1	1	310	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2102	2D	11	0	25	24	0	50.5	11.1	3	126	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2154	2D	11	0	25	25	0	24	10.1	15	226	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2154	2D	11	0	25	25	0	24	76	7	33.4	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2154	2D	11	0	25	25	0	22	11.1	1	51.5	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2154	2D	11	0	25	25	0	20.1	10.3	1	228	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
2154	2D	11	0	25	25	0	50.5	10.3	1	90.9	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2154	2D	11	0	25	25	0	27	10.1	1	149	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2136	2D	11	1	25	25	0	24	10.3	15	266	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2136	2D	11	1	25	25	0	24	76	2	7	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2136	2D	11	1	25	25	0	20.3	10.3	1	34	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2186	2D	11	1	25	26	0	20	10.3	1	17.6	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2186	2D	11	1	25	26	0	20.1	10.3	1	102	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2186	2D	11	1	25	26	0	24	10.3	1	19.3	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2270	2D	11	0	25	27	0	50.6	10.3	1	735	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2270	2D	11	0	25	27	0	20.1	10.3	1	180	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2270	2D	11	0	25	27	0	20	10.3	1	27.7	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2308	2D	11	0	25	28	0	22	10.3	1	17	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2308	2D	11	0	25	28	0	21	10.3	1	39	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2308	2D	11	0	25	28	0	24	10.3	1	21	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2308	2D	11	0	25	28	0	5	10.3	1	9	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2287	2D	11	1	25	28	0	20.1	10.3	1	120	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2405	2D	11	0	25	30	0	2	10.3	1	735	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2405	2D	11	0	25	30	0	24	10.3	1	36.6	F	LF?	elite res-admin	division between LF and MF in Stratum F uncertain		
2912	2D	11	1	25	34	0	64	64	1	20.1	F	LF/MF?		division between LF and MF in Stratum F uncertain		
2956	2D	11	1	25	37	0	74	74	1	0.1	F	LF/MF?		division between LF and MF in Stratum F uncertain		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
2966	2D	11	1	25	38	0	24	10.3	7	126	F	LF/MF?		division between LF and MF in Stratum F uncertain		
2983	2D	11	1	25	39	0	24	10.3	4	113	F	LF/MF?		division between LF and MF in Stratum F uncertain		
2983	2D	11	1	25	39	0	20	10.3	1	12.6	F	LF/MF?		division between LF and MF in Stratum F uncertain		
2983	2D	11	1	25	39	0	50.1	10.3	1	256	F	LF/MF?		division between LF and MF in Stratum F uncertain		
2995	2D	11	1	15	41	0	24	10.3	3	54.5	F	MF?		division between LF and MF in Stratum F uncertain		
2995	2D	11	1	25	41	0	50.2	11.1	1	32.6	F	MF?		division between LF and MF in Stratum F uncertain		
10006	2D	11	1	25	42	0	9	10.1	2	1130	F	MF?		division between LF and MF in Stratum F uncertain		
4218	2D	11	1	25	42	0	50.5	11.1	1	156	F	MF?		division between LF and MF in Stratum F uncertain		
4218	2D	11	1	25	42	0	24	10.3	2	59.7	F	MF?		division between LF and MF in Stratum F uncertain		
10014	2D	11	1	25	43	0	24	10.3	5	194	F	MF?		division between LF and MF in Stratum F uncertain		
10014	2D	11	1	25	43	0	27	10.3	1	285	F	MF?		division between LF and MF in Stratum F uncertain		
10027	2D	11	1	25	44	0	50.5	10.3	1	37.6	F	MF?		division between LF and MF in Stratum F uncertain		
5568	2D	9	1	9	15	0	24	10.1	7	159	F4	LF	elite res-admin	floor	dark gray sand floor with ceramic and basalt fragments	
5568	2D	9	1	9	15	0	24	10.1	2	36.2	F5	LF	elite res-admin	floor	black sand floor	
5606	2D	9	3	9	16	0	24	10.3	3	37.6	F6	LF	elite res-admin	floor	dark brown clayey silt floor with ceramics	
5606	2D	9	3	9	16	0	72	72	4	32.4	F6	LF	elite res-admin	floor	dark brown clayey silt floor with ceramics	

Op. 2E

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
8101	2E	15	0	1	1	0	24	11.1	1	60	A		plow zone			
8101	2E	15	0	1	1	0	21	10.1	1	77	A		plow zone			
8134	2E	15	0	1	4	0.1	2	10.3	1	88	A		plow zone			
8110	2E	15	0	1	4	0	2	10.3	1	193	A		plow zone			
8110	2E	15	0	1	4	0	1	10.3	1	141	A		plow zone			
8110	2E	15	0	1	4	0	1	10.3	7	354	A		plow zone			
8110	2E	15	0	1	4	0	24	76	1	6	A		plow zone			
8118	2E	15	0	1	4	0	2	10.3	2	194	A		plow zone	plaza fill		
8118	2E	15	0	1	4	0	24	11.1	1	92	A		plow zone	plaza fill		
8142	2E	15	1	2	5	0	20.1	10.3	1	459	B	TF?	civic-ceremonial	plaza fill		
8146	2E	15	0	2	5	0	20.1	10.3	4	314	B	TF?	civic-ceremonial	plaza fill		
8146	2E	15	0	2	5	0	24	10.1	7	166	B	TF?	civic-ceremonial	plaza fill		
8146	2E	15	0	2	5	0	24	10.1	3	221	B	TF?	civic-ceremonial	plaza fill		
8146	2E	15	0	2	5	0	24	11.1	6	115	B	TF?	civic-ceremonial	plaza fill		
8146	2E	15	0	2	5	0	24	11.1	5	252	B	TF?	civic-ceremonial	plaza fill		
8132	2E	15	0	2	5	0	70	70	1	145	B	TF?	civic-ceremonial	plaza fill		
8157	2E	15	0	2	6	0	20	10.2	4	265	B	TF?	civic-ceremonial	plaza fill		
8157	2E	15	0	2	6	0	24	10.1	3	56	B	TF?	civic-ceremonial	plaza fill		
8178	2E	15	1	2	8	0	24	11.1	2	184	B	TF?	civic-ceremonial	plaza fill		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
8173	2E	15	0	2	8	0	24	11.1	5	106	B	TF?	civic-ceremonial	plaza fill		
8173	2E	15	0	2	8	0	24	11.1	1	26	B	TF?	civic-ceremonial	plaza fill		
8187	2E	15	0	2	9	0	24	11.1	2	70	B	TF?	civic-ceremonial	plaza fill		
8182	2E	15	0	2	9	0	20	10.3	3	365	B	TF?	civic-ceremonial	plaza fill		
8212	2E	15	1	3	10	0	25	11.1	3	152	B	TF?	civic-ceremonial	plaza fill		
8257	2E	15	1	4	12	0.8	24	10.1	7	250	C	LF	civic-ceremonial	plaza fill		
8257	2E	15	1	4	12	0.8	24	10.3	2	84	C	LF	civic-ceremonial	plaza fill		
8257	2E	15	1	4	12	0.8	20	10.3	1	17.5	C	LF	civic-ceremonial	plaza fill		
8278	2E	15	0	4	13	0	24	11.1	2	127	C	LF	civic-ceremonial	plaza fill		
1378	2E	15	4	12	14	0	20.1	10.3	1	213		LF	civic-ceremonial	plaza fill	parece error de datos. El numero de bolsa esta fuera de la secuencia y no hay una combincion de zona y nivel asi en la unidad 15.	
8173	2E	15	0	8	15	0	20	10.3	1	317	D	LF	domestic	floors and fill	may be plaza resurfacings and fill but high density of cultural material suggests domestic	
8315	2E	15	0	8	15	0.18	24	10.1	3	47	D	LF	domestic	floors and fill	may be plaza resurfacings and fill but high density of cultural material suggests domestic	
8325	2E	15	1	8	15	0	24	10.3	5	124	D	LF	domestic	floors and fill	may be plaza resurfacings and fill but high density of cultural material suggests domestic	
8325	2E	15	1	8	15	0	25	10.1	1	42	D	LF	domestic	floors and fill	may be plaza resurfacings and fill but high density of cultural material suggests domestic	
8325	2E	15	1	8	15	0	24	76	1	6	D	LF	domestic	floors and fill	may be plaza resurfacings and fill but high density of cultural material suggests domestic	
8325	2E	15	1	8	15	0	20	10.3	1	5	D	LF	domestic	floors and fill	may be plaza resurfacings and fill but high density of cultural material suggests domestic	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
8358	2E	15	1	10	16	0.3	1	10.3	1	109	D	LF	domestic	floors and fill	may be plaza resurfacings and fill but high density of cultural material suggests domestic	
8334	2E	15	0	10	16	0.21	20	10.3	1	35	D	LF	domestic	floors and fill	may be plaza resurfacings and fill but high density of cultural material suggests domestic	
8334	2E	15	0	10	16	0.21	24	10.1	1	13	D	LF	domestic	floors and fill	may be plaza resurfacings and fill but high density of cultural material suggests domestic	
8352	2E	15	0	9	16	23	22	11.1	2	196	D	LF	domestic	floors and fill	may be plaza resurfacings and fill but high density of cultural material suggests domestic	
8352	2E	15	0	9	16	0.22	21	10.1	1	51	D	LF	domestic	floors and fill	may be plaza resurfacings and fill but high density of cultural material suggests domestic	
8368	2E	15	1	10	16	0	20	10.3	1	59.7	D	LF	domestic	floors and fill	may be plaza resurfacings and fill but high density of cultural material suggests domestic	
8382	2E	15	0	10	17	0.35	2	10.3	1	724	D	LF	domestic	floors and fill	may be plaza resurfacings and fill but high density of cultural material suggests domestic	
8385	2E	15	0	10	17	0.36	20	10.3	1	172	D	LF	domestic	floors and fill	may be plaza resurfacings and fill but high density of cultural material suggests domestic	
8404	2E	15	1	12	17	0.41	20	10.3	1	75.6	D1	LF	domestic	refuse dump	"basurero"	
8401	2E	15	0	12	17	0.4	20.1	10.3	1	381	D1	LF	domestic	refuse dump	"basurero"	
8483	2E	15	1	16	19	0	2	10.3	1	99	D1	LF	domestic	refuse dump	"basurero"	
8488	2E	15	1	16	19	0.3	24	10.3	1	60	D1	LF	domestic	refuse dump	"basurero"	
8489	2E	15	1	16	19	0.5	50.6	10.3	1	56	D1	LF	domestic	refuse dump	"basurero"	
8482	2E	15	1	16	19	0	25	10.1	3	132	D1	LF	domestic	refuse dump	"basurero"	
8334	2E	15	0	16	20	0.21	20	10.3	1	8	D1	LF	domestic	refuse dump	"basurero"	
8510	2E	15	0	16	20	0.3	24	10.1	1	89.3	D1	LF	domestic	refuse dump	"basurero"	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
8622	2E	15	1	16	21	0	20.1	10.3	3	193	D1	LF	domestic	refuse dump	"basurero"	
8622	2E	15	1	16	21	0	20	10.3	2	23	D1	LF	domestic	refuse dump	"basurero"	
8622	2E	15	1	16	21	0	60	60	6	232	D1	LF	domestic	refuse dump	"basurero"	
8622	2E	15	1	16	21	0	24	10.1	4	65	D1	LF	domestic	refuse dump	"basurero"	
8719	2E	15	1	16	23	0	24	11.2	1	52	D1	LF	domestic	refuse dump	"basurero"	
8720	2E	15	1	16	23	0	24	70	23	62	D1	LF	domestic	refuse dump	"basurero"	
8618	2E	15	1	17	21	0	20	10.3	2	79	E	LF	domestic			
8587	2E	15	0	17	21	0	60	60	4	42	E	LF	domestic			
8667	2E	15	0	17	22	0.2	20.1	10.3	1	346	E	LF	domestic			
8703	2E	15	0	17	22	0	60	60	12	905	E	LF	domestic			
8697	2E	15	0	17	23	0	20	10.3	1	54	E	LF	domestic			
8697	2E	15	0	17	23	0	20	10.3	1	45	E	LF	domestic			
8697	2E	15	0	17	23	0	60	60	2	9	E	LF	domestic			
8698	2E	15	0	17	23	0	60	60	6	581	E	LF	domestic			
8450	2E	15	0	15	19	0	20	10.3	2	129	E1	LF	domestic			
8450	2E	15	0	15	19	0	50.2	10.3	1	103	E1	LF	domestic			
8450	2E	15	0	15	19	0	20	10.3	1	29	E1	LF	domestic			
8412	2E	15	0	15	19	0.51	1	10.3	1	187	E1	LF	domestic			
8559	2E	15	1	19	20	0	20	10.3	2	57	E2	LF	domestic	troncoconical pit		
8559	2E	15	1	19	20	0	20	10.3	1	35	E2	LF	domestic	troncoconical pit		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
8559	2E	15	1	19	20	0	24	10.1	1	32	E2	LF	domestic	troncoconical pit		
8559	2E	15	1	19	20	0	60	60	1	5	E2	LF	domestic	troncoconical pit		
8428	2E	15	0	13	18	0.45	22	11.1	1	66.5	E4	LF	domestic	sand floor - intrusive pit?		
8843	2E	15	1	21	31	0.1	2	10.3	1	90	F	LF?				
8952	2E	15	1	22	38	0	50.1	10.3	1	446	F	LF?				

