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I am submitting herewith a dissertation written by Richard Rowand Polhemus entitled "Activity Organization in Mississippian Households: A Case Study from the Loy Site in East Tennessee." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Anthropology.

Charles H. Faulkner, Major Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the Council:

Associate Vice Chancellor and
Dean of The Graduate School

ACTIVITY ORGANIZATION IN MISSISSIPPIAN HOUSEHOLDS: A CASE STUDY FROM THE LOY SITE IN EAST TENNESSEE

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Richard Rowand Polhemus
August 1998



View to the northwest of the 1986-1991 excavation at the Loy site (40JE10) showing structures 2 and 3, situated between the palisade lines in the center of the photograph.

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DEDICATION

This dissertation is dedicated to

James H. Polhemus, Jr.
(1919-1990)

father, archaeologist, mining engineer

for his guidance, encouragement, and support

as well as first taking me to the Loy site

fifty years ago.

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Betty Creech, facilitator par excellence at the Frank H. McClung Museum, aided in compilation of the final draft.

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ABSTRACT

Archaeologists have expressed an ever increasing interest in information embedded in the spatial context of archaeological materials. Spatial studies endeavor to extract and interpret such embedded information in terms of human activities and behavior. This study examines the form and content of two contemporary Mississippian period domestic structures excavated from 1986 to1991 at the Loy site (40JE10) in Jefferson County, Tennessee for spatial patterning and attempts to explain such patterning in terms of human activities and behavior.

The structures are excavated with attention to both vertical and horizontal control. All artifacts possible are piece-plotted, and structure fill screened in small units to provide a data set, amenable to spatial analysis. Piece-plotted data are subjected to k-means analysis by artifact and size class, while the total sample data are subjected to a variety of intuitive pattern recognition techniques by artifact and size class in an effort to identify congruent and contrasting patterning between the structures. Ethnohistoric data and artifacts derived from contemporary burial contexts provide gender attributions for many of the recovered artifacts, thus allowing gender based interpretation of activities and spatial patterning.

Most artifact classes present non-random distributions, some displaying congruent patterning and others contrasting patterning between the structures. Congruent patterning reflects the material results of activities and behavior common to the same space in each structure. Contrasting patterning reflects the material results of

activities and behavior differing between the two structures. Architectural remains and food refuse, for example, display congruent patterning reflecting the same construction and the same accumulation of floor refuse, while larger artifact size and the presence of many presumedly functional artifacts display contrasting patterning reflecting differing states of occupation or abandonment. Patterning of gender based artifact attributions suggests some portions of each structure along the walls are primarily utilized by males and others by females, while still others, such as the hearth area and right front quarter, appear to be utilized in common.

This effort demonstrates that pattern recognition studies can reach beyond the identification of activities present in structures. Detailed excavation of entire households can provide a dynamic view of domestic activities and behavior.

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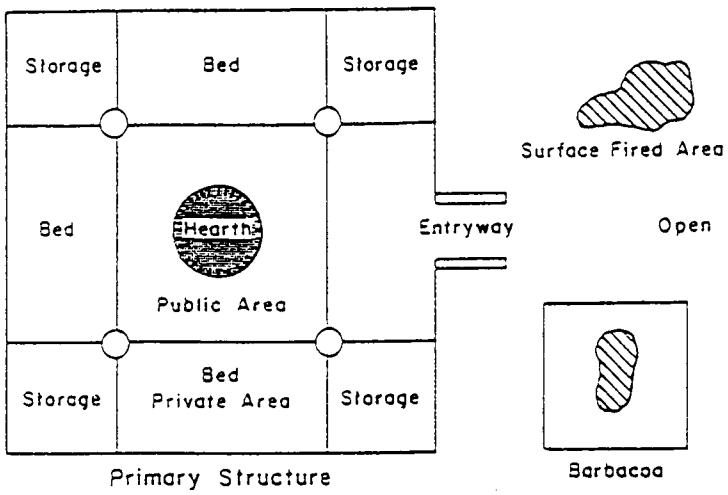
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CHAPTER I

INTRODUCTION

This study will examine the spatial dynamics of primary or dwelling structure use during the Dallas phase of the Mississippian period, using cultural materials from within two structures excavated at the Loy site (40JE10) in Jefferson County, Tennessee. These data will be employed to elucidate and refine a model accounting for the use of space within the Dallas phase household. This model (Figure 1.1), based upon archaeological evidence and historical evidence, has been previously developed in studies on the Toqua site (40MR6) (Polhemus 1985, 1987, 1990). Archaeologically, the typical Dallas phase household is represented by a primary or dwelling structure, a secondary structure, and an outdoor activity area with associated processing facilities. It should be noted that this study is limited to the primary or dwelling structure unit of the Dallas household because of the difficulty in identifying positively contemporary deposits in the more open area around each primary structure and because of the great volume of material present, although it is hoped that comparable data for associated secondary structures and outdoor activity areas with associated processing facilities may be incorporated into the model at a later date. This existing household model provides a starting point from which to address the range and patterning of activities to be expected within the primary dwelling unit of a Dallas household. In this study, I will employ spatial analysis, including both k-means clustering and intuitive techniques, to identify and describe patterning of features and artifacts reflecting past activities. Analyses



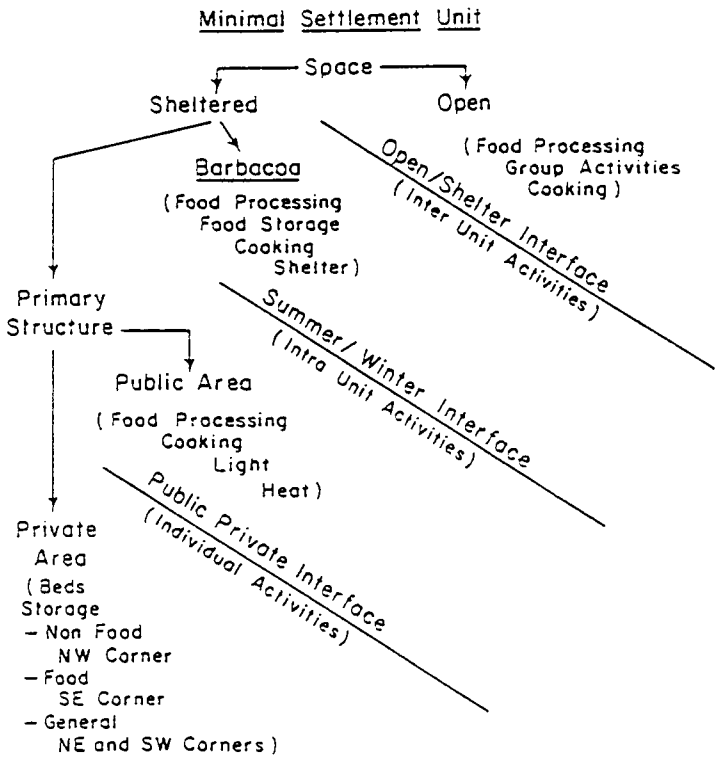


Figure 1.1. Dallas Phase Household Model (after Polhemus 1985: Figure 3.6).

capable of utilizing grid counts as well as the point plot data will be included.

Dallas primary structures consistently display evidence of partitioning and the differential use of space. Such structures usually possess four main roof supports and are divided into an open central "public" floor area and a subdivided surrounding "private" floor area (Polhemus 1990:127). As presented by Polhemus for the Toqua site (1990:127), the public floor area, that central portion of the primary structure centered on the prepared clay central hearth and bounded by the main roof supports, served a variety of purposes, such as access, food preparation, and other activities requiring heat and/or light. The private floor area, that portion of the structure situated between the main roof supports and the exterior wall, was frequently divided by partitions into sections serving different purposes. The central portion along each wall, flanked by the main roof supports, served as a bed or bench for individuals occupying the structure. The corners of the structure served a storage function. Food supplies and other materials were most frequently stored in the northwest and southeast corners. Food preparation activities were concentrated on the side of the hearth closest to the entryway. Residues from processing, food consumption, and manufacturing activities were allowed to accumulate within the structure, and only the public area in the vicinity of the central hearth was kept relatively free of debris. The interpreted use of primary structure space suggested by the Toqua data, although limited by recovery constraints, provides the model to which the Loy site data is applied.

This chapter defines the problem to be addressed in this study: what can spatial analysis contribute about the social organization of people, particularly of the

Mississippian period Dallas phase? The contents of two contemporary, primary dwelling structures will be examined to address the spatial organization within this unit of the Dallas household. Questions of concern include: what activities are represented in each structure; is there patterning that reflects consistent and real patterns of functional organization; and what patterns may be explained in other ways? Is such patterning the same in both structures or does it differ; how may such similarities or differences be explained; and lastly how may the described patterning of materials within the two structures modify or extend my previously constructed Dallas household model? Can spatial analysis contribute to our understanding of the social organization of people in general and this segment of the Dallas household in particular? Questions address the content and distribution of cultural materials within each structure to identify patterning. Such patterning is then compared between the two structures to identify congruences and contrasts of use in addressing questions of general content and function.

Chapter II will be concerned with establishing a background or context within which to examine the contents of the two structures. The use of spatial analysis will be briefly introduced. The Dallas phase of the Mississippian period will be defined. The potential range of activities and associated tangible evidence will be discussed with respect to sex and/or age of the participants through the use of ethnohistoric sources and a large sample of Dallas phase burials.

The third chapter will describe the Loy site and two structures forming the core of this study. The site location, chronology, site structure, sequence of occupation, and relationship of the two structures to each other will be described.

The fourth chapter will describe the methods used to acquire and examine the Loy site data. Field and processing methods will be described. The intuitive and k-means spatial methods applied to the Loy site data will be described.

The fifth chapter will describe the contents of the two structures. The tabulation and analysis of these contents will be directed toward functional attributes rather than stylistic description or interpretation.

The sixth chapter will present the k-means analysis of the piece-plotted structure contents. Each structure sample will be examined by size class for all materials combined as well as by each material class in order to define patterns of deposition. Seven cluster pattern types will be described for the two structure samples.

The seventh chapter will present the intuitive spatial analysis of Structure 2. Patterning of the content of Structure 2 by size and material class will be presented.

The eighth chapter will present the intuitive spatial analysis of Structure 3. Patterning of the content of Structure 3 by size and material class will be presented.

The ninth chapter will present a comparison of patterning of structure contents. Spatial patterning will be compared between the two structures and congruences or contrasts will be described for each material class.

The tenth chapter will discuss other studies of site structure, spatial patterning, structure content, and suggested artifact function. These studies will be then compared to the Loy site data.

The eleventh and final chapter will summarize what we have learned about the

spatial organization of the Dallas household. Suggestions for future research will also be presented.

We turn now to the background to this research and describe the archaeological and ethnohistoric materials used in addressing the above-stated questions with data from the Mississippian period Loy site.

CHAPTER II

BACKGROUND

The trend in modern archaeology toward increased methodological rigor and detail provides additional tools and data requirements for archaeological research. While the archaeological investigation of Mississippian mound and village sites in the Great Valley of East Tennessee began over 140 years ago (Dunning 1871; Grant 1871; MacCurdy 1917; Read 1868), it was not until the systematic Great Depression Era public works programs, such as the WPA of the 1930s, that cultural and temporal variations began to be recognized and systematically described (Lewis and Kneberg 1941, 1946; Webb 1938). Even more recent is the interest in data-based functional and cultural interpretation of individual artifact forms and tool kits for specific activities, with an increasing focus on gender-linked interpretation of the archaeological record (Cobb and Pope 1998; Hally 1982; Polhemus 1977; Smith 1978; Winters 1969). This study will utilize both generalized ethnohistoric activity attributions, derived from Charles Hudson (1976) and John R. Swanton (1946), and sex/age affiliations, derived from a comparative sample of more than 1000 Dallas phase burials curated at the Frank H. McClung Museum, University of Tennessee, in addition to context for suggested functional and cultural attributions.

The development of techniques directed toward spatial analysis has proceeded from early relatively simplistic assumptions and interpretations of archaeological contexts to an ever increasing appreciation of the complexities reflected in the depositional and

post-depositional record dissected by the archaeologist (see Hietala 1984; Kintigh 1990; Kintigh and Ammerman 1982; Simek 1984 for further discussion of spatial techniques). Of particular interest and relevance to the present study is the discussion of the k-means clustering technique, a non-hierarchical form of cluster analysis in which a parent population of objects is reduced to a series of optimal cluster solutions (Kintigh and Ammerman1982; Simek 1984). This study will employ a combination of intuitive pattern recognition techniques and k-means analysis to define patterning in the Loy site structures.

The Dallas phase of the Mississippian period was first defined as the Dallas focus by T. M. N. Lewis and Madeline Kneberg as a result of archaeological investigations in the Chickamauga Reservoir (1941,1946). The term "focus," referring to archaeological manifestations displaying a large number of closely shared traits, has gradually been supplanted by the term "phase," denoting both a temporal placement as well as a closely related spatial entity. The Dallas phase, centered in the Great Valley of East Tennessee, is now characterized as a combination of ceramic, mortuary, subsistence, and architectural traits displaying many of the characteristics of a chiefdom (Polhemus 1987). Dallas ceramics are characterized by shell tempering, paddle-and-anvil construction with cordmarked and plain surface treatments, incised decoration, and the frequent addition of applique appendages and modeled decorative elements such as lug handles, strap handles, rim fillets, and effigies. Mortuary patterning is characterized by partly flexed inhumations generally clustered within domestic and public buildings. One fifth of such inhumations typically contain associated materials displaying patterned distributions by

age, sex, and site area. Subsistence is characterized by maize production and hunting deer, bear, and turkey, supplemented by a wide range of wild plant foods as well as small game and aquatic resources. Dallas sites situated toward the edges of the Dallas culture area, such as the Loy site, show increased evidence of larger mammals such as elk and black bear, than sites toward the center of the valley (Bogan 1987:987; Lewis and Kneberg 1946:46). Dallas phase architecture is characterized by settlements made up of aggregations of domestic household units, surrounding public spaces and constructions such as platform mounds and public buildings, encircled by a palisade. Individual domestic household units are made up of a primary dwelling and one or more secondary structures and associated support facilities. Primary dwellings are generally square, of single-set post construction with four central main roof supports around a clay hearth, and frequently displaying an entryway made up of two parallel trenches. The term "Dallas phase" as utilized here refers to a recognizable cultural entity, defined by a unique combination of traits and relationships, found in the Great Valley of East Tennessee from the late thirteenth century to the end of the sixteenth century. The long and apparently continuous occupation of many Dallas sites throughout this extended period has hindered the clear identification of temporally and socially significant subdivisions within the Dallas phase (Polhemus 1987). However, an early (A.D. 1300-1400), middle (A.D. 1400-1525), and late (A.D. 1525-1625) division of the Dallas phase has more recently been suggested, primarily on the basis of ceramic characteristics (Polhemus 1990:40-41). The Loy site is attributed to the middle division of the Dallas phase on the basis of C14 dates, ceramic assemblage, and architectural traits.

Ethnohistoric Activity Attributions

Ethnohistoric data as an aid in the interpretation of archaeological materials have been utilized by archaeologists in different ways. Howard Winters (1969:30), in his classic study of the Archaic Period Riverton Culture along the Wabash River in Illinois, proceeds from "... observations of the primary attributes (i.e. observable techniques of manufacture, the form of the object, and the use characteristics thereof) and the secondary attributes (i.e. those of context) of the artifacts, supplemented by the citing of ethnohistorical parallels." On this basis he establishes ten Riverton functional categories (weapons, general utility tools, domestic implements, fabricating and processing tools, wood working tools, agricultural or digging tools, ornaments, ceremonial equipment, recreational equipment, and fire-making equipment) with which to compare and discuss content between his three sites. He recognizes and discusses the potential for objects to relate to more than one of his functional categories, wood working tools as fabricating tools or ornaments as ceremonial equipment for examples. He incorporates ethnohistoric data "... where parallels with the prehistoric artifacts seemed indicated, or when it was felt that the historic material might provide a model for further investigation of the prehistoric artifacts"(Winters 1969:31). His observations, grounded in tangible evidence of form, manufacture, use, and context, provide a good framework for the use of ethnohistoric data.

Investigation of the Mississippian period Powers phase Gypsy Joint site in southeastern Missouri by Bruce Smith (1978) includes the tentative attribution of activities by sex utilizing an ethnographic sample. Such attributions are made first with a

large ethnographic reference sample and then checked against a smaller sample of historic Indian populations in the Lower Mississippi Valley and the Southeastern United States (Swanton 1946). Ten activities identified as strictly masculine in a world-wide reference class, and as male-oriented by Swanton, are lumbering, hunting large land fauna, wood working, fowling, making musical instruments, catching small land fauna, boat building, stone working, fishing and house building, while six primarily feminine activities are identified as fuel gathering, pottery making, gathering of wild vegetal foods, water fetching, cooking, and preparation of vegetal food. Activities considered by Smith as causative in producing the patterns of cultural material at the Gypsy Joint site are discussed in terms of four interrelated sets of specific activities (Smith 1978:162). His four interrelated activity sets (lithic manufacture, processing of faunal resources, processing of plant resources, and miscellaneous activities) account for the bulk of the cultural materials recovered. Smith utilizes the material consequences of the attributed male and female activities to assess the strength of his presented hypotheses concerning the size and makeup of the social group occupying the Gypsy Joint site.

The present study utilizes the work of Charles Hudson (1976) and John Swanton (1946) to provide the summary of the division of labor and activities by sex presented in Table 2.1. Many of the resulting categories are reflected in the two works by Winters and Smith cited above. The presented clustering of activities is generally applicable to the interior Southeastern United States. These clusters of activities display varying degrees of archaeological visibility in the manufacture, use, storage, and disposal of the

Table 2.1. Sexual Division of Labor/Activities.

WOMEN	MEN
All Work Involved in Running Household	**Politics and Ceremonial Activities**
Cooking, Food Preparation, Food Processing	**Constructed Domestic and Public Buildings**
Manufactured Pottery, Basketry, Textiles, and Most Clothing	**Manufactured Tools, Weapons, Ornaments, and Other Paraphernalia**
Processed Animal Skins	**Hunted**
Gathered Firewood and Most Wild Plant Food Used	**War**
Reared Children	**Ball Game / Chunkey**
Worked Kitchen Garden and Agricultural Fields	**Cleared Land Used for Buildings and Agriculture**
Ornamentation and Dress	**Ornamentation and Dress**
Sources: Hudson 1976; Swanton 1946	Note: Politics and ceremonial activities overlap with, and are inseparable from, other male activities such as war, hunting, and the ball game.

tangible results of each activity. Other activities, such as politics and ceremonial activities, overlap with, and are frequently inseparable from other, primarily male, activities such as war, hunting, ball game/chunkey, ornamentation, and dress. The focus of the present study, limited as it is to one segment of the domestic household unit, excludes certain activities by virtue of location or space requirements; however, the manufacture, maintenance, and storage of related equipment likely took place in the primary dwelling or elsewhere in the household unit. We may now review each activity cluster presented in Table 2.1 for likely expected equipment, manufacturing residues, and refuse that could reflect activities in the cluster.

All work involved in running the household is attributed to women, and is directed toward maintenance of household facilities and perhaps interior furnishings. That interior furnishings, such as beds, might have been constructed and maintained by women, or some one other than those responsible for construction of the actual structure, is suggested by different wood species represented in such furnishings as opposed to those utilized in the surrounding structure in Structure 1 at the Bussell Island site (Polhemus 1985:92-95). Maintenance activities such as replacement of bedding, sweeping, and removal of refuse as well as hearth ash, obviously affected the ultimate disposition of accumulated cultural materials within the structure.

The food-cooking, food-preparation, food-processing activity cluster, attributed to women, undoubtedly produces the greatest volume of non-perishable or less perishable refuse as well as the largest preserved artifacts and facilities in the household unit. While maize was likely reduced to meal with a perishable wooden mortar and

pestle, small seeds were probably processed in a basin metate and cobble mano. Such materials range from processing facilities, ceramic vessels and plant food grinding tools to vessel fragments, fire-cracked rocks, and all forms of plant and animal food remains.

Manufacturing activities attributed to women include the production of pottery, basketry, textiles, and most clothing. Equipment and materials utilized in these activities range from the pottery clay, temper, pottery trowel, scraping tool, and polishing stone of the potter to the less evident, unrecognized, or perishable tools of the weaver and basket maker. Some bone tools, such as certain awl forms and the rare eyed needle, are likely linked to clothing and container production. Other than ceramics, the products resulting from these activities are usually represented in the archaeological record in the form of rare charred fragments or in the form of impressions on fired clay as well as ceramic vessels.

Processing animal skins, attributed to women after field dressing by men, is poorly represented in the archaeological record by a few deer metapodial beamers and perhaps a variety of chisel bitted bone implements for which a functional attribution is unclear. Formal lithic tools identified as end scrapers do not appear until the end of the Dallas phase.

The gathering activity cluster, attributed to women, the elderly, and perhaps sub-adults, is centered upon the acquisition of firewood and wild plant foods, although some small animals such as box turtles encountered during other gathering activities and perhaps collecting shellfish should be included. Gathering equipment is probably limited to perishable items such as digging sticks, containers, carrying devices, and perhaps

cordage if small animal snares are included and is virtually invisible in the archaeological record.

The child-rearing activity cluster, attributed to women, also has low archaeological visibility unless suggested feeding and maintenance equipment (small pottery vessel with a bivalve shell spoon and perhaps a head flattening device) is included. Miniature ceramic vessels and small examples of other items are frequently identified as toys, although direct association of such items in subadult burials for example is absent, with the exception of the rare ceramic vessel.

The kitchen garden and agricultural field activity cluster, attributed to women and subadults, is, like the gathering activity cluster, of limited archaeological visibility in the Great Valley of East Tennessee where Mississippian period digging tools lack the specialized chipped stone blades noted in some other Mississippian cultures. Gardening and agricultural field equipment is probably limited to perishable digging implements and containers. Two cylindrical hickory tool handles, approximately 4 centimeters in diameter and of unknown length, were recovered in Dallas phase Structure 39 at the Toqua site (Polhemus 1987:1197). These were probably digging tools; however, the form of the digging tool bit, is suggested only by well preserved tool marks on Mississippian period pit walls indicating the use of a flattened blade 4 to 5 centimeters wide with a rounded point (Polhemus 1996:25).

The ornamentation and dress cluster elements attributed to women in the ethnohistoric record differ from that attributed to men (Hudson 1976:260-264). Such described differences, however, are largely perishable and thus generally invisible in the

archaeological record. Some elements of ornamentation such as shell beads and gorgets are mentioned in early historic accounts (Lawson 1966:193; Williams 1930:178-179), but specific forms are not differentiated by sex.

In summary, women's activities, with the exception of food manipulation residues such as vessel fragments and food remains, appear to be poorly reflected in the archaeological record. Even the food remains resulting from gathering and agricultural activities, such as wild plant foods and maize, are preserved in the archaeological record only though accidental carbonization and thus are less visible than animal bones or ceramic sherds. Associated equipment for, and the products of, many women's activities appear to be either of perishable materials or of an expedient nature and thus are not well represented in closed contexts such as burials. Ornaments, frequently of less perishable marine shell, display a similar degree of representation across age and sex boundaries while differing in specifics of form and decoration.

Activities attributed to men appear to have required a wider range of diagnostic equipment. While much of the equipage attributed to male activities described in ethnohistoric accounts is, like that summarized for females, of perishable materials, a larger number are likely to be preserved and recovered in archaeological contexts. Some forms, such as projectile points and polished stone celts, could function in more than one activity cluster.

The politics and ceremonial activity cluster overlaps with other primarily male activities such as war and hunting. Politics and ceremonial activities frequently took place in public buildings or other dedicated spaces and reflect scheduling of events. In

addition to equipage from related activities this cluster may be indicated by ceramic or stone pipes, minerals and different colored pigments, as well as the use of exotic or non-local materials.

The domestic and public building construction activity cluster, attributed to men, is directed toward the cutting and shaping of structural members, and the assembling of such members into structures. Equipment required for building construction includes wood working tools such as polished stone celts and digging tools for site preparation and excavation of post holes.

Manufacturing activities attributed primarily to men include the production of tools, weapons, ornaments, and other paraphernalia. These activities could and probably did take place both within the primary dwelling and elsewhere in the household unit depending upon the weather and season of the year. Manufacturing activities are most evident in the archaeological record in the form of a wide range of bone, flaked stone, and ground stone tools as well as lithic debitage and worked bone residues. Tool forms range from the expedient tool of the moment, such as a cobble or fire-cracked rock of appropriate size and shape, to highly curated finely crafted specialized wood working tools, such as polished stone celts, adzes, and chisels.

The hunting activity cluster, attributed to men, is centered upon the acquisition of larger game such as deer, bear, elk, and turkey, although the full range of faunal resources were utilized and are represented in the archaeological record. Hunting equipment is most obviously represented by stone and bone projectile points, while the arrow shafts and other perishable elements are rarely identified or recovered. Projectile

points recovered in household contexts are likely to be lost, stored for later use, or more likely, exhausted or broken items discarded in equipment maintenance.

The war activity cluster, attributed to men, is represented by some of the same equipment, such as projectile points, as the hunting activity cluster, with the addition of specialized or symbolic forms such as the war club. In an archaeological context such forms might be represented by larger biface knives, perforated axes or specialized celts, and socketed bone spear points, while most clubs appear to have been of perishable materials.

The ball game/chunkey activity cluster, attributed to men, is represented in the archaeological record by stone discoidals and perhaps cleared level public space. The ball game, with perishable equipment may be represented only by the sharp bone teeth of the scratcher or historic Cherokee kanuga (Hudson 1976:415). The range of sizes and forms of stone discoidals present in archaeological contexts, coupled with disparate ethnohistoric descriptions of discoidal or perishable hoop use, suggests that several recreational activities were involved with chunkey (1976:421-425) utilizing only the larger, more specialized forms. Poles or spears, perhaps tipped with socketed bone spear points (Polhemus 1977), make up the second, more perishable element of the chunkey game.

The land clearing activity cluster, attributed to men, is represented by the same range of wood cutting and perhaps digging equipment utilized in building construction.

The ornamentation and dress cluster elements attributed to men in the ethnohistoric record differed from that attributed to women (Hudson 1976:260-264).

Such described differences, however, are largely perishable and thus generally invisible in the archaeological record. Some elements of ornamentation such as shell beads and gorgets are mentioned in early historic accounts (Lawson 1966:193; Williams 1930:178-179), but specific forms are not differentiated by sex.

In summary, men's activities appear to have a greater level of visibility in the archaeological record than women's activities, thus contributing to the apparent disparity in the recognition of gender roles. While a large portion of male equipment is, as with that associated with women's activities, perishable in nature, the frequent presence of nonperishable elements in a variety of diagnostic forms provides greater visibility. Wood working tool handles and weapon shafts, for example, are rarely identified while individual elements such as celts, adze blades, and projectile points are frequently identified. The results of the hunt, in the form of animal bones, have greater visibility than the results of gathering activities, in the form of charred botanical materials.

For the specifics of the non-perishable parts of the equipment for these activity clusters and for confirmation of the attributions by sex for at least a portion of such equipment, we now turn to data derived directly from the Dallas phase population. While the assumption must be made that objects deposited with the dead relate in some structured way with that individual, and that such associations represent only the preserved portion of such objects, not only the sex and/or age but coeval association of different classes of objects may be determined.

The Comparative Burial Sample

The comparative sample of Dallas phase burials utilized in determining the general affiliation of particular types of artifacts with sex and age groups is derived from original field records on file at the Frank H. McClung Museum, University of Tennessee. Human burials from four sites, Fain's Island (40JE1), Loy (40JE10), Toqua (40MR6), and Citico (40MR7), totaling over one thousand individuals, make up the comparative sample. While burial condition, degree of completeness in field records, and level of expertise in age and sex determination, introduce a certain level of potential bias or mis-attribution in the association of poorly represented types, sample size should offset these, and general attributions may be made. Such attributions are summarized in Table 2.2.

Many artifact forms, such as larger ceramic vessels, metates, manos, and cobble tools, rarely occur in burial contexts. Some artifact types, such as marine shell beads, marine shell ear pins, deer ulna awls, turtle shell rattles, and turtle shell vessels are recovered in both female and male contexts. Others, such as splinter awls and occasionally spherical cobble manos, are recovered in female contexts. Many artifacts found with females, such as small ceramic vessels, fresh water bivalve shell spoons, bone beads, and marine shell rattlesnake gorgets, are also frequently recovered with subadults of indeterminant sex. The greater range of distinctive artifact forms are associated with males and are linked to tool and weapon manufacture, weapons and hunting equipment, and objects of potential ritual importance such as smoking pipes or minerals such as mica, graphite, and galena.

Table 2.2. Suggested Sex Affiliation of Artifact Forms.

CLASS OR TYPE	ETHNO HISTORIC AFFILIATION	BURIAL SAMPLE
Fire-Cracked Rock		
Round Rock		
Tabular Rock		
Ceramics	F	Differ by Form
Small Jars and Bowls		F/SA
Exotic Forms - Gravy Boat, Bottle		M/?
Discoidal		
Bead		M/YA
Pellet		
Pallet		/SA
Pottery Clay	F	
Pipe	M	M/MA
Worked Stone		
Biface Blade		M
Projectile Point/Knife	M	M
Perforator		M
Ground Edge Tool (Woodworking)	M	M
Abrading Tool (Stone, Bone, Shell Working)		M
Percussion Tool (Stone, Bone, Shell Working)		M
Scraping Tool (Wood, Bone Working)		
Planing Tool (Wood Working)		
Chopping Tool (Heavy Cutting/Butchering)		
Grinding Tool (Plant Food Preparation)	F	F
Discoidal - Simple - Biconcave	M M	M/SA M
Minerals - Pigments (Red, Black, White)	M	M
Manufacturing Residues	M	M

Note: M = Male, F = Female, SA = Sub Adult, YA = Young Adult, MA = Mature Adult

Table 2.2. (Continued)

CLASS OR TYPE	ETHNO HISTORIC AFFILIATION	BURIAL SAMPLE
Bone	M/F	
Shell	F	
Worked Bone		
Projectile Point		M
Antler Projectile Point		M
Cylindrical Antler Pressure Flaker		M
Scarifier	M	M
Bead		F/SA
Turkey TMT Awl		M
Splinter Awl		F
Turtle Shell Bowl		M/F
Manufacturing Residues and Preforms		M?
Worked Shell		
Bivalve "Spoon"		F/SA

Note: M = Male, F = Female, SA = Sub Adult, YA = Young Adult, MA = Mature Adult

Artifacts other than ornaments associated with presumed female activities such as plant food preparation, cooking, pottery making, weaving, and the manufacture of mats or baskets, are less often deposited with the dead. The lack of tangible recognition of the female role, other than perhaps an historical lack of interest in gender studies in the Dallas household is due, in large part, to the nature of the tools used for these activities and to their poor representation in burial contexts compared to males. Male equipage, on the whole, tends to be more portable. Differences in the content of otherwise more "obvious" tool kits for craft activities (such as flint knapping or wood working), or weapons may reflect what happened to be in a personal container rather than what the deceased actually possessed. Containers such as animal skin bags or pouches are indicated both by tight clustering in a burial context and by the occasional preservation of skeletal parts (foot bones, tail vertebrae, and cut cranial elements) of mustelids (mink and weasel) from which they were made (Bogan 1987:1034-1035). The bulk of small or unhafted items for example are generally tightly clustered in a male burial as opposed to items such as axes, adzes, or groups of projectile points displaying evidence of hafting. The relative portability of male equipage could relate to the pattern of matrilineal kinship generally noted for the Southeastern Indians of the Historic Period (Hudson 1976:186, 201,213), where a family dwelling was owned by the matrilineal group of relatives. The greater mobility of males, both with respect to residence and to hunting and warfare, may be reflected in the array of personal equipage utilized and considered appropriate for inclusion with the individual at death.

Artifacts most often found with females, such as shell beads, bone beads, other shell ornaments, and particularly small ceramic vessels with bivalve shell spoons, are also frequently found with infants and children. These vessel and "spoon" combinations may have served as infant soft food preparation and feeding equipment during weaning. Artifacts found near the skull exclusively with young subadults, less than one year of age, include rectangular stone and ceramic "pallets" and rectangular "pillows" or bags of ash that were possibly utilized for skull deformation (Roberts 1987:797-798). The use of devices other than, or in addition to, a cradle board to produce the skull deformation present on Dallas phase individuals of both sexes is also supported by John Adair (Williams1930:305) in his observation in the eighteenth century that the "Choktah flatten their foreheads with a bag of sand, which with great care they keep fastened on the scull of the infant while it is in its tender and imperfect state." That the practice, and the use of a bag of sand, had widespread usage in the eighteenth century is indicated by John Lawson's description from the Waxhaw in South Carolina that "In their Infancy, their Nurses lay the Back-part of their Children's Heads on a Bag of Sand, (such as Engravers use to rest their Plates upon.) They use a roll, which is placed upon the Babe's Forehead, it being laid with its Back on a flat board..."(1966:33-34).

In summary, this chapter provides some background upon which two Mississippian period Dallas phase domestic dwellings at the Loy site may be examined. While only a portion of the described activities and artifactual associations can be expected to have taken place within these domestic dwellings, much of the required equipment for such activities can reasonably be expected to have been manufactured,

maintained, or stored in a domestic dwelling context. The comparative burial sample provides the link between the individual and the artifact, while the ethnohistoric activity summary provides the link between the artifact and the more extended cultural context. With these specific contexts and general parameters in hand the reader can proceed to the Loy site data.

CHAPTER III

CONTEXT

Chapter III will provide the framework within which to examine the contents of two Dallas phase structures which are the core of this study. The location, chronology, site structure, sequence of occupation, and relationship of the two structures to each other will be delineated. Definition of these parameters will allow correlation of the construction, use, and destruction of the two structures. Without such determination of temporal continuity, any similarities or differences in content or spatial organization could be obscured by the possibility that such similarities or differences are due to time or other factors rather than to culture-determined behaviors.

The Loy Site

The Loy site is located on the east bank of the Holston River in Jefferson County, Tennessee, approximately 30 miles north of Knoxville (Figure 3.1). The site is within the Ridge and Valley physiographic region of East Tennessee. The site is situated on a well-drained portion of the first terrace on the west side of Sweet Gum Bend in the vicinity of broad shoals in the Holston River opposite the upper end of the McKinney Islands. The riverine environment, with alternating pools, shoots, and shoals, provided opportunity for exploitation of fish, shellfish, and other aquatic resources. The surrounding low ridges, presenting limestone bluffs where intersected by the river, provided opportunity for both a wide array of terrestrial game and access to mineral resources. Nearby ridges

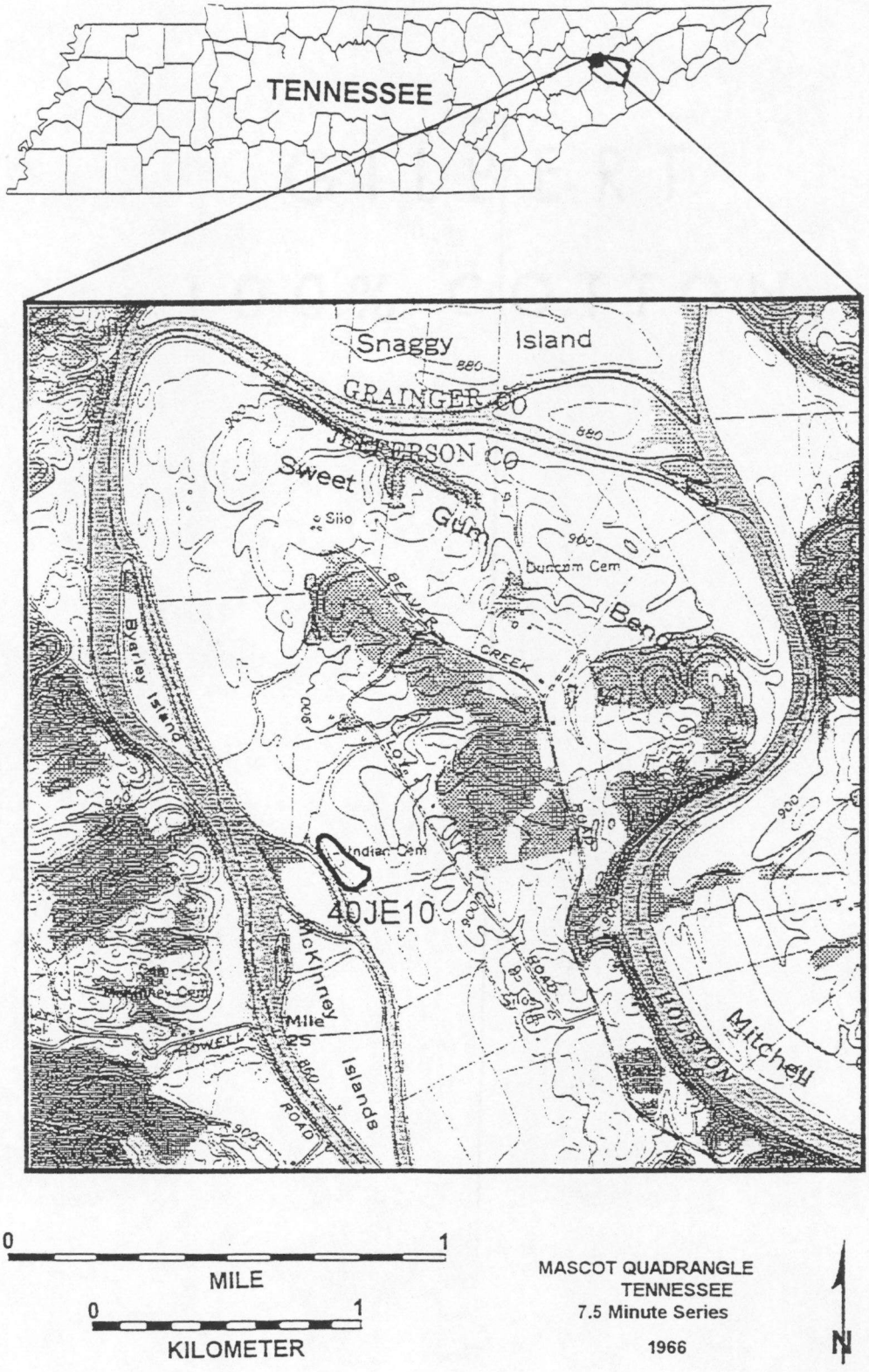


Figure 3.1. Location of the Lov Site.

and valleys, still covered with mixed hardwood forests, provided opportunity for a variety of plant resources. The large mound at the Loy site is said to have been covered with large oak trees when it was first cleared in the 1790s (MacCurdy 1917:68). River cane, still present on the river banks in the vicinity of the site, provided raw material for construction and other uses. Extensive bottom land and the several islands with loam and sandy loam soils near the site would have provided opportunity for cultivation. Water sources include a spring at the foot of the second terrace east of the site as well as the small watercourse at the east edge and the Holston River on the west edge.

The primary occupation of the Loy site is attributable to the Dallas phase of the Mississippian period, with localized traces of earlier Archaic and Woodland period occupation. Two carbon 14 samples (Beta-64717; Beta-64718), collected from the burned final construction of the two structures used in this study, provide an end date in the late fifteenth to early sixteenth century for the Loy site. A temporal span beginning about A.D. 1300 and ending about A.D. 1500 is suggested for the Dallas occupation at Loy based on ceramic styles, architecture, and stratigraphy in addition to the carbon dates.

The Loy site covers an area approximately 120 m by 210 m and is made up of a substructure mound and an open plaza surrounded by a village area. Site size and structure were determined at the beginning of the present investigation through systematic small diameter coring and close interval magnetometer mapping. The mound, described by E. O. Dunning at the time of his investigation in 1870 after 80 years of cultivation as a truncated cone 24 m (80 ft) in diameter and 4.57 m (15 ft) in height

(MacCurdy 1917:68), is now only 1.8 m (6 ft) in height. The mound is fronted on the southeast by a plaza approximately 33 m (110 ft) square flanked on three sides by an elevated accumulation of midden up to 30 cm (1 ft) in thickness below the plowzone. The elevated midden appears to be delineated by the earliest and innermost of the four identified palisades encompassing the site. The earliest palisade, encountered in a test trench in 1963 and accompanied by an extensive alignment of exterior barrow pits, traced for much of its length during the proton magnetometer survey, is situated some 30 m west of the two structures excavated for this study. Later expansions to the south, east, and north, delineated by two or possibly more palisades, are represented by discontinuous midden deposits, structures in shallow basins, and truncated features. At its maximum extent, the settlement covered most of the level first terrace segment encompassed by a small watercourse running north along the east and west along the north side of the site to join the Holston River. A borrow pit, situated on the bank of the watercourse 121 m (400 ft) southeast of the mound, probably served as a clay source during the latter part of the Dallas occupation.

Archaeological interest in the vicinity of the Loy site was initiated by discovery of a stone image, now in the Smithsonian Institution, in a cave near Strawberry Plains a few miles downstream (Grant 1871). The substructure mound at the Loy site, called the McBee Mound after the early land owner by E. O. Dunning, was first investigated by Dunning in February and March of 1870 (MacCurdy 1917:68-72). He trenched the mound, excavated at least eighteen burials, and noted four vertical cedar posts in it, but apparently did not dig elsewhere on the site. Dunning's material from the McBee

Mound is curated at the Yale University Peabody Museum of Natural History and at the Harvard University Peabody Museum of Archaeology and Ethnology. About ten years later Dr. McCormick, of nearby Strawberry Plains, also dug in the mound and collected a number of artifacts now curated at the Smithsonian Institution. His investigations came to an abrupt end when his excavation collapsed and killed him (Wood 1986:21; 147). The site was next investigated, formally reported, and assigned a site number in 1948 by James H. Polhemus and Hugh Orton. Their investigation, conducted shortly after the site was first plowed with a tractor, was limited to a surface collection and a small test pit about 45 m (150 ft) southeast of the mound. In the 1950s several people, including Roy Porter, did some digging in the mound and removed additional burials and artifacts. The present location of this material is not known. In 1962 James Cobb and Richard Polhemus located and excavated part of a burned structure just north of the substructure mound. In the summer of 1963 Polhemus returned to determine the size and condition of the site. Polhemus excavated two test pits in the mound, a test pit in the south village area and a trench, in 1.52 m (5 ft) units, from the east limit of the site 32 m (105 ft) toward the substructure mound. This trench crossed one and perhaps two palisade lines at its east end, bisected a burned structure 17 m (55 ft) in from the palisade, and encountered the early inner palisade bordered by borrow pits 30 m (100 ft) in from the palisade. The south village test pit encountered midden and complex stratigraphy. The two mound tests were expected to encounter only disturbed deposits; however, only a small amount of upper level disturbance was encountered. The intact condition of the structure floors and the two burials encountered led to discontinuance of the tests in

order not to damage the identified structures. Such efforts for preservation failed in 1966 when a group from Knoxville leased the mound and an area north of the mound and dug through it without keeping records. Once again the mound took the brunt of the antiquarian interests to the virtual exclusion of the rest of the site.

The present investigation began in 1981 when the author searched for a Mississippian site meeting requirements necessary to focus on the spatial organization or structure of a Dallas phase settlement. Necessary requirements, not available for previous research by the author at the Citico and Toqua sites in the Little Tennessee Valley, included concerned cooperative owners, time frame not limited by construction schedules, manageable size, and relatively well known condition. The Loy site, owned by Mr. and Mrs. Gordon D. Witt, met these conditions. The long term goal of the research was to acquire data on settlement structure across the entire site in the least destructive manner possible prior to further excavation. By identifying site limits, structure locations, plaza boundaries, mound condition, and other elements of the spatial organization at Loy, specific structures as well as intervening space could be sampled as cultural units rather than by blindly placed arbitrary units.

To accomplish this task, a combination of systematic small diameter core testing and large scale short interval proton magnetometer surveying was implemented over several years. A permanent grid was established, anchored by 1.22 m (4 ft) lengths of drill steel at 30 m (100 ft) intervals along the west or river edge of the field (Figure 3.2). A technique and format for recording detailed complex stratigraphy was developed and cores first taken at each 30 m grid intersection to provide overall site limits and

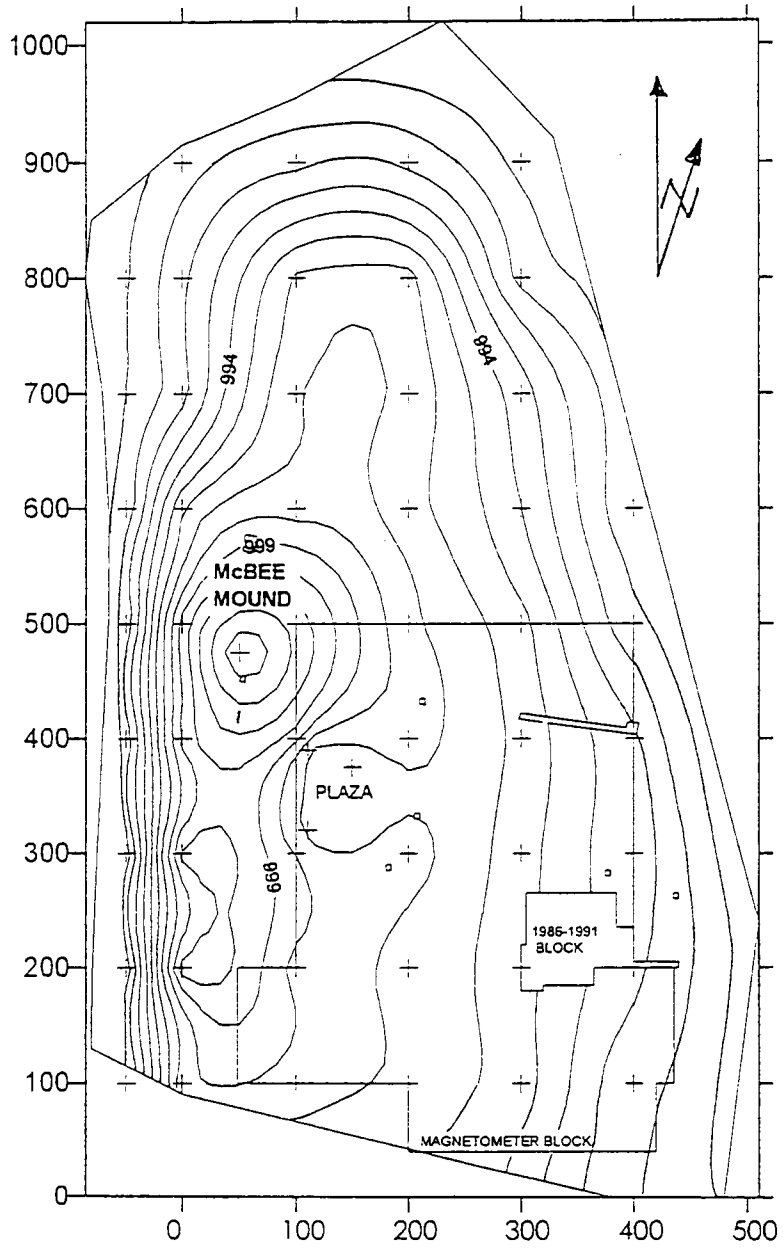


Figure 3.2. Site Plan Showing Excavation Areas and Proton Magnetometer Block.

depositional sequence across the 4.05 hectare (10 acre) field containing the Loy site. Marshal Williams, then of the University of Georgia, provided and operated his custom-built proton magnetometer to survey a 1.22 m (4 ft) interval matrix covering an area of 12,282 m^2 (132,200 ft^2) including most of the south half of the site. Each interval reading was recorded, converted to percentage, and color coded on the site map. High negative readings clearly indicated the presence of fired clay masses such as surface-fired areas, prepared clay hearths, and masses of fired clay architectural material. High positive readings indicated areas without structures and with few postholes. The occasional iron agricultural implement fragment, usually indicated by a single very high reading, was winnowed out with a metal detector when such an anomaly was encountered. The extreme sensitivity of the equipment limited the distance to how close to bordering fences and the steep river bank the survey could get to 15 m (50 ft). Four test units, 1.52 m (5 ft) square, were excavated over three high negative readings and one high positive reading early in the magnetometer survey in order to determine what cultural features were being detected. All three tests over negative readings were located just west of prepared clay hearths in burned structures, while the test over the positive reading contained only five postholes and virtually no cultural material in the overlaying plowzone. Some later anomalies were verified with a small diameter core. Thirty-four to 36 structure locations were tentatively identified in the wider south half of the site during the magnetometer survey.

The next step in the investigation in 1986 was to choose sample structures for spatial examination through block excavation. Structure 2 and Structure 3, toward the

southeastern edge of the site, were chosen on the basis of the magnetometer survey and further delineated and evaluated by a small diameter core 1.52 m (5 ft) interval matrix. These structures were known from core data to possess intact floor deposits and burned superstructures without being inundated in midden deposits requiring extended excavation or processing time. The goal, always in mind, was on quality rather than quantity, to recover the data that at Toqua and Citico was only glimpsed and suggested. The initial 15.2 m (50 ft) block centered on Structure 2 was begun in November of 1986, and it was later extended to include Structure 3, associated secondary structures and adjoining palisades (Figure 3.3).

The block excavation comprises 269 1.52 m by 1.52 m (5 ft by 5 ft) plowzone units, totaling 624.77 m^2 (6,725 ft^2). The western half of the block, comprising 476 76.2 cm by 76.2 cm (2.5 ft by 2.5 ft) sub-plowzone units, had intact continuous Mississippian deposits up to 10.7 cm (0.35 ft) in thickness in the northwest corner, thinning to the east and southeast. Three palisades and twenty structures were identified from the 1,380 postholes recorded in the block. Three primary structures and nine secondary structures were completely exposed as well as portions of three primary and four secondary structures extending beyond the limits of the block. One other structure of less determinant form (ST13) was also recorded. One hundred and sixty-seven features were identified in the block excavation, 134 of which were excavated. Of the total, 71 or 43%, are associated and described with either Structure 2 or Structure 3.

The occupational sequence of palisades, structures, and other elements of site structure exposed in the block excavation is determined on the basis of intrusion,

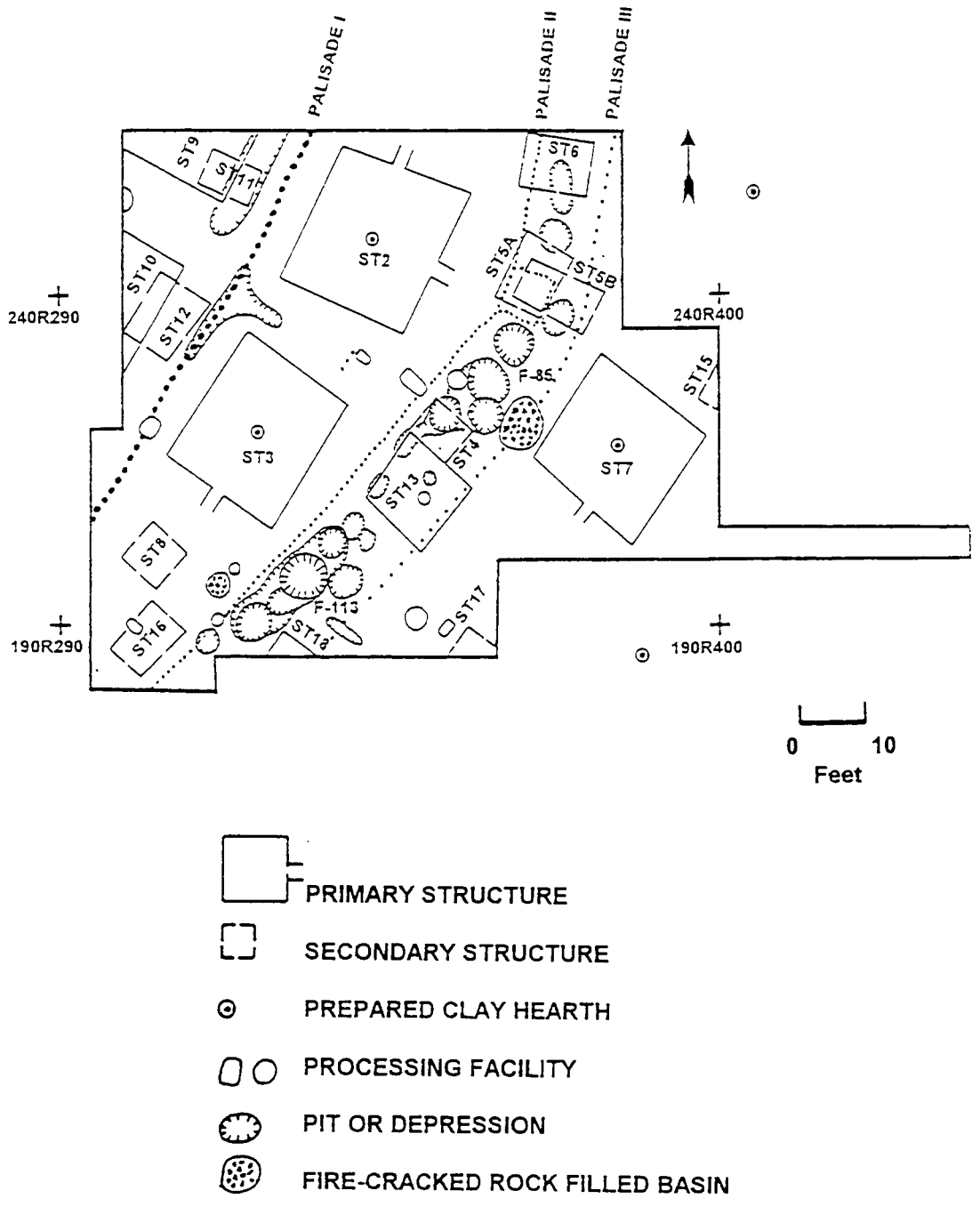


Figure 3.3. Block Excavation Showing Structures and Selected Features.

superposition, orientation, and fill characteristics as well as position within the block. While a percentage of postholes and non-intersecting features cannot be attributed to a specific phase of occupation, the general sequence is clear, and is presented in Figure 3.4 and Figure 3.5. Four phases of construction are evident within the block excavation, concluding with a general conflagration of all standing structures and site abandonment in Phase IV.

Phase I is limited to within Palisade I in the northwest corner of the block excavation and is represented by sheet midden, a secondary structure (ST12A), and a large shallow processing pit (F-118) just west or within the palisade (Figure 3.4a). This feature has a red fired floor and is comparable to similar features at the Toqua site with respect to size, form, and location within the palisade (Polhemus 1987:177). Accumulated interior sheet midden and the large size of the Phase I palisade (PI) posts 21.3 cm - 29.0 cm (0.7 ft - 0.95 ft) diameter set 12.2 cm - 73.2 cm (0.4 ft - 2.4 ft) deep suggest Phase I was of longer duration than later phases.

Phase II represents an expansion of the village area to the southeast and the addition of Structure 2 and Structure 3 within Palisade II (Figure 3.4b). The first construction of primary Structure 2 is oriented to the north parallel to the palisade, while the first construction of primary Structure 3 is oriented to the south and has a secondary structure (ST8) in front. A secondary structure (ST11) replaces the large processing pit and secondary Structure 12A is replaced with a slightly larger, more heavily built, secondary structure (ST12B) after removal of the Phase I palisade. The Phase II palisade (PII) has smaller posts 10.7 cm - 16.8 cm (0.35 ft - 0.55 ft) set 9.1 cm - 48.8 cm

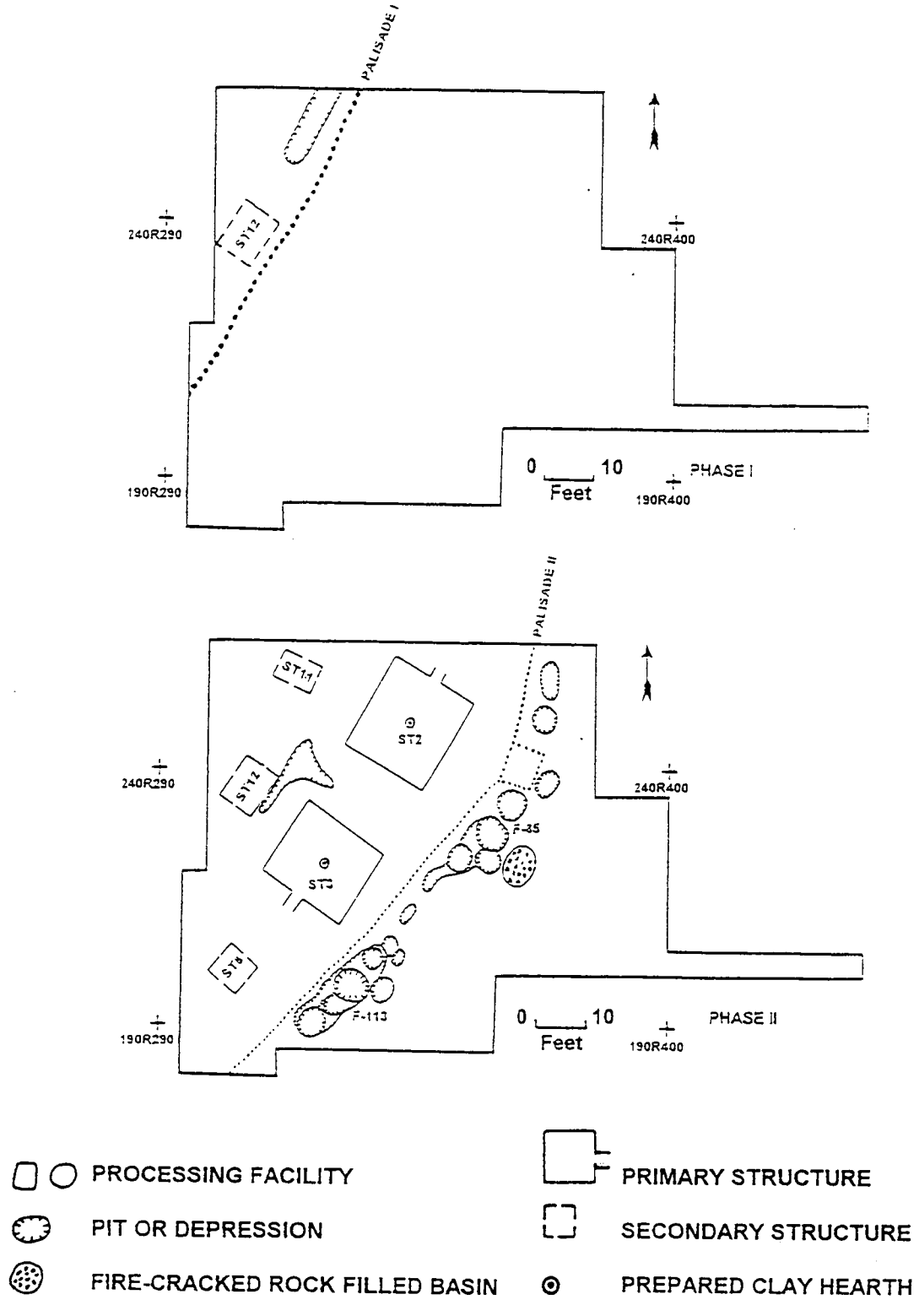


Figure 3.4. Block Excavation Plan Showing Occupation Phase I and Phase II.

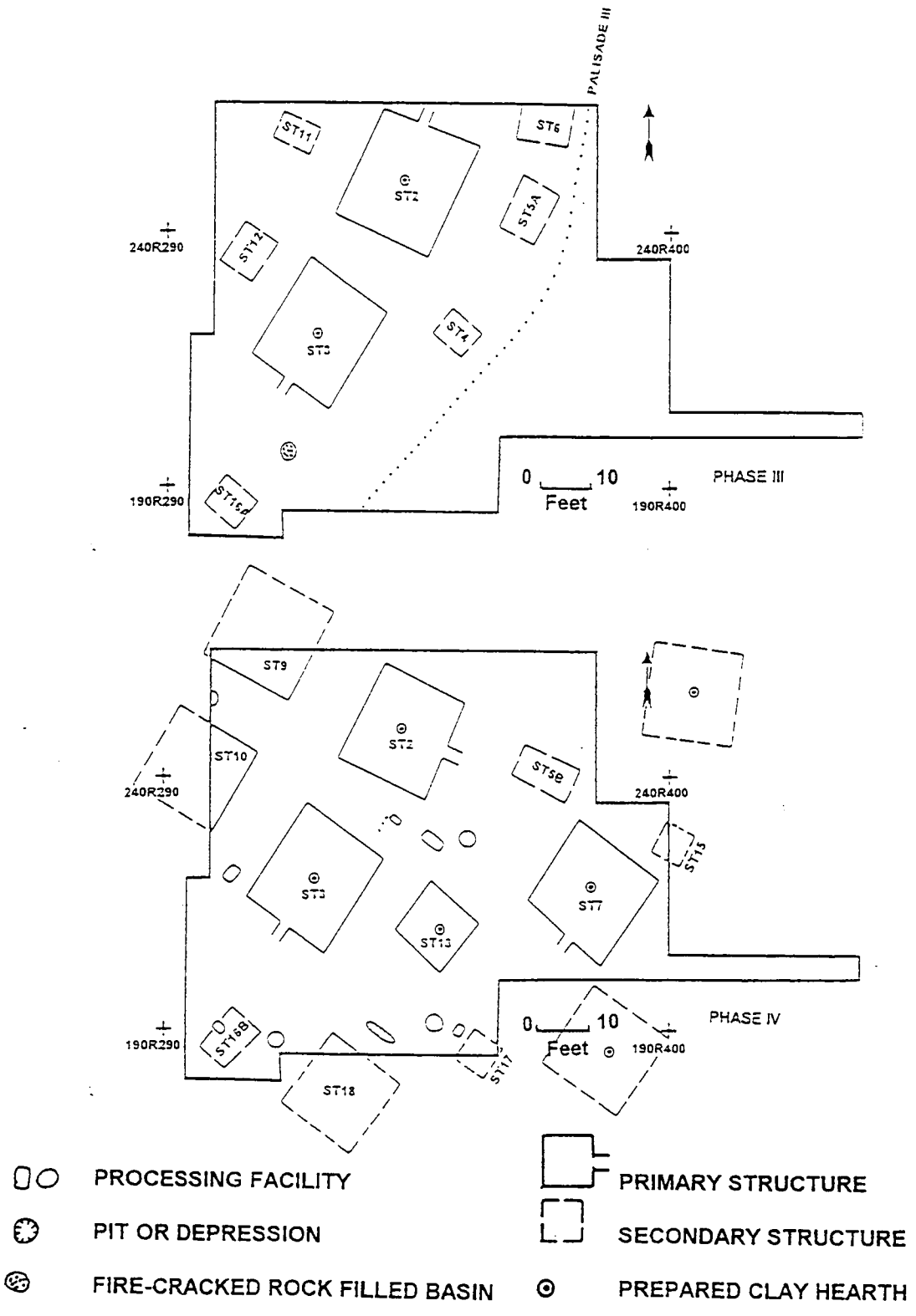


Figure 3.5. Block Excavation Plan Showing Occupation Phase III and Phase IV.

(0.3 ft - 1.6 ft) deep and a 2.44 m (8 ft) square rectangular bastion east of Structure 2. A series of circular, oval, and irregularly shaped borrow pits of varying depths are present in a band just east of Palisade II. The greatest quantity of refuse is concentrated in two deeper pits (F-85, F-113), each near a primary structure on the opposite side of the palisade. Ceramics in each of the two pits closely resemble those from the adjoining structure, suggesting a probable source for the refuse although no cross-mends have yet been identified. That at least some of these borrow pits are contemporary is shown by ceramic cross-mends between pits near the north edge of the block.

Phase III represents a limited expansion of the village area and consists of Palisade III, paralleling and 3.66 m (12 ft) east of Palisade II, coupled with shifts in secondary structure location (Figure 3.5a). Secondary structures (ST4, ST5A, ST6) are situated at intervals just inside Palisade III and parallel to it. Structure 2 is enlarged and possibly rotated 90 degrees to face south of east toward its associated secondary structure (ST5A). Structure 3, also enlarged, maintains its southern orientation toward a new secondary structure (ST16A) situated parallel to the palisade just beyond the preceding Structure 8. The Phase II palisade (PIII) posts are quite small, 9.1 cm - 15.2 cm (0.3 ft - 0.5 ft) in diameter set 6.1 cm - 35.1 cm (0.2 ft - 1.15 ft) deep, and widely spaced (45.7 cm - 109.7 cm (1.5 ft - 3.6 ft)).

The final, Phase IV expansion resulted in both the addition of at least one and perhaps more rows of primary structures to the east beyond the Phase III palisade and a reorganization of space within the Phase III palisade (Figure 3.5b). Secondary structures (ST11 and ST12B) in the northwest corner of the block were removed and replaced with

primary structures (ST9 and ST10). Structure 2 and Structure 3 retain their position and orientation although both associated secondary structures (ST5A and ST16A) are rebuilt (ST15B and ST16B). A structure of indeterminant type having a prepared clay hearth replaces secondary Structure 4. Primary Structure 7 and associated secondary Structure 17 are built outside the Phase III palisade. Structure 7 is oriented to the south and was rebuilt once without alteration of position or orientation. Primary Structure 14, extending beyond the south edge of the block, appears to have only a single construction stage and is oriented with Structure 7 13 m (43 ft) to the north. One corner of secondary Structure 15 extends from the east edge of the block behind Structure 7 and is probably associated with an unexcavated primary structure situated 7.6 m (25 ft) north of Structure 7. A second unexcavated structure is situated beyond the southeast corner of the block. These last structures were verified and delineated through small diameter coring in a close interval matrix. A 1.52 m (5 ft) wide trench was extended 12.19 m (40 ft) to the east in an inconclusive attempt to identify a palisade associated with Phase IV. That a later palisade is probably present southeast of the block is suggested by the straight west edge of the large borrow pits discovered 21 m (70 ft) beyond the Phase III palisade.

The final Phase IV settlement plan is of primary interest in the present investigation because of the burned condition of every Phase IV structure excavated, tested, or verified through small diameter coring. Although, as will be demonstrated in the description and analysis of the two structures utilized for this study, at least one standing structure does not appear to have been occupied at the time of the fire, other

structures contain a wide range of materials suggesting rapid and abrupt destruction while in use. The occupational sequence preceding the Phase IV plan is of importance in determining what is unlikely to represent the final occupation as well as structures and features that do relate to Phase IV. Without definition of the overall sequence and surrounding site structure, one could not correlate the construction, use, and destruction of Structure 2 to Structure 3; without temporal continuity between the two structures any similarities or differences in content or spatial organization would be obscured by the possibility that such similarities or differences are due to time rather than human behavior.

The Structures

In this section, the two structures utilized for this study are described and their condition, particular stratigraphy, construction sequence, and associated features are discussed. Both structures are of single-set post construction, rectangular, with four main roof supports centered on a prepared clay hearth, and are provided with trench entryways. While both structures have the same probable construction date, (indicated by position within the palisade sequence), and the same probable destruction date, (indicated by destruction by fire without subsequent aboriginal disturbance or deposition), the appearance and use trajectory of each structure differs somewhat. These differences reflect the changing needs and surroundings of the occupants, and of the occupation or abandonment state of each structure at destruction.

The fabric of each structure is made up in the archaeological record of postholes, postmolds, hearths, partitions, entryways, and fallen superstructure (Table 3.1). The content or tangible archaeological evidence of aboriginal occupation of each structure is made up in the archaeological record of artifacts, accumulated floor deposits, and non-architectural features such as pits and basins. The former provides the framework or finite boundary for the latter; however, this bounded space represented by the primary structure makes up only one segment of household space. Each element making up these primary structures is discussed prior to describing the structures themselves to provide an understanding of the form, function, and interplay of these elements and avoid duplication in description. The content of postholes, entryway trenches, and subfloor pits is not included in the spatial study and so will not be considered.

Postholes (Figure 3.6a) provide the foundation of the structure and interior furnishings such as beds and partitions. The size, that is, the diameter and depth, of a posthole does not always accurately reflect the size of the member contained other than to provide an upper threshold or limit to post size. The diameter of the actual post, either in the form of a postmold or of a charred post, reflects more clearly the intent of the builder than the posthole dug to receive it. In addition to diameter and point of origin, patterning in alignment, spacing, and fill type as well as the size of any preserved posts or postmolds aid in attributing postholes to particular building episodes. Structure postholes (n=625) range from 9.1 cm - 45.7 cm (0.3 ft - 1.5 ft) in diameter while postmolds (n=176) range from 9.1 cm - 28.9 cm (0.3 ft - 0.95 ft) in diameter. Postholes greater than 30.5 cm (1.0 ft) in diameter are predominantly associated with the structures

Table 3.1. Feature Type by Structure and Construction Phase.

FEATURE TYPE	STRUCTURE 2 TOTAL	STRUCTURE 2 FINAL PHASE	STRUCTURE 3 TOTAL	STRUCTURE 3 FINAL PHASE	FEATURE TYPE TOTAL
Prepared Clay Hearth	4	1	3	1	7
Surface Fired Area	5	3			5
Trench Entryway	3	1	2	1	5
Clay Partition	5	5			5
Fired Clay Mass	10	10	1	1	11
Oblong Basin With Rocks	1	1	2	1	3
Burial Pit	7	3?	6	3?	13
Clay Lens On Floor	3	3			3
Small Circular Depression			1	1	1
Worked Bone Cluster	1	1	1	1	2
Ceramic Vessel	14	14	1	1	15
Basin Metate	1	1			1
TOTAL	54	43	17	10	71

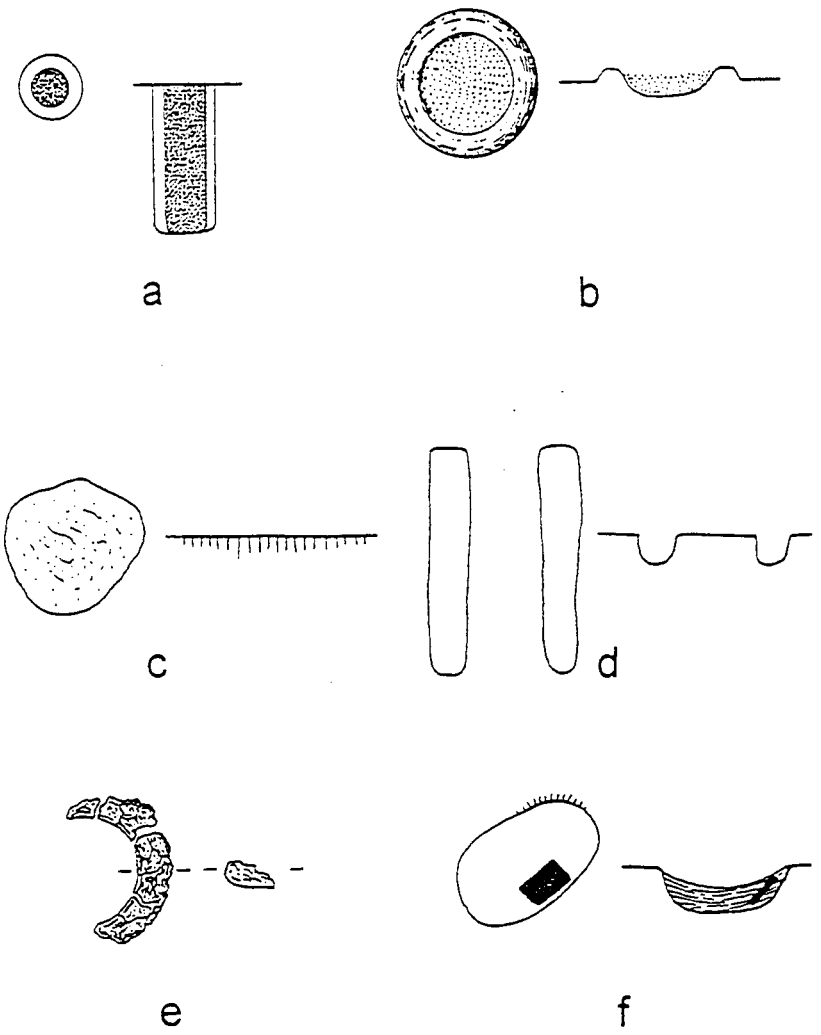


Figure 3.6. Feature Types.
a. Posthole, b. Prepared Clay Hearth, c. Surface Fired Area,
d. Trench Entryway, e. Fired Clay Smoke Hole, f. Shallow oblong basin.

as main roof supports. Posthole depth tends to be greatest for main roof supports, followed by exterior wall posts, and least for interior furnishings. Exterior wall posts are spaced 30.5 cm - 122 cm (1.0 ft - 4.0 ft) apart with the widest spacing toward the center of each wall in both structures. Where postholes are more closely spaced, every second posthole tends to be significantly deeper than the intervening one.

The prepared clay hearth (Figure 3.6b) is centrally placed in each structure where it provided a focal point of heat and light. The shallow circular hearth basins have steep walls and are fired to a hard red color and contain grey or white ash. The ash contains little charcoal or material other than an occasional small calcined bone fragment. Flat, red fired floor surfaces (Figure 3.6c) likely indicate areas of generalized hearth use, similar to that of surface-fired areas situated in outdoor or secondary structure contexts, or may indicate the combustion of substantial fallen architectural elements during destruction of the building.

Entryways (Figure 3.6d), constructed of wood or other perishable material set in a pair of parallel trenches perpendicular the structure wall, provided access to the structure and may have provided a revetment for earth banked against the exterior structure wall. While not preserved at the Loy site, small posts or split planks, set edge-to-edge, have been identified in such entryway trenches at the Toqua site (Polhemus 1987:200). Intra-structural comparisons would clearly be more difficult to make without such an indicator of structure orientation.

Clay architectural elements (Figure 3.6e), such as partitions and clay plaster on the underside of the central roof area, provide construction details as well as delineate

space. Impressions on fired clay in both structures indicate the use of some broad leaf plants as well as the more common grasses as a binding material, while finished surfaces indicate rounded edges on partitions and a smoke hole. Clay partitions and raised modeled hearth rims may be indicators of higher status, as these elements tend to be associated with larger structures and public buildings containing high status materials at other Dallas phase sites (Lewis and Kneberg 1946; Polhemus 1985).

Interior features of unknown use, consisting of shallow oblong basins containing three to five cobbles or a limestone slab along one side (Figure 3.6f), are situated to the right or left side of the central floor area toward the front of each structure. The oblong basin may be overlain by a lens of bivalve shell and dark grey ash, backfilled with a tan fill, or open as indicated by a fill of fired clay and charred superstructure.

Rectangular sub-floor pits are common in both structures and excavated examples contain burials. Rectangular sub-floor pits containing burials are much deeper than normal for the Dallas phase burial population. Near several such pits a thin compacted lens of distinctive sandy subsoil was encountered on the structure floor that may represent floor leveling efforts or backdirt from sub-floor features.

A shallow well-formed circular depression near the structure wall, first thought to be a large posthole, has a shallow depth and even curvature reminiscent of the basal profile of a large ceramic vessel. This feature form would function as a stable pot rest.

Artifacts on a structure floor can be informative concerning activities occurring within a structure, but can be moved, stored, or discarded at other locations. Artifacts stored in a structure may have been used elsewhere. Determination of a use mode, a

storage mode, a discard mode or other disposition may be suggested by completeness, position, and context. Complete vessels in an upright position and containing charred foodstuffs, for example, would most likely represent the vessel in a use mode as a container and the contents in a use mode or storage mode depending upon the specific context of the vessel. A vessel in an inverted position would represent a storage mode while a vessel in an upright position, without obvious contents, could be in either mode. A basin metate clustered on a structure floor with small cobbles showing grinding facets suggests a use mode context. Clusters of worked deer metapodials and metapodial segments suggest a storage mode context. The identification of less obvious patterning is determined in large part through control of the recovery context and recognition of potential sources of depositional bias and post occupation disturbance in each structure.

