THE SPATIAL ANALYSIS OF THE PLOW ZONE ARTIFACT DISTRIBUTIONS FROM TWO VILLAGE SITES IN NORTH CAROLINA

by

Henry Trawick Ward

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Approved by:

Adviser

Reader

Reader

Reader

Reader

HENRY TRAWICK WARD. The Spatial Analysis of the Plow Zone Artifact Distributions from Two Village Sites in North Carolina (Under the direction of JOFFRE LANNING COE).

This study focuses on the relationships between artifact distributions in the plow zone and the undisturbed structures and features at two Late Woodland sites in North Carolina. The Warren Wilson site ($Bn^{V}29$) and Upper Saura Town ($Sk^{V}1a$) have been excavated extensively for several years and large areas of both villages have been exposed. These sites are somewhat unique in the Southeastern United States since not only have much of the village areas been excavated, but all of the plow zone materials have also been carefully controlled and collected.

There is a current trend in American Archaeology to assume that artifact distributions on the surface and in the plow zone can be used to reconstruct spatial patterns that reflect activity or behavioral structures. Many archaeologists today believe there is a close relationship between plow disturbed deposits and the underlying undisturbed remains. Few researchers have, however, investigated the nature of this relationship on a scale of sufficient magnitude to determine if, in fact, the assumption of close correspondence is valid. This study, using statistical mapping techniques, carefully analyzes the relationships between several artifact patterns in the plow zone and similar patterns from undisturbed contexts. It also compares these distributions with the known site plan of features and architecture.

It is concluded that patterns of storage and refuse disposal determine, to a large extent, the degree of correspondence between the plow zone and undisturbed deposits. This study discusses two distinct modes of storage and refuse disposal that would not have come to light without a complimentary analysis of data from both plow zone and undisturbed contexts.

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CHAPTER I

INTRODUCTION

Background

When I began my graduate studies in the 1960's, archaeology was in the throes of tremendous change. Evolutionary theory as espoused principally by Leslie White at the University of Michigan was being incorporated into archaeological thinking, and the goals of understanding and explaining cultural processes were being forged. The so-called "new archaeology" was soon to be birthed by Lewis Binford and a number of other Michigan graduate students.

Today, archaeology is in the middle of another metamorphosis that may have an even greater impact than that of the theoretical developments over the past two decades. The passage of new conservation legislation during the 1970's has profoundly affected not only the goals of archaeology but its very form and structure. Archaeology is no longer simply science or history; it is also government and business. It is against this background of change that this study was conceived, and in a way, it is presented as a challenge to many of the current attitudes concerning the nature of archaeological data from sites in North Carolina particularly and the Southeast in general.

I feel that my early commitment to the new archaeology, subsequent training along more traditional lines, and a later commitment

to "nuts and bolts" archaeology--regardless of race, creed, or paradigm--has so conditioned the approach, ideas, and general timbre of much that is to follow that a brief, albeit presumptuous, personal background should be outlined.

Since completing my Master's Degree in 1968, I have spent the past 11 years--except for a three-year hitch in the army--as a participant observer in that small but evergrowing society of American archaeologists. I began my studies in 1963 at Georgia State College when, as a sophomore, I had an introductory course in anthropology. The required text was Leslie White's Science of Culture (1949). While at Georgia State, I was taught the new archaeology before I read Lewis Binford's early essays and didn't know there was anything but processual archaeology until I began graduate work at the University of Missouri in 1966. Although the "Michigan School" was very much represented by the cultural anthropologists at Missouri, the archaeologists at that time were more of the traditional mold. In fact, I was forbidden to use the term "evolutionary change" in a National Park Service report I prepared and to correct my heretical thinking, was given a copy of J. L. Champ's Ash Hollow Cave (1946) to use as a guide for the preparation of future archaeological research reports. Needless to say, much has changed at Missouri since I studied there.

For the past several years, I have found myself corralled with the reactionaries and "young fogeys" (Flannery 1973) although my involvement has been almost totally passive since I have published little. I have, however, meditated much--a characteristic which

might be taken to reflect a maturity and sagacity well beyond that indicated by my moderate experience. I began to resent the often reptilian attacks and stereotypic images thrust upon those of us who have not joined the flock or jumped on the latest band wagons (South 1978, Binford 1979).

As a result, my meditations became deeper and more earnest. Where did I go astray? Surely those brief encounters at Missouri were insufficient to crack a very solid foundation cured under the luminescence of White and Binford at Georgia State. And my Chapel Hill experience has done nothing more than patch the battered edges of that foundation and inspired an even greater desire to seek an understanding of that ever elusive, myriad complex of processes created and driven by man's unique extrasomatic adaptive capacity.

Over the past few years I think I have found at least a partial answer and I am now beginning to understand why I am with the "young fogeys". I cannot say that it is a completely right answer or that it is the only answer, but it is a beginning. The prophets during the 1960's put much hope and warmth in the hearts and souls of the students of my generation. We were told that the complex questions of culture change and adaptation, questions of process, could be answered if only they were asked in the right way and approached in a scientific manner. As a result, many questions have been framed within systems of strict scientific logic over the past two decades; however, there have been precious few meaningful answers derived. Even one of the most high priests in the new archaeology Sanhedrin has recently bemoaned the fact that much of

the intellectual turmoil during the 1960's and early 1970's has resulted in little more than sound and fury (Binford 1979). The hope of understanding and predicting the past and the warmth felt in knowing this understanding would contribute much to making the world a better place has not been realized. There simply has not been enough meat placed on the tables of archaeological knowledge to continue to nuture and feed those ambitious dreams and hopes inspired fifteen years ago.

One of the reasons for this failure, I feel, is the shift in emphasis during the early 1970's to contract archaeology or Cultural Resource Management. Although the recent flurry of Cultural Resource Management studies in the Southeast have provided a tremendous amount of new distributional data from surveys in areas that have traditionally been uninvestigated, the overwhelming majority of these new sites are in the plow zone. They are badly eroded and lack minimal horizontal or vertical stratigraphy. Features such as trash pits, storage facilities, and burials, as well as architectural remains, have long been obliterated and their contents swirled together in a kaleidoscopic maze, making it as difficult to separate components or activity loci as it is to extract the ice cream from a milk shake. In many instances, temporally and functionally sensitive diagnostics are rare or absent. So what remains to be studied? Actually, a handful of chips, maybe a tool or two, some vague spatial dimensions, and a dot on a topographic map. Of course, these site conditions are not the fault of the Cultural Resource Management program; they are simply

a consequence of topography and site formation processes (cf. Coe 1964:6).

Although many of these sites lack minimal structural or contextual relationships, they may yet provide some information upon which we can begin to construct patterns of settlements and perhaps formulate models to infer ecological and subsistence parameters. Problems arise only when the data potential contained in such sites is stretched beyond its logical limits by unfounded assumptions. When these plowed and eroded remains are assumed to represent discrete episodes of behavior functionally patterned as synchronous components of complex systems, any processual or adaptive models subsequently developed cannot be accepted (cf. Deetz 1968:282). This is not to say that there is no hope left, that we should give up the goals of understanding, explaining, and predicting cultural phenomena, but rather we must realize that without good contextual data, there will continue to be few answers to many of the very important questions in Southeastern prehistory.

In short, my problem in dealing with archaeology today has not been so much involved with new versus old archaeology, or with a normative versus a processual approach, but rather with what can reasonably be extracted from the record and the kinds of data that are being presented today in support of various questions and hypotheses. Too often plow zone and surface deposits are being treated as if they represent the direct consequences of past activities. The disturbance and displacement of artifacts in such

contexts are simply assumed to be minimal, and hypotheses and test implication are used to develop past cultural reconstructions that are limited only by the fertility of the researchers' imagination. I feel that these assumptions and test implications have too often been substituted for trash pits and post holes. I am not a "young fogey". I am a skeptic, and this skepticism led to the research that follows in the next few chapters.

Objectives

The overall purpose of this study is to investigate the spatial structure of two late prehistoric villages; the Warren Wilson site ($Bn^{V}29$) located in the Appalachian Summit area and Upper Saura Town ($Sk^{V}1a$) located in the north central Piedmont (Figure 1). Both artifact distributions in the plow zone and their occurrence in the undisturbed spatial matrix comprised of features and structures will be studied. In addition, the spatial relationships among the various architectural remains comprising the villages will be described and compared. A main emphasis will be on the correlations between the structure of undisturbed features and architecture and the patterns of various classes of artifacts contained in the plow zone. It is hoped that these structural comparisons will clarify the nature of the spatial relationships between artifacts in the plow zone and in situ features. In doing so, the degree of structural integrity that plow zone and, indirectly, surface deposits retain should also be clarified, and the validity of many of the assumptions current today tested.

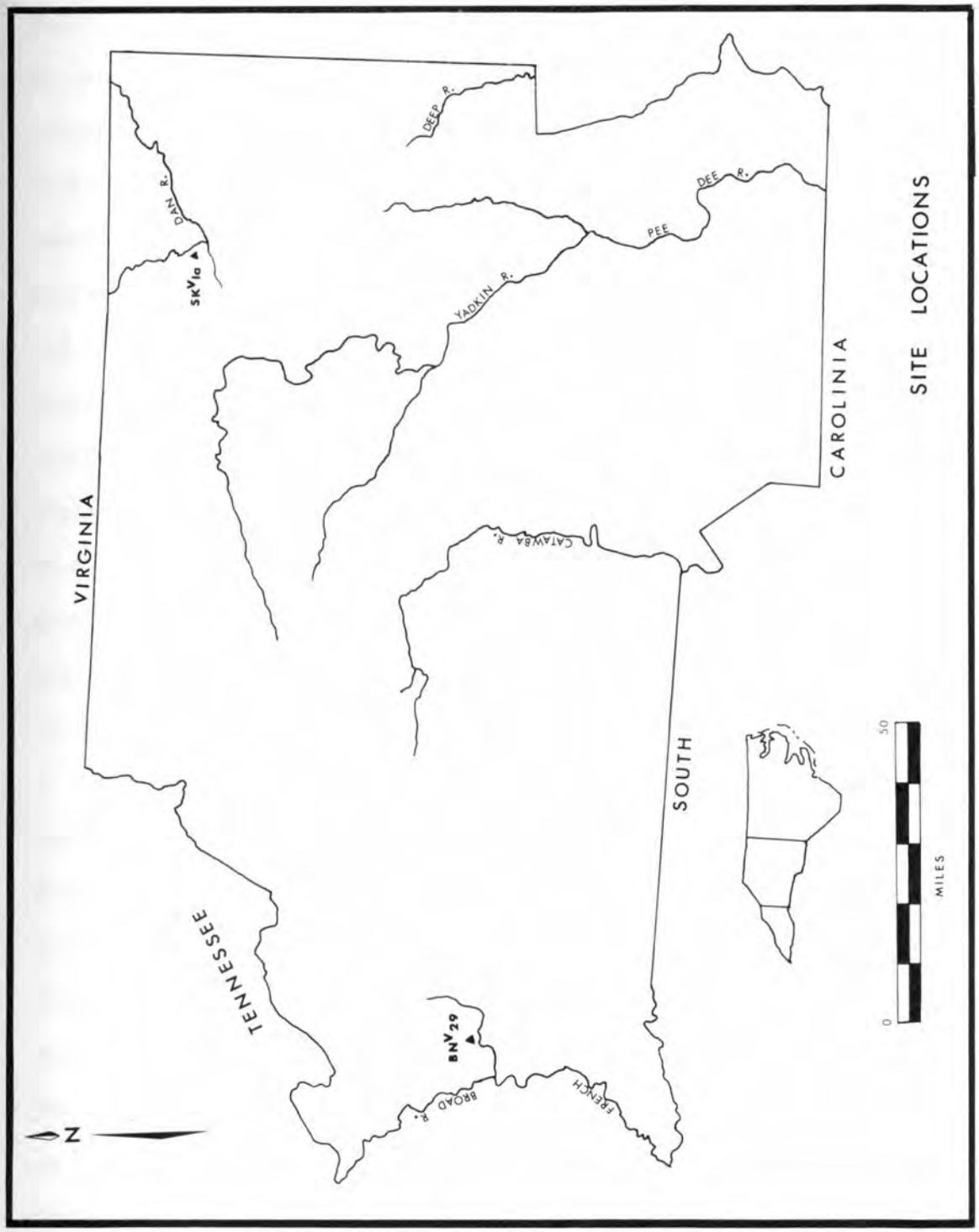

SITE LOCATIONS
VIRGINIA
TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
DAN R.
SKV10
DEEP R.
YADKIN R.
PEE DEE R.
CATAWBA R.
BNV29
BROAD R.
FRENCH
0
50
MILES
N

Figure 1

Recently several researchers (Binford et al. 1970; Redman and Watson 1970; Schiffer and Rathje 1973; Flannery 1976; Faulkner and McCollough 1979) have dealt explicity with the problem of the degree of coincidence between disturbed structure and undisturbed site structures. These studies have, however, been primarily concerned with surface-subsurface correlations. Few have attempted to investigate on a large scale the spatial patterns and the degree of correspondence between the artifact densities within the plow zone and the in situ spatial structure represented by buried features, houses, and other architectural forms. Based on these initial studies of surface-subsurface correspondences, no obvious explanation of forthcoming, and it appears that a myriad complex of factors are at play (Flannery 1976). However, by comparing the plow zone artifact densities with the known in situ structure, the best possible conditions for patterned correspondence between the two contexts exist.

My interest in this area grew out of a concern over a growing number of reports primarily within the sphere of Cultural Resource Management, dealing with the excavation of small, plow disturbed sites where a high degree of horizontal spatial integrity has simply been assumed. It was felt that many of the spatial relationships among various artifact types and classes were not reflecting the activity structure and adaptive poses of past cultural systems as much as they were indicating agricultural practices, as well as fortuitous and capricious natural forces.