Op. 3A Units 17, 18, 24, and 33

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
91106	3A	18	0	0	0	0	20.1	10.3	1	312	A	C/H	surface	surface	
9106	3A	18	0	0	0	0	16	10.3	1	28	A	C/H	surface	surface	
9113	3A	17	0	1	1	0	20.1	10.1	1	560	A	C/H	plow zone	plow zone	
9255	3A	24	0	1	1	0	20	10.3	1	4.7	A	C/H	domestic	plow zone	
9123	3A	17	0	1	3	0	20	10.3	1	21.4	A	C/H	plow zone	plow zone	
9123	3A	17	0	1	3	0	22	10.3	1	102	A	C/H	plow zone	plow zone	
9120	3A	18	0	1	3	0	50.2	10.3	1	34	A	C/H	plow zone	plow zone	
9120	3A	18	0	1	3	0	50.2	10.1	1	78	A	C/H	plow zone	plow zone	
9120	3A	18	0	1	3	0	50.2	10.3	1	98	A	C/H	plow zone	plow zone	
9280	3A	24	0	1	3	0	9	10.1	1	139	A	C/H	domestic	plow zone	
9280	3A	24	0	1	3	0	20	10.3	1	4.4	A	C/H	domestic	plow zone	
9465	3A	24	0	2	4	0	20	61	11	21	A	C/H	domestic	plow zone	
9359	3A	24	0	2	4	0	10.2	10.3	1	74.5	A	C/H	domestic	plow zone	
9259	3A	24	1	2	4	0	20	10.3	1	194	A	A	domestic	plow zone	
9461	3A	24	0	4	3	0.2	1	11.1	1	1730	A1	H	domestic	hearth	
9461	3A	24	0	4	3	0.2	20	11.1	2	106	A1	H	domestic	hearth	
9436	3A	24	0	4	4	0	20	10.3	1	16.7	A1	H			
9369	3A	24	0	2	4	0.5	20.1	10.3	1	149	A/B	C/H	domestic		
9465	3A	24	0	2	4	0	20	61	9	11.1	A/B	C/H	domestic		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
9269	3A	24	1	2	4	0	20	11.3	1	28.3	A/B	TF/C/H	domestic		
9356	3A	24	0	2	4	0.5	20	10.3	1	18.5	A/B	C/H	domestic		
9139	3A	17	1	2	4	0	1	10.3	1	4368	B	TF/EC	domestic		
9659	3A	24	0	3	4	0	10.2	11.1	1	68.3	B	H	domestic	sandstone platform	
9191	3A	17	0	5	5	0	20	10.3	1	31.6	B	TF/EC	domestic	concentration of metate fragments	
9178	3A	18	0	2	5	0	2	11.3	1	210	B	TF/EC	domestic		
9633	3A	24	0	3	5	0	24	10.3	1	17.3	B	H	domestic	sandstone platform	
9455	3A	24	0	2	5	0	20	10.3	1	34.5	B	TF/EC	domestic		
9455	3A	24	0	2	5	0	24	10.3	1	65.7	B	TF/EC	domestic		
9390	3A	24	0	2	5	0	20	10.3	2	11.4	B	TF/EC	domestic		
9390	3A	24	0	2	5	0	50.6	10.3	1	25.6	B	TF/EC	domestic		
9828	3A	24	0	3	5	0.3	1	11.1	1	415	B	H	domestic	sandstone platform	
9167	3A	17	0	2	6	0	50.3	10.3	1	66.9	B	TF/EC	domestic		
18588	3A	33	0	2	6	0	20.1	11.1	1	118	B	TF/EC	domestic		
18588	3	33	0	2	6	0	20	10.3	1	28.6	B	TF/EC	domestic		
18588	3	33	0	2	6	0	20.1	11.2	1	122	B	TF/EC	domestic		
18588	3	33	0	2	6	0	5	11.1	1	17.2	B	TF/EC	domestic		
18599	3	33	0	2	7	0	1	10.3	1	39	B	TF/EC	domestic		
18593	3	33	2	2	7	0	20	10.1	2	33.8	B	TF/EC	domestic		
18596	3	33	0	2	7	0	20	10.3	1	12.1	B	TF/EC	domestic		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
18620	3	33	0	2	8	0	20	11.1	1	18	B	TF/EC	domestic		
18620	3	33	0	2	8	0	24	10.3	1	11	B	TF/EC	domestic		
9769	3A	24	0	8	5	0	21	11.1	16	172	B3	LF?	domestic	floor	black sand and sandy loam floor at B/C interface
9487	3A	24	0	2	6	0	9	10.3	1	78.7	B/C	LF?	domestic		
9483	3A	24	0	2	6	0	24	76	1	20.9	B/C	LF?	domestic		
9798	3A	17	1	23	7	0	20	10.3	1	15.7	C	LF?	domestic		
9798	3A	17	1	23	7	0	18	11.1	1	11.2	C	LF?	domestic		
1E+08	3A	17	1	23	7	0	18	10.1	1	16.6	C	LF?	domestic		
1E+08	3A	17	1	23	7	0	18	10.3	1	28.1	C	LF?	domestic		
1E+08	3A	17	1	23	7	0	50.2	10.1	1	21	C	LF?	domestic		
9236	3A	18	0	11	7	0	16	11.1	1	11	C	LF?	domestic		
9521	3A	24	0	5	7	0	20	10.3	1	87.3			domestic		
9794	3A	24	0	11	7	0	20	10.3	1	48.6	C	LF?	domestic		earth below sandstone platform
9762	3A	24	0	11	7	0	20	10.3	1	18.2	C	LF?	domestic		earth below sandstone platform
9762	3A	24	0	11	7	0	20.1	11.1	1	128	C	LF?	domestic		earth below sandstone platform
9538	3A	24	0	2	7	0	24	10.1	1	23.2	C	LF?	domestic		
9329	3A	17	0	11	8	0	20.1	10.3	1	29.5	C	LF?	domestic		
9322	3A	17	0	11	8	0	20.1	11.1	1	139	C	LF?	domestic		
9488	3A	17	0	11	8	0	20	10.3	1	16.3	C	LF?	domestic		
9488	3A	17	0	11	8	0	24	10.2	1	17.5	C	LF?	domestic		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
9488	3A	17	0	11	8	0	20.2	10.3	1	0.8	C	LF?	domestic		
9325	3A	18	0	11	8	0	20	10.3	2	28	C	LF?	domestic		
9317	3A	18	0	11	8	0	20	10.1	1	21	C	LF?	domestic		
9317	3A	18	0	11	8	0	20.1	10.1	1	97	C	LF?	domestic		
9568	3A	24	0	6	8	0.5	1	10.3	1	325	C	LF?	domestic		
9565	3A	24	0	6	8	0	24	10.1	58	665	C	LF?	domestic		
9565	3A	24	0	6	8	0	24	76	2	4.1	C	LF?	domestic		
9819	3A	24	0	12	8	0	50.2	10.3	1	44.3	C	LF?	domestic		
9819	3A	24	0	12	8	0	20.1	10.3	1	130	C	LF?	domestic		
9819	3A	24	0	12	8	0	20.1	10.3	1	126	C	LF?	domestic		
9819	3A	24	0	12	8	0	21	10.3	1	41.2	C	LF?	domestic		
9828	3A	24	0	6	8	0	21	10.1	1	74.8	C	LF?	domestic		
9256	3A	17	0	11	9	0	50.5	10.3	1	11.5	C	LF?	domestic		
9256	3A	17	0	11	9	0	17	10.3	1	50.1	C	LF?	domestic		
9256	3A	17	0	11	9	0	20	11.2	1	17.2	C	LF?	domestic		
9256	3A	17	0	11	9	0	50.2	10.3	1	44.2	C	LF?	domestic		
9256	3A	17	0	11	9	0	5	11.1	1	96.2	C	LF?	domestic		
9256	3A	17	0	11	9	0	20	11.1	1	39.5	C	LF?	domestic		
9256	3A	17	0	11	9	0	24	11.1	1	50	C	LF?	domestic		
9834	3A	17	1	23	9	0	20.1	11.1	1	81	C	LF?	domestic		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
9832	3A	17	1	23	9	0	20	10.3	1	23.1	C	LF?	domestic		
9295	3A	17	0	11	10	0	50.1	10.3	1	95	C	LF?	domestic		
9295	3A	17	0	11	10	0	50.6	10.3	1	33.5	C	LF?	domestic		
9295	3A	17	0	11	10	0	50.5	11.2	1	69.3	C	LF?	domestic		
9339	3A	17	0	11	10	0	1	10.3	1	291	C	MF	domestic		
9339	3A	17	0	11	10	0	24	10.3	1	43.5	C	LF?	domestic		
9512	3A	17	0	11	10	0	20	10.3	1	10.8	C	LF?	domestic		
9350	3A	18	0	11	10	0	20.1	10.3	1	39	C	LF?	domestic		
9350	3A	18	0	11	10	0	5	11.3	1	34	C	LF?	domestic		
9350	3A	18	0	11	10	0	50.8	11.1	1	94	C	LF?	domestic		
9920	3A	24	0	13	10	0	20	10.3	1	99.5	C	LF?	domestic		
9869	3A	17	1	23	11	0	50.2	10.3	1	140	C	LF?	domestic		
9441	3A	17	0	11	12	0	1	10.3	1	81	C	LF?	domestic		
9441	3A	17	0	11	12	0	20.1	10.3	1	139	C	LF?	domestic		
9399	3A	17	0	11	12	0	50.4	10.2	1	110	C	LF?	domestic		
9399	3A	17	0	11	12	0	5	11.1	1	87.7	C	LF?	domestic		
9525	3A	17	0	11	12	0	18	10.3	1	12.8	C	LF?	domestic		
9473	3A	18	0	11	12	0	20	11.1	1	23	C	LF?	domestic		
9473	3A	18	0	11	12	0	20	11.3	1	12	C	LF?	domestic		
9473	3A	18	0	11	12	0	50.5	10.3	1	70	C	LF?	domestic		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
9473	3A	18	0	11	12	0	50.4	10.3	1	61	C	LF?	domestic		
18634	3	33	0	4	8	0	20.1	10.3	1	59	C1	LF?	domestic		
18641	3	33	0	3	9	0	1	11.2	2	179	C1	LF?	domestic		
18641	3	33	0	3	9	0	20	10.2	2	33	C1	LF?	domestic		
18641	3	33	0	3	9	0	5	11.2	1	38	C1	LF?	domestic		
18645	3	33	0	5	9	0	22	10.3	1	49	C1	TF?	domestic		
18643	3	33	0	3	9	0	50.7	11.3	1	287	C1	LF?	domestic		
18670	3	33	0	3	10	0	20	10.3	1	9	C1	LF?	domestic		
18670	3	33	0	3	10	0	24	11.1	1	14	C1	LF?	domestic		
18670	3	33	0	3	10	0	50.7	11.1	1	107	C1	LF?	domestic		
18728	3	33	0	3	12	0.4	2	10.3	1	79.8	C2	TF?	domestic		
18899	3	33	0	3	13	0	50.7	10.3	1	835	C2	LF?	domestic		
9552	3A	24	1	6	8	0	50.6	11.1	1	138	C/E	LF/MF	domestic		
9552	3A	24	1	6	8	0	20	10.1	1	25.4	C/E	LF?	domestic		
9594	3A	24	1	6	9	0	21	11.1	2	45	C/E	LF/MF	domestic		
9594	3A	24	1	6	9	0	20	10.3	1	2.5	C/E	LF/MF	domestic		
9588	3A	24	1	6	9	0.1	2	11.1	1	77.5	C/E	LF/MF	domestic		
9590	3A	24	1	6	9	0.2	20	10.3	1	75.3	C/E	LF/MF	domestic		
9919	3A	24	0	13	10	0	20.1	10.1	1	52.7	C/E	LF/MF	domestic		LF/MF transition
18004	3A	24	0	13	11	0	50.4	11.1	1	163	C/E	LF/MF	domestic		LF/MF transition

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
9736	3A	18	0	18	13	0	50.2	10.3	1	44	C/E	MF	mortuary	Burial 1	child burial with offerings
9736	3A	18	0	18	13	0	20	10.3	1	33	C/E	MF	mortuary	Burial 1	child burial with offerings
9774	3A	17	0	18	13	0	24	10.3	3	85.3	C/E	MF	mortuary	Burial 1	child burial with offerings
9774	3A	17	0	18	13	0	24	10.1	4	105	C/E	MF	mortuary	Burial 1	child burial with offerings
9774	3A	17	0	18	13	0	24	11.1	2	170	C/E	MF	mortuary	Burial 1	child burial with offerings
18179	3A	17	0	25	14	0	1	10.3	1	101	C/E	MF	Burial 3	adult burial with offerings	
18192	3A	17	0	25	14	0	20	10.1	1	19.2	C/E	MF	Burial 3	adult burial with offerings	
18192	3A	17	0	25	14	0	24	10.3	1	58.1	C/E	MF	Burial 3	adult burial with offerings	
9862	3A	18	0	24	15	0	4	10.3	1	72	D	MF	domestic	daub concentration/midden	
9846	3A	18	0	24	15	0	9	10.3	1	123	D	MF	domestic	daub concentration/midden	
9913	3A	18	0	24	16	0	1	11.1	1	106	D	MF?	domestic	daub concentration/midden	
9913	3A	18	0	24	16	0	1	10.3	1	146	D	MF?	domestic	daub concentration/midden	
9913	3A	18	0	24	16	0	50.3	11.1	1	138	D	MF?	domestic	daub concentration/midden	
9891	3A	24	1	13	10	0	9	10.1	1	111	E	MF	domestic		
9903	3A	17	1	17	13	0	50.1	10.3	1	283	E	MF	domestic	Zones 14 and 17 are same	
9782	3A	17	0	17	13	0	20	10.3	2	12.2	E	MF	domestic	Zones 14 and 17 are same	
9564	3A	18	0	17	13	0	1	10.3	1	73	E	MF	domestic		
9761	3A	17	0	17	14	0	20.1	10.3	1	82.8	E	MF	domestic	Zones 14 and 17 are same	
9761	3A	17	0	17	14	0	24	11.1	1	13.2	E	MF	domestic	Zones 14 and 17 are same	
9674	3A	17	0	14	14	0	72	72	1	2.5	E	MF	domestic	Zones 14 and 17 are same	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT
9676	3A	18	0	17	14	0	2	10.3	1	175	E	MF	domestic	
9622	3A	18	1	17	14	0	16	10.3	1	99	E	MF	domestic	
18111	3A	24	0	13	14	0	20.1	11.1	1	78.5	E	MF	domestic	
9366	3A	24	0	13	14	0	20	10.1	1	69.9	E	MF	domestic	
9366	3A	24	0	13	14	0	27	10.1	1	69.2	E	MF	domestic	
9366	3A	24	0	13	14	0	21	10.3	1	37.3	E	MF	domestic	
9366	3A	24	0	13	14	0	20	72	1	42.8	E	MF	domestic	
18096	3A	24	0	13	14	0	50.7	11.1	1	114	E	MF	domestic	
9944	3A	17	0	17	15	0	50.2	10.3	1	170	E	MF	domestic	Zones 14 and 17 are same
9944	3A	17	0	17	15	0	24	11.1	1	80.6	E	MF	domestic	Zones 14 and 17 are same
9686	3A	17	0	14	15	0	20	10.3	1	53.9	E	MF	domestic	Zones 14 and 17 are same
9696	3A	18	0	17	15	0	16	10.1	0	1	E	MF	domestic	
18178	3A	24	0	13	15	0	1	10.3	1	187	E	MF	domestic	
9970	3A	17	0	17	16	0	1	10.3	1	129	E	MF	domestic	Zones 14 and 17 are same
18232	3A	24	0	13	16	0	20.1	11.1	1	98.4	E	MF	domestic	
18232	3A	24	0	13	16	0	20.1	11.1	1	98.4	E	MF	domestic	
9993	3A	17	0	17	17	0	1	11.1	1	152	E	MF	domestic	Zones 14 and 17 are same
18291	3A	17	0	17	17	0	20	10.1	1	38.2	E	MF	domestic	Zones 14 and 17 are same
9963	3A	18	0	17	17	0	50.4	10.3	1	88	E	MF	domestic	
18325	3A	17	0	27	18	0	16	10.3	1	85.8	E	MF	domestic	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
18325	3A	17	0	27	18	0	4	10.3	1	92.3	E	MF	domestic		
18325	3A	17	0	27	18	0	1	10.1	1	83.6	E	MF	domestic		
9999	3A	18	0	27	18	0	24	11.1	1	82	E	MF	domestic		
9999	3A	18	0	27	18	0	20.1	10.1	1	59	E	MF	domestic		
9999	3A	18	0	27	18	0	20.1	10.3	1	46	E	MF	domestic		
9998	3A	18	0	27	18	0	2	10.3	1	215	E	MF	domestic		
18358	3A	17	0	27	19	0	1	11.1	1	155	E	MF	domestic		
18186	3A	18	0	28	21	0	20	10.1	5	712	E	MF	domestic		
18186	3A	18	0	28	21	0	20.1	10.3	2	216	E	MF	domestic		
18186	3A	18	0	28	21	0	20.1	10.3	1	113	E	MF	domestic		
18186	3A	18	0	28	21	0	7	10.3	1	83	E	MF	domestic		
18186	3A	18	0	28	21	0	20.1	10.3	3	490	E	MF	domestic		
18186	3A	18	0	28	21	0	16	11.3	1	557	E	MF	domestic		
18186	3A	18	0	28	21	0	16	11.3	1	179	E	MF	domestic		
18237	3A	18	0	28	22	0	50.5	10.3	1	755	E	MF	domestic		
18237	3A	18	0	28	22	0	20	10.3	3	141	E	MF	domestic		
18215	3A	18	0	27	22	0	20.1	10.3	1	131	E	MF	domestic		
18215	3A	18	0	27	22	0	17	10.3	1	71.4	E	MF	domestic		
18280	3A	18	0	28	23	0	1	10.3	1	355	E	MF	domestic		
18340	3A	18	0	28	24	0	50.5	10.3	2	108	E	MF	domestic		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
21198	3	33	0	7	20	0	20.1	11.1	1	85	E1	MF	domestic		
21198	3	33	0	7	20	0	50.7	10.1	1	95.6	E1	MF	domestic		
21218	3	33	0	7	21	0	1	10.1	1	90.6	E1	MF	domestic		
21217	3	33	0	7	21	0	24	10.3	1	433	E1	MF	domestic		
21217	3	33	0	7	21	0	20.1	10.3	1	89.1	E1	MF	domestic		
21217	3	33	0	7	21	0	22	11.1	1	87.9	E1	MF	domestic		
21224	3	33	0	8	22	0	22	10.3	1	120	E2	MF	domestic		
21224	3	33	0	8	22	0	20.1	10.1	1	90	E2	MF	domestic		
21224	3	33	0	8	22	0	5	11.1	1	53	E2	MF	domestic		
21224	3	33	0	8	22	0	5	11.1	1	3	E2	MF	domestic		
21225	3	33	0	8	22	0.2	2	10.3	1	673	E2	MF	domestic		
21222	3	33	0	8	22	0	20.1	10.3	1	372	E2	MF	domestic		
18293	3A	24	1	14	17	0.1	1	10.3	1	695	F	EF/MF	domestic		EF/MF transition
18803	3A	17	1	26	18	0	20.1	10.3	1	82	F	EF/MF	domestic	EF/MF transition	
18336	3A	17	1	26	19	0	20.1	10.1	1	94.1	F	EF/MF	domestic	EF/MF transition	
18336	3A	17	1	26	19	0	1	10.3	1	38.8	F	EF/MF	domestic	EF/MF transition	
18368	3A	17	0	26	20	0	50.2	10.3	1	27.4	F	EF/MF	domestic	EF/MF transition	
18368	3A	17	0	26	20	0	50.2	10.1	1	25.5	F	EF/MF	domestic		
18420	3A	24	0	14	20	0	20	10.1	1	47.8	F	EF/MF	domestic		EF/MF transition
18410	3A	17	0	26	21	0	13	10.3	1	50	F	EF/MF	domestic	EF/MF transition	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
18387	3A	17	1	26	21	0	20	10.3	1	33.8	F	EF/MF	domestic	EF/MF transition	
18401	3A	17	0	26	21	0	20.1	11.3	1	139	F	EF/MF	domestic	EF/MF transition	
18453	3A	24	0	14	21	0	20.1	10.3	1	68.5	F	EF/MF	domestic		EF/MF transition
18453	3A	24	0	14	21	0	20	10.3	1	68.5	F	EF/MF	domestic		EF/MF transition
18444	3A	17	0	26	22	0	21	10.3	1	126	F	EF/MF	domestic	EF/MF transition	
18444	3A	17	0	26	22	0	50.2	11.1	2	96.1	F	EF/MF	domestic	EF/MF transition	
18448	3A	17	0	26	22	0	5	11.1	1	144	F	EF/MF	domestic	EF/MF transition	
18448	3A	17	0	26	22	0	50.5	11.1	1	105	F	EF/MF	domestic	EF/MF transition	
18448	3A	17	0	26	22	0	20.1	10.1	1	22	F	EF/MF	domestic	EF/MF transition	
18448	3A	17	0	26	22	0	22	10.3	1	98.3	F	EF/MF	domestic	EF/MF transition	
18430	3A	17	1	26	22	0	20	10.3	1	31.5	F	EF/MF	domestic	EF/MF transition	
18430	3A	17	1	26	22	0	20	10.3	1	31.2	F	EF/MF	domestic	EF/MF transition	
18481	3A	17	0	26	23	0	50.2	10.1	1	36.9	F	EF/MF	domestic	EF/MF transition	
18481	3A	17	0	26	23	0	20	10.3	1	12.1	F	EF/MF	domestic	EF/MF transition	
18466	3A	17	1	26	23	0	20.1	11.1	1	62.9	F	EF/MF	domestic	EF/MF transition	
18278	3A	18	0	26	23	0	16	10.3	1	23	F	EF/MF	domestic	EF/MF transition	
18513	3A	17	0	26	24	0	69	69	1	23.1	F	EF/MF	domestic	EF/MF transition	
18513	3A	17	0	26	24	0	71	71	1	93.1	F	EF/MF	domestic	EF/MF transition	
18300	3A	18	1	26	24	0	50.7	10.3	3	276	F	EF/MF	domestic	EF/MF transition	
18300	3A	18	1	26	24	0	8	10.3	1	156	F	EF/MF	domestic	EF/MF transition	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
18300	3A	18	1	26	24	0	20	10.3	1	15	F	EF/MF	domestic	EF/MF transition	
18555	3A	17	0	26	25	0	20.1	10.3	1	53.1	F	EF/MF	domestic	EF/MF transition	
18555	3A	17	0	26	25	0	20	10.3	1	24.5	F	EF/MF	domestic	EF/MF transition	
18555	3A	17	0	26	25	0	20.1	10.3	2	93.8	F	EF/MF	domestic	EF/MF transition	
18555	3A	17	0	26	25	0	16	10.1	1	43.9	F	EF/MF	domestic	EF/MF transition	
18555	3A	17	0	26	25	0	72	72	2	26.3	F	EF/MF	domestic	EF/MF transition	
1839	3A	18	0	26	25	0	24	10.1	1	1	F	EF/MF	domestic	EF/MF transition	
18405	3A	18	0	26	25	0	1	11.3	1	212	F	EF/MF	domestic	EF/MF transition	
18405	3A	18	0	26	25	0	20	10.3	1	13	F	EF/MF	domestic	EF/MF transition	
18405	3A	18	0	26	25	0	50.7	10.3	1	56	F	EF/MF	domestic	EF/MF transition	
18405	3A	18	0	26	25	0	10.2	10.3	1	210	F	EF/MF	domestic	EF/MF transition	
18405	3A	18	0	26	25	0	20	10.3	1	41	F	EF/MF	domestic	EF/MF transition	
18405	3A	18	0	26	25	0	20.1	10.3	1	42	F	EF/MF	domestic	EF/MF transition	
18471	3A	18	1	26	28	0	1	10.1	1	70	F	EF/MF	domestic	EF/MF transition	
18471	3A	18	1	26	28	0	20	10.3	1	10	F	EF/MF	domestic	EF/MF transition	
18471	3A	18	1	26	28	0	10.2	10.3	1	17	F	EF/MF	domestic	EF/MF transition	
18502	3A	18	1	26	30	0	16	10.3	1	25	F	EF/MF	domestic	EF/MF transition	
18502	3A	18	1	26	30	0	20.2	10.3	1	1	F	EF/MF	domestic	EF/MF transition	