Structure 2

Structure 2, situated between Palisade I and Palisade II, was rebuilt at least three and more likely four times prior to final destruction by fire (Figure 3.7). The structure is composed of 401 postholes and 54 features. Forty-three features are associated with the last or final construction. Only those features, such as pottery vessels, a metate, fired concentrations of architectural material, and features contributing to an understanding of the final structure floor content are of concern here. The higher portions of the burned architectural zone in the central portion of the structure, the structure floor in the northeast corner and, to a lesser extent, the northwest corner of the structure, have been somewhat impacted by plowing. Examination of the distribution of plowzone materials

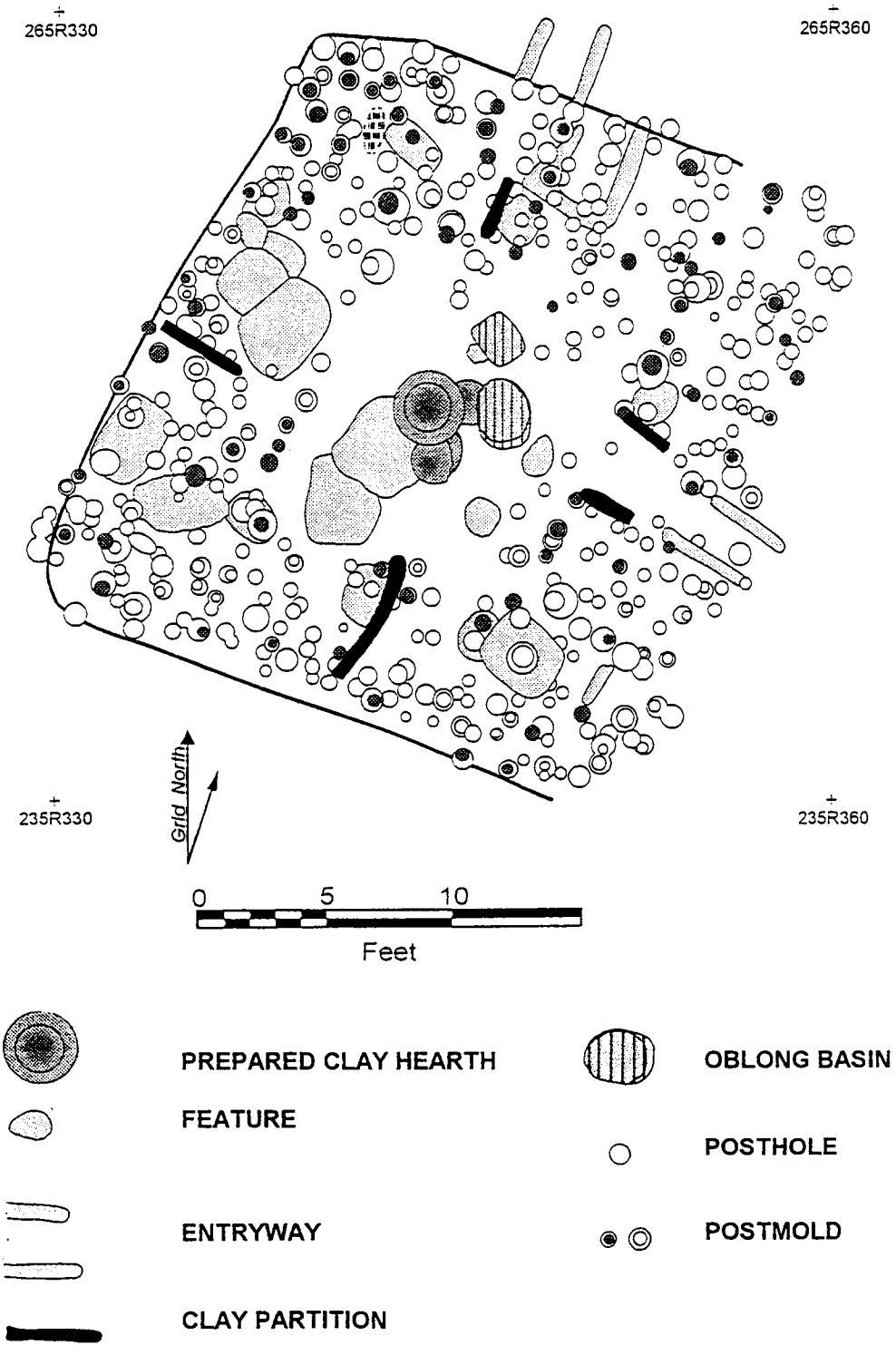


Figure 3.7. Structure 2 Floor Plan.

overlaying the structure to determine the effect of plowing on structure content indicates some attrition in numbers without loss of patterning in artifact classes or categories.

Slight changes in structure size and orientation make possible determination of structure limits for three construction episodes; however, many postholes cannot be attributed to a specific structure. The initial construction phase centered on a circular prepared clay hearth (F-179), measured 6.1 m (20 ft) NS and 6.1 m (20 ft) EW with a floor area of 37.2 m^2 (400 ft^2), and had a trench type entryway (F-213) oriented to the north near the center of the north wall. Following the removal of this structure the entryway trenches and at least some postholes were backfilled with yellow clay probably derived from the roof of the initial structure. The second and possibly the third construction phase centered upon two circular prepared clay hearths (F-178, F-180), measured 7.16 m (23.5 ft) NS and 6.40 m (21 ft) EW with a floor area of 45.85 m^2 (493 ft^2), and had a trench type entryway (F-192) oriented to the north a little west of the center of the north wall. The wall line of this construction phase is in the form of a rhomboid, with the northwest and southeast corners at oblique angles, perhaps due to increased spatial constraints created by increasing structure size while maintaining the location of the nearby palisade. The final construction phase is centered upon a large circular prepared clay hearth having a raised modeled rim (F-80). The floor measures 6.55 m (21.5 ft) NS and 6.58 m (21.6 ft) EW and has a floor area of 43.10 m^2 (464 ft^2). A trench type entryway (F-212) extends 1.07 m (3.5 ft) beyond the center of the east wall. Interior arrangement of space is indicated by a clear central area delineated by the four main roof supports, and an outer zone divided by five prepared clay interior

partitions. Paired charred vertical posts parallel to the partitions probably supported raised beds 1.22 m (4 ft) in width along the walls. The floor slopes gently toward the central hearth and many interior postholes from earlier construction phases are quite shallow. This fact, and the missing upper portions of the earlier central hearths, suggest that the floor was cleared or lowered each time the structure was rebuilt, thus providing a clean floor for each new structure. The floor surface is best defined and compacted within the compass of the four main roof supports and less compacted outside the supports toward the wall. Given that the orientation of the entrance to the structure shifted ninety degrees for the last construction phase such rotation would provide a confusing amalgamation of overlapping use of interior space if the same floor existed for both.

Forty-three of the 54 Structure 2 features are associated with the latest construction episode (Figure 3.8; Table 3.1). Fourteen of the 43 features consist of shell tempered pottery vessels or vessel sections resting on the floor. The more elevated portions of most vessels had been truncated by cultivation. All but one vessel, a small cordmarked jar with a notched applique rim fillet, are situated in the left diagonal half of the structure. This vessel is situated within the central fired clay mass over the oblong basin with associated rocks (F-181) to the right of the central hearth. The basin metate, with three out of four small cobble manos close by, is situated at the front edge near the center of the north bench. A tight cluster of worked deer metapodial fragments in the northwest corner of Structure 2, recorded at the base of the plowzone in the first two units excavated, was later given a feature number (F-219) for descriptive convenience.

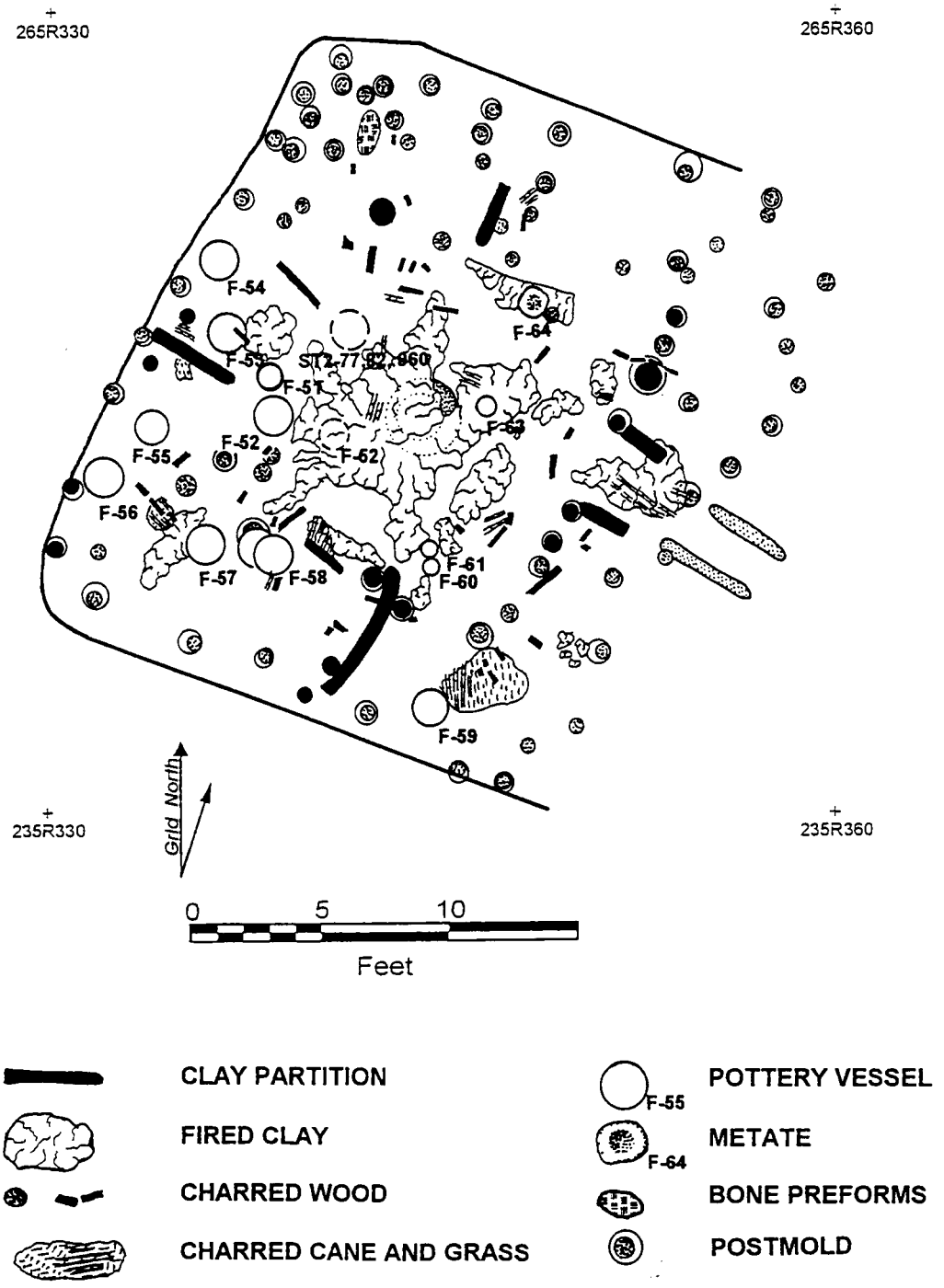


Figure 3.8. Structure 2 Superstructure.

Ten of the 43 features consist of fallen masses of fired clay containing varying quantities of charred wood, river cane, grass thatch, and bark. Preservation of charred architectural material depended upon the mass of the architectural element and superposition of fired clay. Direction of collapse, sequence of collapse, and perhaps prevailing wind direction, are indicated by position on the structure floor and color of the fired clay masses. The central fired clay mass, made up of features 65, 67 and 69, fell to the SSW and is most heavily red fired on the southwest side, the west, north, and east edges grading to a dark grey color indicative of a reducing atmosphere and less complete combustion. Linear masses of heavily fired clay, made up of features 66, 68, and 79, which had abutted the main beams linking the four main roof supports, later fell more to the southwest when either the beams or the roof supports burned through. This collapse, in turn, led to the fall of the east and west partitions resulting in fired clay masses (F-70, F-78). The outer wall, with the exception of several posts near the southwest corner, did not burn fully and so did not leave charred post segments. Some interior posts, such as bench supports on the east, south, and west sides as well as the two north main roof supports, did leave charred vertical segments at floor level. Twenty charred construction members resting on the floor were plotted and collected for wood species identification.

Five clay partitions, perpendicular to the exterior wall and extending from the wall to the inner edge of the beds or benches, divide the outer floor area into an entry vestibule and four nearly equal segments. The partitions, 1.37 m (4.5 ft) in length, are reinforced with canes spaced at 5 cm to 8 cm intervals and have an inner core of clay

heavily mixed with grass oriented perpendicular to the canes. The grass-filled core is covered with a nearly grass free finish coat of clay. Partition thickness ranges from 4 cm to 15 cm, depending upon height above the floor and proximity to a vertical post. Partition height is unknown for Structure 2; however, similar partitions in structures 3 and 14 at the Toqua site were at least 1.22 m (4 ft) high (Polhemus 1987:207-208; 283). The partitions are offset to one half the diameter of the central hearth in a counterclockwise direction from the center of each wall (Figure 3.7).

An interior feature (F-181) of unknown use, consisting of a shallow oblong basin containing a row of cobbles along the west side, is situated in the central floor just east of the hearth. This feature is overlain by a lens (F-81) of bivalve shell and dark grey ash. A second, backfilled, example (F-209) is situated north of the hearth and is attributed to an earlier construction of the structure.

Rectangular sub-floor pits, containing burials, ranging from 76.2 cm (2.5 ft) to 121.9 cm (4.0 ft) in depth, are much deeper than normal for Dallas phase burials. Near three rectangular sub-floor pits thin compacted lenses of distinctive sandy subsoil backdirt encountered on the floor may represent floor leveling efforts or backdirt from subfloor features.

Structure 3

Structure 3, only 3 m to 3.7 m (10 ft to 12 ft) south-southwest of Structure 2, is also situated between Palisade I and Palisade II and was rebuilt three times prior to final destruction by fire (Figure 3.9). The structure is composed of 223 postholes and 17

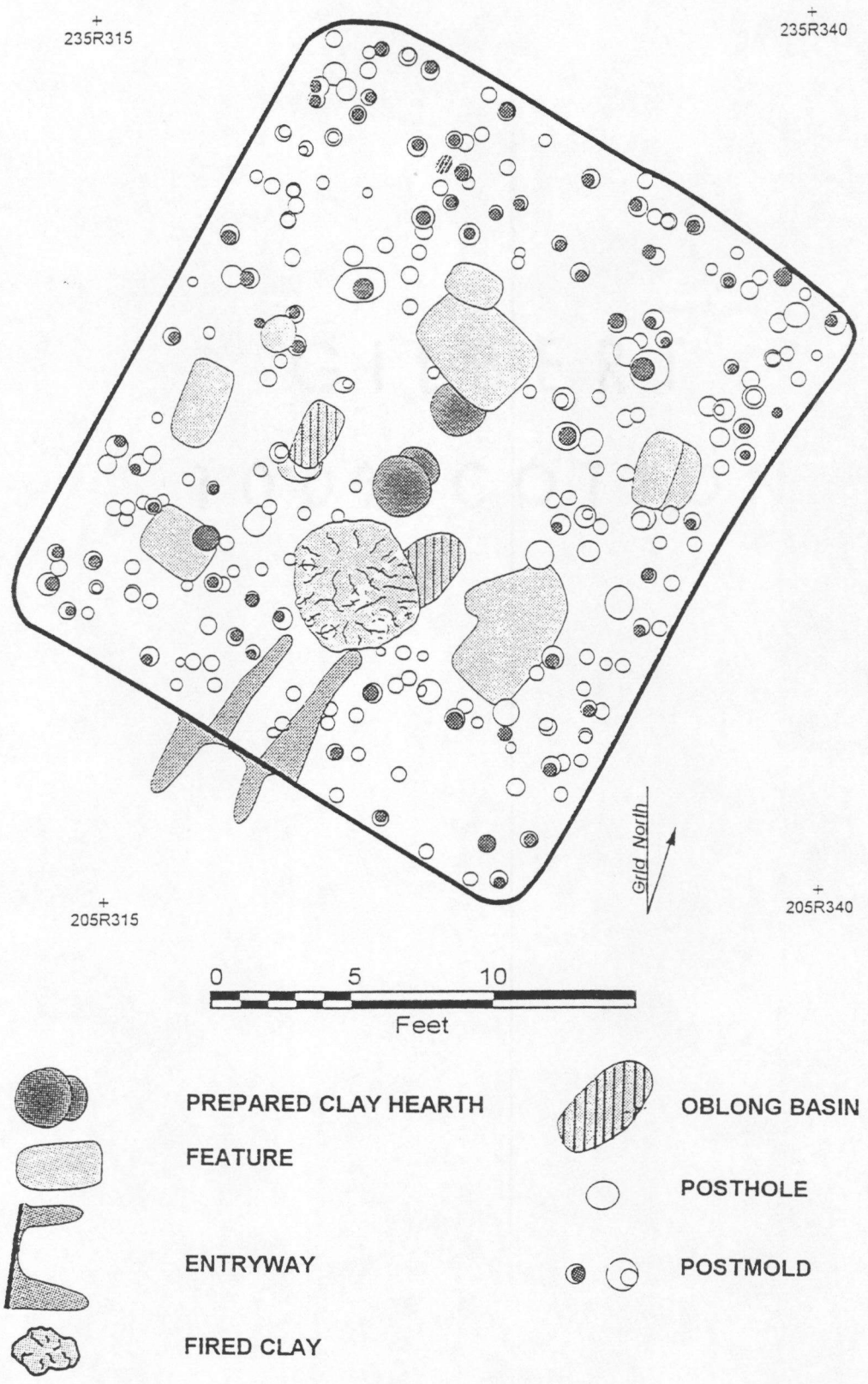


Figure 3.9. Structure 3 Floor Plan.

features. Ten features are associated with the last or final construction. Only those features, such as artifacts, concentrations of architectural material, and features contributing to an understanding of the final structure floor content are of concern here. Structure 3, set in a deeper housepit or floor basin than Structure 2, was not impacted by cultivation; indeed, plowzone distributions of all classes of cultural material declined over the structure. Only a slightly greater number of artifacts were noted toward the limits of the structure in the 7.62 cm (0.25 ft) thick sub-plowzone unit not included in this study.

Slight changes in structure size, posthole fill, and posthole depth make possible the determination of structure limits for three construction episodes; however, many postholes cannot be attributed to a specific structure. The initial construction phase centered on a circular prepared clay hearth (F-141) measured 5.70 m (18.7 ft) NS and 5.79 m (19 ft) EW with a floor area of 33 m^2 (355 ft^2), and had a trench type entryway (F-132) oriented to the south near the center of the south wall. The second construction phase centered upon a second circular prepared clay hearth (F-142) measured 7.01 m (23 ft) NS and 6.25 m (20.5 ft) EW with a floor area of 43.8 m^2 (471 ft^2), and had a trench type entryway (F-112) oriented to the south near the center of the south wall. The front wall was extended 1.22 m (4 ft) to the south, increasing the structure size while maintaining the location of the nearby palisade. The final construction phase is centered upon a third simple circular prepared clay hearth (F-140). The floor measures 6.86 m (22.5 ft) NS and 6.10 m (20 ft) EW and has a floor area of 41.8 m^2 (450 ft^2). The previous trench type entryway (F-112), extends 79.2 cm (2.6 ft) beyond the center

of the south wall. The interior arrangement of space is indicated by a clear central area delineated by four main roof supports, and an outer zone occupied by postholes indicating the presence of interior furnishings such as beds or benches and partitions. Raised beds some 1.22 m (4 ft) in width are suggested by posthole alignments between the main roof supports and the exterior wall. Probable burial pits are also concentrated in the outer floor zone. The floor slopes gently toward the central hearth and many interior postholes from earlier construction are quite shallow. This fact, and the missing upper portions of the two earlier prepared clay hearths, suggest the floor was cleared or lowered each time the structure was rebuilt, thus providing a clean floor for each new construction. The floor surface is defined and compacted within the compass of the four main roof supports and less so out toward the wall.

Ten of the 17 Structure 3 features are associated with the latest construction episode (Table 3.1). A single small strap handle jar is situated within the central fired clay mass over an oblong basin with a limestone slab (F-32) to the right of the central hearth. Two worked deer metapodials (F-220), buried vertically in the floor near the west end of the north bed or bench, still retained adjoining small bones in articular position.

Only one central fired clay mass was identified in Structure 3. Feature 30, of much more limited extent than the Structure 2 central fired clay mass, is centered south-southwest of the central hearth. The fired clay mass is fired to a hard red color, although it is more fragmented than much of the Structure 2 fired clay. Charred architectural materials, wood and river cane, are also more fragmented and best preserved beneath the

fired clay mass. Of particular interest on the north edge of the central fired clay mass is a concave arc or donut-shaped opening of smoothed clay surface forming over half a circle, 39.6 cm (1.3 ft) in diameter, resting directly on the floor. The clay is heavily tempered with grass over river cane and appears to be the finished inner limit or smoke-hole in the center of the clay plastered under a surface of the roof. The circular prepared clay hearth (F-140) has no modeled rim and the rim is flush with the surrounding floor.

The oblong shallow basin (F-32), having a limestone slab against the east wall and thin mottled tan lower fill lens, is situated in the southeast or right diagonal half of the floor near the hearth. The remaining portion of the basin is filled with fired clay, charred wood, cane, and a small jar broken during the fire, as indicated by differential firing of the fragments. The earlier oblong shallow basin (F-31), having a row of cobbles against the west wall and backfilled with a tan fill, is situated in the central floor area west of the hearth. A shallow (7.6 cm) well-formed circular depression, 38.1 cm (1.25 ft) in diameter near the center of the west wall was first thought to be a large posthole. The shallow depth and even curvature of the depression are reminiscent of the basal profile of a large ceramic vessel and would function as a stable pot rest. Without excavation or small diameter coring this feature, as well as posthole sized exterior features commonly referred to as smudge pits, would be misinterpreted as postholes. Three of the rectangular probable burial pits have a slumped upper surface and are not intruded by postholes suggesting deposition late in the occupation of the structure.

Summary of Context

Chapter III has provided the framework within which to examine the contents of the two Dallas phase domestic dwellings forming the core of this study. The location, period of occupation, site structure, sequence of occupation, and relationship of the two structures to each other have been delineated. Prior to definition of the overall sequence and surrounding site structure, we could not correlate the construction, use, and destruction of the two structures. Lacking such determination of temporal continuity any similarities or differences in content or spatial organization would be obviated by the possibility that such similarities or differences are due to time or other factors rather than culture. With the context in hand we can now turn to the contents of the structures.

CHAPTER IV

METHODOLOGY

Chapter IV will describe the methods used on the Loy site data to approach the problem of Dallas household organization. The field and laboratory methods utilized in obtaining detailed intrasite settlement patterning data at the Loy site focus upon the identification of fine scale cultural contexts and the use of uniform recovery and processing techniques. Analytical methods are directed toward the identification of fine scale temporal and spatial patterning both in the contexts utilized in this study and the excavation block beyond the limits of the two primary structures.

Field and Laboratory Processing Methods

The size and settlement plan of the Loy site, beginning in 1981, was investigated through the use of systematic small diameter coring and close interval magnetometer mapping techniques. Some 34 to 36 primary structures, along with other settlement elements such as substructure mound limits, a plaza, and palisades, were identified in the south half of the site as a result of this preliminary work. From these base data, a block known to contain two adjoining well-preserved primary structures and associated settlement unit facilities was chosen for excavation in 1986. The excavation block, totaling 658.464 m^2 (7,125 ft^2), provided an understanding of the construction sequence and settlement plan relationships of the targeted structures.

All excavated sediments within the excavation block were screened and all retained materials were processed. Overlaying plow disturbed deposits were removed in 152 cm by 152 cm (5 ft by 5 ft) units and processed through 1.25 cm (½ in) mesh , while all sub-plowzone deposits, including feature and structure contents, were removed in natural levels by 76 cm by 76 cm (2.5 ft by 2.5 ft) units and processed through 0.62 cm (1/4 in) mesh. Flotation samples were collected at the southeast corner of each sub-plowzone unit for all recovery contexts across the excavation block. As a result of the large volume of material recovered by screening all excavated sediments, only those deposits associated with the floors of Structure 2 and Structure 3 will be considered in the present study. Limited samples from other contexts will be utilized when necessary for comparison in specific instances.

Particular care was taken in the excavation of each structure to identify architectural elements which might serve to define or delimit interior space as an aid to the interpretation of structure content. Structure deposits were excavated with three dimensional plotting of in situ archaeological materials; all displaced sediments were processed through a 0.62 cm (1/4 in) mesh screen in 76 cm by 76 cm (2.5 ft by 2.5 f) units. All ceramic, lithic, bone, and shell artifacts greater than one centimeter were assigned individual catalog numbers and recorded by x and y coordinates and datum depth. Fire-cracked rocks, rounded rocks, and tabular rocks were point plotted only if greater than 2.5 cm (1 in) in size. Stratigraphic control was provided for each structure unit through small diameter coring at each 76 cm (2.5 ft) grid intersection. Natural stratigraphic units were removed in arbitrary 7.5 cm (0.25 ft) levels when such levels

were thick or core defined boundaries appeared unclear. The similar depositional history of the two adjoining structures; with probable construction at the same time, more than probable destruction by fire at the same time, little or no evidence of post-occupational disturbance, and subsequent natural in-filling of the structure pit, provided an ideal opportunity for the direct comparison of the content of the two structures. Preliminary comparison of content within the several levels of each structure unit suggested the utility of combining such levels in each unit for the spatial analysis.

All recovered materials were cleaned and size sorted through 2.5 cm (1 in), 1.25cm (½ in), and 0.62 cm (1/4 in) mesh screens. Each screen size population for each unit was sorted first by material class and then by typological category. Material classes and typological categories were then counted, weighed in grams, and recorded on catalog sheets for each size class within each level and recovery unit. Raw data were entered in a Paradox data base file from which Surfer compatible material class, typological class, and size class data files were compiled for the production of Surfer isopleth and post maps. The individually point plotted objects were processed and entered in a Paradox data base file in the same way as the screened data so as to be comparable to the screen-gathered data set as well as compiled into k-means compatible data files by material class, typological class, and size class.

Analytical Methods

The analytical methodology applied to the cultural materials derived from the structures consists of a combination of statistical and intuitive pattern recognition

techniques designed to compare and contrast the contents of the two structures. Techniques capable of utilizing grid counts as well as piece plot data are necessary to derive the maximum level of information from the structure contents. Such techniques include the creation of raw distribution maps, isopleth maps, k-means analyses, and numerical comparisons presented by delimited spatial units, as well as structure to structure comparison of content. The content of each individual structure is first examined for patterning with respect to spatial organization. The content and patterning identified in each structure is then compared and contrasted with the other structure. Subjects, addressed in Chapter IX, derived from such interstructural comparisons include the use of space, activity areas, attribution of space by sex and/or age utilization, floor maintenance activities, size sorting, and the effect of abandonment as opposed to occupation at the time of destruction by fire.

The k-means analysis technique provides an opportunity to examine cluster size and composition for that portion of the sample collected with point provenience. The k-means clustering technique is a non-hierarchical form of cluster analysis in which a parent population of objects is reduced to a series of optimal cluster solutions (Kintigh and Ammerman 1982; Kintigh 1990; Simek 1984, 1987). The k-means technique has been utilized on European Paleolithic "living surface" assemblages but has not previously been applied to Mississippian period structure assemblages. The creation of an isopleth map for each material class in each structure, utilizing the Surfer software package (Golden Software 1997), provides an opportunity to visually examine differences in distribution for each class in a uniform manner. Paired isopleth maps for each material

class, displaying floor unit data by weight or mean weight as well as by count, provide a more direct visual comparison of material by relative size as well as by count, without the necessity of including isopleth maps for each size class. These Surfer isopleth maps make possible, in the case of Structure 3, comparison of micro artifact distributions with distributions of more traditional macro-size artifacts from the same structure (Sherwood 1991; Sherwood et al. 1995)

Paired isopleth maps displaying the same data class for both Structure 2 and Structure 3 provide a direct visual comparison of patterning between structures for that class. To facilitate interstructural comparisons, made in Chapter IX, Structure 2 is rotated clock-wise 90 degrees to place both structure entryways in the same relative position.

Raw distribution maps are useful tools for illustrating the distribution of classes of material, such as diagnostic tools, cross-mends, other objects of potentially great interpretive value, or classes represented by only small numbers of objects. Raw distribution maps are provided for the following classes or subclasses of cultural material: ceramic vessel form, non vessel ceramic items, worked stone other than lithic debitage, and worked bone artifacts. Symbols on each map are grouped by type or object class as close to the center of each floor unit as possible, given the number of types or total objects within a particular unit. Numerical comparisons of structure content provided a simplified mode of comparative analysis for both intrastructural and interstructural content. The structure-to-structure comparison of content in the form of material culture profiles provides an opportunity to examine the overall similarity of the

two structure samples, regardless of differences in over all sample size. Such comparison provides an overview of activities represented in both structures as well as those represented in only one structure. Delimited space or clusters for interstructure comparisons are defined by the settlement unit model or other divisions suggested by architectural features or k-means clustering solutions.

The archaeological context for each primary dwelling will be described, and then the contents of the two dwellings will be described by material class and type. The patterning of the point plotted portion of the contents of each structure will then be examined through the use of the k-means technique. The entire content of each structure will also be examined for patterning utilizing the described intuitive techniques. The patterning noted within and between the two structures will be compared through the use of paired structure plans displaying the same data set for each class or structure. Such visual representations, once both structures are oriented in a similar manner with respect to entryway location, will provide the best vehicle for comparison of patterning both within and between structures.

CHAPTER V

STRUCTURE CONTENTS

Chapter V will describe the contents of Structure 2 and Structure 3. The description will be directed toward functional attributes rather than stylistic description or interpretation. The function of ceramic vessels as cooking, storage, food preparation, and serving containers, for example, will thus be more important to this study than design motifs or decoration. Food remains, such as animal bone, shell, and charred plant foods will be more important as indicators of food storage, preparation, consumption, and discard than are specific faunal and botanical identifications.

Functional attributions and affiliation with any particular social segment as discussed in Chapter II are drawn from a variety of sources, and should be considered more as tentative suggestions facilitating discussion of patterning within and between the two structures than definitive assignments. Specific association of some artifact tool forms with a particular sex or age group is based upon consistent associations within Dallas phase burial populations. This study draws more general attributions relating to subsistence activities evident in the material culture from Charles Hudson (1976). Of particular interest, as discussed in Chapter II, is Hudson's discussion concerning division of labor by sex and contrast in subsistence activities by season (1976:259-313).

All the size-sorted, point plot, and screen recovered materials (n=192,086) from the structures were counted and weighed by class, type, and excavation unit (Table 5.1). Classes are defined by raw material and primary modification of the raw material.

Table 5.1. Structure 2 and Structure 3 Artifacts and Recovery Mode.

CLASS	STRUCTURE 2	STRUCTURE 2 SCREEN	STRUCTURE 2 TOTAL	STRUCTURE 3	STRUCTURE 3 SCREEN	STRUCTURE 3 TOTAL	CLASS TOTAL
Fire-Cracked Rock	126	2296	2422	473	5378	5851	8273
Round Rock	32	1316	1348	75	3078	3153	4501
Tabular Rock	5	95	100	49	387	436	536
Fired Clay	1	101347	101348	2	40194	40196	141544
Ceramics	393	5294	5687	1058	14966	16024	21711
Lithic Debitage	55	311	366	297	896	1193	1559
Flaked Tool (FTOOL)	18	19	37	60	48	108	145
Cobble Tool (CTOOL)	28		28	33	13	46	74
Other Stone	3	2	5	7	6	13	18
Bone	188	2316	2504	718	5981	6699	9203
Worked Bone	8	11	19	28	36	64	83
Shell	363	540	903	290	764	1054	1957
Worked Shell	1		1		1	1	2
Botanical	52	1427	1479	27	974	1001	2480
TOTAL	1273	114974	116247	3117	72722	75839	192086

Classes made up of groups displaying secondary modification into types or typological clusters, such as ceramics, lithics, worked bone, and worked shell, are subdivided into those types for descriptive purposes. The bulk of the sample (n=170,053) consists of material tabulated by class count, weight, and size class for each excavation unit without further subdivision. The provenience data for illustrated artifacts are provided in Appendix A.

Cracked Rock (n=8,273)

This class consists of quartzite, quartz, and sandstone cobbles exhibiting color changes and angular fractures resulting from exposure to intense heat. The cobbles from which these fire-cracked fragments were derived ranged from 13 cm to 26 cm in length. Size studies from feature and general excavation contexts at the Loy site suggest that fire-cracked fragments less than 5 cm in diameter were too small for consistent reuse, providing a tentative use threshold. The degree of fragmentation per use episode probably varied depending upon composition, temperature, and rapidity of temperature alteration. Some heated cobbles have been reduced to fragments of loosely consolidated friable sandstone. Heated rocks, in a facility such as an earth oven or on the ground surface, have been attributed to activities requiring extended heat retention or indirect application of heat such as cooking and food preparation. The specific use of fire-cracked rock in a primary structure context is unknown, and the facility for heating such rock does not appear to have been within the primary structure.

Round Rock (n=4,501)

This class consists of unmodified quartz, quartzite, and slate pebble-sized to small cobble-sized rocks which show no obvious evidence of heat. The majority of this class is pebble-sized material that, in part, is probably derived from the same source as the clay utilized for structures, as identical pebbles occur in the fired clay architectural material in both structures. Several larger cobbles, displaying no discernable marks of use, may have served functions which left no trace.

Tabular Rock (n=536)

This class consists of shale and limestone fragments which typically have two relatively flat parallel surfaces. Surfaces, particularly on the limestone fragments, are soft and frequently altered by leaching making identification of use marks difficult. Fragments showing surface modification in the form of abrasion or polishing marks from abrader or whetstone use are tabulated in the worked stone class. Tabular rock also appears to have served some of the same functions as the cracked rock class.

Fired Clay Architectural Material (n=141,544)

This class consists of sandy clay fired to a tan to orange to red to dark grey color by exposure to heat, the colors differing with temperature and exposure to oxygen during firing. Impressions from varying amounts and kinds of organic materials, such as grass, leaves, cane, bark, and wood, are present in most fragments and provide details concerning building construction. Fired clay architectural material is the product of

destruction by fire of the associated structure. Without the destructive fire the yellow clay architectural elements, with the exception of the hearth areas, are reduced to "clay floors" in rebuilt structures or lenses of clay wash in and around the structure locations. Clay-lined central hearths and flat surfaced hearths display varying degrees of firing, depending upon temperature, duration, and clay thickness. Hearth clay, with the exception of modeled rims, contains little organic material, perhaps because a supporting binder or framework is not necessary in a ground-fast context. In Dallas contexts clay is not used to daub exterior walls, but is used for interior partitions, hearths, and fireproofing the central interior roof area. Even when clay interior partitions are well preserved and charred wall posts are preserved, as in Structure 2, no evidence of clay daub on the exterior wall is present. The mass of fired clay daub commonly found in Dallas phase structures is concentrated in the central portion of each structure and represents clay applied to the undersurface of the roof-structure over the public floor area, probably to fireproof that portion of the roof most vulnerable to sparks from the central hearth (Polhemus 1985:25-28).

Ceramics (n=21,711)

This class consists of modeled fired clay items, and is made up primarily of vessel fragments. The 28 non-vessel items are described after the vessel sample. Shell tempered ceramics make up the bulk of the class, with less than 1% tempered with other materials, such as grit, chert, sand, and limestone. Seventy-five percent of the ceramics are less than 1.27 cm (½ in) in size and other than tabulation by temper are not further

described as consistent determination of surface treatment and other traits become increasingly unreliable with decreasing size. The remaining sherds (n=5,322) are further divided by surface treatment, decorative mode, appendage form, vessel portion, and vessel form. Surface treatment, decorative modes, and appendage form, as well as inclusive Woodland period sherds (n=11), are beyond the scope of this research other than to clearly place the Loy site in the middle portion of the Dallas phase with minimal representation from other, earlier, time periods (Table 5.2). Shell tempered sherds having an eroded or exfoliated surface make up 47% of the Size Class 2 (+½ in) sample. Vessel portion and vessel form relate more directly to vessel function and are described in greater detail.

Dallas ceramic technology employed paddle-and-anvil construction to form the vessel followed by elaboration in the form of appliques, incision, and modeling to achieve a variety of vessel sizes and forms (Lewis and Kneberg 1946). A cord-wrapped paddle provides the dominant surface treatment in the sample for which the surface may be examined (n=2,795); indeed, when otherwise plain vessels in the vessel sample are closely examined traces of cord marking resulting from the manufacturing process are often present. Neck, rim, or decorated portions of most cord marked vessels are smoothed or wiped to a plain surface, suggesting that "plain" sherds do not consistently represent plain vessels. Most decorative modes and appendages can and do co-occur when large sherds or vessels are examined, particularly on jar forms. Surface treatments, in order of occurrence, are cord marked (n=2,097), plain (n=520), appendage and applique decoration fragments (n=88), textile impressed (n=36), oxidized surface

Table 5.2. Number of Ceramics by Type and Decoration.

CERAMIC TYPE AND DECORATION	STRUCTURE 2	STRUCTURE 3	TOTAL
SHELL TEMPER			
Cordmarked Total	**723**	**1374**	**2097**
Applique Rim Fillet	5	15	20
Applique Decoration	15	12	27
Incised Decoration			
Applique Lug Handle	3	4	7
Applique Strap Handle	13	6	19
Plain Total	**159**	**361**	**520**
Applique Rim Fillet	7	26	33
Applique Decoration	7	13	20
Incised decoration	6	5	11
Applique Lug Handle	7	14	21
Applique Strap handle	1	4	5
Perforated Colander		4	4
Oxidized Exterior Total	**1**	**15**	**16**
Stamped Total	**4**	**10**	**14**
Cobb Island Complicated Stamped		3	3
Curvilinear Complicated Stamped		2	2
Diamond Stamped	4	2	6
Check Stamped		3	3
Saltpan Fabric Impressed	**6**	**30**	**36**
Other - Applique Fragments	**25**	**63**	**88**
Eroded Surface	**621**	**1895**	**2516**

Table 5.2. (Contined)

CERAMIC TYPE AND DECORATION	STRUCTURE 2	STRUCTURE 3	TOTAL
FINE SHELL/MICA TEMPER			
Cordmarked	1	5	6
Plain		3	3
ROTTEN CHERT TEMPER			
Check Stamped		1	1
GRIT TEMPER			
Pisgah Complicated Stamped	1	4	5
Plain		1	1
Eroded Surface	2	6	8
SAND/LIMESTONE TEMPER (Woodland Period)	1	10	11
TOTAL	1544	3778	5322

(n=16), and stamped (n=14). Grit tempered Pisgah (Dickens 1976:171-301) or Cobb Island (Polhemus and Polhemus 1966) wares (n=14) and a chert tempered check stamped sherd indicate links with regions up the Holston and French Broad rivers to the north and east.

Some vessel portions, such as rims or other fragments bearing attributes applicable to a particular vessel form, provide more information than others. The population (n=322) for which basic vessel form can be determined is made up of sherds and 14 vessels or vessel sections. The complete or restorable vessel assemblage from both structures is illustrated in Figure 5.1 and Figure 5.2. Jars conform to the Mississippian jar form described by Hally (1986:277) characterized by a flattened globular body, rounded base, and a vertical or in-sloping rim on a constricted neck. The Mississippian jar form frequently has applique strap and/or lug handles in opposed paired sets extending from the vessel rim. Bowls are represented by simple rounded, constricted rounded or closed, flaring rim, and carinated or cazuela forms. The large basin or pan form commonly referred to as a "saltpan" is represented by textile impressed sherds. The perforated "colander" sherds from Structure 3 lack rims but comparison with other Dallas phase colander sherds suggest a bowl form for this category. A single, long necked, bottle sherd from Structure 3 completes the range of vessel forms from the two structures.

A strong case is made by David Hally (1984; 1986) for vessel function as reflected in both form and size categories in Barnett phase Mississippian ceramics in northwest Georgia. Drawing upon Hudson (1976) and Swanton (1946), Hally notes

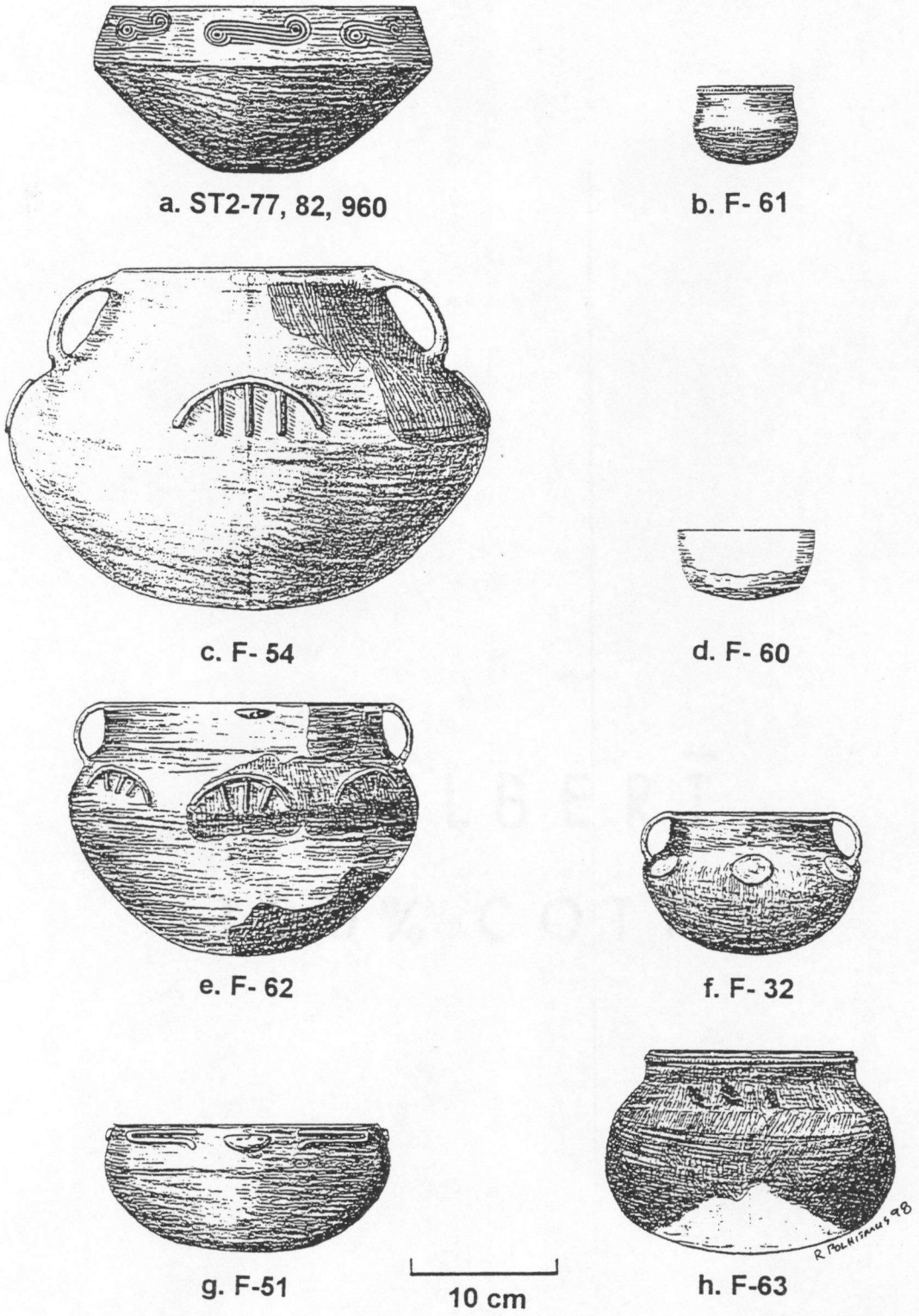


Figure 5.1. Ceramic Vessels from Structure 2 and Structure 3.

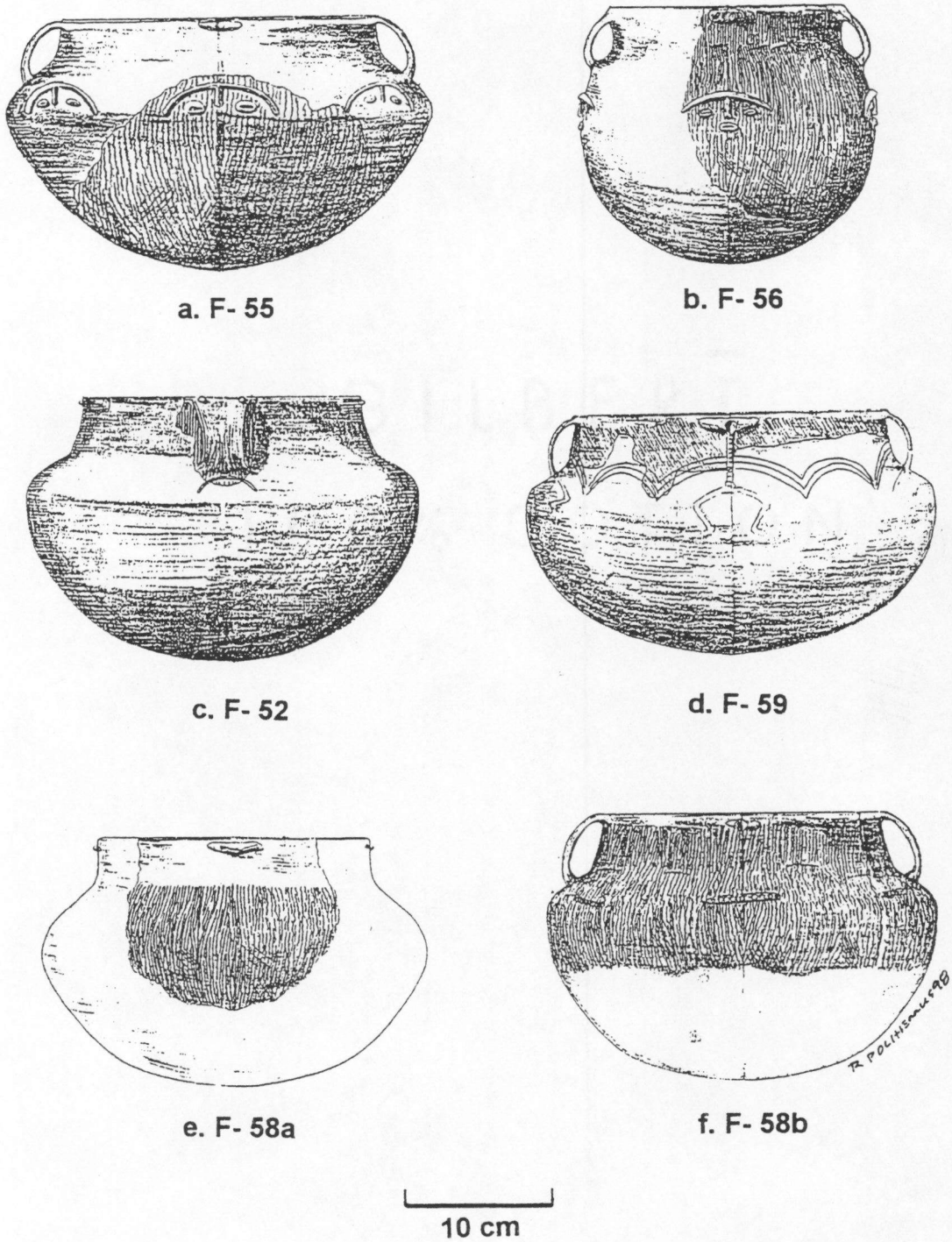


Figure 5.2. Structure 2 Large Ceramic Vessels.

the uniformity of food habits across the southeastern United States and provides a reconstruction of food habits linked to vessel usage. While not all Barnett vessel forms occur in the Dallas phase and not all Dallas vessel forms occur in the Barnett phase, his observations are generally applicable to the Loy site sample. Loy site vessel size classes are based upon rim and shoulder diameters due to the fragmentary condition of the sample. Small vessels range from 8 to 18 cm in rim diameter. Medium vessels range from >18 to 28 cm in rim diameter. Large vessels are greater than 28 cm in rim diameter.

The Mississippian jar form, in its several sizes and with and without exterior sooting, probably served a variety of functions at Loy occupied by several of the grit tempered Barnett phase vessel forms. Large examples with exterior sooting undoubtedly served a cooking or food processing function, while examples without exterior sooting probably served a storage function. Hally (1986) suggests small Mississippian jars, which usually bear exterior sooting, were used to prepare small quantities of food, particularly foods such as beans that require longer cooking. Bowl forms at the Loy site, including rounded or simple bowls in several sizes, closed bowls, carinated or cazuela bowls in two sizes and, more rarely, small flaring rim bowls, seldom display the exterior sooting evident on Mississippian jars. Small bowls of all forms at Loy appear to have primarily filled a serving function, in contrast to carinated and rounded Barnett phase bowls. Bottle and gravy boat forms, rare in both Barnett phase and Dallas phase sites, are generally recovered in mound contexts rather than the domestic context considered here and probably served specialized functions.

One aspect of small Mississippian jars, both with and without applique' strap handles, noted in Dallas phase burial contexts primarily of subadults and females, is the frequent presence of one or more bivalve shell spoons in each vessel. The large size of most shell spoons, relative to the small orifice diameter of the containing jars, clearly indicates such spoons could not be dipped into the jar, indeed it is sometimes difficult to extract the spoon from an empty vessel. Examination of many shell spoons from the Little Tennessee Valley (Polhemus 1987:1019-120) indicates, regardless of the presence and degree of handle elaboration, that the end opposite the umbo or hinge is tapered by grinding the outer edge. Such spoons, frequently manufactured of the left valve of the freshwater pocketbook mussel (Lamsilis ovata), are likely the Dallas equivalent of a pap spoon for feeding babies or young children soft or semiliquid food heated in small quantities in the associated vessels bearing sooted exterior surfaces.

Other ceramic materials include sherd discoidals, sherd disks, pipe fragments, beads, pellets, and pottery clay (Figure 5.3). Sherd discoidals (n=13)(Figure 5.3a) ranging from 26 mm to 65 mm in diameter have well finished slightly rounded margins and are manufactured from both plain and cordmarked vessel fragments. Sherd disks (n=2)(Figure 5.3b) of somewhat larger size, 84 mm and 90 mm in diameter, have less well finished trimmed and ground margins. Ceramic tobacco pipes (n=8) are manufactured of fine sand tempered or untempered clay except one shell tempered bowl fragment from Structure 2. With one exception the pipes are represented by such small fragments form cannot be determined. One heavily used pipe, represented by two fragments in Structure 2, is of the "monolithic axe" form (Figure 5.3c). Two well

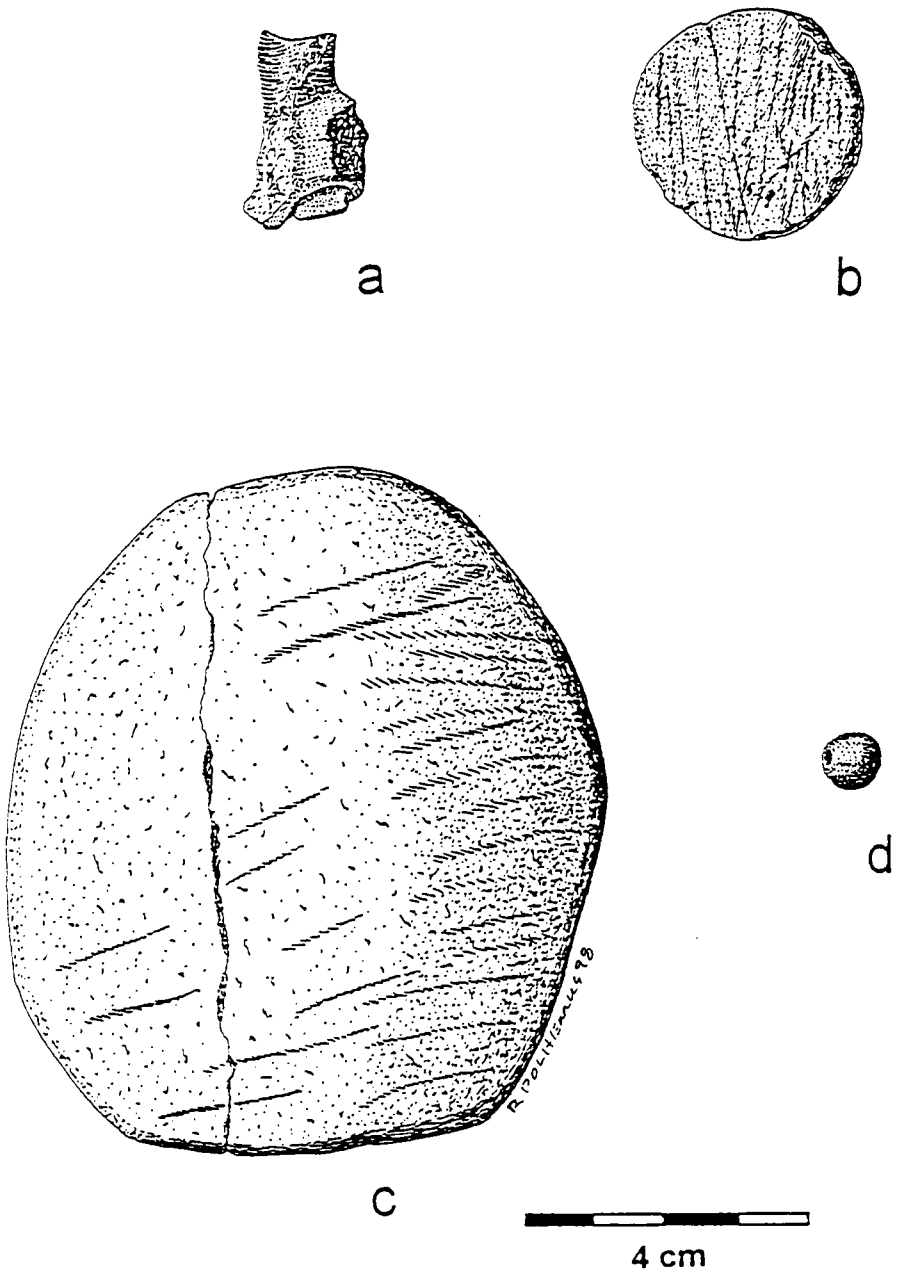


Figure 5.3. Non Vessel Ceramics.
a. Axe effigy pipe, b. Discoidal, c. Large disk, d. Bead.

finished spherical beads (Figure 5.3d) and two cylindrical pellets of untempered clay as well as flattened lumps of greasy yellow-orange "pottery"clay are present in Structure 3.

Lithics - Debitage (n=1,559)

The lithic debitage class consists of all otherwise-unmodified chipped material resulting from the manufacture, maintenance, or repair of lithic artifacts. The bulk of this class consists of material derived from chipped fine grained raw materials, predominately Knox black chert, associated with the flaked tool class. All stages of reduction are present from slightly tested nodules and blocky chunks to flakes and flake fragments to bifacial thinning and pressure retouch flakes. Bifacially worked artifacts and fragments, representing the later part of the reduction process, are included in the flaked tool class. Debitage from coarser grained raw materials, such as quartz and quartzite, is associated with the manufacture and maintenance of tools in the cobble tool class. Debitage from tough impact resistant materials, such as greenstone, are associated with the manufacture and rejuvenation of ground stone edge tools such as celts and adzes. Some of the greenstone flakes display a polished finished surface predating pecking marks and flake surfaces, indicating repair or rejuvenation rather than manufacture.

Lithics - Flaked Tool (n=145)

The flaked tool class consists of all flaked artifacts other than obvious debitage (Table 5.3)(Figure 5.4). Two categories, bipolar flakes displaying opposed crushed edges and bifacially worked fragments, may reflect the final stages of two different lithic

Table 5.3. Number of Worked Stone Artifacts by Structure.

TYPE	STRUCTURE 2	STRUCTURE 3	TOTAL
FLAKED TOOL (FTOOL)			
Projectile Point/Knife			
Mississippian Triangular	6	19	25
Mississippian Projectile Point/Knife	2	4	6
Pisgah Serrated	1	2	3
Earlier Projectile Point/Knife	2	2	4
Other			
PE	4	41	45
Bifacially Worked	13	18	31
Utilized Flake	6	14	20
Flake Tool	1	8	9
Perforator	2		2
COBBLE TOOL (CTOOL)			
Abrading Tool			
Tabular	2	14	16
Other	11	2	13
Scraping Tool			
Edge-Utilized FCR	2	10	12
Edge-Utilized Cobble	2	2	4
Planing Tool			
Cobble Plane	1	1	2
Cutting Tool			
Greenstone Flake		4	4

Table 5.3. (Continued)

TYPE	STRUCTURE 2	STRUCTURE 3	TOTAL
Chopping Tool			
Flaked Cobble Chopper	1	3	4
Grinding Tool			
Cobble Mano		3	3
Cobble Mano With Other Use	5	1	6
Pestle		1	1
Basin Metate	1		1
Percussion Tool			
Spherical Hammerstone		3	3
Discoid Hammerstone	1		1
Hammerstone With Other Use		1	1
Anvil	2	1	3
OTHER			
Mineral	4	7	11
Discoidal	1	3	4
Pebble Artifacts		3	3
TOTAL	70	167	237

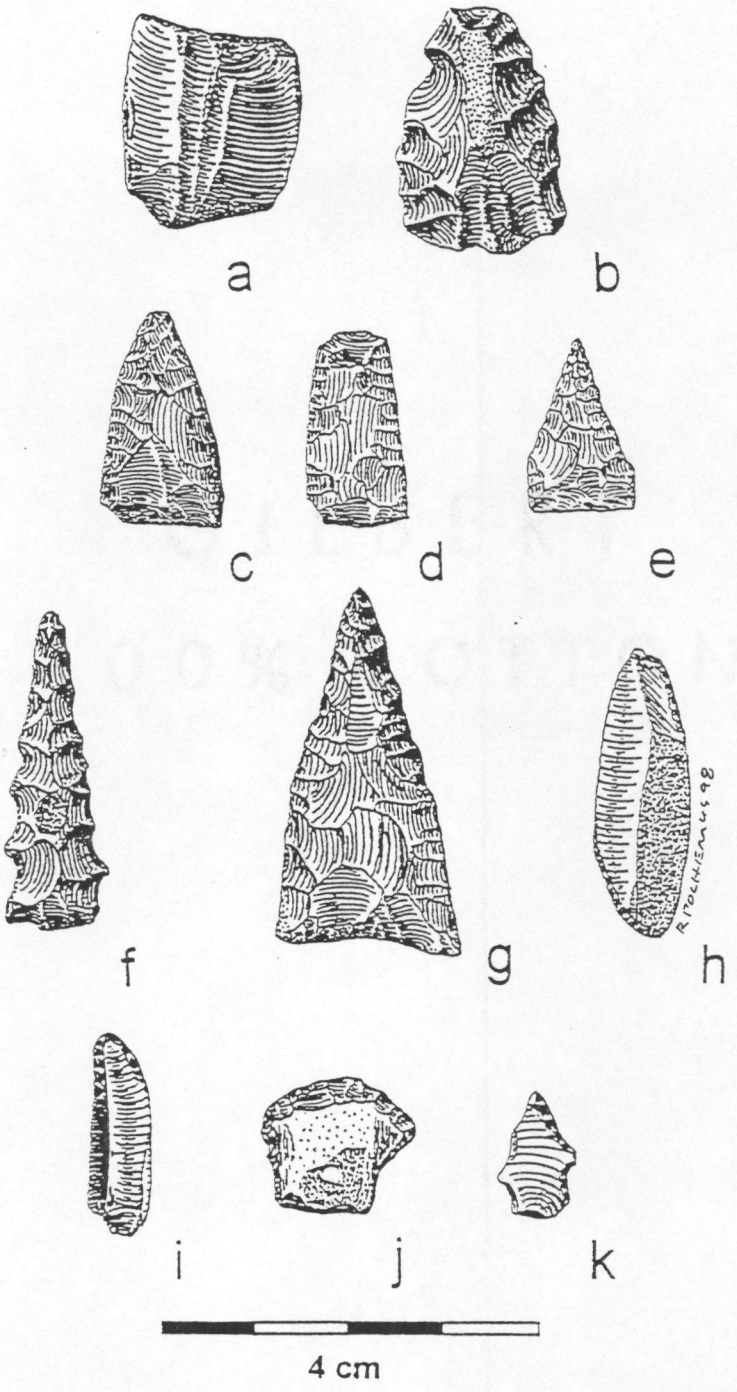


Figure 5.4. Flaked Tool Assemblage.
a. Pieces Esquillee, b. Biface or preform, c. Mississippian triangular projectile point, d. Mississippian triangular projectile point with impact fracture, e. Exhausted Mississippian triangular projectile point, f. Pisgah serrated projectile point, g. Mississippian triangular projectile point/knife, h. Flake tool with lateral retouch, i. Flake tool with point, j. Flake tool with distal retouch.

reduction techniques rather than specific tool forms. The bipolar pieces or piece esquillée (n=45)(Figure 5.4a) were first thought to be indicative of bone working activities (MacDonald 1968:88-90); however, the diffuse distribution in comparison to the clustered grooved bone fragments and small size suggest a terminal stage of bipolar reduction (Chapman 1977:82). Only one specimen from Structure 3 displays crushing on all four edges. The bifacially worked category (n=31)(Figure 5.4b) includes three complete small oval to triangular preforms and otherwise unidentifiable fragments bearing evidence of flaking on both sides. The majority of this category probably represents bifacial core-based reduction failures although amorphous bifacially worked tool fragments lacking pressure retouch cannot be ruled out.

Projectile point/knives (n=38) make up the largest finished flaked tool category. Small thin Mississippian triangular projectile points (n=15)(Figure 5.4c-e) having straight or excurvate blade edges and a straight, concave, or slightly excurvate base are the most common form in Dallas phase sites. A sample of Mississippian triangular projectile points (n=196) from burials at the contemporary Dallas phase Fain's Island site (40JE1) was examined for comparison to the Loy site examples. While the overall form, maximum width (Loy average 14.0 mm; Fain's Island average 14.9 mm), thickness (Loy average 3.4 mm; Fain's Island average 3.6 mm), and raw material are comparable between the two samples, length is not. Mississippian triangular projectile point length in structure contexts at Loy ranges from 15.0 mm to 22.0 mm (average 17.6 mm) while projectile point length in burial contexts at Fain's Island ranges from 21.25 mm to 49.0 mm (average 31.3 mm). This disparity in length likely reflects functional decisions on

the part of the user; retooling and equipment maintenance with discard of exhausted points at Loy, and the inclusion of fully functional equipment with the presumed owners at Fain's Island. Ten distal ends, having straight or excurvate blade edges and a pressure flaking pattern closely resembling the triangular projectile points, are likely tip portions from such points. Three small thick serrated projectile points (Figure 5.4f), a common type in contemporary Pisgah phase sites up the Holston and French Broad rivers to the north and east, are also present. These Pisgah serrated projectile points are manufactured from bipolar flakes, and represent a minority type in Dallas phase sites as far south as the Little Tennessee River Valley.

Somewhat larger Mississippian triangular points (Figure 5.4g), up to 42 mm in length and having a basal width one to five millimeters wider than the 15 mm projectile point cluster width, have relatively straight blade edges and a more diamond shaped cross-section and may have been utilized as a knife form for cutting purposes. Of course any projectile point, if hafted to the foreshaft segment of a compound arrow, can be utilized for cutting purposes; however, a wider haft element and increased medial thickness would improve stability and reduce breakage due to lateral strain. Mississippian triangular "projectile points" occur with both males and females in the Dallas phase burial sample; however, those individuals with more than one projectile point are males. A close examination of single points, and points spatially separated from obvious oriented projectile point clusters in burial contexts, may provide sufficient data to more clearly define a utilitarian knife form from projectile points in the Dallas phase.

Projectile points from earlier periods (n=4) in the structure sample consist of three Early Archaic period corner-notched fragments and a complete stemmed Early Woodland point. One Early Archaic Kirk corner-notched projectile point fragment had been incorporated in the clay of an architectural feature (F-70) in Structure 2 and was probably derived from the source of the clay used for building purposes. Earlier projectile points sometimes occur as burial associations in the Dallas phase burial sample and may have been collected by the later occupants of the area.

Other flaked tool categories consist of utilized flakes (n=20), flake tools (n=9), and perforators (n=2). Utilized flakes, possessing use damage to portions of one or both relatively thin lateral margins, are otherwise unaltered and were likely used for cutting activities. Flake tools were intentionally retouched to modify, shape, or sharpen a flake into one of several forms. Flakes with one or both lateral margins retouched (n=3)(Figure 5.4h) are the larger flake tools. Flakes with both lateral margins steeply retouched on the dorsal surface to form a thick sharp point (n=5)(Figure 5.4i) are from 18 mm to 21.5 mm in length, 6.5 mm to 12.5 mm in maximum width, and 3 mm to 4 mm in thickness. The specimen from Structure 2 has three such thick sharp points on a single flake. The last flake tool (n=1)(Figure 5.4j) has one lateral margin of a wider flake retouched into an end scraper-like form. Flake and blade tools of micro-lithic size have been reported for a number of Mississippian sites and are frequently attributed to manufacture of shell beads and graving or cutting bone and shell (Morse and Morse 1983:222-224).

Perforators (n=2)(Figure 5.4k) are defined by tip form and wear characteristics recognized on two widely differing artifact forms; a recycled projectile point and a small flake. Tip form is alternately beveled to the upper limit of edge wear. Edge wear can be seen with the naked eye. The length of the edge-worn tip in each specimen equals the width at the upper limit of wear, providing an indication of perforation depth , 8 mm and 11.5 mm, as well as perforation diameter at the surface of the object being perforated. One interesting difference, other than one example being a recycled projectile point and the other a small flake only 13 mm in length, is that the direction of the bevel, and therefore the direction of drill rotation, is different for each. The flake perforator has some retouch for hafting on the proximal end, indicating both specimens were probably hafted for use.

Lithics - Cobble Tool (n=74)

The cobble tool class consists of larger, often expedient utilitarian items utilized for reduction of other materials (Figure 5.5). As such utilitarian items, a wide range of activities is probably represented. The class is characterized by relatively large size, the use of cobbles, or to a smaller extent tabular limestone or sandstone as raw material, and multiple use or recycling of individual artifacts. Use categories identified are based upon a combination of technological observations, informal replication experiments, and studies by others on non-flaked stone tools (Hally 1980; Pennington 1977). While a particular action, such as abrasion or percussion, might be reasonably surmised, the material acted upon or activity engaged upon is a more difficult matter. No consistent

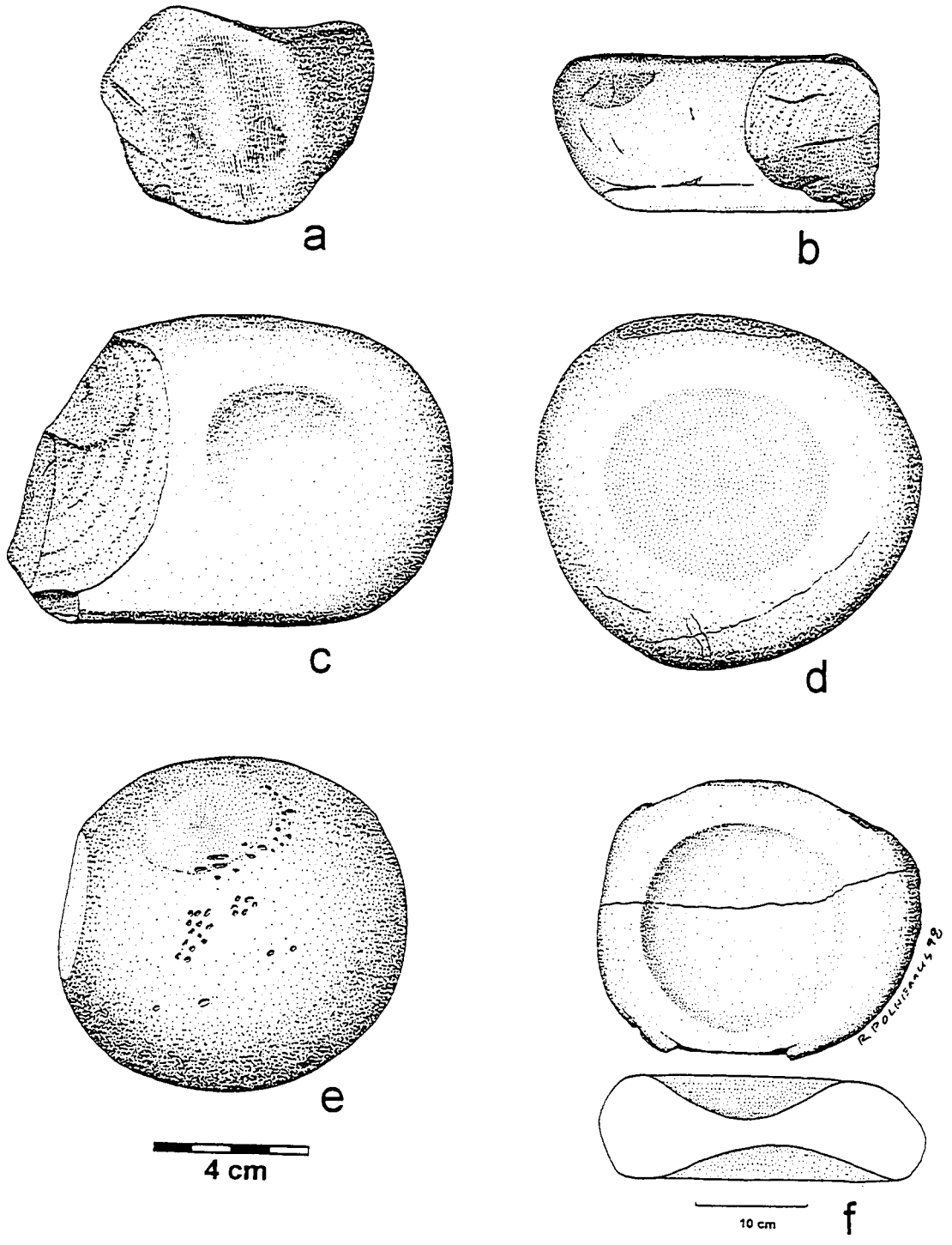


Figure 5.5. Cobble Tools.
a. Sandstone abrader, b. Cylindrical cobble plane, c. Cobble chopper, d. Bifacial cobble mano with hammer-stone usage, e. Spherical cobble mano, f. Bifacial basin metate (not to scale).

multiple use sequence or trajectory could be determined, other than utilization of broken edges following breakage of other forms (Table 5.4). An arbitrary decision concerning order of secondary use categories was made during analysis and multiple use is noted on distribution maps and in discussion of the cobble tool class.

The abrading category (n=29) is made up of nearly equal numbers of coarse sandstone cracked cobbles, finer grained tabular fragments, and tabular limestone or sandy limestone fragments, displaying one or more abraded surfaces. Two small sandstone abraders from Structure 3 exhibit slight grooves, while a larger sandstone abrader from Structure 2 has both slight grooves and a slightly concave facet (Figure 5.5a). The other abraders have nearly flat to slightly concave worn areas on the broken surface of a cracked cobble or a natural surface on tabular materials. Grain size, coarse for rapid removal of material, medium for finishing or resharpening, and fine to very-fine for honing or polishing, probably dictated the choice of raw material. The coarse-grained abrader size may be controlled by limitations in the size of fire-cracked sandstone cobbles, but are larger than the medium grained abraders. The fine-grained limestone abraders or whetstones tend to be larger and probably would have been utilized in a stationary manner, that is, moving the object to be abraded or polished across the surface of the limestone rather than the reverse. Abraders are used for shaping, smoothing, sharpening, and polishing harder materials such as bone and stone for both tools and ornaments.

The scraping category (n=16) is made up of fire-cracked cobbles and broken cobbles or other cobble tools having one or more angular edges rounded or crushed from

Table 5.4. Multiple Use of Cobble Tools.

PRIMARY USE	SCRAPING EDGE UTILIZATION	PERCUSSION HAMMER STONE	PERCUSSION PITTED COBBLE	PERCUSSION ANVIL	TOTAL
ABRADING	1	1		5	7
SCRAPING	1		1	1	3
PLANING		1			1
CHOPPING	2				2
GRINDING		4	1		5
PERCUSSION			1		1
TOTAL	4	6	3	6	19

use. Lightly utilized fire-cracked cobbles, given the coarse texture of the material, probably escape detection and this category likely represents only the most heavily utilized examples. The utilized edge most frequently is a nearly right angle and is straight to slightly concave in shape. Rough shaping of wooden shafts would be possible with this artifact form. This tool form has not previously been recognized or described.

The planing category (n=2)(Figure 5.5b) is made up of distinctive elongated quartz cobbles of "roller" shape truncated by a single blow to form a steeply angled straight bit. The bit is on the flatter surface of the cobble and resembles the bit of a traditional woodworking plane. Rejuvenation of the working edge is accomplished by detaching a single steeply angled flake having cobble cortex around the entire edge and the earlier working surface on the outer face. Primary manufacturing flakes display the

same steep angle on the ventral face and the rounded end of the cobble on the outer surface.

The cutting category (n=4) is made up of ground stone edge tools, such as celts, adzes, and chisels, manufactured of greenstone and other tough impact resistant stones. The cutting category is represented by only four small greenstone flakes bearing traces of polished surface and pecking marks indicating tool repair rather than manufacturing activities in Structure 3. Ground stone edge tools are poorly represented in other contexts at the Loy site other than platform mound burial contexts. Such tools are consistently adult male burial associations and frequently occur in groups, suggesting woodworking toolkits in the Dallas phase burial sample. The larger, round polled celt form of axe is also found in association with other high status objects and likely had symbolic as well as technological functions.

The chopping category (n=4)(Figure 5.5c) is made up of relatively flat oval quartz cobbles having a percussion flaked working edge at one end. The working edge is created by flake removal from one or both faces. Projecting portions of the bit are frequently crushed by impact with a hard surface, and two of the four studied specimens are broken down the central axis and the resulting edges used for scraping activities. Four cobble choppers, and associated anvils bearing matching impact scars, were recovered with a mass of large mammal bone on an exterior occupation surface at the Toqua site interpreted as a butchering or primary processing area (Polhemus 1987:205, F-886). The context of the Toqua specimens and fragmented nature of the associated bone suggest a heavy chopping or reduction function where additional tool weight would

be an advantage such as marrow extraction. The anvils in the Loy site structures do not have the linear impact scars noted at Toqua and thus do not appear to be associated with this activity.