These doubts eventually led to the current study, using data from $Bn^{v}29$ and $Sk^{v}1a$ where materials from the plow zone and the

undisturbed zones have been carefully excavated and controlled. The Warren Wilson site is the better known of the two and has been the subject of a recent book and several articles by Dickens (1976, 1978, 1979). This site represents a late prehistoric Cherokee village located on the floodplain of the Swannanoa River in Buncombe County, N.C. In many ways, the Warren Wilson site is typical of the medium-sized villages occupied during the Pisgah phase in western North Carolina. $Sk^{v}1a$ is located on the Dan River in the northern Piedmont section of Stokes County. This site is a historic Siouan village that has been putatively identified as a component of Upper Sauratown. It too is typical of many of the Dan River phase (Coe and Lewis 1952) occupations along the Dan and its tributaries in North Carolina and Virginia. Wilson (1978) has recently detailed a segment of the subsistence cycle at $Sk^{v}1a$ and is currently carrying out an extensive study of the Dan River phase.

These sites are of interest to the current research because large portions of their respective village areas have been totally excavated, bringing to light considerable information concerning spatial arrangements of features, burials, and architectural forms (houses, palisades, etc.). Over 24,000 square feet have been opened at $Bn^{v}29$, while well over 10,000 square feet have been exposed at $Sk^{v}1a$, and the work is continuing today. The scale of the excavations alone certainly does not make them unique, but the fact that they have been consistently excavated using exacting field techniques resulting in the near total recovery of plow zone materials does set them apart. This plow zone data, in

conjunction with the in situ village structure permit the evaluation of the previously mentioned assumptions concerning the relationships between disturbed and undisturbed site structures.

If some form of predictive relationship between the two contexts can be established, different classes of artifacts should display different degrees of predictive acuity, and certain kinds of specimens should most readily indicate specific types of subsurface facilities. A second objective is to identify these relationships between disposed context and artifact distributions. For example, it is hypothesized that the presence of concentrations of bone in the plow zone indicates subsurface trash pits. This relationship is predicted because the unattractive and noxious nature of bone would cause it to very likely be cleaned up and deposited in a secondary context (cf. South 1977). Bone elements would also be broken up into smaller and smaller fragments with each successive plowing, and these smaller, dispersed fragments would lose their survival potential. Consequently, only those pieces kicked up by the most recent plowings would be present in the plow zone, and these should be concentrated in close proximity to their points of origin.

Because of its small size and unobnoxious presence, lithic debris probably entered the record in a primary or de facto context (Schiffer 1972; Binford 1978; South 1979). A similar disposal pattern is hypothesized for the small triangular arrow points common at both sites. As a result of the way in which these specimens most likely entered the record--or were transformed from

systemic to archaeological context, to use Schiffer's (1976) terminology--it is further hypothesized that plow zone densities of debitage and arrow points will have little predictive value in locating subsurface features.

A third objective is to define the intra-site structure contained in both the plow zone and the undisturbed context. Recent studies, by and large, have either relied totally on in situ deposits when both disturbed and undisturbed materials were present (Smith 1978) or assumed a degree of spatial association for plow zone or surface artifact distributions when intact remains were lacking (House and Wogaman 1978). Few, if any, spatial or activity analyses have utilized both contexts in interpreting spatial patterns and whatever cultural processes that may be encoded in such patterns. By using data from both contexts, it is hoped that a complementary relationship can be established that will allow for a more complete understanding of the site formation processes, as well as spatial dynamics.

A Discussion of Terms

Since archaeological terminology has proliferated and become more specialized over the past few years, it seems appropriate, if not necessary, to explicitly define and explain some of the key terms and phrases that will be used throughout the remaining chapters.

Since one of the main objectives is to compare the in situ site structure with the disturbed site structure, the term "site

structure" needs clarifying. The concept as it is used here closely parallels South's usage in that, "The distribution of artifacts, architecture, features, and strata in spatial patterns (emphasis in the original) on a site is a major element in site structure delineation" (South 1979:220). Site structure is further defined by the various patterned associations between artifacts, architecture, and features. Most sites have two structures; one defined by the distribution of artifacts in the plow zone (the disturbed structure) and the other defined by the distribution of architecture, features, and their content (the in situ structure) contained in the undisturbed subsoil.

It is the nature of the relationship between these structures that is of paramount importance. For example, the association between the spatial configuration of the ceramics distribution in the in situ site structure can be compared with the configuration of ceramic densities in the plow zone. By comparing these spatial patterns, hopefully insight may be gained into the nature of the cultural and natural forces that forged this particular component of the site structure. Likewise, the patterned correspondences between the other artifact classes and the features and architecture can be scrutinized to develop biophysical and cultural models that may be used in deriving explanatory principles. Patterned correspondence simply refers to the fact that if undisturbed areas of a site have high artifact output, it is expected that this trend would be discernible within the plow zone and vice versa.

One of the primary contributing factors to site structure is the mode of refuse disposal. "Refuse labels the post-discard condition of an element--the condition of no longer participating in a behavioral system" (Schiffer 1972:159). In the process of refuse disposal, artifacts are transformed from their "systemic" context to their "archaeological" context (Schiffer 1976:28), and by studying these modes of transformation, behavioral inferences can begin to be formulated.

The term "primary refuse" is used to refer to material remains that were discarded in the same areas as they were used. In the case of secondary refuse, the location of discard is different from the area of use (Schiffer 1972:161). Schiffer also describes a third type of refuse disposal, de facto, which consists of cultural elements that enter the archaeological record without being discarded (Schiffer 1972:161). South has expanded the definition of de facto refuse to include in situ de facto which refers to objects, ". . . demonstrated to have archaeological context relationships directly reflecting locational relationships in the systemic context" (South 1977:297). The objects recovered from the floor of a burned structure for example would fit into this category, while the unwanted elements casually left behind when a structure was abandoned would comprise simple de facto refuse.

South has also added the category "displaced refuse" to refer to primary or secondary refuse that has been displaced by natural or cultural forces. He mentions as examples displacements

resulting from the filling of depressions such as old wells and cellar holes, erosion control, and general site use (South 1977:298). Presumably displace refuse would also include the contents of middens and features that occur in the plow zone, as well as intact deposits that have been displaced by activities such as pot hunting.

Of all the various refuse disposal modes, primary and secondary are the main types encountered at $Bn^{v}29$ and $Sk^{v}1a$. In fact, most prehistoric sites in North Carolina rarely have de facto or in situ de facto deposits. Even if objects or elements do exist in these states, in most cases it is difficult to recognize or distinguish between them. Granted the artifacts and materials resting on the floor of a burned structure are easily identified as such if this context has been preserved, but even in this situation, it can never be determined whether or not more valuable items were removed and those remaining left in a kind of de facto context. On the other hand, the fire could have occurred with sufficient rapidity to prevent the removal of any material remains. The point is that it is often difficult to draw such fine lines from the archaeological evidence contained on most sites. To determine whether an object was lost or simply abandoned is also difficult in most cases. Certainly at $Bn^{v}29$ and $Sk^{v}1a$ this kind of fine-grained resolution of refuse disposal was not possible.

These terms and phrases refer to principles and concepts that are not new to archaeology. Most have been around and expressed in one way or another for several generations of archaeologists.

In fact, a legitimate criticism of some of the new archaeology might be that it has jargonized the obvious to the point of obfuscating basic principles and concepts. The attempt here is to eschew such obfuscation, and these terms are used only to refer to specific concepts as they are currently expressed in the literature. Hopefully, no new jargon has inadvertently crept into the following chapters that might distort the perception of the ideas presented.

A Review of Related Studies

As discussed in the last section, this research began with an interest in the nature and extent of the relationship between plow zone and surface artifact distributions and subsurface cultural features. Such interest is certainly not revolutionary, and for several years archaeologists have been concerned with what kinds and how much information can be gleaned from surface artifact configurations. However, the plow zone has only recently received attention.

One of the earliest efforts to systematically investigate surface and subsurface correspondences was undertaken by Lewis Binford in 1963 at Hatchery West, a Woodland site on the Kaskaskia River near Carlyle, Illinois. The site was first plowed, then gridded into six-meter squares and intensively collected after it had been rained on. A little over 3.5 acres were plowed and 416 units were collected. Based on this collection, a determination of site boundary and size was made

using primarily ceramic distributions (Binford et al. 1970:7).

One of the primary research goals at Hatchery West was to

> . . . investigate the nature of the relationship between the structure of the site as defined by the surface distribution of cultural items and the structure of the site as defined by the spatial configuration of sub-surface cultural features (Binford et al. 1970:7).

This interest grew out of serious doubts concerning the way areas of investigation were traditionally chosen for excavation by archaeologists. In the past, as well as today, excavations are often placed where the most material appears on the surface of the site. Binford et al. felt, however, that this kind of strategy could lead to underrepresented and biased data (Binford et al. 1970:7).

After the surface specimens were cataloged and analyzed, a series of contour maps were constructed plotting the various densities of different artifact classes. The plow zone was then mechanically removed, and the in situ features were excavated and mapped. The results of this work led to the conclusion that the traditional method of choosing where to excavate (i.e. the richest areas) would have meant that all the architectural features would have been missed because of the fact that there was a complementary distribution between areas of high sherd density and structures. It was also concluded that because of the non-overlapping distribution of the various classes of artifacts, it would have been impossible to have obtained a representative sample for any one area of the site.

> We conclude from this analysis and discussion that without a program of stratified sampling and/or a prior knowledge (emphasis in original) of the culture history of a site that densities of items cannot be used as a guide to excavation. Densities of items themselves will tell us nothing of the distribution of features on a site, nor of the functional variability represented (Binford et al. 1970:71).

Flannery has recently commented on Hatchery West and concluded that much of the success of the project resulted from the fact that the site was relatively small and could be systematically collected in a short period of time with relatively few people. Also contributing to the amount of information retrieved from surface data was the fact that the site lay immediately below the plow zone where a general correspondence between surface and subsurface features would be expected (Flannery 1976:53).

In 1968 Redman and Watson undertook a similar study at two large mound sites located near Diyarbakir, Turkey. At the Cayönü site, a 10 percent simple random sample of five-meter squares was studied, while at Girik-i-Haciyan a stratified unaligned scheme was used to obtain the 10 percent fraction. This research was designed to not only test the hypothesis that "Surface and subsurface artifact distributions are related so that a description of the first will allow prediction of the second" (Redman and Watson 1970:280) but also to construct a model that could describe the relationship between the appearance of a site's artifact distribution and the natural and cultural processes that were responsible for this distribution.

> We wish to delineate grouping of material objects resulting from the prehistoric activities which took place in the various areas of the site. The primary variables determining this pattern are the depositional and erosional processes that have been operative at the site. These depend on both natural and human agencies and on the topography of the site itself. Wind and water can order, winnow, or redistribute debris. The number of culture periods, phases, or occupations represented at the site is important. Later occupations can partially or totally cover earlier ones so that only a small portion of the surface distribution represents the early habitations of the site. Later peoples or animals can dig up areas of the site exposing large quantities of artifacts from the earlier levels, thus mixing assemblages. Later cultivation can reshape the distributions. Differential deposition and erosion have a marked effect on the quantities and distributions of artifacts on the site surface. Each of these factors must be noted and assessed at least in a general way when the surface distributions are being interpreted (Redman and Watson 1970:280).

Evidently Redman and Watson were satisfied that surface distributions were good indicators of subsurface densities for, ". . . it is asserted that the systematic sampling of a large area of a site or, preferably, of the entire site, will allow prediction of what excavations would yield in one area vis-a-vis what they would yield in another" (Redman and Watson 1970:285). They did find that there was high correlation between artifact counts from the upper excavation levels and the surface, but in contrast to Binford, they were comparing the surface distributions with arbitrary slices of stratigraphically homogeneous fill, not features and architecture. It was further stated that intact features were found where there was little material on the surface, and in other instances, small numbers of intact features were discovered where there was a lot of surface material (Redman and Watson 1970:283).

In many respects, the research of Redman and Watson was not comparable to Binford's work at Hatchery West. The former were not primarily concerned with investigating the correspondence between undisturbed formal structural units (features) and surface artifact distributions. Their research was concerned primarily with simply comparing counts and ratios of artifact classes from the surface with counts and ratios of artifacts from different levels within a relatively homogeneous matrix of fill.

However, there is ambiquity and confusion in their use of the term feature. In one instance it was stated that the mounds were featureless (Redman and Watson 1970:290), while earlier it had been stated that, ". . . of the three test excavations on each site, the square with the highest surface yield had the fewest remains of intact features, and the square with the lowest surface yield had the most remains of intact features directly below the surface" (Redman and Watson 1970:285). It is suspected that by featureless in the first context, the authors were referring to surface features, and subsurface features did occur at both sites. Nevertheless, no attempt was made to define what a subsurface feature consisted of. Obviously, a garbage pit will have more output and be defined on the surface more readily than a burial--all things being equal. This failure to describe the features is also a criticism that could be leveled at Binford's Hatchery West report. Except for houses, he did not define or discuss the functional range of any of the features.

At Coapexco, an Early Formative site in the Valley of Mexico, a controlled surface collection was carried out by Tolstoy and Fish in 1973 (Flannery 1976). Based on surface densities, some 50 concentrations of artifacts such as potsherds, figurine parts, chipped stone, and ground stone were isolated. Tolstoy and Fish predicted that these "hot spots" indicated the location of houses and subsequently tested this hypothesis by excavating trenches in the suspected areas. Some of the concentrations did turn out to be associated with house sites, while others were associated with other types of features. Houses were also found that were not suspected from the surface indications.

> In summary, the results of the Coapexco experiment indicate that, on reasonably shallow sites, controlled surface pickup can indicate the locations of houses before excavation begins. However, not all these houses will be contemporary, and some may turn out to be features (Flannery 1976:57).

Flannery further stressed the fact that a multiplicity of factors affect the distribution of surface artifacts. Erosion, depth of overburden, and length of occupation at the site make predictions of such parameters as population size and occupational intensity at any given time difficult, even if the surface to subsurface association is relatively close (Flannery 1976:57).