Op. 3A Units 36 and 37

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
18685	3A	37	0	1	1	0	2	10.2	1	77.8	A2/A3		plow zone	plow zone	
18685	3A	37	0	1	1	0	9	10.3	1	10.2	A2/A3		plow zone	plow zone	
18372	3A	36	0	2	5	0	20	10.3	3	84.1	A2/A3		plow zone	plow zone	
18732	3A	36	0	2	5	0	20.1	10.3	1	124	A2/A3		plow zone	plow zone	
18967	3A	36	0	2	6	0	20	10.3	1	13	A2/A3		plow zone	plow zone	
18658	3A	36	0	1	1	0	1	11.3	1	440	A1		plow zone	plow zone and rodent burrows	
18658	3A	36	0	1	1	0	2	10.3	1	390	A1		plow zone	plow zone and rodent burrows	
18658	3A	36	0	1	1	0	20	10.3	3	53.8	A1		plow zone	plow zone and rodent burrows	
18705	3A	36	1	2	5	0	20	10.3	2	33.1	A1		plow zone	plow zone and rodent burrows	
18705	3A	36	1	2	5	0	2	11.1	1	150	A1		plow zone	plow zone and rodent burrows	
18705	3A	36	1	2	5	0	21	10.3	1	49.7	A1		plow zone	plow zone and rodent burrows	
18738	3A	37	0	4	5	0	16	10.3	1	71	A1		plow zone	gravel layer within "plow zone"	
18801	3A	37	1	2	6	0	20	10.3	3	87.7	A1		plow zone	plow zone and rodent burrows	
18823	3A	37	0	2	6	0	20	10.1	2	50.7	A1		plow zone	plow zone and rodent burrows	
18742	3A	36	0	3	5	0.2	1	11.1	1	760	B3	mixed	mixed	concentration of burned earth and artifacts	artifacts mixed by plow?
18982	3A	36	0	5	6	0	20	10.3	1	17.3	B1	MF or LF?	domestic		B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
21024	3A	36	0	3	6	0.3	1	11.2	1	136	B3	mixed	mixed	concentration of burned earth and artifacts	artifacts mixed by plow?
21002	3A	36	0	3	6	0.1	20.1	10.3	1	166	B3	mixed	mixed	concentration of burned earth and artifacts	artifacts mixed by plow?
21010	3A	36	0	3	6	0	24	10.3	2	10.6	B3	mixed	mixed	concentration of burned earth and artifacts	artifacts mixed by plow?
18982	3A	36	0	5	6	0	20	10.3	1	17.3	B1	MF or LF?	domestic		B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
18820	3A	37	0	5	6	0	50.6	10.3	1	148	B1	MF or LF?			
18811	3A	37	0	5	6	0	50.6	11.1	1	148	B1	MF or LF?			
18956	3A	37	1	5	7	0.1	2	10.3	1	279	B1	MF or LF?	domestic		B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
18962	3A	37	1	5	7	0	20	10.3	4	168	B1	MF or LF?	domestic		B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
18961	3A	37	1	5	7	0	2	10.1	1	83.6	B1	MF or LF?	domestic		B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21030	3A	36	0	3	7	0.4	20	10.3	1	13.3	B3	mixed	mixed	concentration of burned earth and artifacts	artifacts mixed by plow?
21061	3A	36	1	3	8	0	22	10.3	1	69.5	B3	mixed	mixed	concentration of burned earth and artifacts	artifacts mixed by plow?
21075	3A	36	1	3	8	0.1	20.1	10.3	1	235	B1	mixed	mixed	concentration of burned earth and artifacts	artifacts mixed by plow?
21076	3A	36	1	9	9	0.1	1	10.3	1	565	B1	MF or LF?	domestic		B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
20197	3A	36	0	9	9	0.3	20	10.3	1	2.2	B1	MF or LF?	domestic		B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21154	3A	36	0	9	9	0.5	50.5	10.3	1	131	B1	MF or LF?	domestic		B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21126	3A	36	0	9	10	0	20	10.1	1	12.2	B1	MF or LF?	domestic		B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21103	3A	36	1	9	10	10.1	20	10.2	1	25	B1	MF or LF?	domestic		B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21126	3A	36	0	9	10	0	20	10.1	1	12.2	B1	MF or LF?	domestic		B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21194	3A	37	0	9	11	0.1	20	10.3	1	31.2	B1	MF or LF?	domestic		B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21266	3A	37	0	11	12	0.3	4	10.3	1	102	B1	MF or LF?	domestic		B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21606	3A	37	0	22	15	0	24	10.3	1	136	B1/C3/C4	MF or LF?	domestic	midden	trash midden with high density of ceramic, lithic, and bone artifacts
21515	3A	37	0	22	15	0	24	10.3	1	19.8	B1/C3/C4	MF or LF?	domestic	midden	trash midden with high density of ceramic, lithic, and bone artifacts
21515	3A	37	0	22	15	0	24	11.1	1	33.1	B1/C3/C4	MF or LF?	domestic	midden	trash midden with high density of ceramic, lithic, and bone artifacts
21515	3A	37	0	22	15	0	20	10.3	1	17.1	B1/C3/C4	MF or LF?	domestic	midden	trash midden with high density of ceramic, lithic, and bone artifacts

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
21023	3A	37	0	7	8	0	20	10.3	2	89.2	B2	MF or LF?	domestic	house platform	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21105	3A	37	0	7	8	0.3	1.25	11.1	1	395	B2	MF or LF?	domestic	house platform	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21104	3A	37	0	7	8	0.2	1	11.1	1	1165	B2	MF or LF?	domestic	house platform	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
18995	3A	37	1	7	8	0.1	5	10.3	1	112	B2	MF or LF?	domestic	house platform	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21037	3A	37	0	7	9	0.1	2	10.2	1	58.6	B2	MF or LF?	domestic	house platform	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21095	3A	36	0	10	9	0.2	20	10.1	1	154	B2	MF or LF?	domestic		B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21099	3A	36	0	10	9	0.4	20	10.3	1	15.6	B2	MF or LF?	domestic		B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21099	3A	36	0	10	9	0.4	24	10.1	1	29.2	B2	MF or LF?	domestic		B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21208	3A	37	0	8.11	9.11	0.3	50.7	10.3	1	4520	B	MF or LF?	domestic	midden	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21145	3A	37	0	10	10	0	20	10.3	1	210	B2	MF or LF?	domestic	house platform	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21226	3A	37	1	10	11	0.4	1	10.1	1	96.6	B2	MF or LF?	domestic	house platform	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
21196	3A	37	0	10	11	0	24	11.1	1	57.3	B2	MF or LF?	domestic	house platform	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
18685	3A	37	0	8	11	0	24	76	1	2.4	B	MF or LF?	domestic	midden	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
18685	3A	37	0	8	11	0	50.5	10.3	1	9.6	B	MF or LF?	domestic	midden	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
18685	3A	37	0	8	11	0	24	11.1	1	34.1	B	MF or LF?	domestic	midden	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21242	3A	36	0	10	11	0	20	10.1	1	6.1	B2	MF or LF?	domestic		B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21236	3A	36	0	10	11	0.3	20.1	10.3	1	102	B2	MF or LF?	domestic	midden	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21242	3A	36	0	10	11	0	20	10.1	1	6.1	B2	MF or LF?	domestic		B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21283	3A	36	0	15	12	0.1	50.5	11.1	1	269	B2	MF or LF?	domestic	midden	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21283	3A	36	0	15	12	0.1	50.5	11.2	1	269	B2	MF or LF?	domestic	midden	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21262	3A	37	0	10	12	0	1	10.3	1	75.3	B2	MF or LF?	domestic	house platform	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21302	3A	37	1	10	12	0.4	20.1	10.3	1	400	B2	MF or LF?	domestic	house platform	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
21461	3A	37	1	10	12	0.8	50.5	10.3	1	206	B2	MF or LF?	domestic	house platform	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21186	3A	37	0	82	12	0	50.6	11.1	1	62.9			domestic		
21286	3A	37	0	8c	12	0	20	10.3	1	11.8	B	MF or LF?	domestic	midden	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21334	3A	37	0	10	13	0.6	20	10.3	1	112	B2	MF or LF?	domestic	house platform	B seems to correlate with E (MF) in Units 17 and 18 but ceramics look LF
21164	3A	36	1	13	10	0.7	20	10.3	1	30.6	C1	MF or LF?	domestic	midden	discrete trash dumps with metate recycling
21049	3A	36	1	13	10	0.6	1	10.1	1	345	C1	MF or LF?	domestic	midden	discrete trash dumps with metate recycling
20165	3A	36	1	13	10	0.8	2	10.3	1	325	C1	MF or LF?	domestic	midden	discrete trash dumps with metate recycling
21271	3A	36	1	13	11	0	24	76	2	97.1	C1	MF or LF?	midden	discrete trash dumps with metate recycling	
21271	3A	36	1	13	11	0	24	76	2	97.1	C1	MF or LF?	domestic	midden	discrete trash dumps with metate recycling
21352	3A	36	0	16	13	0	50.5	10.3	1	325	C2	EF/MF?	domestic		C2 Appears to correlate with F (EF/MF) in Units 17 and 18.
21342	3A	36	0	16	13	0	20	11.1	1	71.1	C2	EF/MF?	domestic		C2 Appears to correlate with F (EF/MF) in Units 17 and 18.
21482	3A	36	0	16	14	0	20.1	11.1	1	223	C2	EF/MF?	domestic		C2 Appears to correlate with F (EF/MF) in Units 17 and 18.
21482	3A	36	0	16	14	0	20	10.3	1	35	C2	EF/MF?	domestic		C2 Appears to correlate with F (EF/MF) in Units 17 and 18.
21482	3A	36	0	16	14	0	5	10.3	1	65	C2	EF/MF?	domestic		C2 Appears to correlate with F (EF/MF) in Units 17 and 18.

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
2E+06	3A	36	0	19	14	0	9	10.2	2	184	C3	MF or LF?	domestic		C3 Appears to be coeval with construction of platform B2
2E+06	3A	36	0	19	14	0	24	10.3	2	67	C3	MF or LF?	domestic		C3 Appears to be coeval with construction of platform B2
21467	3A	37	1	19	14	0	20	10.1	1	18.9	C3	MF or LF?	domestic	below house platform	
21487	3A	36	1	16	15	0	20	10.3	1	15	C2	EF/MF?	domestic		C2 Appears to correlate with F (EF/MF) in Units 17 and 18.
21487	3A	36	1	16	15	0.1	50.5	11.3	1	115	C2	EF/MF?	domestic		C2 Appears to correlate with F (EF/MF) in Units 17 and 18.
21534	3A	37	0	16	15	0	20	10.2	1	22.6	C2	EF/MF?	domestic		
21510	3A	37	0	19	15	0	1	10.2	1	217	C3	MF or LF?	domestic	below house platform	
21510	3A	37	0	19	15	0	24	11.1	1	19.3	C3	MF or LF?	domestic	below house platform	
21579	3A	36	0	19	16	0	20	11.1	3	38.3	C3	MF or LF?	domestic		
21579	3A	36	0	19	16	0	50.5	11.1	1	66.8	C3	MF or LF?	domestic		
21579	3A	36	0	19	16	0	24	10.1	2	29.8	C3	MF or LF?	domestic		
21592	3A	36	0	16	16	0	20	10.3	1	43.5	C2	EF/MF?	domestic		C2 Appears to correlate with F (EF/MF) in Units 17 and 18.
21592	3A	36	0	16	16	0	20	10.1	1	30.1	C2	EF/MF?	domestic		C2 Appears to correlate with F (EF/MF) in Units 17 and 18.
21592	3A	36	0	16	16	0	24	11.1	1	66.4	C2	EF/MF?	domestic		C2 Appears to correlate with F (EF/MF) in Units 17 and 18.
21592	3A	36	0	16	16	0	24	11.1	1	39.6	C2	EF/MF?	domestic		C2 Appears to correlate with F (EF/MF) in Units 17 and 18.
21567	3A	37	0	16	16	0	24	76	1	33.6	C2	EF/MF?	domestic		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
21567	3A	37	0	16	16	0	24	10.1	2	34.8	C2	EF/MF?	domestic		
21567	3A	37	0	16	16	0	9	10.3	1	102	C2	EF/MF?	domestic		
21591	3A	36	0	16	16	0.1	10.3	10.3	1	325	C2	EF/MF?	domestic		C2 Appears to correlate with F (EF/MF) in Units 17 and 18.
21559	3A	37	0	19	16	0.5	27	10.3	1	465	C3	MF or LF?	domestic	below house platform	
21617	3A	37	0	16	16	0.7	1	10.3	1	1275	C2	EF/MF?	domestic		
21586	3A	37	0	19	16	0.9	1	10.3	1	395	C3	MF or LF?	domestic	below house platform	
21585	3A	37	0	19	16	0.8	4	10.3	1	795	C3	MF or LF?	domestic	below house platform	
21536	3A	37	0	20	15	0.6	1	10.2	1	124	C4	MF or LF?	domestic	midden	midden with organics
21589	3A	37	0	22	16	0.11	20	10.3	1	34.6	C4	MF or LF?	domestic	midden	trash midden with high density of ceramic, lithic, and bone artifacts
21588	3A	37	0	22	16	0.9	2	11.1	1	109	C4	MF or LF?	domestic	midden	trash midden with high density of ceramic, lithic, and bone artifacts
21558	3A	37	1	22	16	0.4	50.2	10.3	1	415	C4	MF or LF?	domestic	midden	trash midden with high density of ceramic, lithic, and bone artifacts
21604	3A	37	0	22	17	0.2	21	72	1	113	C4	MF or LF?	domestic	midden	trash midden with high density of ceramic, lithic, and bone artifacts
21606	3A	37	0	22	17	0	24	76	1	22.3	C4	MF or LF?	domestic	midden	trash midden with high density of ceramic, lithic, and bone artifacts
21606	3A	37	0	22	17	0	24	10.1	1	45.2	C4	MF or LF?	domestic	midden	trash midden with high density of ceramic, lithic, and bone artifacts
21606	3A	37	0	22	17	0	20	10.3	1	162	C4	MF or LF?	domestic	midden	trash midden with high density of ceramic, lithic, and bone artifacts

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
21622	3A	37	0	22	18	0.1	1	11.2	1	305	C4	MF or LF?	domestic	midden	trash midden with high density of ceramic, lithic, and bone artifacts
21619	3A	37	0	22	18	0	1	10.2	1	72.4	C4	MF or LF?	domestic	midden	trash midden with high density of ceramic, lithic, and bone artifacts
21619	3A	37	0	22	18	0	25	10.2	1	15	C4	MF or LF?	domestic	midden	trash midden with high density of ceramic, lithic, and bone artifacts
21496	3A	36	1	18	15	0	24	10.3	1	15.1	D	EF?			D Appears to correlate with G in Units 17 and 18.