The grinding category (n=10) consists of items such as manos, a metate, and a pestle, traditionally associated with plant food processing. Manos of two different forms are present in the sample. The first variety (n=4)(Figure 5.5d), common in earlier periods, is manufactured from a relatively flat oval hand-size cobble and frequently has a pair of opposed, sometimes pitted, flat grinding surfaces. The slight pit may have served some purpose in the grinding process or some unrelated function. Among the Iroquois F. W. Waugh (1916:59) states that "A very crude or primitive method of grinding corn was by means of two medium-sized pebbles of a flat round shape, the lower one pitted slightly in the center to hold the grains." Waugh also comments (1916:60) that "the pebbles, one of which was generally somewhat larger than the other, were used in a large wooden bowl which caught the cracked grain, ground meal, or cracked nuts." The second variety (n=4)(Figure 5.5e) is manufactured from a more rounded baseball size cobble that usually has a single relatively small slightly rounded grinding surface. One of two examples associated with an older adult female in the Dallas phase burial sample has two opposed slightly rounded grinding surfaces. The slightly rounded grinding surface and close association of three out of four of these smaller manos with a basin metate in Structure 2 suggests use with the metate in processing plant materials. Secondary hammerstone usage of the smaller mano variety is indicated by impact scars on other surfaces of all four specimens and possible abrader use on one specimen.

The metate category (n=1)(Figure 5.5f) consists of a large sandstone cobble with a basin shaped concavity worn into the upper and lower face. The concavities are 185 mm and 220 mm in diameter and 33 mm and 25 mm in depth. Close association of the preceding smaller mano variety suggests processing of hard plant materials such as seeds.

The single pestle fragment from Structure 3 may relate to a previous occupation period as it appears to be a fire-cracked cobble.

The percussion category (n=8) consists of hammerstones and cobble anvils. Three rounded baseball-sized cobbles in Structure 3 display impact scars comparable to the hammerstone usage on the smaller variety of manos from Structure 2. One hammerstone has an irregular pit on one face similar to that produced by bipolar reduction of chipped lithic materials. One small discoid hammerstone from Structure 2, 36 mm in diameter and 19 mm in thickness, of a form found with other flint knapping equipment in Dallas phase burial contexts, bears the small marginal facets characteristic of such use. The anvils are larger cobbles or cobble fragments bearing a small number of impact scars on one or more flattened surfaces.

Lithics - Other Worked Stone (n=18)

The other worked stone class consists of items such as minerals, discoidals, and modified pebbles, which are not easily incorporated in the two preceding classes (Figure 5.6). Minerals utilized as a source of pigment, bearing one or more ground facets, include hematite (n=10)(Figure 5.6a) and galena (n=1). Discoidals (n=4)

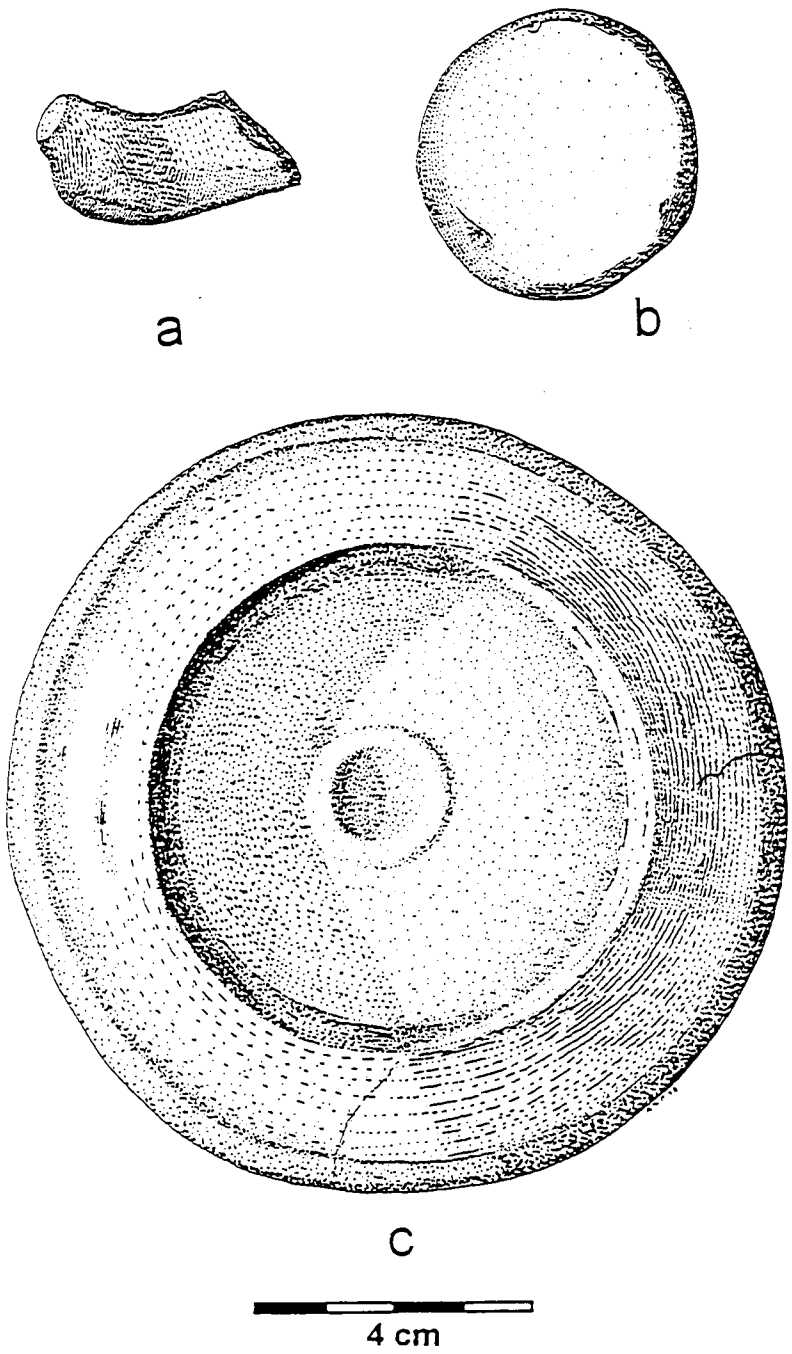


Figure 5.6. Other Worked Stone.
a. Hematite with facets, b. Sandstone discoidal, c. Quartzite biconcave discoidal.

include all disk-shaped stone objects, and probably represents a population with mixed functions. Two rough disks from Structure 3 are manufactured of shale and sandstone and may be abraders or whetstones (Figure 5.6b). A split limestone discoidal from Structure 3, 30 mm in diameter, presents a more uniform shape despite an eroded surface. A honey colored quartzite biconcave discoidal from Structure 2 is 108 mm in diameter and 39 mm in rim thickness (Figure 5.6c). The concavity on each face is 69 mm in diameter and 14 mm in depth and possesses a small raised secondary ring 16 mm in diameter at the center. A large chip broken from one face has been ground smooth following breakage. This discoidal fits the description of the stone disk used in the game of chunkey during the early historic period (Hudson 1976:421-423). Hudson relates that chunkey was always played by males and that chunkey stones were owned and carefully preserved by towns or particular clans in the towns. A tan quartzite roughly pecked discoidal preform from the fill of Feature 108 below the floor of Structure 2, and thus not part of the spatial sample, suggests biconcave discoidals may have been manufactured by the occupants. This preform, 140 mm in diameter and 51 mm in thickness, has a flaw on one face that would have made completion unlikely.

Bone (n=9,203)

The bone class consists of all vertebrate remains, including fish scales, recovered from the structures. Bones were first screened for size classification and then sorted into categories by class of modification. Modification of faunal elements can provide evidence of actions involving bones. Intentionally modified faunal elements, and any

resulting manufacturing and use residues are treated separately. Other modification categories include butchering marks and reduction by breakage, heat alteration, canid gnawing, canid digestion, and rodent gnawing. Butchering marks and breakage patterns, not tabulated here, provide data concerning processing of animals (Guilday, Parmalee, and Tanner 1962).

Application of heat, as indicated by distinctive breakage and partial to complete discoloration ranging from brown to black to grey to white, may result from roasting or other open fire processing of food animals, burning or tossing discarded bone in a fire, or burning during destruction of the structure by fire. Patterning of heat alteration by size and affected element may reflect the processing of food animals or tossing discarded bone in a fire. The lack of such patterning may indicate random exposure to heat such as being present within a structure destroyed by fire. Calcination, that is, heat reduction resulting in grey to white color throughout and fragmentation and distortion, is best represented by bone fragments within clearly defined hearth contexts and may indicate intentional burning as opposed to random exposure to fire.

Gnawing marks, and surface alteration of smaller bones and fragments by digestive juices, provide data concerning the behavior of resident canids, presumably dogs (Morey and Klippel 1991; Snyder and Klippel 1986). A canid presence affects faunal assemblage composition through differential destruction of elements as well as spatial distribution of elements. Bones bearing gnawing marks, some crosscutting earlier butchering marks, may delineate canid disposition rather than human activities. Bones bearing the distinctive gloss and acidic erosion or sculpting of broken edges indicative of

surface alteration by digestive juices may delineate canid disposition of feces or general refuse disposal areas.

Gnawing marks left by small rodents appear to be much less common and, in one burned structure at the Toqua site, are found in association with charred food remains and small rodent bones in the corner storage area of the structure (Polhemus 1987:285). A cluster of rodent gnawed bones may therefore suggest the presence of a relatively safe small rodent habitat and perhaps a food storage area within a structure or a food storage facility such as a secondary structure or barbacoa.

Worked Bone (n=86)

The worked bone class consists of all bones and bone fragments which have been intentionally modified or make up a portion of an object manufactured of animal parts. The worked bone class may be subdivided into minimally prepared raw materials, partially completed objects, finished objects, fragments resulting from use, and manufacturing residues (Table 5.5)(Figure 5.7; Figure 5.8). One notable aspect of Dallas phase worked bone is an apparent concentration on a limited number of species and elements for raw material in the manufacture of tools and other objects. Some elements, such as deer metapodials and deer antlers, were only slightly altered and retained for later reduction into specific tools (Figure 5.7a). Antlers were reduced by removal of usable tines through groove and snap or, more frequently, application of controlled breakage, leaving a distinctive fracture pattern. The intended breakage point may have been heated, prior being placed on the edge of an anvil and struck off, as the convex

Table 5.5. Number of Worked Bone Artifacts by Structure.

TYPE	STRUCTURE 2	STRUCTURE 3	TOTAL
FINISHED ARTIFACT			
Projectile Point	8	17	25
Antler Projectile Point	2	1	3
Antler Cylindrical Flaker		1	1
Scarifier		1	1
Bead	3	7	10
Bird Bone Awl		1	1
Splinter Awl		1	1
Turtle Shell Bowl	2	1	3
MINIMALLY ALTERED			
Deer Metapodial		2	2
Deer Antler	1		1
PREFORM			
Grooved Metapodial Segment	*	18	18
Bead Preform		2	2
RESIDUE			
Antler Shaved Tine	1	2	3
Antler Groove and Snap		2	2
Other Worked Fragments	2	8	10
TOTAL	19	64	83

[Note:* = 27 Grooved Deer Metapodial Segments at base of plowzone over Structure 2]

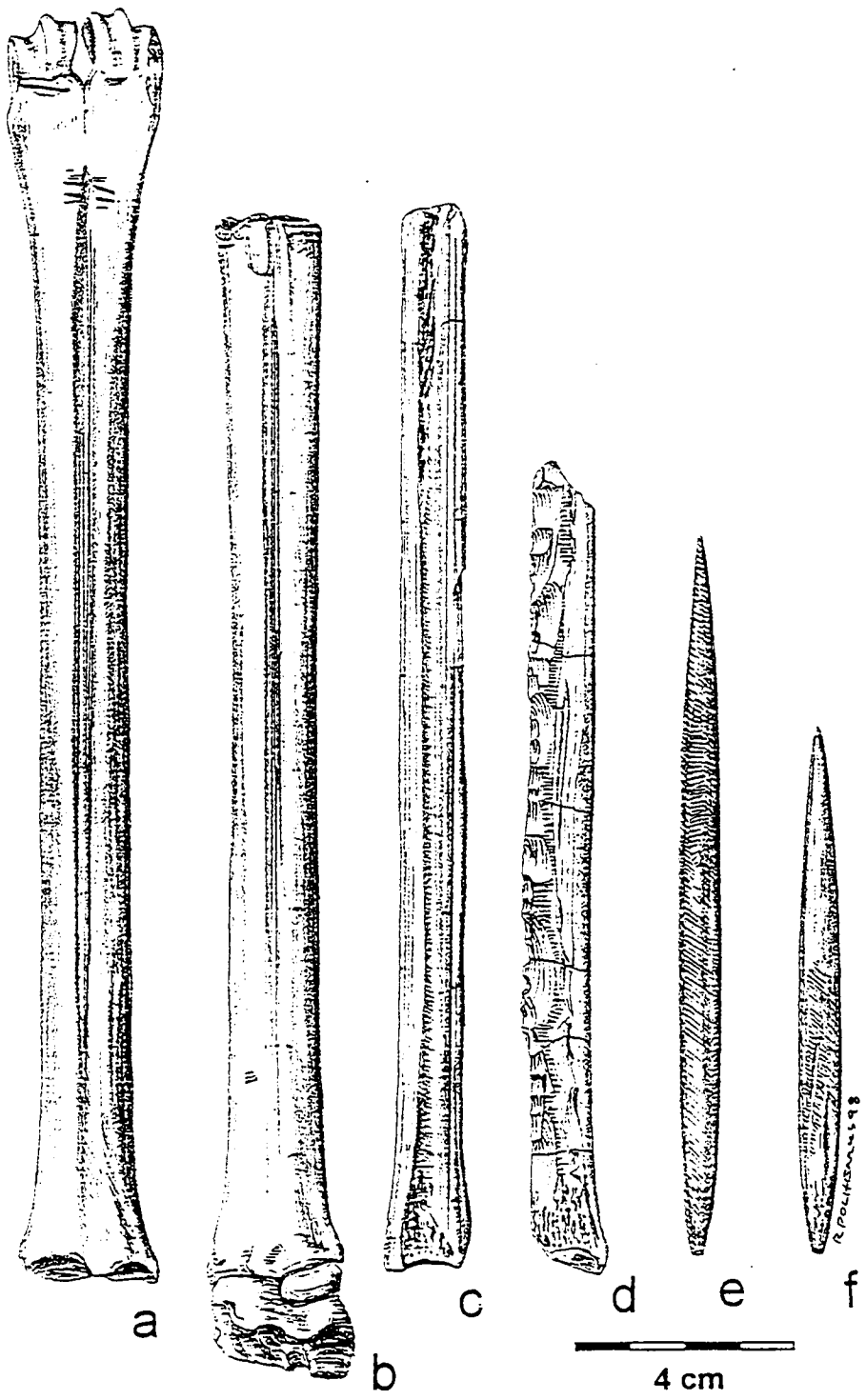


Figure 5.7. Deer Metapodial Reduction Sequence and Bone Projectile Points.
a. Metapodial with butchering marks, b. Metapodial with groove-and-snap removal of articular end, c. Longitudinally slotted quarter metapodial preform, d. Flaked and slotted quarter metapodial preform, e-f. Bone projectile points.

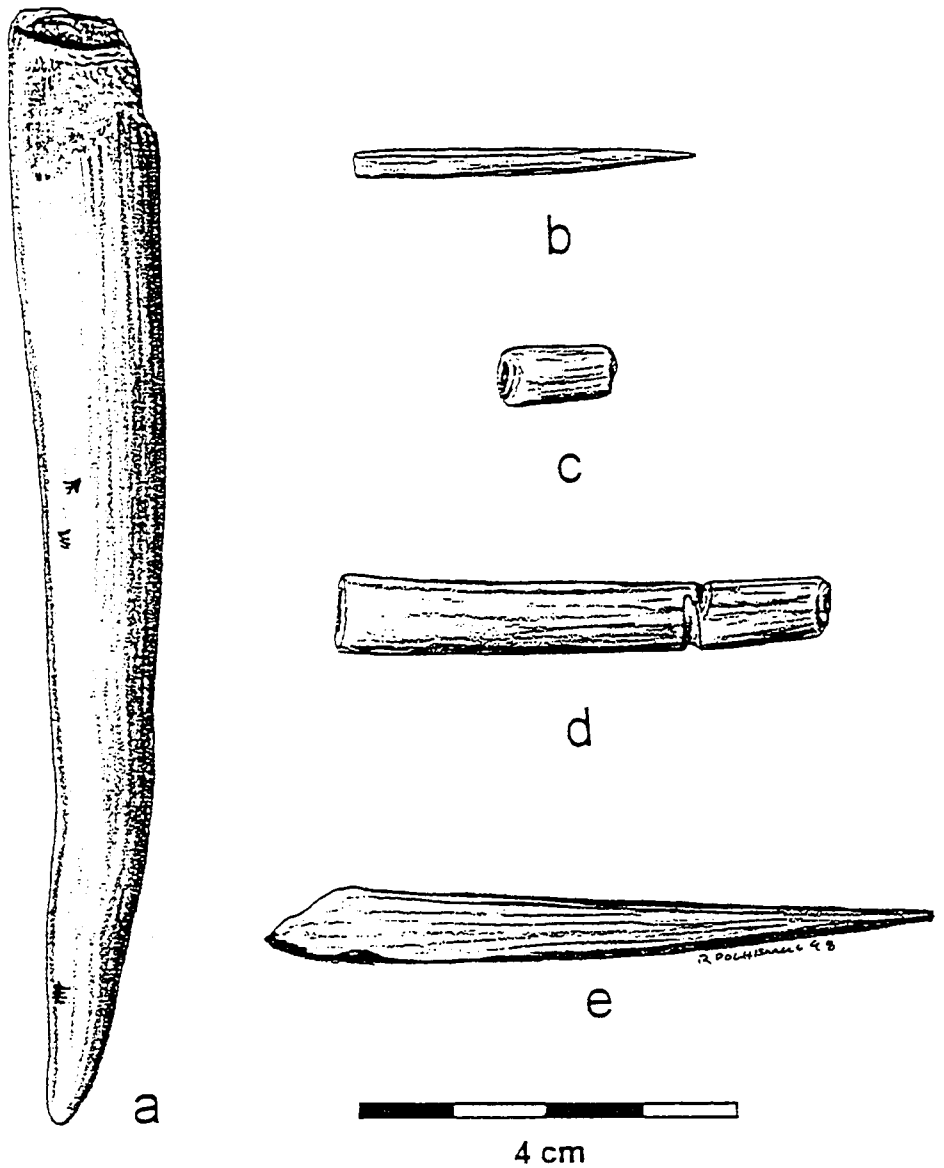


Figure 5.8. Worked Bone Artifacts.
a. Antler tine with polished tip, b. Sharpened bone sliver, c. Bead, d. Bead preform, e. Splinter awl.

surface is frequently scorched or discolored at this location. Metapodials, sometimes stored with smaller proximal bones attached (Figure 5.7b), were reduced by first starting a longitudinal groove down the anterior and posterior surfaces, removal of the distal end by groove and snap, and continuing to deepen the longitudinal groove until separation was possible. Further reduction, for the manufacture of projectile points for example, was accomplished by cutting a longitudinal groove down the center of the marrow cavity of each half previously created (Figure 5.7c). Fragments of such quartered metapodial preforms make up nearly 20% of the worked bone in the structure sample. Secondary reduction was sometimes accomplished through flaking thinner edges toward the inner concave face of the quartered metapodial in the case of projectile points (Figure 5.7d) and the halved metapodial in the case of pins with an expanded head. Final shaping, which sometimes leaves traces of the inner and outer shaft wall surfaces and the longitudinal grooves, was produced through coarse grained abrasion at an angle to the long axis of the artifact. Finishing activities are indicated by finer striations and may indicate the use of fine-grained sandstone, siltstone, or sandy limestone tabular abraders. Other artifact forms were manufactured in a similar manner. The use of a small adze, or perhaps a beaver tooth hafted in a similar manner, is evident on one antler tine fragment, suggesting a less frequent reduction technique. Residues resulting from the manufacture of bone objects are limited to articular ends and a variety of shaft wall fragments displaying grooves from perpendicular groove and snap, or longitudinal reduction techniques. Manufacture of some artifacts, such as splinter awls, deer ulna awls, and

turtle shell bowls, utilizing only abrasion to modify an existing form leaves no recognizable residues.

Finished bone artifacts are dominated by bone (n=25) and antler (n=3) projectile points. Bone projectile points (Figure 5.7e,f), sometimes described as bipointed or "double ended" awls, are more sharply pointed on the distal end and possess a more abrupt and somewhat roughened base. The number of projectile point fragments is inflated by the burned condition of most fragments (n=22) of this form. Similarities in cross section, number of base fragments, cross-mends, and clustering of fragments suggest seven projectile points are represented. The heavily burned black to calcined white fragmented condition of this form contrasts with other bone artifacts. Perhaps arrows were stored in the roof thatch and were thus exposed to greater heat during destruction of the dwellings by fire. In contrast, the antler projectile points, identified by a shaved sharp profile identical to complete examples from the site, are represented only by unburned tip fragments. Manufacture of antler projectile points is indicated by shaved tine groove and snap discard segments in both structures. Bone projectile points and socketed antler projectile points are associated with adult males in the Dallas burial sample.

A split fragment of a cylindrical antler pressure flaker from Structure 3 is the only clearly identifiable flint knapping tool in the sample. The one antler tine does not display any use facets, although tip polish suggests it might have been used on softer materials (Figure 5.8a). Cylindrical antler pressure flakers are associated with flint knapping debris and with adult males having flint knapping toolkits at the Dallas phase Toqua site

(Polhemus 1987). A sharpened sliver (Figure 5.8b), 38 mm in length, of unidentified bird bone shaft wall closely resembles a tooth of a kanuga or toothed comb utilized for ritual scratching by the historic Cherokee (Hudson 1976:415). Such an attribution is strengthened by the spaced side-by-side context of five of these teeth with an adult male at the Dallas phase Cox site (40AN19). Longitudinal groove reduction in the manufacture of this object is indicated by preserved groove segments on the edges back from the finely ground point.

Bone beads (n=10)(Figure 5.8c) and bead preforms or residues (n=2)(Figure 5.8d) indicate that beads, manufactured from various sizes of thin-walled shaft fragments, were utilized in both structures. The beads, ranging from 12 mm to 25 mm in length and 4 mm to 9 mm in diameter, are highly polished and lack identifying landmarks. Bone beads are associated with subadults and females in the Dallas phase burial sample.

Pointed bone tools commonly described as awls, and presumably serving a piercing function, are poorly represented in the structure sample (n=2). A bird bone awl tip fragment, 23 mm in length, from Structure 3 shows a probable use break. A splinter awl, of heavier mammal bone and with the tip missing, is also from Structure 3 (Figure 5.8e). Certain types of bird bone awls, particularly the turkey tarsometatarsus awl, are found predominantly with adult males in the Dallas phase burial sample. Splinter awls, and other forms such as the deer ulna awl, are found in equal numbers with burials of both sexes in the Dallas phase burial sample.

Box turtle shells with the protruding vertebral column ground off the interior surface (n=3) probably served as containers. One fragment has the margins of the shell ground down to an even edge. Turtle shell vessels are associated with both sexes in the Dallas phase burial sample.

Shell (n=1,957)

The shell class consists of all gastropods and pelecypods in the structures. Pelecypod fragmentation, due in small part to cultural activities and primarily to soil conditions, inflates the shell count in the two smaller size classes. Gastropods and pelecypods, having a similar source and subsistence function, are treated as a single class in distributional studies.

Worked Shell (n=2)

A bivalve fragment in Structure 3 has a ground edge and may be either part of a shell spoon or a shell scraper. A large pocketbook mussel on the floor of Structure 2 may also have served as a shell spoon. Other worked shells may have been present; however, the friable condition of the lateral margin of many bivalves in the shell class precludes such a determination.

Botanical Material (n=2,480)

The large quantity of charred botanical material associated with the structures is due, in large part, to destruction by fire and consists primarily of architectural remains.

Architectural materials, making up 89% of the sample, in order of occurrence, include charred wood, cane, bark, and traces of grass thatch. Food related materials make up 11% of the sample, and, in order of occurrence, include hickory nut shell fragments, walnut shell fragments, a bean, various seeds, and fruit remains. It should be noted that botanical identifications are tentative and the sample utilized includes only those materials individually plotted during excavation or recognized and retained in the 0.62 cm (1/4 in) screen. Such a recovery technique depends greatly on the individual excavating or screening a particular unit. That recognizable patterning is present in both structures at this level of recovery bodes well for future analysis of the floatation samples collected from each level of each structure excavation unit. A cursory examination of the floatation samples from Structure 2, for the presence or absence of the same classes utilized in the distributional studies, confirms the patterning identified on the larger scale as well as adding other plant forms, such as maize, sunflower, grape, and maypop. These additional plant forms, while not included in the quantitative distributional study, will be discussed with respect to botanical patterning in Structure 2 in Chapter VII.

This chapter has described the cultural material recovered from Structure 2 and Structure 3. The description has been directed toward functional attributes rather than stylistic description or interpretation. The functional attributions and tentative artifact affiliation with a particular social segment presented here and in Chapter II lay the groundwork for examining intra structural and inter structural patterning in the following chapters.

CHAPTER VI

K-MEANS ANALYSIS

Chapter VI will discuss the k-means analysis of the contents of Structure 2 and Structure 3 by material class and by size class. Spatial patterning for each class will be identified and compared, first between classes, then between the two structures. The k-means analysis of the piece-plotted content of each structure will define patterns of deposition by material class within each structure. Such patterns for each material class, when compared with those for other material classes at the same cluster solution levels, will provide general patterns reflecting the sum of actions resulting in the deposition or movement of objects within each structure. Comparison of patterning at all levels between the two structures will identify common patterns as well as patterns that differ. Similar patterns will likely represent similar actions or organizations, at least by the occupants of these two structures, while dissimilar patterns will represent differing actions such as structure use or abandonment. Finally, six spatial patterns applicable to the structures will be defined and discussed.

The k-means analysis of piece-plotted structure content is conducted for selected segments of each structure sample. Size bias, particularly evident in the materials derived from the axial baulks of Structure 3, prompted removal of the following size and material classes from further consideration in the k-means analysis: fire-cracked rock <2.5 cm (1 in); unmodified rock <2.5 cm (1 in); tabular rock <2.5 cm (1 in); ceramics <1.26 cm (½ in); bone <0.64 cm (1/4 in); shell <0.64 cm (1/4 in); lithic debitage

<0.64 cm (1/4 in); and all botanical or architectural material. While such size filtering reduced the piece-plotted total sample size, it reduced recovery bias and artificial hot-spots evident where axial baulks crossed the ring pattern of material surrounding the relatively clear central hearth area in each structure. Each structure sample is examined by the three size classes for all materials combined as well as by each material class. Each k-means analysis was carried to a fifteen-cluster solution in order to go beyond the scale deemed relevant within a 6 m by 6 m structure. The k-means cluster solutions thus derived are summarized by class in Table 6.1 and statistics for each cluster solution are provided in Appendix B. All terminology is derived from Kintigh and Ammerman (1982) and Simek (1984). The reader is referred to those sources for complete definitions of the terms used here in describing k-means results.

Structure 2 K-means Analysis

A random distribution is noted for the Ceramic Vessel Form sample of the Ceramic Class when subjected to the k-means analysis. Two samples, Tabular Rock and Worked Bone, have limitations imposed by small sample sizes and are not further described. The remaining seven material classes and all three size classes produced non-random solution levels of from three to twelve clusters. Samples displaying random distributions are described as a group. Those material classes displaying non-random distributions at one or more cluster solutions are described by cluster solution level within each class.

Table 6.1. Summary of K-means Cluster Solutions by Class.

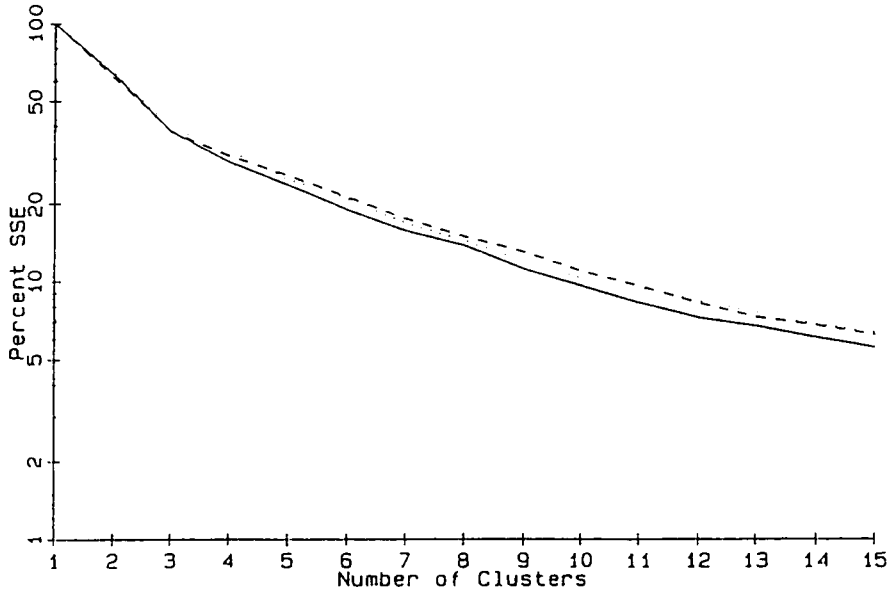
MATERIAL CLASS	STRUCTURE 2	STRUCTURE 3
Fire-Cracked Rock	6, 9	R
Round Rock	5	9
Tabular Rock	S	4
Ceramics	12	5
Ceramic Vessel Form	R	4
Lithic Debitage	4, 9	4, 8
Worked Stone	3, 4, 6, 11	R
Worked Bone	S	S
Bone	12, 14	5
Shell	6, 12	8
SIZE CLASS		
Size Class 1 (+1")	3, 5	4
Size Class 2 (+½")	6	R
Size Class 3 (+1/4")	5, 9	R
Total Size Sample	R	R
	R = Random Sample S = Sample Size Limitation 3, 5 = Cluster Solutions	

Random Distributions

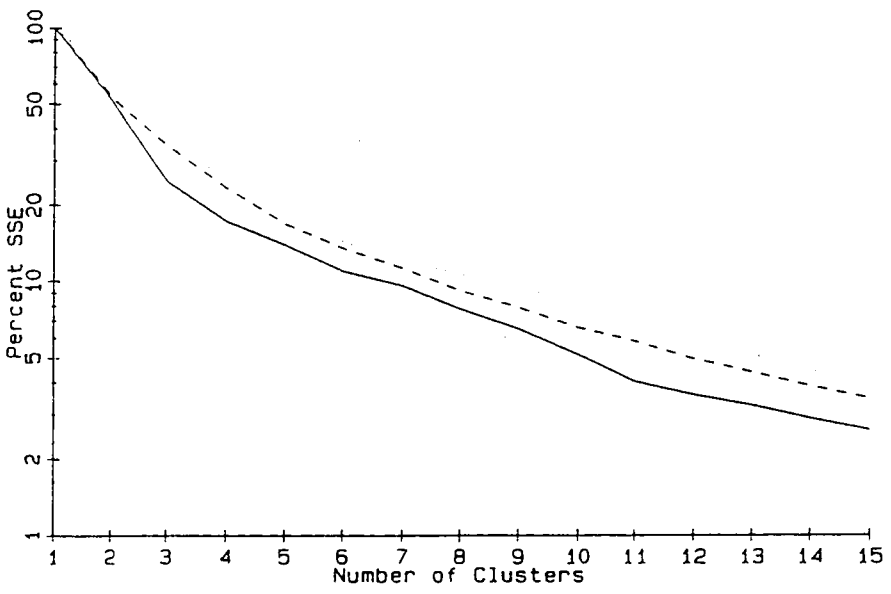
The k-means analysis of the Ceramic Vessel Form sample produced a random distribution, as indicated by the close proximity and trajectory of the data line to the random run lines on the %SSE plot (Figure 6.1a). The Ceramic Vessel Form sample, derived from the larger Ceramics Class, is widely dispersed across the structure floor, probably as a result of both the gradual accumulation of sherds from breakage during use and as a result of vessel shatter by roof fall.

Non-random Distributions

The k-means analysis of the remaining seven material classes produced non-random distributions, as indicated by divergence of the data line from the random run lines on the %SSE plot (Figure 6.1b) produced for each class. One or more inflection points in the data line indicate optimal cluster solutions worthy of further examination. For all classes lower level, four cluster, solutions invariably define clusters in the four quarters of the structure. The four cluster solution appears to be an artifact of geometry created by enclosure of a ring-shaped distribution within a rectangular bounded space. As the k-means technique attempts to form circular clusters (Kintigh 1990:190) in minimizing the global sum-squared error, it may have variable results when dealing with data sets of other forms such as the ring-shaped distributions noted for the Loy site structures.



A. RANDOM PLOT - CERAMIC VESSEL FORM



B. NONRANDOM PLOT - WORKED STONE

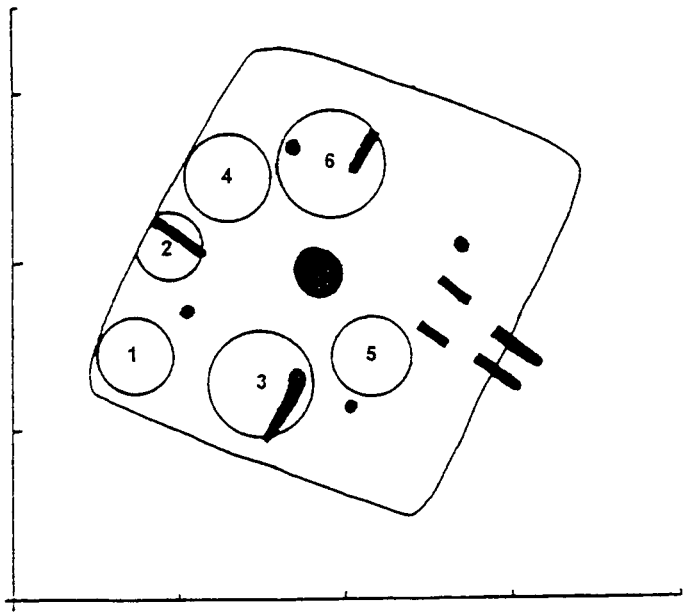
Figure 6.1. Structure 2 Sample %SSE Plots.

Fire-cracked Rock

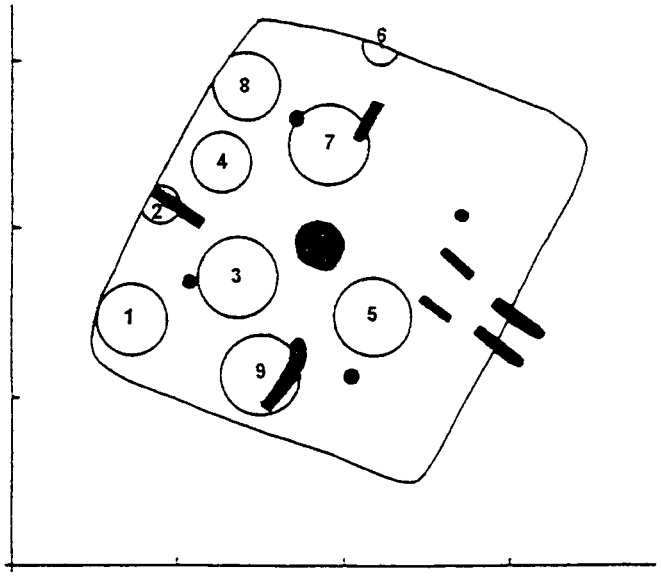
Inspection of the %SSE plot for the Structure 2 Fire-cracked Rock Class indicates inflections at six and nine cluster solution points. Four of the clusters in both solutions are nearly identical, while each of the remaining three clusters of the six cluster solution splits into different patterns. Fire-cracked rocks included in the k-means analysis are limited to Size Class 1.

The six cluster solution for fire-cracked rock (Figure 6.2a) follows the south and west structure walls, with the exception of Cluster 5, situated in the central floor area southeast of the hearth, and Cluster 6, situated near the front edge of the north bench. Cluster 1 is situated in the southwest corner. Cluster 2 is situated against the west wall south of the clay partition. Cluster 3 is situated beneath the center of the south bench west of the partition. Cluster 4, making up 28% of the sample total, is situated beneath the center of the west bench north of the partition. Cluster 5 and Cluster 6, together making up only 19% of the sample total occupy the right front diagonal half of the structure, while the other six clusters making up 81% occupy the left rear half.

The nine cluster solution for fire-cracked rock (Figure 6.2b) follows the western limits of the structure, with the exception of Cluster 3, situated in the central floor area southwest of the hearth, Cluster 5, situated in the central floor area southeast of the hearth, and Cluster 7, situated in the central floor area northwest of the hearth. Cluster 1, situated in the southwest corner, is nearly identical in size and location to the six cluster solution Cluster1. Cluster 2, situated against the west wall south of the partition, is a more compact version of the six cluster solution Cluster 2 at this location. Cluster 4,



A. FIRE-CRACKED ROCK - SIX CLUSTER SOLUTION



B. FIRE-CRACKED ROCK - NINE CLUSTER SOLUTION

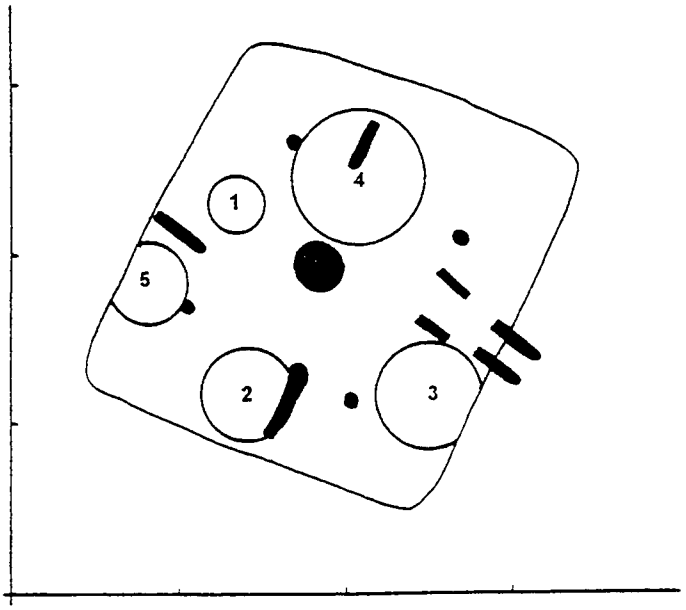
Figure 6.2. Structure 2 Fire-Cracked Rock K-means Solutions.
(Structure orientation the same as in Figure 3.7)

situated beneath the west bench north of the partition, is a more compact version of the six cluster solution Cluster 4 and still makes up 23% of the sample total. Cluster 6, situated against the north wall of the structure, is made up of only two fire-cracked rocks against the structure pit wall. Cluster 8, situated north of Cluster 4 beneath the west bench, is limited to only eight fire-cracked rocks. The three clusters situated toward the limits of the central floor area, together making up 26% of the sample total, have longer RMS radii and are thus more dispersed. These fire-cracked rocks tend to be larger than those beneath the benches and may more closely reflect location of use for activities requiring indirect heat or scraping activities requiring heat fractured cobbles bearing right angle edges.

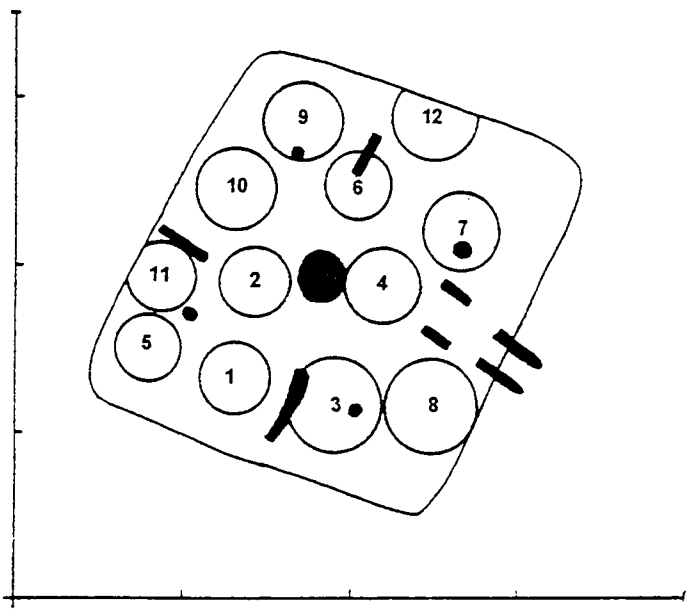
Round Rock

Inspection of the %SSE plot for the Structure 2 Round Rock Class indicates an inflection at the five cluster solution point. Unmodified rocks included in the k-means analysis are limited to Size Class 1. Round unmodified rocks in the form of unbroken river cobbles may represent either cobble tools with no discernable surface alteration or cobbles not yet displaying alteration by heat. Comparison with the distribution of identifiable cobble tools, such as manos and hammerstones, suggests three clusters of unmodified cobbles are associated with cobble tools.

The five cluster solution for unmodified rock (Figure 6.3a) is concentrated against the south half of the east and west walls, with the exception of Cluster 1, situated near the front edge of the west bench north of the partition, Cluster 2, situated beneath



A. ROUND ROCK - FIVE CLUSTER SOLUTION



B. CERAMICS - TWELVE CLUSTER SOLUTION

Figure 6.3. Structure 2 Round Rock and Ceramics K-means Solutions.

the south bench west of the partition, and Cluster 4, situated along the front edge of the north bench. Cluster 3, concentrated against the east wall, is made up of only three unmodified rocks. Cluster 5, concentrated against the west wall south of the partition, is closely associated with a fire-cracked rock cluster. Cluster 1 consists of a compact group of six cobbles and is associated with recognizable cobble tools. Cluster 2 consists of a less compact group of cobbles centered on a dense cluster of other materials. Cluster 4 consists of an elongated group of five cobbles closely associated with cobble tools including hammerstones, manos, and a metate.

Ceramics

Inspection of the %SSE plot for the Structure 2 Ceramics Class indicates an inflection at the twelve cluster solution point. Ceramic sherds in Size Class 1 and Size Class 2 are used in the k-means analysis. The lack of a lower cluster solution and narrower range of RMS radii indicate a more uniform distribution of ceramics across the structure floor than for other material classes. Vessels and vessel sections made up of contiguous cross mending fragments are counted as single items.

The twelve cluster solution for the Ceramic Class (Figure 6.3b) displays both clusters within the central floor area and beneath the benches following the walls of the structure. The overall pattern of clusters is influenced by the presence of 14 ceramic vessels or vessel sections on the structure floor. Two, and perhaps three, of the central floor area clusters are made up largely of fragments making up single vessels broken when the structure burned. Four of the bench clusters, along the south and west wall,

are made up, in part by one to three vessels each. The twelve cluster solution represents both ceramic sherds reflecting vessels in the structure at the time of the fire as well as ceramic sherds reflecting previously broken vessels largely removed or redistributed during floor maintenance prior to the fire.

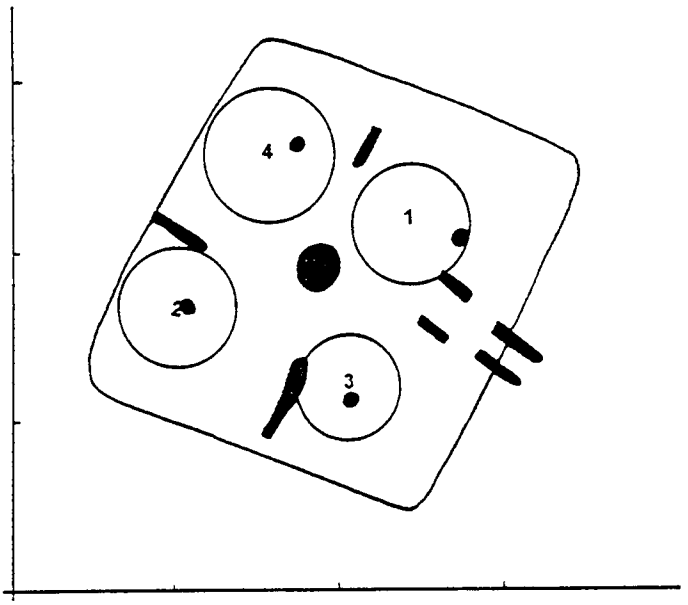
Cluster 1, situated beneath the south bench west of the partition, differs from Cluster 10 (F-51, F-52, F-53), situated beneath the west bench north of the partition, in that it does not have associated vessels while both clusters contain the largest number of ceramic sherds in the sample. Cluster 2, situated in the central floor area southwest of the hearth, is largely made up of a single jar (F-62) broken by roof fall. Cluster 3, situated beneath the south bench east of the partition, includes a large inverted jar (F-59) and two small upright vessels (F-60, F-61) along the front edge of the bench. Cluster 4, situated in the central floor area just east of the hearth, is largely made up of a single small jar (F-63) in the roof fall. Cluster 5, situated in the southwest corner, includes the base of a large upright jar (F-57). Cluster 6, situated in the central floor area near the front edge of the north bench, includes portions of an incised cazuela bowl. Cluster 7, situated near the northeast main roof support, and Cluster 8, situated near the east wall south of the entryway, are made up of only a small number of ceramic sherds of diverse origins. Cluster 9, situated in the northwest corner, is not associated with any vessel clusters or cross mends. Cluster 11, situated beneath the west bench south of the partition, includes portions of two jars (F-55, F-56). Cluster 12, situated against the center of the north wall, is made up of only 12 ceramic sherds.

Lithics - Debitage

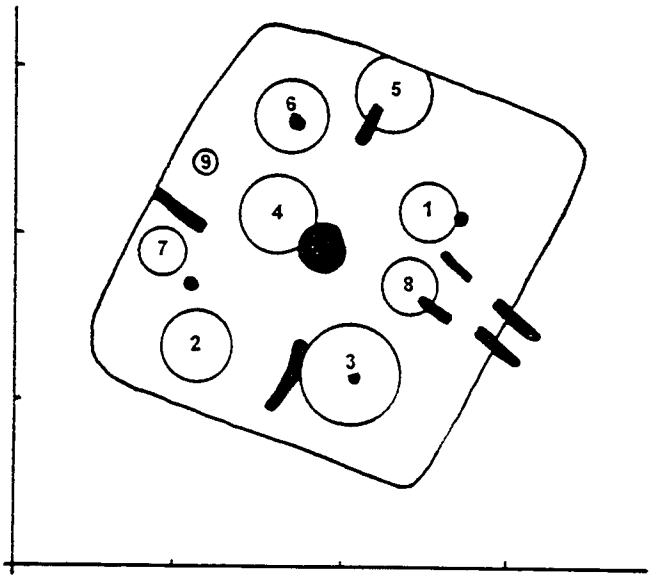
Inspection of the %SSE plot for the Structure 2 Lithic Debitage Class indicates inflections at the four and nine cluster solution points. Lithic debitage in all three size classes is included in the k-means analysis. Such debitage includes altered nodules and chunks as well as flakes.

The four cluster solution for lithic debitage (Figure 6.4a) reflects the four quarters of the structure floor. Cluster 1, situated in the northeast quarter, and Cluster 3, situated in the southeast quarter, flank the entryway and are made up of lithic debitage representing all three size classes. Cluster 2, situated in the southwest quarter, and Cluster 4, situated in the northwest quarter, lack larger lithic debitage.

The nine cluster solution for lithic debitage (Figure 6.4b) presents a refined pattern of distribution within Structure 2. Cluster 1 and Cluster 8, situated near the east edge of the central floor area flanking the entryway, are compact concentrations made up of all three size classes, although Cluster 1 on the north contains 22% of the sample total or three times the number in Cluster 8. Cluster 3, situated in the vicinity of the southeast main roof support, is made up of a small number of more widely distributed flakes in Size Class 2 and Size Class 3. Cluster 4, situated in the central floor area west of the hearth, is made up only of flakes in Size Class 2. The remaining five clusters, situated beneath the benches along the north, west, and south walls are made up of both Size Class 2 and Size Class 3 debitage.



A. LITHIC DEBITAGE - FOUR CLUSTER SOLUTION



B. LITHIC DEBITAGE - NINE CLUSTER SOLUTION

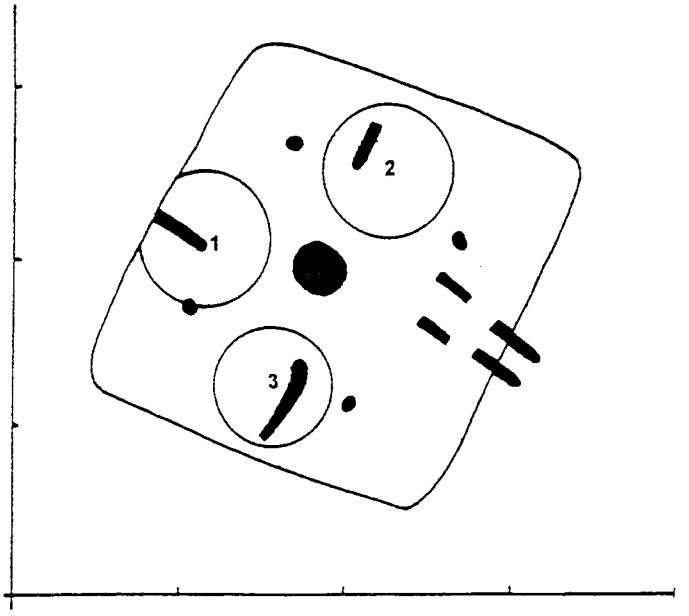
Figure 6.4. Structure 2 Lithic Debitage K-means Solutions.

Worked Stone

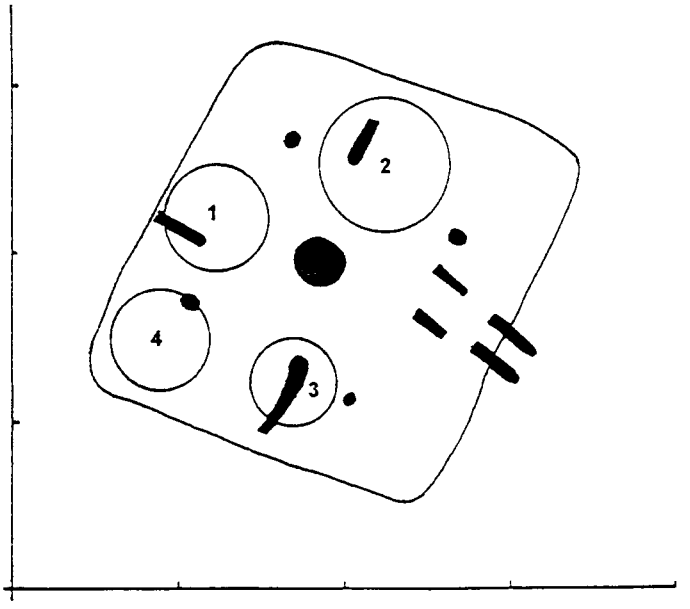
Inspection of the %SSE plot for the Structure 2 Worked Stone sample indicates inflections at the three, four, six, and eleven cluster solution points (Figure 6.1b). The Worked Stone sample combines the Flaked Stone Tool Class and the Other Worked Stone Class. Twenty stone artifact categories are represented by the 50 objects making up the Worked Stone sample. Such artifact categories may be consolidated into fewer groups on the basis of shared technological characteristics linked, for discussion purposes, to one or more presumed functions.

The three cluster solution for Worked Stone (Figure 6.5a; Table 6.2) centers upon each of the three clay partitions marking the center of the north, west, and south walls of Structure 2. Cluster 1, centered on the west partition, is dominated by abrading/scraping tools manufactured from fire-cracked rocks (39%) and bifacially worked chert (24%). Cluster 2, centered just east of the north partition, includes large stone tools such as a cobble chopper, a metate, a mano, an anvil, and a hammerstone, as well as three fire-cracked rock abraders. Cluster 3, centered just west of the south partition, displays the greatest range of worked stone types, as well as the only faceted hematite fragments and discoidal in the structure sample.

The four cluster solution (Figure 6.5b; Table 6.3) is quite similar to the preceding solution with the addition of a cluster in the southwest corner. Cluster 1, centered just north of the west partition, and Cluster 3, centered at the south partition, both contribute members to the newly created Cluster 4 in the southwest corner. Cluster 2, centered just east of the north partition, remains unchanged. Cluster 3 retains its diversity while



A. WORKED STONE - THREE CLUSTER SOLUTION



B. WORKED STONE - FOUR CLUSTER SOLUTION

Figure 6.5. Structure 2 Lower Level Worked Stone K-means Solutions.

Table 6.2. Structure 2 Worked Stone by Type, Three Cluster Solution.

TYPE	CLUSTER 1	CLUSTER 2	CLUSTER 3
FLAKED TOOLS (FTOOL)			
Projectile Point/Knife			
Mississippian Triangular			
Triangular			1
Pisgah Serrated			
Archaic PPK			1
Bifacially Worked	5	2	2
Perforator			
Reworked Dallas Triangular			1
Flake Tool			
Utilized Flake	1	1	1
PE	2		
COBBLE TOOL (CTOOL)			
Abrading Tool			
Fire-Cracked Rock	6	3	2
Tabular Rock	1		
Tabular/Grooved			1
Whetstone			1
Scraping Tool			
Edge-Utilized FCR	2		1
Cutting Tool			
Greenstone Flake	1		

Table 6.2. (Continued)

TYPE	CLUSTER 1	CLUSTER 2	CLUSTER 3
Planing Tool			
Cobble Plane			
Heavy Cutting Tool			
Cobble Chopper		1	1
Cobble Flake			
Grinding Tool			
Mano	2		
Mano Combination		1	
Pestle			
Basin Metate		2	
Percussion Tool			
Spherical Hammerstone		1	1
Anvil	1	1	
OTHER			
Mineral - Hematite			2
Discoidal			1
Pebble Artifacts			
CLUSTER TOTAL	21	13	16

Table 6.3. Structure 2 Worked Stone by Type, Four Cluster Solution.

TYPE	CLUSTER 1	CLUSTER 2	CLUSTER 3	CLUSTER 4
FLAKED TOOL (FTOOL)				
Projectile Point/Knife				
Mississippian Triangular				
Triangular			1	
Pisgah Serrated				
Archaic PPK				1
Bifacially Worked	5	2	2	
Perforator				
Reworked Dallas Triangular			1	
Flake Tool				
Utilized Flake	1	1	1	
PE		1		2
COBBLE TOOL (CTOOL)				
Abrading Tool				
Fire-Cracked Rock	6	3	2	
Tabular Rock	1			
Tabular/Grooved			1	
Whetstone			1	
Scraping Tool				
Edge-Utilized FCR	2		1	
Cutting Tool				
Greenstone Flake				1

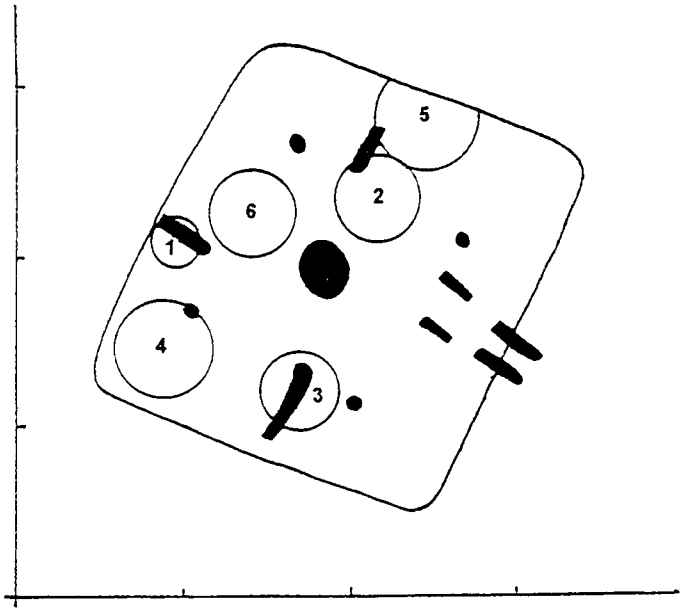
Table 6.3. (Continued)

TYPE	CLUSTER 1	CLUSTER 2	CLUSTER 3	CLUSTER 4
Planing Tool				
Cobble Plane				
Heavy Cutting Tool				
Cobble Chopper		1		1
Cobble Flake				
Grinding Tool				
Mano	1			1
Mano Combination		1		
Pestle				
Basin Metate		2		
Percussion Tool				
Spherical Hammerstone		1		1
Anvil	1	1		
OTHER				
Mineral - Hematite			2	
Discoidal			1	
Pebble Artifacts				
CLUSTER TOTAL	17	13	13	7

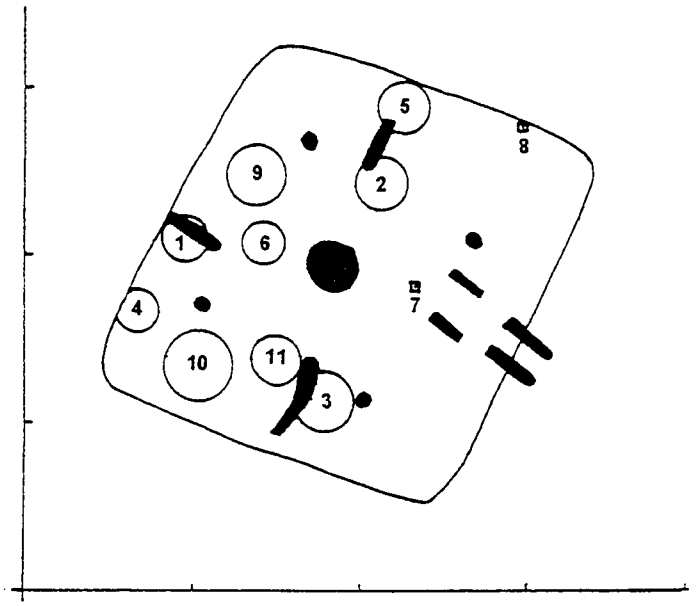
Cluster 1 loses three types (projectile point/knives, P-Es, and greenstone) to Cluster 4.

The six cluster solution for worked stone (Figure 6.6a; Table 6.4) refines the four cluster solution through the division of the four cluster solution Cluster 1 and Cluster 2 into two clusters each. Cluster 1, centered against the west wall just south of the partition, and Cluster 6, centered near the front edge of the bench north of the west partition, are derived from four cluster solution Cluster 1. Cluster 2, centered near the front edge of the bench just east of the north partition, and Cluster 5, centered against the north wall just east of the north partition, are derived from four cluster solution Cluster 2. Cluster 3, centered on the south partition, is identical to the four solution Cluster 3. Cluster 4, situated in the southwest corner, is nearly identical to its four solution counterpart. Cluster 1 is dominated by abrading/scraping tools (71%), while Cluster 2, made up in large part of crushing/pounding and grinding tools, is centered upon a well-worn basin metate. Cluster 3 maintains its diversity without being dominated by any particular class. Cluster 4 remains unchanged in content. Cluster 5, made up of only four artifacts, removes three of the four chipped stone items previously attributed to the four cluster solution Cluster 2. Cluster 6 contains nearly half (44%) of the bifacially worked class in the structure sample.

The eleven cluster solution (Figure 6.6b; Table 6.5) divides three of the previous clusters in two, while two additional clusters evidenced substantial reductions in RMS radii through removal of distant isolates to form additional single item clusters. Cluster 1 remains compact and unchanged against the west wall just south of the partition. Cluster 2, centered just east of the north partition, is reduced to a compact concentration with



A. WORKED STONE - SIX CLUSTER SOLUTION



B. WORKED STONE - ELEVEN CLUSTER SOLUTION

Figure 6.6. Structure 2 Higher Level Worked Stone K-means Solutions.

Table 6.4. Structure 2 Worked Stone by Type, Six Cluster Solution.

TYPE	CLUSTER 1	CLUSTER 2	CLUSTER 3	CLUSTER 4	CLUSTER 5	CLUSTER 6
FLAKED TOOL (FTOOL)						
Projectile Point/Knife						
Mississippian Triangular						
Triangular			1			
Pisgah Serrated						
Archaic PPK				1		
Bifacially Worked	1	1	2		1	4
Perforator						
Reworked Dallas Triangular			1			
Flake Tool						
Utilized Flake			1		1	1
PE				2		
COBBLE TOOL						
Abrading Tool						
Fire-Cracked Rock	3	2	2		1	3
Tabular	1					
Tabular/Grooved			1			
Whetstone			1			
Scraping Tool						
Edge-Utilized FCR	1		1			1
Cutting Tool						
Greenstone Flake				1		

Table 6.4. (Continued)

TYPE	CLUSTER 1	CLUSTER 2	CLUSTER 3	CLUSTER 4	CLUSTER 5	CLUSTER 6
Planing Tool						
Cobble Plane						
Heavy Cutting Tool						
Cobble Chopper		1		1		
Cobble Flake						
Grinding Tool						
Mano				1		
Mano Combination		1				
Pestle						
Basin Metate		2				
Percussion Tool						
Spherical Hammerstone		1		1		
Anvil	1	1				
OTHER						
Mineral - Hematite			2			
Discoidal			1			
Pebble Artifacts						
CLUSTER TOTAL	7	9	13	7	4	10

Table 6.5. Structure 2 Worked Stone by Type, Eleven Cluster Solution.

TYPE	CLUSTER 1	CLUSTER 2	CLUSTER 3	CLUSTER 4	CLUSTER 5	CLUSTER 6	CLUSTER 7	CLUSTER 8	CLUSTER 9	CLUSTER 10	CLUSTER 11
FLAKED TOOL (FTOOL)											
Projectile Point/Knife											
Mississippian Triangular											
Triangular			1								
Pisgah Serrated											
Archaic PPK										1	
Bifacially Worked	1	1	2		1	4					
Perforator											
Reworked Dallas Triangular											1
Flake Tool											
Utilized Flake			1		1				1		
PE				1				1			
COBBLE TOOL (CTOOL)											
Abrading Tool											
Fire-Cracked Rock	3	1	2		1		1		3		
Tabular	1										
Tabular/Grooved											1
Whetstone			1								
Scraping Tool											
Edge-Utilized FCR	1					1					1
Cutting Tool											
Greenstone Flake				1							

Table 6.5. (Continued)

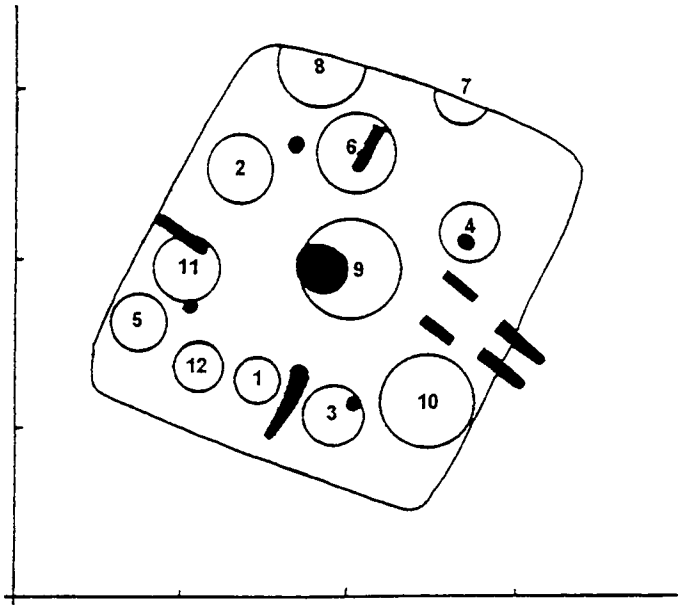
TYPE	CLUSTER 1	CLUSTER 2	CLUSTER 3	CLUSTER 4	CLUSTER 5	CLUSTER 6	CLUSTER 7	CLUSTER 8	CLUSTER 9	CLUSTER 10	CLUSTER 11
Planing Tool											
Cobble Plane											
Heavy Cutting Tool											
Cobble Chopper		1								1	
Cobble Flake											
Grinding Tool											
Mano				1							
Mano Combination		1									
Pestle											
Basin Metate		2									
Percussion Tool											
Spherical Hammerstone		1								1	
Anvil	1	1									
OTHER											
Mineral - Hematite											2
Discoidal			1								
Pebble Artifacts											
CLUSTER TOTAL	7	8	8	3	3	5	1	1	5	4	5

the removal of a fire-cracked rock abrader to form an isolate (Cluster 7) at the east edge of the central floor area near the entryway. Cluster 3, centered just east of the south partition, and Cluster 11, centered just west of the south partition, are derived from the six cluster solution Cluster 3. Cluster 4, situated against the west wall in the southwest corner, and Cluster 10, situated near the south wall nearby, are derived from the six cluster solution Cluster 4. Cluster 5, situated against the north wall just east of the partition, is reduced to a compact concentration by the removal of a P-E to form an isolate (Cluster 8) against the north wall 2.3 meters east of the Cluster 5 centroid. Cluster 6, centered in the central floor area between the west partition and the hearth, and Cluster 9, centered beneath the west bench north of the partition, are derived from the six cluster solution Cluster 6. Cluster 6 is dominated by bifacially worked lithics while Cluster 9 is dominated by fire-cracked rock abraders. The Flaked Stone Class and the Other Worked Stone Class display a tendency to segregate at the eleven cluster solution level.

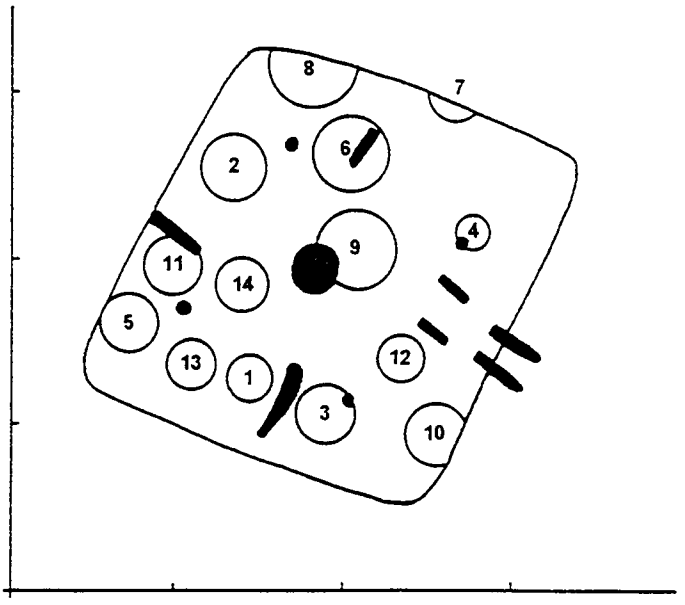
Bone

Inspection of the %SSE plot for the Structure 2 Bone Class indicates inflections at the twelve and fourteen cluster solution points. The lack of a lower cluster solution indicates a more uniform distribution across the structure floor than for most other material classes. Movement of bone fragments on the floor after breakage is indicated by eleven cross mends, eight of which are in the south half of the structure.

The twelve cluster solutions for the Bone Class (Figure 6.7a) is concentrated



A. BONE - TWELVE CLUSTER SOLUTION



B. BONE - FOURTEEN CLUSTER SOLUTION

Figure 6.7. Structure 2 Bone K-means Solutions.

beneath the benches following the north, west, and east walls of the structure, with the exception of Cluster 9 just east of and including the central hearth. Cluster 1, situated beneath the south bench west of the partition, consists of a tight concentration, including a number of adjoining ribs bearing butchering marks, making up nearly one quarter of the sample total. Cluster 2 is situated beneath the west bench north of the partition. Cluster 3 is situated near the south wall east of the partition. Cluster 4 is situated in the vicinity of the northeast main roof support. Cluster 5 is situated in the southwest corner of the structure. Cluster 6 is situated near the front edge of the north bench. Cluster 7 and Cluster 8 are both concentrated against the north wall. Cluster 9, including the central hearth, while made up of only seven fragments, includes a greater proportion of burned bone than the other clusters. Cluster 10, a dispersed concentration situated in the southeast corner of the structure, includes 38% of the Size Class 1 bone in the structure while making up only 7% of the sample total. This cluster also includes 60% of the rodent gnawed bone identified in Structure 2. Cluster 11 is situated beneath the west bench south of the partition. Cluster 12 is situated between Cluster 1 and Cluster 5 beneath the south bench west of the partition.

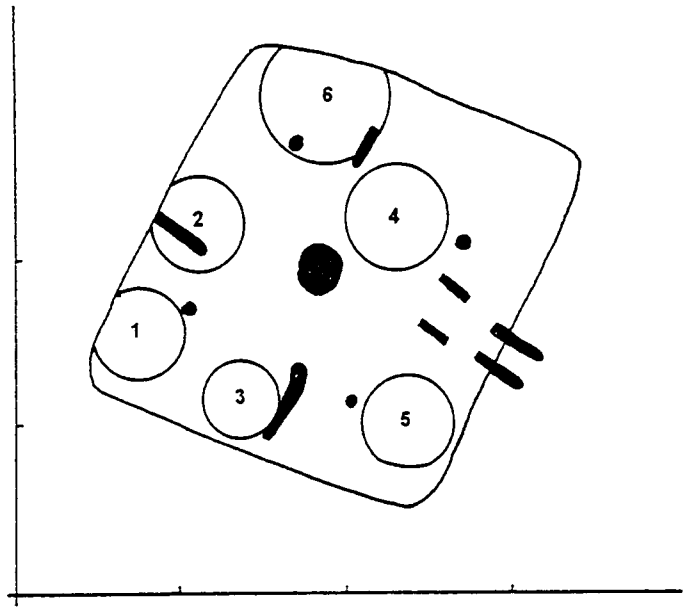
The fourteen cluster solution (Figure 6.7b) closely resembles the twelve cluster solution; indeed, eight clusters remain unchanged other than cluster designation (1=1, 2=2, 3=3, 5=5, 6=6, 7=7, 8=8, and 12=13). Cluster 4, situated near the northeast main roof support, and Cluster 9, situated at the central hearth, each shrink by one bone fragment. Cluster 10, situated against the east wall south of the entryway, and Cluster 12, situated near the front edge of the bench south of the entryway, are derived from the

twelve cluster solution Cluster 10. Cluster 11, situated beneath the west bench just south of the partition, and Cluster 14, comprised of only three bone fragments situated in the central floor area southwest of the hearth, are derived from twelve cluster solutions Cluster 9 and Cluster 11. The southeast quarter and the northwest quarters once again contain a larger proportion of Size Class 1 bone fragments than other parts of Structure 2.

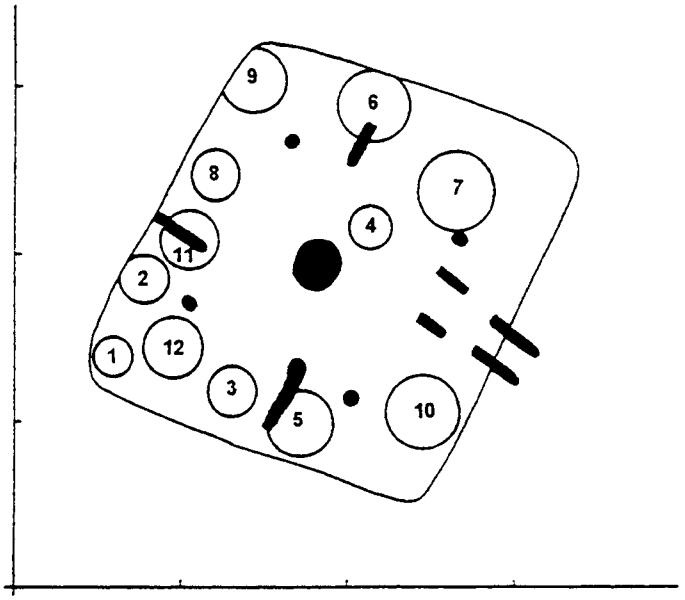
Shell

Inspection of the %SSE plot for the Structure 2 Shell Class indicates inflections at the six and twelve cluster solution points. All clusters in both cluster solutions are represented by all three size classes. Size Class 2 and Size Class 3 both consist of gastropods and bivalve fragments while Size Class 1 consists of less fragmented bivalves. Each of the six solution clusters generally split into, or contribute to, two or perhaps three of the twelve solution clusters.

The six cluster solution for the Shell Class (Figure 6.8a), follows the benches along the four walls of the structure, with the exception of Cluster 4 situated in the central floor area northeast of the hearth near the entryway. Cluster 1, situated in the southwest corner, makes up 29% of the sample total. Cluster 2 is situated beneath the bench along the center of the west wall. Cluster 3 is situated beneath the bench along the south wall. Cluster 4 is situated within the central floor area in the vicinity of shell-filled Feature 81. Cluster 5, situated in the southeast corner, and Cluster 6, situated in the northwest corner, both consist of more dispersed concentrations containing a larger



A. SHELL - SIX CLUSTER SOLUTION



B. SHELL - TWELVE CLUSTER SOLUTION

Figure 6.8. Structure 2 Shell K-means Solutions.

proportion of Size Class 1 shell than the other clusters.

The twelve cluster solution for the Shell Class (Figure 6.8b) follows the benches along all four walls, with the exception of Cluster 4 and Cluster 7 in the northeast quarter of the structure. Cluster 1, Cluster 2, and Cluster 12, situated in the southwest corner, are derived from six cluster solution Cluster 1. Cluster 3 and a portion of Cluster 5, flanking the south wall partition, are derived from the six cluster solution Cluster 3. Cluster 4 and Cluster 7, in the northeast quarter of the structure, are derived from six cluster solution Cluster 4. The remaining portion of Cluster 5 as well as Cluster 10, situated in the southeast quarter of the structure, are derived from six cluster solution Cluster 5. Cluster 5 and Cluster 10, making up the southeast quarter of the structure, contain one third of the Size Class 1 fragments in the sample total. Cluster 6 and Cluster 9, situated against the northwest corner and flanking the north wall partition respectively, are derived from six cluster solution Cluster 6. Cluster 8, situated along the west wall north of the partition, and Cluster 11, flanking the west wall partition, are derived from six cluster solution Cluster 2. The general pattern of relatively small uniform clusters closely following the structure limits is the result of the more or less continuous band of shell the width of the bench following the structure walls.

K-means Analysis by Size Class

K-means analyses were conducted by artifact size class in order to determine the effect of artifact size upon patterning in Structure 2. One or more non-random distributions are evident for each of the size class samples, while a random distribution is

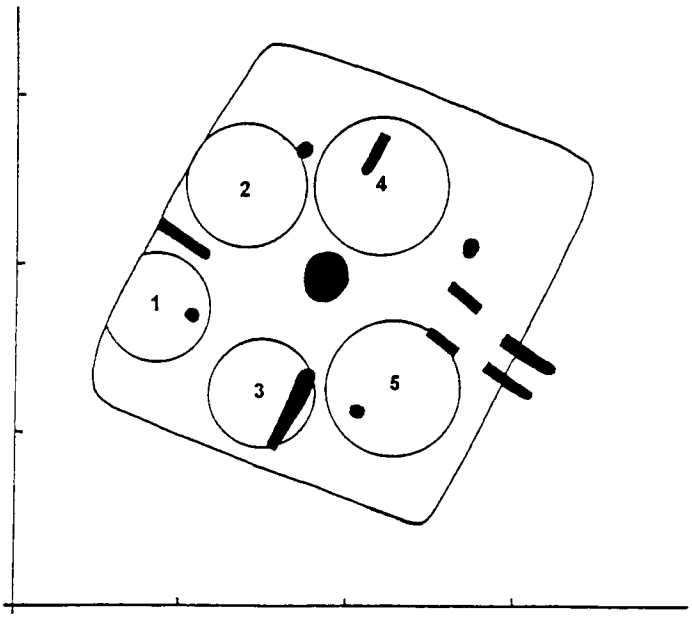
evident for the total sample. The random distribution for the total sample is evidently the result of overlapping solutions for the three size classes that, when combined, produced the random patterning.