At a deeper site, San Jose Mogote in Oaxaca, Flannery was able to locate surface scatters that indicated areas of common dwellings, public buildings, and a section of the site that contained craft specialists. These distinct activity areas were not, however, functioning simultaneously. This site was very

large, covering some 100 hectares, and in some instances, the cultural strata were buried as much as five meters deep. Less than 0.2 percent of the site was sampled and the sample was not systematic (Flannery 1976:58-62).

These two Mesoamerican studies, in conjunction with Binford's (1970) work and the investigations by Redman and Watson (1970) led Flannery to conclude that systematic intensive surface studies can yield important information even when a site is large and complex with a long term occupation that caused a great deal of spatial disturbance.

> They can yield such information, however, only if one approaches the whole study with healthy skepticism, aware that a great deal of the pattern on the surface has resulted from erosion, gravity, monumental construction and disturbance, plowing, looting, and modern occupation. Indeed, in many cases, the use of extremely sophisticated sampling techniques might--because of these sources of disturbance--yield data no better than a relatively simple sampling design (Flannery 1976:62).

At the Joint site in Arizona (Schiffer and Rathje 1973; Schiffer 1976), it was hypothesized that artifact densities and distributions across the surface would reflect similar densities and distributions below the surface. Sampling strata were defined in terms of major variations in the surface densities of ceramic and lithic specimens. Excavation failed, however, to support this hypothesis. Although the Joint site represented a single component occupation, there were no direct correspondences between surface and subsurface distributions. In retrospect, the authors found this not to be surprising because even if the

patterns of cultural deposition were constant, variations in the noncultural formation processes could create misleading surface patterns (Schiffer and Rathje 1973:172).

At the Joint site, artifacts were moved laterally by wind, water, and gravity until they were impeded by standing pueblo walls. These barriers, depending upon their height, significantly influence the nature of the surface distributions. However, according to Schiffer and Rathje (1973:173), if these "n-transforms" had been made explicit and operationalized prior to excavation, the location of midden and refuse pits could have been predicted from the configuration of the surface scatters. Such might be the case in the Southwest, but in the Southeast, it would be extremely difficult, if not impossible, to predict the effects of natural disturbances on surface remains to a degree that would allow them to be placed in their original spatial context.

At Beckwith's Fort, a large Mississippian site in southwest Missouri, Healan was able to isolate different temporal components and gross functional areas by using a controlled surface collection. Squares 50 feet on a side were the basic units within the confines of the still visible vestiges of the fort embankment. A functional area was defined as, "A unit occupying a spatial and temporal position within which certain repetitive activities take place which are related to some culturally regulated theme or activity" (Healan 1972:3). This definition is broad and although the object of the study was not to attempt to delimit specific functional zones such as cooking areas, sleeping quarters, or tool

manufacturing areas, an attempt was made to isolate such things as individual houses (Healan 1972:3).

Four types of artifactual materials were collected: daub, ceramics, lithics, and bone. Except for the daub, which was sampled, the other items were picked up in their entirety. Of these, ceramics provided the overwhelming bulk of the final collection with 18,580 sherds making up over 90 percent of the sample. Consequently, 61 of the 77 variables describing the data were ceramic (Healan 1972:12-35). By using factor analysis and contouring the grid units by factor scores, the study purported to be able to separate habitation areas from the central plaza, and the pre-Mississippian period areas from the Mississippian.

Actually about all Healan was able to say was that the site was occupied earlier than previously believed (during the Baytown period), and that this occupation seemed to represent habitation midden, ". . . due to the diversity of weapons, implements, and ceramic attributes, the kind of things associated with residential debris" (Healan 1972:38). However, there is some question as to where this diversity really came from since, other than the ceramics, only 39 chipped stone tools or fragments were recovered, along with 123 bone fragments (Healan 1972:14). Nonetheless, based primarily on ceramic distributions, an extensive Baytown occupation was identified that extended into the area of the later Mississippian plaza. Because of concentrations of Baytown ceramics found on two of the mounds, they were also thought to be part of this earlier component (Healan 1972:26).

The Mississippian period was represented by two large pyramidal mounds and a restricted habitation zone evidenced by daub clusters around the plaza.

By and large, most of these observations could have been made from a casual walkover by an experienced archaeologist. This is not to fault Healan, however, since he did collect hard data that allows the formulation of hypotheses that can be tested through excavation, and as he stated, ". . . even the most cogent demonstration of this sort can only be ultimately validated or invalidated by excavation" (Healan 1972:40).

A section of the Banks site located on the upper Duck River in south central Tennessee was also subjected to intensive controlled surface collecting. The site was actually comprised of a complex of occupations covering some 40 acres. The University of Tennessee Project concentrated on two of the major components, a late Middle Woodland occupation dating to the Owl Hollow phase (A.D. 400-600) and an emergent Mississippian Banks phase occupation dating between A.D. 800 and A.D. 1000. A half acre of the site was collected and controlled by a 20 foot grid system. Some 2,058 artifacts were inventoried, including 291 projectile points, 685 fragments of debitage, 463 retouched flakes, 287 bifaces, 3 crinoid stem fragments, 3 pieces of Chattanooga black shale, 2 bottle glass sherds, 1 nail, 35 small bone fragments, and 280 sherds. Most of this material dated to the Middle Woodland period (Faulkner and McCollough 1979:10).

The purpose of the surface collection was to locate areas of differential occupational intensity, to segregate components, and to locate specialized activity areas. Three areas of differential intensity were noted, based on concentrations of unworked lithic material. In each of the subareas there was a difference between areas with high unworked lithic frequencies and adjacent zones with high frequencies of finished lithic implements (Faulkner and McCollough 1979:24).

Because of the small number of ceramics per unit (Five sherds were the maximum), this category was not very helpful in identifying significant horizontal strata. Functionally different lithic tool categories were plotted, and based on the projectile point distributions, one activity area was assigned to the Owl Hollow phase, another to the Late Archaic, and a final area to the Mississippian period (Faulkner and McCollough 1979:24-28).

Perhaps one of the more revealing discussions centered around the distribution of 28 adzes which were thought to represent woodworking activities. These were widely scattered, and only three were located in the Middle Woodland activity area. This distribution, ". . . demonstrated that adzes and the activity they represent were not concentrated in the major area of Owl Hollow occupation"; however, "If the adzes pertain to one, rather than several, of the occupations, the most likely candidate is the Owl Hollow occupation which shows the most similar widespread occurrences of diagnostic material" (Faulkner and McCollough 1979:30). The final conclusion concerning the

adzes was that they were not used in an Owl Hollow phase structure that was found but were used in the lightly wooded area around the structure (Faulkner and McCollough 1979:30). With a total of only 28 adzes from 70 collecting units, one wonders why the ceramics were not put to better use in interpreting the spatial structure of the site. After all, there were 280 sherds compared with only 28 adzes, and if the above conclusion could be rendered from such a small sample, surely similar conclusions could have been surfaced by further meditations on the pottery.

Scrapers and perforating and drilling implements evidenced a widespread distribution, but clusters were noted only in areas that seemed to coincide with variations in the general occupational intensity.

Despite the limitations of the surface evaluation, it did lead to the identification of several components and suggested some hypotheses that were tested by subsequent excavations. According to Faulkner and McCollough, however, the most revealing thing about the surface investigation was the fact that surface indications badly distorted the structure of the various occupations. Rich concentrations of surface debris were correlated negatively with the most important subsurface features. One of these was the Owl Hollow phase structure that contained two large earth ovens. Other earth ovens were also isolated that were not indicated on the surface, although these were prime data units. A midden area north of the structure did, however, correspond with one of the activity areas that evidenced

intensive Middle Woodland usage. The authors correctly pointed out that this deposit could easily have been misinterpreted if it alone had been excavated and the various artifacts treated as primary or de facto refuse rather than secondary refuse resulting from cleaning the structure's floor and the ovens (Faulkner and McCollough 1979:30).

Another feature that correlated negatively with the surface remains was a Mississippian ossuary and several refuse-filled clay borrow pits. Although the surface evidence guided the excavations in the general direction of the Mississippian occupation area, there were no in situ features or structures in the areas of the highest surface intensity. In addition, there was very little material on the surface corresponding with the location of the refuse-filled borrow pits and the ossuary (Faulkner and McCollough 1979:33).

In addition to these somewhat extensive studies, there have been other less involved investigations of the relationship between the pattern of surface artifacts and subsurface features. Chomko (1974) isolated three distinct activity areas at the Hopper site in Missouri by flagging surface artifacts with different colored flags. Baker recently discussed some possible biases in the surface content of sites. He hypothesized that larger objects are over-represented, because they are less likely to be covered by silt and, consequently, more likely to be picked up and reused by the later inhabitants of a site (Baker 1978:288).

From all these discussions, there is one thing that is obvious in terms of surface-subsurface correspondence; there are few regularities. At some sites, houses were located in areas of intense surface scatter, while at others, they were not. Sometimes features were detected on the basis of surface scatter; other times they were not. Ceramics were good indicators of activity intensity at some sites, poor at others. The only clear-cut relationship that was not contradicted was the fact that if a dense midden is plowed through, it will be detected during the course of a controlled surface collection. Houses, subsurface features, and other architectural remains may or may not be indicated on the surface. Most often they are not.

Given this spotty track record of surface remains in contributing to an understanding of site structure, some archaeologists today have turned to the plow zone as the unit of study rather than relying solely on surface scatters. This interest in the plow zone is also at least partially related to one of the main theoretical thrusts in the recent development of American archaeology. Today archaeologists are committed to the study of cultural systems as adaptive, energy-extracting entities with functionally dependent and interrelated components articulating with socio-physical environmental variables. Such studies require that all types of sites be investigated. Only after the small, activity-specific loci have been incorporated into the adaptive strategies of the larger, stratified base camps can the

dynamic processes of culture change begin to be understood. Most of the smaller sites, at least in the Southeast, have been severely disturbed by plowing, and many are contained solely within the plow zone.

The importance of these small plow zone sites also stems from a completely nontheoretical development that has occurred in American archaeology over the past decade. With the passage of the National Historic Preservation Act in 1966, followed by the National Environmental Policy Act in 1970, and Executive Order 11593 in 1971, archaeology in the United States has become almost dominated by the environmental impact assessment process and what is commonly referred to today as Cultural Resource Management.

Archaeological survey and the inventory and assessment of sites are now required by law in areas that have been traditionally considered to be marginal from a research standpoint. Highway corridors, power transmission lines, and sewage outfall easements have joined the traditional river basin as areas to be searched by the archaeologist. Small plow zone sites make up a large portion of the total inventory from such studies, and archaeologists in the business of Cultural Resource Management have, in a sense, been forced to study them in a detail unimaginable 20 years ago. There are many archaeological mouths to feed today, and if all that are found are small plow zone sites, then something has to be done analytically with these data to justify the large sums of money that are being spent in the environmental review process

and to insure that the funds do not run out.

Plog et al. (1977) have stressed the importance of the small site in understanding settlement and subsistence and, in particular, have emphasized the fact that settlement and subsistence studies can't ignore sites that are restricted to the plow zone, because these may represent activities functionally distinct from those of the larger, stratified sites. "While disturbance of sites by plowing may render an analysis of activity areas within the sites difficult or impossible, it in no way hinders comparison with artifacts from other sites" (Plog et al. 1977:118). It is also believed that the mixing of different time periods and artifact assemblages is not problematical if groups of people returned to the same location to carry out the same or similar activities. As part of the research design for the SUNY-Binghamton Cultural Resource Management program, plow zone sites are routinely excavated, and supposedly it has been possible to isolate functionally distinct areas within them (Plog et al. 1977:118). However, no published data describing these sites and activity areas in detail are currently available.

Talmage et al. (1977) have reiterated Plog's concern over the importance of small plow zone sites, and speaking for the National Park Service, have stated that small site resources must be systematically studied or else a whole segment of the archaeological record will be lost. Small sites are seen as representing instances of archaeological time which produce "ethnically pure"

assemblages that are, ". . . unclouded by the complexities of larger sites" (Talmage et al. 1977:1). Echoing Schiffer (1976) in discussing site formation processes, it is asserted that:

> Although the processes are complex, modern cultural disturbances such as pothunting and plowing, or natural phenomena like flooding and drifting which disturb sites are only additional variables that must be studied while doing field archaeology; disturbance to sites does not necessarily preclude investigation of the archaeological resources once the regularities of the disturbance are defined (Talmage et al. 1977:2).

Roper (1976) investigated a Late Archaic mortuary and found that fragments of bifaces on the surface could be fitted with excavated specimens, thus allowing a measurement of plow displacement. The maximum distance between fragments was a little over ten meters, while the minimum distance was three meters. Based on these displacements, Roper concluded that plowing was not as detrimental to spatial context as had been previously suspected (Roper 1976:372-373). It should be pointed out that there are several questions concerning the nature of the context within which the undisturbed specimens were recovered. Were they really undisturbed or also in the plow zone? In addition, no mention was made as to when the specimens were broken. Were they broken during aboriginal use or by the plow? If the latter was the case, displacement would then depend upon which plowing was responsible for the breakage.

One of the most recent and extensive excavations at a shallow plow zone site took place in Fairfield County, South Carolina. The Windy Ridge site, 38FA118, was located on a ridge in the

inter-riverine zone between the Catawba-Wateree and Broad rivers in the South Carolina Piedmont (House and Wogaman 1978). Excavations resulted from mitigation necessitated by the construction of an interstate highway and was funded by the South Carolina Department of Transportation. The excavations were considered necessary because Windy Ridge exhibited a high artifact density and appeared to be less eroded than most ridge top sites in the Piedmont. It was believed that extensive excavations would shed much needed light on the functional parameters of small upland Archaic sites (House and Wogaman 1978:1).

The site itself measured approximately 100 meters north-south and 300 meters east-west along the ridge toe between two creeks. Slightly less than 800 square meters were located in the highway right-of-way and ultimately subjected to subsurface investigations. This area did, however, represent the most concentrated part of the site (House and Wogaman 1978:32).