Op. 3B

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
12171	3B	21	0	1	1	0	20.1	10.3	1	88.4	A	TF	domestic		
12171	3B	21	0	1	1	0	20	10.3	3	30.5	A	TF	domestic		
12184	3B	21	0	1	1	0	1	10.3	1	320	A	TF	domestic		
12188	3B	21	0	1	1	0	20	10.3	1	34.6	A	TF	domestic		
12191	3B	22	0	1	1	0	20.1	10.1	1	94.2	A	TF	domestic		
12191	3B	22	0	1	1	0	50.5	10.1	1	44.2	A	TF	domestic		
12191	3B	22	0	1	1	0	50.5	10.1	1	5.6	A	TF	domestic		
12176	3B	22	0	1	1	0	24	10.1	1	56	A	TF	domestic		
12175	3B	22	0	1	1	0	25	10.3	3	27	A	TF	domestic		
12186	3B	23	0	1	1	0	25	76	1	35.8	A	TF	plow zone	area of ceramic and basalt production	
12190	3B	23	0	1	1	0	11	63	1	228	A	TF	plow zone	area of ceramic and basalt production	
12199	3B	23	0	1	1	0	24	10.1	2	39.7	A	TF	plow zone	area of ceramic and basalt production	
12199	3B	23	0	1	1	0	20	11.1	1	10.4	A	TF	plow zone	area of ceramic and basalt production	
12183	3B	23	0	1	1	0	20	10.1	5	37.7	A	TF	plow zone	area of ceramic and basalt production	
12183	3B	23	0	1	1	0	20	11.1	5	72	A	TF	plow zone	area of ceramic and basalt production	
12180	3B	23	0	1	1	0	50.5	10.3	1	81.7	A	TF	plow zone	area of ceramic and basalt production	
12180	3B	23	0	1	1	0	24	11.1	3	66.9	A	TF	plow zone	area of ceramic and basalt production	
12180	3B	23	0	1	1	0	22	11.3	2	170	A	TF	domestic	area of ceramic and basalt production	
12536	3B	26	0	1	1	0	20	10.3	1	121	A	TF	plow zone	plow zone	
12563	3B	27	0	1	1	0	24	11.1	4	78.4	A	TF	plow zone	plow zone	
12563	3B	27	0	1	1	0	20	10.3	1	4.6	A	TF	plow zone	plow zone	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
12629	3B	28	0	1	1	0	50.5	11.1	2	142	A	TF	plow zone	area of ceramic production	
12629	3B	28	0	1	1	0	20	10.3	3	42	A	TF	plow zone	area of ceramic production	
12629	3B	28	0	1	1	0	24	11.3	6	250	A	TF	plow zone	area of ceramic production	
12629	3B	28	0	1	1	0	16	10.3	1	20	A	TF	plow zone	area of ceramic production	
12629	3B	28	0	1	1	0	24	11.3	13	146	A	TF	plow zone	area of ceramic production	
12556	3B	26	1	1	2	0	50.5	10.3	2	28	A	TF	plow zone	plow zone	
12556	3B	26	1	1	2	0	20	10.3	1	7	A	TF	plow zone	plow zone	
12541	3B	26	0	1	2	0	20	10.3	1	24.9	A	TF	plow zone	plow zone	
12541	3B	26	0	1	2	0	1	10.3	1	132	A	TF	plow zone	plow zone	
12541	3B	26	0	1	2	0	1	11.1	1	43.4	A	TF	plow zone	plow zone	
12541	3B	26	0	1	2	0	50.5	11.1	1	47.6	A	TF	plow zone	plow zone	
12541	3B	26	0	1	2	0	72	72	1	26.8	A	TF	plow zone	plow zone	
12593	3B	26	1	1	3	0	24	10.1	4	69.4	A	TF	plow zone	plow zone	
12583	3B	26	0	1	3	0	20	10.3	1	66.1	A	TF	plow zone	plow zone	
12583	3B	26	0	1	3	0	20	10.1	2	48	A	TF	plow zone	plow zone	
12583	3B	26	0	1	3	0	24	10.1	12	239	A	TF	plow zone	plow zone	
12583	3B	26	0	1	3	0	72	72	1	76.7	A	TF	plow zone	plow zone	
12611	3B	27	1	1	4	0	14	11.1	1	64.4	A	TF	plow zone	plow zone	
12611	3B	27	1	1	4	0	24	10.3	1	11.1	A	TF	plow zone	plow zone	
12589	3B	27	0	1	4	0	21	11.1	1	37.2	A	TF	domestic		
12204	3B	23	1	2	3	0	2	10.3	1	213	A1	TF	domestic	area of ceramic and basalt production	
12235	3B	23	0	2	3	0	24	11.1	5	32.5	A1	TF	plow zone	area of ceramic and basalt production	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
12228	3B	23	0	2	3	0	20	11.1	1	8.1	A1	TF	plow zone	area of ceramic and basalt production	
12228	3B	23	0	2	3	0	24	11.1	4	85.4	A1	TF	plow zone	area of ceramic and basalt production	
12216	3B	21	0	1	4	0	20.1	10.3	1	360	A1	TF	domestic		
1226	3B	21	0	1	4	0	20	10.1	1	59.8	A1	TF	domestic		
12226	3B	21	0	1	4	0	20	10.3	1	20	A1	TF	domestic		
12220	3B	21	0	1	4	0	63	63	1	1.3	A1	TF	domestic		
12420	3B	23	0	2	4	0	2	11.1	1	175	A1	TF	domestic	area of ceramic and basalt production	
12299	3B	23	0	2	4	0	20	10.3	2	20.2	A1	TF	domestic	area of ceramic and basalt production	
12298	3B	23	0	2	4	0	20	11.1	3	57.6	A1	TF	domestic	area of ceramic and basalt production	
21605	3B	26	0	2	4	0	24	10.3	4	47.7	A1	TF	domestic	area of ceramic production	
12616	3B	26	1	2	4	0	73	73	1	380	A1	TF	domestic	area of ceramic production	
12621	3B	27	1	2	4	0	24	11.1	4	96.1	A1	TF	domestic		
12599	3B	27	0	2	4	0	24	10.1	2	27	A1	TF	domestic		
12351	3B	23	0	2	5	0	2	11.1	1	115	A1	TF	domestic	area of ceramic and basalt production	
12351	3B	23	0	2	5	0	20	11.1	2	82.3	A1	TF	domestic	area of ceramic and basalt production	
12351	3B	23	0	2	5	0	20	10.3	1	8.5	A1	TF	domestic	area of ceramic and basalt production	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
12351	3B	23	0	2	5	0	24	10.3	1	29	A1	TF	domestic	area of ceramic and basalt production	
12351	3B	23	0	2	5	0	24	11.1	1	39.3	A1	TF	domestic	area of ceramic and basalt production	
12351	3B	23	0	2	5	0	24	10.3	1	16.6	A1	TF	domestic	area of ceramic and basalt production	
12637	3B	26	0	2	5	0	24	10.3	5	70.9	A1	TF	domestic	area of ceramic production	
12637	3B	26	0	2	5	0	20	10.3	2	36.8	A1	TF	domestic	area of ceramic production	
12637	3B	26	0	2	5	0	20	11.1	1	46.2	A1	TF	domestic	area of ceramic production	
12637	3B	26	0	2	5	0	20	10.3	1	10.3	A1	TF	domestic	area of ceramic production	
12642	3B	26	1	2	5	0	20	10.3	1	85.5	A1	TF	domestic	area of ceramic production	
12642	3B	26	1	2	5	0	20	10.3	1	62.3	A1	TF	domestic	area of ceramic production	
12642	3B	26	1	2	5	0	24	10.1	4	88.7	A1	TF	domestic	area of ceramic production	
12656	3B	27	0	2	5	0	20	10.3	1	37.2	A1	TF	domestic		
12656	3B	27	0	2	5	0	24	10.3	2	21.1	A1	TF	domestic		
12656	3B	27	0	2	5	0	20.3	61	1	3.1	A1	TF	domestic		
12672	3B	27	1	2	5	0	24	10.1	1	20.3	A1	TF	domestic		
12269	3B	21	0	2	5	0	20	10.3	1	1.9	B	TF	domestic		
12270	3B	21	0	2	5	0	20	10.3	1	35	B	TF	domestic		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
12270	3B	21	0	2	5	0	20.1	10.3	1	66.1	B	TF	domestic		
12372	3B	22	0	2	5	0.5	20	10.1	1	112	B	TF	domestic		
12668	3B	27	0	3	5	0	24	11.1	6	68	B	TF	mortuary/offering	dog burial	
123243	3B	21	0	3	6	0	20.1	10.2	1	55.3	B	TF	domestic	ceramic concentration	
12377	3B	22	0	2	6	0	20.1	10.1	1	62.6	B	TF	domestic		
12377	3B	22	0	2	6	0	20	10.3	1	116	B	TF	domestic		
12377	3B	22	0	2	6	0	18	11.1	1	22.3	B	TF	domestic		
122398	3B	23	0	2	6	0	20.1	11.1	1	53.4	B	TF	domestic	area of ceramic and basalt production	
12402	3B	23	0	2	6	0	24	10.3	1	48.2	B	TF	domestic	area of ceramic and basalt production	basurero
12400	3B	23	0	2	6	0	20	10.3	2	59.8	B	TF	domestic	area of ceramic and basalt production	basurero
12400	3B	23	0	2	6	0	20	10.1	2	42.5	B	TF	domestic	area of ceramic and basalt production	basurero
12403	3B	23	0	2	6	0	20	10.3	1	41.6	B	TF	domestic	area of ceramic and basalt production	basurero
12367	3B	23	1	2	6	0	20	10.3	5	158	B	TF	domestic	area of ceramic and basalt production	basurero
12367	3B	23	1	2	6	0	20.1	10.3	1	25	B	TF	domestic	area of ceramic and basalt production	basurero
12367	3B	23	1	2	6	0	50.5	10.3	1	4.9	B	TF	domestic	area of ceramic and basalt production	basurero
12731	3B	26	1	2	6	0	24	10.1	8	149	B	TF	domestic	area of ceramic production	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
12731	3B	26	1	2	6	0	20	10.3	1	5.4	B	TF	domestic	area of ceramic production	
12678	3B	27	0	2	6	0	24	10.1	9	109	B	TF	domestic		
12691	3B	27	1	2	6	0	24	10.1	1	15.6	B	TF	domestic		
12740	3B	28	0	2	6	0	24	10.2	5	43	B	TF	plow zone	area of ceramic production	
12740	3B	28	0	2	6	0	24	10.3	2	23	B	TF	plow zone	area of ceramic production	
12740	3B	28	0	2	6	0	20	10.3	1	2	B	LF	plow zone	area of ceramic production	
12740	3B	28	0	2	6	0	14	10.3	1	7	B	TF	plow zone	area of ceramic production	
12740	3B	28	0	2	6	0	69	69	2	7	B	TF	plow zone	area of ceramic production	
20102	3B	28	0	2	6	0	50.2	10.3	1	356	B	TF	plow zone	area of ceramic production	
12766	3B	28	0	2	6	0	24	10.3	7	40	B	TF	plow zone	area of ceramic production	
12766	3B	28	0	2	6	0	24	10.3	9	229	B	TF	plow zone	area of ceramic production	
12766	3B	28	0	2	6	0	24	76	1	7	B	TF	plow zone	area of ceramic production	
12335	3B	21	1	2	7	0.1	10.2	11.1	1	106	B	TF	domestic		
12384	3B	21	0	2	7	0	20.1	10.3	1	57.8	B	TF	domestic		
12384	3B	21	0	2	7	0	20	10.3	1	13	B	TF	domestic		
12384	3B	21	0	2	7	0	24	10.1	2	44.5	B	TF	domestic		
12384	3B	21	0	2	7	0	20.1	10.1	1	56.3	B	TF	domestic		
12384	3B	21	0	2	7	0	10.2	10.3	1	14.7	B	TF	domestic		
12384	3B	21	0	2	7	0	20	10.3	1	12.8	B	TF	domestic		
12384	3B	21	0	2	7	0	20	10.3	1	24.3	B	TF	domestic		
12357	3B	21	0	2	7	0	50.7	10.3	1	470	B	TF	domestic		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
12385	3B	21	0	2	7	0	27	76	1	42.5	B	TF	domestic		
12459	3B	22	0	2	7	0	20	10.3	1	62.9	B	TF	domestic		
12447	3B	23	1	2	7	0	20	10.3	1	46.2	B	TF	domestic	area of ceramic and basalt production	basurero
12447	3B	23	1	2	7	0	22	11.1	1	37.9	B	TF	domestic	area of ceramic and basalt production	basurero
12447	3B	23	1	2	7	0	50.5	11.1	1	194	B	TF	domestic	area of ceramic and basalt production	basurero
12442	3B	23	0	2	7	0	20	10.3	5	63	B	TF	domestic	area of ceramic and basalt production	basurero
12442	3B	23	0	2	7	0	5	76	1	31.2	B	TF	domestic	area of ceramic and basalt production	basurero
12442	3B	23	0	2	7	0	20	10.3	1	6.3	B	TF	domestic	area of ceramic and basalt production	basurero
12442	3B	23	0	2	7	0	24	11.1	2	51.2	B	TF	domestic	area of ceramic and basalt production	basurero
12442	3B	23	0	2	7	0	20	11.1	2	56.9	B	TF	domestic	area of ceramic and basalt production	basurero
12421	3B	23	0	2	7	0.1	50.4	10.1	1	350	B	TF	domestic	area of ceramic and basalt production	basurero
12428	3B	23	0	2	7	0.8	20.1	11.1	1	690	B	TF	plow zone	area of ceramic and basalt production	basurero
12981	3B	26	0	4	7	0	24	11.1	1	6.3	B	TF	domestic	area of ceramic production	firing pit

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
12929	3B	26	0	4	7	0	24	10.3	3	9.7	B	TF	domestic	area of ceramic production	firing pit
12772	3B	26	0	2	7	0	24	10.3	12	121	B	TF	domestic	area of ceramic production	
12487	3B	26	0	2	7	0	50.2	10.3	1	620	B	TF	domestic	area of ceramic production	
12789	3B	26	1	2	7	0	24	10.1	5	77.2	B	TF	domestic	area of ceramic production	
12743	3B	26	0	2	7	0	63	63	1	54.7	B	TF	domestic	area of ceramic production	
12710	3B	27	0	2	7	0	24	11.1	1	53.2	B	TF	domestic		
12709	3B	27	0	2	7	0	2	11.1	1	90.5	B	TF	domestic		
12783	3B	27	1	2	7	0	24	11.1	1	27.2	B	TF	domestic		
12437	3B	21	0	2	8	0	20	10.3	1	28.2	B	TF	domestic		
12437	3B	21	0	2	8	0	20	11.3	1	35.8	B	TF	domestic		
12485	3B	22	0	2	8	0	50.5	10.1	2	18.7	B	TF	domestic		
12470	3B	23	0	2	8	0	20	10.3	1	49.5	B	TF	domestic	area of ceramic and basalt production	basurero
12470	3B	23	0	2	8	0	20	10.3	1	15	B	TF	domestic	area of ceramic and basalt production	basurero
12470	3B	23	0	2	8	0	20	10.1	1	8.7	B	TF	domestic	area of ceramic and basalt production	basurero
12470	3B	23	0	2	8	0	20	10.3	2	52	B	TF	domestic	area of ceramic and basalt production	basurero
12470	3B	23	0	2	8	0	72	72	2	33.1	B	TF	domestic	area of ceramic and basalt production	basurero

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
12428	3B	23	1	2	8	0	20	10.3	1	2.3	B	TF	domestic	area of ceramic and basalt production	basurero
12428	3B	23	1	2	8	0	24	10.1	2	38.7	B	TF	domestic	area of ceramic and basalt production	basurero
12936	3B	26	0	4	8	0	24	11.1	9	60.4	B	TF	domestic	area of ceramic production	
12936	3B	26	0	4	8	0	24	76	1	8.4	B	TF	domestic	area of ceramic production	
12905	3B	26	1	2	8	0	24	11.1	7	102	B	TF	domestic	area of ceramic production	
12905	3B	26	1	2	8	0	24	76	1	20.8	B	TF	elite res-admin	area of ceramic production	
12973	3B	26	0	4	8	0	24	10.1	2	44.7	B	TF	domestic	area of ceramic production	firing pit
12899	3B	26	0	2	8	0	24	11.1	21	206	B	TF	domestic	area of ceramic production	
12899	3B	26	0	2	8	0	24	76	1	5.6	B	TF	domestic	area of ceramic production	
12899	3B	26	0	2	8	0	20	10.3	2	6.8	B	TF	domestic	area of ceramic production	
12899	3B	26	0	2	8	0	20.1	10.2	1	26.6	B	TF	domestic	area of ceramic production	
12899	3B	26	0	2	8	0	20.1	10.3	1	79.9	B	TF	domestic	area of ceramic production	
12985	3B	26	0	4	8	0	24	10.1	4	46.3	B	TF	domestic	area of ceramic production	
12747	3B	27	0	2	8	0	24	10.1	4	40.2	B	TF	domestic		
12747	3B	27	0	2	8	0	50.5	11.3	2	37.5	B	TF	domestic		
12465	3B	21	1	2	9	0	20	10.3	1	107	B	TF	domestic		
12465	3B	21	1	2	9	0	20	10.3	1	22.8	B	TF	domestic		
12491	3B	21	1	2	9	0	61	28	1	230	B	TF	domestic		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
12494	3B	23	1	2	9	0	20	10.1	1	66.6	B	TF	domestic	area of ceramic and basalt production	basurero
12494	3B	23	1	2	9	0	24	11.1	5	67	B	TF	domestic	area of ceramic and basalt production	basurero
12494	3B	23	1	2	9	0	72	72	2	27	B	TF	domestic	area of ceramic and basalt production	basurero
12400	3B	23	0	3	9	0	20	10.3	5	35.7	B	TF	domestic	area of ceramic and basalt production	
12514	3B	23	0	3	9	0	72	72	1	4.9	B	TF	domestic	area of ceramic and basalt production	
20104	3B	26	0	2	9	0	20	10.1	1	2.4	B	TF	domestic	area of ceramic production	
20107	3B	26	0	2	9	0	20	10.3	1	5.7	B	TF	domestic	area of ceramic production	
20109	3B	26	0	2	9	0	20	10.3	1	8.7	B	TF	domestic	area of ceramic production	
20109	3B	26	0	2	9	0	24	76	2	54.6	B	TF	domestic	area of ceramic production	
12818	3B	27	0	2	9	0	24	10.1	11	119	B	TF	domestic		
12817	3B	27	0	2	9	0	20	10.2	1	48.9	B	TF	domestic		
12811	3B	27	0	2	9	0	24	10.1	7	104	B	TF	domestic		
12811	3B	27	0	2	9	0	20.1	11.1	1	78.3	B	TF	domestic		
12806	3B	27	0	5	9	0	24	10.1	14	83.7	B	TF	mortuary	adult extended burial	
12806	3B	27	0	5	9	0	25	10.1	2	80.4	B	TF	mortuary	adult extended burial	
12784	3B	27	1	2	9	0	20	11.1	1	78.7	B	TF	domestic		
12783	3B	27	1	2	9	0	22	11.1	1	65.8	B	TF	domestic		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
12847	3B	27	0	2	10	0	24	10.3	3	21.4	B	TF	domestic		
12847	3B	27	0	2	10	0	20	11.1	1	41.6	B	TF	domestic		
12500	3B	21	0	2	10	0	24	10.3	1	29.2	B	TF	domestic		
12500	3B	21	0	2	10	0	24	10.3	1	16.1	B	TF	domestic		
12500	3B	21	0	2	10	0	72	72	1	44.8	B	TF	domestic		
20112	3B	26	0	6	9	0	24	10.3	1	6.8	B/B5	TF	domestic	area of ceramic production	intrusive pit
12886	3B	28	0	3	8	0	50.2	10.3	1	59	B1	TF	plow zone	area of ceramic production	
12886	3B	28	0	3	8	0	25	10.3	4	37	B1	TF	plow zone	area of ceramic production	
20135	3B	26	0	5	9	0	20.1	10.3	1	72.1	B1	TF	domestic	area of ceramic production	sandstone floor
20139	3B	26	0	5	9	0	50.6	10.3	4	108	B1	TF	domestic	area of ceramic production	sandstone floor
20135	3B	26	0	5	9	0	50.5	10.3	3	38.6	B1	TF	domestic	area of ceramic production	sandstone floor
20123	3B	26	0	5	9	0	24	10.2	5	45.6	B1	TF	domestic	area of ceramic production	sandstone floor
20123	3B	26	0	5	9	0	50.5	11.2	1	113	B1	TF	domestic	area of ceramic production	sandstone floor
12911	3B	22	0	3	10	0	50.5	10.1	1	395	B1	TF	domestic	floor	
12911	3B	22	0	3	10	0	2	11.1	1	123	B1	TF	domestic	floor	
12911	3B	22	0	3	10	0	50.5	10.3	2	30.3	B1	TF	domestic	floor	
20152	3B	26	0	5	10	0	24	10.1	2	33.5	B1	TF	domestic	area of ceramic production	sandstone floor (underlies B, B2, B4)
20152	3B	26	0	5	10	0	24	10.1	1	62.1	B1	TF	domestic	area of ceramic production	sandstone floor (underlies B, B2, B4)

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
20307	3B	26	0	5	11	0	20	10.3	1	1.2	B1	TF	domestic	area of ceramic production	sandstone floor (underlies B, B2, B4)
12938	3B	28	0	5	9	0	24	10.3	1	28	B6	TF	plow zone	area of ceramic production	
123938	3B	28	0	5	9	0	50.5	10.1	1	4	B6	TF	plow zone	area of ceramic production	
12938	3B	28	0	5	9	0	20	10.3	1	4	B6	TF	plow zone	area of ceramic production	
20114	3B	28	0	5	9	0	24	10.3	1	31	B6	TF	plow zone	area of ceramic production	
12963	3B	28	0	5	10	0	50.3	10.3	1	87	B6	TF	plow zone	area of ceramic production	
20131	3B	28	0	5	11	0	24	10.3	4	29	B6	TF	plow zone	area of ceramic production	
20131	3B	28	0	5	11	0	24	10.3	1	6	B6	TF	plow zone	area of ceramic production	