Size Class 1 (+1 inch)

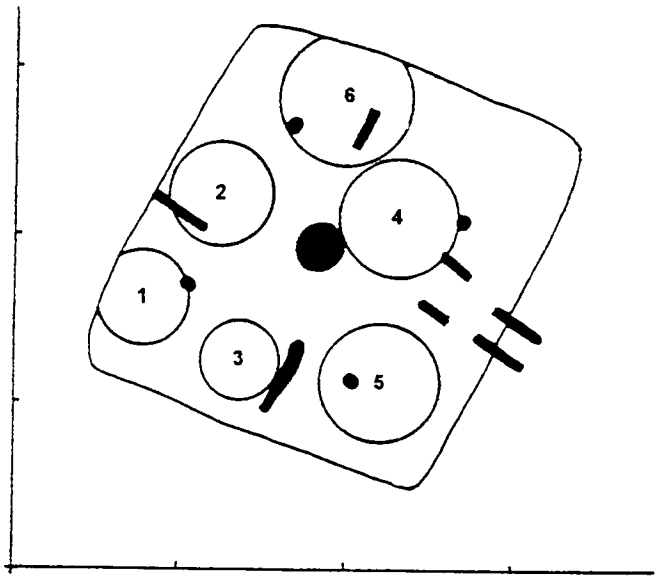
Inspection of the %SSE plot for the Structure 2 Size Class 1 indicates inflections at the three and five cluster solution points. The three cluster solution, with cluster centroids at 254.96R342.44, 247.39R334.28, and 242.51R344.20, approximates the three quarters of the structure producing the most material. The fourth, right front quarter containing somewhat less material splits out at the four cluster level. The five cluster solution (Figure 6.9a; Table 6.6) follows the four structure walls, with the three clusters having shorter RMS radii situated along the west and south walls. Cluster 1 is situated along the west wall north of the clay partition. Cluster 2 is situated in the southwest corner south of the clay partition. Cluster 3 is situated along the south wall near the clay partition. Cluster 4, situated near the center of the north wall, and Cluster 5, situated near the east wall south of the entryway, are made up of fewer artifacts displaying a more dispersed disposition. The five cluster solution for Size Class 1 is closely mirrored by the five cluster solution for Size Class 3.

Size Class 2 (+1/2 inch)

Inspection of the %SSE plot for the Structure 2 Size Class 2 indicates an inflection at the six cluster solution point. The six cluster solution (Figure 6.9b;



A. SIZE CLASS 1 - FIVE CLUSTER SOLUTION



B. SIZE CLASS 2 - SIX CLUSTER SOLUTION

Figure 6.9. Structure 2 Size Class 1 and 2 K-means Solutions.

Table 6.6. Structure 2 Size Class 1 (+1"), Five Cluster Solution.

CLASS	CLUSTER 1	CLUSTER 2	CLUSTER 3	CLUSTER 4	CLUSTER 5
FIRE-CRACKED ROCK	34	36	16	13	6
ROUND ROCK	6	8	6	5	3
TABULAR ROCK	1				1
CERAMICS	42	33	33	38	27
LITHIC DEBITAGE				2	1
CHIPPED TOOL (FTOOL)	1				1
COBBLE TOOL (CTOOL)	6	7	6	7	3
SHELL	3	6	5	7	6
BONE	1	1	3	2	6
WORKED BONE			1		
WORKED SHELL			1		
CLUSTER TOTAL	94	91	71	74	54

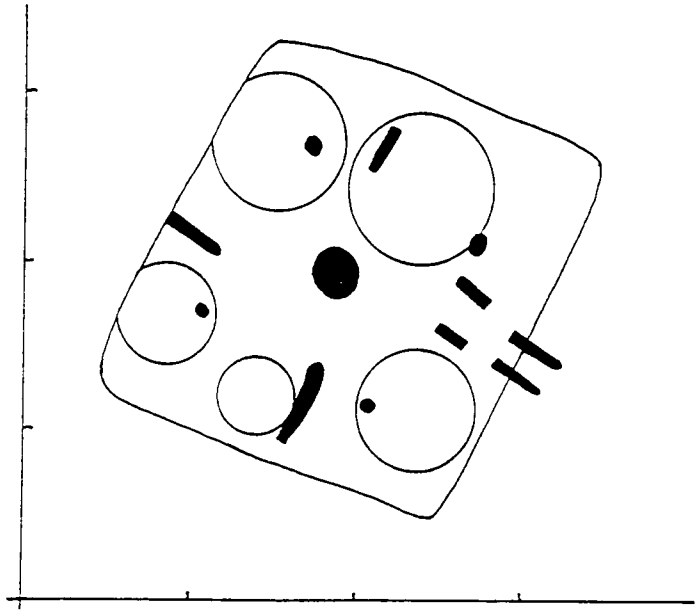
Table 6.7) follows the structure walls, with the exception of Cluster 4, situated northeast of the central hearth. Cluster 1, situated in the southwest corner, Cluster 3, situated west of the partition along the south wall, and Cluster 5, situated in the southeast corner, all closely mirror five cluster solution Size Class 1 and Size Class 3 size class clusters in location. Cluster 2, situated north of the partition along the west wall, Cluster 4, situated northeast of the central hearth, and Cluster 6, situated west of the partition along the north wall, do not match clusters defined at the five cluster solution level for either Size Class 1 or Size Class 3.

Size Class 3 (+1/4 inch)

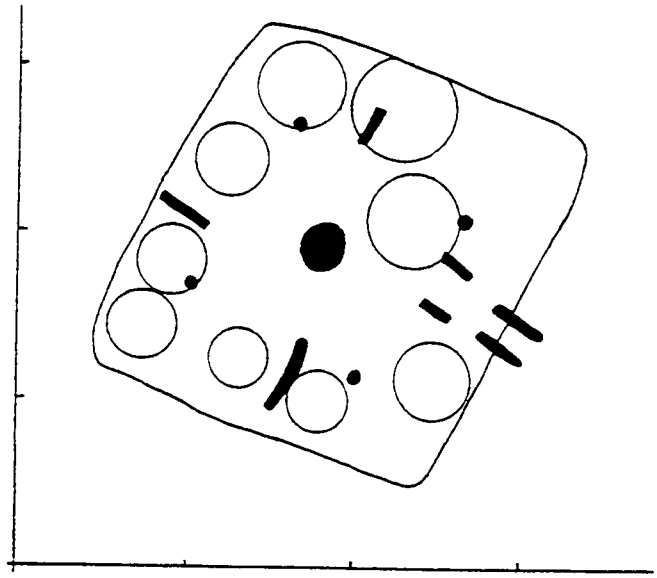
Inspection of the %SSE plot for the Structure 2 Size Class 3 indicates inflections at the five and nine cluster solution points. The five cluster solution (Figure 6.10a; Table 6.8) for Size Class 3 follows the four structure walls and closely mirrors the five cluster solution for Size Class 1. With the exception of Cluster 1 and Cluster 3, the Size Class 3 clusters have longer RMS radii than for the Size Class 1 clusters at approximately the same locations and thus display greater dispersion. Cluster 1, situated in the southwest corner south of the clay partition, is made up of nearly a third (32%) of the Size Class 3 sample. Cluster 3, a compact cluster situated along the south wall near the clay partition, makes up another quarter (26%) of the sample. The remaining clusters, Cluster 2 along the west wall north of the clay partition, Cluster 4 near the center of the north wall, and Cluster 5 near the east wall south of the entryway, are made up of 16%, 18%, and 8% of the sample, respectively.

Table 6.7. Structure 2 Size Class 2 (+1/2"), Six Cluster Solution.

CLASS	CLUSTER 1	CLUSTER 2	CLUSTER 3	CLUSTER 4	CLUSTER 5	CLUSTER 6
CERAMICS	43	47	31	36	30	30
LITHIC DEBITAGE	5	6	2	32	31	2
CHIPPED TOOL (FTOOL)	2	4	2			2
COBBLE TOOL (CTOOL)			2	1		
SHELL	71	43	41	36	16	18
BONE	16	13	30	7	12	21
WORKED BONE			2			
CLUSTER TOTAL	137	113	110	83	61	73



A. SIZE CLASS 3 - FIVE CLASS SOLUTION



B. SIZE CLASS 3 - NINE CLASS SOLUTION

Figure 6.10. Structure 2 Size Class 3 K-means Solutions.

Table 6.8. Structure 2 Size Class 3 (+1/4"), Five Cluster Solution.

CLASS	CLUSTER 1	CLUSTER 2	CLUSTER 3	CLUSTER 4	CLUSTER 5
LITHIC DEBITAGE	4	7	3	13	3
FLAKED TOOL (FTOOL)	1	1	1	2	1
BONE	22	10	25	7	6
WORKED BONE		2	2	1	
CLUSTER TOTAL	70	35	56	38	18

The nine cluster solution for the Size Class 3 sample (Figure 6.10b; Table 6.9; Table 6.10) follows the four structure walls, with the exception of Cluster 4 situated in the central floor area northeast of the prepared clay hearth. Clusters 1, 2, 3, 6, and 8, situated in the southwest or left rear diagonal half of the structure display shorter RMS radii than the remaining clusters in the northeast or right front half. Cluster 1, situated in the southwest corner, Cluster 2, situated near the west wall south of the clay partition, and Cluster 3, situated near the south wall west of the clay partition, are made up of more than 90% shell and bone. Cluster 4, just inside and to the right of the structure entryway, while made up of only 10% of the sample contains 37% of the Size Class 3 sample lithic debitage. Cluster 5, situated in the northwest corner, contains nearly equal amounts of shell, bone, and lithic debitage. Cluster 6, situated near the south wall east of the clay partition, contains a large proportion of animal bone (46%). Cluster 7, situated near the center of the north wall, Cluster 8, situated near the west wall north of the clay

Table 6.9. Structure 2 Size Class 2 (+1/4"), Nine Cluster Solution.

CLASS	CLUSTER 1	CLUSTER 2	CLUSTER 3	CLUSTER 4	CLUSTER 5	CLUSTER 6	CLUSTER 7	CLUSTER 8	CLUSTER 9
LITHIC DEBITAGE	1	3	2	11	5	2	3	2	1
FLAKED TOOL (FTOOL)	1		1		1	1	2		
BONE	9	11	23	4	5	6	4	5	3
WORKED BONE			1	1		1		2	
SHELL	20	24	22	6	6	3	9	9	7
CLUSTER TOTAL	31	38	49	22	17	13	18	18	11

Table 6.10. Structure 2 Cluster Composition by Percentage, Nine Cluster Solution.

CLASS	CLUSTER 1	CLUSTER 2	CLUSTER 3	CLUSTER 4	CLUSTER 5	CLUSTER 6	CLUSTER 7	CLUSTER 8	CLUSTER 9
LITHIC DEBITAGE	3	8	4	50	29	15	17	11	9
FLAKED TOOL (FTOOL)	3		2		6	8	11		
BONE	29	29	47	18	29	46	22	28	27
WORKED BONE			2	5		8		11	
SHELL	65	63	45	27	35	23	50	50	64
CLUSTER PERCENTAGE	100	100	100	100	99	100	100	100	100
CLUSTER TOTAL	31	38	49	22	17	13	18	18	11

partition, and Cluster 9, near the east wall south of the entryway, are each made up of only a small number of artifacts. The overall depositional pattern, again with the exception of Cluster 4, suggests accumulation beneath the raised beds or benches along the walls of the structure. The content of Cluster 4 suggests flint knapping or tool maintenance took place at this relatively clear floor area situated near both hearth and entryway, perhaps due to potentially better light at this location.

Structure 2 K-means Summary

The k-means analysis of the contents of Structure 2 by material class and size class has been described. A random distribution was noted for the Ceramic Vessel Form sample of the Ceramic Class. The Tabular Rock and Worked Bone samples were not further described due to limitations imposed by small sample sizes. The remaining seven material classes produced non-random solution levels of from three to twelve clusters. The samples displaying random distributions, Ceramic Vessel Form and Total Sample, were described as a group. Those material classes displaying non-random distributions at one or more cluster solutions were described by cluster solution level within each class.

Patterning at the one cluster level was described for the Ceramics Class and for Size Class 2. The twelve cluster solution for the Ceramics Class represented both ceramic sherds reflecting vessels in the structure at the time of the fire as well as ceramic sherds reflecting previously broken vessels largely removed or redistributed during floor maintenance activities. The six cluster solution for Size Class 2 presented a similarity in

patterning to the other size classes on the south side of the structure while the three northern clusters differed both in cluster centroid location and degree of dispersion, reflecting perhaps a differing status for this size class in more open floor areas.

Patterning at the two cluster level was described for the Lithic Debitage Class, Fire-cracked Rock Class, Shell Class, Bone Class, Size Class 1, and Size Class 3. The four cluster solution described for the Lithic Debitage Class presents the four quarters of the structure floor while the nine cluster solution more clearly defines probable lithic reduction and tool maintenance areas. The Fire-cracked Rock Class, with six and nine cluster solutions, presented a general pattern of larger fragments toward the limits of the central floor area, which might more closely reflect location of use for activities requiring indirect heat or scraping activities utilizing fractured cobbles, while smaller fragments accumulated beneath the bench nearest their location of use. The Shell Class, with six and twelve cluster solutions, presented a general pattern, at both solutions, of deposition beneath the wall benches and, in burned condition, northeast of the hearth. The Bone Class, with twelve and fourteen cluster solutions, presented a more uniform distribution across the structure floor. The potentially interrupted nature of floor maintenance activities was suggested both by cross-mends and larger bone fragments present in the northwest and southeast quarters at both cluster solutions. Size Class 1, with three and five cluster solutions, and Size Class 3, with five and nine cluster solutions, mirror each other at the five cluster level. The five cluster solution follows the four structure walls, while the three cluster solution for Size Class 1 is more closely linked to the three quarters of the structure containing the most material. The overall distribution of the

nine cluster solution for Size Class 3 follows the four structure walls and, with the exception of the cluster in the central floor area northeast of the hearth near the entryway, suggested accumulation beneath the beds or benches against the walls. The exception, containing 37% of the Size Class 3 lithic debitage in the sample, may represent a flint knapping or tool maintenance area situated near better light provided by the entryway.

The Worked Stone sample, made up of the combined Flaked Stone Tool Class (Ftool), the ground stone or Cobble Tool Class (Ctool), and the Other Worked Stone Class, was the only sample to display more than two cluster solution levels. The stone artifact categories were consolidated into a smaller number of groups linked by shared technological characteristics to one or more presumed functions for discussion purposes. The four cluster solution levels (3, 4, 6, 11), and the variation in cluster content of the clusters making up each solution, provide the best indication of spatial variation in the performance of a range of activities in Structure 2

Structure 3 K-means Analysis

Random distributions are noted for the Fire-cracked Rock Class and the Worked Stone Class when subjected to the k-means analysis. One sample, the Worked Bone Class, has limitations imposed by small sample size and is not further described. The remaining seven material classes produced non-random solution levels of from four to eight clusters. Samples displaying random distributions are described as a group. Those

material classes displaying non-random distributions at one or more cluster solutions are described by cluster solution level within each class.

Random Distributions

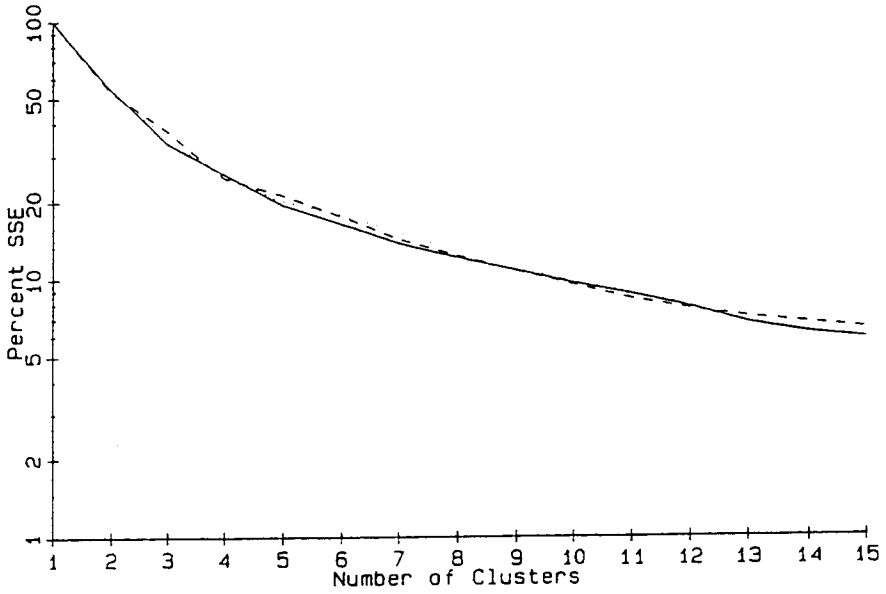
The k-means analysis of the Fire-cracked Rock Class and the Worked Stone Class produced random distributions, as indicated by the close proximity and trajectory of the data line to the random run lines on the %SSE plot (Figure 6.11a). The Ceramic Vessel Form sample, derived from the larger Ceramics Class, is widely dispersed across the structure floor as a result of both the gradual accumulation of sherds from breakage during use and as a result of vessel shatter by roof-fall.

Non-random Distributions

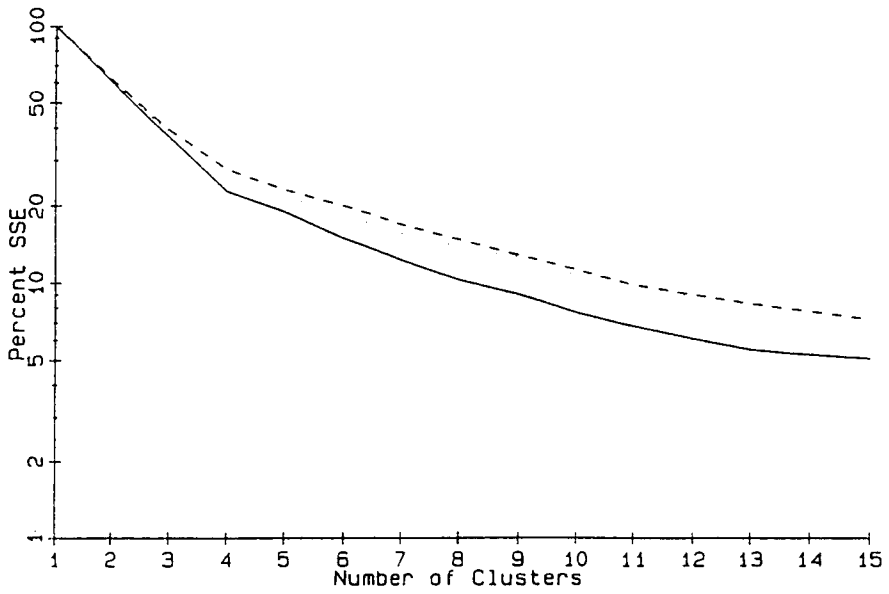
The k-means analysis of the remaining seven material classes produced non-random distributions, as indicated by divergence of the data line from the random run lines on the %SSE plot (Figure 6.11b) produced for each class. One or more inflection points in the data line indicate optimal cluster solutions worthy of further examination.

Round Rock

Inspection of the %SSE plot for the Structure 3 Round Rock Class indicates an inflection at the nine cluster solution point. Round unmodified rocks in Size Class 1 are included in the k-means analysis. Round unmodified rocks in the form of unbroken river



A. RANDOM PLOT - WORKED STONE

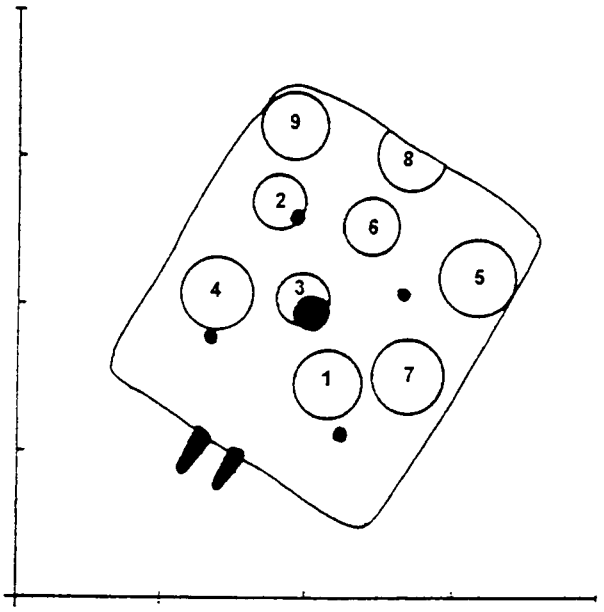


B. NONRANDOM PLOT - CERAMIC VESSEL FORM

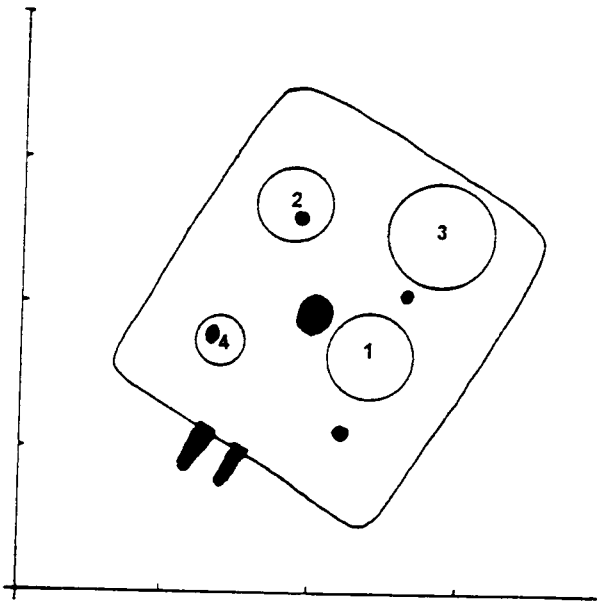
Figure 6.11. Structure 3 Sample %SSE Plots.

cobbles may represent either cobble tools with no discernable surface alteration or cobbles not yet displaying alteration by heat.

The nine cluster solution for unmodified rock (Figure 6.12a), follows the benches along the east, north, and west walls of the structure, with the exception of Cluster 1, situated in the central floor area south of the hearth, and Cluster 3, situated in the central floor area northwest of the hearth. Cluster 1, in the central floor area east of the axis between hearth and entryway, is made up of nine unmodified rocks in the vicinity of Feature 32. Cluster 2, situated near the front edge of the bench in the vicinity of the northwest main roof support, is made up of eight cobbles. Cluster 3 consists of a compact group of 11 cobbles and is situated near the northwest edge of the hearth. Cluster 4 consists of a more dispersed group of cobbles situated near the front edge of the west bench north of the southwest main roof support. Cluster 5 consists of a dispersed group of five cobbles in the northeast corner of the structure. Cluster 6 consists of six cobbles situated near the front edge of the center of the bench along the north wall. Cluster 7 consists of six cobbles intermixed with cobble tools and quartzite flakes situated on the east or right front side of the structure. Cluster 8 consists of only four cobbles situated against the center of the north wall of the structure. Cluster 9 consists of five cobbles in the northwest corner of the structure. Clusters 1, 2, 4, 6, and 7, situated within or bordering the central floor area, all contain a larger proportion of the sample than outlying clusters and form a rough ring or border along the border of the central floor area.



A. ROUND ROCK - NINE CLUSTER SOLUTION



B. TABULAR ROCK - FOUR CLUSTER SOLUTION

Figure 6.12. Structure 3 Round Rock and Tabular Rock K-means Solutions. (Structure orientation the same as in Figure 3.9)

Tabular Rock

Inspection of the %SSE plot for the Structure 3 Tabular Rock Class indicates an inflection at the four cluster solution point. Tabular rocks in Size Class 1 are used in the k-means analysis. Tabular rocks, primarily of limestone or sandy limestone, served both like fire-cracked rock in activities requiring indirect heat and as raw material for other artifacts. The soluble limestone surface frequently loses the finely striated surface indicative of whetstone use.

The four cluster solution for tabular rock (Figure 6.12b) reflects the probable location of perishable partitions aligned with the west, north, and east main roof supports in addition to the primary cluster situated southeast of the hearth. Cluster 1, situated in the southeast quarter bordering the central floor area near Feature 32 to the right of the structure axis through hearth and entryway, is made up of nearly half (44%) of the sample total. Cluster 2 is situated in the northwest quarter of the structure. Cluster 3 is situated in the northeast quarter and is made up of only three widely scattered fragments. Cluster 4 is situated in the southwest quarter of the structure near the main roof support. Cluster 1 appears to be associated with Feature 32, a shallow oblong pit or basin in the central floor area containing tabular heat-altered limestone. The tabular limestone and sandy limestone fragments from the three remaining clusters mirror the distribution of whetstones bearing preserved use wear and likely served a similar function.

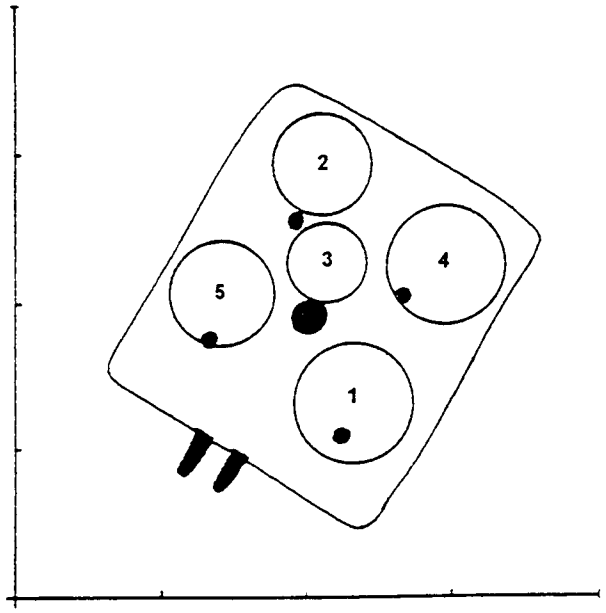
Ceramics

Inspection of the %SSE plot for the Structure 3 Ceramics Class indicates an inflection at the five cluster solution point. Ceramic sherds in Size Class 1 and Size Class 2 are used in the k-means analysis. Vessels and vessel sections made up of contiguous cross mending fragments are counted as single items.

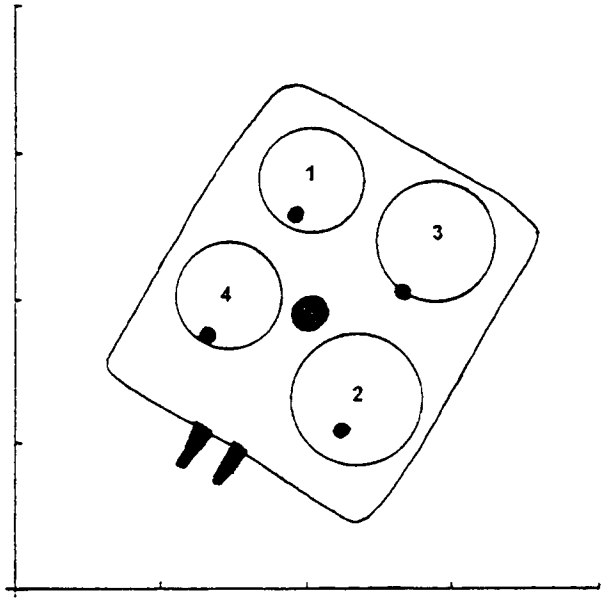
The five cluster solution for the Ceramics Class (Figure 6.13a) displays a single smaller cluster within the central floor area flanked by four more diffuse clusters representing the four quarters of the structure. In contrast to Structure 2, the overall pattern of clusters in Structure 3 is not greatly influenced by the presence of ceramic vessels or vessel sections on the structure floor as only a single vessel, a jar mixed in the roof-fall filling Feature 32, was found on the floor. Cluster 3, situated in front of the bench north of the hearth opposite the entryway, has the shortest RMS radius and the largest proportion (89%) of Size Class 2 ceramic sherds in the structure. Larger sherds are more common (21%-32%) toward the structure walls in each of the remaining four clusters. The five cluster solution represents, with the exception of the vessel in Feature 32, ceramic sherds reflecting previously broken vessels largely removed or redistributed during floor maintenance prior to the fire.

Ceramic Vessel Form

Inspection of the %SSE plot for the Structure 3 Ceramic Vessel Form sample of the Ceramics Class indicates an inflection at the four cluster solution point. Jars, in a range of sizes, and three bowl forms make up the bulk of the sample while the saltpan



A. CERAMICS - FIVE CLUSTER SOLUTION



B. CERAMIC VESSEL FORM - FOUR CLUSTER SOLUTION

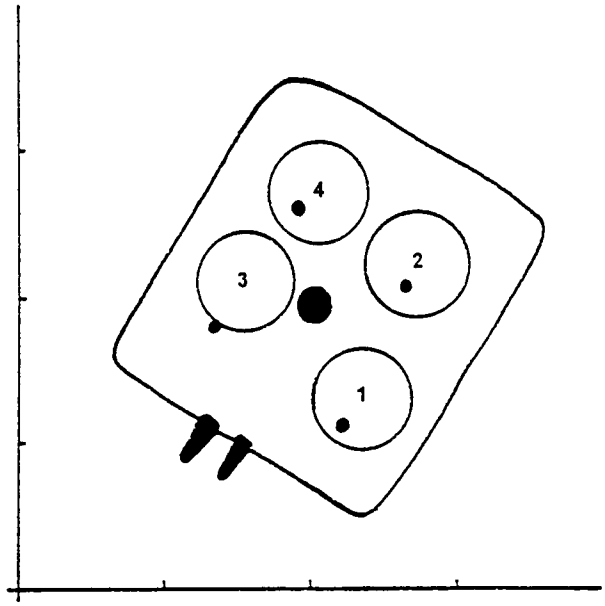
Figure 6.13. Structure 3 Ceramics and Ceramic Vessel Form K-means Solutions.

and bottle forms are represented by a small number of sherds. Ceramic items other than vessels, such as disks and utilized sherds, are present in small numbers in each of the four clusters. The four cluster solution for the ceramic vessel form sample (Figure 6.13b) reflects the four quarters of the structure floor. Cluster 1, situated in the northwest quarter of the structure, has the shortest RMS radius and the largest number of sherds. Cluster 2, a more dispersed concentration in the southeast quarter, is made up of the largest proportion of jar sherds (85%) and the most limited range of vessel forms present in Structure 3. Cluster 3 is situated in the northeast quarter of the structure. Cluster 4, situated in the southwest quarter, has the most vessel forms represented, including the single long neck bottle sherd in the structure sample.

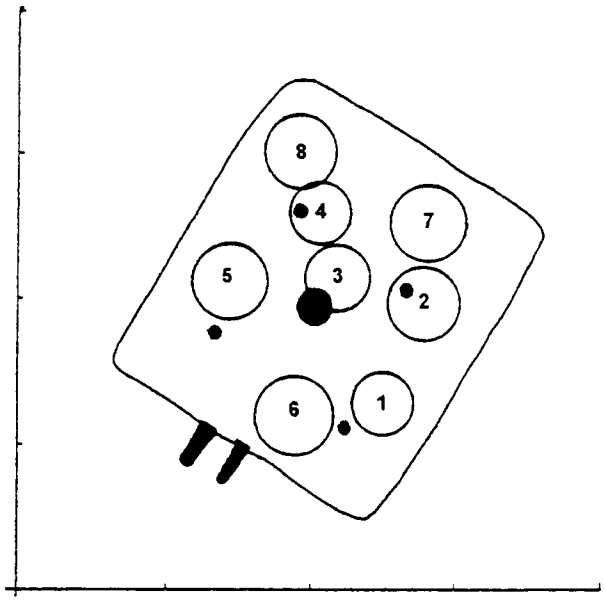
Lithics - Debitage

Inspection of the %SSE plot for the Structure 3 Lithic Debitage Class indicates inflections at the four and eight cluster solution points. Lithic debitage in all three size classes is included in the k-means analysis. Lithic debitage includes altered nodules and chunks as well as flakes.

The four cluster solution for lithic debitage (Figure 6.14a) reflects the four quarters of the structure floor. Cluster 1, situated in the southeast quarter, and Cluster 3, situated in the southwest quarter, flank the entryway and are made up of lithic debitage representing all three size classes. Cluster 2, situated in the northeast quarter, and Cluster 4, situated in the northwest quarter, lack larger lithic debitage.



A. LITHIC DEBITAGE - FOUR CLUSTER SOLUTION



B. LITHIC DEBITAGE - EIGHT CLUSTER SOLUTION

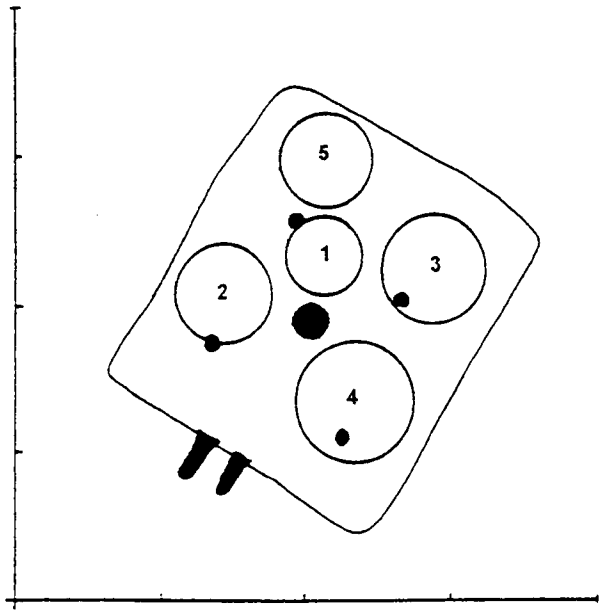
Figure 6.14. Structure 3 Lithic Debitage K-means Solutions.

The eight cluster solution for lithic debitage (Figure 6.14b) presents a refined pattern of distribution within Structure 3. Cluster 1 and Cluster 6 are situated in the vicinity of the shallow oblong basin near the south edge of the central floor area flanking the southeast main roof support east of the entryway. Cluster 6 is made up of all three size classes, while Cluster 1 is made up primarily of Size Class 3 flakes. Cluster 3, situated between the hearth and the center of the rear bench is also made up primarily of small flakes in Size Class 2 and Size Class 3. Cluster 4, situated near the northwest main roof support on the north edge of the central floor is made up of nearly equal numbers of small flakes in Size Class 2 and Size Class 3. The remaining four clusters, situated beneath the benches along the northwest, northeast, and southeast walls are made up of both Size Class 2 and Size Class 3 debitage.

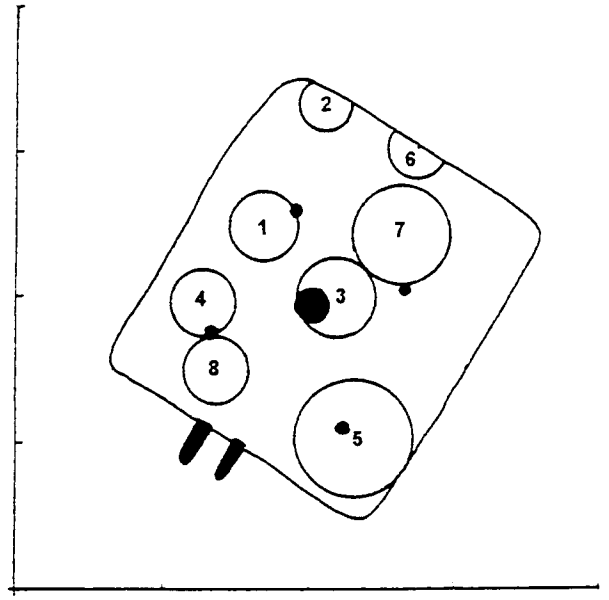
Bone

Inspection of the %SSE plot for the Structure 3 Bone Class indicates an inflection at the five cluster solution point. Bone associated with Structure 3 displays five times the number of canid gnawed elements. Elements displaying the glossy slightly pitted surfaces characteristic of exposure to the acidic environment of the canid digestive tract are also present in Structure 3. The presence of bones displaying these characteristics in Structure 3 suggests patterning in the faunal sample reflecting a combination of human and nonhuman behavior during the lifespan of the structure.

The five cluster solution for the Bone Class (Figure 6.15a) displays a single smaller cluster within the central floor area flanked by four more diffuse clusters



A. BONE - FIVE CLUSTER SOLUTION



B. SHELL - EIGHT CLUSTER SOLUTION

Figure 6.15. Structure 3 Bone and Shell K-means Solutions.

representing the four quarters of the structure. Cluster 1, situated in the central floor area north of the central hearth, has the shortest RMS radius and the largest number and proportion (58%) of the Size Class 3 bone fragments. Cluster 2 is situated in the southeast quarter of the structure north of the main roof support. Cluster 3 is situated in the northwest quarter. Cluster 4 consists of a more dispersed concentration situated in the southeast quarter of the structure north of the main roof support. Cluster 5 is situated in the northwest corner of the structure. Larger bones, including a substantial number of deer foot bones, are more common toward the structure walls. The largest bones tend to be situated near the structure wall in each of the four corners.

Shell

Inspection of the %SSE plot for the Structure 3 Shell Class indicates an inflection at the eight cluster solution point. All but Cluster 5 and Cluster 7 are represented by all three size classes. The Size Class 2 and Size Class 3 shells consist both of gastropods and bivalve fragments while the Size Class 1 shells consist of less fragmented bivalves.

The eight cluster solution for the Shell Class (Figure 6.15b) follows the benches along the north, west, and south walls of the structure, with the exception of Cluster 3 situated in the central floor area northeast of the hearth. Cluster 1, situated beneath the west bench south of the northwest main roof support, includes 30% of the Size Class 1 shell in the sample total. Cluster 2 is situated against the wall in the northwest corner. Cluster 3 near the hearth has the largest proportion of the Size Class 3 shell (30%) of any cluster in Structure 3. Cluster 4 is situated beneath the west bench north of the

southwest main roof support and is likely a continuation of Cluster 1 produced by the k-means analysis in its definition of circular clusters from an elongated concentration of shell. Cluster 5, a dispersed group of 11 shells situated in the southeast corner of the structure, is the only cluster limited to the Size Class 2 and Size Class 3 classes. Cluster 6 is, like Cluster 2, situated against the north wall. Cluster 7, situated beneath the north bench near the northeast main roof support, is made up only of the larger, Size Class 1 and Size Class 2 shells. Cluster 8 is situated near the south wall just west of the entryway. A general pattern of clusters containing more shell and having shorter RMS radii is evident for the west half of Structure 3, with the east half containing less shell and more dispersed groupings.

K-means Analysis by Size Class

K-means analyses were conducted by artifact size class in order to determine the effect of artifact size upon patterning in Structure 3. A non-random distribution is evident for the Size Class 1 sample while random distributions are evident for the Total Sample as well as for the Size Class 2 and Size Class 3 samples from Structure 3. The random distributions are evidenced by longer cluster RMS radii than non-random distributions having the same cluster solution level. Longer cluster RMS indicate larger, more dispersed concentrations of material. Such dispersion might be expected after initial deposition on the structure floor through maintenance activities, foot traffic, or scavenging by dogs and small rodents.

Inspection of the %SSE plot for the Structure 3 Size Class 1 sample indicates an inflection at the four cluster solution point. The four cluster solution, with cluster centroids at 214.41R329.26, 228.54R325.69, 220.28R318.78, and 224.67R334.02, approximates the four quarters of the structure floor and is likely an artifact of geometry created by enclosure of a ring-shaped distribution in a rectangular bounded space. The presence of the non-random four cluster solution only for the Size Class 1 sample, in contrast to the smaller size classes, reflects the greater numbers and more even dispersion of these smaller sized materials than for the larger sized sample.

Structure 3 K-means Summary

The k-means analysis of the contents of Structure 3 by material class and size class has been described. A random distribution was noted for the Fire-cracked Rock sample, the Worked Stone sample, the Total sample, the Size Class 2 sample, and the Size Class 3 sample. The Worked Bone sample was not further described due to the limitations imposed by small sample size. The remaining seven material classes and one size class produced non-random distributions at one or more cluster solutions were described by cluster solution within each class.

Patterning at the one cluster level was described for the Ceramics Class, the Ceramic Vessel Form sample, the Tabular Rock Class, the Bone Class, and Size Class 1. The four cluster solution for both the Ceramic Vessel Form sample reflected the four quarters of the structure floor, while the Tabular Rock Class, with the primary cluster situated near the shallow oblong basin southeast of the hearth and three clusters aligned

with the west, north, and east main roof supports, probably reflected a dual use of limestone for abrading/polishing along the benches as well as heat related activities in the vicinity of the shallow oblong feature. The four cluster solution for Size Class 1 reflected the four quarters of the structure floor. The five cluster solution for the Ceramics Class displayed a single, smaller cluster within the rear central floor area flanked by four, more diffuse clusters representing the four quarters of the structure, and reflected previously broken vessels largely removed or redistributed during floor maintenance activities. The five cluster solution for the Bone Class also displayed a single, smaller cluster within the rear central floor area flanked by four, more diffuse, clusters representing the four quarters of the structure, and reflected generally smaller bones toward the center of the structure and larger bones toward the structure walls, particularly the four corners.

Patterning at the two cluster level was described for the Lithic Debitage Class. The four cluster solution for the Lithic Debitage Class reflected the four quarters of the structure. The eight cluster solution for the Lithic Debitage Class displayed a cluster made up of all three size classes situated just east of the entryway, two clusters made up primarily of Size Class 3 sized flakes in the rear central floor area, and five clusters situated along the northwest, northeast, and southeast walls. The eight cluster solution for the Lithic Debitage Class reflected a combination of probable lithic reduction or tool maintenance activities near the entryway and at points along the perimeter of the central floor area as well as deposition beneath the wall benches.

K-means Cluster Patterns

The k-means analysis of the piece-plotted contents of the two structures, described above, may be reduced or compiled into six defined patterns (Figure 6.16, Table 6.11). Some defined patterns may reflect only slight accumulative differences in a general ring or donut pattern within a rectangular bounded space, while others reflect more directly linked cultural behavior such as food preparation or floor maintenance. The six defined patterns are described, illustrated, and interpreted.

I. Four Quarters Pattern

The Four Quarters Pattern is defined by four clusters positioned toward the four corners of the structure. This pattern is interpreted as the result of the reduction of a broad band of material surrounding a relatively clear central hearth area and bounded by the rectangular structure limits.

II. Ring Pattern

The Ring Pattern is defined by more than four clusters spaced out from the central hearth and bounded by the rectangular structure limits. This pattern is interpreted as the result of the reduction of a narrower band of material following and beneath the beds or benches along the structure walls. More compact linear concentrations in this pattern are sometimes broken down into more than one cluster as a result of the k-means clustering algorithm.

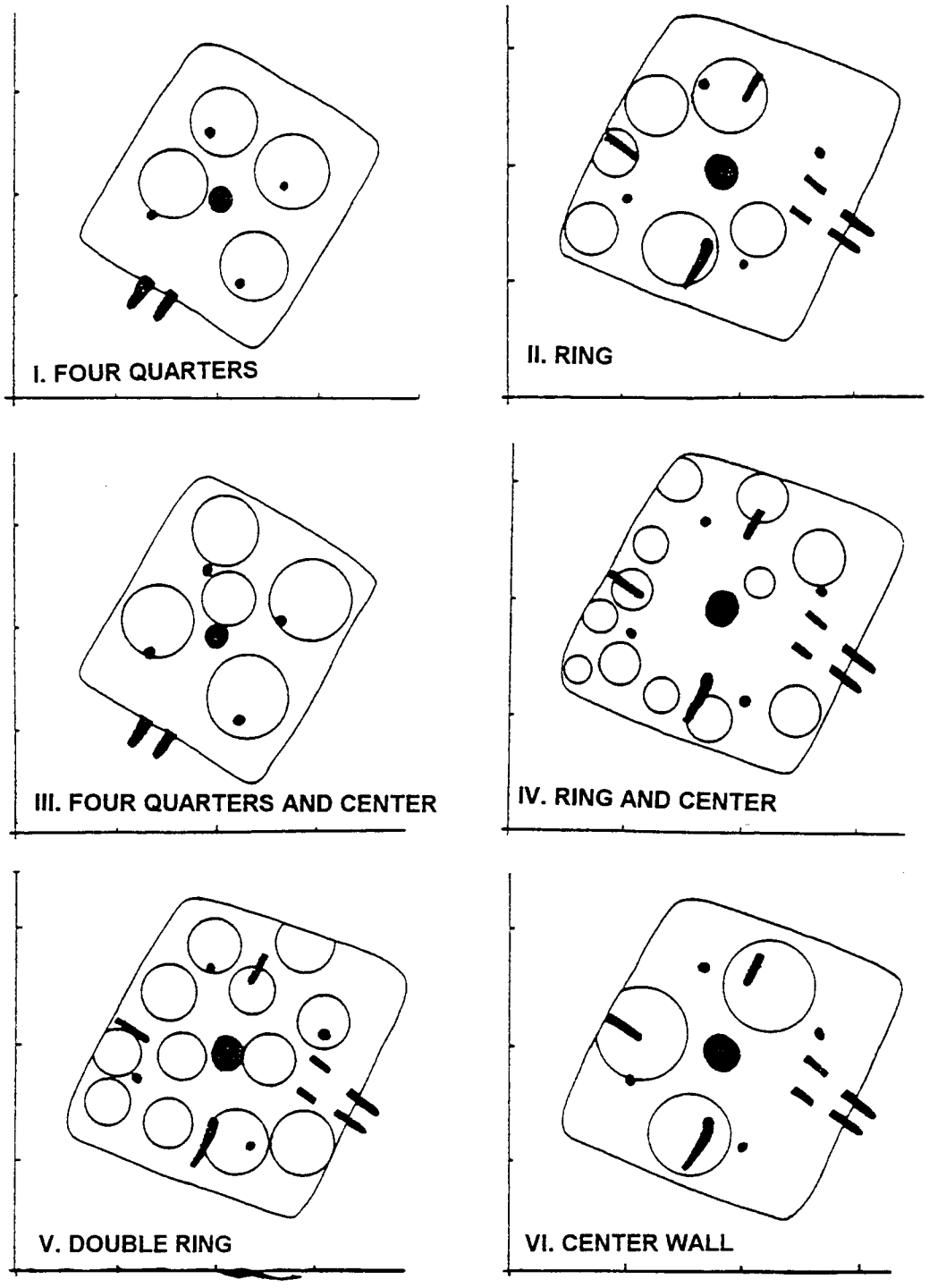


Figure 6.16. K-means Cluster Patterns.

Table 6.11. K-Means Patterns for Selected Material Classes.

MATERIAL CLASS	STRUCTURE 2	STRUCTURE 3
Fire-Cracked Rock	II, V	R
Round Rock	VI	V
Tabular Rock	S	I
Ceramics	V	III
Ceramic Vessel Form	R	I
Lithic Debitage	I, IV	I, IV
Worked Stone	VI, VI, VI, V	R
Worked Bone	S	S
Bone	IV	III
Shell	II, IV	IV
SIZE CLASS		
Size Class 1 (+1")	II	I
Size Class 2 (+½")	II	R
Size Class 3 (+1/4")	II	R
Total Size Class Sample	R	R
	R = Random Sample S = Sample Size Limitation I, IV = Cluster Patterns	

III. Four Quarters and Center Pattern

The Four Quarters and Center Pattern is defined by four corner oriented clusters, as in the Four Quarters Pattern, with the addition of a smaller cluster in the central floor area just back of the hearth. This pattern is interpreted as the result of the reduction of a relatively broad band of material surrounding a relatively clear central hearth area having a concentration centered between the rear bench and the hearth.

IV. Ring and Center Pattern

The Ring and Center Pattern is defined by more than four clusters spaced out from the central hearth, with the addition of a cluster at or near the central hearth. This pattern is interpreted as the result of the reduction of a narrower band of material following and beneath benches along the structure walls (as in Pattern II above), with the addition of a concentration near or including the hearth. Materials in the outer clusters are likely the result of sweeping or redeposition beneath the benches, while the inner cluster likely represents use or a more frequently utilized location.

V. Double Ring Pattern

The Double Ring Pattern is defined by four clusters spaced out from the central hearth near the structure walls, with the addition of two or more clusters within the border of the central floor area. This pattern is interpreted as the result of the reduction of a broad band of materials following the benches with the addition of multiple concentrations in the central floor area. Materials in the outer clusters are likely refuse

swept or discarded beneath the benches, while the inner clusters likely represent more recently utilized or deposited materials.

VI. Center Wall Pattern

The Center Wall pattern is defined by three or more clusters, each of which is centered on the middle of the left, rear, or right wall with the addition of the left rear corner of the structure. The higher cluster solutions are created by fissioning of the clusters in a lower solution into pairs, until isolates are spun off at the eleven cluster solution level. This pattern is interpreted as the result of clustering of cultural materials, worked stone tools in the case of Structure 2, most directly linked to recent or ongoing processes. The Center Wall Pattern, like the Double Ring Pattern above, appears to be closely linked to more rapid closure of social context as opposed to a gradual process with retrieval or extensive redistribution of cultural material, such as maintenance activities or structure abandonment.

Pattern Discussion

Lower level k-means pattern solutions, particularly the Four Quarters Pattern (I), may reflect only slight accumulative differences in a general ring or donut pattern within a rectangular bounded space. Mid-level k-means pattern solutions, particularly the Center Wall Pattern (VI), appear to more directly reflect more recent or ongoing activities within or bordering the central or more open portions of each structure. Mid-level solutions are particularly evident in the Worked Stone Class, the Ceramics Class,

and Size Class I in Structure 2. The ring based higher level cluster solutions, represented by the Ring and Center Pattern (IV) and the Double Ring Pattern (V), reflect the accumulation, or redeposition from the more frequented or utilized central floor area, of materials in a ring-like form around and bordering the central floor area beneath the benches and in other less accessible portions of the structure floor. A maintenance activity, such as sweeping, likely directed objects subject to movement away from the center of the structure. The side of the hearth or central floor area most involved in a particular activity will thus most likely be adjoining the area of redeposition, at least for those objects not picked up for disposal elsewhere and those objects capable of being transported by sweeping.

Chapter VI has discussed the k-means analysis of the contents of Structure 2 and Structure 3 by material class and size class. Spatial patterning was identified for most classes and compared between the two structures. Comparison of patterning at all levels between the two structures identified common patterns as well as patterns that differed. Six spatial patterns applicable to the structures were defined and discussed. Similar or congruent patterns likely represent the results of similar actions or organizations, at least by the occupants of these two structures, while dissimilar patterns represent differing actions such as structure use or abandonment.

We turn now to the intuitive examination of structure contents utilizing Surfer isopleth and post maps for pattern recognition. Structure 2 will be examined in Chapter VII while Structure 3 will be examined in Chapter VIII.

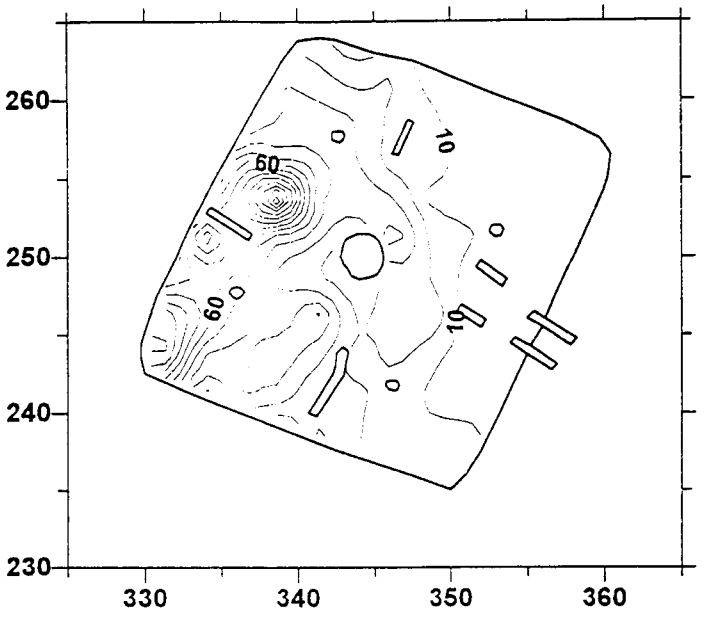
CHAPTER VII

SPATIAL PATTERNING IN STRUCTURE 2

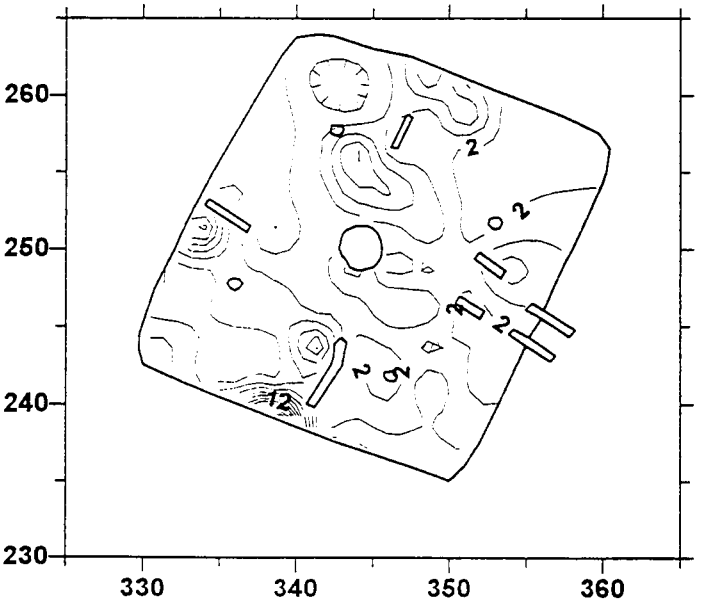
Chapter VII will examine the contents of Structure 2, described in Chapter V, with respect to spatial patterning of artifacts and features within the structure. Nine percent of the contents, other than fired clay, is plotted in three dimensions. Variation in the percentage of objects within a class that are piece-plotted is related to size of the members making up the class due to increasing bias in uniformity of recovery with decreasing size. For uniformity, and to increase sample size within smaller tool classes, both piece-plotted and screen-recovered materials will be combined in the production of Surfer isopleth and post maps for intuitive pattern recognition. A measure of size will be provided for most classes by including paired isopleth maps displaying the mean weight in grams, as well as the class count within each floor unit. Floor areas with greater fragmentation and corresponding larger unit counts will thus be identified without including distribution maps of each size class. The base map, with included central hearth, clay partitions, and main roof supports, will provide a frame within which such patterns may be examined.

Cracked Rock (n=2,422)

The distribution of fire-cracked cobbles of quartzite, quartz, and sandstone by count and mean weight within each floor unit is presented in Figure 7.1. While the



A. ST2 CRACKED ROCK COUNT



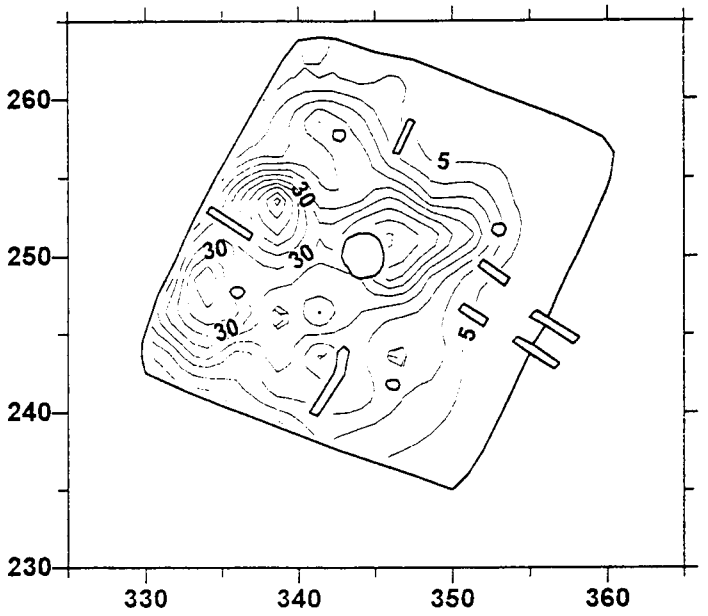
B. ST2 CRACKED ROCK MEAN WEIGHT

Figure 7.1. Structure 2 Cracked Rock.

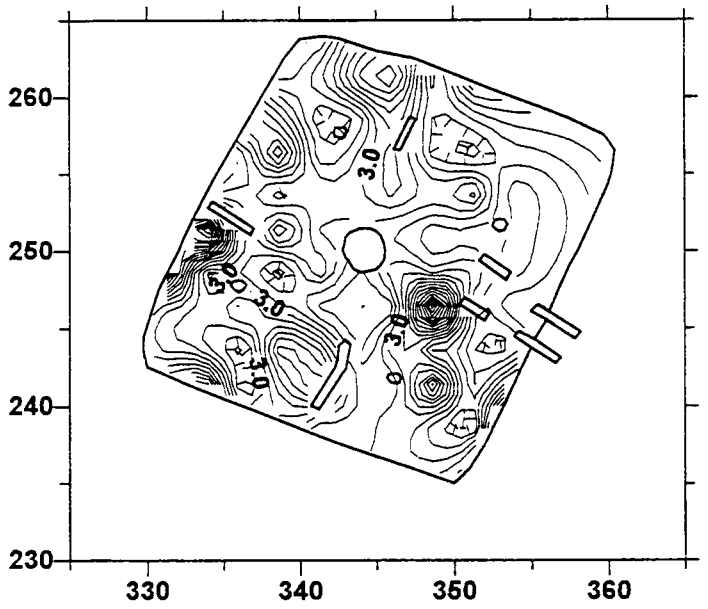
number of fragments is higher under the west bench and the outer edge of the southwest corner with a slight central ring pattern weighted to the southwest, the larger fire-cracked rocks display a different pattern. The mean weight pattern reflects presence of a smaller number of larger fire-cracked rock in and bordering the central floor area on the north and south sides in a punctuated ring as well as at the wall line on the north, west, and south. The punctuated ring pattern suggests more than one location, and likely more than one participant, for an activity requiring the use of heated rocks. A second, scraping function utilizing a cracked rock edge is possible; however, the edge wear on this cobble tool form is not evident. The distribution of the larger number of small fragments beneath the west and south benches suggests greater use on this side of the central hearth with nonfunctional smaller fragments being swept or discarded away from the hearth under the benches. Larger fire-cracked rock along the wall-line can be attributed to backfilling of the structure basin against the exterior wall during building construction.

Round Rock (n=1,348)

The distribution of unmodified quartz, quartzite, and slate pebble-sized to small cobble-sized rocks by count and mean weight within each floor unit is presented in Figure 7.2. The round rock class is probably derived from two sources. Smaller pebble-size rocks are likely inclusions in clay used for building purposes; indeed the low count south of the central hearth coincides with the hard fired clay mass containing identical pebbles. Larger apparently unmodified rocks are found both along the inner edge of the



A. ST2 ROUND ROCK COUNT



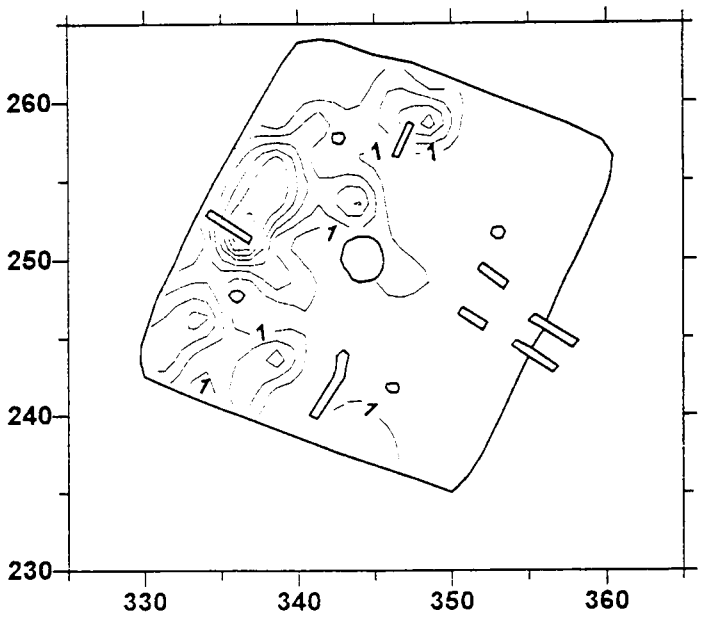
B. ST2 ROUND ROCK MEAN WEIGHT

Figure 7.2. Structure 2 Round Rock.

bench line and along the outer walls. The larger bench line rocks may have been utilized without obvious modification and are similar in distribution to the cobble tool punctuated ring. Round rocks along the outer wall line can be attributed to backfilling the house basin against the exterior wall during construction.

Tabular Rock (n=100)

The distribution of tabular shale and limestone fragments by count and weight within each floor unit is presented in Figure 7.3. Limestone and shale are subject to fragmentation and chemical weathering of surfaces, and thus present additional interpretive problems. Shale, soft and friable and making up 66% of the tabular class, is present in small fragments in the west half of the structure. No worked or modified shale fragments are recognizable and function is unknown. Limestone, less friable but with frequently weathered surfaces and making up 34% of the tabular class, is of larger size and probably served more than one function. Limestone along the west and south bench lines reflects the pattern presented by recognized limestone whetstones and sandstone abraders in the cobble tool class and may be weathered tools or tool fragments. Limestone is also commonly utilized in the manufacture of discoidals at the Loy site. Three larger limestone fragments are also situated in the shell and ash lens just east of the central hearth and to the right of the entryway.



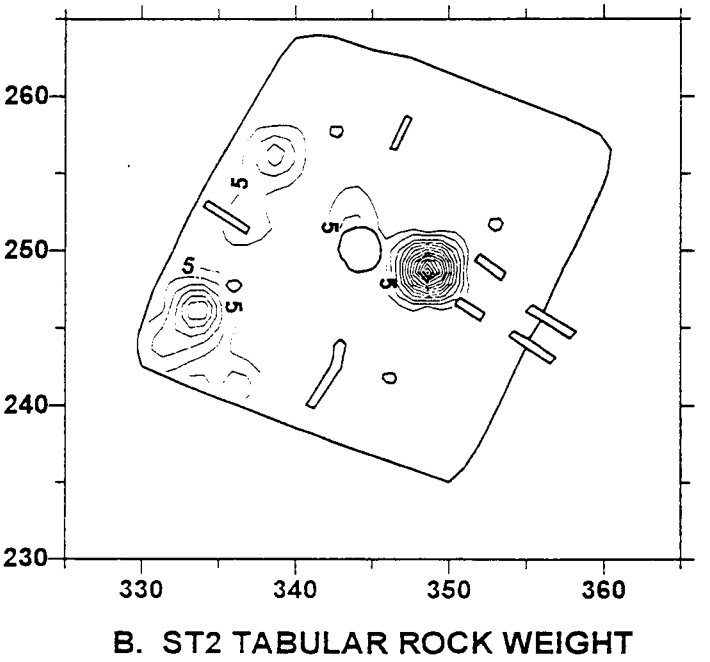


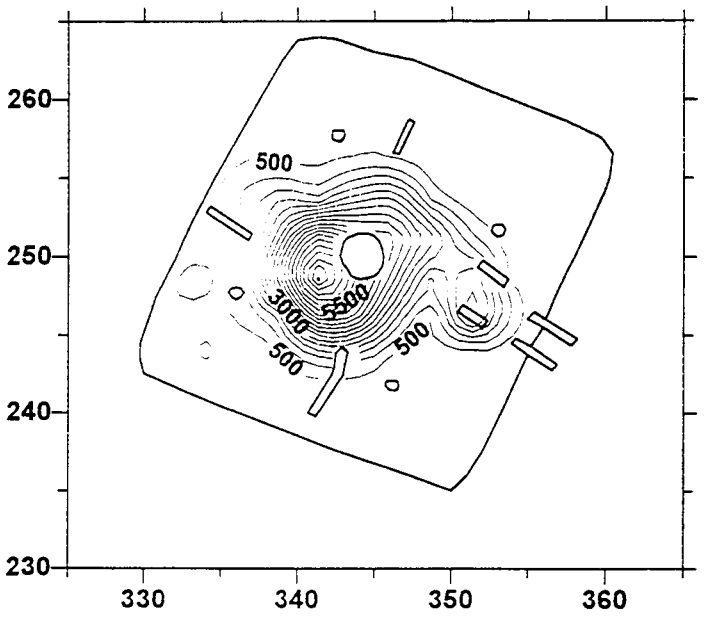
Figure 7.3. Structure 2 Tabular Rock.

Fired Clay Architectural Material (n=101,348)

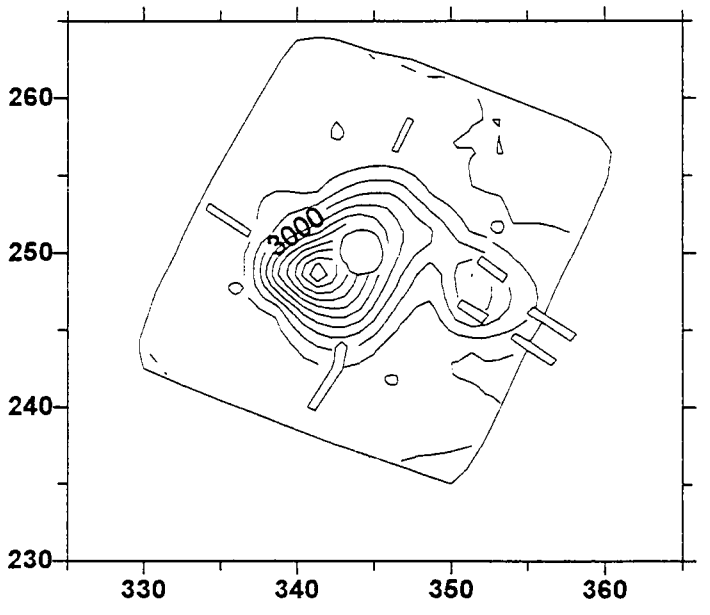
The distribution of fired clay architectural material by count and mean weight within each floor unit is presented in Figure 7.4. The Structure 2 fired clay mass, made up of fragments ranging from 0.64 cm (1/4 in) to 14 cm (5½ in) (maximum mean weight = 4.48 gr) in size, is concentrated in the center of the structure. Clay partitions are indicated by peripheral lobes to the central concentration on the east and west. The upper surface of the fired clay mass is quite fragmented, suggesting a period of exposure prior to being covered by a post occupation humus. Uncharred and partially charred architectural elements are indicated by linear gaps and cavities within the fired clay mass while fully charred elements are represented by charred timber fragments.

Ceramics (n=5,687)

The distribution of ceramic vessel fragments and a small number of non-vessel items is presented by count and mean weight within each floor unit in Figure 7.5. All cross-mended sherds making up a vessel or vessel section are counted as a single item to prevent single vessels broken in situ from creating undue bias. Ceramic vessel fragments are concentrated to the west and south of the central hearth with a smaller concentration in front of the hearth. While the greatest number of sherds is evident beneath the south and particularly the west bench line, the largest sherds are situated in the central floor area southwest of the hearth near the main roof support. The distribution of the large number of smaller sherds beneath the south and west benches suggests greater use of this

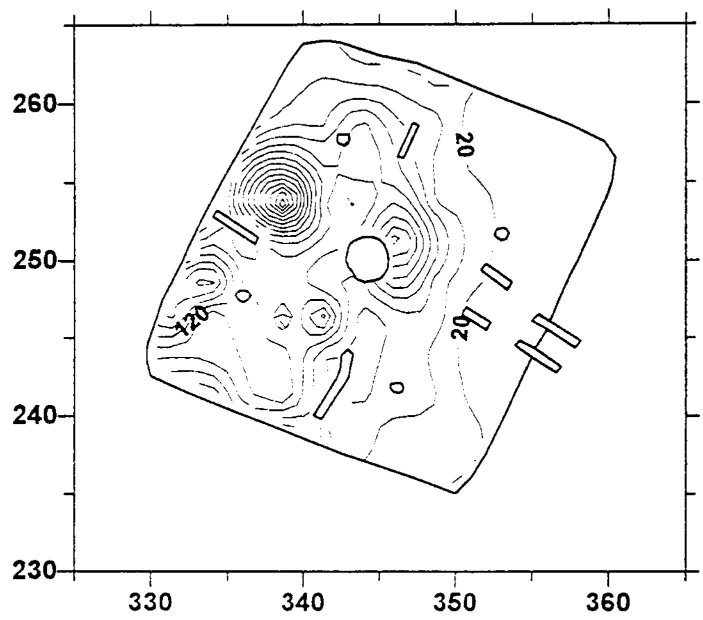


A. ST2 FIRED CLAY COUNT

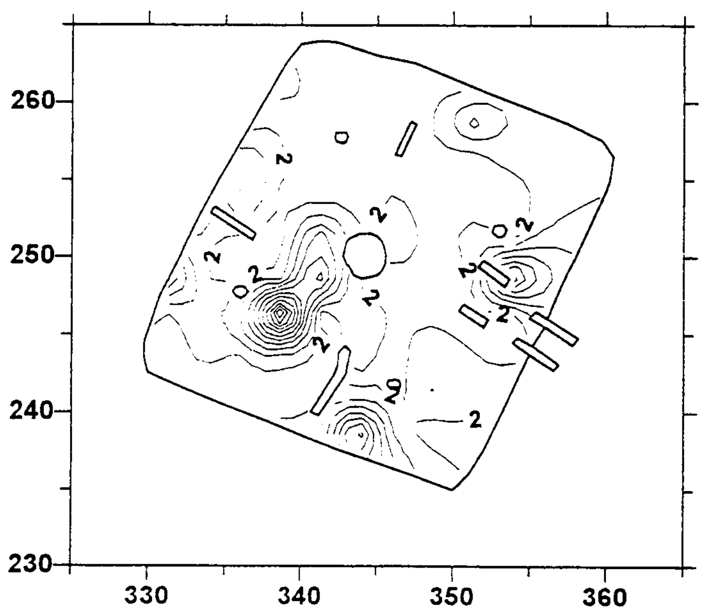


B. ST2 FIRED CLAY WEIGHT

Figure 7.4. Structure 2 Fired Clay.



A. ST2 CERAMIC COUNT

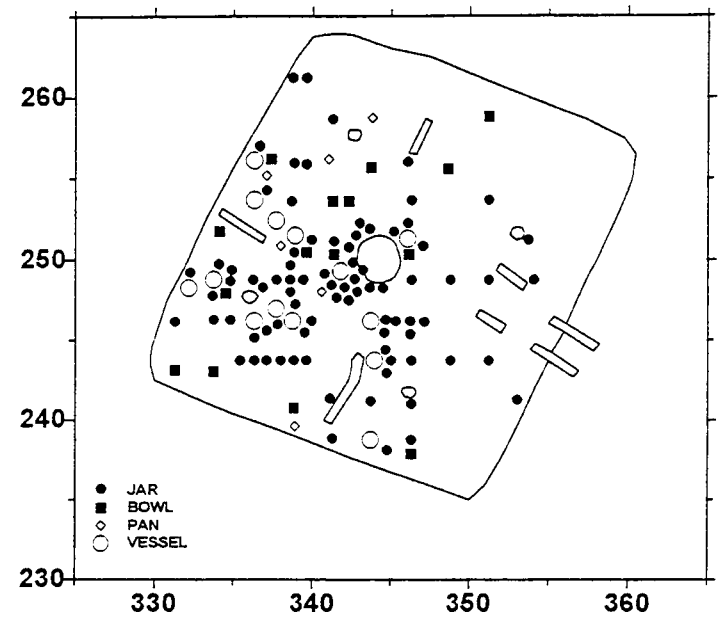


B. ST2 CERAMIC MEAN WEIGHT

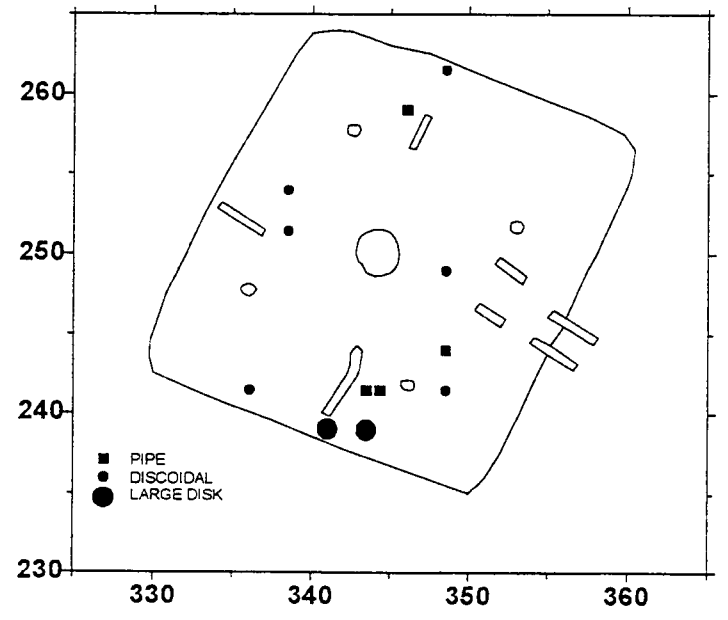
Figure 7.5. Structure 2 Total Ceramics.

side of the central hearth with less easily picked up sherds being swept or discarded away from the hearth under the benches.

Ceramic vessels, represented by three nearly complete or restorable examples and ten vessel sections, are concentrated on the south and west sides of the structure with the exception of one small jar in the fired clay roof fall at the east edge of the hearth (Figure 7.6a). Cultivation damage and weathering of exposed vessels after the fire has resulted in truncation of more elevated portions. Seven large shell tempered cordmarked jars, having rim diameters ranging from 29 cm to 33 cm and shoulder diameters ranging from 40 cm to 44 cm, are ranged in an upright position along the front of the south and west bench line (three vessels), beneath the front edge of the west bench (two vessels), and inverted against the west and south walls (two vessels). One medium sized cordmarked strap handled jar, with a shoulder diameter of 24 cm, is situated in an upright position just west of the central hearth, while a second, with a rim diameter of 25 cm and a shoulder diameter of 28 cm, is situated against the west wall in an indeterminant position. The small cordmarked jar with a notched applique fillet rim, with a rim diameter of 14 cm and a shoulder diameter of 18 cm, is situated just east of the hearth in the fired clay mass rather than on the floor. A second small jar, with a rim diameter of 8 cm and a shoulder diameter of 10 cm, is situated in an upright position near a small bowl between the hearth and the end of the south partition. The small bowl, 16 cm in diameter with the rim plowed off, is also situated in an upright position. A medium sized bowl, with applique frog effigy decoration and a rim diameter of 19.5 cm, is situated beneath the front edge of the west bench. Cross-mends of dispersed incised cazuela



A. ST2 CERAMIC VESSEL FORM DISTRIBUTION



B. ST2 NONVESSEL CERAMICS

Figure 7.6. Structure 2 Ceramics.

bowl sherds suggest a vessel of this form may have been present northwest of the hearth.