Since one of the primary research objectives was to study the site structure in terms of activity analysis, it was assumed that,

> . . . virtually all of the prehistoric artifacts at Windy Ridge entered the archaeological record as primary rather than secondary refuse, that they were discarded more-or-less at the location where they ceased to be useful in some on-going activity (House and Wogaman 1978:9).

In addition, the following hypotheses were considered: 1) Windy Ridge was an intensively occupied habitation site, 2) The site

was used only for procuring and the preliminary processing of natural resources, 3) it represented a gathering and processing station for harvesting hickory nuts and acorns, and 4) Windy Ridge was a hunting-butchering camp primarily devoted to deer procurement. All of these hypotheses were based on the further assumption that Archaic peoples participated in a seasonal round of resource exploitation.

Various test implications were designed for each of the hypotheses. For example, it was felt that if the site represented a long-term habitation, subsurface features should be present as well as a variety of tool forms. On the other hand, if the ridge top was used primarily as a procuring and processing facility, then subsurface features would be lacking and a narrow range of tool types indicating the resources exploited would be in evidence (House and Wogaman 1978:10).

The excavations revealed a stratigraphy that consisted of a plow zone overlying a sandy loam that, in some instances, overlay a clay-silt loam. As expected, a key question throughout the report was the degree of disturbance of the artifact-bearing matrix which was defined almost entirely by the plow zone. However, the authors concluded that, ". . . the ground surface has apparently remained relatively stable and only minimal sheet erosion seems to have occurred" (House and Wogaman 1978:40). Because of this stability, other explanations were sought to account for the burial of the cultural material. These other explanations were found in the form of pedoturbators, which

included tree fall where stump holes were subsequently filled with soil. Roots were also discussed for their ability to move things vertically through the soil, but of primary importance were such animals as moles and squirrels and insects such as ants and termites (House and Wogaman 1978:41). For some inexplicable reason, plowing was never mentioned for its ability to bury things.

As mentioned previously, one of the most significant test implications relating to the site function hypothesis was considered to be whether or not subsurface features were present. It was assumed that these would have been utilized only at fairly permanent sites. A total of twelve intrusions were identified, but all except three were interpreted to be either tree stump or root holes. The exceptions included a questionable posthole, an artifact cluster consisting of a Savannah River point and two flakes in the northeast corner of one of the excavation units at the base of the plow zone, and some possible fired rock found 24 centimeters below the surface. The posthole was thought to probably be a root hole, and all the buried manifestations were interpreted as resulting from forces of pedoturbation. Consequently, no evidence of undisturbed subsurface activity was present (House and Wogaman 1978:48).

Since one of the major goals of the Windy Ridge excavation was to define the intra-site spatial structure and its behavioral variability, it was hoped that clustered distributions of artifacts representing synchronic episodes of deposition could be isolated. The problems associated with using stratigraphically

homogenized data were supposedly somehow compensated for by using "fine-grained" spatial controls. It was assumed, ". . . that the outputs of a finite number of discrete, systemically-unrelated episodes of occupation should exhibit at least some degree of horizontal discreteness on a landform as large as Windy Ridge" (House and Wogaman 1978:112). It was also assumed that disturbance from plowing had been minimal because it took place so long ago that mules or perhaps small tractors were the only implements used to cultivate the ridge (House and Wogaman 1978: 113). However, judging from the size of the pine trees on the site, it appeared to have not been out of cultivation for more than 10 or 15 years (House and Wogaman 1978:Figure 1). Be that as it may, one final assumption was necessary before the spatial analysis could be carried out. "The present analysis makes the assumption that the magnitude of the spatial transformations intervening between the last use and the discard of cultural elements in the past at Windy Ridge was typically very minor" (House and Wogaman 1978:112). As a consequence of all these assumptions, the cultural material was treated as primary refuse with associational integrity.

In order to study the intra-site structure at Windy Ridge, contour maps plotted by the Computer Graphics' SYMAP program were made of the densities of six raw material categories putatively identified with specific Archaic complexes. Based on the map data, the various raw material categories tended to be clustered in

various sections of the site. Only Morrow Mountain points, however, occurred with sufficient frequency across the site to discuss their distribution relative to the debitage. A total of seven specimens were recovered from units that also produced a high density of quartz debitage (House and Wogaman 1978:113-120).

These Morrow Mountain clusters were seen as the most significant spatial pattern uncovered at Windy Ridge. Extrapolating from the sample data, the clusters were thought to be 10 to 20 meters in diameter and might include 50 to 150 Morrow Mountain points and as much as 5 to 15 kilograms of quartz debitage. Although the narrow range of functional tool types was consistent with the extractive locus hypothesis, the authors felt that the degree of clustering was more indicative of an intensive occupation over a fairly brief period of time (House and Wogaman 1978:123-124).

> (1) In spite of the narrow range of technology and function represented, the clusters may reflect some type of whole kin group habitation of substantial structures that was sufficiently prolonged to have considerable outputs, but was perhaps nonetheless sufficiently brief or seasonally specialized to involve only a limited range of lithic tool technology and function. (2) the behavior that took place at the site might yet be a specialized extractive activity carried out by a minimal social segment that nonetheless involved construction and annual reuse of facilities. To speculate, a lean-to, a group of tent poles, or a butchering rack might have been left at a hunting camp and re-used for periods going on a week or so every year or every other year (House and Wogaman 1978:125).

These are rather spectacular findings considering the quantity of data and their contextual relationships. It would seem that hypotheses tested by assumptions and implications fueled by fertile imaginations can indeed paint a picture of past behavior

with incredible resolution. In fact, the Windy Ridge report has been presented as a pioneer study that breaks new ground in research on small disturbed sites.

> I fear, though, that describing Windy Ridge as an 'upland lithic scatter' is analogous to referring to the Statue of Liberty as a 'skywardly oriented pile of bronze'. While both expressions may be correct descriptively the very morphological nature of these terms reveals a complete ignorance about what each has to do with human beings (Goodyear 1978:xii).

This researcher feels that a great deal of ignorance concerning what Windy Ridge really had to do with human beings still remains, and in trying to glean such understanding from a site such as this is properly analogous to dismantling the Statue of Liberty to explain turn of the century French foreign policy. There are several things that should be pointed out concerning the interpretation of the data from Windy Ridge. The theoretical soundness of the seasonal transhumance settlement model for the Archaic has been discussed elsewhere (Ward 1980), so that the comments here will be restricted to the interpretations and assumptions relating to the processes of site formation.

First, is the question as to how Windy Ridge escaped all but minimal sheet erosion when Fairfield County is one of the most eroded counties in the South Carolina Piedmont (Clyde 1978). In fact, the Winnsboro series soils which cover the ridge the site is located on have a higher erodibility than most other Fairfield County soils (Trinkley, personal communication).

Regardless of the amount of erosion, to assert that the ground surface has remained relatively stable over the past several thousand years and that the artifacts were buried as a result of downward movement by natural agents borders on the absurd. Windy Ridge is no different than the vast majority of upland Piedmont sites where the combined processes of plowing and erosion have long since thoroughly mixed the assemblages and destroyed any stratigraphic or spatial context. Examination of the report indicated that virtually all the specimens were from the top eight to ten inches of soil (House and Wogaman 1978:43). Although quick to point out the downward movement of artifacts caused by pedoturbators, plowing was mentioned as having occurred but given no credit for having buried the specimens, although almost all were retrieved from the plow zone.

To use the presence or absence of subsoil features in such a highly disturbed site to test hypotheses concerning site function was totally unjustified. Of course, this test implication resulted from the initial premise that little erosion had taken place. Obviously, when the basic premise is in error, any subsequent implications or assumptions derived from that premise are of necessity also erroneous. As a consequence, many of the other assumptions were similarly unfounded and reflect a naiveté in understanding the nature of site formation processes in the Piedmont.

There were also no grounds for assuming that all the specimens entered the record as primary refuse. It would have been just as logical to have assumed that they were secondarily deposited in trash pits or curative facilities that were obliterated by erosion and plowing. Much of the clustering of the debris might also have come about as a result of specimens washing into depression and holes created by tree fall and other natural processes. These, too, could have been easily erased by plowing and deflation.

Because of the shaky premise that the site was not eroded and the ungrounded and untestable assumptions that the artifacts entered the record as primary refuse that retained much of its spatial integrity, it is not possible to accept any of the interpretations concerning site structure and activity areas. If an in situ spatial structure had been present, then the data from the plow zone could have been compared with it to determine the degree of disturbance and spatial dislocation, and perhaps some valid conclusions or at least testable hypotheses could have been offered. Instead, only a reckless, unproductive web of speculation could be constructed.

Summary

Today, primarily as a consequence of Cultural Resource Management, considerable amounts of money are being spent excavating sites that lie within the plow zone. In fact, a recent review of all the Cultural Resource Management studies

carried out in the North Carolina Piedmont since 1972, revealed that of all the sites that had been tested and excavated, only two were found to contain in situ deposits (Ward 1980).

There is a growing number of archaeologists, again working primarily in Cultural Resource Management, who seem to feel that in situ context is no longer a necessary prerequisite for site excavation and that meaningful spatial, activity analyses can be based solely on surface or plow disturbed data. Yet there has been no effort made to consistently excavate sites where disturbed, as well as undisturbed contexts are preserved so that the nature of the relationship between the two can be studied and evaluated. All that have been presented are assumptions, much like those forming the precarious underpinnings of the Windy Ridge study.

I strongly believe that we can no longer spend research time and resources on such sites until the various assumptions concerning the degree of spatial disturbance by plowing, as well as erosion and other natural forces, are investigated to determine to what extent they are valid. Certainly plow zone sites can produce useful typological information and fill voids in settlement studies, but how productive can they be in intra-site spatial studies? What do the artifact clusters in the plow zone really mean? How reflective are plow zone distributions of the undisturbed site structure? Are there "regularities of disturbance" in the plow zone that can be defined and controlled for? Based on the answers to these questions, it can then be determined if plow zone sites warrant the expenditure of funds

necessary for large scale excavations.

Hopefully, some of these questions will be answered in the next few chapters, and new insights will be gained into the complexities of the relationship between plow zone artifact densities and the in situ spatial structure of sites.

CHAPTER II

METHODS

The Data Set

Once the initial decision was made to investigate the relationship between the site structure as defined by the plow disturbed matrix and the site structure as defined by the in situ features, the greatest problems then became what data were suited for the study and how best to organize and manipulate these data. The heart of the problem lay in determining the best ways of quantifying variables with sufficient sensitivity to provide objective, meaningful measurements of the relationships and correspondences between the two archaeological matrices.

The first decision that had to be made concerned which classes of artifacts should be used. For the plow zone, the choice was fairly easy and dictated by factors of preservation and numbers. Only a few classes of artifacts were represented at each of the sites in sufficient numbers to insure valid inter- and intra-site comparisions. Ceramics, specifically sherd counts, were an obvious choice since pottery was present in both contexts at both sites in abundant quantities. Ceramics are a good indicator of overall activity intensity. This assessment is

based on the fact that the overwhelming volume of specimens from late village sites in the southeast consist of sherds from vessels produced for domestic use, which enter the archaeological record as a result of breakage during such use. This pattern was especially evident at Warren Wilson and Saura Town where a high degree of non-utilitarian ceramic specialization was not present.

The next most frequently occurring artifact class at both sites was unmodified lithic debris. This category consisted of relatively small (usually one half inch or less) thin flakes that were either removed during the final steps of tool manufacture or detached in the process of sharpening or recycling old tools. Evidence of re-touch, either fortuitous or purposeful, was lacking, and the flakes appeared not to have functioned as part of a tool kit. It must be admitted, however, that all these specimens were only inspected microscopically by persons with varying degrees of skill. Microscopic scrutiny by a highly trained lithic technologist would probably gainsay the above description in a few cases, but it is extremely unlikely that the error would be large enough to affect the assumption that these flakes were primarily indicative of tool manufacture, use, and maintenance either directly or indirectly involved with woodworking or butchering behavior. This material is referred to as "lithics" or "flakes" throughout the remaining chapters.

Projectile points were chosen for inter- and intra- site comparison for many of the same reasons as lithics and pottery. They occurred quite frequently and are believed to be good indicators of overall activity intensity. The late prehistoric and historic period projectile points were usually small, triangular in outline, and used to tip arrows. Unlike some of the large broad-bladed specimens used during the Archaic, they probably only served this function and were not also used as knives or cutting tools.

The final category compared at both sites was animal bone. The bone consisted of whole pieces and fragments from the undisturbed deposits and the plow zone. Many natural factors affect bone preservation, and these factors may cause considerable variability in quantity within as well as between sites. Bone occurred frequently, however, in both disturbed and undisturbed contexts at $Bn^{V}29$ and $Sk^{V}1a$. This high frequency of occurrence and the fact that its presence usually implies a specific set of behavioral correlates, e.g. butchering, eating, and disposal, outweighed any inconsistencies and error caused by preservation processes. No attempt was made to identify individual species although casual observation, as well as a recent study by Runquist (1979), indicate that deer makes up the bulk of faunal remains from Pisgah as well as Dan River sites.

As stated previously, the primary criterion for the selection of these categories of materials for comparison was their numbers. Pottery, flakes, projectile points, and animal

bone occurred more frequently in the plow zone and in the undisturbed features than any other cultural remains. Each of the classes, however, reflects different behavior, and each in turn entered the archaeological record through different avenues.

Similarly it has been hypothesized that bone is represented in secondary context. This hypothesis rather ethnocentrically assumes that the inhabitants of the sites cleaned the bone from the living areas because of its not only cumbersome but also noxious nature (see South 1977). Bone and potsherds were both purposefully removed from the areas where they were used and dumped, along with other garbage, in special areas or facilities.