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BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
13071	4	19	0	1	1	0	20.1	10.1	2	137	A	mixed MF-EC	elite res-admin	plow zone	
13071	4	19	0	1	1	0	20	10.1	1	25	A	mixed MF-EC	elite res-admin	plow zone	
13071	4	19	0	1	1	0	24	76	4	19.1	A	mixed MF-EC	elite res-admin	plow zone	
13071	4	19	0	1	1	0	50.5	10.2	17	188	A	mixed MF-EC	elite res-admin	plow zone	
13071	4	19	0	1	1	0	50.5	10.1	16	122	A	mixed MF-EC	elite res-admin	plow zone	
13071	4	19	0	1	1	0	50.5	11.1	6	104	A	mixed MF-EC	elite res-admin	plow zone	
13071	4	19	0	1	1	0	50.5	10.2	17	201	A	mixed MF-EC	elite res-admin	plow zone	
13071	4	19	0	1	1	0	50.5	10.1	8	115	A	mixed MF-EC	elite res-admin	plow zone	
13071	4	19	0	1	1	0	24	76	3	13.2	A	mixed MF-EC	elite res-admin	plow zone	
13071	4	19	0	1	1	0	50.5	10.3	26	103	A	mixed MF-EC	elite res-admin	plow zone	
13071	4	19	0	1	1	0	72	72	8	29.1	A	mixed MF-EC	elite res-admin	plow zone	
13071	4	19	0	1	1	0	50.5	11.1	1	53.3	A	mixed MF-EC	elite res-admin	plow zone	
13336	4	25	0	1	1	0	20	10.3	1	15.5	A	LF-TF	elite res-admin	plow zone	
13336	4	25	0	1	1	0	20.1	10.3	1	118	A	LF-TF	elite res-admin	plow zone	
13336	4	25	0	1	1	0	21	10.1	4	8.2	A	LF-TF	elite res-admin	plow zone	
13224	4	25	0	1	1	0	60	60	1	15.7	A	LF-TF	elite res-admin	plow zone	
13224	4	25	0	1	1	0	24	10.1	1	66	A	LF-TF	elite res-admin	plow zone	
13340	4	25	0	1	1	0	62	62	1	7.2	A	LF-TF	elite res-admin	plow zone	
13095	4	20	0	1	3	0	24	10.2	1	47.3	A	mixed MF-EC	elite res-admin	mixed slope wash	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
13095	4	20	0	1	3	0	24	11.1	1	15.7	A	mixed MF-EC	elite res-admin	mixed slope wash	
13087	4	19	0	1	4	0	24	10.1	2	30.7	A	mixed MF-EC	elite res-admin	mixed slope wash	
13087	4	19	0	1	4	0	50.5	10.2	5	41	A	mixed MF-EC	elite res-admin	mixed slope wash	
13116	4	20	0	3	5	0	24	10.1	1	10.9	A/B	mixed MF-EC	elite res-admin	mixed slope wash	
13116	4	20	0	3	5	0	24	76	2	3.6	A/B	mixed MF-EC	elite res-admin	mixed slope wash	
13077	4	19	0	3	4	0	24	10.3	1	76.7	B	mixed MF-EC	elite res-admin	mixed slope wash	
13077	4	19	0	3	4	0	24	10.1	2	37.7	B	mixed MF-EC	elite res-admin	mixed slope wash	
13110	4	19	0	2	5	0	50.5	10.2	5	112	B	mixed MF-EC	elite res-admin	mixed slope wash	
13110	4	19	0	2	5	0	72	72	1	6.9	B	mixed MF-EC	elite res-admin	mixed slope wash	
13109	4	19	0	3	5	0	50.5	10.2	2	77.7	B	mixed MF-EC	elite res-admin	mixed slope wash	
13109	4	19	0	3	5	0	50.5	10.1	4	31.2	B	mixed MF-EC	elite res-admin	mixed slope wash	
13109	4	19	0	3	5	0	72	72	1	18.3	B	mixed MF-EC	elite res-admin	mixed slope wash	
13120	4	19	0	4	5	0	21	10.3	6	59.1	B	mixed MF-EC	elite res-admin	mixed slope wash	
13120	4	19	0	4	5	0	50.5	10.1	2	31.7	B	mixed MF-EC	elite res-admin	mixed slope wash	
13112	4	19	0	2	5	0	24	10.1	1	4.9	B	mixed MF-EC	elite res-admin	mixed slope wash	
13107	4	19	1	3	5	0	5	10.1	1	168	B	mixed MF-EC	elite res-admin	mixed slope wash	
13122	4	19	1	3	6	0	50.5	10.1	4	119	B	mixed MF-EC	elite res-admin	mixed slope wash	
13122	4	19	1	3	6	0	24	10.3	1	9.1	B	mixed MF-EC	elite res-admin	mixed slope wash	
13134	4	19	0	2	6	0	24	10.1	1	46.5	B	mixed MF-EC	elite res-admin	mixed slope wash	
13134	4	19	0	2	6	0	21	10.3	1	23.1	B	mixed MF-EC	elite res-admin	mixed slope wash	
13134	4	19	0	2	6	0	24	10.3	1	3.9	B	mixed MF-EC	elite res-admin	mixed slope wash	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
13129	4	19	0	3	6	0	21	10.2	7	118	B	mixed MF-EC	elite res-admin	mixed slope wash	
13153	4	19	0	3	7	0	21	10.1	4	63.7	B	mixed MF-EC	elite res-admin	mixed slope wash	
13153	4	19	0	3	7	0	21	10.3	2	72.2	B	mixed MF-EC	elite res-admin	mixed slope wash	
13154	4	19	0	5	7	0	50.5	10.1	3	70.3	C	mixed MF-EC	elite res-admin	mixed slope wash	
13154	4	19	0	5	7	0	20	10.1	1	16.5	C	mixed MF-EC	elite res-admin	mixed slope wash	
13154	4	19	0	5	7	0	50.5	11.1	1	71.3	C	mixed MF-EC	elite res-admin	mixed slope wash	
13154	4	19	0	5	7	0	24	10.1	2	28.3	C	mixed MF-EC	elite res-admin	mixed slope wash	
13168	4	19	0	5	8	0	21	10.1	2	14.4	C	mixed MF-EC	elite res-admin	mixed slope wash	
13181	4	19	0	5	9	0	50.5	10.1	3	37.7	C	mixed MF-EC	elite res-admin	mixed slope wash	
13178	4	19	1	5	9	0	24	10.1	2	16.2	C	mixed MF-EC	elite res-admin	mixed slope wash	
13189	4	19	0	5	10	0	20	10.3	1	43.8	C	mixed MF-EC	elite res-admin	mixed slope wash	
13191	4	19	1	5	11	0	20	10.3	1	9.3	C	mixed MF-EC	elite res-admin	mixed slope wash	
13200	4	19	0	5	11	0	24	76	1	11.1	C	mixed MF-EC	elite res-admin	mixed slope wash	
13206	4	19	1	5	12	0	24	10.1	2	35.9	C	mixed MF-EC	elite res-admin	mixed slope wash	
13219	4	19	0	5	13	0	50.5	10.1	7	5.5	C	mixed MF-EC	elite res-admin	mixed slope wash	
13339	4	19	0	5	14	0	24	10.2	1	35.2	C	mixed MF-EC	elite res-admin	mixed slope wash	
13332	4	19	0	5	14	0	24	10.1	2	13.1	C	mixed MF-EC	elite res-admin	mixed slope wash	

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BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO
23039	5	41	0	0	0	0	50.5	10.3	5	39	surface	EC/TF	civic-ceremonial	surface collection	
23039	5	41	0	0	0	0	20	10.3	1	20	surface	EC/TF	civic-ceremonial	surface collection	
17204	5	31	0	0	0	0	20	10.3	1	46	superficie	LF	civic-ceremonial	plow zone	
17204	5	31	0	0	0	0	24	10.1	3	72	superficie	LF	civic-ceremonial	plow zone	
23079	5	41	0	1	1	0	1	10.3	3	546	A	EC/TF	civic-ceremonial	plow zone	
23079	5	41	0	1	1	0	24	11.1	2	98	A	EC/TF	civic-ceremonial	plow zone	
23079	5	41	0	1	1	0	24	11.1	28	287	A	EC/TF	civic-ceremonial	plow zone	
23079	5	41	0	1	1	0	5	10.3	1	6	A	EC/TF	civic-ceremonial	plow zone	
23058	5	41	0	1	1	0	24	10.1	72	642	A	EC/TF	civic-ceremonial	plow zone	
23058	5	41	0	1	1	0	20	10.3	5	137	A	EC/TF	civic-ceremonial	plow zone	
23058	5	41	0	1	1	0	24	11.1	2	113	A	EC/TF	civic-ceremonial	plow zone	
23058	5	41	0	1	1	0	24	10.1	4	157	A	EC/TF	civic-ceremonial	plow zone	
23042	5	41	0	1	1	0	24	11.1	106	638	A	EC/TF	civic-ceremonial	plow zone	
23042	5	41	0	1	1	0	20.1	10.3	4	133	A	EC/TF	civic-ceremonial	plow zone	
23042	5	41	0	1	1	0	24	10.1	25	292	A	EC/TF	civic-ceremonial	plow zone	
23042	5	41	0	1	1	0	5	10.3	1	55	A	EC/TF	civic-ceremonial	plow zone	
23042	5	41	0	1	1	0	20	10.3	1	12	A	EC/TF	civic-ceremonial	plow zone	
23060	5	41	0	1	1	0.3	24	11.1	1	457	A	EC/TF	civic-ceremonial	plow zone	
23047	5	41	0	1	1	0.1	50.2	10.3	1	363	A	EC/TF	civic-ceremonial	plow zone	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
23053	5	41	0	1	1	0	24	11.1	35	416	A	EC/TF	civic-ceremonial	plow zone		
23053	5	41	0	1	1	0	24	10.1	5	167	A	EC/TF	civic-ceremonial	plow zone		
23046	5	41	0	1	1	0	60	60	1	8	A	TF/EC	civic-ceremonial	plow zone		
23055	5	41	0	1	1	0	22	11.1	1	44	A	TF	civic-ceremonial	plow zone		
23062	5	41	0	1	1	0	21	11.1	1	322	A	TF	civic-ceremonial	plow zone		
17219	5	30	0	1	1	0	24	10.1	1	50.8	A	TF/LF mixed	elite res-admin	plow zone		
17183	5	30	0	1	1	0	24	11.1	4	97.2	A	TF/LF mixed	elite res-admin	plow zone		
17183	5	30	0	1	1	0	50.5	11.3	3	181	A	TF/LF mixed	elite res-admin	plow zone		
17183	5	30	0	1	1	0	24	10.3	1	13.7	A	TF/LF mixed	elite res-admin	plow zone		
17183	5	30	0	1	1	0	50.4	10.1	1	37.7	A	TF/LF mixed	elite res-admin	plow zone		
17222	5	30	0	1	1	0	24	10.1	2	51.1	A	TF/LF mixed	elite res-admin	plow zone		
17222	5	30	0	1	1	0	22	11.1	2	45.2	A	TF/LF mixed	elite res-admin	plow zone		
17213	5	30	1	1	1	0	24	11.1	1	27.1	A	TF/LF mixed	elite res-admin	plow zone		
17213	5	30	1	1	1	0	50.5	10.3	1	3.4	A	TF/LF mixed	elite res-admin	plow zone		
17187	5	30	0	1	1	0	50.6	10.1	1	217	A	TF/LF mixed	elite res-admin	plow zone		
17187	5	30	0	1	1	0	20	10.1	1	41.7	A	TF/LF mixed	elite res-admin	plow zone		
17187	5	30	0	1	1	0	24	10.1	4	60.5	A	TF/LF mixed	elite res-admin	plow zone		
17187	5	30	0	1	1	0	50.5	11.3	1	17.7	A	TF/LF mixed	elite res-admin	plow zone		
17492	5	32	0	1	1	0	25	11.1	6	135	A	mixed	civic-ceremonial	plow zone		
17492	5	32	0	1	1	0	25	10.1	1	12	A	mixed	civic-ceremonial	plow zone		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
17422	5	32	0	1	1	0	25	11.1	4	64	A	mixed	civic-ceremonial	plow zone		
17422	5	32	0	1	1	0	20	10.3	4	75	A	mixed	civic-ceremonial	plow zone		
17422	5	32	0	1	1	0	24	10.1	1	32	A	mixed	civic-ceremonial	plow zone		
17447	5	32	0	1	1	0	20	10.3	3	403	A	mixed	civic-ceremonial	plow zone		
17449	5	32	0	1	3	0	25	11.1	8	144	A	mixed	civic-ceremonial	plow zone		
17218	5	31	0	1	1	0	50.2	10.3	1	254	A	LF	civic-ceremonial	plaza fill		
17218	5	31	0	1	1	0	20	10.3	5	72	A	LF	civic-ceremonial	plaza fill		
17218	5	31	0	1	1	0	50.5	10.1	3	207	A	LF	civic-ceremonial	plaza fill		
17218	5	31	0	1	1	0	24	10.1	16	170	A	LF	civic-ceremonial	plaza fill		
17207	5	31	0	1	1	0	20	10.3	3	32	A	LF	civic-ceremonial	plow zone		
17207	5	31	0	1	1	0	24	11.1	1	67	A	LF	civic-ceremonial	plow zone		
17207	5	31	0	1	1	0	25	10.1	5	50	A	LF	civic-ceremonial	plow zone		
17207	5	31	0	1	1	0	24	11.1	5	49	A	LF	civic-ceremonial	plow zone		
17207	5	31	0	1	1	0	24	76	1	1	A	LF	civic-ceremonial	plow zone		
17236	5	31	0	1	1	0	24	11.1	9	196	A	LF	civic-ceremonial	plow zone		
17236	5	31	0	1	1	0	24	11.1	3	109	A	LF	civic-ceremonial	plow zone		
17229	5	31	0	1	1	0	24	10.1	4	89	A	LF	civic-ceremonial	plow zone		
17229	5	31	0	1	1	0	24	10.1	1	24	A	LF	civic-ceremonial	plow zone		
17229	5	31	0	1	1	0	25	11.1	2	70	A	LF	civic-ceremonial	plow zone		
17229	5	31	0	1	1	0	20	10.3	2	32	A	LF	civic-ceremonial	plow zone		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
17229	5	31	0	1	1	0	20.1	10.3	1	344	A	LF	civic-ceremonial	plow zone		
17245	5	31	0	1	1	0	20	10.3	3	75	A	LF	civic-ceremonial			
17244	5	31	0	1	1	0	20	10.3	1	142	A	LF	civic-ceremonial	plow zone		
17237	5	31	0	1	1	0	2	10.3	1	282	A	LF	civic-ceremonial	plow zone		
17449	5	32	0	1	3	0	20	10.3	2	23	A	LF	civic-ceremonial	plow zone		
17449	5	32	0	1	3	0	24	10.1	1	23	A	LF	civic-ceremonial	plow zone		
17363	5	31	0	2	1	0	20	10.3	7	151	B	LF	civic-ceremonial			
17363	5	31	0	2	1	0	24	11.1	1	3	B	LF	civic-ceremonial			
17256	5	31	0	2	1	0	60	60	1	54	B	LF	civic-ceremonial			
17255	5	31	0	2	1	0	24	10.1	8	167	B	LF	civic-ceremonial			
17404	5	31	0	3	1	0	60	60	16	1448	B	LF	civic-ceremonial	laja fragments		
23090	5	41	0	3	4	0	1	10.3	1	540	B	TF	civic-ceremonial	edge of red clay adoratorio platform		
17248	5	30	0	2	5	0	50.5	10.3	1	5.6	B	TF/LF mixed	elite res-admin	slope wash		
17368	5	31	1	2	5	0	24	11.1	7	84	B	LF	civic-ceremonial			
17396	5	31	0	2	5	0	24	11.1	3	68	B	LF	civic-ceremonial			
17525	5	32	0	2	5	0	24	10.1	9	195	B	LF	civic-ceremonial			
17525	5	32	0	2	5	0	20	10.3	4	57	B	LF	civic-ceremonial			
17521	5	32	1	2	5	0	25	11.1	1	15	B	LF	civic-ceremonial			
17752	5	30	1	2	6	0	24	10.1	1	58.5	B	TF/LF mixed	elite res-admin	slope wash		
17415	5	31	0	2	6	0	24	11.1	27	309	B	LF	civic-ceremonial			

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
17415	5	31	0	2	6	0	24	10.1	7	67	B	LF	civic-ceremonial			
17415	5	31	0	2	6	0	25	11.1	3	75	B	LF	civic-ceremonial			
17408	5	31	1	2	6	0	24	11.1	7	57	B	LF	civic-ceremonial			
17408	5	31	1	2	6	0	25	10.1	3	53	B	LF	civic-ceremonial			
17433	5	31	1	2	6	0	24	10.1	10	96	B	LF	civic-ceremonial			
17433	5	31	1	2	6	0	25	11.1	3	16	B	LF	civic-ceremonial			
17427	5	31	0	2	6	0	24	10.1	4	18	B	LF	civic-ceremonial			
17427	5	31	0	2	6	0	24	11.1	3	18	B	LF	civic-ceremonial			
17427	5	31	0	2	6	0	20	10.3	1	28	B	LF	civic-ceremonial			
17583	5	32	0	2	6	0	24	10.1	2	74	B	LF	civic-ceremonial			
17583	5	32	0	2	6	0	24	10.1	1	13	B	LF	civic-ceremonial			
17583	5	32	0	2	6	0	24	11.1	1	9	B	LF	civic-ceremonial			
17583	5	32	0	2	6	0	24	10.1	2	57	B	LF	civic-ceremonial			
17565	5	32	1	2	6	0	25	11.1	9	46	B	LF	civic-ceremonial			
17565	5	32	1	2	6	0	24	10.1	8	63	B	LF	civic-ceremonial			
17372	5	30	0	2	7	0	20.1	11.1	1	88.5	B	TF/LF mixed	elite res-admin	slope wash		
17375	5	30	0	2	7	0	9	11.1	1	20	B	TF/LF mixed	elite res-admin	slope wash		
17490	5	31	0	2	7	0	60	60	44	156	B	LF	civic-ceremonial			
17444	5	31	1	2	7	0	21	11.1	30	403	B	LF	civic-ceremonial			
17444	5	31	1	2	7	0	22	10.1	44	251	B	LF	civic-ceremonial			