Ceramic sherds for which vessel form may be determined provide a similar spatial pattern as well as the relative proportion of jars and bowls (Figure 7.6a). The bowl form is made up of simple (n=5), closed (n=7), and cazuela or carinated (n=4) shapes. An additional "saltpan" form (n=6) is represented by small textile impressed sherds. The maximum thickness for all sherds of unidentified form is compared with the same measure for the vessel sample and vessel form sherd sample (Table 7.1) in an attempt to compare size distributions of vessels represented only by body sherds. While maximum sherd thickness alone does not indicate vessel form, it does appear to correlate with vessel size. Based on sherd thickness in the point plot sample smaller vessels appear to be more common in the northeast half while the full range of vessel sizes is represented in the southwest half of Structure 2.

Other, non-vessel, ceramic items in Structure 2 consist of discoidals (n=6), larger sherd disks (n=2), and smoking pipe fragments (n=4). These items tend toward the south half of the structure along the front edge of the benches. The two larger sherd disks are situated near the south wall close to the yellow quartzite biconcave discoidal. Two and perhaps three of the pipe fragments are derived from an axe effigy pipe in the southeast quarter of the structure.

Lithics - Debitage (n=366)

The distribution of all otherwise unmodified chipped material resulting from the manufacture, maintenance, or repair of lithic artifacts is presented by count and mean

Table 7.1. Thickness and Vessel Form for Structure 2 Ceramic Sherds and Vessels.

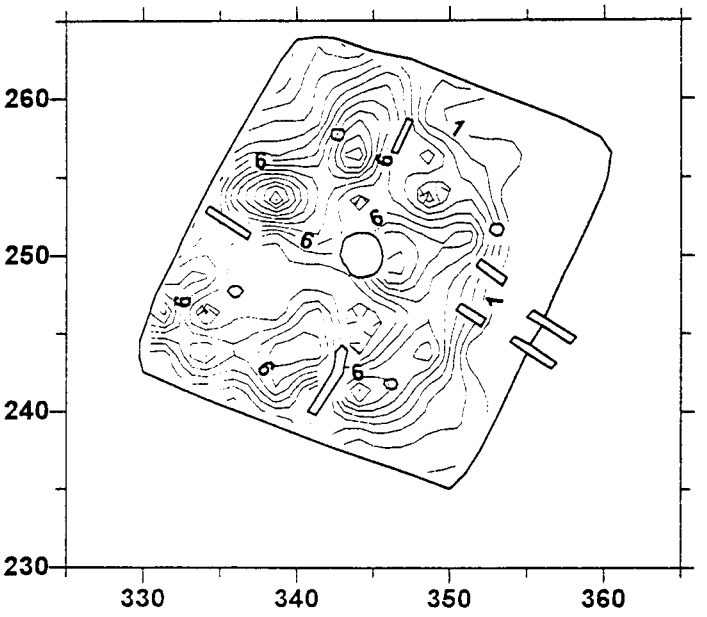
MAXIMUM THICKNESS	UID FORM	JAR	BOWL	CAZUELA	COLANDER	SALTPAN
3.0						
3.5	2					
4.0	6	4				
4.5	9	3				
5.0	19	5 **F61S**	1			
5.5	24	6	1	1		
6.0	30	7 **F63S**		2		
6.5	24	4				
7.0	33	2 **F62M**	2 **F51M F60S**			
7.5	28	4	1			
8.0	26	3 **F52L**	3			
8.5	11	1				
9.0	12	2 **F56M F58L**				
9.5	8	1				
10.0	6	1 **F55L F59l**				
10.5	8	**F53L F57L**				
11.0	4	**F54L**				
11.5	1					
12.0	1					
12.5						
13.0						
13.5						
14.0	2					2
14.5						
TOTAL	254	39 **13**	8 **2**	5		2

[Vessel size designation by rim diameter S = <8-18cm; M = >18-28cm; L = >28cm]

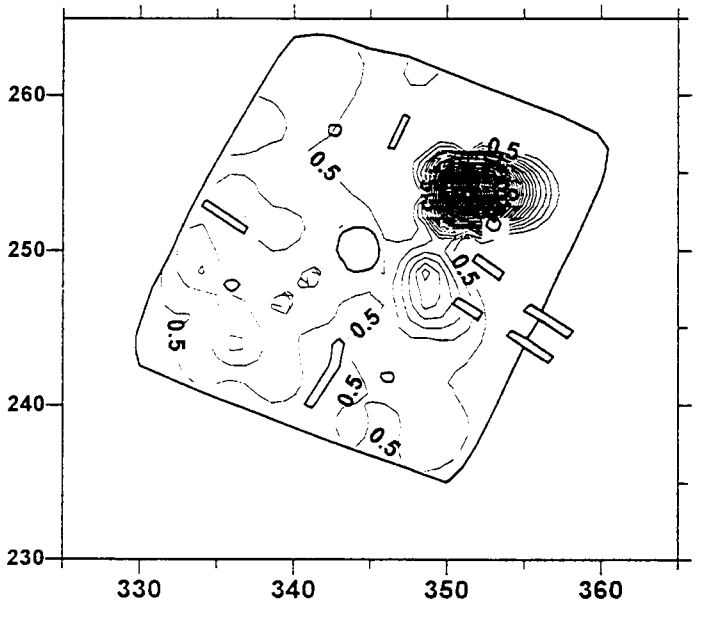
weight within each floor unit in Figure 7.7. The distribution by count presents the punctuated ring pattern centered on the hearth with higher counts beneath the front edge of the benches. The examination of the distribution by mean weight within each floor unit presents a different pattern, with the greatest mean weights on the east side near the entryway. A re-examination of those fragments most likely to affect the mean weight factor, such as blocky chunks, cores, and tested nodules, indicates that the largest fragments are toward the entryway rather than where the flakes and other debitage are concentrated. Smaller chunks are distributed with other debitage concentrations on the west side of the punctuated ring pattern. The punctuated ring pattern for lithic debitage suggests several separate areas along the north, west, and south benches where lithic reduction and tool maintenance took place.

Lithics - Flaked Tool (n=37)

The distribution of the flaked tool class, made up of all flaked artifacts other than obvious debitage, is presented Figure 7.8. Bifacially worked projectile point/knife types and fragments (Figure 7.8a) make up a ring pattern approximating the front edge of the benches. Three of the four probable triangular knives are beneath the west bench north of the partition, while the fourth is near the east wall south of the entryway. One Archaic period projectile point in Feature 70 near the entryway had been incorporated in the clay of the fired clay partition. Two early projectile point/knives are in the southwest corner of the structure.

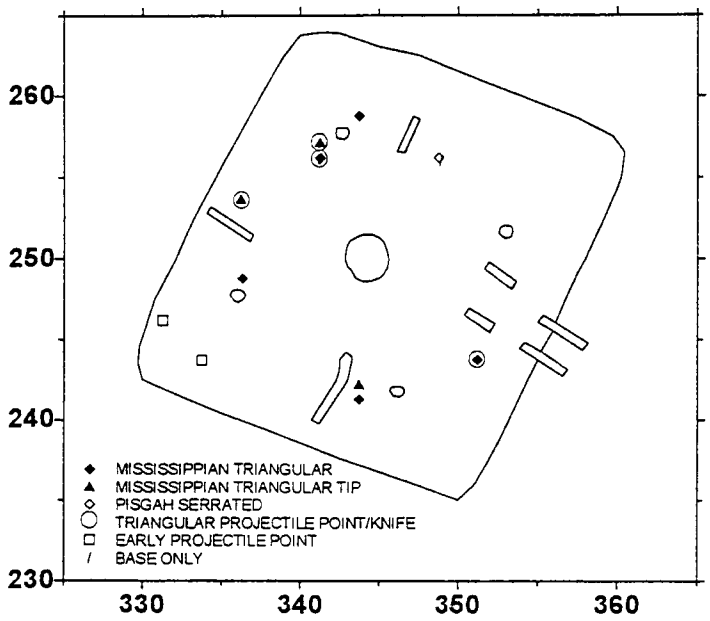


A. ST2 LITHIC DEBITAGE COUNT

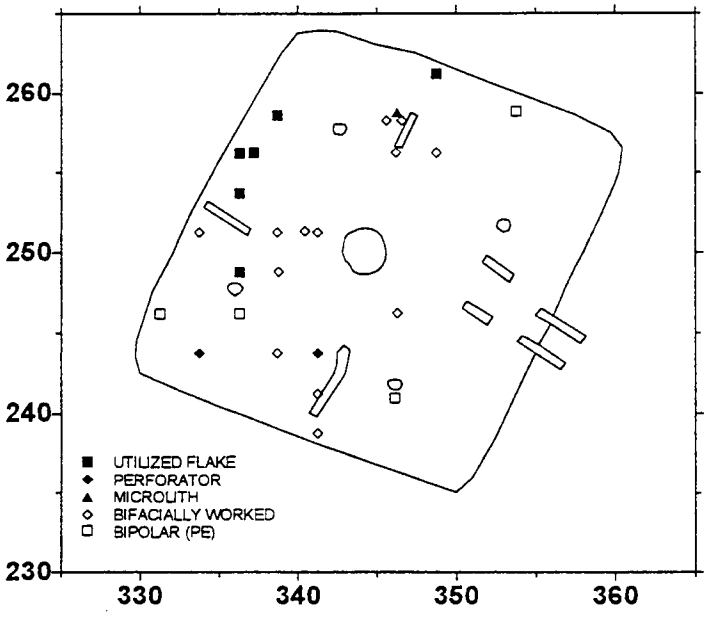


B. ST2 LITHIC DEBITAGE MEAN WEIGHT

Figure 7.7. Structure 2 Lithic Debitage.



A. ST2 PROJECTILE POINT/KNIVES



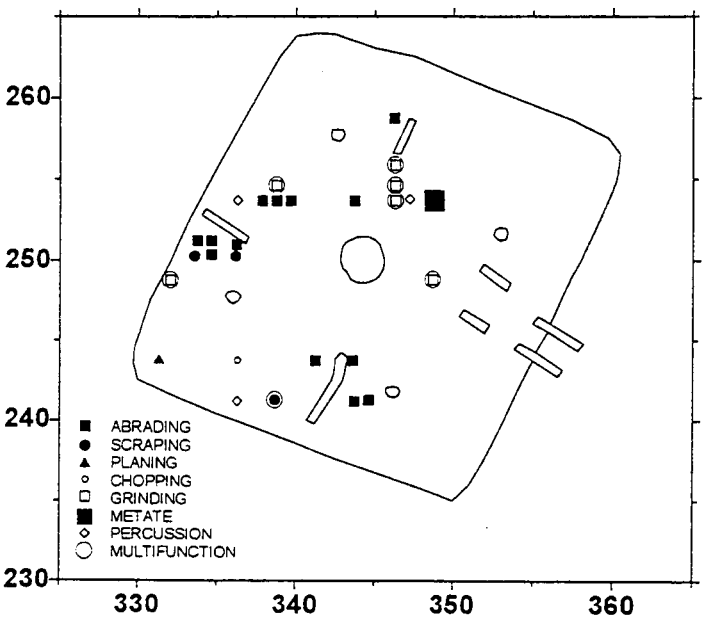
B. ST2 OTHER FLAKED TOOLS

Figure 7.8. Structure 2 Flaked Tools.

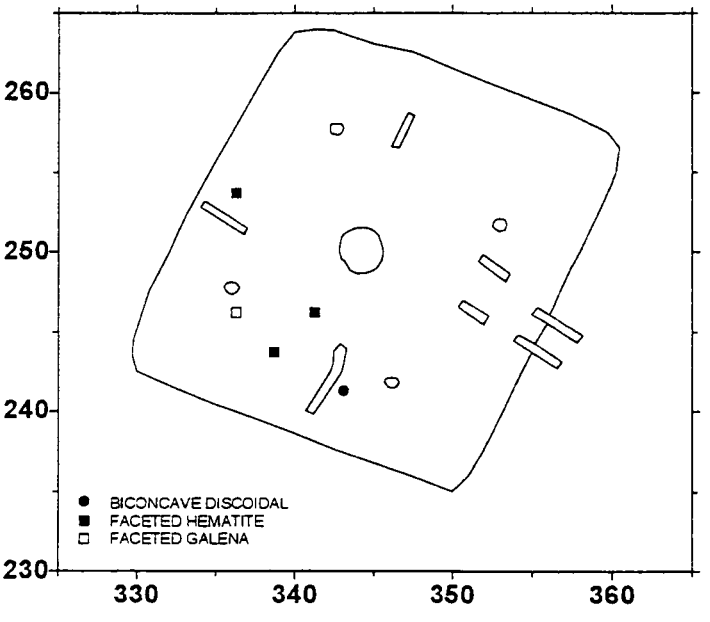
Flaked tool type distributions are illustrated in Figure 7.8b. Four of six utilized flakes are situated near the center of the west bench north of the partition, while the fifth is just south of the partition. The last utilized flake is near the north wall. Both the flake tool perforator and the reworked projectile point perforator are situated beneath the south bench west of the partition. A flake tool having the lateral margins retouched on the dorsal surface to form three thick sharp points is just west of the north wall partition. Bifacially worked fragments and pieces displaying bipolar crushing on two or more opposed edges (PE) are widely scattered across the structure floor. The utilized flakes suggest light cutting activities near the west bench, while the perforators and the steeply pointed flake tool suggest specialized activities may have taken place elsewhere in the structure.

Lithics - Cobble Tool (n=28)

Cobble tools consist of larger, often expedient, utilitarian items utilized in the reduction of other materials. A wide range of activities is probably represented by this class. While a particular action, such as abrasion or percussion, might reasonably be surmised, the material acted upon or activity engaged in is a more difficult matter. As no consistent multiple use sequence could be determined, other than utilization of broken edges after breakage of other forms, an arbitrary decision concerning choice of the primary use category was made during analysis and multiple use noted on the distribution map (Figure 7.9a).



A. ST2 COBBLE TOOLS



B. ST2 OTHER WORKED STONE

Figure 7.9 Structure 2 Other Stone.

The general ring pattern of cobble tool deposition in Structure 2 is composed of three main groups centered on the north, west, and south walls. Each of these groups is further subdivided by a clay partition. The east portion of the north group, made up of a well-used basin metate, three spherical cobble manos showing secondary percussion use, and a hammerstone, is situated near the edge of the central floor area east of the wall partition and is probably a plant food processing area. The portion of the north group situated west of the partition consists of a sandstone abrader in front of the bench and a fire-cracked rock abrader at the back of the bench.

The portion of the west group near the center of the wall north of the partition consists of three fire-cracked rock abraders, a fragmentary spherical hammerstone, and a small cobble mano displaying percussion use. The portion of the west group just south of the partition consists of four fire-cracked rock abraders, combined with two edge-utilized fire-cracked rocks and an edge-utilized biface mano fragment. Both portions of the west group of cobble tools are dominated by very coarse-grained abrasive tools, and continue the evidence of multiple use or sequential reuse of cobble tools noted in the north group.

The portion of the south group west of the partition consists of a cobble chopper, an edge-utilized cobble displaying anvil use, a small discoid hammerstone, and a slightly grooved sandstone abrader broken into two parts. This diverse assemblage mirrors that of other classes at this location and is in contrast to that portion of the south group just east of the partition. The east portion of the south group, near the biconcave discoidal, consists of two fire-cracked rock abraders and a tabular limestone whetstone. These

abrading and finishing tools could be linked to the partially reworked discoidal.

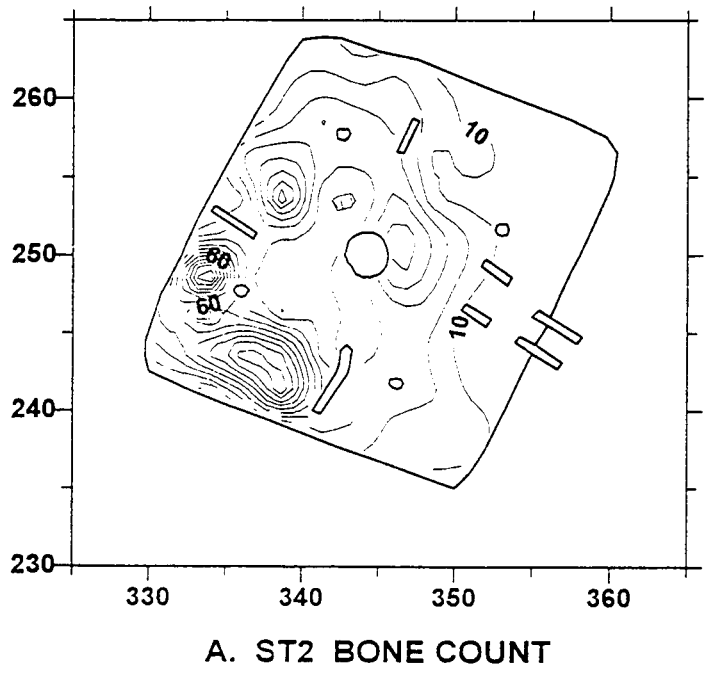
Two isolated cobble tools complete the Structure 2 inventory. A cobble mano, also displaying use as a hammerstone and anvil, is situated east of the hearth in the central floor area not far south of the metate. A rejuvenation flake derived from a cylindrical cobble plane is in the southwest corner of the structure.

Lithics - Other (n=5)

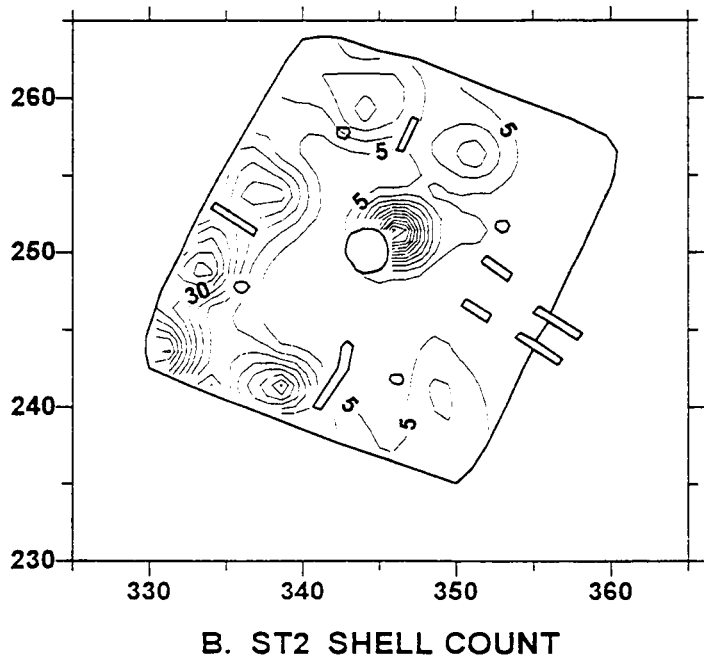
The distribution of other worked stone is presented in Figure 7.9b. Sources of pigment make up the majority of the class. Two hematite fragments, bearing ground facets from the production of red pigment, are present beneath the south bench west of the partition and one is beneath the center of the west bench. A galena cube, bearing ground facets from the production of white pigment, is also beneath the south bench. The large honey colored biconcave discoidal is situated just east of the clay partition dividing the south wall.

Bone (n=2,504)

The distribution of animal bone by count is presented in Figure 7.10a. The bone sample follows the limits of the benches along the four walls with the exception of a concentration northeast of the hearth in the central floor area. Burned and calcined bone fragments make up 30% of the sample and, while widely scattered in small numbers, are concentrated in the central floor area northeast of the hearth and near the center of the west bench. The distribution of burned and calcined bone suggests heat alteration



A. ST2 BONE COUNT



B. ST2 SHELL COUNT

Figure 7.10. Structure 2 Bone and Shell.

resulted from cultural factors other than the destruction of Structure 2 by fire. Butchering marks are present on three elements, two of which are situated near the north edge of the central floor area.

The small number of bones (n=78) displaying gnawing marks and surface alteration by digestive juices provide data concerning the behavior of resident canids. Gnawed (0.4%) and digested (2.8%) fragments are widely scattered beneath the benches in the west half of the structure. Rodent gnawed fragments make up only a small portion (0.3%) of the recovered bone and have a different pattern from those modified by canids. Four of the seven rodent gnawed fragments are clustered in a single floor unit near the southeast corner, while the rest are beneath the west and south benches near the partitions or the southwest main roof support.

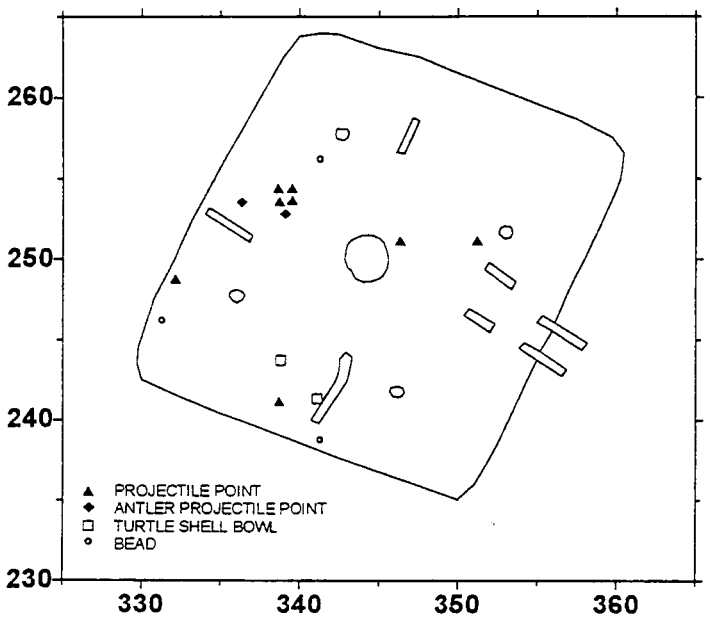
The punctuated ring pattern is evident for the bone in Structure 2 with the largest quantity present in the southwest or left rear half. Elements displaying canid alteration, while not common, follow the benches on the west or rear half of the structure. Small rodent activity, indicated by the rodent gnawed elements, suggests (along with charred maize kernels) food storage in the southeast or left front corner as well as a somewhat protected environment beneath the benches. The northeast or right front quarter contains only a small quantity of bone, unaltered by either canids or small rodents, and likely was a more open floor zone less conducive to such deposition.

Shell (n=903)

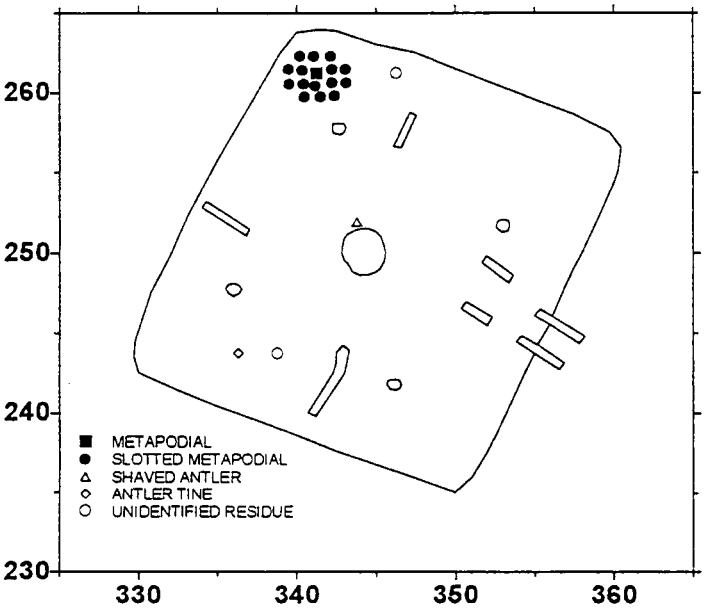
The distribution of shell by count is presented in Figure 7.10b. The shell sample closely follows the limits of the benches along the four walls with the exception of a concentration just northeast of the hearth in the central floor area. The compact concentration near the hearth is made up almost entirely of somewhat burned pelecypod or bivalve shells in ash, while deposits beneath the benches are made up of both pelecypods and gastropods. Pelecypods make up 69% of the shell sample. Gastropods make up 31% of the sample. Fragmentation, due in small part to cultural activities and primarily to soil conditions, inflates the bivalve shell count in the two smaller size classes, while the gastropod count more closely reflects the original number present. Periodic concentrations beneath the bench line indicate a punctuated ring pattern of deposition is present.

Worked Bone (n=19)

The worked bone sample is divided into finished bone artifacts or fragments of artifacts and preforms or residues from the manufacture process. A range of artifacts and associated residues indicating the manufacture and use or storage of worked bone items is present in Structure 2. The distribution of finished bone artifacts is presented in Figure 7.11a, and the distribution of worked bone preforms and residues is presented in Figure 7.11b. The worked bone artifacts are dominated by bone and antler projectile point fragments. Projectile points, manufactured from deer metapodial segments, are represented by heavily burned fragments concentrated near the center of the west bench



A. ST2 WORKED BONE ARTIFACTS



B. ST2 WORKED BONE PREFORMS AND RESIDUES

Figure 7.11. Structure 2 Worked Bone Artifacts.

north of the partition. The black, heavily burned condition of these projectile points contrasts with all other worked bone and suggests that the projectile points were stored, as arrow components, in the roof thatch of the structure. The unburned antler projectile points are both situated beneath the west bench north of the partition. Turtle shell bowls are represented by two fragments beneath the south bench west of the partition. The three beads, manufactured of small animal long bones reduced to length by groove-and-snap reduction, are widely scattered along the west and south benches.

Worked bone preforms and residues in Structure 2 are dominated by evidence of the deer metapodial reduction sequence. A partially worked metapodial and longitudinally grooved quarter metapodial preforms are present in the northwest corner of the structure. An antler tine, situated beneath the south bench, is either a minimally altered raw material or a tool utilized on soft non-abrasive materials. A shaved antler tine segment, perhaps the residue from antler projectile point manufacture, is situated near the west edge of the central hearth. Two grooved and ground shaft fragments of unidentified form, from near the north and south walls, complete the inventory of worked bone from Structure 2.

Worked Shell (n=1)

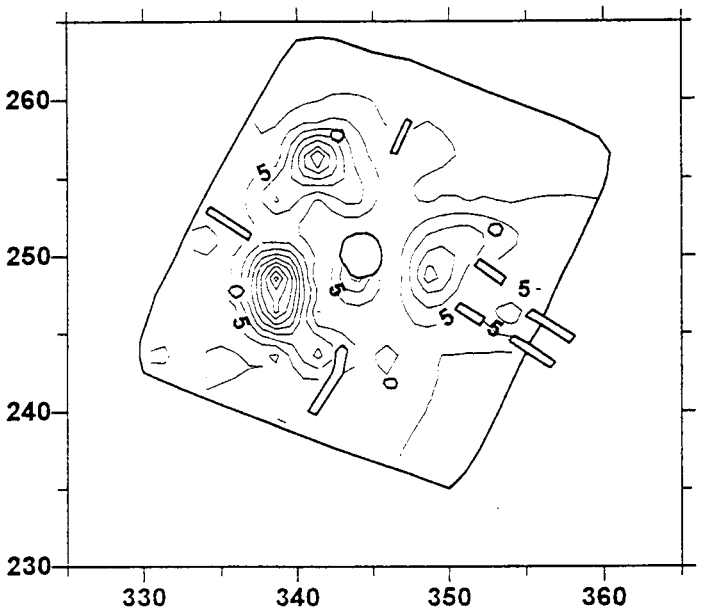
Worked shell is limited to a single large poorly preserved pocketbook mussel shell situated beneath the south bench west of the clay partition. The margins of the shell appear to be lightly ground. The pocketbook mussel is the most commonly utilized species for the shell "spoons" frequently found in small to medium sized jars in Dallas

phase burial contexts. Other worked shells may have been present; however, the friable condition of many bivalves precludes such a determination.

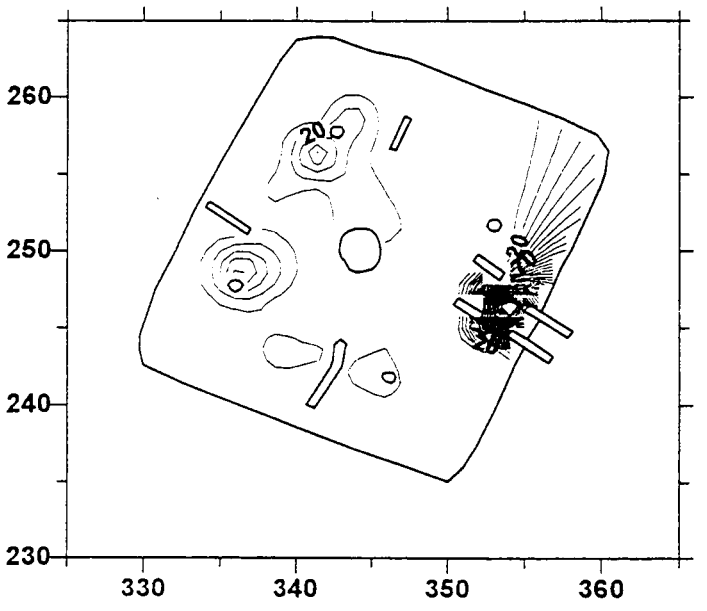
Botanical Material (n=1,479)

Botanical material, comprising both architectural elements and food remains, is the class most affected by exposure and weathering prior to being protected by accumulating sediments and thus best preserved where covered by fired clay roof fall or other more protected environments within the structure. Architectural elements and food remains provide differing distributions within Structure 2. Botanical identifications are tentative and the sample utilized includes only those materials individually plotted during excavation or recognized in the 0.64 cm (1/4 in) screen. A cursory examination of the floatation samples from Structure 2 for the presence or absence of the classes utilized in the distributional studies confirms the patterning identified on the larger scale, as well as adding other plant forms such as maize, sunflower, grape, and maypop. These additional plant forms, while not included in the quantitative distributional study, will be included in the discussion of botanical patterning.

Architectural materials, such as wood, cane, and bark, make up 90% of the Structure 2 botanical sample. The distribution of wood fragments, including large structural members and posts protruding from the floor, is presented by count in Figure 7.12a. Much of the wood, making up 28% of the architectural sample, is preserved around the edges of the mass of fired clay daub roof-fall. The distribution of architectural non-wood, making up 71% of the architectural sample and consisting of



A. ST2 WOOD COUNT



B. ST2 ARCHITECTURAL NON-WOOD COUNT

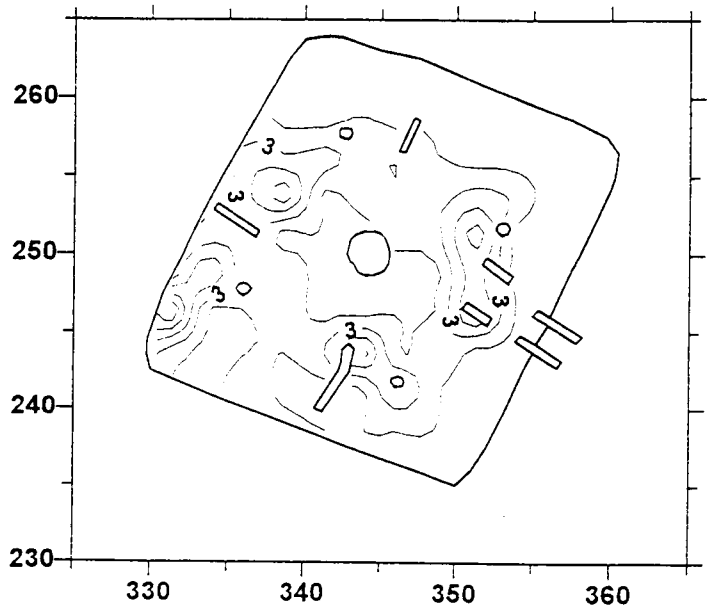
Figure 7.12. Structure 2 Botanical Remains.

cane and bark, is presented by count in Figure 7.12b. The bark is concentrated within the entryway near the east side of the structure while river canes follow the front edge of the benches along the west and south wall and may represent interior furnishings as well as roof elements.

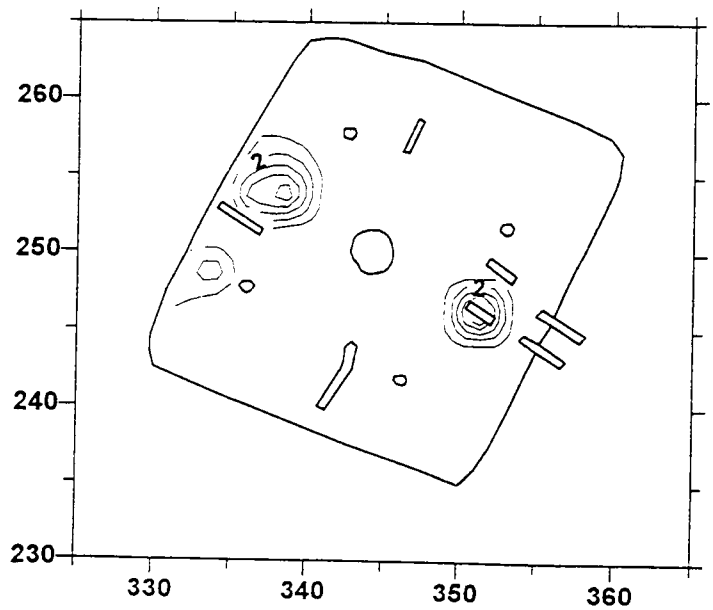
Preserved botanical food remains included in the quantitative distributional study include hickory nut shell, walnut shell, and a combined seed and fruit group. The distribution of all food remains by count, presented in Figure 7.13a, illustrates the punctuated ring pattern centered on the hearth and following the front edge of the benches. When divided into its component parts, each of the three groups of the food remains displays a different pattern.

Botanical seeds and fruits, presented in Figure 7.13b, include honey locust seeds (50%), cherry pits, and a bean. Fragments of porous charred material resembling burned fleshy pods, perhaps honey locust, are distributed along the north, west, and south benches as well as near the entryway. Honey locust seeds are concentrated beneath the center of the west bench with a smaller group in the southwest corner. The bean and one probable cherry pit are also beneath the center of the west bench, while the second probable cherry pit is beneath the south bench east of the clay partition.

The distribution of hickory nut shell fragments is presented in Figure 7.14a. This discontinuous distribution of relatively large fragments along the front edge of the bench, with a separate concentration in the southwest corner, is in contrast to that for black walnut shell fragments. The distribution of walnut shell fragments, presented in Figure 7.14b, is concentrated within the central floor area just within and to the north of the



A. ST2 BOTANICAL FOOD REMAIN COUNT



B. ST2 BOTANICAL SEED AND FRUIT COUNT

Figure 7.13. Structure 2 Botanical Food Remains.

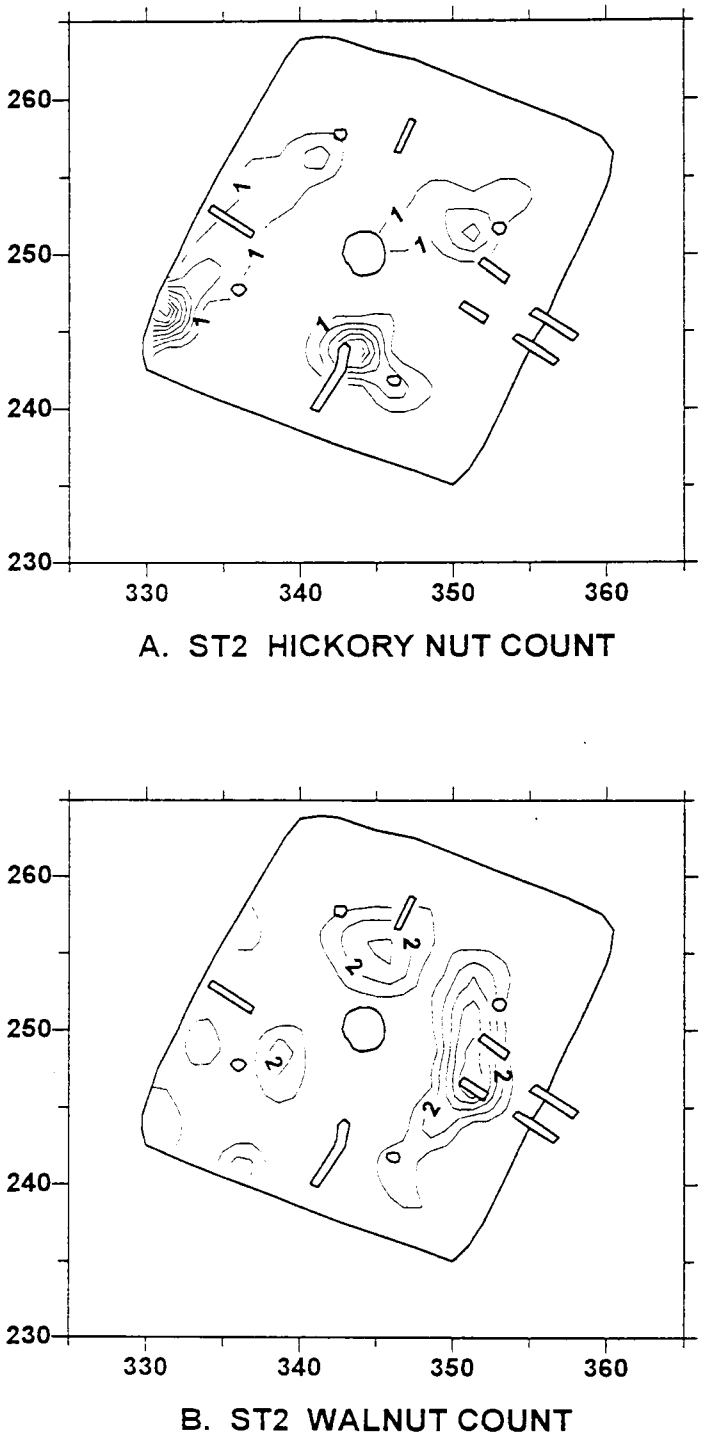


Figure 7.14. Structure 2 Botanical Nut Remains.

entryway with only a few fragments scattered elsewhere in the structure such as along the west and south walls. Few floor units contain both hickory and walnut shell fragments.

The cursory examination of botanical material in the floatation samples taken from all 52 floor units, provides additional insight on the distribution of botanical materials. Each floatation sample was quickly examined for the presence of the previously described botanical classes as well as for additional plant forms passing through the 0.64 cm (1/4 inch) screen. Eighty-eight percent of the floor units contained charred wood fragments, while river cane was noted as present in 71% of the floor units. Bark was noted in 19% of the units, and while concentrated at the entryway was present near the four walls of the structure outside the central floor area. Wild plant foods are represented by honey locust seeds (present in 27% of floor units) along the west bench, grape seeds (present in 4% of floor units) at the center of the west wall and near the hearth, and a passion flower seed present near the south wall west of the partition. Domestic plant foods are represented by maize kernels (present in 8% of the floor units) near the east wall on each side of the entryway, and sunflower seeds (present in 8% of the floor units) near the west and south walls. Hickory nut shell (present in 50% of the floor units) is concentrated against the east and west sides of the structure and poorly represented across the center of the structure from the center of the north wall to the center of the south wall. Walnut shell (present in 13% of the floor units) is widely scattered across the floor yet shares only three units with hickory nut shell. The

floatation data confirm and refine the distributions observed in the piece-plotted and screened sample derived from Structure 2.

Structure 2 Summary

Chapter VII has examined the contents of Structure 2 with respect to spatial patterning of artifacts and features within the structure. For uniformity, and to increase sample size within smaller tool classes, both piece-plotted and screen-recovered materials were combined in the production of Surfer isopleth and post maps for intuitive pattern recognition. A measure of size was provided for most classes by including paired isopleth maps displaying the mean weight as well as the class count within each floor unit. Floor areas displaying greater fragmentation were thus identified without inclusion of distribution maps for each size class. In each case the base map, showing the central hearth, clay partitions, and main roof supports, provided a frame within which the presented patterning could be examined.

Most materials display a donut or punctuated ring shaped pattern centered on the central hearth. Food and food preparation related refuse, such as smaller fire-cracked rock, bone, and ceramic fragments display a marked concentration in the left rear half of the structure. Ceramic vessels and vessel sections are also concentrated in the left rear half of the structure along the edge of the central floor area and beneath the benches along the walls. Worked bone and flaked stone artifacts are concentrated in the rear half of the structure, particularly in the vicinity of the rear bed or bench, while plant processing tools are concentrated in the right front quarter of the floor.

The overall distribution of materials in Structure 2, with numerous larger apparently functional tools and ceramic vessels in addition to smaller items and obvious refuse, suggests rapid abandonment of an occupied dwelling due to destruction by fire. Vessels were stored, in inverted position, beneath the benches in addition to the corner storage of other materials suggested in the existing Dallas phase household model. The central "public" floor area, with the central hearth, and the bordering "private" floor area, with partitions and benches, are present in the existing model. A third division of floor space not in the existing model, a more open area in the right front quarter of the structure apparently utilized for plant food processing and other activities requiring additional space, is present in Structure 2 and will be addressed in the revised household model.

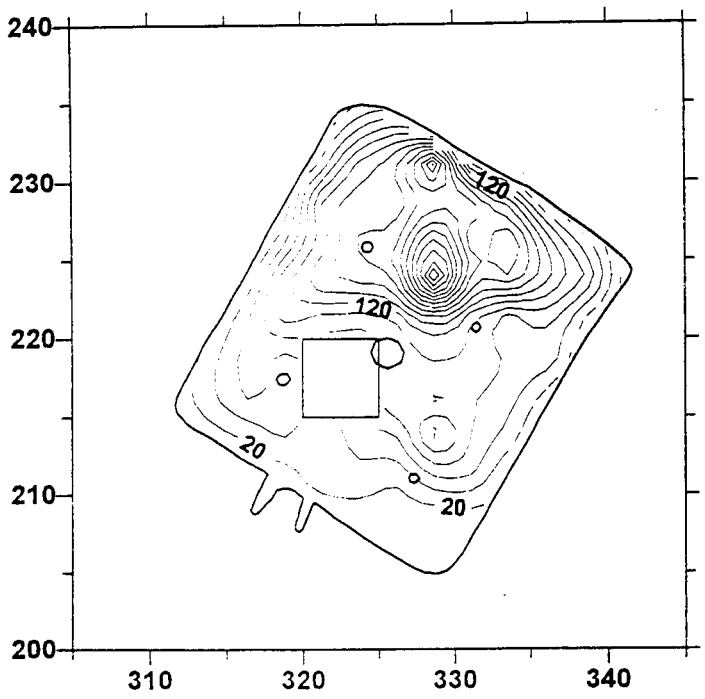
CHAPTER VIII

SPATIAL PATTERNING IN STRUCTURE 3

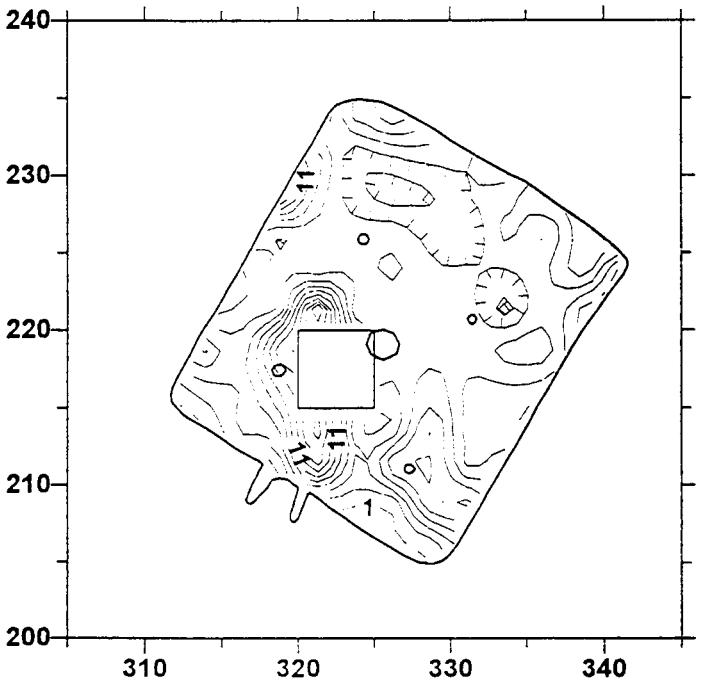
Chapter VIII will examine the contents of Structure 3, described in Chapter V, with respect to spatial patterning of artifacts and features within the structure. The proportion of the structure contents (8.7%), other than fired clay, plotted in three dimensions, is nearly identical to that for Structure 2 (9%). Variation in the percentage of objects within a piece-plotted class is related to size of the members making up the class due to increasing bias in uniformity of recovery with decreasing size. For uniformity and to increase sample size within smaller tool classes, both piece-plotted and screen-recovered materials will be combined in the production of Surfer isopleth and post maps for intuitive pattern recognition. A measure of size will be provided for most classes by including paired isopleth maps displaying the mean weight in grams, as well as the class count within each floor unit. Floor areas with greater fragmentation and corresponding larger unit counts will thus be identified without including distribution maps of each size class. The base map, with included central hearth and main roof supports, will provide a frame within which such patterns may be examined.

Cracked Rock (n=5,851)

The distribution of fire-cracked cobbles of quartzite, quartz, and sandstone by count and mean weight within each floor unit is presented in Figure 8.1. While the number of fragments is higher in the northwest, or left rear diagonal half of the structure,



A. ST3 CRACKED ROCK COUNT



B. ST3 CRACKED ROCK MEAN WEIGHT

Figure 8.1. Structure 3 Cracked Rock.

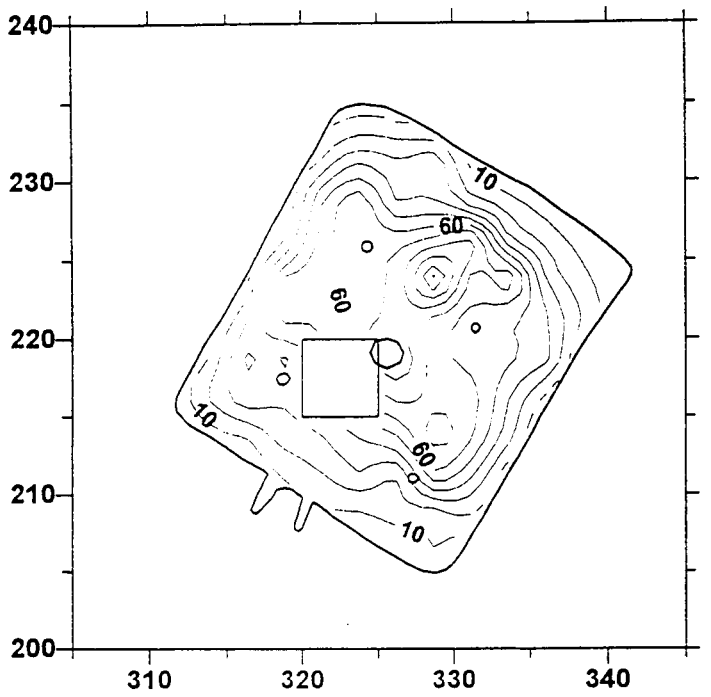
the larger fire-cracked rock displays a different pattern. The mean weight pattern reflects presence of a smaller number of larger fire-cracked rock in the central floor area south of the hearth, between the hearth and the entryway, as well as at the wall line on the east, north, west, and south. A secondary concentration of larger fire-cracked rock, situated in the southeast or right front quarter of the structure, is coupled with an increased number of smaller fire-cracked rocks. Smaller fire-cracked rock is most heavily concentrated near the center of the north bench, between the bench and the hearth on the opposite side of the hearth from the entryway. The overall pattern of fire-cracked rock suggests use in more than one location for activities requiring the use of heated rocks. The great proportion of smaller fire-cracked rock suggests an accumulation of rock too fragmented by repeated heating to be of further use. A second, scraping function utilizing a cracked rock edge is possible, as indicated by the presence of ten edge-utilized fire-cracked rocks in the piece-plotted sample; however, the edge wear characteristic of this cobble tool form is not evident on these fragments. The distribution of the larger number of small fragments beneath the north and west benches suggests greater use on this side of the central hearth with nonfunctional smaller fragments being swept or discarded away from the hearth under the benches. Larger fire-cracked rock along the wall-line can be attributed to backfilling of the structure basin against the exterior wall during building construction.

Round Rock (n=3,153)

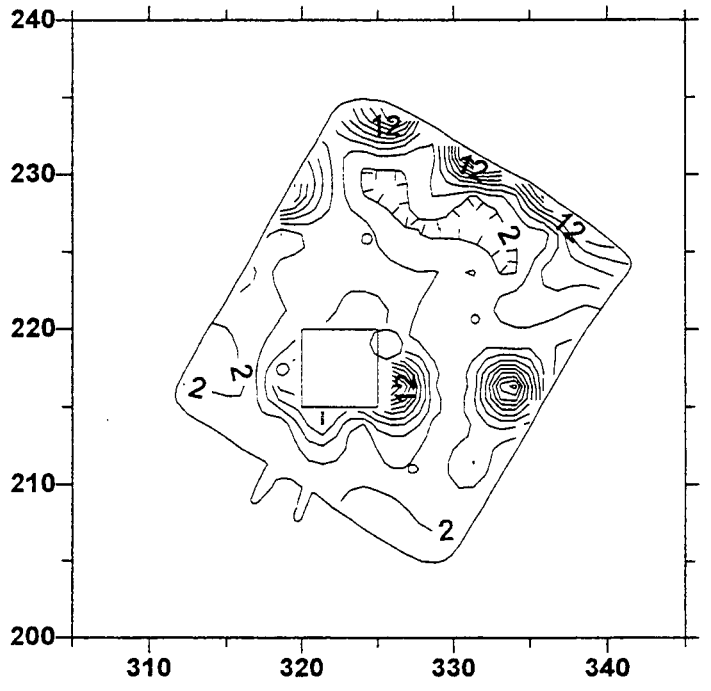
The distribution of unmodified quartz, quartzite, and slate pebble-sized to small cobble-sized rocks by count and mean weight within each floor unit is presented in Figure 8.2. The round rock class is probably derived from two sources. Smaller pebble-size rocks are likely inclusions in clay used for building purposes; indeed the low count south of the central hearth coincides with the hard fired clay mass containing identical pebbles. Larger, apparently unmodified, rocks are found southeast of the hearth in the vicinity of Feature 32, near the center of the east wall, and along the north and west outer walls. The larger rocks may have been utilized without obvious modification and display a distribution similar to the cobble tools. Round rock along the outer wall line can be attributed to backfilling the house basin against the exterior wall during construction.

Tabular Rock (n=436)

The distribution of tabular shale and limestone fragments by count and weight within each floor unit is presented in Figure 8.3. Limestone and shale are subject to fragmentation and chemical weathering of surfaces, and thus present additional interpretive problems. Soft and friable shale, making up 67% of the tabular class, is most common in small fragments in the northwest half of the structure. Only one discoidal-shaped, worked or modified shale fragment is recognizable and other functions are unknown. Limestone, less friable but frequently with weathered surfaces and making up 30% of the tabular class, is of larger size, making up 90% of the tabular rock more than

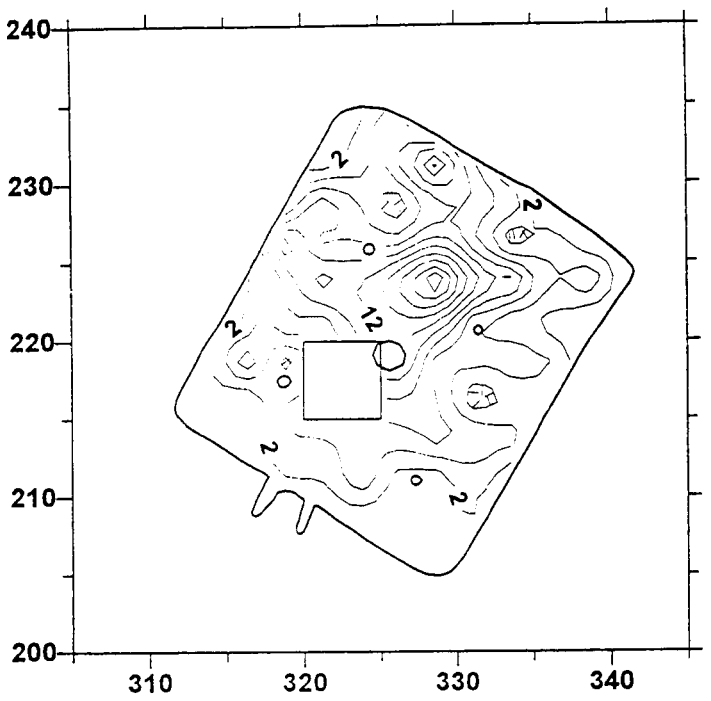


A. ST3 ROUND ROCK COUNT



B. ST3 ROUND ROCK MEAN WEIGHT

Figure 8.2. Structure 3 Round Rock.



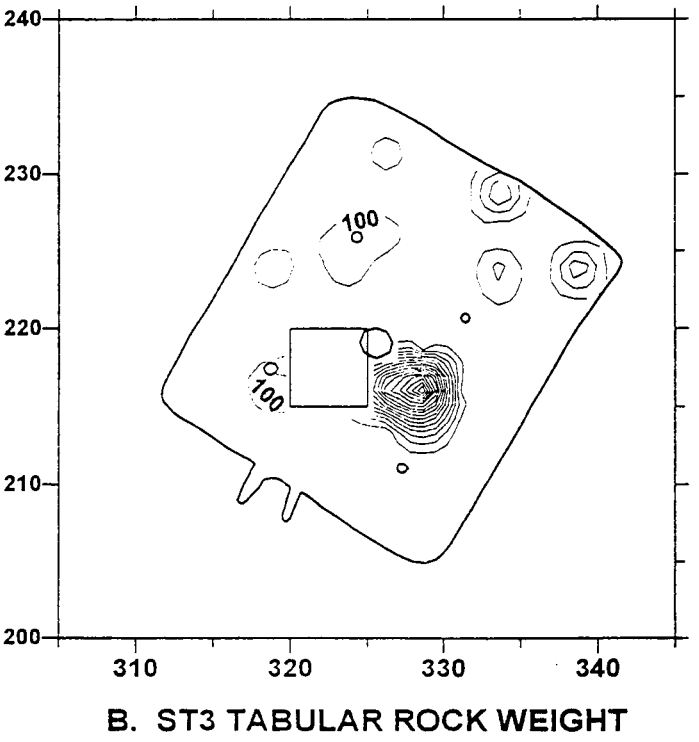
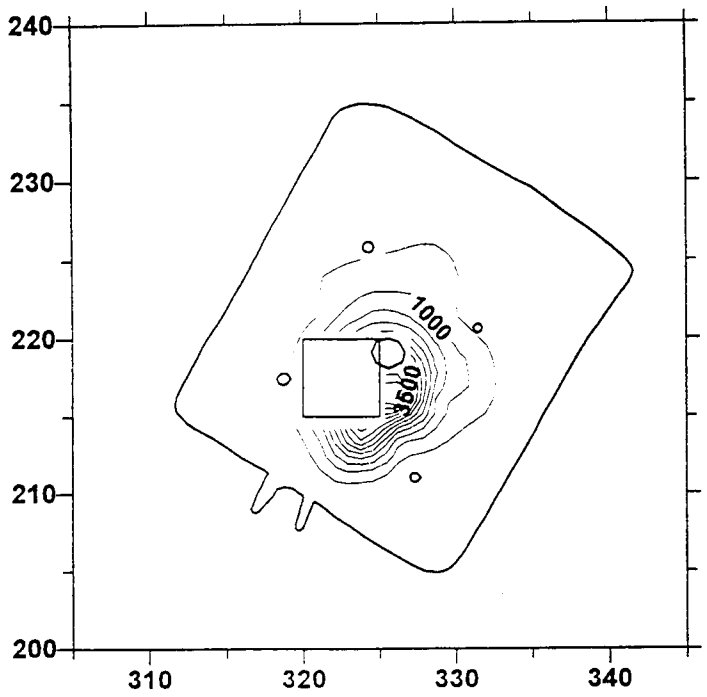


Figure 8.3. Structure 3 Tabular Rock.

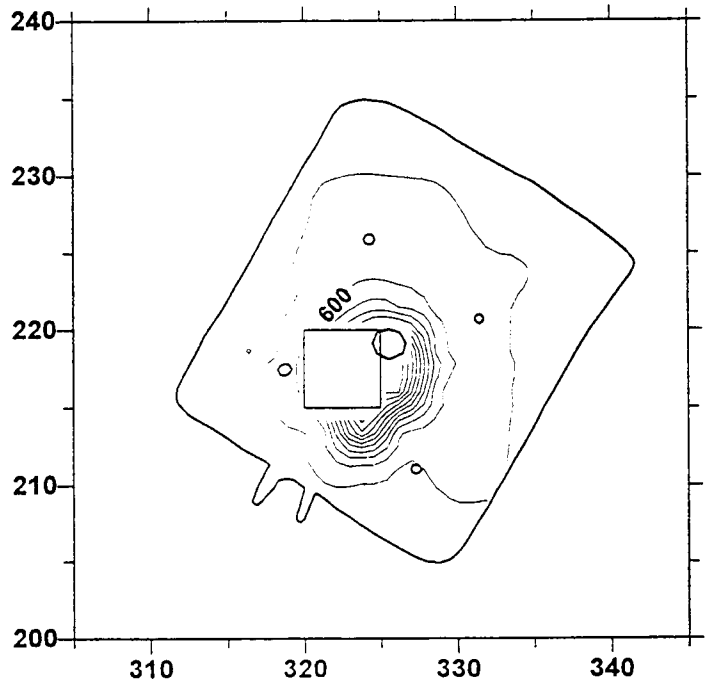
2.55 cm (1 in) in size, and probably served more than one function. Tabular limestone, some showing evidence of heat, is concentrated in the vicinity of Feature 32 southeast of the central hearth. Other larger tabular limestone, sandy limestone, and sandstone fragments reflect the pattern presented by recognized limestone whetstones and sandstone abraders in the cobble tool class and may be weathered tools or tool fragments. Limestone is commonly utilized in the manufacture of discoidals at the Loy site.

Fired Clay Architectural Material (n=40,196)

The distribution of fired clay architectural material by count and mean weight within each floor unit is presented in Figure 8.4. The Structure 3 fired clay mass, made up of fragments ranging from 0.64 cm (1/4 in) to 10 cm (4 in) in size, is concentrated south of the hearth in the center of the structure. The upper surface of the fired clay mass is quite fragmented, suggesting a period of exposure prior to being covered by a post-occupation humus. Uncharred and partially charred architectural elements are indicated by linear gaps and cavities of the fired clay mass while fully charred elements are represented by charred timber fragments. The relatively small quantity of fired clay recovered probably reflects a smaller amount utilized on the structure or, less likely, the effect of the length of time the structure was unoccupied prior to destruction by fire.



A. ST3 FIRED CLAY COUNT



B. ST3 FIRED CLAY WEIGHT

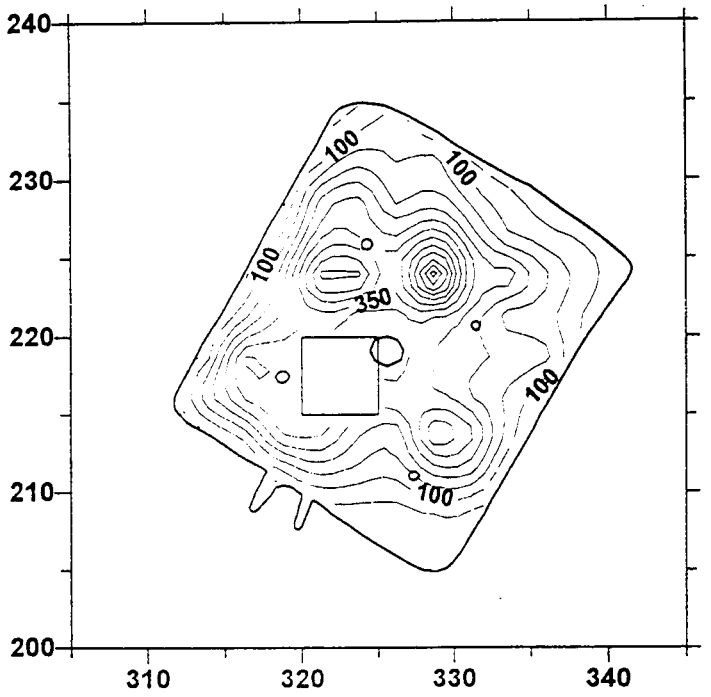
Figure 8.4. Structure 3 Fired Clay.

Ceramics (n=16,024)

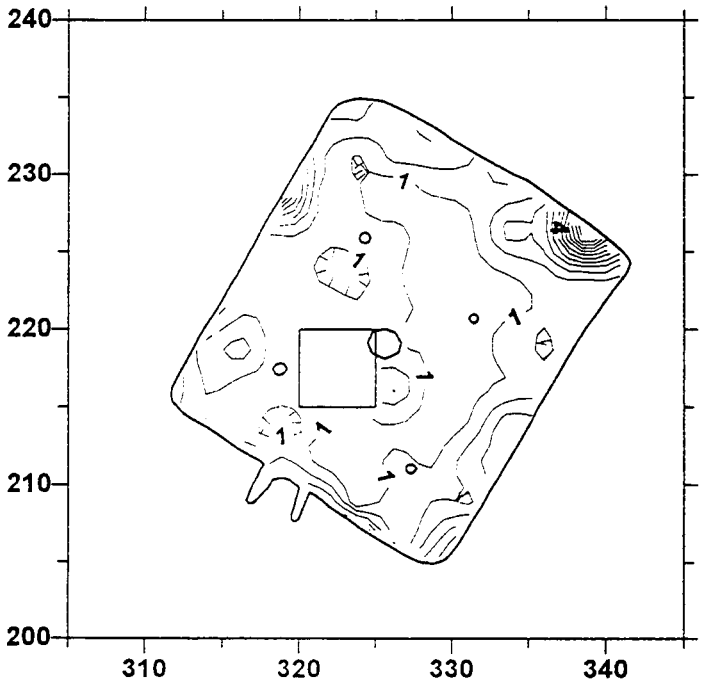
The distribution of ceramic vessel fragments and a small number of non-vessel items is presented by count and mean weight within each floor unit in Figure 8.5. All cross-mended sherds making up a vessel or vessel section are counted as a single item to prevent the single vessel broken in situ from creating undue bias. Ceramic vessel fragments are concentrated in the left rear half of the structure, to the north and west of the central hearth with a smaller concentration just north of the southeast main roof support. While the greatest number of sherds is evident between the center of the north bench and the central hearth opposite the entryway, the largest sherds are situated against the four walls. The distribution of the large number of smaller sherds beneath the west and north benches suggests greater use of this side of the central hearth with less easily picked up sherds being swept or discarded away from the hearth under the benches.

Ceramic vessels are represented by a single restorable example, a small strap handled jar incorporated in the fired clay roof fall over Feature 32 southeast of the hearth (Figure 8.6a). The small cordmarked strap handled jar, with a rim diameter of 13 cm, a shoulder diameter of 16.5 cm, and a height of 9.5 cm, is situated in an upright position within the daub mass filling the feature.

Ceramic sherds for which vessel form may be determined provide a spatial pattern as well as the relative proportion of jars and bowls (Figure 8.6a). The bowl form is made up of simple (n=25), closed (n=10), cazuela or carinated (n=4), and flanged (n=1) shapes. An additional "saltpan" form (n=24) is represented by textile impressed

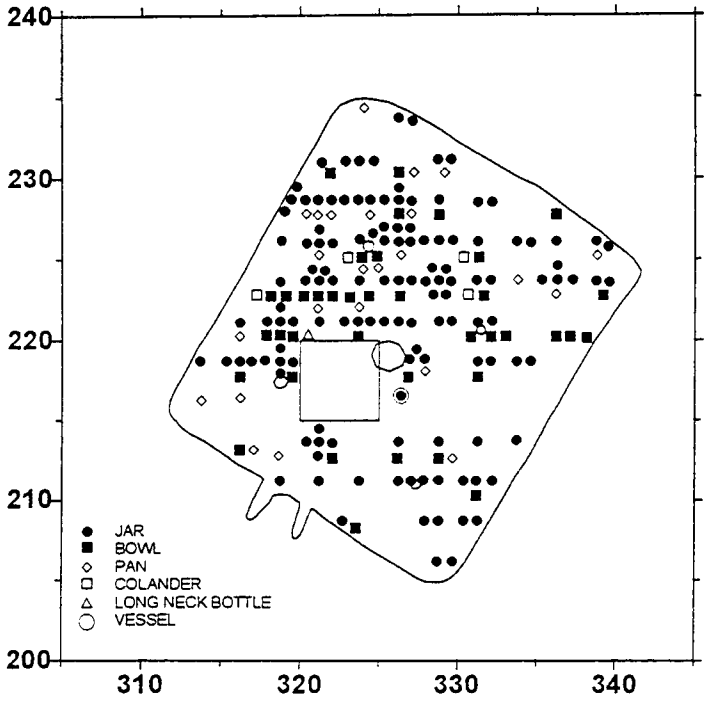


A. ST3 CERAMIC COUNT

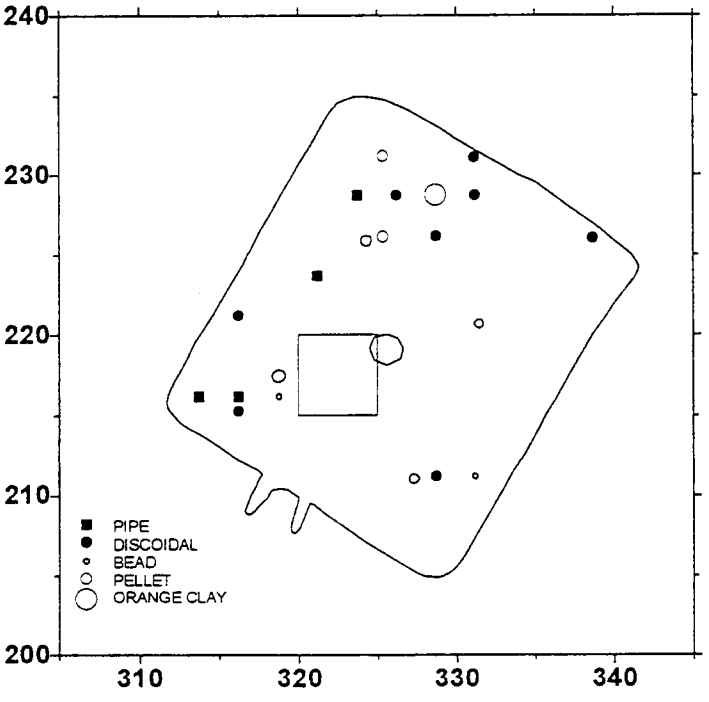


B. ST3 CERAMIC MEAN WEIGHT

Figure 8.5. Structure 3 Total Ceramics.



A. ST3 VESSEL FORM DISTRIBUTION



B. ST3 NONVESSEL CERAMICS

Figure 8.6. Structure 3 Ceramics.

sherds. The maximum thickness for all sherds of unidentified form is compared with the same measure for the vessel form sherd sample and the single vessel (Table 8.1) in an attempt to compare size distributions of vessels represented only by body sherds. While maximum sherd thickness alone does not indicate vessel form at the Loy site, it does appear to correlate with vessel size. Based on sherd thickness in the piece-plotted sample smaller vessels appear to be more common in the southeast half while the full range of vessel sizes is represented in the northwest half of Structure 3. Localized clusters of body sherds, such as near the southwest main roof support, having similar curvature, thickness, and surface treatment probably represent locations of vessel breakage where flatter sherds were not fully removed during floor maintenance.

Other, non-vessel, ceramic items in Structure 3 consist of discoidals (n=7), smoking pipe fragments (n=4), beads (n=2), clay pellets (n=2), and pottery clay (n=1). These items tend to occupy the west or left half of the structure (Figure 8.6b). The seven ceramic discoidals, manufactured of vessel fragments ground into shape, are widely scattered across the floor. At least two plain elbow pipes are represented by the four fragments, one of which had been reworked after stem breakage, in the southwest corner and west bench of the structure. The small temperless clay beads, spherical and barrel shaped, are present in the southeast and southwest quarters of the structure. The two fired solid pellets of temperless clay are situated in the northwest quarter of the structure along with a lump of bright orange greasy-textured unfired clay.

Table 8.1. Thickness and Vessel Form for Structure 3 Ceramic Sherds and Vessels.

MAXIMUM THICKNESS	UID FORM	JAR	BOWL	CAZUELA	COLANDER	SALTPAN
3.0	1					
3.5	5					
4.0	12	F32S				
4.5	29	5	2			
5.0	48	6	1		1	
5.5	66	5	2			
6.0	62	7	1	1		
6.5	79	13	3	1		
7.0	87	11	2	1		
7.5	66	12	1			1
8.0	65	7	5		1	1
8.5	53	8	1			3
9.0	49	8	1			
9.5	37	8	1			
10.0	34	8	1			3
10.5	17	3				
11.0	9					
11.5	8					1
12.0	6					2
12.5	3					1
13.0						
13.5	1					
14.0	3	1				1
14.5	1					1
TOTAL	741	103 1	22	3	2	14

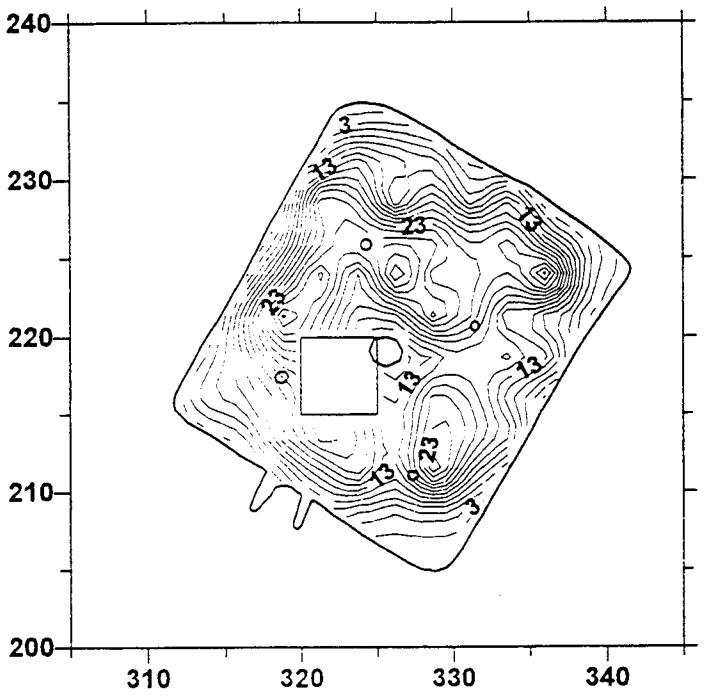
[Vessel size designation by rim diameter S = <8-18cm; M = >18-28cm; L = >28cm]

Lithics - Debitage (n=1,193)

The distribution of all otherwise unmodified chipped material resulting from the manufacture, maintenance, or repair of lithic artifacts is presented by count and mean weight within each floor unit in Figure 8.7. The distribution by count presents the punctuated ring pattern centered on the hearth with higher counts beneath the front edge of the north and west benches. The greatest quantity of lithic debitage is concentrated near the center of the north bench. The distribution by mean weight within each floor unit presents a different pattern, with the greatest mean weights situated between the north bench and the hearth in the central floor area. A secondary concentration by mean weight is evident in the southeast quarter of the structure just east of the entryway. A reexamination of those fragments most likely to affect the mean weight factor, such as blocky chunks, cores, and tested nodules, indicates that the largest fragments are concentrated east and south of Feature 32 in the south or right front portion of the structure near the entryway as well as where the flakes and other debitage are concentrated. The punctuated ring pattern for lithic debitage suggests several separate areas along the east, north, and south benches where lithic reduction and tool maintenance took place.

Lithics - Flaked Tool (n=108)

The distribution of the flaked tool class, made up of all flaked artifacts other than obvious debitage, is presented in Figure 8.8. Bifacially worked projectile point/knife types and fragments (Figure 8.8a) are concentrated in the north or rear half of the



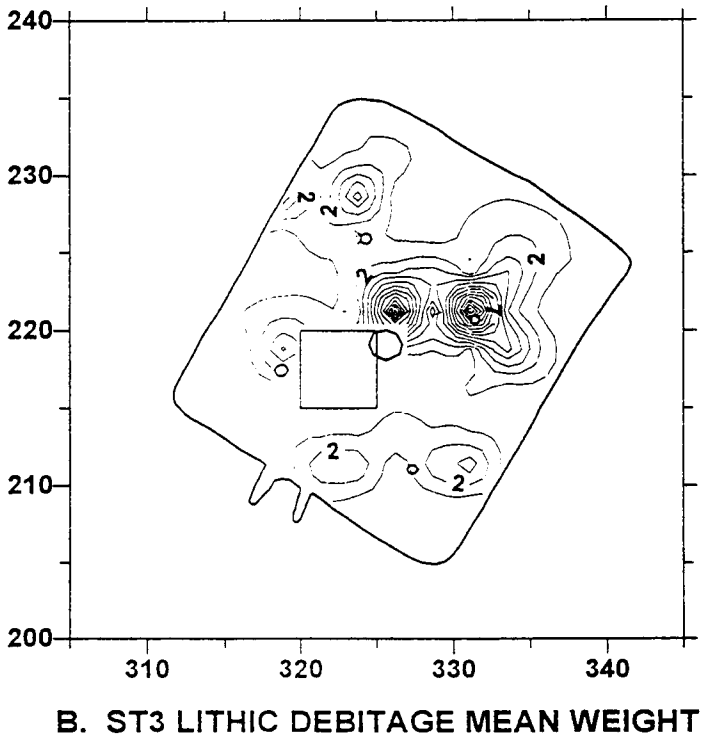
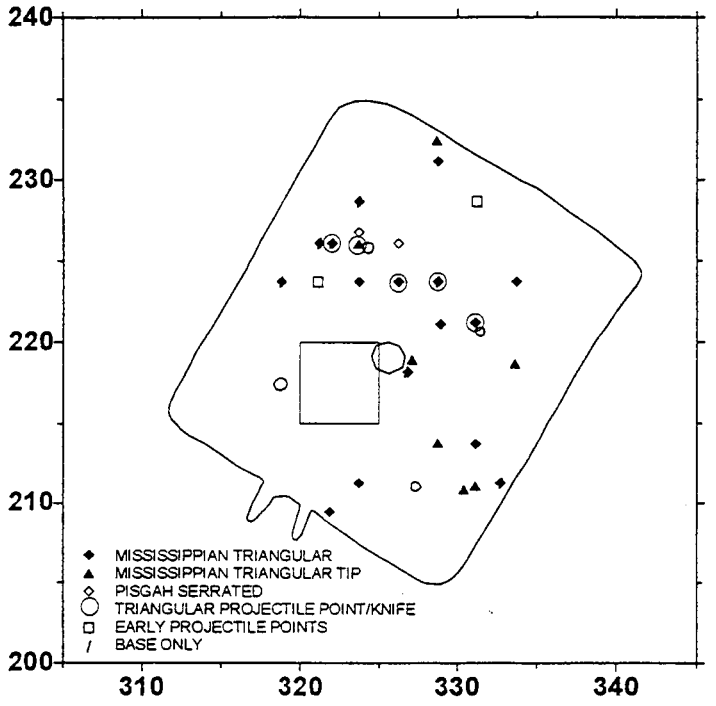
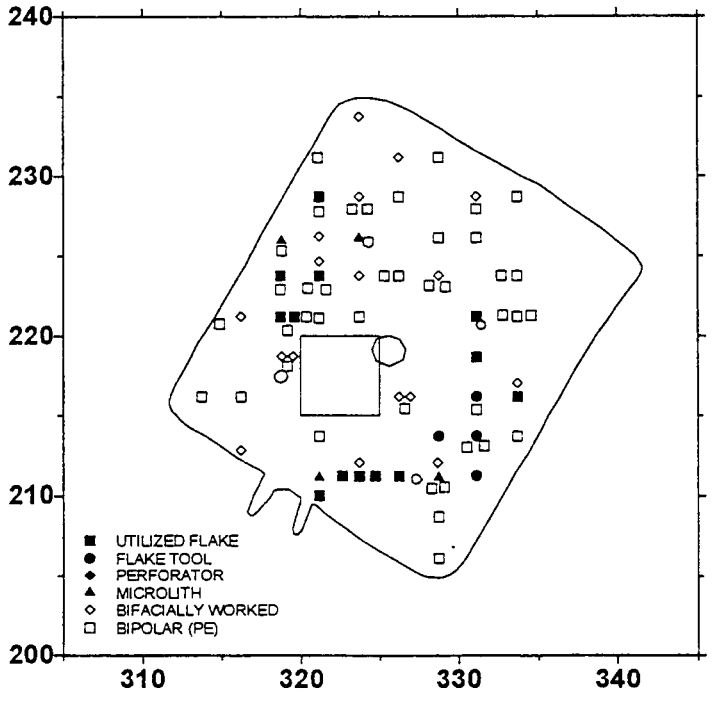


Figure 8.7. Structure 3 Lithic Debitage.