Plow zone counts were calculated for each class of artifacts per 10-foot grid unit at each site. There were 242 such units at $Bn^{v}29$ and 102 at $Sk^{v}1a$. Since a midden was lacking at both sites, the undisturbed matrix consisted of various pits and postholes that had been truncated by the plow. To avoid the tedious and time consuming task of calculating artifact totals for each feature, it was initially felt that the total amount of feature space expressed in terms of exposed square feet within each square would provide an accurate index that could be used to compare with the artifact counts from the plow zone. The more feature "footage", the more material expected in the plow zone. If significant variations in different classes of specimens were noted, the actual feature contents would be quantified. This initial comparative strategy was quickly abandoned when it became

obvious that there was considerable variability in terms of overall feature space and content. Although some of this variability was realized prior to the decision to use feature extent, the degree of variation was not appreciated until after a few preliminary comparisons were made. Some small pits had tremendous artifact outputs, while several expansive, shallow features produced a sparse amount of artifactual materials. No matter how time consuming, it was finally determined that it would be necessary to calculate artifact counts by class from individual features per square in order to have comparative, reliable data from the plow zone and the undisturbed matrix.

All of the artifact counts were then recorded on a set of five by eight cards. In order to compare the gridded plow zone counts with the feature data, the contents from all the features within a square were added together by artifact class. As a result, each square had two data sets:

Plow Zone No.	Feature No.
Ceramics	Ceramics
Lithics	Lithics
Projectile points	Projectile points
Bone	Bone

It should be noted that at this stage of the analysis, no attempt was made to functionally differentiate features other than exclude burials from the calculations. They were left out because

the burial fill from both sites was generally sterile. Posthole counts were excluded because they also had extremely low artifact outputs at both sites. Other than excluding burial and posthole fill, all the features within each square were summarized by totaling their content for each artifact category.

Only Pisgah features were analyzed at Warren Wilson although a few Archaic hearths were isolated at the base of the plow zone in the area of House C. Likewise, no attempt was made to sort out the few Archaic and Early and Middle Woodland specimens from the plow zone squares. Such a task would require years of research and would not significantly alter the results of this study. This conclusion is based on previous work by Dickens which determined that almost all the plow zone artifacts resulted from the Pisgah occupation. Comparing feature and plow zone sherd samples, Dickens found that 99.9 percent of the identifiable specimens from features, as well as the plow zone, were assignable to the Pisgah phase (Dickens 1970:59).

In order to double check Dickens' findings, another sample of plow zone pottery was analyzed. The sample consisted of four squares of plow zone material that were chosen because of their locations and the number of sherds they contained. Units that evidenced a high intensity of occupation and units that indicated light occupational intensity were selected. An effort was also made to pick squares from all areas of the site. The final selection included 140R210 (also analyzed by Dickens), 200R270, 70R230, and 140R330. Since it is virtually impossible to

identify many of the small ceramic "crumbs" from the plow zone, the sherds were initially screened through one inch hardware cloth, and only those passing through the mesh were analyzed (Table 1). Based on this analysis, as well as Dickens' study, the conclusion that there were no hidden concentrations of earlier material that would affect the validity of any observations concerning the plow zone-feature relationships was verified. The most recent plow zone ceramic sample did, however, contain a slightly larger percentage of earlier sherds than reported by Dickens.

The situation at Sauratown was much less complex since the site was occupied for only a relatively brief period during the early 1700's (Coe, personal communications; Wilson 1977). An occasional Archaic specimen has been recovered from the plow zone, but these are found only rarely. The ceramic component is entirely Dan River; therefore, an analysis of a sample from the plow zone was not necessary.

Trend Surface Analysis

To determine the degree of correspondence and coincidence between the disturbed and undisturbed contexts, the data were quantified and simplified by using the Computer Graphics SYMAP program to create contour, trend surface, and residual maps of each class of artifacts from both contexts at each site. This computer mapping technique has had widespread use in archaeology

Table 1. $Bn^{v}29$ Plow Zone Ceramic Analysis
Selected Squares

Unit	Pisgah	Connestee	Pigeon	Swannanoa	Total
140R210	565(89.2)	32(5.1)	28(4.4)	8(1.3)	633
70R230	104(91.2)	2(1.8)	1(.9)	7(6.1)	117
200R270	579(93.5)	4(.6)	14(2.3)	22(3.6)	619
140R330	234(92.4)	10(4.0)	7(1.6)	2(1.0)	253

( ) = Percent within each square

(Redman and Watson 1970; House and Wogaman 1978) and provides an easy means for constructing distributional or density maps that can be studied descriptively as well as quantitatively. Most archaeological maps, however, have used only the contour capability of the SYMAP package. The mapping of trend surfaces and the residuals from these surfaces has not been extensively tested on either an inter-site or intra-site level (Hodder and Orton 1976) nor used to explicate the variability between disturbed and undisturbed site structures.

Because trend surface analysis is relatively new, at least in American archaeology, a brief review of the technique should be presented to assess its applicability to the present problem. A detailed discussion of the mathmatical and statistical principles involved is beyond the scope of this research, not to mention the level of expertise of this researcher. Only the general principles will be outlined here. For more detail, the reader is referred to Davis (1973) who presents the most detailed and lucid description of the statistical foundations and limitations of trend analysis. Hodder and Orton (1976) discuss in some detail its potential and current uses in archaeology.

Trend surface analysis became practical only after broad, rapid advances in computer technology during the 1960's. This advance in computer hardware was necessary before the large number of calculations required in obtaining trends could be dealt with economically. The technique was first applied to structural mapping and sedimentary petrology by geophysicists. It was later

adapted by geographers where it was considered to be one of the most promising new analytic tools for use in extracting more information from map data (Chorley and Haggett 1965:47). Today it is still a widely used numerical technique in geology and geography (Davis 1973:300).

Basically trend surface analysis separates data into two components, a general regional trend and local deviations from this trend. In archaeology, a geographical area such as a river basin is often considered as a region, and broad trends in site size, content, temporal range, and function are intuitively sought. On the other hand, archaeologists are also interested in the local deviations to trends such as the large ceremonial centers or the small activity specific loci. This same approach is often applied to the individual site. On this level general trends in the distribution of artifacts and features are noted while at the same time, fluctuations in the overall distributions are equally significant. The blank areas and the "hot spots" are extremely important in an interpretation of site structure and a determination of the behavioral correlates responsible for the variability in artifact distributions. As a heuristic device to aid in understanding structural variation, "Trend surfaces can. . . be considered as response surfaces, from which aspects of origin, dynamics, or process can be inferred, wherein variation in form may be thought of as responses to corresponding areal variations in the strength and balance of the controlling factors" (Chorley and Haggett 1965:48).

Trend surface fitting is a form of regression analysis, but instead of fitting a two-dimensional line to a scatter of points, a three-dimensional surface is calculated that best fits data points plotted on a map. Davis operationally defines a trend surface as ". . . a linear function of the geographic coordinates of a set of operations so constructed that the squared deviations from the trend are minimized" (Davis 1973:324). There are three important aspects of this definition that should be expanded. First, a trend surface is based on geographic coordinates which means that an observation, e.g. the number of sherds in a square, is considered to be in part a function of the location of the observation. Secondly, the trend is a linear function having the form, $y = b_1x_1+b_2x_2+. . .$ where b's are coefficients and x's are some combination of the geographic coordinates. The value of the variable on the trend surface is expressed by y. Finally, the linear function fitted to the trend must minimize the squared deviations from the trend, much like a regression line through a scatter of points (Davis 1973:324-326).

Since it is impossible to tell what form a surface should take at any given site, the unknown function can be approximated by an arbitrary one using a polynominal expansion of the linear trend surface. More complex surfaces are created by introducing powers and cross-products of the geographical coordinates. By adding a squared term to the linear equation, $y = b_0+b_1x_1+b_2x_2$, a second degree trend surface is created and expressed by the equation, $y = b_0+b_1x_1+b_2x_2+b_3x_1^2+b_4x_2^2+b_5x_1x_2$. To expand the

trend surface to higher orders, each geographic variable is raised to a higher power, creating two new variables, and the appropriate cross-products of the new coordinates are calculated to give other new variables (Davis 1973:331).

If polynomials are expanded to sufficiently high orders, they can conform to very complex surfaces. Such functions are useful in trend surface analysis because of the ease in finding the coefficients by using matrix algebra and computer solving (Davis 1973:331). Their use does not imply that archaeological site formation processes are somehow rooted in polynomial functions, but rather that they can be approximated by polynomial expansions, as well as other mathematical functions.

Using the Computer Graphics SYMAP program, a trend surface can be expressed as a plane in which case the equation describing the surface is linear, or it can be expressed as a parabola defined by a quadratic (having a squared term) equation. It can also be expressed by a third order or cubic (having cubed as well as squared and linear terms) equation which provides an additional point of inflection to the surface, and so on up to the sixth order. The more complex or higher ordered surfaces tend to minimize the residual noise and reflect the variation in the data more accurately, but lower ordered surfaces can be more useful in isolating local deviations expressed as residuals. The SYMAP program also maps these residuals by using the standard contour interpolation.

When using gridded data to create trend surface and residual maps, some obvious problems occur. First, the size of the grid will determine what is regional and what is local variation. If the grids are too small, the densities will not be smoothed. On the other hand, if they are too large and include several clusters, individual densities will be melted together and lost (Hodder and Orton 1976:157-158). The selection of a suitable grid size is largely subjective; however, with the Warren Wilson and Sk^{v}1a data, the 10-foot squares were close to optimum size. This assessment is based on the dimensions of the structures and features at the sites. In both cases, the grid size is sufficiently small to isolate artifact concentrations associated with specific features and architectural units yet large enough to also permit the construction of meaningful distributional generalizations.

Other problems with trend and residual mapping involve the number and spacing of the data points within the map area. At a very minimum, the number of data points must exceed the number of coefficients in the equation used to calculate the surface. If the map area extends beyond the lateral extent of the data point distribution, there will be few constraints on the form of the trend near the edge of the map. As a result, the slope that exists at the edge of the data points is extrapolated without limits along the map boundaries. These blank areas create "edge effects", and with a high order trend, extrapolated values near

the edge of the map can reach astronomical proportions. Minor edge effects will occur even if the map area is covered with uniformly spaced data points up to the map border. Of course, these discrepancies are also reflected in the residuals mapped from the trend surfaces (Davis 1973:349).

Arrangement of data points within the map can have a noticeable effect, and the shape of the map area can also affect the form of the polynomial fit. For example, if the data points are not contained within an approximately equidimensional area, the trend surface will be elongated parallel to the pattern of points. On the other hand, the clustering of data points can cause undue influence to be exerted and contort the configuration of the trend and its residuals (Davis 1973:351). Since the site maps under study were created from a large number of data points that had a uniform distribution throughout the mapped areas, the above problems were avoided.

Initially the data from the two sites were fitted with first through fifth order trend surfaces, and the resulting residuals from each surface were mapped (Figures 2, 3, 4, 5, 6, 7). It became obvious early in the analysis that the added resolution of the higher order surfaces was inconsequential, and the changes in residuals were of little consequence. After considerable experimentation, the trends and residuals from third order surfaces were found to adequately reflect the various artifact density variations. In addition, contour maps were also