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
17444	5	31	1	2	7	0	21	10.1	19	157	B	LF	civic-ceremonial			
17444	5	31	1	2	7	0	21	11.3	1	13	B	LF	civic-ceremonial			
17478	5	31	0	2	7	0	21	11.1	2	293	B	LF	civic-ceremonial			
17478	5	31	0	2	7	0	24	10.1	13	118	B	LF	civic-ceremonial			
17478	5	31	0	2	7	0	24	11.1	5	52	B	LF	civic-ceremonial			
17478	5	31	0	2	7	0	20	10.3	1	10	B	LF	civic-ceremonial			
17478	5	31	0	2	7	0	60	60	1	1	B	LF	civic-ceremonial			
17479	5	31	1	2	7	0	25	10.1	1	13	B	LF	civic-ceremonial			
17487	5	31	0	2	7	0	24	10.1	42	628	B	LF	civic-ceremonial			
17487	5	31	0	2	7	0	24	11.1	30	362	B	LF	civic-ceremonial			
17489	5	31	0	2	7	0	25	10.1	5	67	B	LF	civic-ceremonial			
17489	5	31	0	2	7	0	67	67	1	3	B	LF	civic-ceremonial			
17607	5	32	0	2	7	0	24	10.1	4	43	B	LF	civic-ceremonial			
17607	5	32	0	2	7	0	25	11.1	4	42	B	LF	civic-ceremonial			
17607	5	32	0	2	7	0	24	10.1	2	28	B	LF	civic-ceremonial			
17389	5	30	0	2	8	0	72	72	1	17.4	B	TF/LF mixed	elite res-admin	slope wash		
17399	5	30	0	2	8	0	20	10.3	1	75.4	B	TF/LF mixed	elite res-admin	slope wash		
17385	5	30	1	2	8	0	72	72	8	31.2	B	TF/LF mixed	elite res-admin	slope wash		
17604	5	32	1	2	8	0	21	10.1	2	122	B	LF	civic-ceremonial			
17604	5	32	1	2	8	0	25	11.1	1	17	B	LF	civic-ceremonial			

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
17607	5	32	0	2	8	0	25	11.1	3	4	B	LF	civic-ceremonial			
17411	5	30	0	2	9	0	20.1	11.1	1	67.8	B	TF/LF mixed	elite res-admin	slope wash		
17411	5	30	0	2	9	0	50.7	10.1	1	143	B	TF/LF mixed	elite res-admin	slope wash		
17411	5	30	0	2	9	0	24	10.1	1	41.9	B	TF/LF mixed	elite res-admin	slope wash		
17553	5	30	0	3	12	0	27	11.1	1	144	B	TF?	elite res-admin	ceramic concentration?		
17553	5	30	0	3	12	0	24	10.1	3	57	B	TF?	elite res-admin	ceramic concentration?		
17618	5	30	0	7	13	0	24	10.1	3	102	B/B1/B2	LF	elite res-admin	basurero		
17617	5	30	0	7	13	0	50.5	10.3	1	87.2	B/B1/B2	LF	elite res-admin	basurero		
17560	5	31	1	5	7	0	50.4	10.3	3	411	B1	LF	civic-ceremonial	basalt concentration		
17560	5	31	1	5	7	0	25	10.1	5	242	B1	LF	civic-ceremonial	basalt concentration		
17561	5	31	1	8	8	0	24	10.1	46	391	B1	LF	civic-ceremonial	ceramic concentration		
17561	5	31	1	8	8	0	24	11.1	27	305	B1	LF	civic-ceremonial	ceramic concentration		
17561	5	31	1	8	8	0	20	10.3	1	23	B1	LF	civic-ceremonial	ceramic concentration		
17621	5	31	0	8	8	0	24	10.1	24	616	B1	LF	civic-ceremonial	ceramic concentration		
17621	5	31	0	8	8	0	24	10.2	1	43	B1	LF	civic-ceremonial	ceramic concentration		
17621	5	31	0	8	8	0	24	10.3	24	179	B1	LF	civic-ceremonial	ceramic concentration		
17621	5	31	0	8	8	0	25	11.1	16	332	B1	LF	civic-ceremonial	ceramic concentration		
17621	5	31	0	8	8	0	24	10.1	2	30	B1	LF	civic-ceremonial	ceramic concentration		
17621	5	31	0	8	8	0	66	66	1	2	B1	LF	civic-ceremonial	ceramic concentration		
17558	5	31	1	8	8	0	60	60	3	190	B1	LF	civic-ceremonial	ceramic concentration		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
17572	5	31	1	8	8	0	25	11.1	20	116	B1	LF	civic-ceremonial	ceramic concentration		
17402	5	31	0	4	5	0	5	10.3	2	238	B2	LF	civic-ceremonial	large olla in situ		
17402	5	31	0	4	5	0	24	10.1	2	16	B2	LF	civic-ceremonial	large olla in situ		
17661	5	31	0	4	5	6	60	60	1	799	B2	LF	civic-ceremonial	large olla in situ		
17429	5	31	0	4	5	0	60	60	4	3	B2	LF	civic-ceremonial	large olla in situ		
17459	5	31	0	4	6	0	60	60	44	962	B2	LF	civic-ceremonial	large olla in situ		
17640	5	31	0	4	6	0	50.2	10.3	1	153	B2	LF	civic-ceremonial	large olla in situ		
17542	5	31	0	4	7	0	24	10.1	4	38	B2	LF	civic-ceremonial	large olla in situ		
17543	5	31	0	4	7	0	60	60	4	35	B2	LF	civic-ceremonial	large olla in situ		
23108	5	41	0	2	4	0	20	10.3	3	138	C	TF	civic-ceremonial	plaza fill		
23084	5	41	1	2	4	0	24	10.1	2	15	C	TF	civic-ceremonial	plaza fill		
23084	5	41	1	2	4	0	24	11.1	2	103	C	TF	civic-ceremonial	plaza fill		
23099	5	41	0	2	4	0	24	11.1	4	173	C	TF	civic-ceremonial	plaza fill		
23710	5	41	1	2	5	0	24	11.1	1	7	C	TF	civic-ceremonial	plaza fill		
23126	5	41	0	2	5	0	24	11.1	3	30	C	TF	civic-ceremonial	plaza fill		
23132	5	41	0	2	6	0	24	10.3	10	265	C	TF	civic-ceremonial	plaza fill		
23132	5	41	0	2	6	0	24	10.1	3	14	C	TF	civic-ceremonial	plaza fill		
23132	5	41	0	2	6	0	20.3	10.3	2	9	C	TF	civic-ceremonial	plaza fill		
23128	5	41	1	2	6	0	24	10.1	3	182	C	TF	civic-ceremonial	plaza fill		
23128	5	41	1	2	6	0	24	10.1	4	47	C	TF	civic-ceremonial	plaza fill		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
23152	5	41	1	2	6	0	60	60	8	64	C	TF	civic-ceremonial	plaza fill		
23159	5	41	0	2	7	0	24	10.1	11	96	C	TF	civic-ceremonial	plaza fill		
23159	5	41	0	2	7	0	25	11.1	5	47	C	TF	civic-ceremonial	plaza fill		
23159	5	41	0	2	7	0	24	10.1	2	62	C	TF	civic-ceremonial	plaza fill		
17598	5	31	0	7	7	0	60	60	3	49	C	LF	civic-ceremonial			
17549	5	31	0	6	7	0	24	10.1	9	671	C	LF	civic-ceremonial	ceramic concentration		
17549	5	31	0	6	7	0	25	11.1	3	108	C	LF	civic-ceremonial	ceramic concentration		
17519	5	31	0	6	7	0	24	10.1	2	25	C	LF	civic-ceremonial	plaza fill		
17587	5	31	0	7	8	0	25	11.1	10	32	C	LF	civic-ceremonial			
17595	5	31	0	9	8	0	25	11.1	3	28	C	LF	civic-ceremonial	below large olla		
17595	5	31	0	9	8	0	24	11.1	4	21	C	LF	civic-ceremonial	below large olla		
17587	5	31	0	7	8	0	24	10.1	3	33	C	LF	civic-ceremonial			
17587	5	31	0	7	8	0	2	10.3	1	51	C	LF	civic-ceremonial			
17597	5	31	0	7	8	0	20.1	10.3	1	148	C	LF	civic-ceremonial			
17633	5	32	0	5	8	0	25	11.1	2	21	C	LF	civic-ceremonial	plaza/construction fill	fragments of sandstone and tuff	
17633	5	32	0	5	8	0	24	10.1	1	22	C	LF	civic-ceremonial	plaza/construction fill	fragments of sandstone and tuff	
17427	5	30	0	4	9	0	60	60	1	560	C	LF	elite res-admin	secondary refuse deposit		
17624	5	31	1	7	9	0	20	10.3	1	15	C	LF	civic-ceremonial			
17624	5	31	1	7	9	0	21	10.1	1	176	C	LF	civic-ceremonial			
17653	5	31	0	7	9	0	20	10.3	1	209	C	LF	civic-ceremonial			