A. ST3 PROJECTILE POINT/KNIVES



B. ST3 OTHER FLAKED TOOLS

Figure 8.8. Structure 3 Flaked Tools.

structure, with a second concentration in the southeast or front right quarter. Four Mississippian triangular points display short blades and heavily retouched margins suggestive of exhausted projectile points discarded during weapon maintenance activities. Five Mississippian triangular base sections may also have been discarded during such activities. Six distal ends derived from such triangulars may have been produced during projectile point manufacture, or, as suggested by two impact-fractured tips, been introduced via successfully hunted game. One Mississippian triangular in the secondary cluster has an unusual, smooth, wear pattern on the blade. Three of the five probable Mississippian triangular knives are along the front edge of the north bench, while the other two are situated near the northwest main roof support a short distance to the west. The two Pisgah serrated projectile points are also near the northwest roof support. The second concentration, in the southeast quarter, is made up of four Mississippian triangular points and three distal ends derived from such triangular points. The Woodland period stemmed projectile point/knife is from the west bench while the Archaic example is from the back of the north bench.

Flaked tool type distributions are illustrated in Figure 8.8b. Utilized flakes are concentrated in three clusters; four closely spaced near the east side of the entryway, five near the center of the west bench, and five near the center of the east wall. Four small flake tools or microliths having the lateral margins retouched on the dorsal surface to form a thick sharp point are associated with these same clusters, one east of the entryway, two along the west bench, and one in the cluster near the east wall. The remaining flake tools, all in the cluster near the east wall, are three elongate flakes with

retouched lateral margins and one with a retouched distal end that resembles a small end scraper. Bifacially worked fragments and pieces displaying bipolar crushing on two or more opposed edges (PE) are widely scattered across the structure floor. The utilized flakes suggest light cutting activities at the three cluster locations; just east of the entryway, near the west bench, and near the east wall, while the steeply pointed flake tools and other flake tools suggest specialized activities may have taken place in the same locations.

Lithics - Cobble Tool (n=46)

A wide range of activities is probably represented by cobble tools. This class consists of larger, probably expedient, utilitarian items utilized for the reduction of other materials. While a particular action, such as abrasion or percussion, might reasonably be surmised, the material acted upon or activity engaged in is a more difficult matter. As no consistent multiple use sequence could be determined, other than utilization of broken edges after breakage of other forms, an arbitrary decision concerning choice of the primary use category was made during analysis and multiple use noted on the distribution map (Figure 8.9a).

The general ring pattern of cobble tool deposition in Structure 3 is composed of three main groups, centered on the north, west, and east walls, and several more isolated implements. The north or rear group is further subdivided into a cluster along the front of the north bench and a cluster against the north wall. The front portion of the north group is made up of five edge-utilized fire-cracked rocks, three tabular sandstone

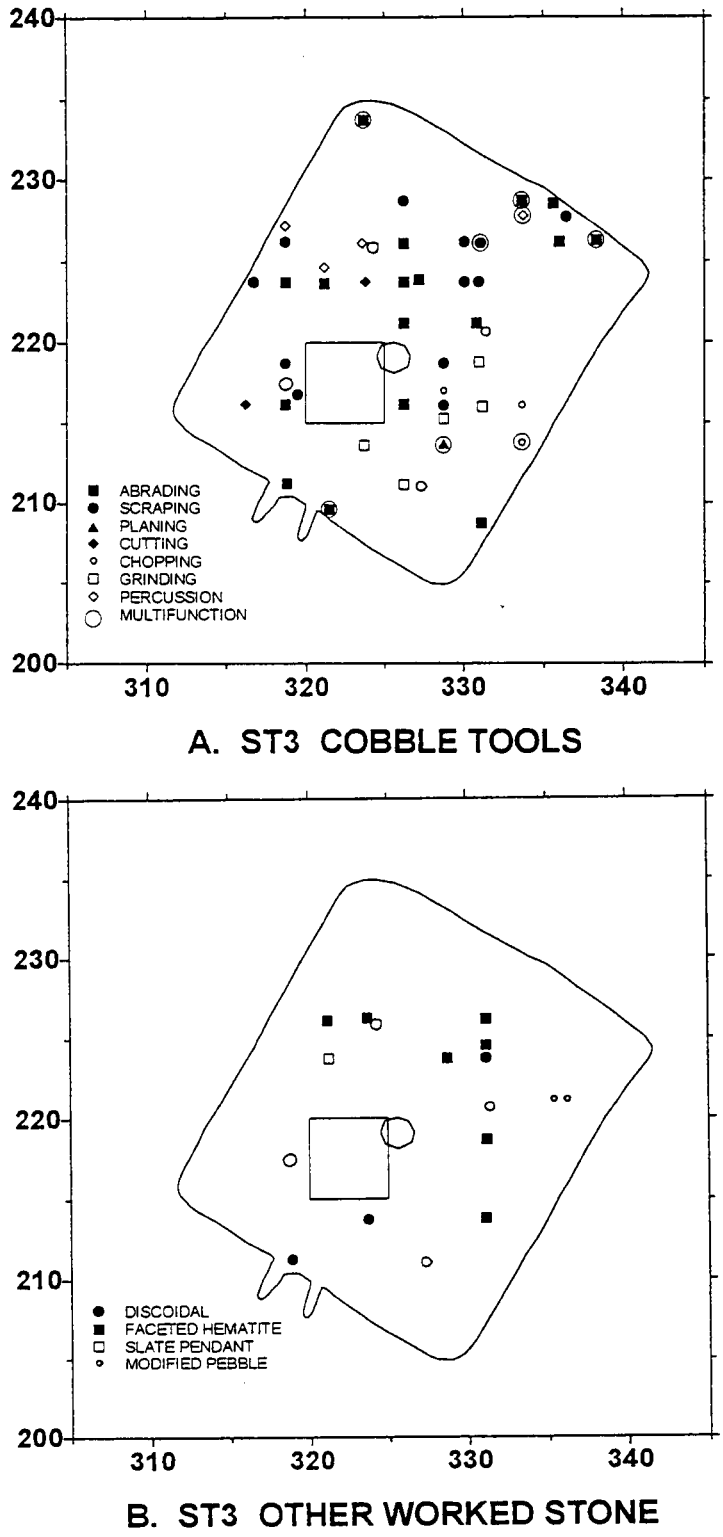


Figure 8.9. Structure 3 Other Stone.

abraders, and two slightly grooved sandstone abraders. One of the edge-utilized rocks shows additional use as indicated by a pit in one face. The back wall portion of the north group, possibly resulting from materials falling behind the bench, is made up of one edge-utilized fire-cracked rock, one tabular sandstone abrader, one bipitted hammerstone, and three large tabular limestone whetstones. Two of the whetstones show additional use as anvils.

The west or left group is made up of an edge-utilized fire-cracked rock, an edge utilized cobble, three spherical hammerstones, and two smaller tabular limestone whetstones. None of the tools in the west group show evidence of having been used for multiple functions.

The east group, occupying the more open floor space in the southeast or right front quarter of the structure, is dominated by plant processing and heavy duty cutting implements. The group is made up of four manos, three choppers, two edge-utilized fire-cracked rocks, two tabular sandstone abraders, one cylindrical cobble plane, and a pestle fragment. Two of the manos, on the south edge of the group, bear two opposed grinding faces, while another bears pits from other usage. Two of the flaked cobble choppers are represented by one lateral half with one showing subsequent edge utilization after breakage. The cobble plane displays impact scars from secondary use as a hammerstone.

Other, more isolated, cobble tools consist of four tabular limestone tools against the structure walls and a tabular sandstone abrader and edge-utilized cobble near the southwest main roof support. A tabular limestone anvil is present against the wall just

east of the entryway. A tabular limestone whetstone against the wall in the northwest corner shows anvil use. Two smaller tabular limestone whetstones are situated just west of the entryway and near the southeast corner of the structure.

Four widely scattered greenstone flakes, one in the west group, two in the east group, and one in the southwest corner, reflect maintenance or repair activities applied to ground stone edge tools such as celts, adzes, and chisels. Each larger flake displays the highly polished surface characteristic of these tool forms between later impact marks resulting from reshaping through pecking. The flakes themselves probably reflect the removal of larger pieces to reform a broken or damaged ground stone edge tool bit.

Lithics - Other (n=13)

The distribution of other worked stone is presented in Figure 8.9b. Sources of pigment make up 54% of the class. Seven hematite fragments, bearing ground facets from the production of red pigment, are present in Structure 3. Three fragments, including two of the three examples larger than 2.55 cm, are near the center of the north or rear bench. Two fragments, including the remaining example more than 2.55 cm in size, are at the north end of the west bench. Two small heavily utilized fragments are near the center of the east wall.

Three stone discoidal-shaped artifacts, manufactured of shale, sandstone, and limestone are present in Structure 3. The roughly shaped siltstone example, with slightly ground edges, is in the tabular stone concentration southeast of the hearth. The sandstone example, with a series of distinct facets making up the edges, is near the

entryway and may have served as a discoid hammer stone utilized in flint knapping. The limestone example, well-shaped but split down the center, is near the center of the north bench.

The pebble artifact class (n=3) serves as a catch all category of objects modified from slate pebbles. An engraved green slate pendant displaying a single biconical perforation near one end, is near the center of the west bench. A small grey slate pebble bearing a pair of opposed notches, and a pebble displaying impact marks on one face, are in the northeast corner.

Bone (n=6,699)

The distribution of animal bone by count is presented in Figure 8.10a. The bone sample follows the limits of the benches along the walls with the exception of a heavy concentration northwest of the hearth in the central floor area. Burned and calcined bone fragments make up 27% of the sample and are widely scattered across the floor. The distribution of burned and calcined bone suggests heat alteration resulted from cultural factors other than the destruction of Structure 3 by fire. Butchering marks are present on only three elements, two of which are situated near west wall and one near the northeast main roof support. One bone bearing butchering marks also displays canid gnawing crosscutting the butchering scars.

The number of bones (n=368) displaying gnawing marks and surface alteration by digestive juices provide data concerning the behavior of resident canids. Gnawed (1.1%) and digested (4.4%) fragments, while concentrated beneath the benches along the walls

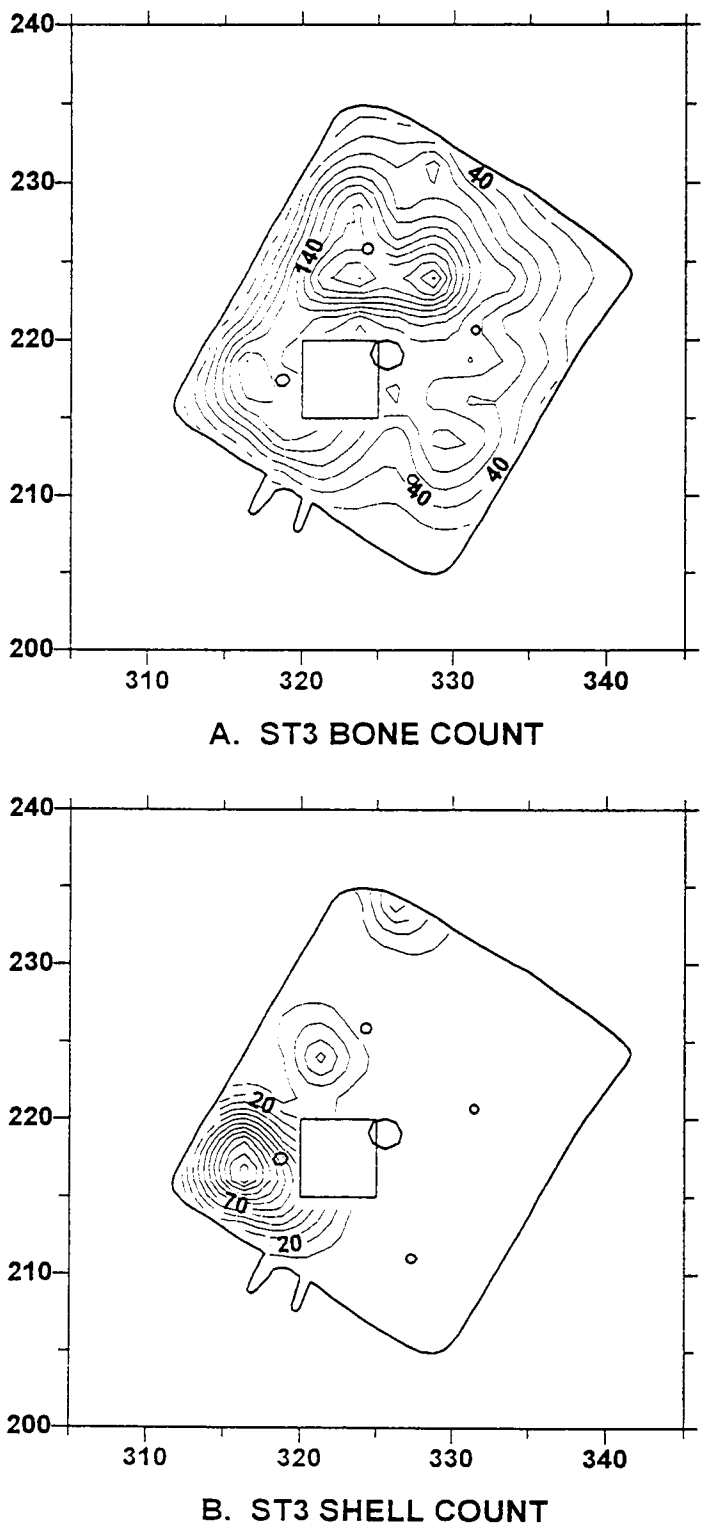


Figure 8.10. Structure 3 Bone and Shell.

of the structure, are also scattered across the floor. The number and distribution of canid altered bones suggest canids frequented all parts of Structure 3 and may have affected the distribution and composition of the faunal sample. Rodent gnawed fragments make up only a small portion (0.1%) of the recovered bone and are found beneath the benches.

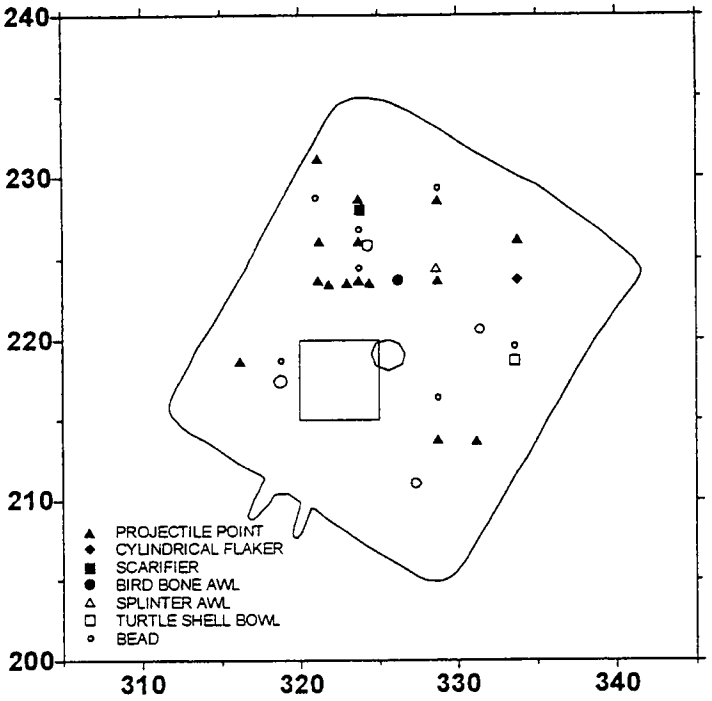
The punctuated ring pattern is evident for the bone in Structure 3 with the largest quantity present in the northwest or left rear half. Elements displaying canid alteration are widely scattered throughout the structure. Small rodent activity, indicated by the rodent gnawed elements, suggests a somewhat protected environment beneath the benches. The southeast or right front quarter contains a relatively small quantity of bone, unaltered by either canids or small rodents, and likely was a more open floor zone less conducive to such deposition.

Shell (n=1,054)

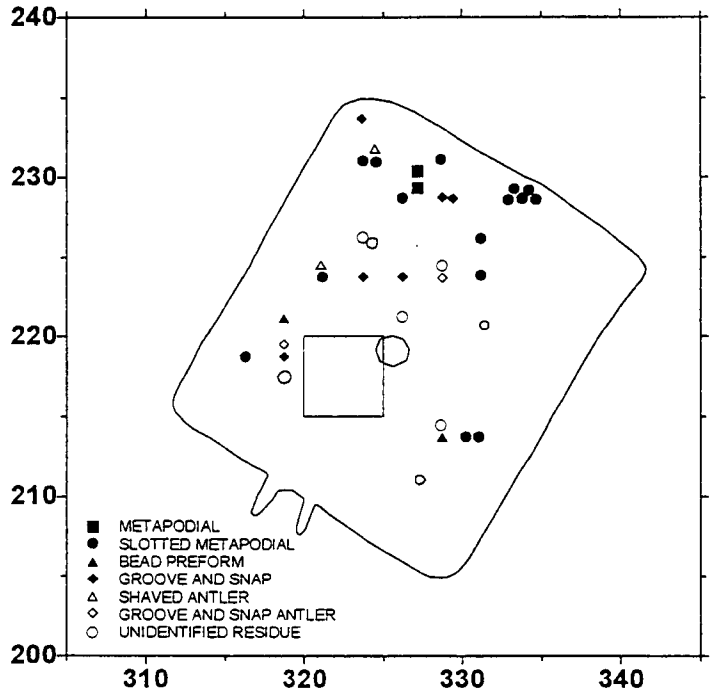
The distribution of shell by count is presented in Figure 8.10b. The shell sample is concentrated in the southwest or left front quarter of the structure with smaller secondary concentrations beneath the west bench and in the northwest corner. Smaller numbers of shells are scattered elsewhere on the floor. The shell sample is made up of both pelecypods and gastropods. Pelecypods make up 58% of the shell sample. Gastropods make up 42% of the sample. Fragmentation, due to in small part to cultural activities and primarily to soil conditions, inflates the bivalve shell count in Size Class 2 and Size Class 3, while the gastropod count more closely reflects the original number present.

Worked Bone (n=64)

The worked bone sample is divided into finished bone artifacts or fragments of artifacts and preforms or residues from the manufacturing process. A range of artifacts and associated residues indicating the manufacture and use or storage of worked bone items is present in Structure 3. The distribution of finished bone artifacts is presented in Figure 8.11a, and the distribution of worked bone preforms and residues is presented in Figure 8.11b. The finished bone artifacts are dominated by bone projectile point fragments. Projectile points, manufactured from deer metapodial segments, are represented by both unburned and heavily burned fragments. Burned projectile point fragments are concentrated near the north end of the west bench and near the east wall, while unburned examples are present at the north end of the west bench and the north bench. At least seven bone projectile points are represented by the seventeen fragments. The black or calcined white heavily burned projectile point fragments probably represent points stored, as arrow components, in the roof thatch of the structure. The unburned examples, including one complete point in a vertical position in a posthole along the west wall and two fragments with impact fractures, rest on or within floor deposits and so are unaltered by the fire. A split fragment of a cylindrical antler pressure flaker is beneath the north bench. A sharpened bird bone sliver, closely resembling a tooth from a scarifier or kanuga utilized for ritual scratching by the historic Cherokee (Hudson 1976:415) is in the northwest corner. Awls are represented by a birdbone awl tip fragment and a splinter awl with the tip missing near the center of the north bench. A turtle shell bowl, represented by a fragment with a smoothly ground rim, is near the



A. ST3 WORKED BONE ARTIFACTS



B. ST3 WORKED BONE PREFORMS AND RESIDUES

Figure 8.11. Structure 3 Worked Bone Artifacts.

northeast main roof support. The seven bone beads, manufactured from small animal long bones reduced to length by groove-and-snap reduction, are widely scattered in the structure.

Worked bone preforms and residues in Structure 3 are dominated by evidence of the deer metapodial reduction sequence. Two metapodials displaying the beginnings of longitudinal grooves, one retaining other lower limb bones in articular position and the other having the distal end removed by groove-and-snap reduction, are driven into the structure floor near the west end of the north bench. Longitudinally grooved quarter metapodial preform fragments (n=18) are concentrated along the north bench, with two fragments along the west bench and two fragments near the east wall. Such preforms provide an intermediate stage in the manufacture of bone projectile points and selected other objects. One unfinished shaved antler projectile point tip is in the northwest corner. Bead preforms (n=2), consisting of small animal long bones grooved for the detachment of short segments for beads, are present near the west bench and the east wall. Shaved antler tine fragments (n=2) and tine segments displaying groove-and-snap reduction (n=2) are present along the west and north benches. The remaining eight examples of worked bone consist of small unidentified fragments displaying evidence of longitudinal grooves, ground edges, or groove-and-snap reduction, present around the edges of the central floor area.

Worked Shell (n=1)

Worked shell is limited to a single bivalve shell fragment displaying a ground edge. Other worked shells may have been present; however, the friable condition of many bivalves precludes such a determination.

Botanical Material (n=1,001)

Architectural elements and food remains provide differing distributions within Structure 3. The distributions of the several botanical subclasses are presented by count within each floor. Botanical identifications are tentative and the sample utilized includes only those materials individually plotted during excavation or recognized in the 0.64 cm (1/4 in) screen. A cursory examination of a portion of the flotation sample from Structure 3 for the presence or absence of the classes utilized in the distributional studies confirms the patterning identified in the larger scale sample. Architectural materials such as wood, cane, and bark, make up 88% of the Structure 3 botanical sample. The distribution of wood fragments, including structural members and posts protruding from the floor, is presented by count in Figure 8.12a. Much of the wood, making up 92% of the architectural sample, is preserved beneath the mass of fired clay daub roof-fall. The distribution of architectural non-wood, making up 8% of the architectural sample and consisting only of cane, is presented by count in Figure 8.12b. The river canes are best preserved within and beneath the fired clay roof-fall and probably represent roof elements.

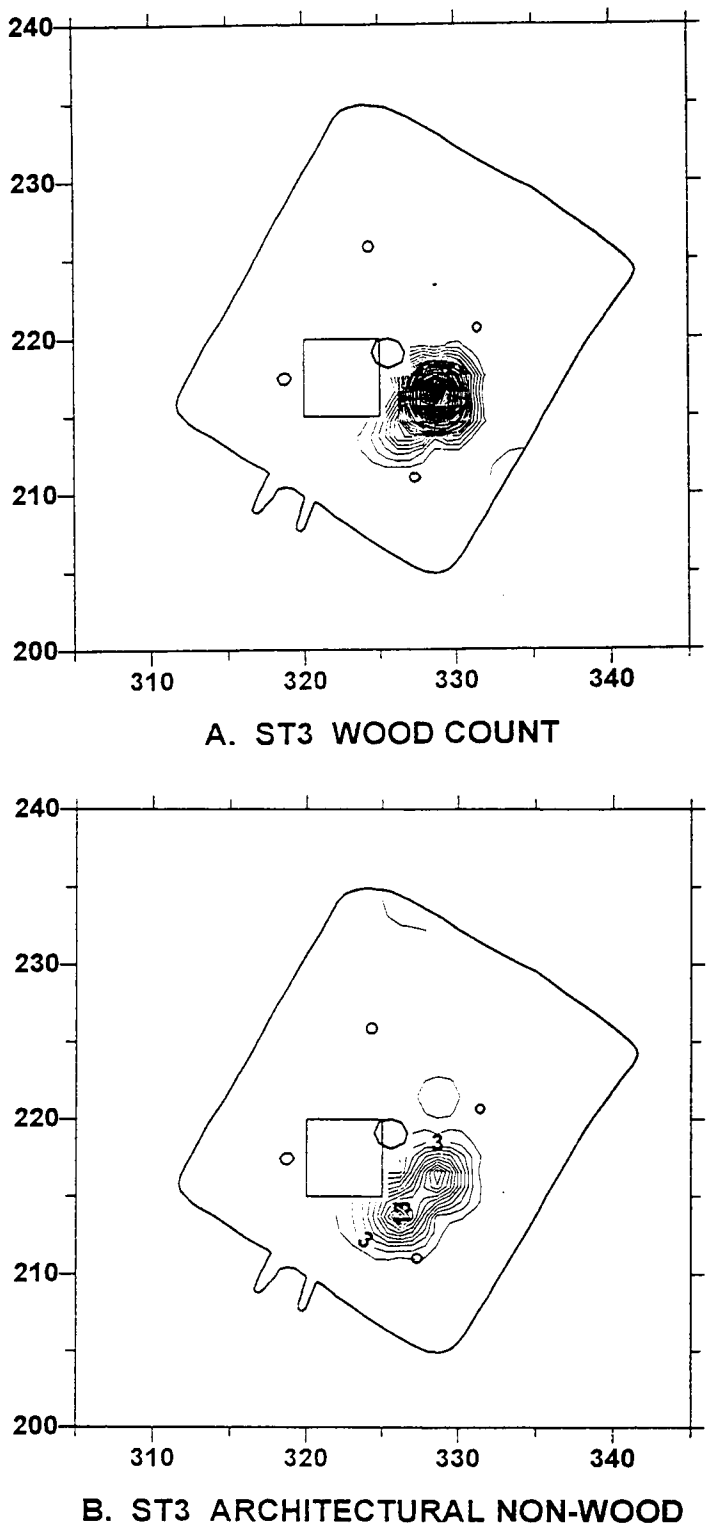


Figure 8.12. Structure 3 Botanical Remains.

Preserved botanical food remains included in the quantitative distributional study include hickory nut shell, walnut shell, and a combined seed and fruit group. The distribution of all food remains by count, presented in Figure 8.13a, illustrates the punctuated ring pattern centered on the hearth and following the benches. When divided into its component parts, the seeds and fruits group and the nut shell group each display a different pattern.

The botanical seeds and fruits group, presented in Figure 8.13b, is made up of only two fragments. A fragment of porous charred material resembling a burned fleshy pod, perhaps honey locust, is situated beneath the north or rear bench. A large unidentified seed or fruit pit is situated south or in front of the central hearth near the entryway.

The distribution of hickory nut shell fragments is presented in Figure 8.14a. This discontinuous distribution of relatively large fragments along the front edge of the bench, with a separate concentration near the east wall in the southeast or right front quarter, is comparable to that for black walnut shell fragments. The distribution of walnut shell fragments, presented in Figure 8.14b, while somewhat more restricted across the structure floor, displays the same pattern. The greatest concentration of walnut shell fragments is also situated near the east wall in the southeast quarter. Forty-one percent of the 46 floor units producing nut shell fragments contain both hickory and walnut shell, while 35% contain only hickory and 24% contain only walnut.

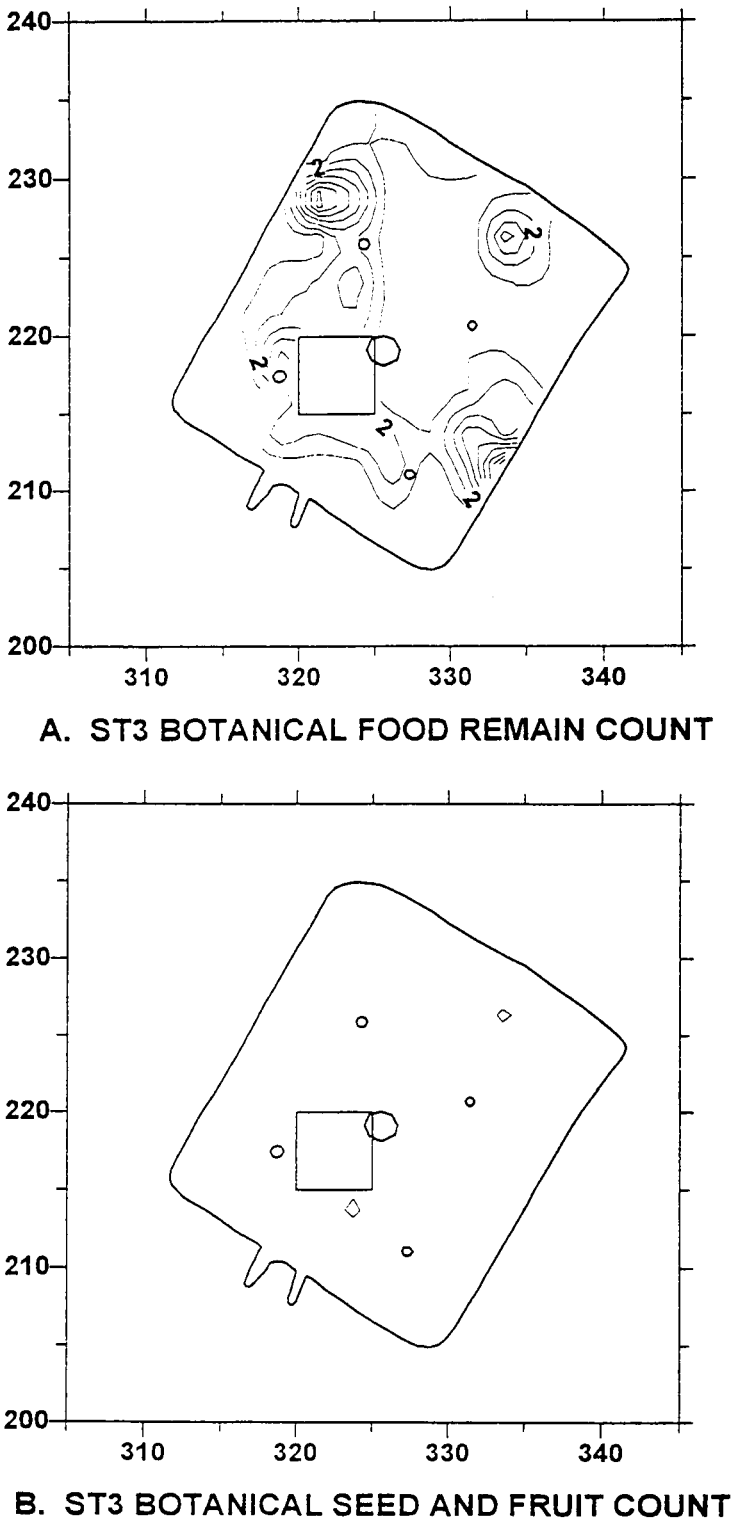
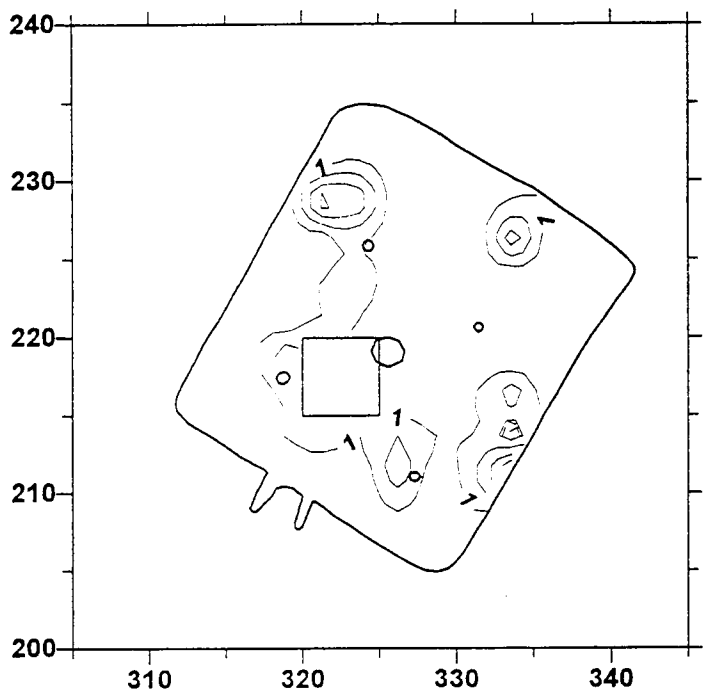


Figure 8.13. Structure 3 Botanical Food Remains.



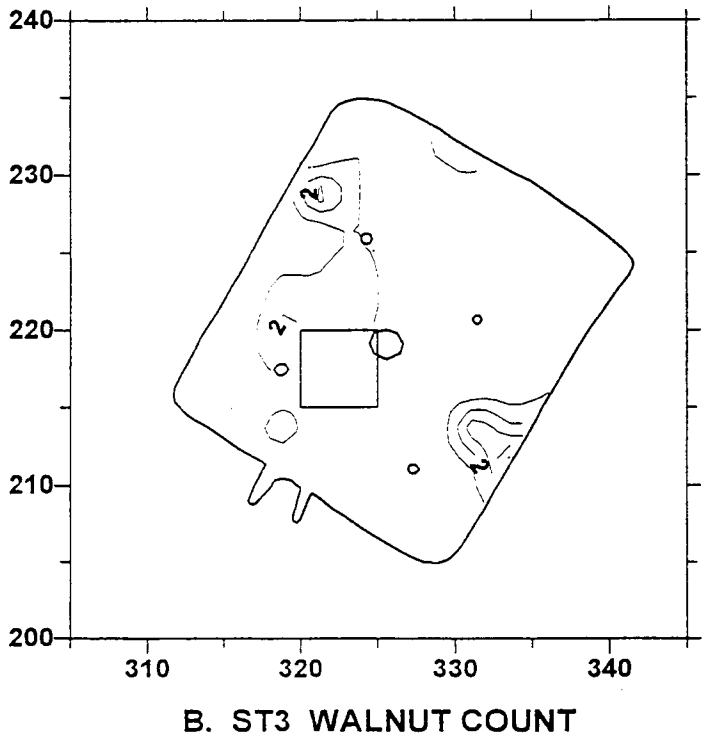


Figure 8.14. Structure 3 Botanical Nut Remains.

Summary of Structure 3

Chapter VIII has examined the contents of Structure 3 with respect to spatial patterning of artifacts and features within the structure. For uniformity and to increase sample size within smaller tool classes, both piece-plotted and screen-recovered materials were combined in the production of Surfer isopleth and post maps for intuitive pattern recognition. A measure of size was provided for most classes by including paired isopleth maps displaying the mean weight as well as the class count within each floor unit. Floor areas displaying greater fragmentation were thus identified without inclusion of distribution maps for each size class. In each case the base map, showing the central hearth and main roof supports, provided a frame within which the presented patterning could be examined.

Most materials display a donut or punctuated ring shaped pattern centered on the central hearth. Food and food preparation related refuse, such as smaller fire-cracked rock, bone, and ceramic fragments display a marked concentration in the left rear half of the structure, while larger fire-cracked rock is concentrated near the entryway and along the edges of the structure basin. Faunal remains display a substantial percentage of gnawed and digested fragments indicative of the presence of canids, presumedly dogs, in the structure, particularly beneath the benches along the structure walls. Only a single small vessel is present, near the central hearth, and vessel sections are absent. Worked bone artifacts, particularly bone projectile points and preforms, are concentrated in the vicinity of the rear bed or bench. Flaked stone artifacts are concentrated in the rear half of the structure, particularly in the vicinity of the rear bench,

with a second concentration in the right front quarter. Plant processing tools are concentrated in the right front quarter of the floor.

The overall distribution of materials in Structure 3, with only a single small apparently functional vessel and a limited number of larger tools in addition to an abundance of smaller lost or discarded items and obvious refuse, suggests the structure was unoccupied when destroyed by fire. While most, if not all, the contents of Structure 3 would appear to be abandoned, or at least not removed with other expected household equipment, patterned distributions of the contents remain, thus the archaeologist need not be restricted to the fully equipped burned structure for pattern recognition studies.

CHAPTER IX

COMPARISON OF SPATIAL PATTERNING

Chapter IX will compare the contents of the two structures within a shared architectural framework. Congruences and contrasts in the spatial patterning of structure contents will be described for each material class. The activities represented in each structure, and the patterning of materials reflecting these activities, will be discussed with respect to each material class and summarized at the end of the chapter. A refined model for the use of space within the primary structure or dwelling unit of the Dallas phase household will then be presented.

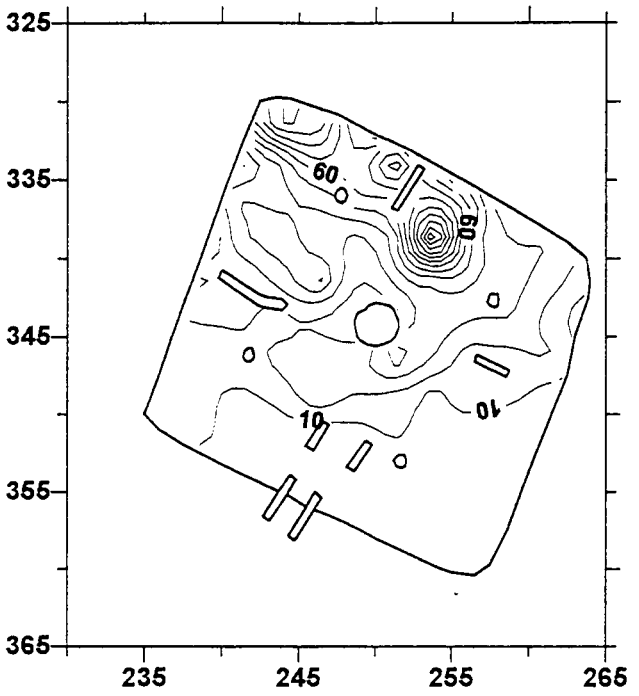
The spatial distributions of material within Structure 2 and Structure 3 are examined with respect to spatial patterning evident in both structures. Both piece-plotted and screen-recovered materials are combined in the production of the paired Surfer isopleth and post maps for intuitive pattern recognition between the structures. Described k-means patterns, defined and illustrated in Chapter VI, are restricted to the piece-plotted sample. A base map for each structure, with central hearth, main roof supports, entryway, and clay partitions (when present), overlays each distribution map and provides a framework within which patterns may be compared.

The isopleth maps and k-means plots for Structure 2 have been rotated clockwise 90 degrees in order to orient this structure in the same relative position as Structure 3, with the entryway toward the bottom of the page. This allows comparable terminology with respect to location within the structure relative to the entryway in the center of the

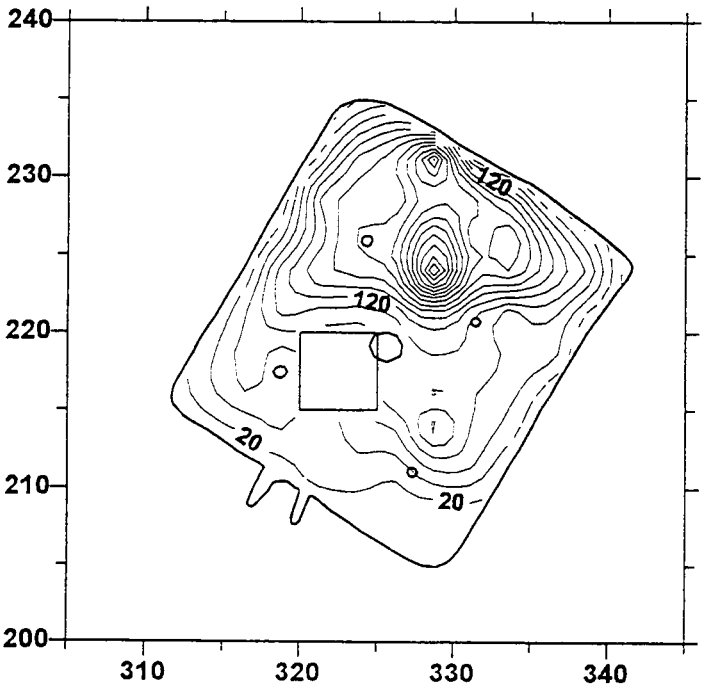
front wall. Dividing lines projected through the central hearth from the center of each wall define left and right halves as well as front and back halves of the structure floor. Dividing lines projected through the central hearth from each corner define left and right, front and back diagonal halves of the structure floor. The center floor area makes up much of the space around the central hearth within the four main roof supports. The middle floor area centers upon the front edge of the benches paralleling the walls and delineated by the main roof supports. The wall floor area follows the base of the exterior walls beyond the middle floor area. A combination of these terms provides both a spatial description of concentrations or clusters within each structure and comparability between the two structures. A concentration of material in the right front center portion, for example, is situated in the central floor area just in front and to the right of the hearth as one enters the structure.

Cracked Rock (ST2 n=2,422; ST3 n=5,851)

The distribution of fire-cracked cobbles of quartzite, quartz, and sandstone by count within each floor unit for both structures is presented in Figure 9.1. The number of fragments is higher in the left rear diagonal half of each structure, particularly near the center of the rear bench. The larger fire-cracked rocks display a different pattern, with a smaller number of fragments situated in the central floor area in front of the hearth, between the hearth and the entryway, as well as at the wall line on right, rear, and left sides of the structure. A secondary concentration of larger fire-cracked rock is situated in the right front quarter of Structure 3 and in the right half of the central floor area in



A. ST2 CRACKED ROCK COUNT



B. ST3 CRACKED ROCK COUNT

Figure 9.1. Structure 2 and Structure 3 Cracked Rock.

Structure 2. Smaller fire-cracked rock in both structures is most heavily concentrated near the center of the rear bench, between the bench and the hearth on the opposite side of the hearth from the entryway.

K-means analysis of piece-plotted fire-cracked rock for Structure 2 produced two non-random cluster solutions, while for Structure 3 it produced a random distribution. The first, six cluster, optimum solution for Structure 2 reflects the basic Ring Pattern surrounding the central floor and hearth area. The second, nine clusters, optimum solution for Structure 2 reflects the Double Ring Pattern and is made up of the ring pattern above coupled with three interior clusters of larger fire-cracked rock within the central floor area.

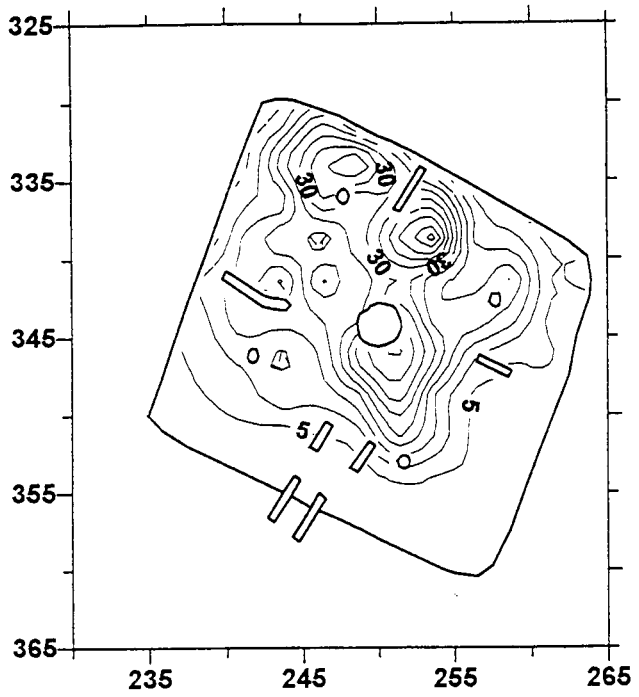
The overall pattern of fire-cracked rock suggests use in more than one location for activities requiring extended heat retention, such as food preparation through the use of heated rocks. The greater proportion of small fire-cracked rock beneath the benches suggests an accumulation of rock too fragmented by repeated heating to be of further use. A second scraping function utilizing a cracked rock edge is indicated by the presence of fire-cracked rock abraders in Structure 2, and edge-utilized fire-cracked rock in Structure 3; however, the wear patterns characteristic of these cobble tool forms are not evident on these fragments. The distribution of the larger number of small fragments beneath the rear and left benches suggests greater use on this side of the central hearth with nonfunctional smaller fragments being swept or discarded away from the hearth under the benches. Larger fire-cracked rock along the wall line can be attributed to backfilling of the structure basin against the exterior wall during building construction.

Round Rock (ST2 n=1,348; ST3 n=3,153)

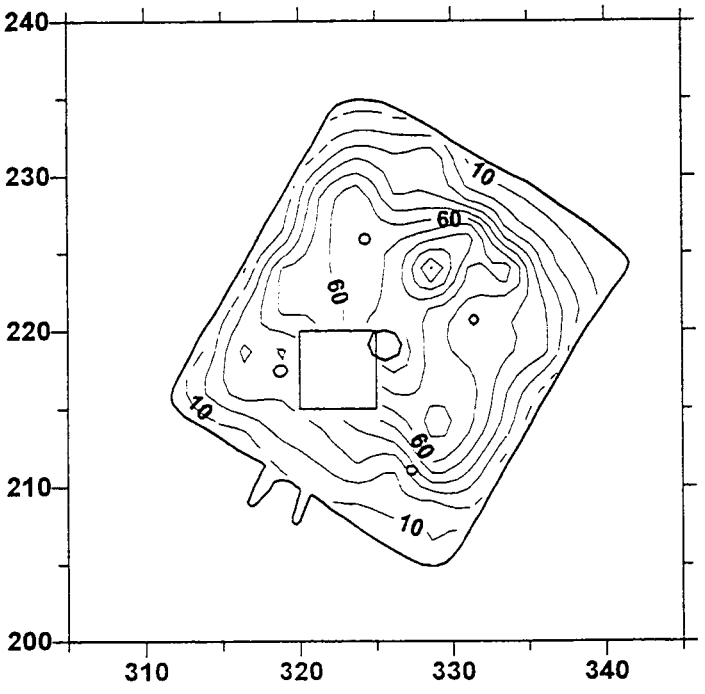
The distribution by count of unmodified quartz, quartzite, and slate pebble-size to small cobble-size rocks within each floor unit for both structures is presented in Figure 9.2. Smaller pebble-size rocks and larger unmodified rocks present somewhat different distributions. The smaller pebble-size rocks display a more uniform distribution while larger sizes display a more restricted, less uniform distribution. The larger unmodified rocks in the right front portion of the structure floor are concentrated in the vicinity of a shallow oblong basin in each structure (Feature 181 in Structure 2 and Feature 32 in Structure 3).

The k-means analysis of piece-plotted unmodified rock for both structures produced one cluster solution for each. The five cluster optimum solution for Structure 2 reflects the basic Ring Pattern surrounding the central floor area, with the three clusters near the center of the left, rear, and right walls approximating those of the Worked Stone group. The nine cluster optimum solution for Structure 3 reflects the Double Ring Pattern, and is made up of the ring pattern coupled with three interior clusters within or close to the central floor area around the hearth.

The combined round rock class is probably derived from two sources. Smaller pebble-size rocks, best represented in the screen-recovered sample, are likely incidental inclusions in clay introduced for building or other purposes. The larger, apparently unmodified rocks along the front of the benches may have been utilized without obvious modification and display a distribution similar to identifiable cobble tools. The small



A. ST2 ROUND ROCK COUNT



B. ST3 ROUND ROCK COUNT

Figure 9.2. Structure 2 and Structure 3 Round Rock.

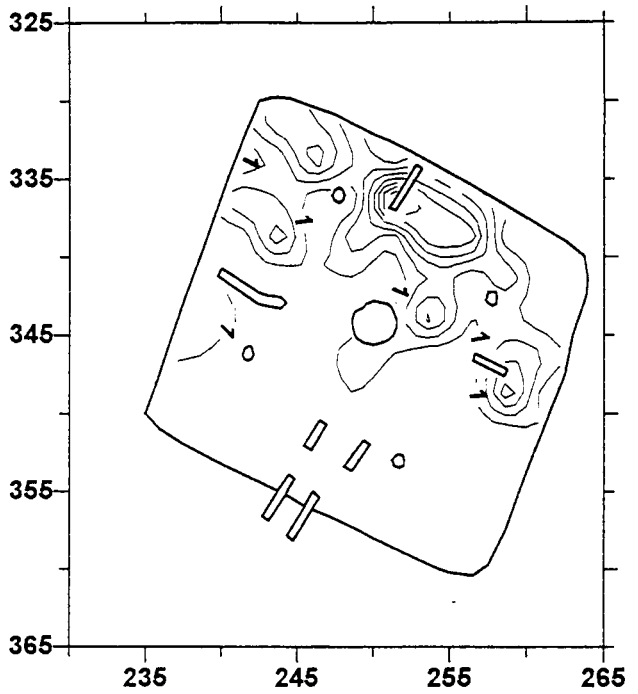
number of unmodified rocks along the outer wall line can be attributed to backfilling the house basin against the exterior wall during construction.

Tabular Rock (ST2 n=100; ST3 n=436)

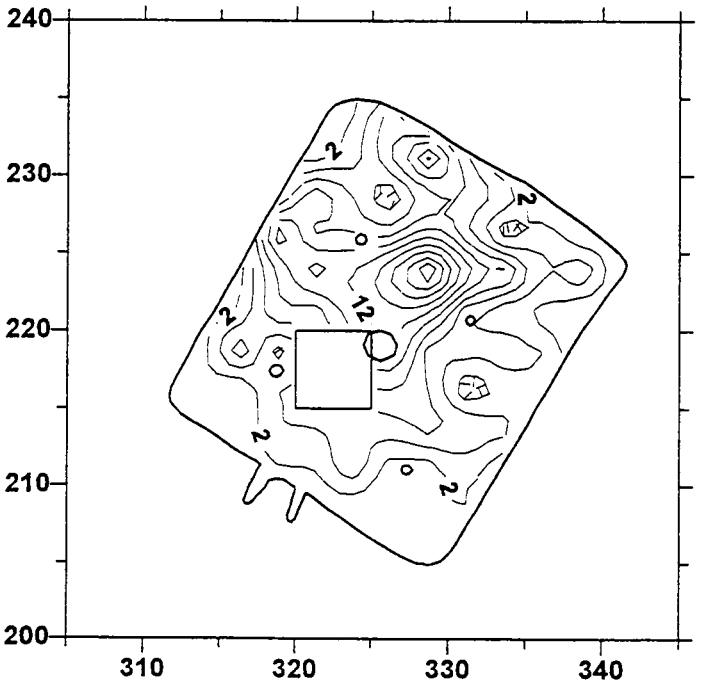
The distribution of tabular shale and limestone fragments by count within each floor unit of both structures is presented in Figure 9.3. The distribution of tabular fragments by weight within each floor unit for both structures, presented in Figure 9.4, provides an indication of the comparable patterning of larger fragments between structures, particularly near the central hearth. Limestone and shale are subject to fragmentation and chemical weathering of surfaces, and thus present additional interpretive problems. Soft and friable shale is most common in small fragments, in the left rear half of each structure. Tabular limestone, some showing evidence of heat, is concentrated in the vicinity of a shallow oblong basin near the central hearth in each structure (Feature 181 in Structure 2 and Feature 32 in Structure 3).

The k-means analysis of piece-plotted tabular rock for Structure 2 lacked a sufficient sample size, while for Structure 3 it produced a four cluster optimum solution reflecting the Four Quarter Pattern. The right front quarter cluster, in the vicinity of Feature 32, is made up of twice as many limestone fragments as any of the three remaining clusters and is probably linked to activities associated with this feature.

Limestone, less friable than shale but frequently with weathered surfaces, is of larger size than shale, and probably served more than one function. Other larger, tabular limestone, sandy limestone, and sandstone fragments reflect the patterns presented by



A. ST2 TABULAR ROCK COUNT



B. ST3 TABULAR ROCK COUNT

Figure 9.3. Structure 2 and Structure 3 Tabular Rock by Count.

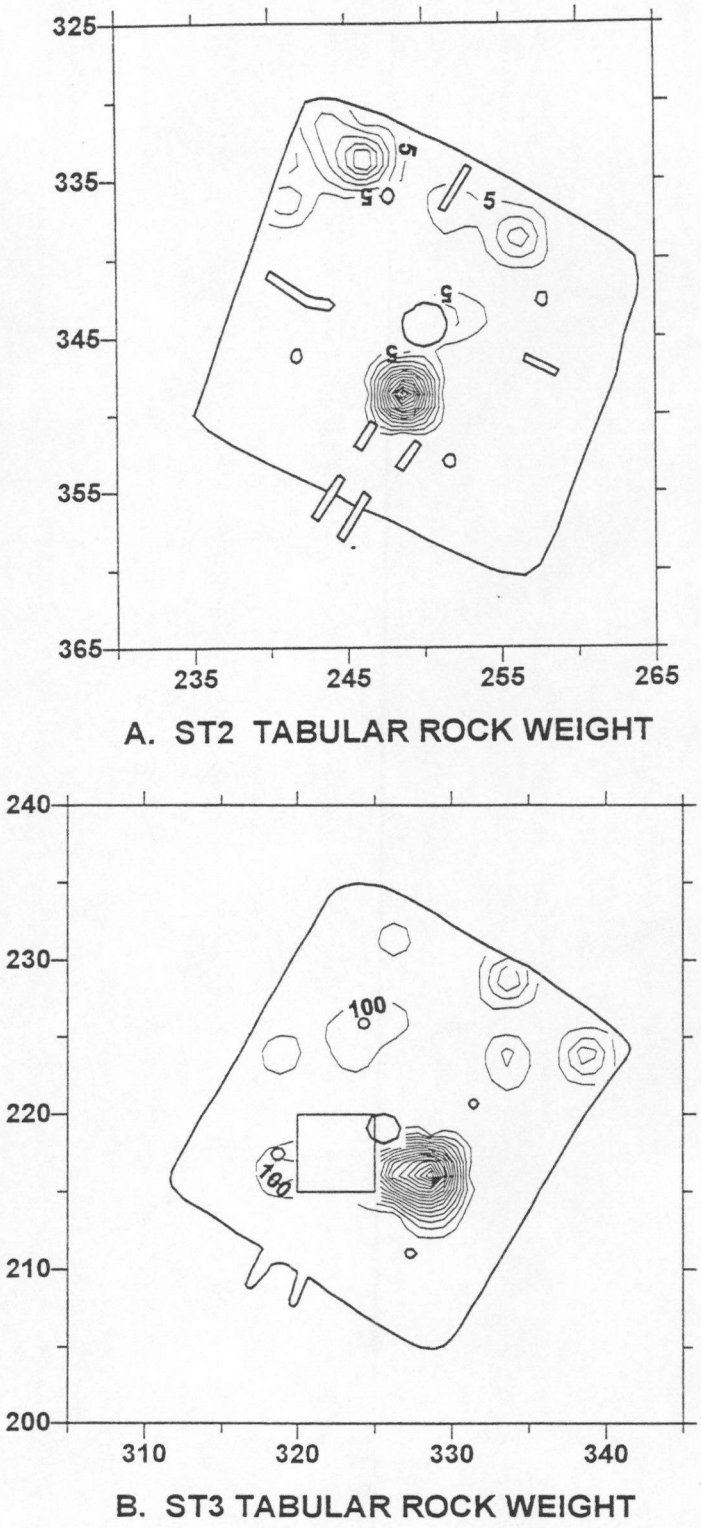
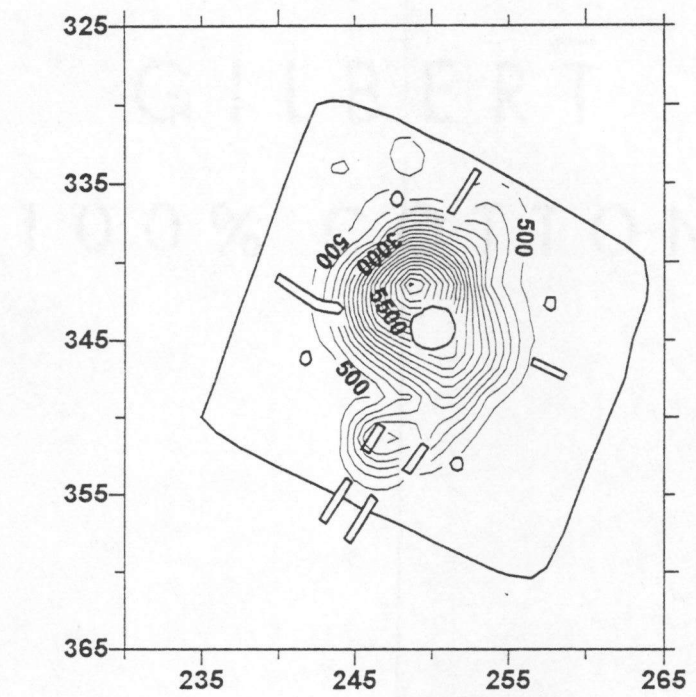


Figure 9.4. Structure 2 and Structure 3 Tabular Rock by Weight.

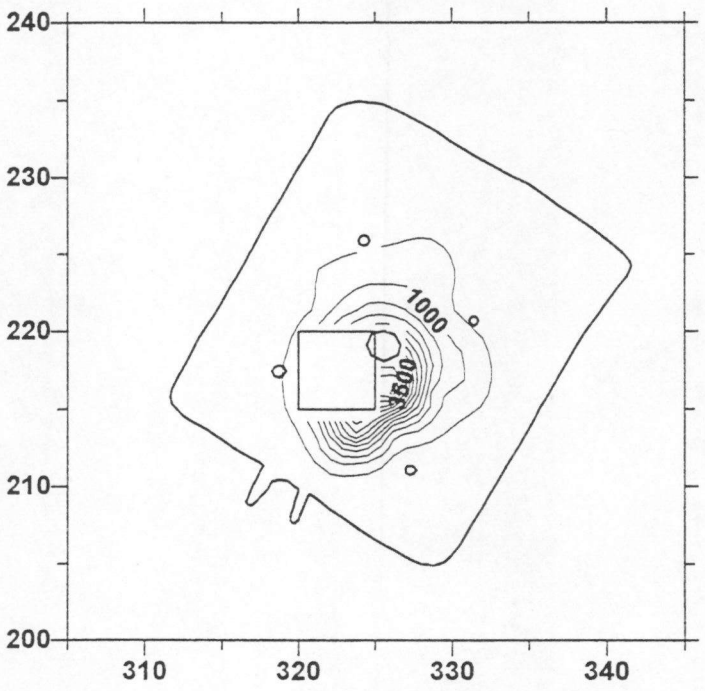
recognized limestone whetstones and sandstone abraders in each structure and may be weathered tools or tool fragments. Only one, discoidal-shaped, a worked or modified shale fragment is recognizable and other functions are unknown.

Fired Clay Architectural Material (ST2 n=101,348; ST3 n=40,196)

The distribution of fired clay architectural material by count within each floor unit for both structures is presented in Figure 9.5. Clay partitions are limited to Structure 2, and are reflected by slight lobes to the fired clay mass representing the plastered interior of the roof over the center of each structure. Impressions in fired clay provide both an indication of the range of perishable materials incorporated in each structure and how these materials were utilized. The central fired clay mass is concentrated south of the hearth in the center of each structure. The position of each fired clay mass to the south and slightly west of the central hearth, given the differing orientation of the structures, suggests some common factor influencing the direction of structure collapse. The color and degree of firing, recorded across each fired clay mass and noted during processing of screened fired clay architectural material, ranges from very hard fired bright red to poorly fired soft yellow in Structure 2 and from hard fired red to a less well fired softer orange in Structure 3. While the absolute degree of firing differs between the two structures, perhaps due to the absolute quantity of combustible materials within each, the pattern of firing across both structures remains the same. The southern and western limits of each fired clay mass display a greater degree of firing, oxidation, and total charring or consumption of contained wooden architectural members, while the northern



A. ST2 FIRED CLAY COUNT



B. ST3 FIRED CLAY COUNT

Figure 9.5. Structure 2 and Structure 3 Fired Clay.

and eastern limits display a lesser degree of firing, less oxidation, and only partial charring of contained wooden architectural members. As those portions of each structure exposed to the greatest degree of draft and available oxygen would burn hotter and faster, the direction of collapse, to the south in each case, and those portions showing the greatest general degree of firing, to the south and west in each case, clearly indicate the influence of a southerly wind on the conflagration.

The upper surface of each fired clay mass is quite fragmented, suggesting a period of exposure prior to being covered by a post occupation humus. Uncharred and only partially charred architectural elements in each structure are indicated by linear gaps and cavities of the less well fired portions of each clay mass while fully charred and fully consumed elements are represented by charred timbers and well fired empty timber molds. The relatively smaller quantity of fired clay noted in Structure 3 probably reflects a smaller amount utilized on this structure, as indicated by the absence of clay partitions, or less likely, the effect of the length of time the structure was unoccupied prior to destruction by fire.

Ceramics (ST2 n=5,687; ST3 n=16,024)

The distribution of ceramic vessels, vessel fragments, and a small number of non-vessel items is presented by count within each floor unit of both structures in Figure 9.6. The mean weight of these same materials within each floor unit of both structures is presented Figure 9.7. All cross-mended sherds making up a vessel or vessel section in each structure are counted as a single item to prevent individual vessels broken in situ

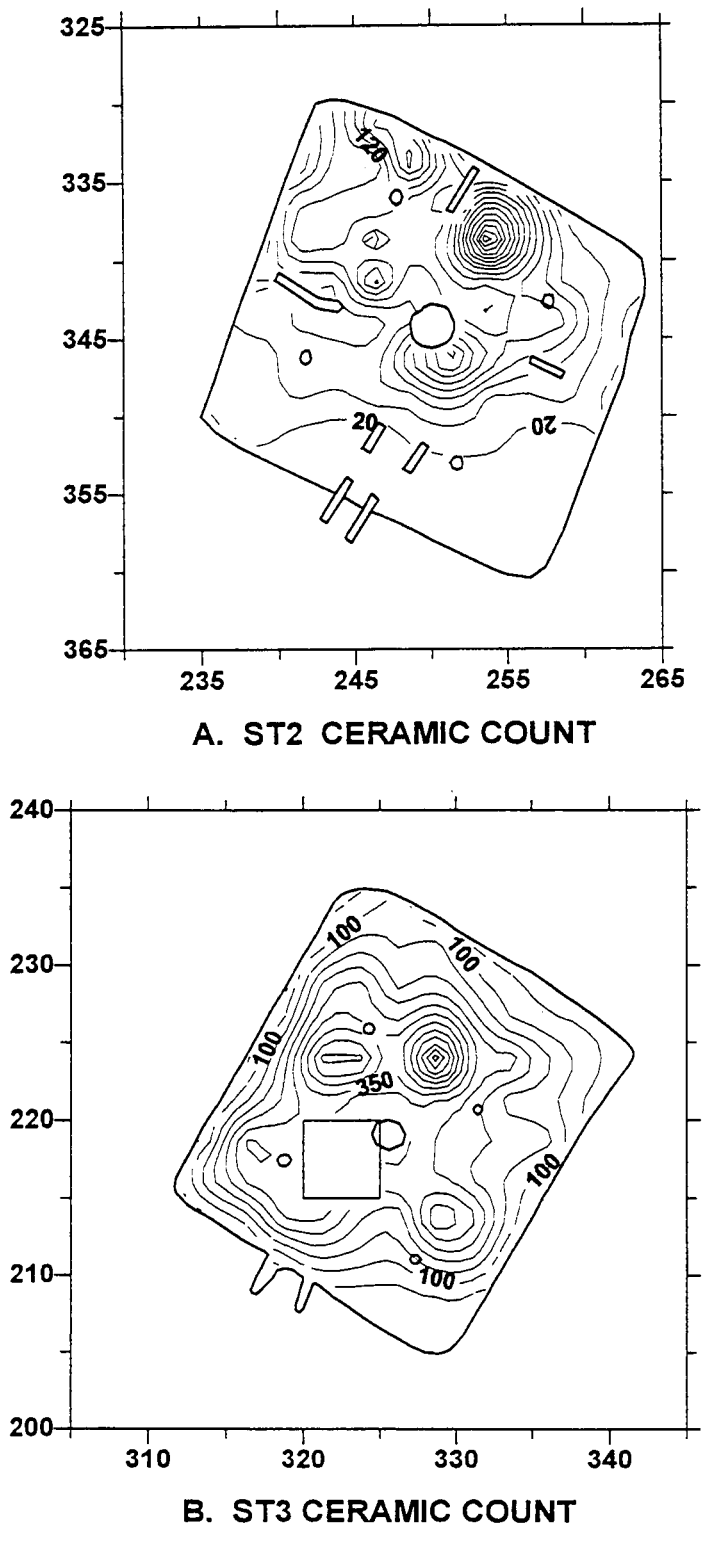
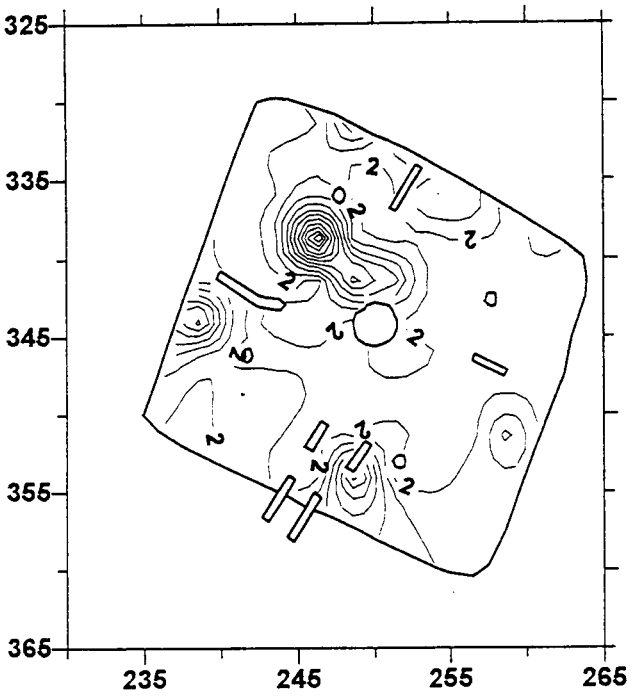
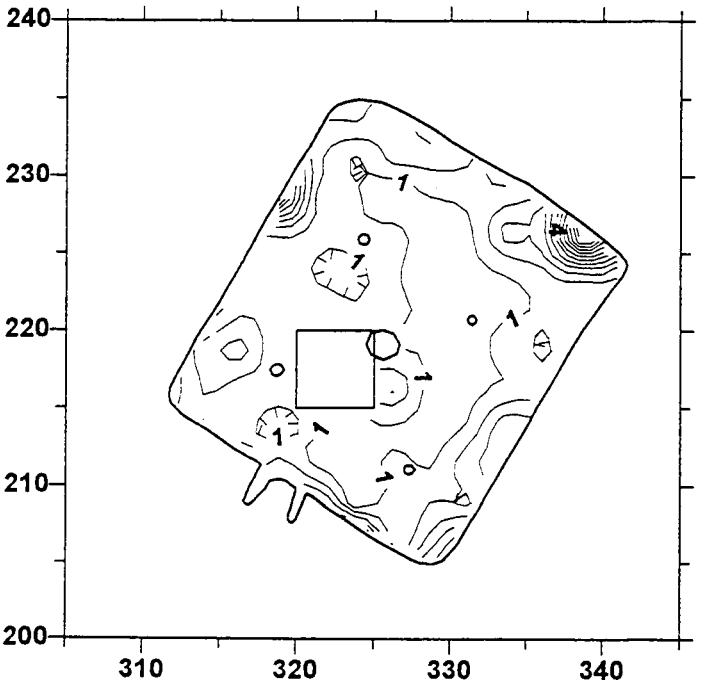


Figure 9.6. Structure 2 and Structure 3 Ceramics by Count.



A. ST2 CERAMIC MEAN WEIGHT

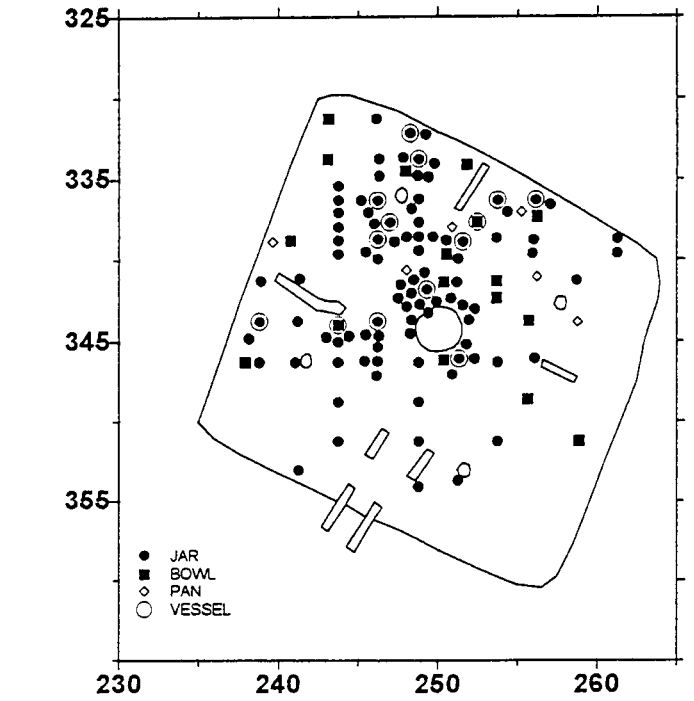


B. ST3 CERAMIC MEAN WEIGHT

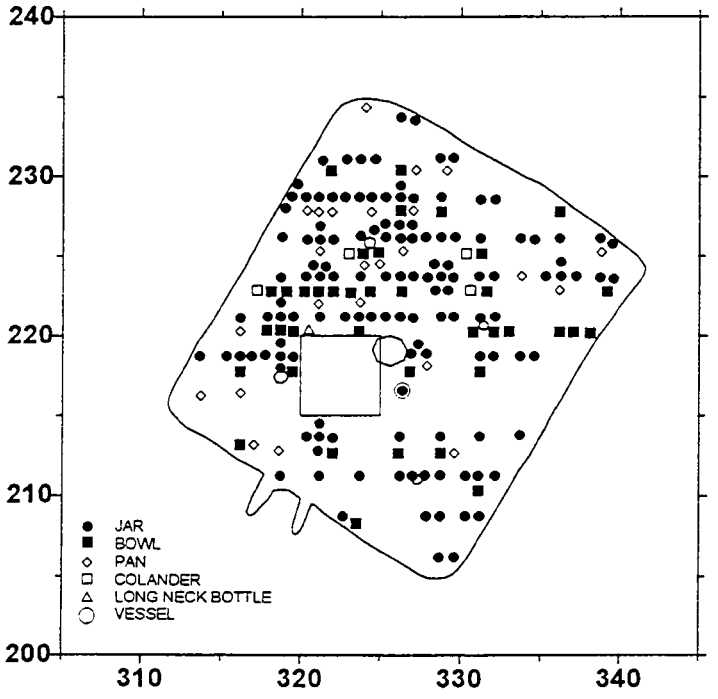
Figure 9.7. Structure 2 and Structure 3 Ceramics by Mean Weight.

from creating undue bias. Ceramic vessel fragments in both structures are concentrated in the left rear half of each structure, with a smaller concentration situated in the right front portion of the central floor area. While the greatest number of sherds in each structure is evident between the center of the rear bench and the central hearth opposite the entryway, the largest sherds are situated differently (Figure 9.7). In Structure 2 large sherds and vessels are widely distributed across the floor, particularly the left diagonal half, while in Structure 3 larger sherds are concentrated against the four walls. The distribution of the large number of smaller sherds in each structure beneath the left and rear benches suggests greater use of this side of the central hearth with less easily picked up sherds being swept or discarded away from the hearth under the benches.

Ceramic vessels in Structure 2 are represented by three nearly complete examples and ten vessel sections, while vessels in Structure 3 are represented by a single example (Figure 9.8; Table 9.1). All but one of the Structure 2 vessels and vessel sections are situated in the left rear diagonal half of the structure. Seven large jars are ranged in an upright position along the left and rear benches, while two large jars are placed in an inverted position against the left and rear walls. Smaller vessels are situated along either the left edge (small jar and bowl) or the rear edge (a medium frog effigy bowl) of the central floor area near the inner end of clay partitions. A medium strap handled jar is situated in the central floor area near the rear edge of the central hearth. The single vessel in Structure 2, a small jar situated near the hearth in the right front diagonal half of the structure, is mirrored in Structure 3 by a small strap handled jar incorporated in the fired clay roof fall over Feature 32, also situated near the hearth in the right front



A. ST2 CERAMIC VESSEL FORM DISTRIBUTION



B. ST3 VESSEL FORM DISTRIBUTION

Figure 9.8. Structure 2 and Structure 3 Ceramic Vessel Form.

Table 9.1. Number of Ceramic Vessels by Structure Area.

VESSEL FORM	STRUCTURE 2		STRUCTURE 3		COMBINED SAMPLE		TOTAL
STRUCTURE AREA	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	
JAR							
Large	7				7		7
Medium	2				2		2
Small	1	1		1	1	2	3
CLOSED BOWL							
Medium	1				1		1
Small	1				1		1
TOTAL	12	1		1	12	2	14

diagonal half of the structure. Both vessels are situated in an upright position within the central fired clay mass and appear to have been incorporated in the roof structure or otherwise suspended above the floor in the same place in each structure.

The general pattern of placement evident for large jars, as indicated by the Structure 2 sample, is one of occupying space beneath the left and rear benches in either an upright or inverted position. Vessels in an upright position could have contained stored foodstuffs, although none were identified in association with the vessels, and vessels in an inverted position are interpreted as not in use or stored beneath the benches at the time of the fire. Medium and small jars and bowls either border the central floor area, on the left and rear edges, or are situated near the central hearth. The tendency to place smaller vessels, as well as larger items in other classes, bordering the central floor area near clay partitions suggests an effort to avoid cluttering the floor along the central portion of each bed or bench. The two small jars, each within the roof-fall near the hearth in the front right diagonal half of each of the two structures, are less simple to interpret. These two vessels, displaying evidence of greater exposure to heat and differential burning than other vessels, are intermixed with, rather than crushed beneath roof-fall, and thus must have been above the floor at the time of the fire. The function of these vessels is at present unknown.

The k-means analysis of piece-plotted ceramics for Structure 2 produced one nonrandom cluster solution, while for Structure 3 it produced two cluster solutions. One Structure 3 cluster solution is derived from only those sherds for which vessel form could be determined. The twelve cluster optimum solution for Structure 2 displays the

Double Ring Pattern, made up of the ring pattern surrounding the central floor area, coupled with three interior clusters of larger sherds within the central floor area. These interior clusters reflect the general location of vessels broken during or, in one case, prior to the fire, in addition to the combination of crushed vessels and accumulated sherd refuse represented by the outer clusters. The five cluster optimum solution for Structure 3 displays the Four Quarters and Center Pattern, made up of larger clusters within the four quarters of the structure floor coupled with a cluster containing 89% Size Class 2 sherds in the central floor area to the rear of the hearth. The vessel form group produced a four cluster optimum solution in the Four Quarters Pattern.