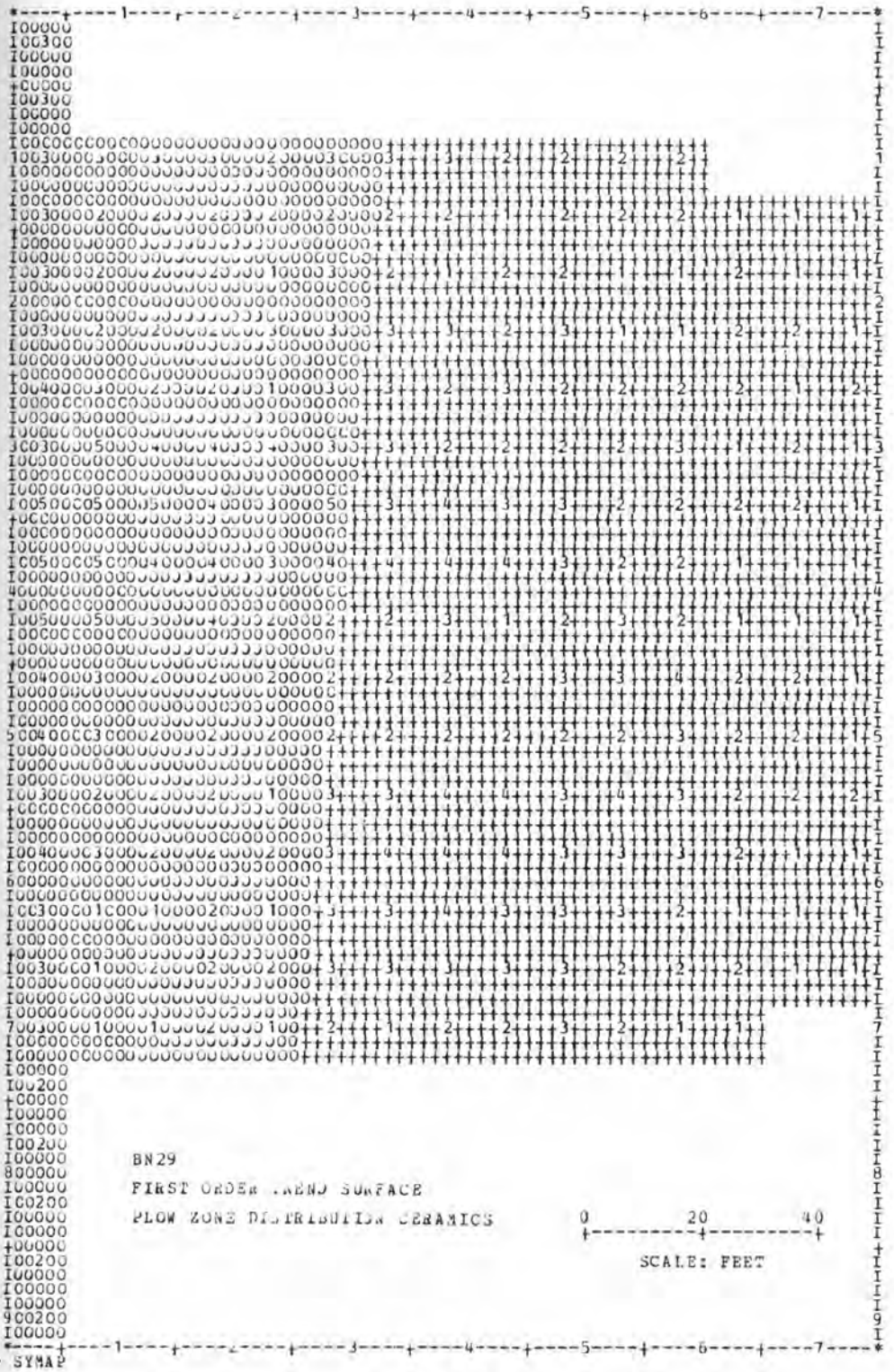

BN29
FIRST ORDER TREND SURFACE
PLOW ZONE DISTRIBUTION CERAMICS
0 20 40
SCALE: FEET
SYMAP

Figure 2

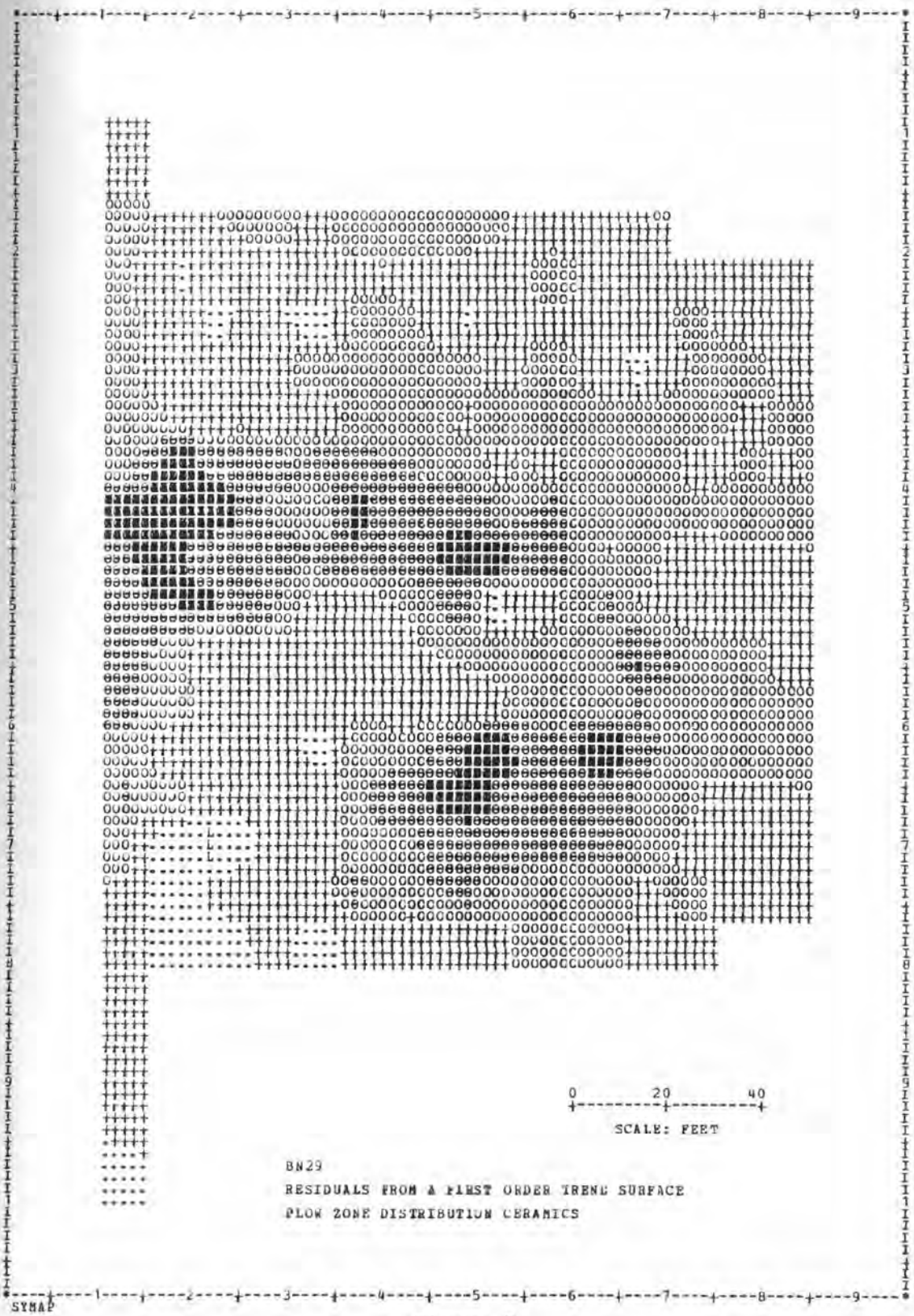

0 20 40
SCALE: FEET
BN29
RESIDUALS FROM A FIRST ORDER TRENE SURFACE
PLOW ZONE DISTRIBUTION CERAMICS
SYMAP

Figure 3

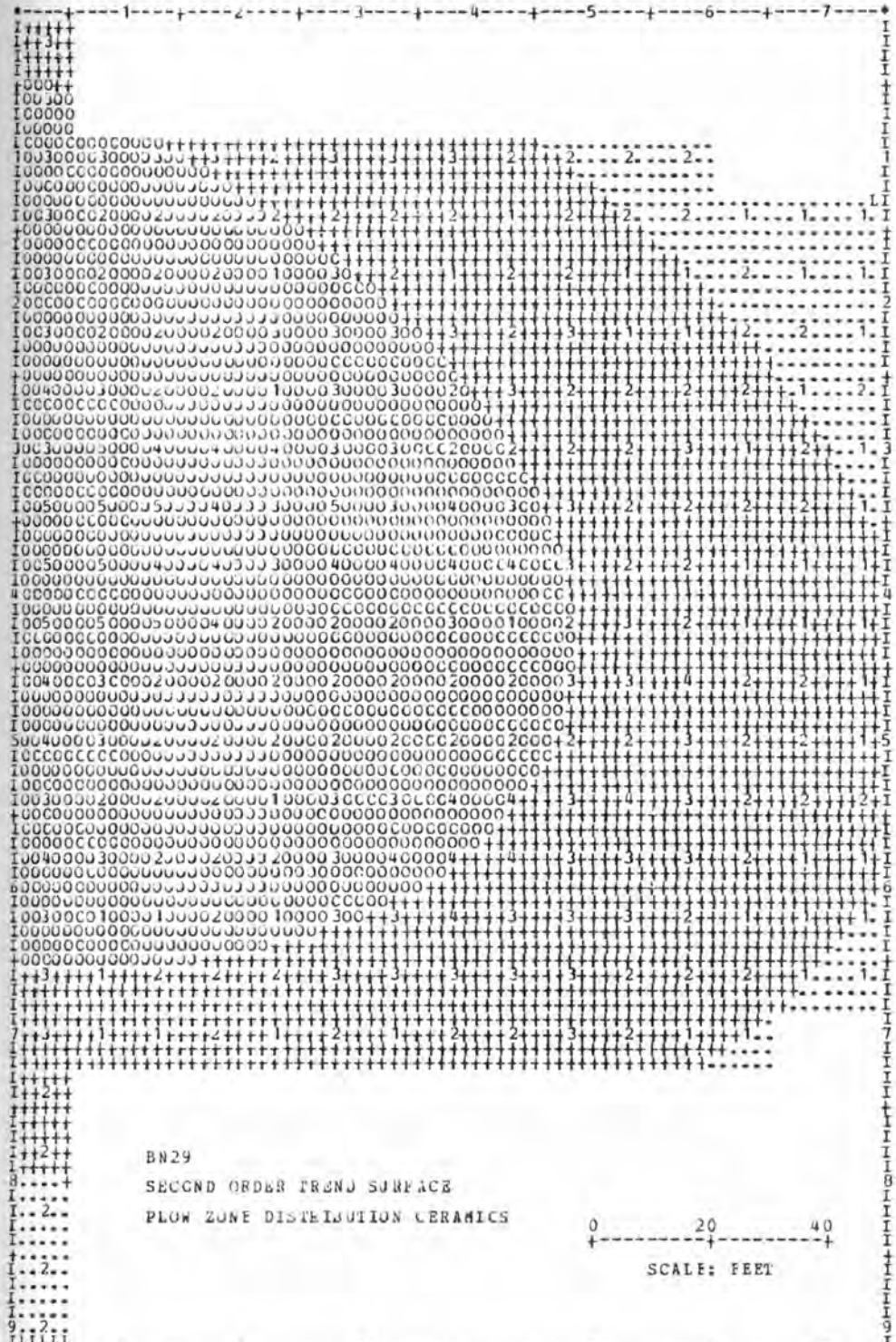

BN29
SECOND ORDER TREND SURFACE
PLOW ZONE DISTRIBUTION CERAMICS
0 20 40
SCALE: FEET
.SYMAP

Figure 4

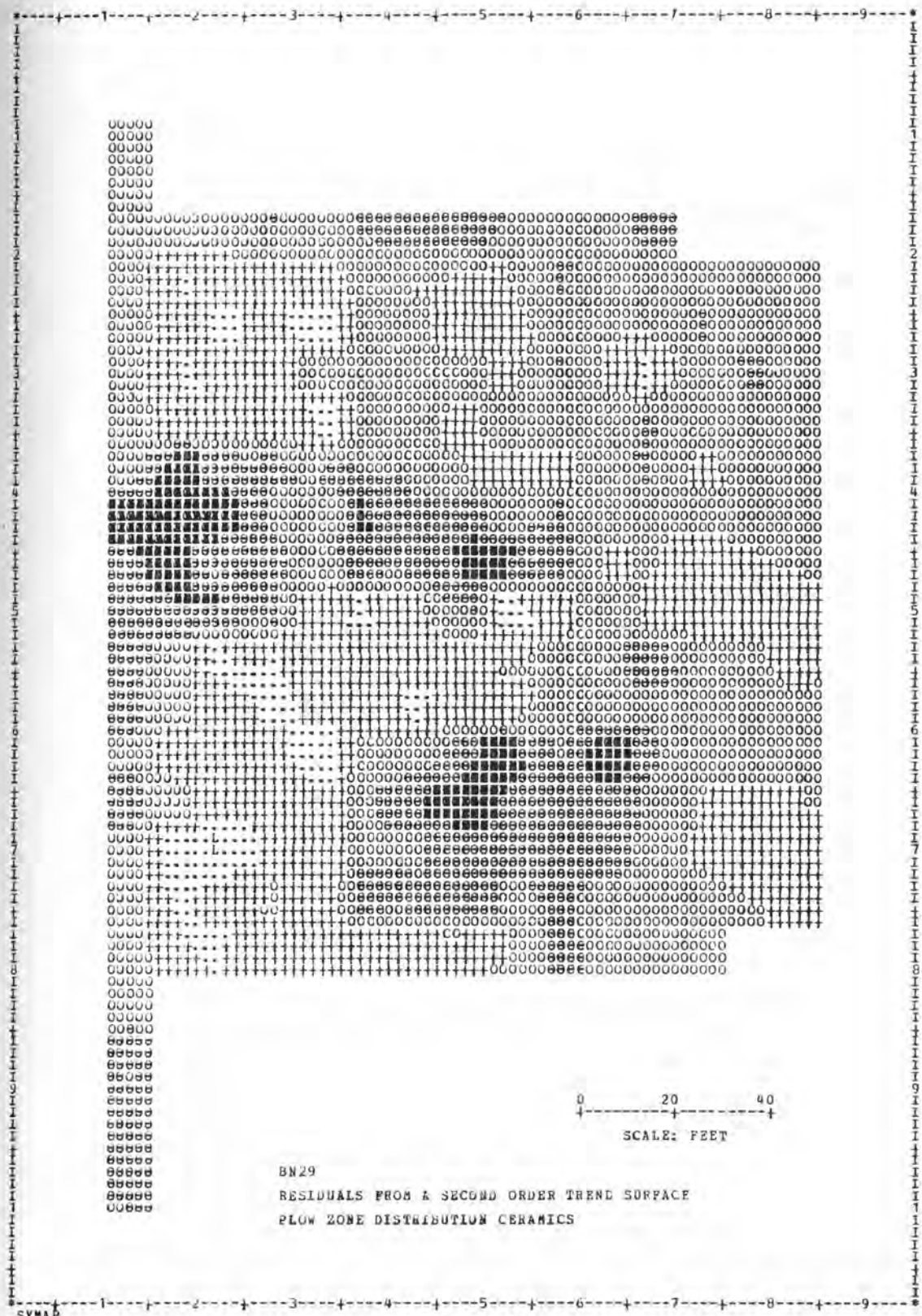

0 20 40
SCALE: FEET
BN29
RESIDUALS FROM A SECOND ORDER TREND SURFACE
PLOW ZONE DISTRIBUTION CERAMICS
SYMAP

Figure 5

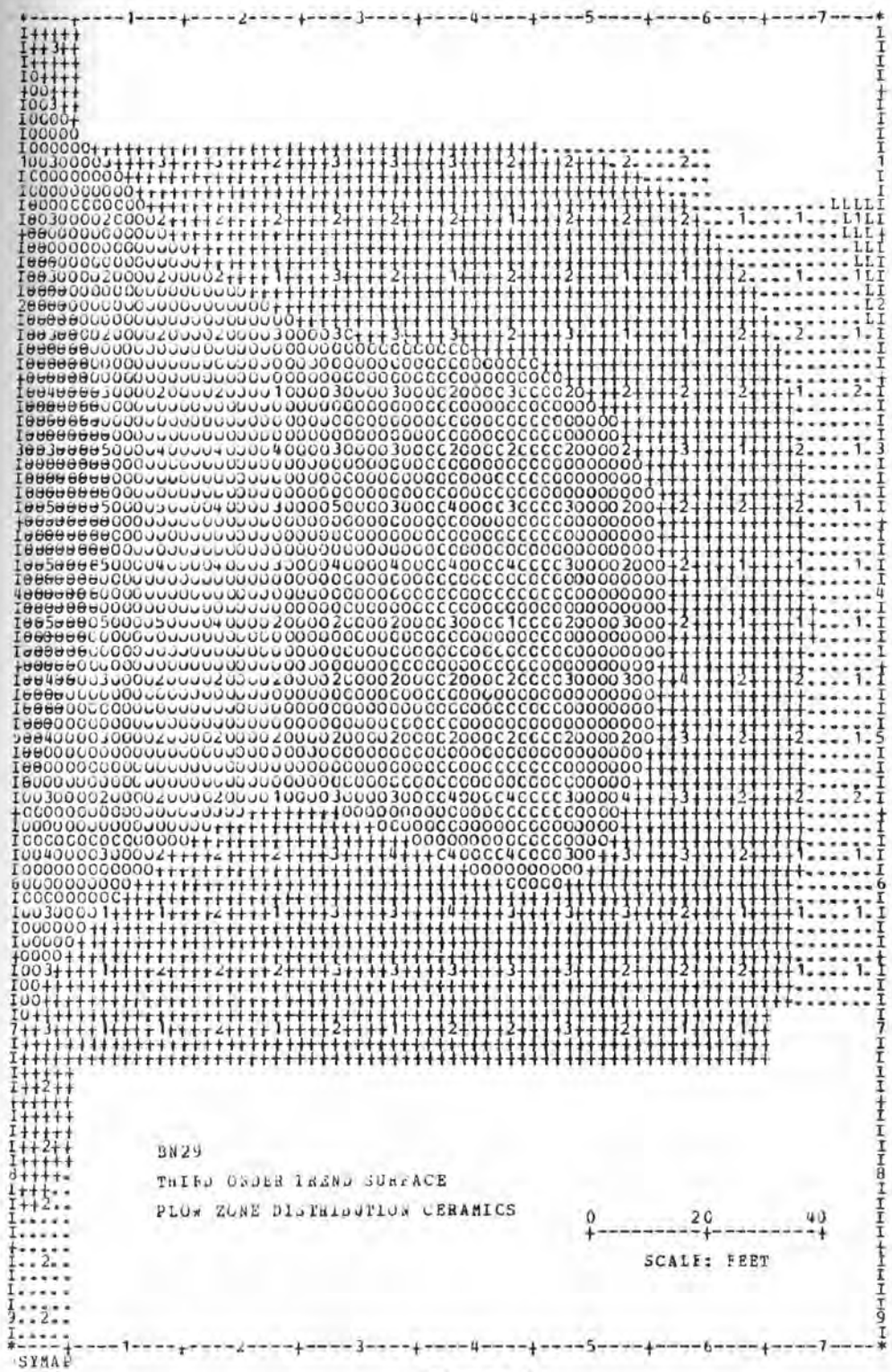

BN29
THIRD ORDER TREND SURFACE
PLOW ZONE DISTRIBUTION CERAMICS
0 20 40
SCALE: FEET
SYMAP

Figure 6

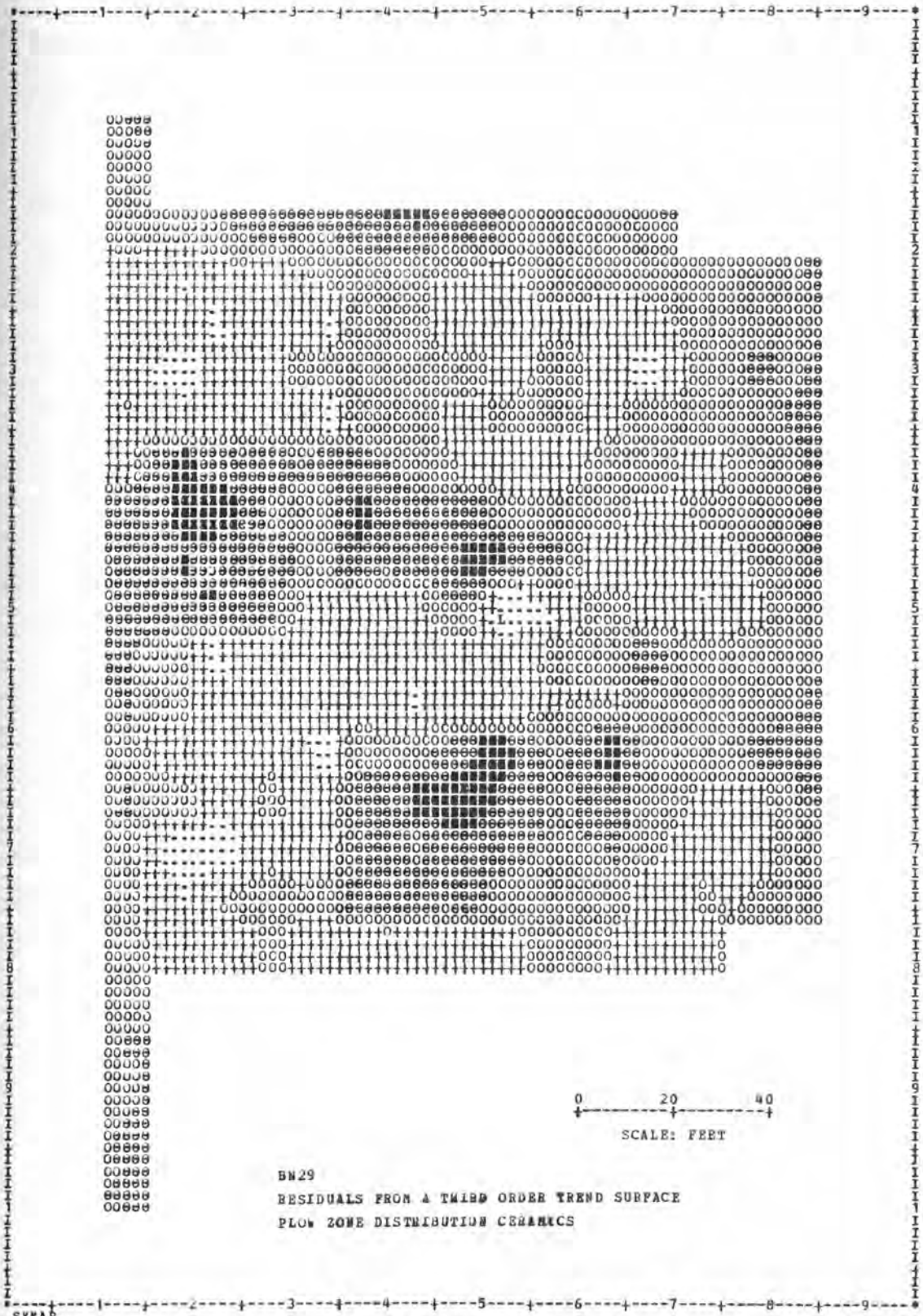

0 20 40
SCALE: FEET
BN29
RESIDUALS FROM A THIRD ORDER TREND SURFACE
PLOW ZONE DISTRIBUTION CERAMICS
SYMAP

Figure 7

plotted to be compared with the residual maps. The latter were found to be more sensitive to "hot spots" and blank areas and provided a more detailed resolution, while the contour maps gave a better picture of the overall distributional patterns. These differences in the degree of resolution will be discussed in detail in Chapters IV and V.

Since contour, trend surface, and residual maps were calculated for each class of artifacts from the plow zone and the features at both sites, a large number of maps were involved in the analysis. Comparing these maps with one another and with the excavation plans was not an easy task. The simple, yet time consuming, visual inspection using a light table and overlays eventually proved most productive. A fairly simple descriptive quantitative technique was also used to not only aid in comparing the maps, but to add another dimension to the overall analysis. The Statistical Analysis System (SAS) provided a flexible program to create data sets from the artifact classes which were then used to calculate an array of Pearson product-moment correlation coefficients. This procedure complimented the SYMAP comparisons and aided in isolating correspondences between different artifact variables. Of course, the correlation coefficients only measure general correspondences between the variables, and since sample locations are not taken into consideration, it is possible to have a high $\underline{r}$ value and very little spatial overlap or a low $\underline{r}$ and considerable spatial coincidence. In this regard, the SYMAPs were

helpful in evaluating the correlation coefficients, while at the same time the r scores guided the visual comparisons of the maps, particularly during the early phases of the study.

CHAPTER III

PLOWING PRACTICES

The Plow and What It Does

Before turning to the data base used to investigate the relationship between the plow zone and the undisturbed site structure, a brief review of plowing practices in general and those specifically employed at $Bn^{v}29$ and $Sk^{v}1a$ is in order. Strange as it may seem, conversations with students and colleagues have elicited the fact that there are many archaeologists who do not understand what a plow is or know what it does. Much of the discussion that follows is based on my personal experience, having plowed many fields while growing up on a farm, and more recent observations made while excavating various sites in North Carolina.

The earliest plows used by the colonists were made of wood with a small point of iron fastened to the tip by rawhide strips. They were massive and usually supported by wheels (Plate I). To control the plow and the team required the labor of at least three people. Few improvements were made in the various forms of the wooden plow until sometime after the beginning of the nineteenth century. The first steel plow was not patented until

1837, and the common horse-drawn plow used into this century was not patented until 1873 (Rush 1960:12-20). However, by 1899 there were a variety of implements, including the sulky plow (Plate II) which could be ridden, gang plows, plows combined with harrows and seed drills, side-hill plows, vineyard plows, beet plows, and subsoil plows (Holmes 1899:316).

The first steam tractors were developed in 1855 and used primarily for plowing. These machines were not as popular as might be expected, since they required as many as five men to operate a single tractor. In 1892 the first gasoline engine powered tractor was developed; these were widely used during World War I because of a shortage of horses and mules for the war effort. Again, these early gas powered tractors were used mainly for plowing. It was not until 1924, when the International Harvester Company developed the Farmall, that tractors were used for cultivating, as well as plowing. Deere and Company followed with the 10-20 tractor in 1928, and modern farming practices were begun. The Depression of the 1930's interrupted the development of farming technology to some extent, and it was not until after World War II that most farms were equipped with modern machinery.

> Plowing, the standard method of breaking land, consists of cutting loose, granulating, and inverting a slice of earth and turning under organic litter. The furrow slice is cut loose by the edge and shin of the plowshare. The crumbling or granulating action takes place at the plow surface and at right angles to the moldboard throughout its length. . . . Lifting and inverting the furrow slice and turning under organic litter take place throughout the length of the moldboard (Raney and Zingg 1957:280).