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
17653	5	31	0	7	9	0	24	10.1	4	56	C	LF	civic-ceremonial			
17659	5	31	0	7	9	0	20.1	10.3	1	643	C	LF	civic-ceremonial			
17654	5	31	0	7	9	0	60	60	2	295	C	LF	civic-ceremonial			
17625	5	31	1	7	9	0	24	10.2	1	14	C	LF	civic-ceremonial			
17665	5	32	0	5	9	0	25	10.1	7	225	C	LF	civic-ceremonial	plaza fill	fragments of sandstone and tuff	
17665	5	32	0	5	9	0	24	11.1	4	59	C	LF	civic-ceremonial	plaza fill	fragments of sandstone and tuff	
17665	5	32	0	5	9	0	24	10.1	3	82	C	LF	civic-ceremonial	plaza fill	fragments of sandstone and tuff	
17665	5	32	0	5	9	0	70	70	1	20	C	LF	civic-ceremonial	plaza fill	fragments of sandstone and tuff	
17638	5	32	1	5	9	0	25	11.1	1	156	C	LF	civic-ceremonial	plaza fill	fragments of sandstone and tuff	
17635	5	32	1	5	9	0	25	11.1	3	20	C	LF	civic-ceremonial	plaza fill	fragments of sandstone and tuff	
17635	5	32	1	5	9	0	24	10.1	1	6	C	LF	civic-ceremonial	plaza fill	fragments of sandstone and tuff	
17690	5	31	0	7	10	0	24	10.1	5	29	C	LF	civic-ceremonial			
17684	5	31	1	7	10	0	24	10.1	2	51	C	LF	civic-ceremonial			
17757	5	31	0	7	10	0	60	60	2	286	C	LF	civic-ceremonial			
17692	5	31	0	7	10	0	60	60	34	474	C	LF	civic-ceremonial			
17799	5	32	0	6	10	11	24	10.1	1	25	C	LF	civic-ceremonial	plaza fill	fragments of sandstone and tuff	
17669	5	32	0	6	10	0	24	10.1	7	166	C	LF	civic-ceremonial	plaza/construction fill	fragments of sandstone and tuff	
17669	5	32	0	6	10	0	25	11.1	7	229	C	LF	civic-ceremonial	plaza/construction fill	fragments of sandstone and tuff	
17747	5	32	0	6	10	0	25	11.1	3	61	C	LF	civic-ceremonial	plaza/construction fill	possibly to receive a tenoned monument	
17747	5	32	0	6	10	0	24	10.1	4	16	C	LF	civic-ceremonial	plaza/construction fill	fragments of sandstone and tuff	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
17750	5	32	0	6	10	0	25	11.1	1	10	C	LF	civic-ceremonial	plaza fill	fragments of sandstone and tuff	
17799	5	32	0	6	10.1	0	24	10.1	5	67	C	LF	civic-ceremonial	plaza fill	fragments of sandstone and tuff	
17799	5	32	0	6	10.1	0	25	11.1	6	95	C	LF	civic-ceremonial	plaza fill	fragments of sandstone and tuff	
17698	5	31	1	7	11	0	25	11.1	1	10	C	LF	civic-ceremonial			
17704	5	31	0	7	11	0	24	10.1	14	212	C	LF	civic-ceremonial			
17704	5	31	0	7	11	0	24	10.1	8	127	C	LF	civic-ceremonial			
17704	5	31	0	7	11	0	24	11.1	3	69	C	LF	civic-ceremonial			
17697	5	31	1	7	11	0	24	10.1	4	27	C	LF	civic-ceremonial			
17697	5	31	1	7	11	0	24	10.1	1	9	C	LF	civic-ceremonial			
17697	5	31	1	7	11	0	25	11.1	1	1	C	LF	civic-ceremonial			
17796	5	32	0	6	11	0	24	10.1	1	7	C	LF	civic-ceremonial			
17482	5	30	1	4	11	0	2	10.1	1	107	C	LF	elite res-admin	secondary refuse deposit		
17529	5	30	1	4	12	0	50.5	10.3	3	297	C	LF	elite res-admin	secondary refuse deposit		
17775	5	31	0	7	12	0	24	10.1	6	104	C	LF	civic-ceremonial			
17775	5	31	0	7	12	0	24	11.1	3	19	C	LF	civic-ceremonial			
17801	5	32	0	6	12	0	24	10.1	7	103	C	LF	civic-ceremonial	plaza fill	fragments of sandstone and tuff	
17801	5	32	0	6	12	0	25	11.1	7	132	C	LF	civic-ceremonial	plaza fill	fragments of sandstone and tuff	
17997	5	32	0	6	12	0	24	10.1	32	835	C	LF	civic-ceremonial	plaza fill	fragments of sandstone and tuff	
17997	5	32	0	6	12	0	25	11.1	11	246	C	LF	civic-ceremonial	plaza fill	fragments of sandstone and tuff	
17975	5	32	0	6	12	0	24	10.1	1	7	C	LF	civic-ceremonial	plaza fill	fragments of sandstone and tuff	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
17614	5	30	0	5	13	0	72	72	2	118	C	LF	elite res-admin	secondary refuse deposit with much carbon		
17614	5	30	0	5	13	0	50.5	11.1	1	58.8	C	LF	elite res-admin	secondary refuse deposit with much carbon		
17610	5	30	0	5	13	0	60	60	2	175	C	LF	elite res-admin	secondary refuse deposit with much carbon		
17886	5	32	0	6	13	0	25	11.1	3	109	C	LF	civic-ceremonial	plaza/construction fill	fragments of sandstone and tuff	
17886	5	32	0	6	13	0	24	10.1	2	42	C	LF	civic-ceremonial	plaza fill	fragments of sandstone and tuff	
23002	5	32	0	6	13	0	24	10.1	6	118	C	LF	civic-ceremonial	plaza/construction fill	fragments of sandstone and tuff	
23002	5	32	0	6	13	0	25	11.1	5	98	C	LF	civic-ceremonial	plaza/construction fill	fragments of sandstone and tuff	
17796	5	32	0	6	13	0	24	10.1	6	227	C	LF	civic-ceremonial	plaza/construction fill	fragments of sandstone and tuff	
17796	5	32	0	6	13	0	25	11.1	5	75	C	LF	civic-ceremonial	plaza/construction fill	fragments of sandstone and tuff	
17642	5	30	1	5	14	0	24	10.1	1	62.5	C	LF	elite res-admin	secondary refuse deposit with much carbon		
17678	5	30	0	5	14	0	24	10.1	3	135	C	LF	elite res-admin	secondary refuse deposit with much carbon		
17678	5	30	0	5	14	0	24	10.1	2	149	C	LF	elite res-admin	secondary refuse deposit with much carbon		
17679	5	30	0	5	14	0	24	11.1	1	125	C	LF	elite res-admin	secondary refuse deposit with much carbon		
17782	5	30	0	5	14	0	2	10.1	1	600	C	LF	elite res-admin	secondary refuse deposit with much carbon		
17919	5	32	0	6	14	0	25	10.1	3	61	C	LF	civic-ceremonial	plaza/construction fill	fragments of sandstone and tuff	
17919	5	32	0	6	14	0	24	10.1	2	40	C	LF	civic-ceremonial	plaza/construction fill	fragments of sandstone and tuff	
178061	5	30	1	5	15	0.2	50.6	10.1	1	64.2	C	LF	elite res-admin	secondary refuse deposit with much carbon		
17810	5	30	1	5	15	0	5	10.1	1	108	C	LF	elite res-admin	secondary refuse deposit with much carbon		
17927	5	32	0	6	15	0	24	10.1	3	20	C	LF	civic-ceremonial	plaza/construction fill	fragments of sandstone and tuff	
17878	5	30	1	5	16	0	50.6	10.3	1	90.7	C	LF	elite res-admin	secondary refuse deposit with much carbon		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
17879	5	30	1	5	16	0	20	10.3	1	53.3	C	LF	elite res-admin	secondary refuse deposit with much carbon		
17879	5	30	1	5	16	0	5	10.3	1	12.5	C	LF	elite res-admin	secondary refuse deposit with much carbon		
17905	5	30	0	5	16	0	24	11.1	1	67.9	C	LF	elite res-admin	secondary refuse deposit with much carbon		
17914	5	30	0	5	16	0	24	10.2	1	27	C	LF	elite res-admin	secondary refuse deposit with much carbon		
17914	5	30	0	5	16	0	25	10.1	1	18.1	C	LF	elite res-admin	secondary refuse deposit with much carbon		
17877	5	30	1	5	16	0	22	11.1	2	54	C	LF	elite res-admin	secondary refuse deposit with much carbon		
17917	5	30	0	5	16	0	24	76	1	3	C	LF	elite res-admin	secondary refuse deposit with much carbon		
17758	5	32	0	7	11	0	24	10.1	2	33	C1	LF	civic-ceremonial	narrow pit in plaza/construction fill	possibly to receive a tenoned monument	
17753	5	32	0	7	11	0	25	11.1	1	3	C1	LF	civic-ceremonial	narrow pit in plaza/construction fill	possibly to receive a tenoned monument	
17994	5	32	0	7	12	0	25	11.1	3	54	C1	LF	civic-ceremonial	narrow pit in plaza/construction fill	possibly to receive a tenoned monument	
17994	5	32	0	7	12	0	20	10.3	1	65	C1	LF	civic-ceremonial	narrow pit in plaza/construction fill	possibly to receive a tenoned monument	
17994	5	32	0	7	12	0	24	10.1	1	20	C1	LF	civic-ceremonial	narrow pit in plaza/construction fill	possibly to receive a tenoned monument	
23000	5	32	0	7	12	0	21	10.1	3	106	C1	LF	civic-ceremonial			
23000	5	32	0	7	12	0	22	11.1	3	64	C1	LF	civic-ceremonial			
17888	5	32	0	7	13	0	25	11.1	3	39	C1	LF	civic-ceremonial	narrow pit in plaza/construction fill	possibly to receive a tenoned monument	
17922	5	32	0	7	14	0	24	10.1	2	34	C1	LF	civic-ceremonial	narrow pit in plaza/construction fill	possibly to receive a tenoned monument	
17925	5	32	0	7	15	0	25	10.1	5	42	C1	LF	civic-ceremonial	narrow pit in plaza/construction fill	possibly to receive a tenoned monument	
17933	5	32	0	7	16	0	25	10.1	2	59	C1	LF	civic-ceremonial	narrow pit in plaza/construction fill	possibly to receive a tenoned monument	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
17969	5	32	0	7	17	0	25	11.1	2	40	C1	LF	civic-ceremonial	narrow pit in plaza/construction fill	possibly to receive a tenoned monument	
17737	5	31	0	10	12	0	25	10.1	3	66	C2	LF	civic-ceremonial	clay floor		
17737	5	31	0	10	12	0	24	11.1	3	54	C2	LF	civic-ceremonial	clay floor		
17715	5	31	1	10	12	0	25	10.1	3	101	C2	LF	civic-ceremonial	clay floor		
17715	5	31	1	10	12	0	25	10.1	3	28	C2	LF	civic-ceremonial	clay floor		
17718	5	31	0	10	12	0	67	67	1	39	C2	LF	civic-ceremonial	clay floor		
17993	5	30	0	13	16	0	60	60	14	181	C2	LF	elite res-admin	floor		
17788	5	31	0	10	13	0	24	10.1	2	38	C3	LF	civic-ceremonial	fill below clay floor		
17788	5	31	0	10	13	0	24	10.1	2	18	C3	LF	civic-ceremonial	fill below clay floor		
17786	5	31	0	10	13	0	25	10.2	1	9	C3	LF	civic-ceremonial	fill below clay floor		
17786	5	31	0	10	13	0	24	11.1	1	12	C3	LF	civic-ceremonial	fill below clay floor		
17786	5	31	0	10	13	0	24	10.3	1	14	C3	LF	civic-ceremonial	fill below clay floor		
17786	5	31	0	10	13	0	24	11.1	2	9	C3	LF	civic-ceremonial	fill below clay floor		
17786	5	31	0	10	13	0	24	11.1	1	5	C3	LF	civic-ceremonial	fill below clay floor		
17760	5	31	1	10	13	0	24	11.1	6	26	C3	LF	civic-ceremonial	fill below clay floor		
17784	5	30	0	9	14	0	24	10.3	1	28.9	C3	LF	elite res-admin	basurero with tuff and sandstone fragments		
17781	5	30	0	9	14	0	50.5	11.1	1	27.2	C3	LF	elite res-admin	basurero with tuff and sandstone fragments	ceramics below sandstone and laja	
17777	5	30	0	8	14	0	50.5	10.1	1	194	C3	LF	elite res-admin	basurero	ceramic with carbon	
17791	5	31	1	10	14	0	24	10.1	1	22	C3	LF	civic-ceremonial	fill below clay floor		
17792	5	31	1	10	14	0	67	67	1	23	C3	LF	civic-ceremonial	fill below clay floor		
17833	5	30	0	9	15	0	60	60	1	645	C3	LF	elite res-admin	basurero with tuff and sandstone fragments		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
17827	5	30	0	9	15	0	1	10.1	1	820	C3	LF	elite res-admin	basurero with tuff and sandstone fragments		
17826	5	30	0	9	15	0.4	1	10.3	1	770	C3	LF	elite res-admin	basurero with tuff and sandstone fragments		
17854	5	30	0	12	15	0	22	11.1	1	440	C3/C9	LF	elite res-admin	basurero		
17854	5	30	0	12	15	0	50.5	11.1	1	106	C3/C9	LF	elite res-admin	basurero		
17935	5	30	0	12	16	0	24	10.1	1	52.1	C3/C9	LF	elite res-admin	basurero		
17943	5	30	0	12	16	0	22	11.1	2	82.2	C3/C9	LF	elite res-admin	basurero		
17943	5	30	0	12	16	0	72	72	2	30.2	C3/C9	LF	elite res-admin	basurero		
23185	5	41	0	5	8	0	24	10.1	7	45	D	TF	civic-ceremonial	plaza floor		
23185	5	41	0	5	8	0	24	11.3	10	224	D	TF	civic-ceremonial	plaza floor		
23216	5	41	0	5	9	0	20	10.3	2	228	D	TF	civic-ceremonial	plaza floor		
23216	5	41	0	5	9	0	24	10.1	4	197	D	TF	civic-ceremonial	plaza floor		
23216	5	41	0	5	9	0	24	11.1	15	257	D	TF	civic-ceremonial	plaza floor		
23220	5	41	0	5	9	0	24	10.1	30	430	D	TF	civic-ceremonial	plaza floor		
23220	5	41	0	5	9	0	25	11.1	5	51	D	TF	civic-ceremonial	plaza floor		
23220	5	41	0	5	9	0	50.5	11.1	3	92	D	TF	civic-ceremonial	plaza floor		
23186	5	41	1	5	9	0	24	11.1	36	468	D	TF	civic-ceremonial	plaza floor		
23186	5	41	1	5	9	0	24	10.1	3	215	D	TF	civic-ceremonial	plaza floor		
23055	5	41	0	5	9	0.6	2	10.3	1	249	D	TF	civic-ceremonial	plaza floor		
23241	5	41	0	5	10	0	24	11.1	9	107	D	TF	civic-ceremonial	plaza floor		
23241	5	41	0	5	10	0	20	10.3	2	57	D	TF	civic-ceremonial	plaza floor		
23224	5	41	1	5	10	0	20	10.3	3	127	D	TF	civic-ceremonial	plaza floor		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
23224	5	41	1	5	10	0	24	10.1	20	199	D	TF	civic-ceremonial	plaza floor		
23224	5	41	1	5	10	0	27	10.3	1	136	D	TF	civic-ceremonial	plaza floor		
23244	5	41	0	5	11	0	24	11.1	2	46	D	TF	civic-ceremonial	plaza floor		
23244	5	41	0	5	11	0	24	10.3	1	23	D	TF	civic-ceremonial	plaza floor		
17740	5	31	0	11	12	0	24	10.1	11	114	D	LF	civic-ceremonial	plaza fill		
17707	5	31	1	11	12	0	24	10.2	4	28	D	LF	civic-ceremonial	plaza fill		
17707	5	31	1	11	12	0	25	11.1	2	49	D	LF	civic-ceremonial	plaza fill		
17771	5	31	1	11	12	0	69	69	5	36	D	LF	civic-ceremonial	plaza fill		
17772	5	31	0	11	13	0	25	10.2	1	16	D	LF	civic-ceremonial	plaza fill		
17772	5	31	0	11	13	0	24	10.1	2	28	D	LF	civic-ceremonial	plaza fill		
17772	5	31	0	11	13	0	25	10.3	3	21	D	LF	civic-ceremonial	plaza fill		
17772	5	31	0	11	13	0	25	11.1	3	9	D	LF	civic-ceremonial	plaza fill		
17764	5	31	1	11	13	0	24	11.1	1	8	D	LF	civic-ceremonial	plaza fill		
17764	5	31	1	11	13	0	24	10.2	1	6	D	LF	civic-ceremonial	plaza fill		
17769	5	31	0	11	13	0	67	67	2	22	D	LF	civic-ceremonial	plaza fill		
17740	5	31	0	11	12	0	24	10.1	15	253	D	LF	civic-ceremonial	plaza fill		
17768	5	31	1	11	13	0	68	68	1	12	D	LF	civic-ceremonial	plaza fill		
17884	5	32	0	8	13	0	24	10.1	1	27	D	LF	civic-ceremonial	plaza fill	scarce barro quemado and lithics	
17884	5	32	0	8	13	0	24	11.1	3	34	D	LF	civic-ceremonial	plaza fill	scarce barro quemado and lithics	
23094	5	32	0	8	13	0	25	11.1	5	39	D	LF	civic-ceremonial	plaza fill	scarce barro quemado and lithics	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
23094	5	32	0	8	13	0	24	11.1	3	55	D	LF	civic-ceremonial	plaza fill	scarce barro quemado and lithics	
23003	5	32	1	8	13	0	24	10.1	3	95	D	LF	civic-ceremonial	plaza fill	scarce barro quemado and lithics	
23003	5	32	1	8	13	0	25	11.1	1	26	D	LF	civic-ceremonial	plaza fill	scarce barro quemado and lithics	
23016	5	32	1	8	13	0	2	10.3	1	508	D	LF	civic-ceremonial	plaza fill	scarce barro quemado and lithics	
17891	5	32	0	8	14	0	25	11.1	4	56	D	LF	civic-ceremonial	plaza fill	scarce barro quemado and lithics	
17929	5	32	0	8	16	0	24	10.1	5	93	D	LF	civic-ceremonial	plaza fill	scarce barro quemado and lithics	
17929	5	32	0	8	16	0	25	11.1	3	85	D	LF	civic-ceremonial	plaza fill	scarce barro quemado and lithics	
17929	5	32	0	8	16	0	24	11.1	1	10	D	LF	civic-ceremonial	plaza fill	scarce barro quemado and lithics	
17934	5	32	0	8	17	0	24	10.1	6	78	D	LF	civic-ceremonial	plaza/construction fill	possibly to receive a tenoned monument	
17934	5	32	0	8	17	0	25	11.1	4	67	D	LF	civic-ceremonial	plaza/construction fill	possibly to receive a tenoned monument	
17971	5	32	0	8	18	0	25	11.1	3	79	D	LF	civic-ceremonial	plaza fill	scarce barro quemado and lithics	
17971	5	32	0	8	18	0	24	10.1	1	6	D	LF	civic-ceremonial	plaza fill	scarce barro quemado and lithics	
17971	5	32	0	8	18	0	24	11.1	1	47	D	LF	civic-ceremonial	plaza fill	scarce barro quemado and lithics	
17974	5	32	0	8	19	0	25	11.1	4	43	D	LF	civic-ceremonial	plaza fill	scarce barro quemado and lithics	
17974	5	32	0	8	19	0	24	10.1	1	20	D	LF	civic-ceremonial	plaza fill	scarce barro quemado and lithics	
23229	5	41	0	8	9	0.9	1	10.3	1	840	D1	TF	civic-ceremonial	plaza floor		
23229	5	41	0	8	9	0.9	1	10.3	1	1006	D1	TF	civic-ceremonial	plaza floor		
23229	5	41	0	8	9	0.8	1	10.3	1	789	D1	TF	civic-ceremonial	plaza floor		
23230	5	41	0	8	9	0	1	10.3	1	1143	D1	TF	civic-ceremonial	plaza floor		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
23230	5	41	0	8	9	0	1	10.3	1	610	D1	TF	civic-ceremonial	plaza floor		
23230	5	41	0	8	9	0	1	10.3	1	179	D1	TF	civic-ceremonial	plaza floor		
23230	5	41	0	8	9	0	1	10.3	1	259	D1	TF	civic-ceremonial	plaza floor		
23230	5	41	0	8	9	0	20.1	10.3	1	124	D1	TF	civic-ceremonial	plaza floor		
23230	5	41	0	8	9	0	21	10.1	1	104	D1	TF	civic-ceremonial	plaza floor		
23230	5	41	0	8	9	0	24	10.1	3	145	D1	TF	civic-ceremonial	plaza floor		
23236	5	41	0	8	10	0	24	101	12	179	D1	LF?	civic-ceremonial	floor		
23236	5	41	0	8	10	0	24	10.1	7	291	D1	LF?	civic-ceremonial	floor		
23236	5	41	0	8	10	0	20.1	10.3	5	857	D1	LF?	civic-ceremonial	floor		
23234	5	41	0	8	10	0	1	10.3	1	700	D1	LF?	civic-ceremonial	floor		
23068	5	30	0	17	18	0	20	10.3	1	20	D2	LF	elite res-admin	concentration of carbon, burned earth, and ceramics		
23068	5	30	0	17	18	0	24	10.3	1	7.5	D2	LF	elite res-admin	burned earth, and ceramics		
23025	5	30	1	17	18	0	24	10.1	1	55.8	D2	LF	elite res-admin	concentration of carbon, burned earth, and ceramics		
23025	5	30	1	17	18	0	24	10.3	6	65.3	D2	LF	elite res-admin	concentration of carbon, burned earth, and ceramics		
23065	5	30	1	17	18	0	24	10.1	3	28.1	D2	LF	elite res-admin	concentration of carbon, burned earth, and ceramics		
23021	5	30	1	17	18	0	25	10.3	1	20.2	D2	LF	elite res-admin	concentration of carbon, burned earth, and ceramics	radiocarbon date 2210 +/- 40 BP, 370-110 cal BC	
230668	5	30	0	18	18	0	20.1	10.1	1	160	D8?	LF	elite res-admin	basurero (small trash pit)		
23117	5	30	0	18	18	0	24	10.3	71	760	D8	LF	elite res-admin	basurero (small trash pit)		
23117	5	30	0	18	18	0	24	76	2	15.9	D8	LF	elite res-admin	basurero (small trash pit)		
23117	5	30	0	18	18	0	50.5	10.1	2	28	D8	LF	elite res-admin	basurero (small trash pit)		
23117	5	30	0	18	18	0	24	10.1	1	42.7	D8	LF	elite res-admin	basurero (small trash pit)		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
23122	5	30	0	18	18	0	20.1	10.3	1	182	D8	LF	elite res-admin	basurero (small trash pit)		
17966	5	30	1	15	17	0	24	10.1	1	57.4	D9	LF	elite res-admin	refuse deposit		
17990	5	30	0	14	17	0	25	10.1	1	71.1	D9	LF	elite res-admin	concentration of carbon and ceramics		
23010	5	30	0	15	17	0	24	10.1	5	99.9	D9	LF	elite res-admin	refuse deposit		
23010	5	30	0	15	17	0	21	10.1	2	48.5	D9	LF	elite res-admin	refuse deposit		
23010	5	30	0	15	17	0	72	72	1	64	D9	LF	elite res-admin	refuse deposit		
23013	5	30	0	15	17	0.6	22	11.1	3	52.1	D9	LF	elite res-admin	refuse deposit		
17986	5	30	0	14	17	0	22	10.1	1	180	D9	LF	elite res-admin	concentration of carbon and ceramics		
17864	5	30	0	14	18	0	24	11.1	1	40.9	D9	LF	elite res-admin	refuse deposit		
17864	5	30	0	14	18	0	24	10.3	1	17.3	D9	LF	elite res-admin	refuse deposit		
23075	5	30	0	15	18	0	24	10.3	8	155	E	LF	elite res-admin	refuse deposit		
23075	5	30	0	15	18	0	21	10.1	1	51.8	E	LF	elite res-admin	refuse deposit		
23137	5	30	0	15	18	0	24	10.3	1	156	E	LF	elite res-admin	refuse deposit		
23116	5	30	0	15	18	0	24	10.1	3	150	E	LF	elite res-admin	refuse deposit		
23116	5	30	0	15	18	0	24	10.3	1	45.1	E	LF	elite res-admin	refuse deposit		
23177	5	30	1	15	22	0	24	10.1	2	82.4	E	LF	elite res-admin	refuse deposit		
23177	5	30	1	15	22	0	25	10.3	1	67	E	LF	elite res-admin	refuse deposit		
17862	5	31	1	14	18	0	24	11.1	7	22	F	LF	civic-ceremonial	plaza fill		
17872	5	31	1	14	19	0	20	10.3	1	59	F	LF	civic-ceremonial	plaza fill		
23198	5	30	1	30	24	0	72	72	2	11.5	F	LF	elite res-admin	volcanic tuff		

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BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
19314	6	34	0	1	3	0	20	11.1	1	92.5	A	TF?	elite res-admin	plow zone		
19314	6	34	0	1	3	0	20	10.3	1	58.9	A	TF?	elite res-admin	plow zone		
19314	6	34	0	1	3	0	24	10.1	2	106	A	TF?	elite res-admin	plow zone		
19312	6	35	0	1	3	0	10.2	10.1	1	37.4	A	mixed LF-TF	elite res-admin	plow zone		
19312	6	35	0	1	3	0	20	10.3	1	18.3	A	mixed LF-TF	elite res-admin	plow zone		
19312	6	35	0	1	3	0	72	72	1	22	A	mixed LF-TF	elite res-admin	plow zone		
19312	6	35	0	1	3	0	50.5	11.1	1	14	A	mixed LF-TF	elite res-admin	plow zone		
19321	6	34	1	1	4	0	25	11.3	1	13.2	A	TF?	elite res-admin	plow zone		
19357	6	35	0	2	4	0	20	11.1	1	12.8	B	LF	elite res-admin	slope wash		
19357	6	35	0	2	4	0	60	60	1	45.8	B	LF	elite res-admin	slope wash		
19357	6	35	0	2	4	0	24	10.1	2	6.2	B	LF	elite res-admin	slope wash		
19339	6	35	0	3	4	0.5	20	10.1	1	38.2	B	LF	elite res-admin	slope wash		
19340	6	35	0	3	4	0	24	10.1	1	9.5	B	LF	elite res-admin	slope wash		
19340	6	35	0	3	4	0	24	76	1	1.3	B	LF	elite res-admin	slope wash		
19831	6	35	0	3	5	0.1	24	10.3	1	60.8	B	LF	elite res-admin	slope wash		
19360	6	34	0	4	6	0	60	60	1	273	B	TF?	elite res-admin	structure fill	concentration of laja (tuff) fragments	
19405	6	35	0	8	6	0	24	10.1	4	73.2	B	LF	elite res-admin	slope wash		
19405	6	35	0	8	6	0	24	10.3	2	47.3	B	LF	elite res-admin	slope wash		
19446	6	35	0	7	6	0	60	60	2	316	B	LF	elite res-admin	slope wash		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
19476	6	35	1	8	8	0	8	10.3	1	90.6	B	LF	elite res-admin	slope wash		
19491	6	35	0	11	9	0	20	10.3	1	114	B	LF	elite res-admin	fill without pieces of laja		
19546	6	40	1	2	8	0	50.5	10.1	1	170	B	post-abandonment	civic-ceremonial	alluvium	many crayfish burrows	
19411	6	34	0	6	9	0	24	10.3	1	37.7	C1	LF	elite res-admin	floor		
19414	6	34	1	5	9	0.1	20	10.2	1	13	C2	LF	elite res-admin	floor		
19428	6	34	0	8	10	0	67	67	1	154	C3	LF	elite res-admin	refuse and fill		
19407	6	34	0	10	10	0	9	10.3	1	660	C3	LF	elite res-admin	ceramic concentration	semi-complete vessles. Possible feasting deposit.	
19480	6	34	0	8	11	0.1	1	11.1	1	570	C3	LF	elite res-admin	refuse and fill		
19500	6	34	0	10	12	0	50.5	10.3	2	415	C3	LF	elite res-admin	ceramic concentration	semi-complete vessles. Possible feasting deposit. frag de vasija	
19555	6	34	0	8	14	0.2	2	11.1	1	179	C3	LF	elite res-admin	refuse and fill		
19630	6	34	0	16	15	0.7	20.1	10.3	1	575	C3	LF	elite res-admin	ceramic concentration	semi-complete vessles. Possible feasting deposit. frag de vasija	
19626	6	34	0	16	15	0.11	50.6	41	1	192	C3	LF	elite res-admin	ceramic concentration	semi-complete vessles. Possible feasting deposit. frag de vasija	
19514	6	34	1	13	12	0.2	20	10.3	1	79.4	C4	LF	elite res-admin	structure fill		
19705	6	40	0	5	18	0	25	10.1	1	114	D	LF	civic-ceremonial	plaza fill	moderate crayfish burrows	

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BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
22011	7	38	0	1	1	0	24	10.1	30	305	A	LF-EC mixed	elite residential?	plow zone		
22011	7	38	0	1	1	0	24	11.1	10	205	A	LF-EC mixed	elite residential?	plow zone		
22011	7	38	0	1	1	0	24	11.3	13	52.2	A	LF-EC mixed	elite residential?	plow zone		
22011	7	38	0	1	1	0	20	11.1	2	53	A	LF-EC mixed	elite residential?	plow zone		
22011	7	38	0	1	1	0	20	10.3	7	170	A	LF-EC mixed	elite residential?	plow zone		
22011	7	38	0	1	1	0	20.1	11.3	4	345	A	LF-EC mixed	elite residential?	plow zone		
22011	7	38	0	1	1	0	50.4	75	1	130	A	LF-EC mixed	elite residential?	plow zone		
22011	7	38	0	1	1	0	20.1	11.1	3	346	A	LF-EC mixed	elite residential?	plow zone		
22011	7	38	0	1	1	0	24	10.1	1	9	A	LF-EC mixed	elite residential?	plow zone		
22011	7	38	0	1	1	0	24	76	1	14	A	LF-EC mixed	elite residential?	plow zone		
22011	7	38	0	1	1	0	72	72	1	24	A	LF-EC mixed	elite residential?	plow zone		
22011	7	38	0	1	1	0	50.5	10.3	1	50	A	LF-EC mixed	elite residential?	plow zone		
22011	7	38	0	1	1	0	24	10.1	2	17	A	LF-EC mixed	elite residential?	plow zone		
22010	7	39	0	1	1	0	24	10.1	8	88	A	mixed	elite residential?	plow zone		
22010	7	39	0	1	1	0	20	10.1	6	170	A	mixed	elite residential?	plow zone		
22010	7	39	0	1	1	0	24	76	3	10	A	mixed	elite residential?	plow zone		
22010	7	39	0	1	1	0	20	61	2	9	A	mixed	elite residential?	plow zone		
22035	7	38	0	1	3	0	24	11.1	1	17	A	LF-EC mixed	elite residential?			
22029	7	38	1	1	3	0	24	10.1	5	47	A	LF-EC mixed	elite residential?			