Ceramic sherds in both structures for which vessel form may be determined provide spatial patterning within each structure as well as the relative proportions of vessel forms represented (Figure 9.8). While the relative proportions of the several vessel forms in both structures are congruent in both the left rear and the right front diagonal halves, the quantity of ceramic vessel fragments in each half differs greatly (Table 9.2). The uniform relative distribution of vessel forms and contrasting distribution by quantity of sherd refuse suggests that while vessel use by form was not restricted, vessel usage and breakage occurred much more frequently in the left rear diagonal half of each structure.

The jar form, in a wide range of sizes and with and without strap handles, is well distributed in both structures (Table 9.3). The bowl form, in small and medium sizes, is made up of simple, closed, cazuela, and flanged shapes. Simple bowls, frequently with notched applique fillet decoration, and closed bowls are well distributed in both

Table 9.2. Number of Ceramic Sherds of each Vessel Form by Structure Area.

VESSEL FORM	STRUCTURE 2		STRUCTURE 3		COMBINED SAMPLE		TOTAL
STRUCTURE AREA	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	
JAR	67	18	96	50	163	68	231
BOWL	12	4	27	13	37	17	56
SALTPAN	5	1	19	5	24	6	30
COLANDER			4		4		4
BOTTLE			1		1		1
TOTAL	84	23	147	68	228	91	322

Table 9.3. Number of Ceramic Sherds of each Vessel Form by Structure.

VESSEL FORM	STRUCTURE 2	STRUCTURE 3	TOTAL
JAR	85	146	231
BOWL			
Simple	5	25	30
Closed	7	10	17
Cazuela	4	4	8
Flanged		1	1
SALTPAN	6	24	30
COLANDER		4	4
BOTTLE		1	1
TOTAL	107	215	322

structures. The cazuela bowl form, represented in the right front diagonal half of Structure 2 by four sherds of a single incised vessel, is the only vessel form to appear limited to one part of the structure. The cazuela bowl form is represented in Structure 3 by four sherds derived from at least two vessels evenly divided between the two halves of the structure. Other vessel forms, present only in Structure 3 and only in the left rear half of the structure, are perforated colanders, represented by four sherds derived from two vessels, and a long necked bottle, represented by a single neck sherd. These vessels suggest the presence of more limited processing or social functions utilizing specialized ceramic equipment; colanders, for example, may have been utilized in processing persimmons (Polhemus 1987:1176). The "saltpan" form, probably utilized in food preparation rather than the production of salt in domestic contexts, is represented in both structures by a small number of textile impressed sherds. These vessels, due to their frequently large size, probably were not utilized in primary structures such as Structure 2 and Structure 3, although such vessels may have occasionally been stored indoors, as indicated by the example from Structure 10 at Loy.

The maximum thickness for all sherds of unidentified form in each structure is compared with the same measure for the vessel form sherd sample and the vessel in each structure in an attempt to compare size distributions of vessels represented only by body sherds. While maximum sherd thickness alone does not indicate vessel form, with the general exception of the "saltpan" at the Loy site, it does appear to correlate with overall vessel size (Table 7.1; Table 8.1). Based on sherd thickness in the piece-plotted sample from both structures, smaller vessels appear to be more common in the right front

diagonal half of each structure while the full range of vessel sizes is represented in the left rear diagonal half of each structure. Localized clusters of body sherds having similar curvature, thickness, and surface treatment in each structure probably represent locations of vessel breakage where flatter sherds were not fully removed during floor maintenance. In Structure 2, for example, clusters of flatter, less diagnostic sherds that were not recognized in the field as portions of featured floor vessels produced similar patterns to those in Structure 3 when the featured portions were removed from the sample.

Other, non-vessel, ceramic items in the two structures consist of discoidals (ST2 n=6; ST3 n=7), larger sherd disks (ST2 n=2), smoking pipe fragments (ST2 n=4; ST3 n=4), beads (ST3 n=2), clay pellets (ST3 n=2), and pottery clay (ST3 n=1). These items generally occupy the left half of each structure (Figure 9.9) although pipe fragments and discoidals tend toward greater dispersion. The ceramic discoidals, manufactured of vessel fragments ground into shape, are widely scattered across the floor. Three plain elbow pipes and one axe effigy elbow pipe are represented by these fragments, one of which had been reworked after stem breakage. While not part of the two structure sample analyzed for this study, it should be noted that both pipe fragments and ceramic discoidals are more common in the vicinity of the secondary structures in front of, and associated with, Structure 2 and Structure 3. The large ceramic disks, situated near the left wall of Structure 2 near a yellow quartz biconcave discoidal, are restricted to that structure and may have a different function than the more common smaller ceramic discoidals. The small temperless clay beads are restricted to the front half of Structure 3 and may serve a general ornamental function similar to bone beads. The two fired solid

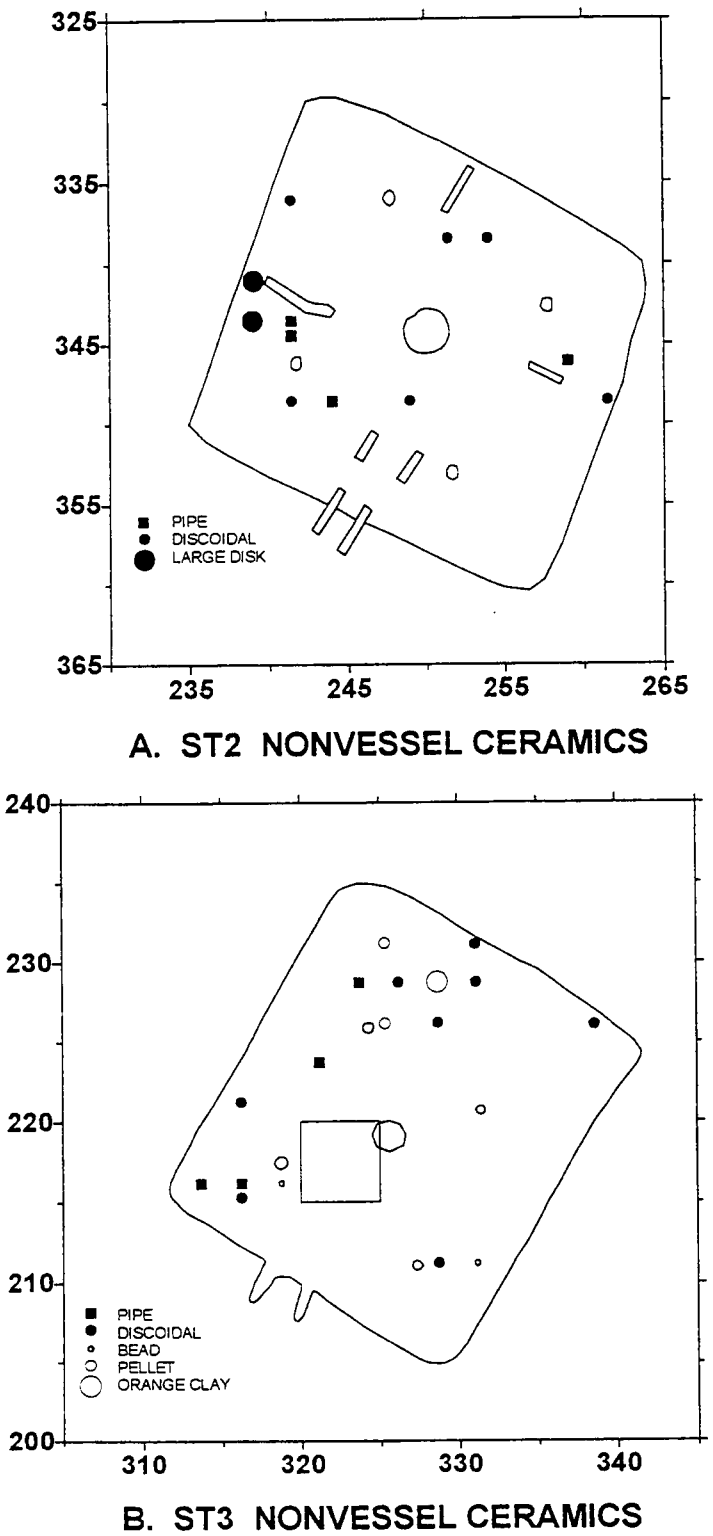


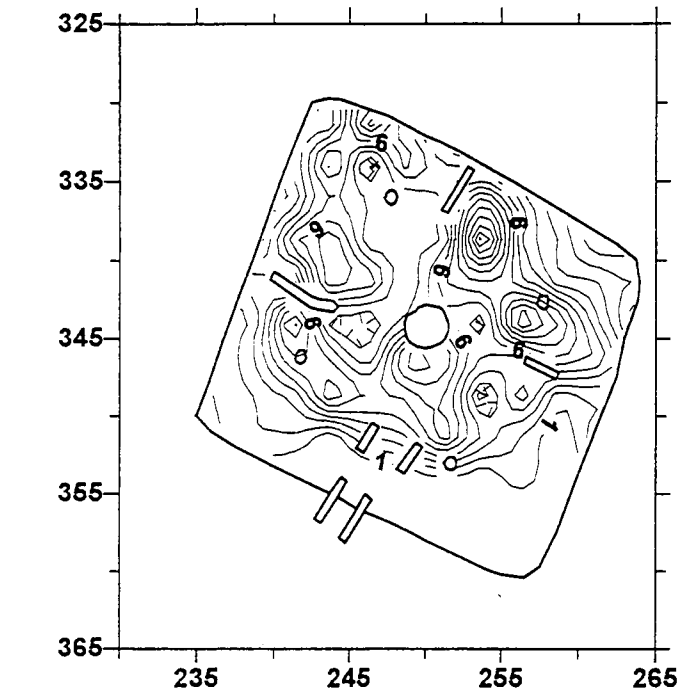
Figure 9.9. Structure 2 and Structure 3 Non Vessel Ceramics.

pellets of temperless clay are restricted to the left rear quarter of Structure 3 and are of unknown function. Traces of untempered bright orange, greasy textured, unfired clay are restricted to the rear bench area of Structure 3 and may be residues from the manufacture of nonvessel ceramic items, such as pipes, or even utilized as a form of pigment. The fired pellets could likely represent clay samples test fired to determine clay quality or characteristics. Unfired shell tempered clay samples found elsewhere in the Loy site block excavation consistently are of a lighter, yellow color and possess a less greasy texture, suggesting this clay was not intended for vessel manufacture.

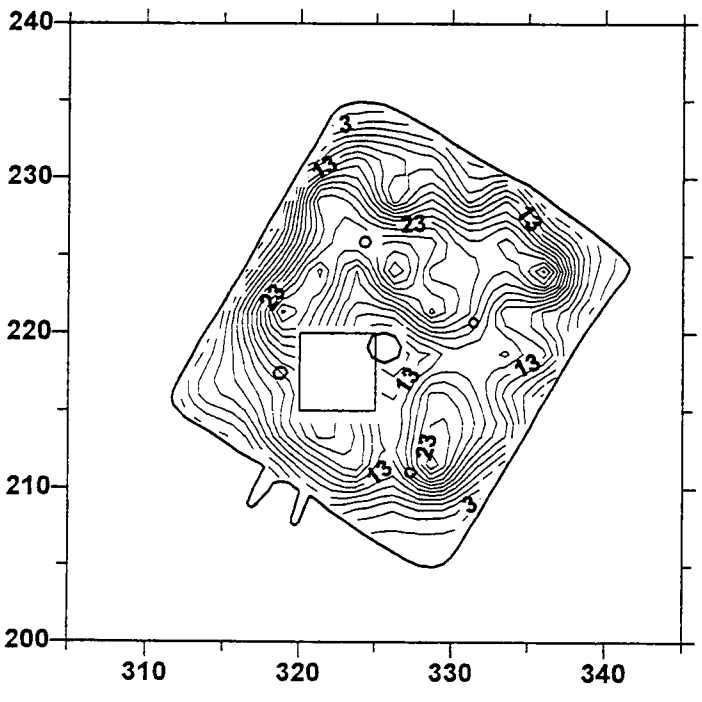
Non-vessel ceramic items in the two structure sample present a limited array of forms, each of which is probably associated with a different activity and perhaps inhabitants of differing age or gender. Ceramic vessels are linked to non-vessel ceramic items only in that vessel fragments serve as raw material in the manufacture of ceramic disks and discoidals.

Lithics - Debitage (ST2 n=366; ST3 n=1,193)

The distribution of all otherwise unmodified chipped material resulting from the manufacture, maintenance, or repair of chipped lithic artifacts is presented by count within each floor unit for both structures in Figure 9.10. The distribution by count for each structure presents the punctuated ring pattern centered on the hearth, with higher counts beneath the front edge of the rear and left benches. The greatest quantity of lithic debitage in each structure is concentrated near the center of the rear bench. Examination of the distribution of those fragments in each structure most likely representing primary



A. ST2 LITHIC DEBITAGE COUNT



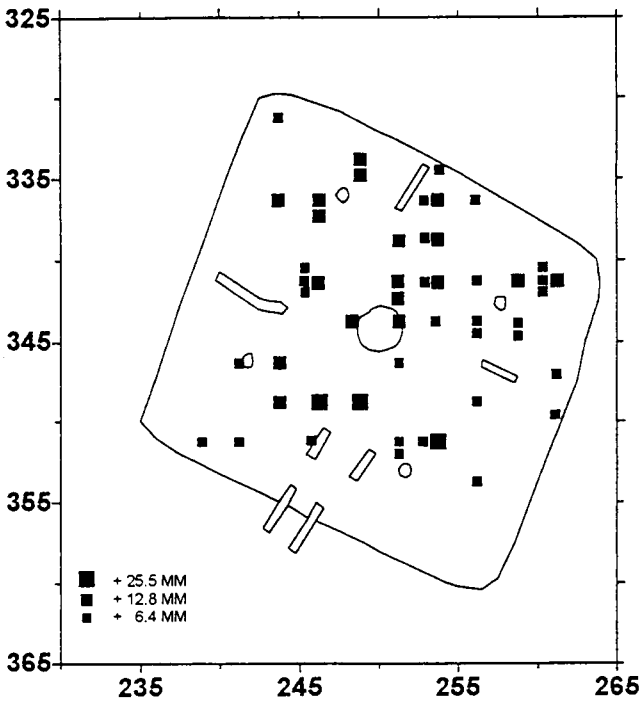
B. ST3 LITHIC DEBITAGE COUNT

Figure 9.10. Structure 2 and Structure 3 Lithic Debitage.

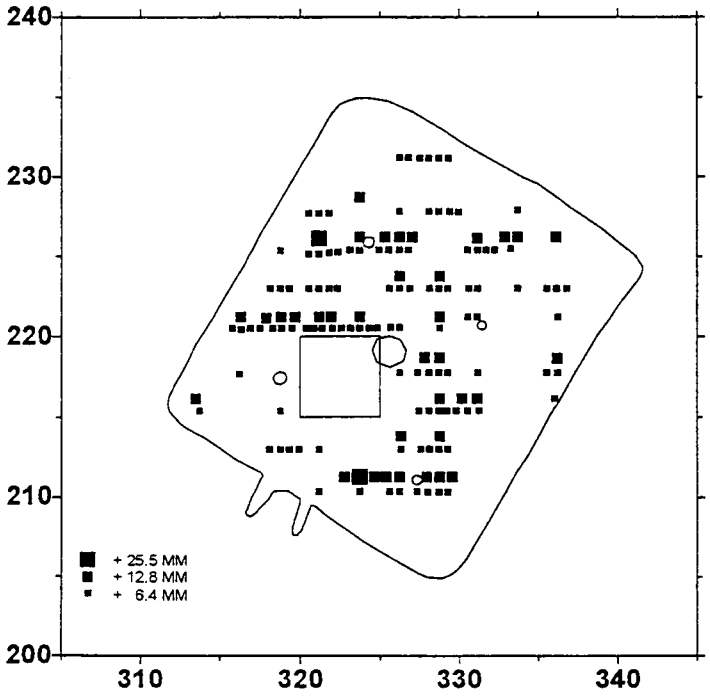
reduction, such as blocky chunks, cores, and tested nodules (Figure 9.11), indicates that the largest fragments are situated in the right front floor area in the vicinity of the oblong feature near the entryway in each structure as well as where the flakes and other debitage are concentrated.

The k-means analysis of piece-plotted lithic debitage produced a pair of non-random cluster solutions for each structure. Both structures display the Four Quarters Pattern for the four cluster optimum solution. The nine cluster optimum solution for Structure 2 reflects the Double Ring Pattern, made up of six outer clusters coupled with three interior clusters, one back of the hearth and two flanking the entryway on the opposite edge of the central floor area. The eight cluster optimum solution for Structure 3 reflects the Ring and Center Pattern, made up of six outer clusters coupled with two closely spaced interior clusters in the rear portion of the central floor area.

The punctuated ring pattern evident in the Surfer maps and the k-means plots for lithic debitage in both structures suggest several separate areas along the left, rear, and right benches, as well as near the entryway, where lithic reduction and tool maintenance took place in each structure. Future examination of small debitage, less than Size Class 3 (0.62 cm) material within the heavy fraction of the flotation samples across the floor of each structure, could bridge the gap between Sherwood's micro artifact analysis of the Structure 3 floor (1991:60) and the larger material included in this study, providing additional data concerning lithic reduction and maintenance activities.



A. ST2 LITHIC DEBITAGE - CHUNKS AND NODULES

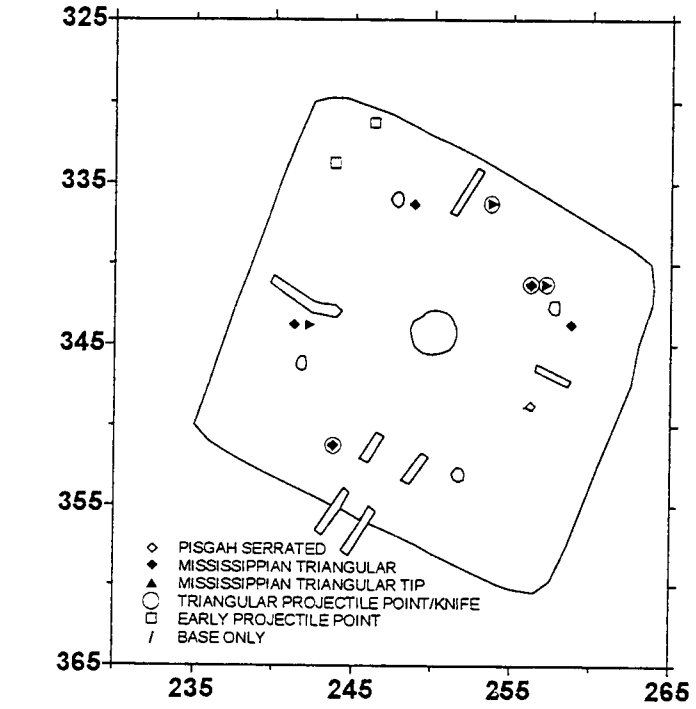


B. ST3 LITHIC DEBITAGE - CHUNKS AND NODULES

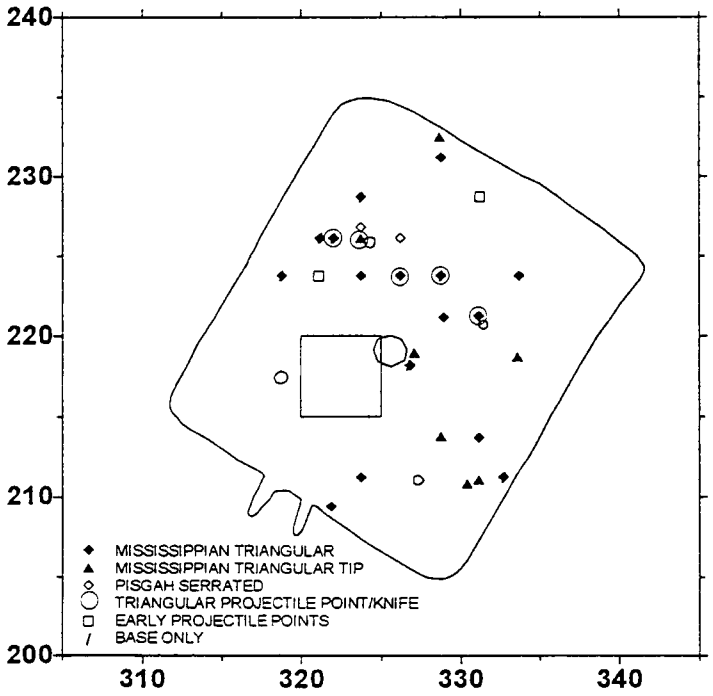
Figure 9.11. Structure 2 and Structure 3 Lithic Chunks and Cores.

Lithics - Flaked Tool (ST2 n=37; ST3 n=108)

The distribution of the flaked tool class, made up of all flaked artifacts other than obvious debitage for both structures, is presented in Figure 9.12 and Figure 9.13. Bifacially worked projectile point/knife types and fragments (Figure 9.12) are concentrated in the rear half of each structure, with smaller numbers forming the punctuated ring pattern centered on each structure hearth. A second concentration is evident in the front right quarter of the floor only in Structure 3. Mississippian triangular projectile points displaying shortened blades and heavily retouched margins suggestive of exhausted projectile points discarded during weapon maintenance activities are present in both structures, as are Mississippian triangular base sections that may also have been discarded during such activities. Distal ends, derived from such triangular projectile points and likely produced during projectile point manufacture or introduced in successfully hunted game, are concentrated in front right quarter of Structure 3. One Mississippian triangular point in the Structure 3 secondary cluster has an unusual, smooth wear pattern on the blade. All three of the probable Mississppian triangular knives from Structure 2, as well as three of five examples from Structure 3, are concentrated along the front edge of the rear bench in each structure. Two Pisgah serrated projectile points in Structure 3 are situated near the left rear main roof support, while the example from Structure 2 is situated on the right or opposite side. Two projectile point/knives, predating the Dallas phase and showing no obvious Dallas modification, are present on the floor of each structure; those from Structure 2 in the left rear corner and those from Structure 3 along the left and rear benches.



A. ST2 PROJECTILE POINT/KNIVES



B. ST3 PROJECTILE POINT/KNIVES

Figure 9.12. Structure 2 and Structure 3 Projectile Point/Knives.

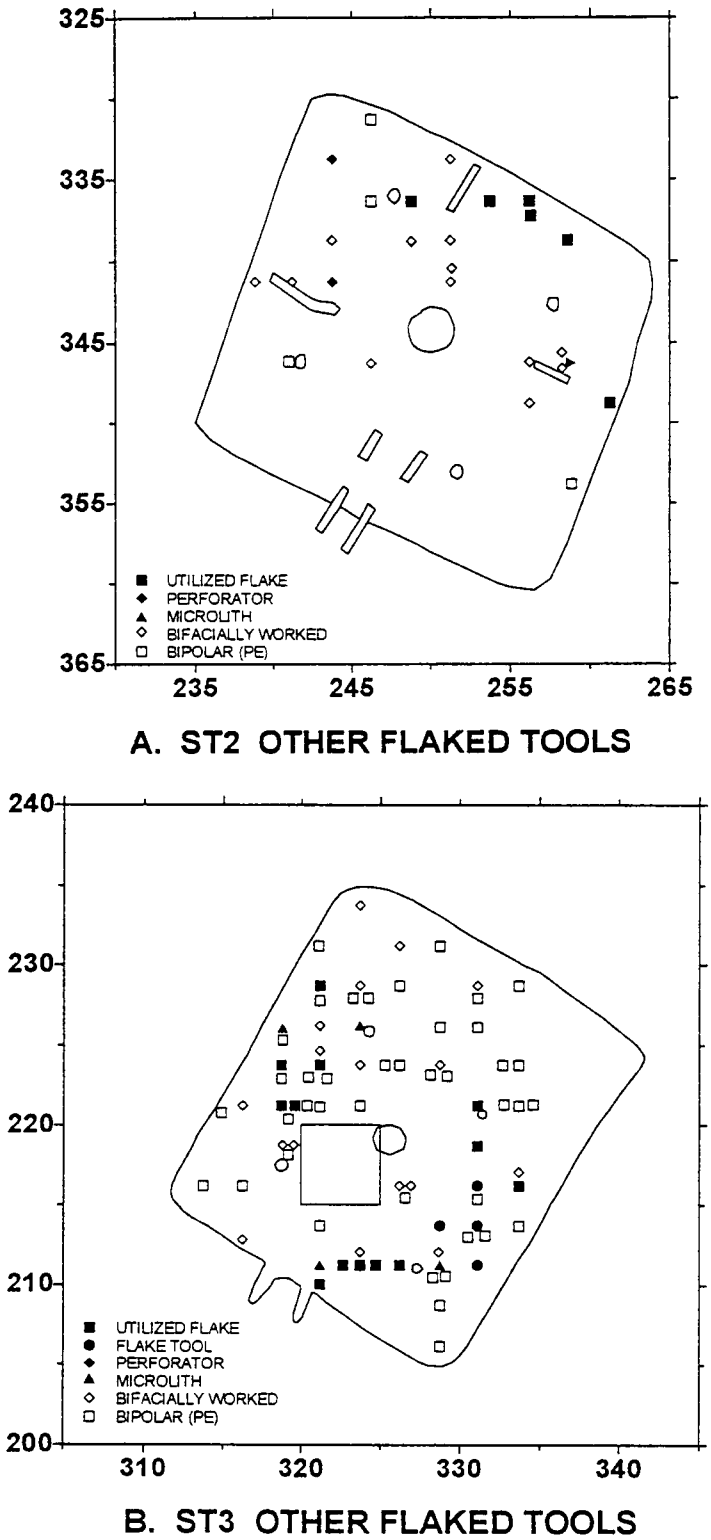


Figure 9.13. Structure 2 and Structure 3 Other Flaked Tools.

Utilized flake and other flake tool distributions, illustrated for both structures in Figure 9.13, differ between the two structures. Utilized flakes in Structure 2 are concentrated along the rear bench with one example near the right wall, while those in Structure 3 are concentrated in three clusters, one just right of the entryway, one near the center of the left bench, and one near the center of the right wall. Perforators in Structure 2 are present only near the left bench, while the example in Structure 3 is near the center of the right wall. Small flake tools or microliths having the lateral margins retouched on the dorsal surface to form one or more thick sharp points are represented by a single example near the right wall of Structure 2 while four such tools are present in Structure 3, one just right of the entryway, two along the left bench, and one in the lithic cluster near the right wall. The remaining flake tools, three elongate flakes with retouched lateral margins and one with a retouched distal end resembling a small end scraper, are present only in the lithic cluster near the right wall of Structure 3. Bifacially worked fragments and pieces displaying bipolar crushing on two or more opposed edges (PE) are widely scattered across the floor of both structures.

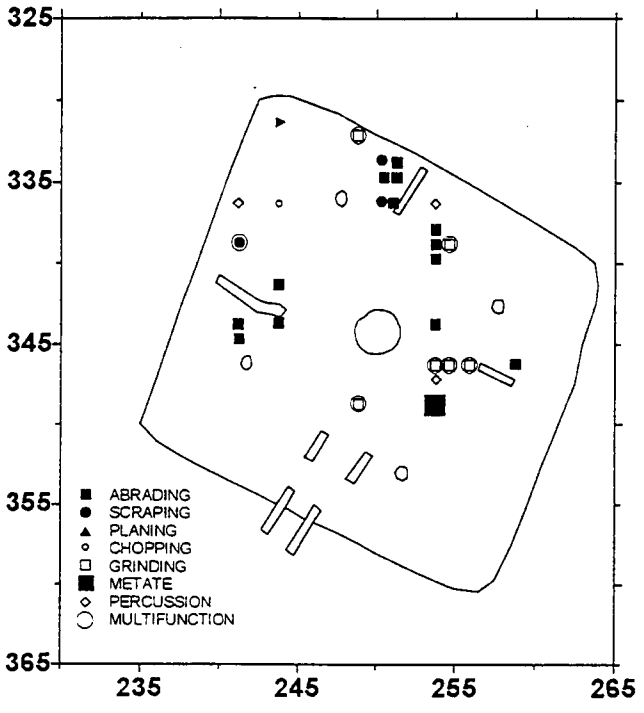
The utilized flakes suggest light cutting activities near the rear bench of Structure 2 and at three differing locations in Structure 3. The small flake tools bearing steeply retouched points are present in each of these Structure 3 locations, as well as near the right wall of Structure 2, suggesting the presence of a specialized activity involving grooving or routing some softer material such as wood or bone. Flake tools with more extensive lateral and distal modification, suggesting the presence of heavier cutting or light scraping activities, are restricted to the lithic cluster near the right wall of

Structure 3. Bifacially worked pieces and pieces displaying bipolar crushing are distributed in a general ring pattern about the central hearth in both structures and may be the result of either lithic reduction or some other more widely distributed activity.

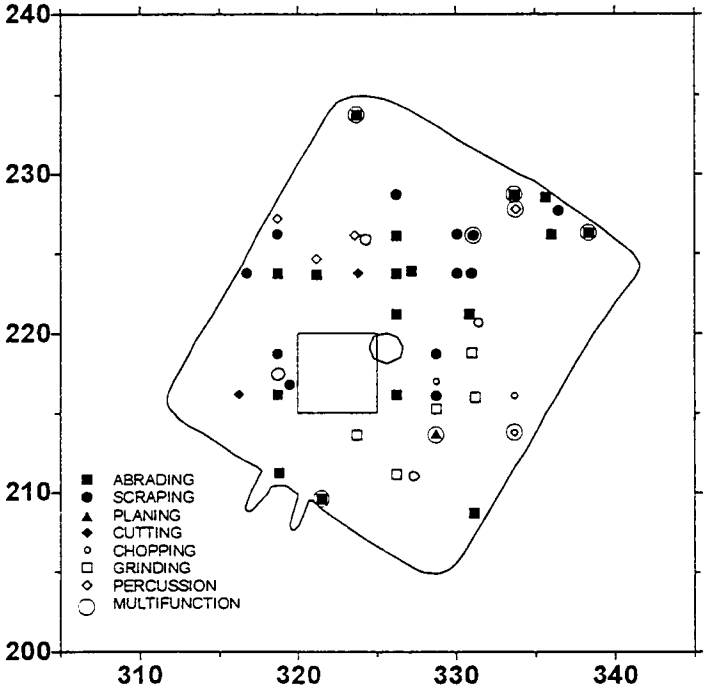
Lithics - Cobble Tool (ST2 n=28; ST3 n=46)

Cobble tools consist of larger, often expedient utilitarian items utilized in the reduction of other materials. A wide range of activities is probably represented by this class.

The general ring pattern of cobble tool deposition in both structures is generally composed of groups (Figure 9.14) situated along the border of the central floor area as well as in the right front quarter of each structure. Patterning in Structure 2 is composed of three main groups centered on the left, rear, and right walls, as well as several isolated cobble tools. Each of these groups in Structure 2 is further subdivided by a clay partition. Structure 3 lacks such clay partitions, although less substantial partitions without clay plastering may have been present. Patterning in Structure 3 is also composed of three main groups, centered on the left, rear, and right walls, as well as several more cobble tools. The rear group in each structure is further subdivided into a cluster along the front of the rear bench and a cluster against the rear wall. The front portion of the rear group in Structure 2 is made up of three fire-cracked rock abraders, a fragmentary hammerstone, and a small cobble mano displaying percussion use; while that in Structure 3 is made up of five edge-utilized fire-cracked rocks, three tabular sandstone abraders, and two slightly grooved sandstone abraders. The rear wall portion of the rear



A. ST2 COBBLE TOOLS



B. ST3 COBBLE TOOLS

Figure 9.14. Structure 2 and Structure 3 Cobble Tools.

group in Structure 2 is made up of four fire-cracked rock abraders, two edge-utilized fire-cracked rocks, and an edge-utilized biface mano fragment; while that for Structure 3 is made up of one edge-utilized fire-cracked rock, one tabular sandstone abrader, one bipitted hammerstone, and three large tabular limestone whetstones. Two of the whetstones show additional use as anvils.

The left group in back of the partition in Structure 2 is made up of a cobble chopper, an edge-utilized cobble displaying anvil use, a small discoid hammerstone, and a slightly grooved sandstone abrader, while two fire-cracked rock abraders and a tabular limestone whetstone are in front of the partition. The left group in Structure 3 is made up of an edge-utilized fire-cracked rock, an edge-utilized cobble, three spherical hammer-stones, and two smaller tabular limestone whetstones. Only one of the cobble tools from Structure 2 in the left group in either structure shows evidence of having been used for multiple functions.

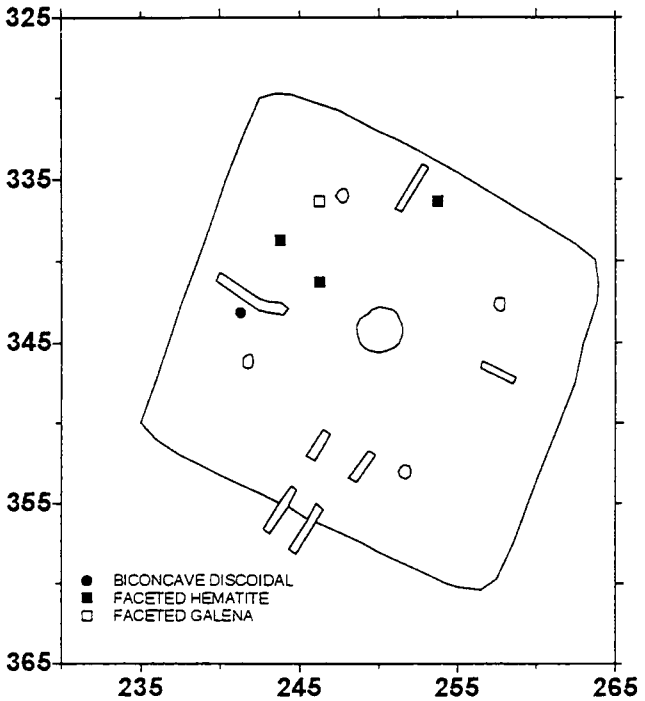
The right group, occupying the more open floor space in the right front quarter of each structure, is dominated by plant processing or heavy cutting implements. In Structure 2 the right group is made up of a well used bifacial basin metate, three spherical cobble manos showing secondary percussion use, and a hammerstone; while in Structure 3 the group is made up of four manos, three choppers, two edge-utilized fire-cracked rocks, two tabular sandstone abraders, one cylindrical cobble plane, and a pestle fragment. One of the Structure 3 manos bears pits from other usage and one of the two flaked cobble choppers represented by one lateral half also show edge utilization after breakage. The cobble plane from Structure 3 also displays evidence of multiple or

sequential use in the form of impact scars from use as a hammerstone.

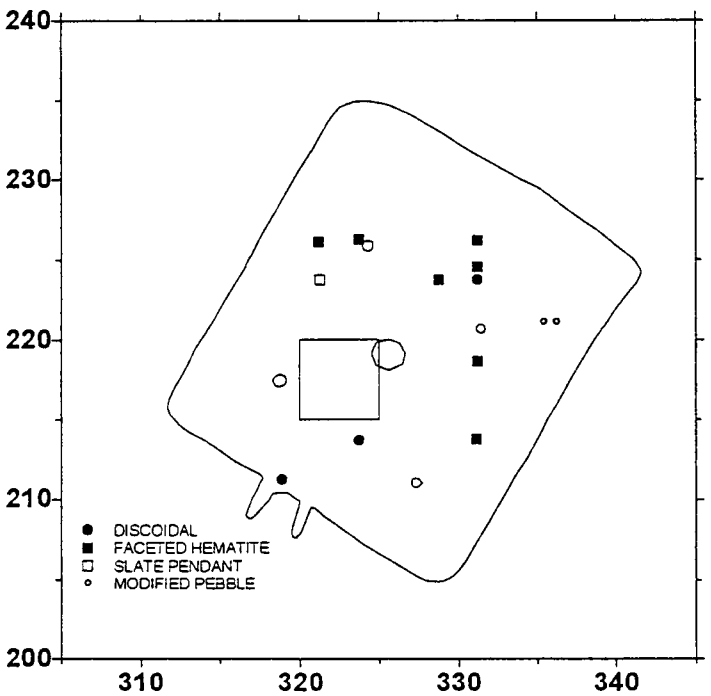
Other isolated cobble tools in Structure 2 consist of a cobble mano displaying hammerstone and anvil use near the entryway, and a cylindrical cobble plane flake in the left rear corner; while those from Structure 3 consist of four tabular limestone tools against the structure walls and a tabular sandstone abrader and edge-utilized cobble near the southwest main roof support. Other isolated Structure 3 implements include a tabular limestone anvil against the wall just right of the entryway, a tabular limestone whetstone showing anvil use against the wall in the left rear corner, and two smaller tabular limestone whetstones, just left of the entryway and near the right front corner of the structure. Evidence of ground stone edge tool maintenance or repair activities is restricted to Structure 3 and is indicated by the presence of greenstone flakes displaying the highly polished surface characteristic of these tool forms in the left and right cobble tool groups. The flakes probably reflect the removal of larger pieces to reform a broken or damaged ground stone bit of a polished celt, adze, or chisel.

Lithics - Other (ST2 n=5; ST3 n=13)

The distribution of other worked stone is presented in Figure 9.15. Sources of pigment make up the majority of the class in both structures. Three hematite fragments, bearing ground facets from the production of red pigment, are present in the left and rear tool groups in Structure 2, while seven fragments are present in the left, rear, and right tool groups in Structure 3. A faceted cube of galena, a source of white pigment, is present toward the left rear corner of Structure 2.



A. ST2 OTHER WORKED STONE



B. ST3 OTHER WORKED STONE

Figure 9.15. Structure 2 and Structure 3 Other Worked Stone.

A large honey-colored quartz biconcave discoidal is present near the left wall of Structure 2, and three stone discoidal shaped artifacts manufactured of shale, sandstone, and limestone are present in Structure 3. The roughly shaped siltstone example is in the tabular stone concentration near the hearth. The sandstone example, with a series of distinct facets making up the edges, is near the entryway and may have served as a discoid hammerstone utilized in flint knapping. The limestone example, well-shaped but split down the center, is near the center of the rear bench.

The pebble artifact class is restricted to Structure 3 and serves as a catch all category of objects modified from slate pebbles. An engraved green slate pendant displaying a single biconical perforation near one end is near the center of the west bench. A small grey slate pebble bearing a pair of opposed notches and a pebble displaying impact marks on one face are in the northeast corner.

Bone (ST2 n=2,504; ST3 n=6,699)

The distribution of animal bone by count within each floor unit is presented for both structures in Figure 9.16. The bone sample follows the benches along the walls of each structure, with higher concentrations near the center of the rear bench and the rear half of the left bench. A third, more limited, concentration of bone is evident in the right front quarter near the entryway of each structure.

The k-means analysis of piece-plotted bone fragments for Structure 2 produced two non-random cluster solutions, while for Structure 3 it produced a single, five cluster, solution. Both the twelve and fourteen cluster optimum solutions for Structure 2 reflect

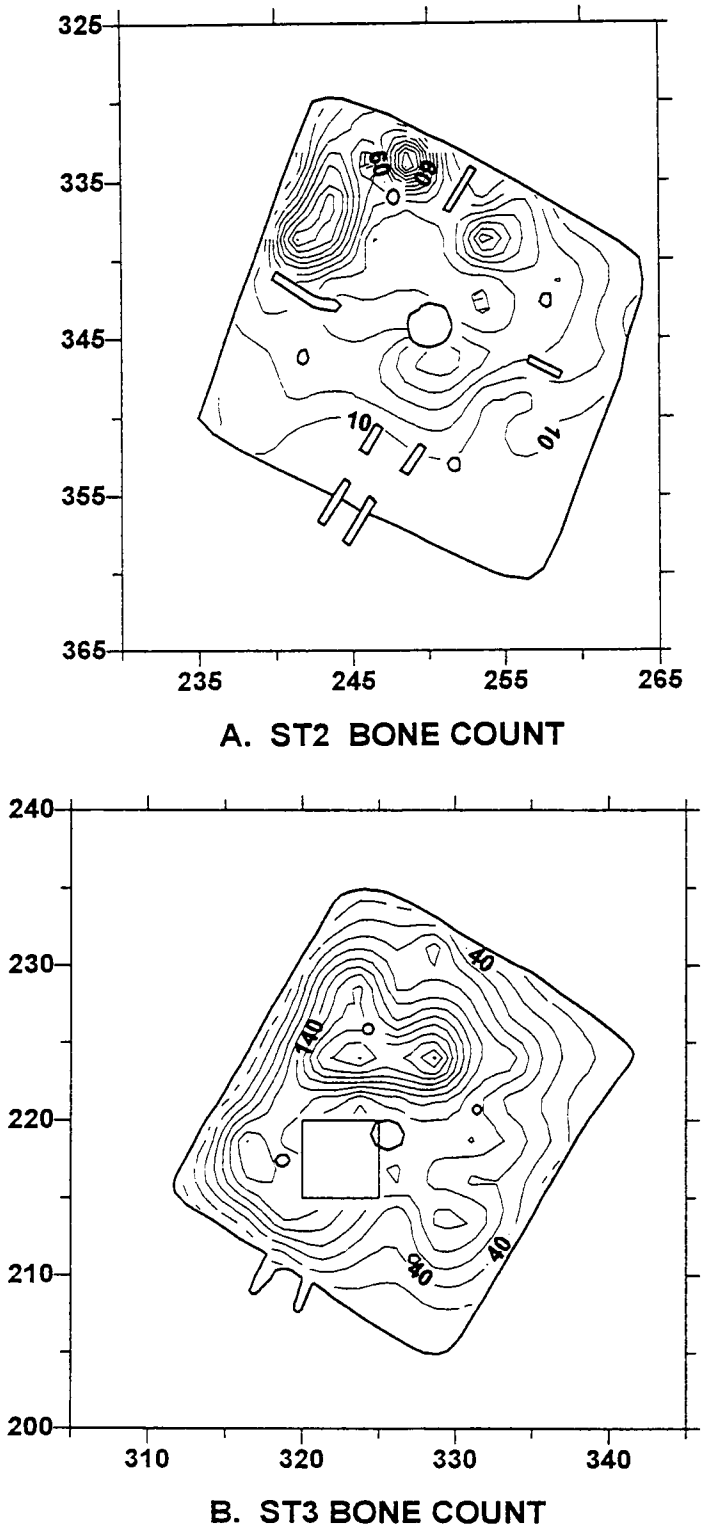


Figure 9.16. Structure 2 and Structure 3 Bone.

the Ring and Center Pattern, made up of an outer band of smaller clusters following the benches with a larger cluster in the center of the structure including the hearth. The five cluster optimum solution for Structure 3 reflects the Four Quarters and Center Pattern, made up of clusters toward each corner with a cluster on the rear side of the hearth in the central floor area.

Burned and calcined bone fragments make up nearly one-third (ST2, 30%; ST3, 27%) of each structure sample and while widely scattered in small numbers across each floor, tend to be concentrated in the central floor area, in the rear center in both structures, and in the right front portion near the hearth in Structure 2. The distribution of burned and calcined bone suggests heat alteration resulted from cultural factors other than the destruction of each structure by fire. Butchering marks are present on only three elements in each structure, and are evenly divided between the left and right halves in each.

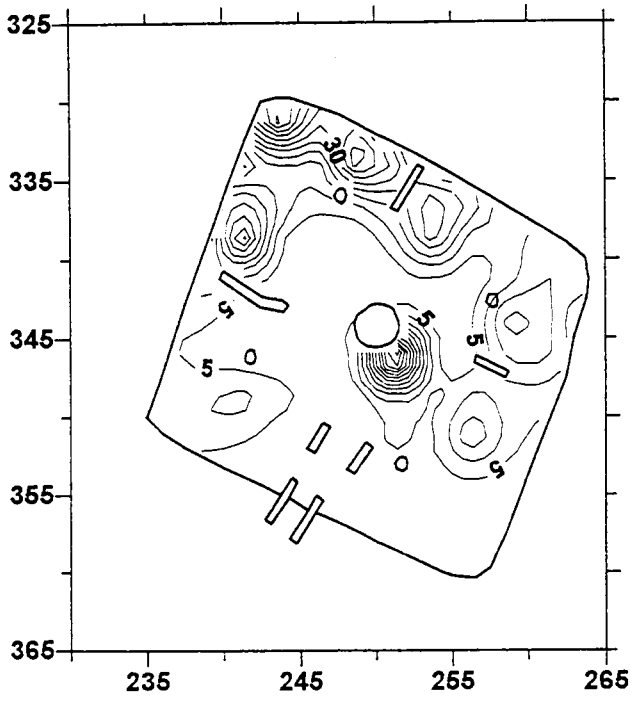
Bones displaying gnawing marks and surface alteration by digestive juices provide data concerning the behavior of canids resident in each structure. Gnawed (ST2, 0.4%; ST3, 1.1%) and digested (ST2, 2.8%; ST3, 4.4%) fragments are concentrated beneath the benches, particularly along the rear wall of each structure, while also scattered across the floor of Structure 3. The distribution of the canid altered bone suggests they frequented all parts of Structure 3, as opposed to more limited access to Structure 2, and may have more severely affected the distribution and composition of the Structure 3 faunal sample. Rodent gnawed fragments make up only a small portion (ST2, 0.3%; ST3, 0.1%) of the bone sample from each structure; however, such

fragments display contrasting patterns. Rodent gnawed bone fragments from Structure 2 are clustered in the left front corner, in association with maize kernels, and to a lesser extent near the left and rear partitions, while those from Structure 3 are more widely distributed beneath the benches.

The punctuated ring pattern and the k-means Ring and Center Pattern, for piece-plotted bones, are evident in both structures, with the greatest quantity of fragments present in the left rear half of each. Elements displaying canid alteration, while widely distributed in each structure, are more heavily represented and more widely scattered in Structure 3. Small rodent activity, indicated by the rodent gnawed elements, suggests a probable food storage area in the left front corner of Structure 2 as well as a somewhat protected environment for small rodents beneath the benches in both structures. The right front quarter of each structure contains a relatively small quantity of bone, unaltered by canids or small rodents, and likely was a more open floor zone less conducive to deposition and activities by either animal.

Shell (ST2 n=903; ST3 n=1,054)

The distribution of shell by count within each floor unit is presented for both structures in Figure 9.17. The shell sample in Structure 2 is concentrated beneath the left, rear, and right benches, with an additional cluster of pelecypods near the front edge of the central hearth, while that in Structure 3 is concentrated in the left front corner of the structure with smaller secondary concentrations beneath the left bench and in the left rear corner. Smaller numbers of shells are scattered elsewhere on each floor. The left



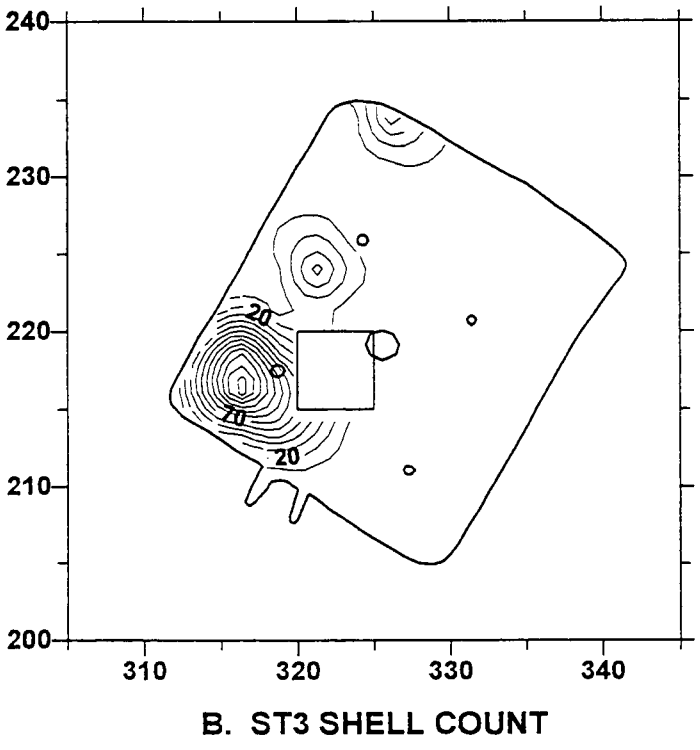


Figure 9.17. Structure 2 and Structure 3 Shell.

front corner concentration in Structure 3, made up in large proportion of pelecypod or bivalve shells, is mirrored to a lesser extent by a smaller number of larger bivalves in the left front corner of Structure 2.

The k-means analysis of piece-plotted shells for Structure 2 produced two non-random cluster solutions, while for Structure 3 it produced a single, eight cluster, solution. The first, six cluster, optimum solution for Structure 2 reflects the basic Ring Pattern surrounding the central hearth. The second, twelve cluster, optimum solution for Structure 2 reflects the Ring and Center Pattern, made up of the ring pattern coupled with a cluster of bivalve shells in the right front portion of the central floor area near the hearth. The eight cluster optimum solution for Structure 3 also reflects the Ring and Center Pattern, made up of the ring pattern coupled with a cluster of shell in the vicinity of the central hearth.

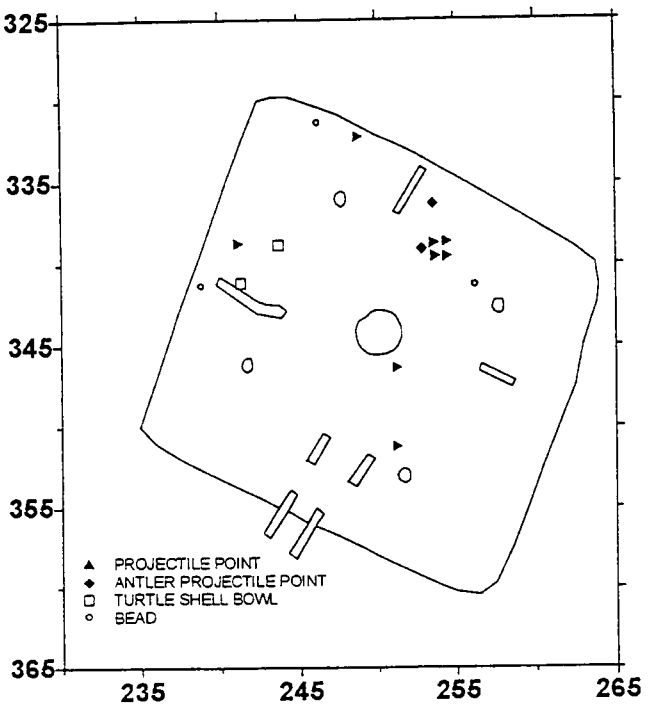
Each shell sample is made up of both pelecypods (ST2, 69%; ST3, 58%) and gastropods (ST2, 31%; ST3, 42%). Fragmentation, due in small part to cultural activities and primarily to soil conditions, inflates the bivalve shell count in the two smaller size classes, while the gastropod count more closely reflects the original number present in each structure.

The primary source of shell within each structure is probably, like bone, discarded nonedible food refuse. While some bivalve shells were likely utilized and slightly modified for or by such use, the small proportion of modified shells should have little effect on the overall distribution in each structure. One concentration in each structure differs from the general pattern of accumulation beneath the benches. The

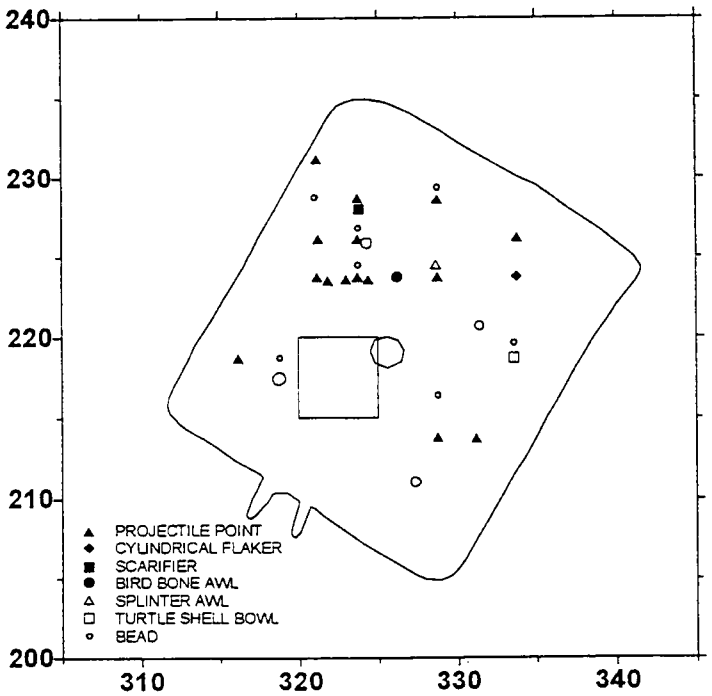
cluster of somewhat burned bivalve shells in dark grey ash situated near the hearth of Structure 2 may represent a specialized activity, such as reduction of the shells into shell temper for ceramic manufacture, or some form of food preparation conducted shortly before the fire. The larger cluster of unburned bivalve shells situated in the left front corner of Structure 3 may represent storage of shells for later use, or merely be the result of convenient discards into a corner storage area prior to abandonment of the structure.

Worked Bone (ST2 n=19; ST3 n=64)

The worked bone sample is divided into finished bone artifacts or fragments of artifacts and preforms or residues from the manufacturing process. A range of artifacts and associated residues indicating the manufacture and use or storage of worked bone items is present in both structures. The distribution of finished bone artifacts for each structure is presented in Figure 9.18, and the distribution of worked bone preforms and residues is presented in Figure 9.19. The finished bone artifact samples in both structures are dominated by bone projectile point fragments. Projectile points, manufactured from deer metapodial segments, are represented by both unburned and heavily burned fragments. Projectile point fragments are concentrated near the center of the rear bench in Structure 2, and the rear end of the left bench and near the right wall of Structure 3. A minimum of five projectile points is represented in Structure 2, while least seven bone projectile points are represented by the 17 fragments in Structure 3. The black or calcined white heavily burned projectile point fragments probably represent points stored as arrow components in the roof thatch of each structure. The unburned

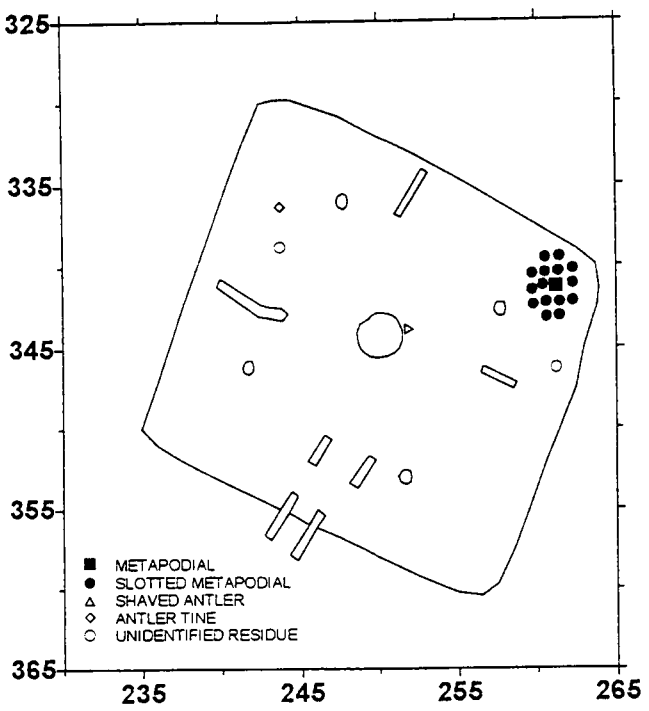


A. ST2 WORKED BONE ARTIFACTS

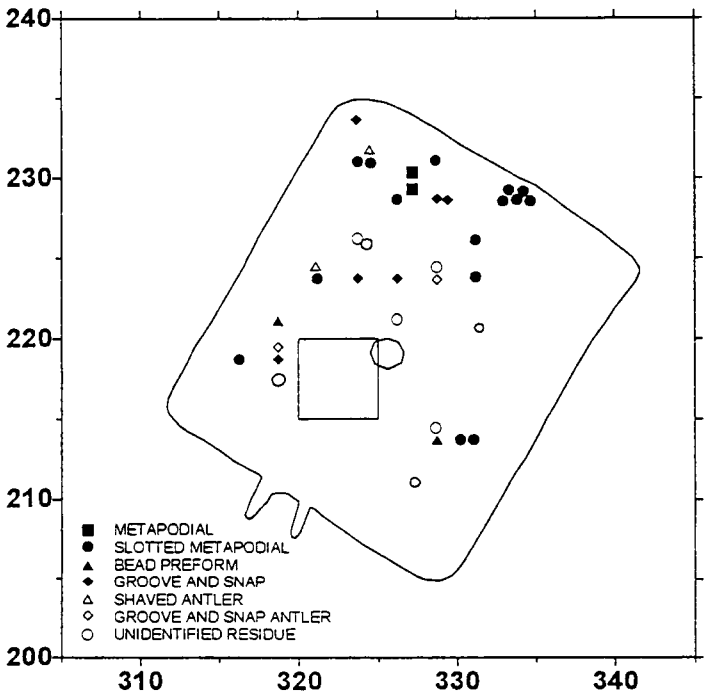


B. ST3 WORKED BONE ARTIFACTS

Figure 9.18. Structure 2 and Structure 3 Worked Bone Artifacts.



A. ST2 WORKED BONE PREFORMS AND RESIDUES



B. ST3 WORKED BONE PREFORMS AND RESIDUES

Figure 9.19. Structure 2 and Structure 3 Worked Bone Performs and Residues.

examples, including one complete point in a vertical position in a posthole along the left west wall and two fragments with impact fractures in Structure 3, rest on or within floor deposits and so are unaltered by the fire. Antler projectile points are restricted to the rear bench of Structure 2. A split fragment of a cylindrical antler pressure flaker is beneath the rear bench of Structure 3. A sharpened bird bone sliver is in the left rear corner of Structure 3. Awls are restricted to Structure 3 and are represented by a birdbone awl tip fragment near the center of the rear bench and a splinter awl with the tip missing. Turtle shell bowls are represented by two fragments beneath the left bench of Structure 2 and a fragment with a smoothly ground rim, near the right rear main roof support of Structure 3. The seven bone beads, manufactured from small animal long bones reduced to length by groove-and-snap reduction, are represented by two examples on the left side of Structure 2 and seven examples widely scattered in Structure 3.

Worked bone preforms and residues in both structures are dominated by evidence of the deer metapodial reduction sequence. Two metapodials displaying the beginnings of longitudinal grooves, one retaining other lower limb bones in articular position and the other having the distal end removed by groove-and-snap reduction, are driven into the floor of Structure 3 near the left end of the rear bench. Fragments of longitudinally grooved quarter metapodial preforms are concentrated along the rear bench of both structures. The cluster of metapodial preforms in Structure 3 coincides with a cluster of cobble tools made up of abraders and whetstones displaying anvil use. Such preforms represent an intermediate stage in the manufacture of bone projectile points. One unfinished shaved antler projectile point tip is in the left rear corner of Structure 3, while

other shaved antler fragments possibly derived from antler projectile point manufacture are present in the left rear half of each structure. The bead preforms, consisting of small animal long bones grooved for the detachment of short segments for beads, are present near the left bench and the right wall of Structure 3. Tine segments displaying groove-and-snap reduction and edge-anvil breaks are present along the left bench in Structure 2 and the left and rear benches in Structure 3. The remaining examples of worked bone in each structure consist of small unidentified fragments displaying evidence of longitudinal grooves, ground edges, or groove-and-snap reduction, present around the edges of each central floor area.

Worked Shell (ST2 n=1; ST3 n=1)

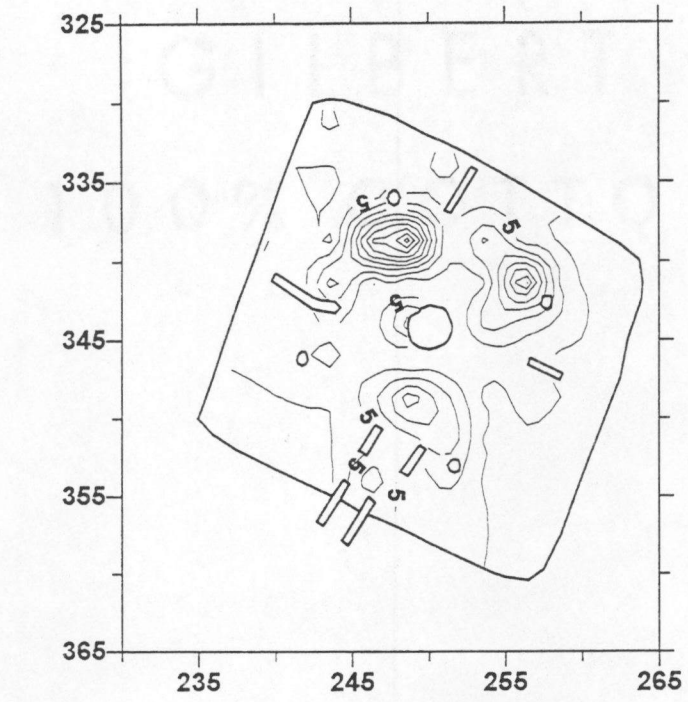
Worked shell in each structure is limited to a single bivalve shell. A large pocketbook mussel with lightly ground margins, probably utilized as a spoon, is situated beneath the left bench of Structure 2. A bivalve fragment displaying a ground edge is present within the shell cluster in the left front corner of Structure 3. Other worked shells may have been present; however, the friable condition of many bivalves precludes such a determination.

Botanical Material (ST2 n=1,479; ST3 n=1,001)

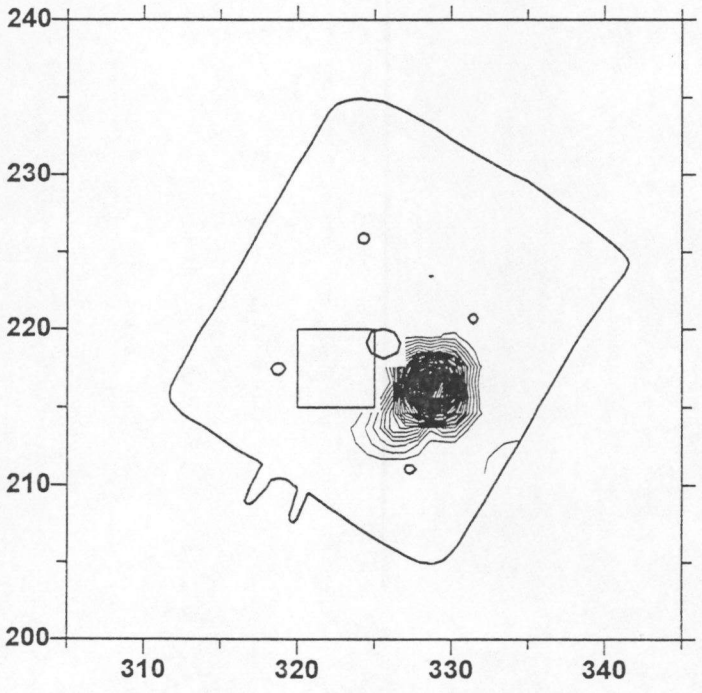
Botanical material, comprising both architectural elements and food remains, is present beneath roof-fall and in other more protected environments within both structures. Architectural elements and food remains provide differing distributions

within both structures. The distributions of the botanical subclasses by count are presented within each floor unit for both structures. Architectural materials such as wood, cane, and bark, make up the majority (ST2, 90%; ST3, 88%) of the botanical sample in each structure. The distribution of wood fragments, including structural members and posts protruding from the floor of each structure is presented by count in Figure 9.20. Much of the wood (ST2, 28%; ST3, 92%) making up the architectural sample in each structure is preserved along the edges of, in Structure 2, or beneath, in Structure 3, the central mass of fired clay roof-fall. The distribution of architectural non-wood in each structure (ST2, 71%; ST3, 8%) is presented by count in Figure 9.21. Architectural non-wood in Structure 2, consisting of bark, cane, and traces of grass thatch, is dominated by fragmented bark preserved beneath fallen clay partitions flanking the entryway; while that from Structure 3 is dominated by river canes preserved within and beneath the central mass of fired clay roof-fall. Patterning in architectural materials is attributable to differential preservation of the fallen superstructure and reflects the thoroughness of combustion coupled with the amount of architectural clay plastering available to retard combustion after structure collapse.

Preserved botanical food remains in each structure include hickory nut shell, walnut shell, and a combined seed and fruit group. The distribution of all food remains by count in both structures is presented in Figure 9.22. The food remains group for each structure displays a punctuated ring pattern centered on each hearth and following the benches. When the food remains group is divided into its component parts; seeds and



A. ST2 WOOD COUNT



B. ST3 WOOD COUNT

Figure 9.20. Structure 2 and Structure 3 Wood.

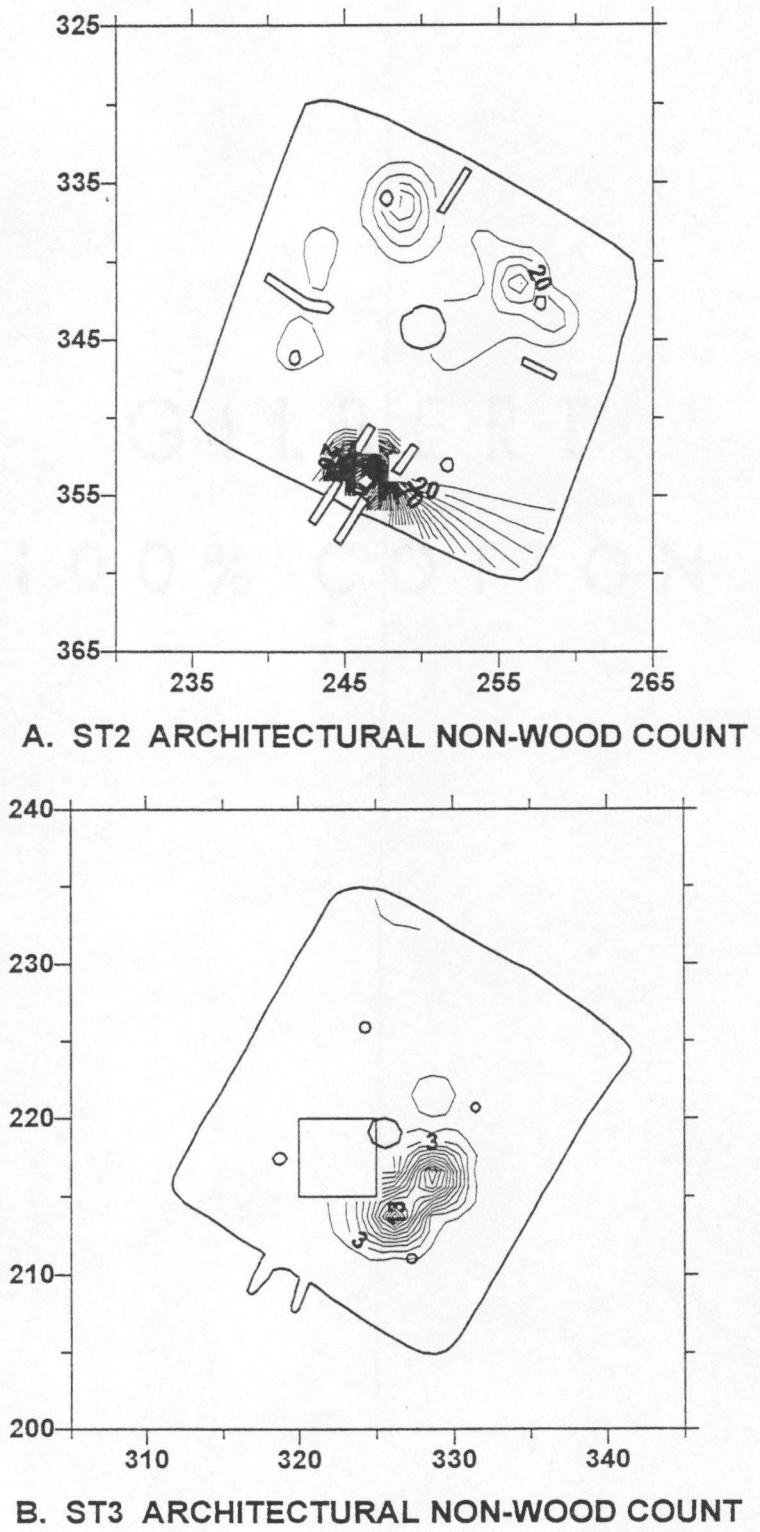
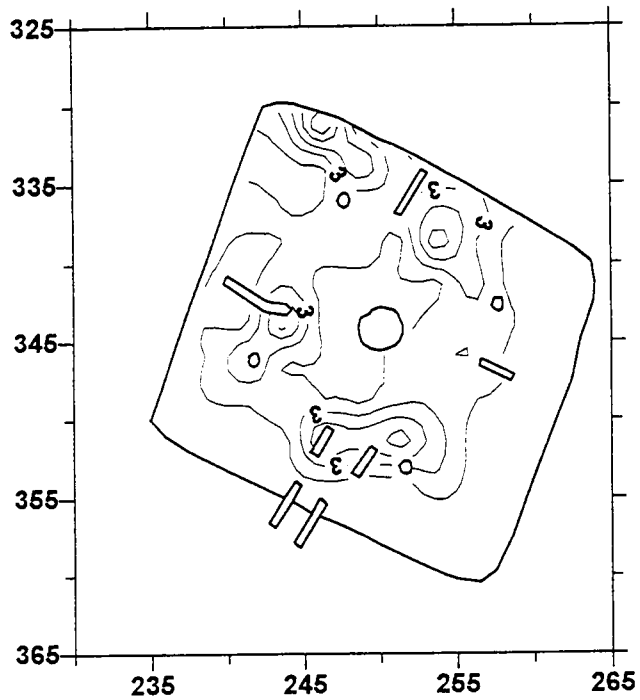
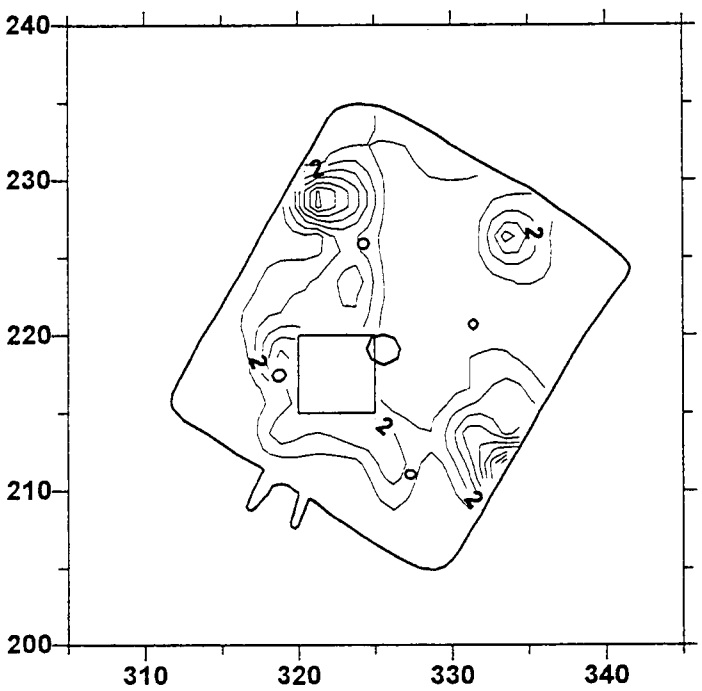


Figure 9.21. Structure 2 and Structure 3 Architectural Non Wood.



A. ST2 BOTANICAL FOOD REMAIN COUNT



B. ST3 BOTANICAL FOOD REMAIN COUNT

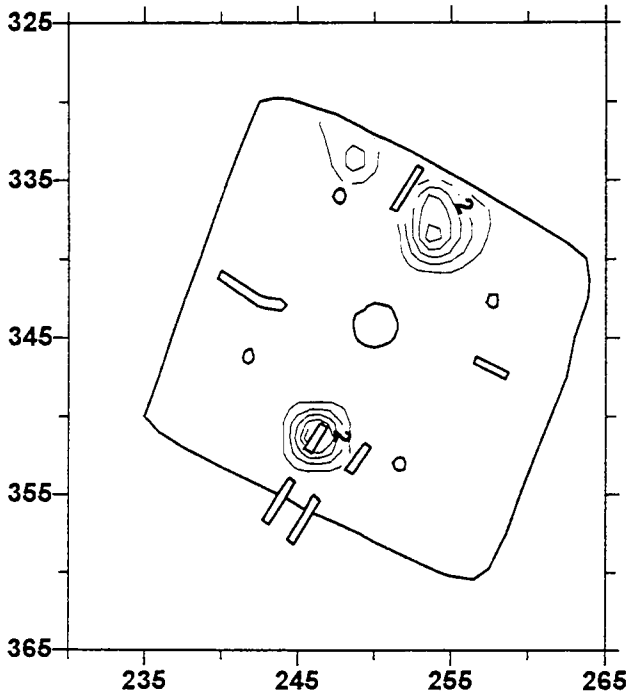
Figure 9.22. Structure 2 and Structure 3 Botanical Food Remains.

fruits, hickory nut shell, and walnut shell, each displays a different pattern that is, however, complementary between structures.

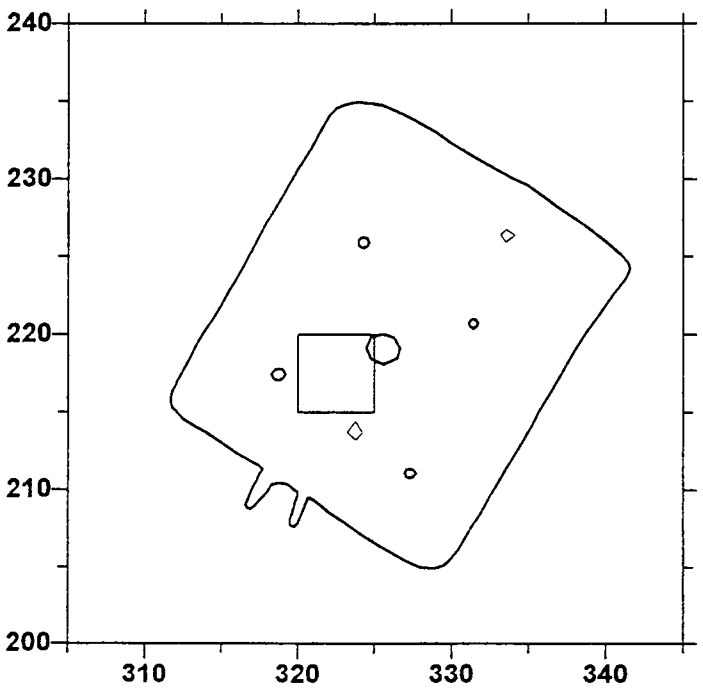
The botanical seeds and fruits group for each structure, presented by count in Figure 9.23, is represented in Structure 2 by honey locust seeds, cherry pits, and a bean, while in Structure 3 this group is represented by a fragment of porous charred material resembling a honey locust pod and a large unidentified seed or fruit pit. Patterning is comparable in both structures, with evident concentrations both near the rear bench and between the entryway and the front of the central hearth.