PLATE I
Early Colonial Plow
(from Yearbook of Agriculture, 1960)

PLATE II
Nineteenth Century Surry Plow
(from Yearbook of Agriculture, 1960)

Several investigators have been concerned with the amount of disturbance caused by plowing and many have concluded that the displacement of artifacts due to agricultural practices may not be sufficient to render the distribution of plow zone contents meaningless (Talmage et al. 1977; Roper 1976). It has been noted that the degree of disturbance depends on many factors, such as the type of soil, type of plow, speed of the plow, and how long a particular field has been under cultivation. Another important factor that is rarely considered is the way in which the field has been plowed over the years.

In the North Carolina Piedmont and the broad mountain valleys, the typical plow used since World War II has been a tractor-pulled moldboard gang type, usually with three points hooked in tandem to a metal frame (Plate III). This type of plow, usually referred to as a bottom plow, displaces the top eight to ten inches of normal agricultural soil approximately fourteen inches per plowing, although sometimes topsoil movement is much more (Plate IV). The direction of displacement is not at right angles to the direction of movement but somewhat more acute, due to the alignment of the plow points and the force of the forward motion itself. Certainly speed can affect displacement, but most plowing is done within a narrow range of speeds due to soil conditions and equipment limitations. Because of these restrictions, speed as a variable is of little consequence in soil dislocation.

PLATE III
Modern Tractor Plow
(from Yearbook of Agriculture, 1957)

PLATE IV
Bulldozer Pulling Four-Foot Mold Board Plow
(from Yearbook of Agriculture, 1960)

Probably the most important factors influencing the amount of disturbance caused by plowing are the length of time a field has been cultivated and how the plowing has been organized. Obviously, the more times specimens are moved within the soil matrix, the more dispersed they become and the farther they are displaced from their original locations. Less obvious is that usually there are only three ways a field can be approached with a plow, and each of these has a direct influence on the amount of site disturbance and the directions of artifact displacement.

Plowing can begin in the middle of a field and spiral outward in ever widening circles clockwise or counter-clockwise until the edges are reached. This way no soil is plowed out of the field and, without erosion, a hypothetical flat plain would be plowed into a cone after several years. Few fields are plowed in this fashion, because their shapes are rarely circular. With any but a circular outline, large edge areas would be cut off, and these have to be completed individually requiring a great deal of turning and plowing back and forth.

A more popular method is strip plowing, where a narrow segment of the field is cut off and plowed out by cutting along each edge in opposite directions until the strip is completely turned. Instead of being moved in a spiral direction toward the center of the field, earth is shifted in opposite directions from the midpoint of the strip. There is minor movement out of the field at the ends of the strip, but because of the narrow width

of the strips, such movements are usually inconsequential. This type of plowing is usually restricted to the large, flat, rectangular fields more typical in the Coastal Plain and to terraced areas (Ayres 1936:181).

By far, the most popular way of plowing a field in the Southeast, regardless of its size or shape, is to begin along the outside perimeter and plow in decreasing spirals in either a clockwise or counter-clockwise direction toward the center. Whether the plow runs clockwise or counter-clockwise, the direction of soil movement is always to the outside of the field. As a result, a flat plain plowed in this fashion for a long enough period of time and discounting erosion would become a basin since dirt is constantly moved out of the field.

Plowing Practices at $Bn^{v}29$ and $Sk^{v}1a$

Both the Warren Wilson site and $Sk^{v}1a$ have been primarily plowed in the outside to inside manner described above. This technique has been verified by archaeological evidence, personal observations over the past eight years, and conversations with individual farmers cultivating the fields containing both sites. The farm manager at $Bn^{v}29$, whose father was also farm manager, stated that until the early 1960's, the field in which the site is located was plowed by starting along the edge and working inward. Just before a portion of the field that contained the

site was set aside to prevent further disturbance in 1963, some plowing was done from the center outward in an attempt to counter the constant movement of the soil to the periphery. A similar shift in plowing also took place at $Sk^{v}1a$, but now the site continues to be plowed, almost every year, from the outside toward the center.