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
22017	7	39	0	1	3	0	4	11.1	1	457	A	mixed	elite residential?	plow zone		
22017	7	39	0	1	3	0	20.1	11.1	1	370	A	mixed	elite residential?	plow zone		
22017	7	39	0	1	3	0	50.5	10.3	4	123	A	mixed	elite residential?	plow zone		
22017	7	39	0	1	3	0	24	10.1	4	72	A	mixed	elite residential?	plow zone		
22017	7	39	0	1	3	0	20	10.3	1	6	A	mixed	elite residential?	plow zone		
22025	7	39	0	1	4	0	24	11.1	6	80	A	mixed	elite residential?	plow zone		
22025	7	39	0	1	4	0	24	10.1	6	32	A	mixed	elite residential?	plow zone		
22025	7	39	0	1	4	0	24	10.3	3	64	A	mixed	elite residential?	plow zone		
22136	7	39	0	1	5	0	24	10.2	2	15	A	mixed	elite residential?	plow zone		
22136	7	39	0	1	5	0	24	10.1	5	26	A	mixed	elite residential?	plow zone		
22041	7	39	0	1	6	0	24	11.1	4	53	A	mixed	elite residential?	plow zone		
22044	7	39	0	1	6	0	72	72	4	26	A	mixed	elite residential?	plow zone		
22044	7	39	0	1	6	0	24	70	1	6	A	mixed	elite residential?	plow zone		
22044	7	39	0	1	6	0	20.1	10.1	1	102	A	mixed	elite residential?	plow zone		
22044	7	39	0	1	6	0	20	10.3	2	15	A	mixed	elite residential?	plow zone		
22100	7	38	0	2	3	0	1	10.1	1	404	B	LF-TF	elite residential?			
22020	7	39	0	2	3	0	20	10.3	2	112	B	LF-TF	elite residential?			
22020	7	39	0	2	3	0	72	72	1	7	B	LF-TF	elite residential?			
22130	7	38	0	2	4	0.2	20.1	10.1	1	180	B	LF-TF	elite residential?			
22131	7	38	0	2	4	0	24	10.1	6	94.7	B	LF-TF	elite residential?			

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
22131	7	38	0	2	4	0	24	11.1	6	65.3	B	LF-TF	elite residential?			
22131	7	38	0	2	4	0	24	10.3	2	21.3	B	LF-TF	elite residential?			
22131	7	38	0	2	4	0	20	10.1	1	25.9	B	LF-TF	elite residential?			
22131	7	38	0	2	4	0	50.6	11.1	1	102	B	LF-TF	elite residential?			
22131	7	38	0	2	4	0	50.6	10.3	1	95.5	B	LF-TF	elite residential?			
22109	7	38	1	2	4	0	50.7	10.3	1	42.3	B	LF-TF	elite residential?			
22109	7	38	1	2	4	0	24	10.3	2	11.3	B	LF-TF	elite residential?			
22128	7	38	0	2	4	0	20	10.3	1	2	B	LF-TF	elite residential?			
22039	7	39	0	2	4	0	24	10.3	2	50	B	LF-TF	elite residential?			
22039	7	39	0	2	4	0	24	10.1	5	64	B	LF-TF	elite residential?			
22039	7	39	0	2	4	0	20.1	11.1	1	101	B	LF-TF	elite residential?			
22039	7	39	0	2	4	0	20	10.3	1	8	B	LF-TF	elite residential?			
22040	7	39	0	2	4	0.1	1	11.1	1	123	B	LF-TF	elite residential?			
22269	7	38	0	2	5	0	20	10.3	1	22.4	B	LF-TF	elite residential?			
22628	7	38	0	2	5	0	72	72	1	13	B	LF-TF	elite residential?			
22104	7	39	0	2	6	0	24	11.1	5	60	B	LF-TF	elite residential?			
22104	7	39	0	2	6	0	24	10.1	3	38	B	LF-TF	elite residential?			
22104	7	39	0	2	6	0	72	72	2	34	B	LF-TF	elite residential?			
22104	7	39	0	2	6	0	24	70	1	6	B	LF-TF	elite residential?			
22104	7	39	0	2	6	0	20	10.3	1	39	B	LF-TF	elite residential?			

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
22139	7	39	0	2	6	0	21	10.2	7	349	B	LF-TF	elite residential?			
22139	7	39	0	2	6	0	72	72	4	143	B	LF-TF	elite residential?			
22139	7	39	0	2	6	0	24	10.1	5	42	B	LF-TF	elite residential?			
22139	7	39	0	2	6	0	24	10.3	3	62	B	LF-TF	elite residential?			
22139	7	39	0	2	6	0	24	70	1	9	B	LF-TF	elite residential?			
22139	7	39	0	2	6	0	20	10.3	1	44	B	LF-TF	elite residential?			
22139	7	39	0	2	6	0	20	10.3	1	39	B	LF-TF	elite residential?			
22296	7	39	0	4	7	0.1	20	10.3	1	11	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22318	7	39	0	6	7	0.1	21	10.1	2	167	B	LF-TF	elite residential?		abundant sandstone	
22318	7	39	0	6	7	0	24	10.3	3	27	B	LF-TF	elite residential?		abundant sandstone	
22294	7	39	0	4	7	0	20.1	10.1	1	54	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22294	7	39	0	4	7	0	50.5	10.1	1	43	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22294	7	39	0	4	7	0	20	10.3	1	27	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22294	7	39	0	4	7	0	24	10.1	11	144	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22294	7	39	0	4	7	0	24	10.3	8	142	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22294	7	39	0	4	7	0	20	10.1	3	112	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22294	7	39	0	4	7	0	72	72	1	50	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22289	7	39	0	5	7	0	24	10.2	2	41	B	LF-TF	elite residential?	possible post mold		
22300	7	39	1	4	7	0	24	11.1	3	109	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22300	7	39	1	4	7	0	24	10.1	2	20	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
22300	7	39	1	4	7	0	72	72	1	22	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22297	7	39	0	4	7	0.2	20.1	10.3	1	402	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22467	7	39	0	4	8	0	20	10.1	1	4	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22442	7	39	0	4	8	0	72	72	26	62	B	LF-TF	elite residential?	abundant ceramics, sparse sandstone		
22442	7	39	0	4	8	0	24	10.1	5	68	B	LF-TF	elite residential?	abundant ceramics, sparse sandstone		
22428	7	39	1	4	8	0	24	10.3	3	38	B	LF-TF	elite residential?	abundant ceramics, sparse sandstone		
22428	7	39	1	4	8	0	24	10.1	4	31	B	LF-TF	elite residential?	abundant ceramics, sparse sandstone		
22437	7	39	0	6	8	0	50.5	10.1	2	163	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22488	7	39	0	8	9	0	20	10.3	1	62	B	MF-LF	elite residential?	platform fill	no sandstone, on interior of wall	
22485	7	39	0	7	9	0	24	10.1	6	17	B	MF-LF	elite residential?	platform fill	no sandstone, on interior of wall	
22616	7	39	0	4	9	0	24	10.1	6	112	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22616	7	39	0	4	9	0	24	10.2	4	97	B	LF-TF	elite residential?	abundant ceramics, sparse sandstone		
22616	7	39	0	4	9	0	24	11.1	2	65	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22617	7	39	0	4	9	0	69	69	3	374	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22620	7	39	0	4	9	0	20.1	10.3	1	179	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22619	7	39	0	4	9	0	2	10.1	1	335	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22641	7	39	0	4	10	0	50.5	11.1	1	115	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22641	7	39	0	4	10	0	21	10.2	1	52	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22641	7	39	0	4	10	0	21	10.1	1	87	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22641	7	39	0	4	10	0	72	72	2	104	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
22637	7	39	1	4	10	0	50.5	11.1	1	122	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22637	7	39	1	4	10	0	24	10.3	2	39	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22654	7	39	1	4	11	0	20	10.1	1	56	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22654	7	39	1	4	11	0	24	10.3	2	31	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22671	7	39	0	4	11	0	20	10.1	2	124	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22671	7	39	0	4	11	0	20	10.3	1	67	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22671	7	39	0	4	11	0	5	10.3	1	28	B	LF-TF	elite residential?		abundant ceramics, sparse sandstone	
22120	7	39	0	3	5	0	24	11.3	3	46	B1	MF-LF	elite residential?	retaining wall		
22120	7	39	0	3	5	0	24	10.1	2	19	B1	MF-LF	elite residential?	retaining wall		
22120	7	39	0	3	5	0	24	10.3	1	35	B1	MF-LF	elite residential?	retaining wall		
22120	7	39	0	3	5	0	20	10.3	1	33	B1	MF-LF	elite residential?	retaining wall		
22120	7	39	0	3	5	0	20	11.1	1	40	B1	MF-LF	elite residential?	retaining wall		
22118	7	39	0	3	5	0.1	1	10.3	1	224	B1	MF-LF	elite residential?	retaining wall		
22119	7	39	0	3	5	0.2	50.6	11.1	1	330	B1	MF-LF	elite residential?	retaining wall		
22117	7	39	0	3	5	0	20.1	10.3	1	638	B1	MF-LF	elite residential?	retaining wall		
22307	7	38	0	2	6	0	20	10.3	1	90.1	B1	LF	elite residential?	retaining wall		
22307	7	38	0	2	6	0	20	10.3	1	35.1	B1	LF	elite residential?	retaining wall		
22306	7	38	0	2	6	0	24	10.1	6	225	B1	LF	elite residential?			
22306	7	38	0	2	6	0	24	10.3	12	148	B1	LF	elite residential?			
22281	7	38	1	2	6	0	20	10.3	3	10	B1	LF	elite residential?			

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
22281	7	38	1	2	6	0	5	10.1	1	51	B1	LF	elite residential?			
22281	7	38	1	2	6	0	24	11.1	3	21	B1	LF	elite residential?			
22281	7	38	1	2	6	0	24	10.3	1	5	B1	LF	elite residential?			
22309	7	38	0	2	6	0.1	1	11.1	1	763	B1	LF	elite residential?			
22260	7	39	0	3	6	0	20.1	10.3	3	176	B1	MF-LF	elite residential?	retaining wall		
22260	7	39	0	3	6	0	24	11.1	6	319	B1	MF-LF	elite residential?	retaining wall		
22260	7	39	0	3	6	0	24	11.1	1	56	B1	MF-LF	elite residential?	retaining wall		
22262	7	39	0	3	6	0	1	10.1	1	289	B1	MF-LF	elite residential?	retaining wall		
22472	7	38	0	2	7	0	24	11.1	22	176	B1	LF	elite residential?			
22472	7	38	0	2	7	0	24	10.3	2	28.9	B1	LF	elite residential?			
22472	7	38	0	2	7	0	24	10.3	1	66.8	B1	LF	elite residential?			
22472	7	38	0	2	7	0	20	10.3	3	65.4	B1	LF	elite residential?			
22472	7	38	0	2	7	0	20.1	11.1	1	249	B1	LF	elite residential?			
22472	7	38	0	2	7	0	20	11.1	1	60.7	B1	LF	elite residential?			
22472	7	38	0	2	7	0	20	11.1	1	108	B1	LF	elite residential?			
22472	7	38	0	2	7	0	20	10.1	1	31	B1	LF	elite residential?			
22472	7	38	0	2	7	0	20	10.1	1	27.2	B1	LF	elite residential?			
22472	7	38	0	2	7	0	50.5	10.1	1	22.2	B1	LF	elite residential?			
22472	7	38	0	2	7	0	20	10.3	1	89	B1	LF	elite residential?			
22472	7	38	0	2	7	0	24	76	1	3.4	B1	LF	elite residential?			

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
22457	7	38	1	2	7	0	24	11.1	10	70.5	B1	LF	elite residential?			
22457	7	38	1	2	7	0	24	10.3	5	26.9	B1	LF	elite residential?			
22457	7	38	1	2	7	0	72	72	1	11.4	B1	LF	elite residential?			
22287	7	39	0	3	7	0	24	10.1	3	119	B1	MF-LF	elite residential?	retaining wall		
22287	7	39	0	3	7	0	50.5	11.1	1	73	B1	MF-LF	elite residential?	retaining wall		
22287	7	39	0	3	7	0	72	72	1	18	B1	MF-LF	elite residential?	retaining wall		
22287	7	39	0	3	7	0	24	10.1	3	72	B1	MF-LF	elite residential?	retaining wall		
22463	7	39	0	3	8	0	20	10.3	1	62	B1	MF-LF	elite residential?	retaining wall		
22463	7	39	0	3	8	0	20	10.3	1	12	B1	MF-LF	elite residential?	retaining wall		
22463	7	39	0	3	8	0	24	11.1	1	17	B1	MF-LF	elite residential?	retaining wall		
22463	7	39	0	3	8	0	24	10.3	2	47	B1	MF-LF	elite residential?	retaining wall		
22466	7	39	0	7	8	0	24	10.3	5	14	B1	MF-LF	elite residential?	platform fill	no sandstone, on interior of wall	
22466	7	39	0	7	8	0	24	10.1	4	30	B1	MF-LF	elite residential?	platform fill	no sandstone, on interior of wall	
22466	7	39	0	7	8	0	1	10.1	1	40	B1	MF-LF	elite residential?	platform fill	no sandstone, on interior of wall	
22485	7	39	0	7	9	0	72	72	1	40	B1	MF-LF	elite residential?	platform fill	no sandstone, on interior of wall	
22608	7	39	0	3	9	0	20	10.1	1	18	B1	MF-LF	elite residential?	retaining wall		
22608	7	39	0	3	9	0	72	72	1	21	B1	MF-LF	elite residential?	retaining wall		
22632	7	38	0	4	6	0	20	10.3	1	11.7	zona 4	LF-EC mixed	elite residential?	intrusive pit		
22596	7	38	0	4	7	0	24	10.3	1	22.5	zona 4	LF-EC mixed	elite residential?	intrusive pit		
22596	7	38	0	4	7	0	20.1	10.1	1	64.2	zona 4	LF-EC mixed	elite residential?	intrusive pit		

BOLSA	OP	U	C	Z	N	SN	TYPE	MAT	FREQ	WT	Stratum	PERIOD	CONTEXT	SPECIFIC CONTEXT	ADDITIONAL INFO	
22632	7	38	0	4	8	0	24	10.3	1	9.5	zona 4	LF-EC mixed	elite residential?	intrusive pit		
22603	7	38	1	5	8	0	25	10.3	3	19.2	B2	MF/LF	elite residential?			
22603	7	38	1	5	8	0	21	10.3	1	10.8	B2	MF/LF	elite residential?			
22625	7	38	0	5	8	0	24	10.1	4	40.2	B2	MF/LF	elite residential?			
22650	7	38	0	5	9	0.1	4	10.3	1	53	B2	MF/LF	elite residential?			
22649	7	38	0	5	9	0	20	10.3	1	6.5	B2	MF/LF	elite residential?			
22649	7	38	0	5	9	0	9	10.3	1	21.2	B2	MF/LF	elite residential?			
22649	7	38	0	5	9	0	24	10.1	2	13.5	B2	MF/LF	elite residential?			
22649	7	38	0	5	9	0	9	10.3	1	6.9	B2	MF/LF	elite residential?			
22659	7	38	1	5	9	0	2	10.3	1	169	B2	MF/LF	elite residential?			
22628	7	38	0	5	9	0	24	10.1	5	91	B2	MF/LF	elite residential?			
22685	7	38	0	5	10	0	2	10.3	1	182	B2	MF/LF	elite residential?			
22675	7	38	1	5	10	0	24	10.1	3	60	B2	MF/LF	elite residential?			
22675	7	38	1	5	10	0	20	10.3	1	23	B2	MF/LF	elite residential?			
22686	7	38	0	5	10	0.2	8	10.3	1	129	B2	MF/LF	elite residential?			

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1991-1996 — National School of Anthropology and History- National Institute of Anthropology and History (ENAH-INAH), Mexico City, Mexico.

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SELECTED PUBLICATIONS

Jaime-Riveron, Olaf.2014. Chapter 2. "La gente del Río. Ocupación antigua del Periodo Preclásico en la región de la Cuenca Baja del Río Coatzacoalcos. Los sitios Etileno XXI, Millán y Benjamin," pp 157-161; Chapter 3 La relación de los sitios Etileno XXI, Millán y Benjamín con los grandes sitios olmecas, pp 164-165 In *La Vida Antigua en la Cuenca Baja del Coatzacoalcos. Los sitios Etileno XXI,* María de Lourdes Hernández Jiménez (ed.). INAH-Braskeen Idesa, México. ISBN: 968-607-96576-2-8.

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