The distribution of hickory nut shell fragments by count in both structures is presented in Figure 9.24. The discontinuous distribution in both structures of relatively large hickory nut shell fragments along the front edge of the bench, with a separate concentration near the front wall in the right front quarter, is generally comparable to that for black walnut shell fragments. The distribution of walnut shell fragments presented in Figure 9.25, while somewhat more restricted across each structure floor, displays much the same pattern. The greatest concentration of walnut shell fragments in each structure is also situated near the right wall in the right front quarter. Less than half of the floor units in each structure yielding nut shell contain both hickory and walnut shell, while one-third contain only hickory nut shell and one-quarter contain only walnut shell.

Patterning of botanical materials in each structure representing architectural elements contrasts with that representing food remains. Charred architectural remains in both structures display comparable patterns of close association with fired clay central

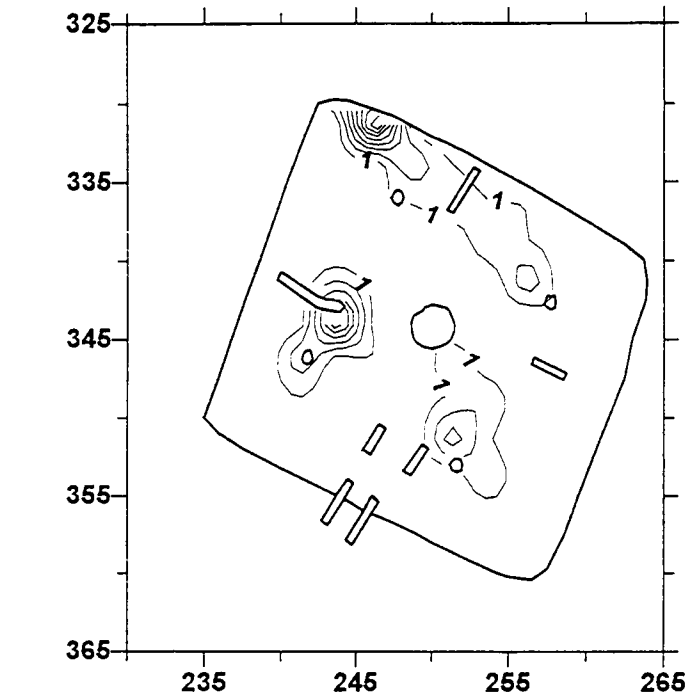


A. ST2 BOTANICAL SEED AND FRUIT COUNT



B. ST3 BOTANICAL SEED AND FRUIT COUNT

Figure 9.23. Structure 2 and Structure 3 Botanical Seed and Fruit.



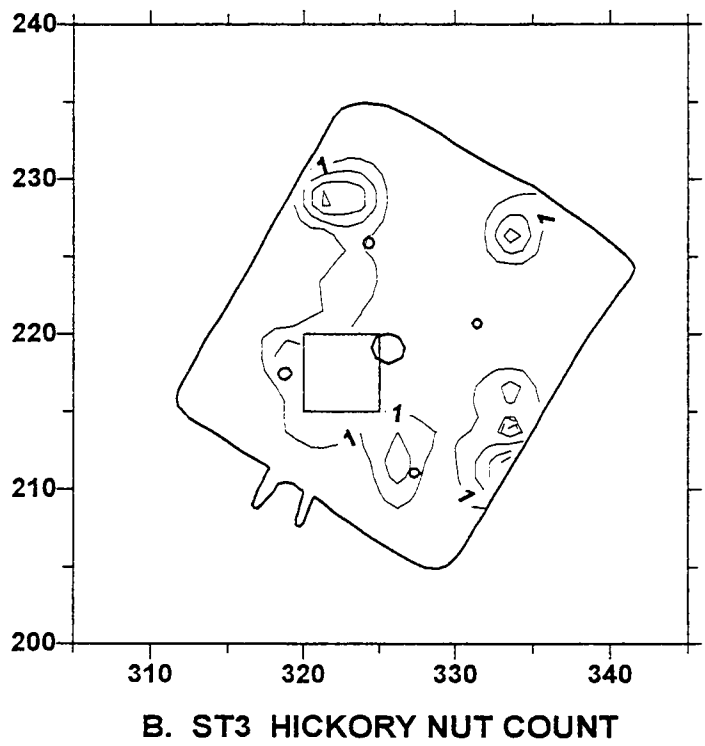
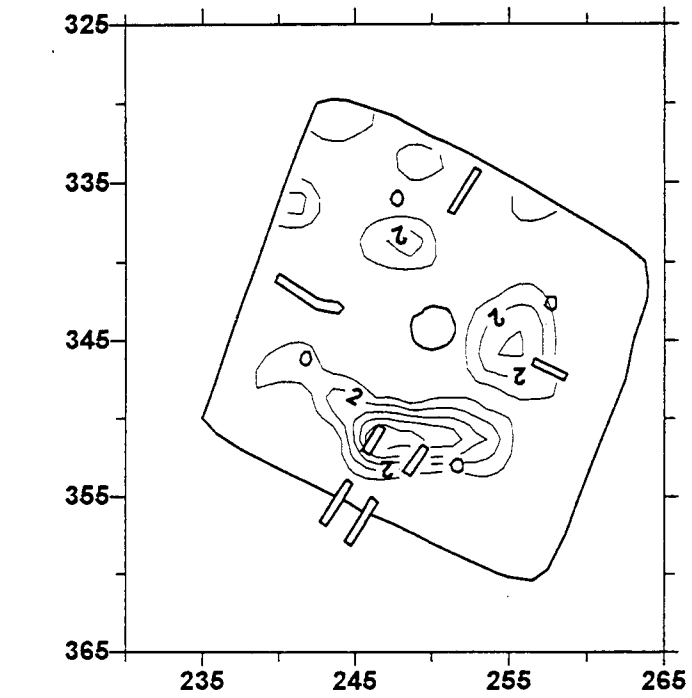


Figure 9.24. Structure 2 and Structure 3 Hickory Nut Remains.



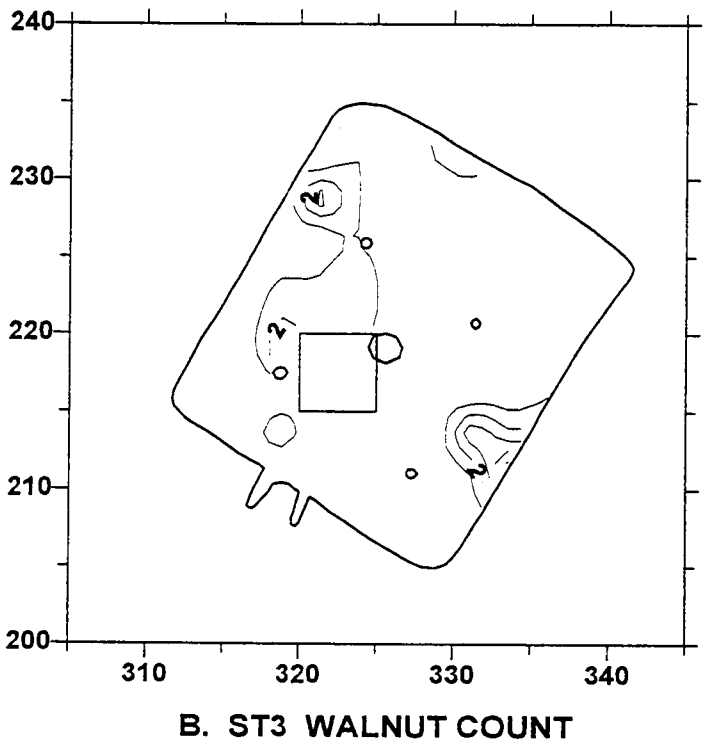


Figure 9.25. Structure 2 and Structure 3 Walnut Nut Remains.

roof-fall, partitions, or postholes linked to the upper portions of each structure. Food remains, while less well represented in Structure 3 than Structure 2, display the punctuated ring pattern following the edge of the central floor area observed for several other material classes. The carbonization process for food remains is potentially complex and could reflect other factors than burning of the structure, such as food preparation failures or potential use of nut shell as fuel as suggested by David Hally (1981). Nut shell, being more durable than other food remains, is most heavily represented in both structures, although it is of interest that only half the units producing nut shell in each structure contain both hickory and walnut shell. While not yet available for both structures, the flotation data derived from Structure 2 indicates the presence of maize, sunflower, maypop, grape, and other seeds in this structure, in addition to confirming the previously determined architectural and nut shell distributions.

Activity Summary

The activities represented in these two structures are reflected, however dimly and distorted during deposition and events thereafter, in patterning of the materials described earlier in this chapter. Patterning by material class for the two structures is summarized in Table 9.4. Congruences and contrasts in this patterning for the two structures are summarized in Table 9.5. Food preparation activities attributed to women as well as storage and food consumption, are represented by fire-cracked rocks, ceramics, botanical food remains, animal bones, and mollusk shells in both structures. Each of these classes shares similar patterning in the two structures. Fire-cracked rocks

Table 9.4. Summary of Patterning by Material Class.

MATERIAL CLASS	STRUCTURE 2		STRUCTURE 3	
FIRED CLAY	C	CP	C	CR
BOTANICAL	C	PR	C	CW
Architectural Wood	C	PR	C	CW
Architectural Non Wood	C	PR	C	CR
Food - Nuts	M	PR	MW	PR
Food - Seeds and Fruits	M	CR	M	CR
CERAMICS	M/L	PR	M/L	PR
LITHIC DEBITAGE	M	PR	M/L	PR
FLAKED TOOL	M	PR	M	PR
COBBLE TOOL	M	PR	M	PR
ROUND ROCK	C	CR	C	CR
FIRE-CRACKED ROCK	L		L	
TABULAR ROCK	L		L	
BONE	L	PR	L	
WORKED BONE	B		L	
SHELL	M/C	PR	L	
WORKED SHELL	L		L	

FLOOR ZONES
C = Central
M = Middle

W = Wall
L = Left Side
B = Back Half

FLOOR PATTERNS
CR = Center Pattern
CP = Center and Partition Pattern
CW = Center and Walls Pattern
PR = Punctuated Ring pattern

Table 9.5. Summary of Congruences and Contrasts in Patterning by Material Class.

MATERIAL CLASS	COMPARATIVE MODE
FIRED CLAY	Yes
BOTANICAL	No
Architectural Wood	No
Architectural Non Wood	No
Food - Nuts	Yes
Food - Seeds and Fruits	Yes
CERAMICS	Yes (Count) No (Size)
LITHIC DEBITAGE	Yes
FLAKED TOOL	Yes
COBBLE TOOL	Yes (Count) No (Size)
ROUND ROCK	Yes
FIRE-CRACKED ROCK	Yes
TABULAR ROCK	Yes
BONE	Yes (Count) No (Size)
WORKED BONE	Yes
SHELL	No
WORKED SHELL	Yes

Yes = Congruent Patterning
No = Contrasting Patterning

are concentrated in the left diagonal half of each structure, with a peak count near the center of the back bench opposite the entryway. A cluster of larger fire-cracked rock, perhaps a heated rock use area, is situated just to the left of the entryway in Structure 3. Ceramic sherds follow a similar pattern of concentration in the left diagonal half of each structure, while vessels and vessel sections, with the exception of a small jar near the hearth in each structure, are restricted to along the left and rear benches in Structure 2. Botanical food remains and animal bone both present a punctuated ring pattern centered on the relatively clear central hearth area. Only a small percentage of animal bone in Structure 2 displays the evidence of gnawing and digestion characteristic of canid presence, while a much larger percentage of such altered animal bone is present in Structure 3. Dogs may have been less welcome in the occupied domestic dwelling and spent more time, or left more evidence of their presence in the unoccupied dwelling. The left diagonal half once again contains the majority of bone fragments, while seed and fruit remains are situated on opposed sides of the hearth on the central axis of the structure. Shell is distributed in a punctuated ring pattern as well as concentrated, in burned condition, in front of the hearth to the right of the entryway in Structure 2. Shell in Structure 3 is concentrated in the left front corner of the structure. The differing distribution of shell may reflect both food refuse and retention for secondary use such as tempering material for ceramics.

Selected classes of lithic, bone, and shell artifacts, as well as their manufacturing or maintenance residues, are presented by suggested functional category in Table 9.6. Tentative attributions by sex and/or age for many of these artifacts have been proposed

Table 9.6. Functional Categories of Worked Stone, Bone, and Shell Artifacts and Residues by Structure Area.

CATEGORY	STRUCTURE 2		STRUCTURE 3		COMBINED	
STRUCTURE AREA	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
FLAKED TOOL						
Projectile Point/Knife	7	2	17	10	24	12
Bifacially Worked	6	7	12	6	18	13
Perforator	2				2	
Flake Tool		1	2	6	2	7
Utilized Flake	6	1	5	9	11	10
PE	3	1	37	15	40	16
Debitage - Chert	193	145	684	390	877	535
COBBLE TOOL						
Abrading Tool	10	3	12	4	22	7
Scraping Tool	4		11	1	15	1
Cutting Tool			2	2	2	2
Planing Tool				1		1
Heavy Cutting Tool	1			3	1	3
Grinding Tool	1	4		6	1	10
Percussion Tool	3	1	4		7	1
Other	5		7	6	12	6
Debitage - Quartzite	6	1	45	18	51	19

Table 9.6. (Continued)

CATEGORY	STRUCTURE 2		STRUCTURE 3		COMBINED	
STRUCTURE AREA	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
WORKED BONE						
Projectile Point	8	2	14	3	22	5
Antler Tine Tool	1				1	
Cylindrical Flaker			1		1	
Scarifier			1		1	
Turtle Shell Bowl	2			1	2	1
Awl Fragment			2		2	
Bead	3		5	2	8	2
Preform and Residue	29	1	28	5	57	6
WORKED SHELL						
Bivalve	1		1		2	
TOTAL	291	169	890	488	1181	657

in Chapter II on the basis of ethnohistoric sources and a large comparative sample of Dallas phase burials. These classes, other than worked shell fragments, are distributed in the punctuated ring pattern with generally greater concentrations in the left diagonal half of each structure, mirroring the wall benches, with periodic clusters in Structure 2 probably representing individual work areas. Recognition or clarity of these periodic clusters likely reflects the abrupt interruption of the occupation in Structure 2, whereas the removal or gradual displacement of material due to abandonment would obscure such clusters in Structure 3. Consolidation of these distributions by suggested functional category, first into k-means cluster solution groups and then into the diagonal halves of each structure floor, provides some idea of activities performed in various parts of the structure. Bone working and lithic reduction activities, attributed to men, are centered on the rear bench with some extension to the left bench. Heat treatment of lithic raw material and some primary lithic reduction, also attributed to men, may have taken place in conjunction with the oblong basin-shaped feature situated in the right front quarter of the floor near the central hearth and just within the entryway. Triangular projectile points and thicker triangular projectile point/knives, as well as bone projectile points, all attributed to men, also center on the rear bench with some extension to the left bench. Small chipped stone tools for light cutting, scraping, perforating, and slotting or grooving functions, attributed to both sexes, are concentrated on the left bench with secondary concentrations on the rear bench and, in Structure 3, near the center of the right wall. Larger, cobble-based, food preparation grinding tools and heavy cutting/chopping tools, attributed to women, are concentrated in the right front quarter

of each structure, suggesting this more open area was utilized by both sexes for larger scale activities requiring more clear floor space. The ground stone and cobble tools representing crushing/pounding, nonfood preparation grinding/abrading, and heavy scraping/planing functions, attributed to men, are concentrated on the rear and left benches and represent equipment of use for a wide variety of tool and ornament manufacturing processes involving lithic, bone, and more perishable materials. Probable personal items attributed to men, such as smoking pipes, sources of pigment, and stone discoidals, are also concentrated on the rear and left benches.

Differentiation of space, both in architectural terms and in the distribution of associated materials, is clearly evident in the two Dallas phase domestic dwellings studied here. Congruences in patterning appear to reflect similarities in the use of space within the domestic dwelling, while contrasts appear to hinge upon the state of occupation at the time of destruction by fire. Of particular interest is the apparent differentiation in the use of space by sex, with the rear bench area primarily attributed to male activities and the left bench area largely to female activities while some activities by both sexes requiring additional space were situated in the right front quarter of the structure. Such differentiation may reflect the first of two fundamental oppositions in the belief system of the Southeastern Indians described by Charles Hudson (1976:259) "which gave structure to the knowledge, techniques, and behavior involved in their subsistence pattern: men as opposed to women, and the cold season as opposed to the warm season." The second fundamental opposition, of cold as opposed to warm seasons, is indicated in the duality of structures commonly making up the Southeastern

Indian household; indeed the very terms "winter house" or "hot house" and "summer house" (Faulkner 1977) suggest this duality.

Revised Dallas Household Model

The model for the use of space within the primary structure or dwelling unit of the Dallas phase household, presented at the beginning of this study (Figure 1.1), has been refined through the incorporation of new data derived from the Loy site. The refined model is enhanced rather than radically altered by the additional detail provided by the Loy data. Both primary structures possess four main roof supports delimiting a public floor area, centered on a prepared clay hearth, from a private floor area situated between the main roof supports and the outer walls. Evidence of raised beds or benches and perishable or clay partitions are evident along the walls of each structure. Both structures are set in shallow rectangular pits which provided a more protected environment for the preservation of both architectural and other cultural contents. The entryway, delimited by paired shallow trenches extending out from the center of the exterior wall, provides the means for orienting both structures in a similar manner. The utilization of space within the primary or dwelling structure, for food processing and cooking in the public floor area and sleeping and storage in the private floor area as defined in the earlier model, still appears to be valid, although more simplistic than is likely to be the case. The more detailed distributional data provided by the Loy site structures suggest both refinements in our knowledge concerning the use of space and a

less simplistic view of the depositional processes producing the archaeological remains of these structures.

The refined model for the use of space in Dallas phase primary or dwelling structures, presented in Figure 9.26, expands upon the earlier model. The distribution of human burials beneath the structure floor, noted in previous discussions of the model at the Toqua site (Polhemus 1990:128), provides support for the attribution of structure areas by age and sex, with adult males most often interred toward the rear wall, adult females most often interred toward the left or right wall, and sub adults most often interred along the perimeter of the central public floor area and front of the structure. In addition to the previously defined public versus private division of floor space a more open segment of floor situated in the right front quarter is identified. This more open segment, designated "I" in the figure, has a shallow basin shaped feature containing a row of rocks situated at the interface with the public floor area. Large cobble tools, such as a metate, manos, and heavy chopping implements, as well as a small number of larger chert fragments, suggest this is a heavy processing area utilized by both sexes. Activity in this area may be affected or regulated by available daylight as indicated by proximity to the entryway. The rear bed or bench, designated "II" in the figure, is characterized by a concentration of lithic and bone projectile points, tools, preforms and residues from the manufacture of such projectile points. Ceramic vessels appear to have been stored beneath and along the front edge of the bench near the partition in the case of the occupied Structure 2. The greatest quantity of occupational refuse is situated near the interface with the public floor area near the center of the bench. The rear bench is

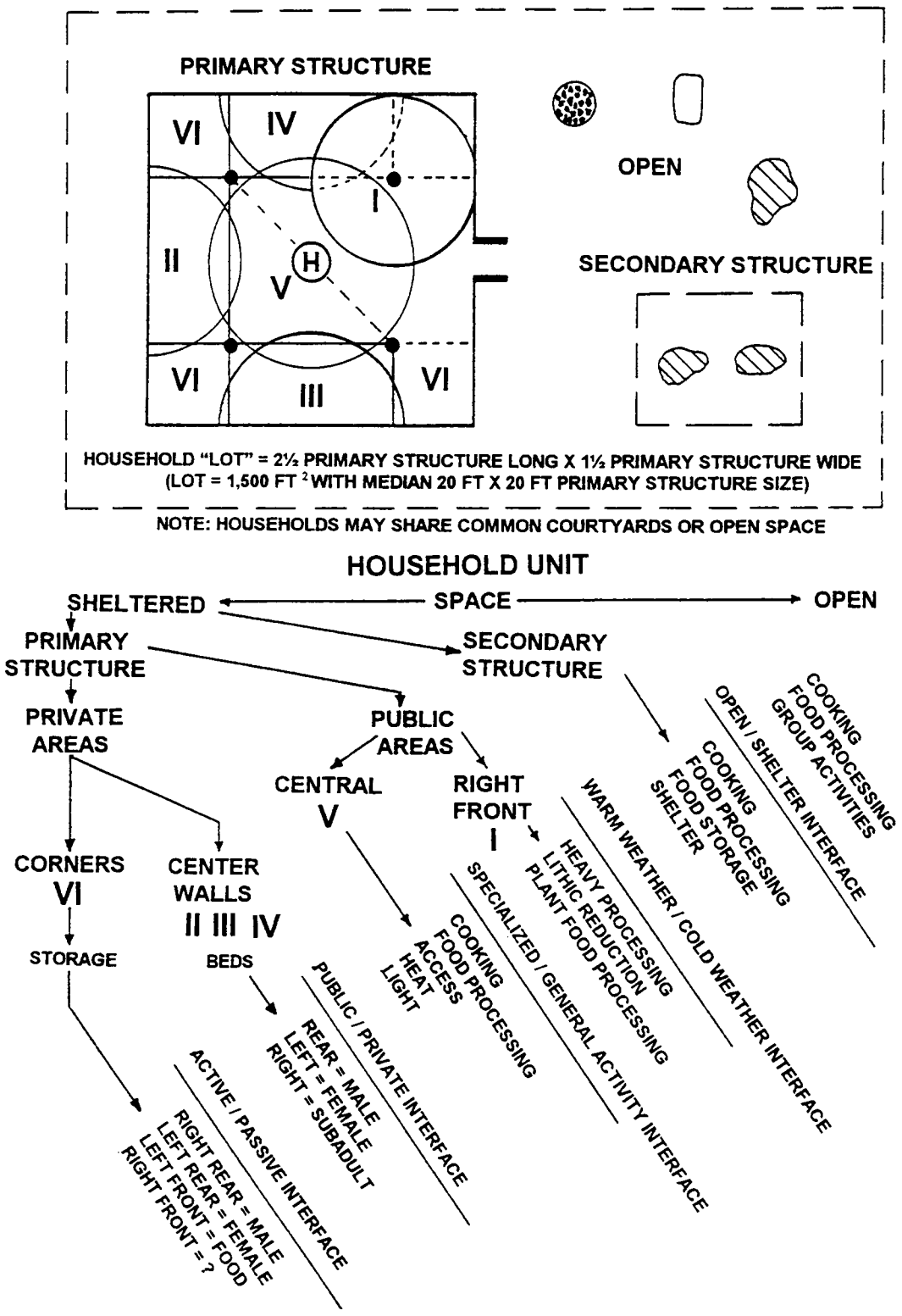


Figure 9.26. Revised Dallas Phase Household Model.

interpreted as the primary or perhaps male dominated area of each structure. The left bed or bench, designated "III" in the figure, is characterized by a wider range of general purpose tools and other deposited materials, including pigments and discoidals, and a lack of Mississippian triangular projectile points. The second greatest quantity of occupational refuse is situated near the interface with the public floor area near the center of the bench. The left bench is interpreted as the secondary or perhaps female dominated area of each structure. The right bed or bench, designated "IV" in the figure, is situated beyond the heavy processing area and is characterized by a moderate quantity of tools and refuse associated with the postholes indicating the presence of interior architecture. This bench, as well as potential bench locations along the front wall in structures of larger overall size, is interpreted as sleeping areas for subadults. The public floor area, designated "V" in the figure, is situated at the center of the structure and is generally bounded by the four main roof supports. The public floor area, centered upon the prepared clay hearth, is the source of light, heat, and general access to the rest of the structure. This floor area is characterized by greater compaction or definition of the floor surface and less floor refuse of smaller size overlain by collapsed roof structure. The public area is bordered by the benches lining the walls, the more open processing area, and the entryway, while the interface with other floor areas, at least in the occupied Structure 2, is marked by the presence of ceramic vessels, the metate, larger cobbles, and cobble tools. The impression one has of public floor use is that of keeping the central area clear of obstructions, yet keeping needed food preparation or individual processing equipment close at hand. The corners of the structure not otherwise utilized, designated

"VT" in the figure, appear to be used for storage. The left front corner most likely serves as a food storage area, as indicated by both charred plant foods and small rodent remains, while the rear corners serve more general storage purposes, including ceramic vessels (female oriented) in the left rear and worked bone preforms (male oriented) in the right rear corners. The greater volume of artifacts and refuse present in the left rear diagonal half of each structure is likely due to more frequent utilization of the rear and left benches by the structure occupants. While floor maintenance activities, such as clearing or removal of larger refuse and sweeping, have undoubtedly affected the quantity and distribution of cultural materials within the structure, the similarity in the distribution of most material classes between the two structures suggests such activities produced similar results. Similar patterning of ceramic sherd refuse and ceramic vessels indicate maintenance activities, for this class at least, have not obliterated significant distributional data.

While archaeological remains of structures and their contents are usually discussed in a two-dimensional format, sheltered space is characterized by vertical as well by horizontal dimensions, making possible the layering or superposition of activities within a structure. Three-dimensional characteristics of architectural space in Dallas primary structures, such as raised beds or benches and interior partitions as well as wall and roof use for storage, have been alluded to in describing the Loy site structures and their contents. Raised beds or benches provide both an upper surface, used for seating and sleeping, with potential for preventing or redirecting deposition of activity byproducts, and a floor surface beneath, used for storage of bulky items such as pottery

vessels as well as a less accessible depositional reservoir for small scale refuse tossed or swept from the more regularly maintained public floor area in each structure. Bed or bench areas are characterized by shallow postholes, unconsolidated floor deposits containing a wide range of small to medium sized artifacts and refuse, as well as large pottery vessels in an upright or inverted position. Interior partitions provide a modicum of privacy between the beds or benches, and may have served to divide occupied space from stored materials as well as to control drafts and direct heat emanating from the central hearth. Small items, or containers such as animal skin bags, were likely hung from walls and support posts while tools or weapons with long shafts appear to have been placed point downward in the edge of a convenient posthole, as with a bone projectile point in Structure 3, or thrust into the thatch roofing material over the owners bed or bench, as indicated by the dispersed and heavily burned condition of the nine bone projectile points in the structures. Some ceramic vessels, such as those found mixed with roof-fall near the right front edge of the central hearth in both Structure 2 and Structure 3, may also have been suspended from structural elements, like a net enclosed jar in Structure 11 at the Toqua site (Polhemus 1986:204,270).

This chapter has compared the contents of the two Loy site structures within a shared architectural framework. Congruences and contrasts in the spatial patterning of structure contents have been described. The activities represented in each structure and the patterning of materials reflecting these activities have been discussed. The activities represented in these two structures reflect the full range of daily endeavors that could have taken place within an enclosed space. Tools, containers, residues, and raw

materials reflecting the manufacture and maintenance of tools, weapons, and ornaments as well as the storage, preparation, and consumption of foodstuffs are present in similar proportions in both structures. The quantity and distribution of these tangible remains within the two structures, however, display both congruences and contrasts in patterning of structure content reflecting similarity in function and dissimilarity in structure state at the time of destruction by fire. Similarity in function is clearly indicated both by material culture content and by similar spatial patterning of many classes of artifacts. Contrasts in patterning of structure content, particularly with respect to object size and presumed functional condition, reflect the presence of occupants immediately prior to the fire in the case of Structure 2, and the apparent lack of occupation immediately prior to the fire in the case of Structure 3.

CHAPTER X

DISCUSSION

Chapter X will discuss other studies of Mississippian period site structure, spatial patterning, structure content, and suggested artifact function. Selected aspects of these studies are utilized to enhance understanding of the use of primary dwelling space at Loy. Some studies are directed toward site-wide structure without analysis of intra-structural patterning (Prentice and Mehrer 1981; Price and Griffin 1979; Smith 1978). Other studies are directed toward intra-structural patterning in differing contexts and with widely differing success (Hally 1975, 1980; Hally and Trotti 1975; Harn 1994; Polhemus n.d., 1987; Price 1969; Rope 1977; Sherwood 1991; Sherwood et al.1995; Smith 1975; Smith 1994; Smith and Garrow 1973). Selected aspects of structure content have been addressed by David Hally (1980, 1981). Hally has also explored vessel function and foodways (Hally 1986,1984). Work by Hally and his colleagues provides the most comparable data, both in cultural and temporal similarities and in the quality of the recovered data and recording techniques.

Investigation of the Mississippian period Gypsy Joint site in southeast Missouri (Smith 1978) was directed toward site-wide patterning and site function. The planned approach toward both field techniques and analysis of identified features and cultural materials on this isolated Powers phase farmstead provides a model of focused effort and interpretation through hypotheses testing of clearly defined problems. These problems, applicable to most archaeological sites, are seasonality of occupation, range of activities

present, size and composition of the occupying group, duration of occupation, and relationship of Gypsy Joint to other Powers phase sites. Of particular interest is the tentative attribution of activities by sex utilizing an ethnographic sample. Attributions are made first with a large ethnographic reference sample and checked against a smaller sample of Indian populations in the Lower Mississippi Valley and Southeastern United States (Swanton 1946). While listed activities display differing archaeological visibility, such tentative attributions provide a beginning point from which to address differential use of space by sex. Patterning of the content of structures at Gypsy Joint is not discussed, due to the limited amount of material recovered from the structure basins.

The Lab Woofie site (Prentice and Mehrer 1981), an uncultivated Mississippian farmstead in the American Bottom region of Illinois, was also examined for site-wide patterning and site function. The study places emphasis on the role of shallow features and the effect cultivation would have on site structure and interpretation. Differing cultural assemblages, in conjunction with differences in structure size and construction, are attributed to seasonality of use. Again, there is no discussion of intra-structural patterning for the structures identified.

James Price has examined intra-structural patterning in structures 8 and 4 at the Turner site as part of the broader scale Powers phase project in southeast Missouri (Price 1969). Intra-structural patterning of both complete vessels and other artifacts as well as various classes of floor refuse are utilized to describe the functional attribution of space within Structure 8. Conjectured division of labor based upon sex is used to interpret the use of space within Structure 8. Patterning between the two structures is

compared and contrasted. The burned condition of the structures preserved architectural details. As with other Powers phase structures, location of the entryway is not clearly indicated.

A larger scale study of the Powers phase Snodgrass site (Price and Griffin 1979), in which a nearly complete fortified town composed of ninety structures grouped around three courtyards was exposed, is directed toward identification of interstructural and site-wide patterning of selected ceramic and lithic artifacts. Clustering of projectile point styles and certain ceramic elements is described and compared between different cultural divisions of the town. While most of the structures apparently burned in one destructive episode, intra-structural patterning of structure contents is not described.

Bradford Rope (1977:186-198) attempted a study of intra-structural patterning in a single structure at the complex Mississippian period Lilbourn site in southeast Missouri. While a general attribution of activity areas within the structure is made, excavation in arbitrary five-foot by five-foot units in arbitrary 0.2 foot levels in heavily occupied midden with structural evidence both above and below the designated structure greatly complicates matters. The burned nature of one construction makes some general observations possible; however, they are hindered by excavation unit size, multiple intrusions, limited exposure, and lack of an identified entryway.

Marvin Smith and Patrick Garrow (1973) examined the spatial distribution of artifacts and refuse within the well-preserved Structure 4 at the Mississippian period Barnett phase King site in northwest Georgia and compared it to Structure 1b at the Potts Tract site (Hally 1970). Structure 4 consisted of a burned 18 ft by 18 ft building

with three preserved clay interior partition segments and possessing a trench entryway in the southwest corner. They described the distribution of five classes of artifacts: chipped stone, ground stone, ceramics, bone tools, and food remains. The first four classes are quantified while food remains, described as clustered in the south central (right center front) floor area and the northwest (left rear) corner, are not quantified. Over half (62%) of the lithic debitage, as well as four bifaces, are clustered in the south central (right front) portion of the structure with smaller concentrations in the north central (center rear) portion (10%) and the northwest (left rear) corner (7%). A small pit containing lithic chunks, flakes, and an oval biface was also identified in the northwest corner. Three clusters of ground stone artifacts are evident. The largest cluster is situated in the south central (right front center) portion of the structure to the right of the south partition and consists of a pitted stone, a stone with ground facets, and five large apparently unmodified stones centered on a basin metate. The second cluster is situated between the two west partitions in the west (left middle) portion of the structure and consists of a limestone discoidal, a red paint stone, and a pecked rectangular slab. The third cluster is situated in the north central (center rear) portion of the structure and consists of a ground stone celt and a cobble chopper. Small stones bearing a ground facet are scattered thoughout the structure. Ceramic fragments are concentrated in the south central (right front center) portion of the structure in the vicinity of the metate (25%) and the north central (center rear) and northwest (left rear) corner (21%), while the two vessels consist of an inverted large strap handled jar in the north central (center rear) portion and a small jar in the southeast (right front) corner of the structure. Six of

seven ceramic discoidals are derived from the south central (right front center) portion of the structure while the last is situated between the two west partitions. Two bone tools are situated near the celt toward the north wall and the south central portion of the structure while a complete antler and additional otherwise unmodified tines are situated in the northwest (left rear) corner. Few artifacts are present in the southwest corner in the vicinity of the trench entryway.

Smith and Garrow suggest that the vicinity of the metate in the south central (right front center) floor area was utilized for food preparation, while the northwest (left rear) corner, containing lithic and antler raw materials, nuts, and bone, served a storage capacity. Sleeping and storage of household items along the walls are suggested for the west (left central) side of the structure between the two clay partitions as well as for the east (right) half of the structure. Comparisons to Structure 1b at the Potts Tract site are hampered by multiple constructions and the lack of an identified entryway location to aid in orienting the two structures in a similar manner.

Marvin Smith (1975) describes the content and distribution, by two-foot-square excavation units, of artifacts and features within Structure 2a at the Mississippian period Little Egypt and Barnett phase Little Egypt site in northwest Georgia. The Little Egypt site was investigated by David J. Hally of the University of Georgia as a part of the salvage archaeology conducted at Carters Dam. These distributions are then visually analyzed, activity areas are inferred, and a computer generated cluster analysis is utilized to check the inferred activity areas. The structure and inferred activity areas are then compared with both archaeological examples from northern Georgia and eastern

Tennessee and descriptions of Creek and Cherokee structures in the ethnohistoric record. Inferred activities include sleeping, storage, food preparation, eating, and flint knapping. The central floor area around the hearth is interpreted as a cooking area. The northeastern portion of the floor is dominated by a relatively heavy concentration of ceramic sherds, bones, and other refuse and is interpreted as either a food preparation and eating area or a deposit of refuse from such activities. The northwest quarter is relatively clear of most artifacts and is interpreted as a sleeping area. The southwest portion of the floor, occupied by several large ceramic vessels and botanical remains, is interpreted as a food storage area. A mass of flint knapping debris, projectile points, and hammer stones against the structure wall in the southeast quarter of the structure is interpreted as a lithic reduction area. Grinding stones are concentrated on the east side of the structure and three ground stone celts are all in the central portion of the floor. Similar patterns of floor usage in Structure 1b at the Potts Tract are noted and ethnohistoric structure data are discussed with reference to suggested activities represented in each structure. Direct comparisons with the Loy site structures are hindered by the lack of an identified entryway location and thus comparable orientation for the Little Egypt and Potts Tract structures.

The continuing work of David Hally and his colleagues on data derived from the Mississippian period Barnett phase King site in northwest Georgia (Hally 1975; 1988:3-16; Hally and Trotti 1975) is aided by the presence of trench entryways in many of the structures possessing intact floor deposits, most often situated in the southwest corner. In an intra-structural and inter-structural study of patterning cultural materials from four

King site structures (structures 7, 8, 9, and 23) Hally divides each floor into nine units, utilizing the main roof supports to define similar units of floor space to examine the relative distribution of cultural materials across each floor. Five classes of cultural material (ceramics, lithics, stone, bone, and shell), each compiled as percentages by weight for each of the nine floor units, display concentrations for nearly every class in the south half of each structure. The concentration of lithic debris, comprised of primary flakes, secondary flakes, cores, preforms, and finished artifacts, is most heavily represented in the southeastern sectors of each structure. Indeed, in structures 8, 14, and 23, clearly delineated areas of lithic debris are evident in the south central or southeastern sectors. From this evidence David Hally rightly concludes that lithic reduction was carried out within the King site domestic structures and that there was a preferred location for this activity (1975:16). In contrast to the distribution of floor deposits, the majority of human burials are concentrated in the northern third of each structure. Following ethnohistoric evidence in the Southeast relating to burial beneath the beds within domestic structures, Hally utilizes this burial distribution, coupled with the relatively small amount of domestic debris in the northern sectors of each King site structure, to suggest a sleeping function for this area. It is anticipated that detailed distributional data concerning tools and vessels for each sufficiently well-preserved structure will be presented in the final report on the King site. While the pattern of floor debris and burial location at the King site differs from that described for the Loy site, the structures demonstrate a marked uniformity of patterning within each site. The methodology and uniform description for the Georgia sites provided by David Hally and

his colleagues supply much needed comparability of data over and above the cultural similarities between two areas.

David Hally has examined individual classes of structure content, such as ceramics and botanical remains, in order to derive a better understanding of how each material class functioned within a cultural context. Utilizing ceramic vessels and sherds from the Little Egypt and King sites (1986:267-295), Hally explores the identification of vessel function through defining morphologically distinct vessel types and examining the mechanical performance characteristics for each vessel type. Evidence of fire related vessel use, as indicated by sooting, and extended liquid content, as indicated by interior pitting, when coupled with vessel form and size characteristics extend the scope of more general distinctions between cooking, storage, and serving functions. Historic Southeastern Indian food habits are reconstructed from ethnohistorical and ethnographic evidence and employed to define the vessel use hypotheses. He derives the following general vessel usage observations from these sources: most foodstuffs were processed in several steps requiring different vessels of possibly different shapes or sizes; the size of cooking vessels would vary with the quantity of foodstuffs being prepared; the size and shape of serving vessels would vary with the nature of the food contained, the size of the group to be fed, as well as the context within consumption took place; and that ceramic vessels were used to store only a limited number and variety of foodstuffs. He defines a Hominy-Beans-Pottage Pattern of food use (Hally 1986) characteristic of the Southeast that appears to have considerable antiquity. Hally (1986:291) states "If true, the vessel assemblages of most Mississippian cultures should bear a number of basic similarities to

the Barnett phase vessel assemblage. We can expect most Mississippian assemblages to have, for example: a large jar for storage of liquid foods; a large bowl for cooking and serving soups and stews; two physically distinct cooking jars; and few if any bottles and individual serving bowls. At the very least, we should be able to employ ethnographically documented food-use patterns as a source of analogies for most vessel assemblages produced after A. D. 1000." Hally also summarizes aboriginal Southeastern food habits in the process of comparing an Early Mississippian period Beaverdam Creek ceramic vessel assemblage to a Late Mississippian period Barnett phase ceramic vessel assemblage (1984).

While some of the vessel forms defined by Hally for the Barnett phase, such as the Mississippian jar, the carinated or cazuela bowl, flaring rim bowl, and rounded bowl are found in several sizes at the Loy site, other important Barnett forms, such as the pinched rim jar and carinated jar are absent. The textile impressed "saltpan" form, common in Mississippian period sites in the Tennessee Valley and at the Loy site, is absent in the Barnett phase. These differences in vessel form assemblages suggest at least some differences in culinary practices between the two areas.

Hally has also examined the topic of plant preservation and the content of paleobotanical samples from three Little Egypt site structures (Hally 1981:723-742). Variation in the composition of these paleobotanical samples is attributed to the effect of nature (burned/not burned) and timing (seasonality) of structure abandonment, the duration of structure occupancy, the functional nature of structures examined, and excavation procedures. He suggests that the botanical content in a burned structure

reflects greater detail and quantity of what was going on at a particular instant, whereas that from an unburned structure reflects the more consistent patterning of activities, at least for those plant materials exposed to fire as a regular part of processing or daily activities. Seasonality is best reflected by what got preserved by a destructive fire, as some kinds of plants will be carbonized only as a result of a structure burning. Each individual structure is interpreted as representing an incomplete and biased view of plant utilization.

Recent interest in the utility of microartifacts in the study of Mississippian period structures resulted in Sarah Sherwood's study comparing the distribution of microartifacts (those artifacts smaller than 2 mm in size) with larger macroartifacts within Structure 3 at the Loy site (Sherwood 1991; Sherwood et al. 1995). She demonstrated that the analysis of microartifacts in addition to larger more traditional classes of material provides a more dynamic view of the use of space. Sherwood proposed three activity areas, a central area in the vicinity of the hearth, a refuse disposal area corresponding to the benches along the structure walls, and a lithic manufacturing area in the right front quarter of the structure near the entryway. The lithic manufacturing area suggested by the microdebitage is not readily visible in the distribution by count of macrodebitage (see Chapter VIII) across the floor; however, reexamination of the macrodebitage by size indicates the presence of a relatively small number of larger fragments at this location in both structures. The relative absence of the usually most frequent mid-sized debitage in this area is unexplained. Perhaps as suggested by Sherwood (1991:90) at least some larger debitage was removed from this

work location and disposed of elsewhere due to "cultural sorting." It is unfortunate that Structure 2 at Loy was excavated prior to Sherwoods' efforts and so was unavailable for analysis of microartifacts.

My own interests in Southeastern Indian structures began while helping my father, James H. Polhemus, with data recovery in the Chilhowee Reservoir in the Little Tennessee River Valley in the early 1950s. Field records and materials recovered through his efforts, on file at the Frank H. McClung Museum, University of Tennessee, remain the only substantial body of data available for the Chilhowee Reservoir area. Structural remains were encountered but time and resources to fully expose an entire structure were lacking. The inception of the Tellico Archaeological Project in 1967 to investigate the lower reaches of the Little Tennessee River prior to construction by the Tennessee Valley Authority of Tellico Dam provided opportunities for the author to investigate entire structures at Mississippian period sites such as Citico (40MR7) in 1967-1968, and Toqua (40MR6) in 1975-1977, culminating in a masters thesis on Mississippian architecture (Polhemus 1985).

Two Dallas phase structures just inside the north palisade at the Citico site (40MR7) were investigated in 1968 (Polhemus n.d.). Structure 1, made up of at least four and perhaps up to six construction episodes with multiple intruded hearths, many intruded burials, and hundreds of postholes, had not burned and displayed such a degree of intrusion that fine scale recovery of content was not employed. The initial construction of Structure 2, situated in a clearly delineated shallow rectangular basin, had burned and the basin intentionally filled prior to two later building phases. The

structure was divided into five-foot by five-foot units and carefully troweled out to expose well-preserved burned architectural remains consisting of a central fired clay daub mass and two clay partitions in addition to charred wall posts. Unfortunately, only five artifacts (two shell tempered plain sherds, a lithic biface fragment, and a polished stone chisel) and several fired mud dauber wasp nests were found on the floor, all situated in the southwest quarter of the structure.

One hundred and thirty-three structures were investigated at the Toqua site (40MR6), although only a small number were sufficiently well-preserved to provide spatial data on content (Polhemus 1987). Structure floors were troweled out, diagnostic artifacts such as ceramic vessels, bone tools, stone tools and well-defined floor deposits plotted in, and troweled sediments water screened through 3/16 inch screen mesh in units of varying size, ranging from four-foot by four-foot squares to ten-foot by ten-foot quarters of the structure floor. With three exceptions floor units were too large or preservation to poor to provide more than a very generalized view of intra-structure patterning.

Structure 39 at Toqua (Polhemus 1987:303-310) burned and provided an abundance of piece plotted tools and perishable artifacts such as basketry and wooden tool handles; however, due to time and weather constraints, troweled sediments were screened in four quarter floor units, limiting its overall utility for the present study. The distribution of such primary materials may be compared to Structure 2 at Loy, although without an identified trench entryway comparable orientation is more difficult to determine. If the entryway, indicated by wash from outside the structure, is situated at

the posthole gap in the center of the southeast wall, an otherwise unaccompanied inverted basin metate is present near the left rear main roof support. Four hammerstones and an abrader are situated near the entryway while a third hammerstone is present in the otherwise clear right front quarter. A large concentration of material, comprised of five worked bone artifacts, four wooden tool fragments, two polished stone adze blades, two ceramic vessels, a deer antler, a charred split cane basket, and a hammerstone, is situated in the right rear corner. Another smaller concentration, comprised of two deer antlers, a ceramic vessel, and a ground and pitted cobble tool, is situated on the opposite side of a clay partition from the large concentration near the front edge of the right bench. The inverted position of the basin metate suggests storage or another form of use may explain its location against the left rear roof support. The cobble tools associated with Structure 39 have not been reexamined for this study and, given the prevalence of multiple use and grinding facets on the Loy site examples, may display evidence of multiple use. The general pattern of clustered larger tools, suggestive of activity areas, encompassing a relatively clear central floor area and corner storage resembles that described for Structure 2 at the Loy site.

Structure 14 at Toqua (Polhemus 1987: 273-285) burned and provided a well-preserved floor, sealed between two sterile mound fills, on which artifacts were point plotted. All troweled sediments were water screened through 1/16 inch screen mesh in five-foot by five-foot grid units. This structure differs from Structure 39 and the Loy site structures in that it is larger (27 feet square), situated on the summit of Mound A, has two contemporary trench entryways, and greater architectural elaboration. The two

entryways, linking Structure 14 to primary Structure 30 on the north and the large secondary structure or pavilion on the east, confuse proper orientation; however, a raised clay dais flanked by pilaster-ended clay partitions occupying much of the south wall suggests this may be considered the rear wall. Well-preserved perishable benches bearing layers of split cane matting and divided by clay partitions line the west and that portion of the north wall west of the entryway. Foodstuffs and other materials are stored in the northwest and southeast corners of the structure. Small rodent remains are also present in the northwest and southeast corners, suggesting predation on foodstuffs stored at these locations. Foodstuffs include large quantities of maize kernels, acorns, hickory nuts, and persimmon seeds in the southeast corner, squash and gourd in the northwest corner, beechnuts on the south dias, and a ceramic vessel full of Iva near the north end of the west bench. Evidence of marine shell reduction, in the form of unfinished objects and heavily utilized flakes, as well as socketed bone spear points and other worked bone, all attributed to male activities, are clustered with a small jar of unique form in the northwest corner. Other male attributed items include a heavy cylindrical bone pin on the west bench, polished stone celts on the west and north benches, an extremely large biface blade of Dover chert with the celt on the north bench, an earlier stemmed projectile point in the northwest corner, and two Pisgah serrated projectile points near the central hearth. Shell and pearl beads are clustered at two points on the north bench in addition to the southeast and northwest corners of the structure while two small ceramic ear pins are also in the southeast corner and on the north bench near the east cluster of shell beads. Food preparation equipment such as

large ceramic vessels, metates, manos, and fire-cracked rocks, attributed to women, is absent, as is more general male equipment such as hammerstones and various forms of abraders. This structure probably represents a high status public building where many of the more ordinary household tasks appear not to have taken place.

Structure 3 at Toqua (Polhemus 1987:247-259) burned and provided a well-preserved floor. The large (38 foot square) structure is situated on a secondary platform against the north slope of Mound A and the floor is for the most part protected by wash from the mound slope. All artifacts observed in situ are point plotted and assigned field specimen numbers while all troweled sediments were water screened through 1/16 inch screen mesh in four-foot by four-foot units oriented with the structure. While a trench entryway, to provide comparable structure orientation, was not identified, mound and secondary platform slopes limit location of the entryway to the east corner or, less likely, the center of the southeast wall. Like Structure 14 this structure displays greater architectural elaboration than Structure 39 with a broad bench faced with clay lining the walls and divided into segments by at least nine and perhaps twelve clay partitions. Associated floor deposits are dominated by a massive concentration of lithic debitage emanating from the clay partitioned bench segment centered on the southeast wall. This lithic concentration, totaling over 57,000 flakes greater than 1/4 inch as well as all stages of manufacture from tested nodules to finished Mississippian triangular projectile points, is accompanied by cylindrical antler pressure flakers, antler tines, and beaver tooth gouges, as well as a single large cazuela bowl against the structure wall. Most other classes of material have their greatest representation in or just in front of bench segment

centered on the southeast wall. Four secondary concentrations of lithic materials, totaling over 3,000 flakes, nodules, cores, and projectile points, are situated at intervals along the other three walls of the structure. Animal bones, worked bone, shells, worked shell, small ceramic sherds, and the abundant lithic debitage form a punctuated ring pattern, centered on the hearth and following the benches, with localized concentrations that vary in content. The range of exotic animals, such as river otter, red-tailed hawk, and red-shoulder hawk, represented in Structure 3, particularly in the southeast central compartment, suggests the possibility of a specialized, probably male oriented, function for the structure. The general absence of food preparation equipment also suggests a specialized function for Structure 3.

The extensive work in the Great Valley of East Tennessee and elsewhere in the Southeastern United States has resulted in the identification of hundreds of Mississippian period structures. This work, spanning many years, has demonstrated the difficulty of obtaining suitable data for comparative studies of structure content. The earlier emphasis by archaeologists on architecture rather than location of content, when combined with the frequent intensive use of, and rebuilding on, the same structure location, has limited the utility of earlier excavation data. The wide range of recovery techniques dictated by when structures were excavated, time constraints, financial constraints, and project limitations, has made direct comparison for spatial studies difficult. Fortunately some general observations may be made concerning patterning of structure space of use in discussing the Loy site data. Activities suggested by these researchers as taking place in the Mississippian period domestic dwelling include food

preparation, eating, storage, sleeping, and craft activities such as flint knapping. Evidence of such suggested activities is neither uniformly or randomly distributed in the structures studied, although the actual location of such evidence varies from site to site and in some cases from structure to structure. In certain cases differences in perceived location for activities within a structure likely reflect the frequent difficulty in identifying the position of the entryway and thus its functional orientation. Frequent recognition of the entryway location in Dallas phase structures and in northwest Georgia provides a decided advantage to researchers in these two areas. Indeed, without proper orientation of the two Loy site structures the results of this study would be reduced.

The tangible evidence of food preparation activities is generally characterized as a concentration of associated equipment and/or residues such as animal bones, shells, botanical remains, and ceramic vessel fragments. The hearth area of the structure is frequently included in food preparation activity areas, in recognition of the hearth as a source of heat and light for a wide range of activities. While the location of food preparation concentrations, as well as other activities, may vary from one area or culture to another it may display consistency within a particular site. Such concentrations in the Barnett phase structures at the King site in northwest Georgia, for example, are consistently located in the south or front half of each structure in contrast to the left rear half of both structures at Loy.

Eating or food consumption is sometimes discussed as a separate activity; however, many of the same parameters discussed with respect to food preparation also may be attributed to food consumption. Research by David Hally (1986), directed

toward vessel function utilizing technological characteristics and modeling of historic Southeastern Indian foodways, provides solid data for addressing differences in vessel usage such as in food preparation or consumption activities.

Tangible evidence of storage activities is generally recognized in the form of clusters or concentrations of materials thought by the archaeologist to be put by or consciously retained for some future use. Such materials include all forms of apparently functional artifacts and rare materials as well as edible food-stuffs. Differentiation between clusters of stored objects and clusters resulting from, for example, an interrupted craft activity generally is determined by location or context within the particular structure. A ceramic vessel containing maize kernels situated near the hearth, for example, will most likely be interpreted as in a food preparation context, whereas the same vessel with maize situated in the corner of the same structure will be interpreted as in a storage context. Certain forms of storage are more readily identifiable, such as pit storage or clustering of goods in one or more corners of the dwelling structure, while others, such as large scale storage of crops in separate above ground facilities (i.e. secondary structures) require large scale excavation and close attention to detail to recognize.

Evidence of sleeping areas within structures is generally presented in the form of an absence or reduced volume of cultural materials in a particular floor area. David Hally (1975) supports this conclusion with a discussion of consistent burial placement in the same north or back portion of each structure that displays less domestic refuse. The superposition of activities (i.e. storage of items such as ceramic vessels beneath raised

perishable beds or benches) and the three dimensional nature of the built environment are not generally addressed.

Tangible evidence of craft activities is, after food preparation, the most sought after class of material culture in spatial studies. Such activities are assumed to require and produce recognizable tool assemblages and residues. While the use of a particular item can seldom be specified in isolation, close examination of numbers of similar items within closed contexts can shed some light on the technological characteristics or usage of the group. Suggested craft activities that could have taken place in domestic dwellings include stone working, bone working, wood working, shell working, pottery making, and the manufacture of other more perishable goods such as baskets, mats, textiles, and clothing. While evidence of most craft activities is limited, either by the perishable nature of the associated equipment, by the actual number of items present, or by our recognition of the members making up a particular tool kit, the evidence for flint knapping is pervasive in the archaeological record. Flint knapping or lithic reduction activity areas, for this reason, have a relatively high level of visibility even with removal of larger debitage and utilized tools. David Hally's conclusion (Hally 1975:16) that lithic reduction was carried out in domestic structures at the King site and that there was a preferred location for this activity in the south (right front) quarter of each structure is supported by data from the Loy site structures.

Specialized studies directed toward individual elements or classes of cultural material, such as functional studies of ceramics by David Hally or the distribution of microartifacts by Sarah Sherwood, contribute to our overall understanding of the

dynamic use of space in domestic dwellings. Both depend on structured observations on materials from controlled contexts and serve as models for examining other aspects of material culture.

This chapter has discussed various studies of Mississippian period site structure, spatial patterning, structure content, and suggested artifact function. These studies have been compared to the Loy site and relevant aspects utilized to enhance our understanding of the dynamic use of structure space at the Loy site. While much remains to be done in elucidating the place and probable function of cultural materials in a structural or spatial context, work throughout the Southeast, and particularly in Georgia and the Great Valley of East Tennessee, are providing an ever clearer framework within which to comprehend the interrelationship of material culture and cultural contexts.

CHAPTER XI

SUMMARY AND CONCLUSIONS

The results of this study both confirm elements of my existing Dallas phase household model and add more detail by defining an additional, more open activity area in the right front quarter of each structure. Refined recovery and analytical techniques, the results of which have been presented for each structure individually as well as the two structures together, defined depositional patterns of use in discussion of congruences and differences in structure content. Both k-means analysis and more traditional methods, such as post maps and isopleth maps, contributed to pattern definition and interpretation within the bounded space of the Dallas primary dwelling structure. The combination of techniques used together provided better results than either used alone.

This research set out with three questions. The first question was: what activities are represented in each of the two primary structures? The activities, as represented by both tangible remains and/or the built environment in each structure, are consistent and reflect shelter, sleeping, food preparation, food consumption, storage, stone tool production, and bone tool production activities. Architectural evidence of roofed construction reflects shelter, as earthfast bed or bench supports flanked by clay or perishable partitions along the left, rear, and right walls provide evidence of sleeping areas. Food preparation and consumption activities are reflected by the concentration of apparently functional ceramic vessels in the left rear half and intact plant food processing

equipment in the right front quarter of Structure 2. Food preparation and consumption activities are also reflected in the greater concentration of associated residues, in the form of small fire-cracked rock, animal bones, shells, and small ceramic fragments, in the left rear half of both structures. Storage is indicated by the presence of raw materials and partially processed deer metapodials in the right rear corner of each structure as well as inverted ceramic vessels in the left rear corner and also along the wall beneath the left and rear benches of Structure 2. Craft activities, particularly stone working and bone working, are represented by raw materials, partially processed objects, finished products, and manufacturing residues in both structures. While an early stage of flaked, lithic reduction may have taken place in conjunction with the basin-shaped feature in the right front quarter, other flint knapping activities and/or tool maintenance activities appear to have taken place near the center of the rear bench as well as, to a lesser degree, at other points along the benches. Both percussion flaking and pressure flaking techniques are represented. Comparison of projectile points derived from the two structure floors with those from the sample of Dallas phase burials suggests the much shorter Structure 2 and Structure 3 projectile points are exhausted or nearly exhausted points discarded in equipment maintenance activities. Bone working activities, concentrated in the rear half of each structure, center on the reduction of deer metapodials and antler tines into projectile points, as well as the manufacture of bone beads and a variety of other implements and ornaments. Controlled breakage, groove-and-snap, and longitudinal slotting accompanied by shaving, whittling, abrasion, and polishing are represented in the worked bone assemblage. That most of the household craft activities could and probably

did take place outdoors or elsewhere when the weather and season of the year permitted is indicated by the range of facilities and materials, not included in this study, elsewhere in the two excavated household units.

The second question was: what patterning, if any, of the cultural materials representing those activities is present? Patterning, summarized above, of both the tangible remains reflecting these activities and the built environment was present in each of the two structures, although the degree and nature of that patterning varied somewhat between them. Similarities in patterning between the two structures reflected consistent and real patterns of functional or behavioral organization, while the differences in the patterning of materials could in part be explained in other ways. While similar patterns of architectural evidence, both of the substructure and preserved in the superstructure, display the same enclosure and delineation of interior space, the greater size and interior elaboration in Structure 2 may indicate a somewhat higher status for the occupants of this dwelling. While the overall volume of occupational debris varies greatly between the two structures, similar patterns of such debris reflect similar patterns of interior utilization.

The third question was: if there is patterning of materials reflecting these activities, how may such patterning modify or extend the existing household model presented in Chapter I? Patterning of materials was found to modify or extend the existing Dallas household model in the following ways. While the earlier threefold division of primary structure space, consisting of a central "public" floor area bounded by the four main roof supports, a "private" floor area situated between the roof supports

and the wall, and one or more storage areas situated in the corners, was found to be present in the Loy structure sample, more detailed excavation and analysis have suggested several refinements to the household model. A fourth area was identified in the right front quarter of each structure adjoining the entryway. This less clearly bounded space included a shallow basin-shaped feature in each structure as well as concentrations of larger lithic debitage and cobble-based processing tools such as metates, manos, and heavy cutting or chopping tools, indicative of activities such as lithic reduction, heavy wood working, and plant food processing. This more open area was probably utilized by both sexes for activities requiring additional space or perhaps additional light or access.

Differences in patterning and structure content reflect the state of occupation of the two adjoining structures at the time of destruction by fire. It should be reiterated, as explained in Chapter III, that both structures display a similar use-life and were probably constructed at the same time and were surely destroyed by fire at the same time; thus differences in content are more likely to be the result of cultural factors than problems of contemporaneity, location, or length of occupation. Structure 2 is well-supplied with apparently functional artifacts distributed in clusters generally following the limits of the central floor area. The Center Wall Pattern, described in Chapter VI on the k-means analysis, is present only in Structure 2 and reflects these clusters near the center of each bench. It is likely that this pattern is indicative of household equipage in use or recently utilized in an occupied dwelling, as opposed to the patterned accumulation of smaller items and refuse present in both Structure 2 and Structure 3. Structure 3, in contrast, is

poorly supplied with apparently functional artifacts and is dominated by the patterned accumulation of smaller items and refuse, suggesting that Structure 3 was unoccupied at the time of the fire. A second line of evidence indicating differences in the occupation status is the relative proportion of canid modification displayed by the animal bone in the two structures. Structure 2, with its larger sized artifact assemblage, has very few gnawed and digested bones while Structure 3, with its smaller sized refuse dominated artifact assemblage, has a large percentage of such altered bone.

The donut or punctuated ring pattern observed in both structures, and reduced to any one of several ring-shaped solutions as the k-means analysis attempts to define a circle in bounded space, should be expected in other structures possessing a more frequently utilized central floor area surrounded by a somewhat obstructed zone available for accumulation of cultural materials.

The site-wide approach to investigating the Mississippian period Dallas phase Loy site, exemplified by extensive definition of site structure and individual structure locations prior to excavation, has provided an unusually appropriate structure sample for intra-structure spatial studies. Individual primary structures were identified and evaluated prior to excavation, through the use of magnetometer mapping and small diameter coring techniques, in order to directly address the nature of the Dallas household unit without expending effort just to locate structures and, more importantly, to limit damage to an otherwise protected resource.

The combination of time-consuming piece plotting of cultural materials with systematic screened grid unit secondary recovery is justified in the case of these two

structures, and significant spatial data were obtained; however, each structure considered for excavation should first be evaluated for condition, context, and potential for addressing specific questions. In some cases, particularly when constrained by time or resources, the use of small grid units across the entire structure might be nearly as useful as point plotting objects, though this would not allow the use of techniques such as k-means that require such a data set. Such a technique could be more useful than excavating only a portion of a structure through sampling. It is better to sample the recovered materials after excavation, and be able to draw additional samples from the total population in hand if necessary, than to be forever limited by partial field recovery.

Future spatial studies of Mississippian structures should be directed toward quality rather than quantity. The smallest systematic grid recovery possible, coupled with point plotting, would provide better detail and greater flexibility in the spatial data set than that utilized for this study. All scales of data should be utilized, from traditional macro-sized artifacts to micro-sized materials, to fully address the effects of artifact size raised by Sherwood's research. A smaller number of carefully selected structures excavated in detail is preferable to a greater number of incompletely recorded examples. Finally, excavation of a large enough area to expose the entire household unit is important, both because the primary structure makes up only one segment of household space and to determine the proper orientation of the primary structure. While the detailed control obtainable in the more protected environment of the primary structure may not be possible in the more exposed portions of the household unit, continuing analysis of associated features, as well as the sub-plowzone deposits resting on the

original humus surrounding Structure 3 at Loy will provide comparable screen unit data capable of addressing the next level of site structure, the entire household unit.

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APPENDICES

APPENDIX A
ILLUSTRATED ARTIFACT PROVENIENCE DATA

Figure 5.1. Ceramic Vessels from Structure 2 and Structure 3.

A. ST2-77,82,960	B. ST2, F-61	C. ST2, F-54
D. ST2, F-60	E. ST2, F-62	F. ST3, F-32
G. ST2, F-51	H. ST2, F-63	

Figure 5.2. Structure 2 Large Ceramic Vessels.

A. ST2, F-55	B. ST2, F-56	C. ST2, F-52
D. ST2, F-59	E. ST2, F-58A	F. ST2, F-58B

Figure 5.3. Non Vessel Ceramics.

A. ST2-70	B. ST2-530	C. ST2-521
D. ST3-4I(OBI)		

Figure 5.4. Flaked Tool Assemblage.

A. ST3-3058	B. ST3-1680	C. ST2-523
D. ST3-858	E. ST3-2548	F. 40JE10/95
G. ST3-3056	H. ST2-884	I. ST3-10D(OBI)
J. ST3-6I(OBII)	K. ST2-4H	

Figure 5.5. Cobble Tools.

A. ST2-322	B. 40JE10/0245	
C. ST2-950	D. B8-S2	E. B8-S1
F. F-64		

Figure 5.6. Other Worked Stone.

A. ST3-1063	B. ST3-87	C. ST2-541

Figure 5.7. Deer Metapodial Reduction Sequence and Bone Projectile Points.

A. ST3, F-220	B. ST3, F-220	C. ST2, F-219B
D. ST2, F-219B	E. ST1	F. ST2, PH540

Figure 5.8. Worked Bone Artifacts.

A. ST2-388	B. ST3-396	C. ST2-9K(F)
D. ST3-2945	E. ST3, F-31	

APPENDIX B
K-MEANS CLUSTER SOLUTION STATISTICS

B.1. Six Cluster Solution Statistics for Structure 2, Fire-Cracked Rock

CLUSTER	CENTROID	COUNT	RMS
1	244.60 R 332.33	17	2.27
2	251.08 R 334.40	22	1.96
3	242.93 R 339.86	17	3.29
4	255.15 R 337.93	29	2.66
5	244.53 R 346.59	6	2.32
6	255.89 R 344.16	14	3.26

B.2. Nine Cluster Solution Statistics for Structure 2, Fire-Cracked Rock.

CLUSTER	CENTROID	COUNT	RMS
1	244.49 R 332.09	16	2.08
2	251.29 R 333.77	17	1.15
3	246.92 R 338.54	10	2.47
4	253.95 R 332.55	24	1.82
5	244.53 R 246.59	6	2.32
6	260.75 R 347.00	2	1.21
7	254.91 R 343.93	11	2.33
8	258.39 R 338.94	8	1.96
9	241.17 R 339.43	11	2.44

B.3. Five Cluster Solution Statistics for Structure 2, Round Rock.

CLUSTER	CENTROID	COUNT	RMS
1	253.00 R 338.43	6	1.67
2	241.70 R 339.13	7	2.88
3	241.57 R 349.97	3	3.13
4	254.52 R 345.78	5	4.06
5	248.31 R 333.06	7	2.50

B.4. Twelve Cluster Solution Statistics for Structure 2, Ceramics.

CLUSTER	CENTROID	COUNT	RMS
1	243.13 R 338.05	43	2.09
2	248.88 R 339.18	38	2.10
3	241.42 R 343.89	40	2.79
4	248.62 R 346.82	33	2.29
5	244.91 R 332.74	39	1.93
6	254.53 R 345.38	34	2.01
7	251.71 R 351.55	16	2.22
8	241.38 R 349.69	20	2.72
9	258.35 R 342.08	30	2.40
10	254.30 R 338.20	47	2.26
11	249.19 R 333.65	39	2.07
12	258.50 R 350.00	11	2.65

B.5. Four Cluster Solution Statistics for Structure 2, Lithic Debitage.

CLUSTER	CENTROID	COUNT	RMS
1	251.56 R 349.27	19	3.70
2	246.74 R 335.18	13	3.58
3	242.03 R 345.60	8	3.20
4	255.71 R 340.65	14	3.91

B.6. Nine Cluster Solution Statistics for Structure 2, Lithic Debitage.

CLUSTER	CENTROID	COUNT	RMS
1	251.26 R 349.97	12	1.69
2	243.32 R 336.06	5	2.09
3	241.50 R 345.27	7	2.94
4	251.24 R 340.99	5	2.34
5	258.38 R 347.85	4	2.32
6	257.07 R 341.69	7	2.16
7	248.91 R 333.93	7	1.51
8	246.67 R 348.82	4	1.74
9	254.30 R 336.50	3	0.58

B.7. Three Cluster Solution Statistics for Structure 2, Worked Stone.

CLUSTER	CENTROID	COUNT	RMS
1	251.04 R 336.42	21	4.15
2	255.19 R 347.58	13	3.89
3	242.36 R 340.69	16	3.51

B.8. Four Cluster Solution Statistics for Structure 2, Worked Stone.

CLUSTER	CENTROID	COUNT	RMS
1	252.08 R 337.26	17	3.27
2	255.19 R 347.58	13	3.89
3	242.32 R 341.95	13	2.51
4	244.86 R 333.89	7	3.01

B.9. Six Cluster Solution Statistics for Structure 2, Worked Stone.

CLUSTER	CENTROID	COUNT	RMS
1	251.04 R 334.53	7	1.39
2	253.69 R 346.70	9	2.60
3	242.32 R 341.95	13	2.51
4	244.86 R 333.89	7	3.01
5	258.57 R 349.55	4	3.42
6	252.81 R 339.17	10	2.58

B. 10. Eleven Cluster Solution Statistics for Structure 2, Worked Stone.

CLUSTER	CENTROID	COUNT	RMS
1	251.04 R 334.53	7	0.99
2	254.40 R 346.45	8	1.59
3	241.31 R 343.07	8	1.72
4	246.70 R 331.77	3	1.32
5	258.87 R 347.77	3	1.58
6	250.80 R 339.39	5	1.31
7	248.00 R 348.70	1	-
8	257.70 R 354.90	1	-
9	254.82 R 338.94	5	1.84
10	243.47 R 335.48	4	2.05
11	243.92 R 340.14	5	1.48

B.11. Twelve Cluster Solution Statistics for Structure 2, Bone.

CLUSTER	CENTROID	COUNT	RMS
1	242.76 R 339.48	44	1.38
2	255.35 R 338.38	13	1.98
3	240.59 R 344.04	12	1.77
4	251.50 R 352.05	6	1,81
5	246.15 R 332.24	21	1.73
6	256.15 R 345.37	18	2.24
7	259.68 R 351.70	5	1.66
8	261.49 R 343.18	9	2.60
9	249.29 R 344.91	7	3.04
10	241.52 R 349.58	14	2.83
11	249.41 R 335.20	16	2.03
12	243.63 R 335.91	16	1.49

B.12. Fourteen Cluster Solution Statistics for Structure 2, Bone.

CLUSTER	CENTROID	COUNT	RMS
1	242.76 R 339.48	44	1.38
2	255.35 R 338.38	13	1.98
3	240.59 R 344.04	12	1.77
4	251.46 R 352.74	5	1.03
5	246.15 R 332.24	21	1.73
6	256.15 R 345.37	18	2.24
7	259.68 R 351.70	5	1.66
8	261.49 R 343.18	9	2.60
9	250.43 R 345.80	6	2.42
10	239.40 R 350.53	7	1.88
11	249.55 R 334.79	14	1.72
12	243.91 R 348.48	8	1.45
13	243.63 R 335.91	16	1.49
14	248.40 R 339.00	3	1.64

B.13. Six Cluster Solution Statistics for Structure 2, Shell.

CLUSTER	CENTROID	COUNT	RMS
1	245.61 R 332.35	103	2.74
2	252.05 R 335.96	69	2.79
3	241.43 R 338.59	70	2.24
4	252.37 R 347.96	50	3.17
5	240.14 R 348.67	29	2.79
6	259.54 R 343.55	37	3.82

B.14. Twelve Cluster Solution Statistics for Structure 2, Shell.

CLUSTER	CENTROID	COUNT	RMS
1	243.80 R 330.95	41	1.14
2	248.42 R 332.91	50	1.42
3	241.71 R 338.07	52	1.48
4	251.36 R 346.37	32	1.27
5	240.33 R 349.52	24	2.18
6	258.51 R 346.67	27	2.21
7	253.39 R 351.64	13	2.30
8	254.62 R 337.20	26	1.47
9	260.25 R 339.59	15	2.02
10	239.72 R 342.25	19	1.96
11	250.75 R 335.66	33	1.71
12	244.23 R 334.48	26	1.75

B.15. Five Cluster Solution Statistics for Structure 2, Size Class 1.

CLUSTER	CENTROID	COUNT	RMS
1	254.77 R 338.56	94	3.60
2	247.60 R 333.38	91	3.40
3	242.56 R 339.66	71	3.20
4	254.69 R 346.53	74	4.02
5	242.92 R 347.36	54	3.92

B.16. Six Cluster Solution Statistics for Structure 2, Size Class 2.

CLUSTER	CENTROID	COUNT	RMS
1	246.33 R 332.75	137	2.93
2	252.54 R 337.54	113	3.18
3	242.48 R 338.65	110	2.54
4	251.14 R 348.21	83	3.55
5	241.26 R 347.12	61	3.56
6	258.25 R 344.98	73	3.80

B.17. Five Cluster Solution Statistics for Structure 2, Size Class 3.

CLUSTER	CENTROID	COUNT	RMS
1	246.85 R 333.46	70	3.00
2	256.95 R 339.93	35	3.96
3	242.16 R 338.77	56	2.33
4	254.13 R 348.43	38	4.31
5	241.07 R 348.19	18	3.52

B.18. Nine Cluster Solution Statistics for Structure 2, Size Class 3.

CLUSTER	CENTROID	COUNT	RMS
1	244.62 R 332.43	31	2.09
2	248.48 R 334.15	38	2.07
3	242.52 R 338.34	49	1.86
4	251.08 R 348.73	22	2.93
5	258.94 R 341.71	17	2.81
6	239.92 R 343.22	13	1.79
7	257.85 R 348.02	18	3.21
8	254.48 R 337.77	18	2.14
9	241.25 R 349.95	11	2.35

B.19. Nine Cluster Solution Statistics for Structure 3, Round Rock.

CLUSTER	CENTROID	COUNT	RMS
1	214.42 R 326.41	9	2.23
2	226.89 R 323.07	8	1.83
3	220.29 R 324.71	11	1.84
4	220.71 R 318.81	8	2.60
5	221.68 R 336.67	5	2.68
6	225.20 R 329.34	5	1.98
7	214.92 R 331.94	6	2.44
8	229.93 R 332.15	4	2.34
9	232.02 R 324.12	5	2.30

B.20. Four Cluster Solution Statistics for Structure 3, Tabular Rock.

CLUSTER	CENTROID	COUNT	RMS
1	216.30 R 328.88	14	2.95
2	226.77 R 323.56	7	2.67
3	224.68 R 333.63	8	3.82
4	217.38 R 318.82	3	1.74

B.21. Five Cluster Solution Statistics for Structure 3, Ceramics.

CLUSTER	CENTROID	COUNT	RMS
1	213.24 R 328.04	189	3.89
2	229.55 R 325.96	281	3.46
3	222.79 R 326.34	223	2.77
4	222.62 R 334.41	175	4.13
5	220.84 R 319.21	145	3.73

B.22. Four Cluster Solution Statistics for Structure 3, Ceramic Vessel Form.

CLUSTER	CENTROID	COUNT	RMS
1	228.80 R 325.47	50	3.87
2	213.09 R 328.61	39	4.43
3	224.03 R 334.08	32	4.21
4	220.35 R 319.85	38	3.91

B.23. Four Cluster Solution Statistics for Structure 3, Lithic Debitage.

CLUSTER	CENTROID	COUNT	RMS
1	212.61 R 328.59	53	3.49
2	221.86 R 332.25	84	3.72
3	220.78 R 320.50	59	3.48
4	226.83 R 325.47	84	3.46

B.24. Eight Cluster Solution Statistics for Structure 3, Lithic Debitage.

CLUSTER	CENTROID	COUNT	RMS
1	212.88 R 330.15	36	2.20
2	219.71 R 332.93	39	2.51
3	221.45 R 326.96	40	2.31
4	225.95 R 325.64	43	2.20
5	221.20 R 319.51	46	2.61
6	212.01 R 323.97	18	2.77
7	225.24 R 333.22	32	2.59
8	230.03 R 324.26	26	2.56

B.25. Five Cluster Solution Statistics for Structure 3, Bone.

CLUSTER	CENTROID	COUNT	RMS
1	223.39 R 326.11	179	2.56
2	220.89 R 319.26	117	3.39
3	222.42 R 333.86	127	3.82
4	213.39 R 328.34	74	3.94
5	229.74 R 326.33	181	3.16

B.26. Eight Cluster Solution Statistics for Structure 3, Shell.

CLUSTER	CENTROID	COUNT	RMS
1	224.80 R 321.94	50	2.39
2	233.06 R 326.07	65	1.75
3	219.92 R 326.95	23	2.70
4	219.48 R 317.81	64	2.32
5	210.24 R 328.28	11	3.98
6	231.65 R 333.33	14	3.04
7	224.29 R 331.28	17	3.51
8	215.05 R 318.66	41	2.39

VITA

Richard Rowand Polhemus was born in Knoxville, Tennessee, on January 24, 1946. He attended elementary school in Knox County, Tennessee, and graduated from Patterson School near Lenoir, North Carolina in May 1964. The following September he entered the University of Arizona, Tucson, with a major in anthropology and a minor in geology. After four years in Tucson he conducted archaeological investigations for the University of Tennessee, Knoxville, and the Institute of Archaeology and Anthropology, University of South Carolina. He entered the University of Tennessee, Knoxville, in 1973 and graduated with a Bachelor of Arts degree with a major in Anthropology in 1974. In 1975 he began study toward a Master of Arts degree with a major in anthropology. His Master of Arts degree was awarded in 1985. He continued his doctoral studies at the University of Tennessee while working as an archaeological consultant.

He has conducted fieldwork in Arizona, North Carolina, South Carolina, and Tennessee. He was associated with the Tellico Archaeological Project from 1967 to 1979. His major excavations include the Toqua Site (40MR6), Tellico Blockhouse (40MR50), Morganton (40LD105), and Carden Farm (40AN44).

He is a member of the Society of Professional Archaeologists, the Society for American Archaeology, the Society for Historical Archaeology, and the Holland Society. Upon completion of the Ph.D. he will continue his consulting work in archaeology.