Archaeological evidence for soil movement out of the fields has been uncovered at both sites, the most striking evidence consisting of deeply buried cultural deposits along the edges of old stream channels bordering the sites (Plate V, VI). This lateral movement was particularly impressive at Warren Wilson, where a reversed stratigraphic sequence built up as soil was constantly plowed from the interior of the site and eventually moved over the old stream bank to collect in the abandoned channel along the site's eastern edge (Plate V). Pisgah (ca. A.D. 1400) remains buried by layers containing Connestee (ca. A.D. 600) and Swannanoa (ca. 500 B.C.) ceramics filled the old channel as a consequence of the plowing (Coe, personal communications). At $Sk^{v}1a$, the soil from the interior of the field collected in a thin wooded border between the site and the current river channel. The constant movement of soil to the field periphery also caused a build up of plow zone along the river bank. Here the plowed soil has been periodically buried by overbank flood deposits (Plate VI).

PLATE V
Buried Plow Zones at $Bn^{v}29$

PLATE VI
Buried Plow Zones at $Sk^{v}1a$

One final point should be mentioned before discussing the spatial structure of the two sites. In order to impress University of North Carolina archaeologists, the site area at Warren Wilson was plowed as deeply as possible prior to their arrival in order to bring as much fresh material as possible to the surface. This plowing done in 1965 represents the final stirring which affected the configuration of the artifact distributions presented in the following chapter. In contrast, $Sk^{v}1a$ has been plowed annually, and no special preparations to impress the archaeologists have been undertaken. Both sites have been in cultivation for at least 100 years (Miller, personal communications; Larson, personal communications).

CHAPTER IV

SPATIAL DISTRIBUTIONS AT THE WARREN WILSON SITE, $BN^{V}29$

Previous Work

Fieldwork began at the Warren Wilson site in 1966 and is continuing today (Plate VII). Except for the summer of 1977, a field party consisting primarily of Warren Wilson College students under the direction of personnel from the Research Laboratories of Anthropology has continued to expose a Pisgah village (Plate VIII). Each summer crew directors have been repeatedly asked, "Are you learning anything new?", "Did you find anything important this summer?", or "Is the dig still worthwhile?" Of course, the answer to all these questions is yes, but to the untrained observer it is often just another structure, or the continuation of a palisade--"Didn't they discover that one in 1978?" From personal experience, however, there is nothing more rewarding than finding some patterned connection between excavations separated by several years and directed by different individuals. To be able to pick up the palisade year after year or to uncover the remaining walls of a house that was only suspected ten years earlier, are tremendously rewarding experiences.

PLATE VII
Students Working at $Bn^{v}29$, 1973

PLATE VIII
Structures and Palisades Uncovered at $Bn^{v}29$
During the Summer of 1973

To date, some 26,364 man-hours of fieldwork have excavated 42,939 cubic feet of earth. In addition to this study and a master's thesis in progress, three Ph.D. dissertations, two of which have been published, have resulted from these excavations. For a detailed description of the site, the reader is referred to Dickens (1970; 1976) and Keel (1976). In this chapter, features and structures that were excavated after 1969 will be added to Dickens' description of the Pisgah component. The earlier data will also be incorporated into an overall view of the site structure, but first a few brief background comments are necessary to place things in perspective.

$Bn^{v}29$ is located on the Swannanoa River in Buncombe County. Artifacts are distributed over roughly three acres along a low alluvial terrace in a bend of the river. The site is stratified with a sparse Morrow Mountain component representing the earliest occupation. This zone is beneath an extensive Savannah River component in turn overlain by an equally extensive early ceramic, Swannanoa occupation. The Late Woodland, Pisgah component is represented in the plow zone and in the subsoil as postholes and features. There is no intact Pisgah midden except in a few shallow depressions and no living floors have survived the ravages of the plow. In addition to the Pisgah remains, there is also a small amount of earlier Swannanoa, Pigeon and Connestee materials in the plow zone (see Chapter II). In terms of the Pisgah component, a little less than half the site has been excavated.

The last feature described by Dickens in 1969 was Number 154. Today there are over 300 features, however, many of these facilities date to the Archaic and early ceramic occupations. In this section, the Pisgah features that have been excavated since 1969 will be described and some general functional categories discussed. Several additional structural patterns have also been isolated, and gaps in the various palisade lines have been filled. These will also be discussed and ultimately related to the distributional data from the plow zone in an effort to examine the total site structure as it is known at the present time.

Features

Feature 167. This feature consisted of a circular pit over three feet in diameter and a little over one foot deep located adjacent to the north wall of House G (Figure 8; Plate IX, X). It was almost completely filled with stones six inches in diameter and larger. The upper .4 foot contained potsherds and little or no charcoal, while the amount of charcoal increased markedly below the .4 foot level. The stones were removed in layers. After removing the fourth layer, a thin zone of yellow sand was encountered superimposed on a burned clay lining covering the bottom of the pit. Several large charred timber fragments were contained in the sand, and many of these were incompletely burned. Apparently, after the pit was dug the bottom was prepared with the clay and sand and a fire started. The stones

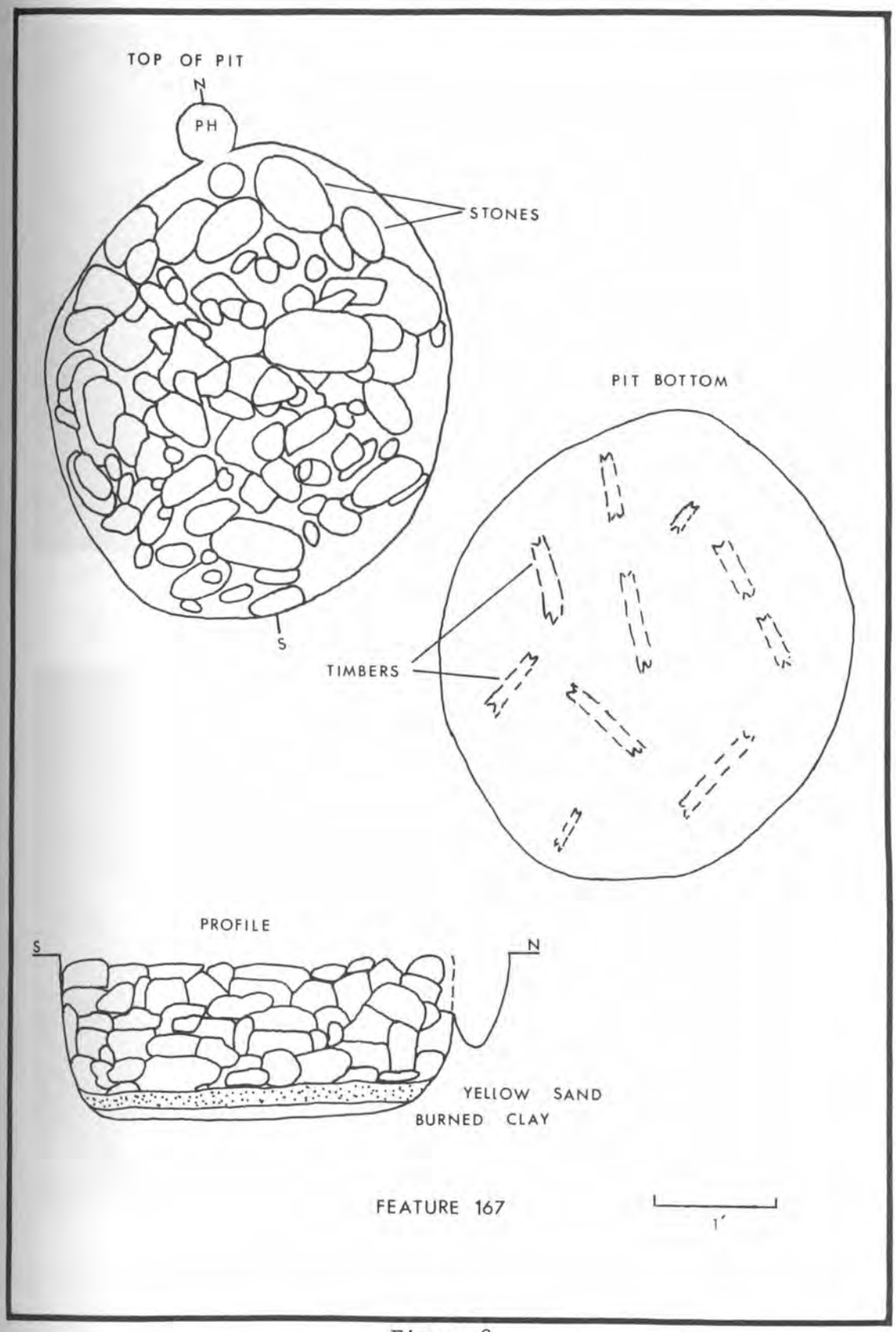

TOP OF PIT
N
PH
STONES
S
PIT BOTTOM
TIMBERS
PROFILE
S
N
YELLOW SAND
BURNED CLAY
FEATURE 167
1'

Figure 8

PLATE IX
Feature 167 at $Bn^{v}29$ at the Base
of the Plow Zone

PLATE X
Feature 167, Rock Layer at the
Bottom of the Pit

were then added to be heated. This feature was located adjacent to the north wall of House I. This structure was probably a hot house or winter lodge, and Feature 167 served as a hearth. There was no clay collared hearth typical of the other houses associated with this structure.

Three flakes and 83 sherds were found in the upper level of the feature, and except for a large quantity of charcoal, the lower portion was devoid of cultural material. The upper zone containing the artifacts probably represented an accumulation of village midden that had nothing to do with the primary function of Feature 167.

Feature 169. This designation was assigned to the center of the floor of House I. The feature consisted of a shallow depression some ten by seven feet that contained an old humus. The depression probably resulted from the repeated cleaning of the structure, as well as the trampling of the floor by its inhabitants. It was only .2 foot deep and contained 12 sherds and three flakes.

Feature 170. This feature represented a small irregular pit between the pair of entry trenches associated with House I. Its maximum length was three feet, and it measured some 1.4 feet across. The feature had an irregular bottom and probably served as a clay borrow pit. Since the fill was sterile, there is little more that can be added from a functional standpoint.

Feature 172. This was a small ovoid pit measuring 1.8 feet east-west and 1.4 feet north-south. It was .8 foot deep and contained charcoal fragments and 13 small animal bones. The feature probably represents a clay borrow pit that was filled with general village debris.

Feature 177. This feature was very similar to Feature 172. It had a generally ovoid outline and measured 2.2 feet by 1.9 feet. It also had an irregular, undulating bottom that was .8 foot deep at its maximum depth. The fill contained some charcoal and burned clay along with one potsherd. The feature was located just north of Palisade F, but was not associated with it. It probably also represents a clay borrow pit.

Feature 179. This number was assigned to the remains of a hearth centered in House L. The upper basin had been truncated by the plow, but a shallow depression almost 4.5 feet in diameter containing burned fill remained. The fill was sterile except for a clay pipe fragment. As is common at the site, a burial was present beneath the hearth.

Feature 189. This feature consisted of a small, roughly circular, pit some 1.5 feet in diameter and .8 foot deep. It contained a dark humic fill that produced 23 sherds, and four animal bone fragments. It was located near the hearth (Feature 179) in House L and may be associated with the structure. Its function as a borrow pit is suggested.

Feature 190. This feature was very similar to 189. It measured 1.9 feet by 1.5 feet and was .8 foot deep at its maximum depth. Unlike 189, however, the bottom was irregular. The fill produced 28 sherds and some charcoal fragments along with a clay pipe. Feature 190 was also located near the hearth in House L. This feature probably represents a hole that was dug while mining clay and was subsequently filled with debris from the structure.

Feature 194. This feature appeared as a vague, irregular depression in the northeast wall of House I. It measured some 5.2 feet by 3.4 feet, and its maximum depth was .75 foot; however, the bottom was extremely uneven. The fill contained 28 sherds, and this feature probably was also related to clay borrowing activities. It may or may not have been functionally articulated with the structure, although its location points to such a possibility.

Feature 196. This pit contained a relatively sterile, mottled yellow clay fill identical to that contained in burial pits. It was almost circular with a diameter averaging 3.5 feet. It was only .9 foot deep and located between Palisades G and H, just northeast of House I. Twelve sherds and two small unworked flakes were found in the fill. A burial where all the bone has been lost to decay is suggested due to the fact that it was filled immediately after excavation with the same clay and top soil that was originally excavated.

Feature 199. This ovoid pit measured 3.7 feet by 2.7 feet and had an irregular, stepped bottom that varied in depth from .5 foot to 1.3 feet. It contained a dark black humic fill that contained 30 potsherds. A borrow pit or perhaps the remnants of a tree stump is suggested. This feature was located in the relatively clear area north of Palisade F, between Houses I and M.

Feature 209. This feature was almost circular, measuring 3.6 feet by 3.1 feet and extended to a depth of 1.6 feet (Figure 9; Plate XI, XII). It contained black purplish fill that produced 473 sherds, 600 animal bone fragments, 9 chips, and 2 triangular projectile points, along with numerous pieces of charcoal. At least two corn cobs and a bone awl were also removed. A mass of clay was encountered near the bottom in the east-central area of the pit. The clay was a little over a foot in diameter and once it was removed, the black fill continued beneath it. Several fire-cracked rocks were embedded in the pit bottom. The feature was located a little over ten feet northeast of House M, almost equidistant between the structure and Palisade G. It is suggested that this feature functioned as a pit hearth that was later filled with refuse.

Feature 210. Like several of the other pits, this feature contained a mottled yellow clay fill similar to that normally associated with burials. It measured 2.4 feet by 1.7 feet and extended to a depth of 1.4 feet below the base of the plow zone.

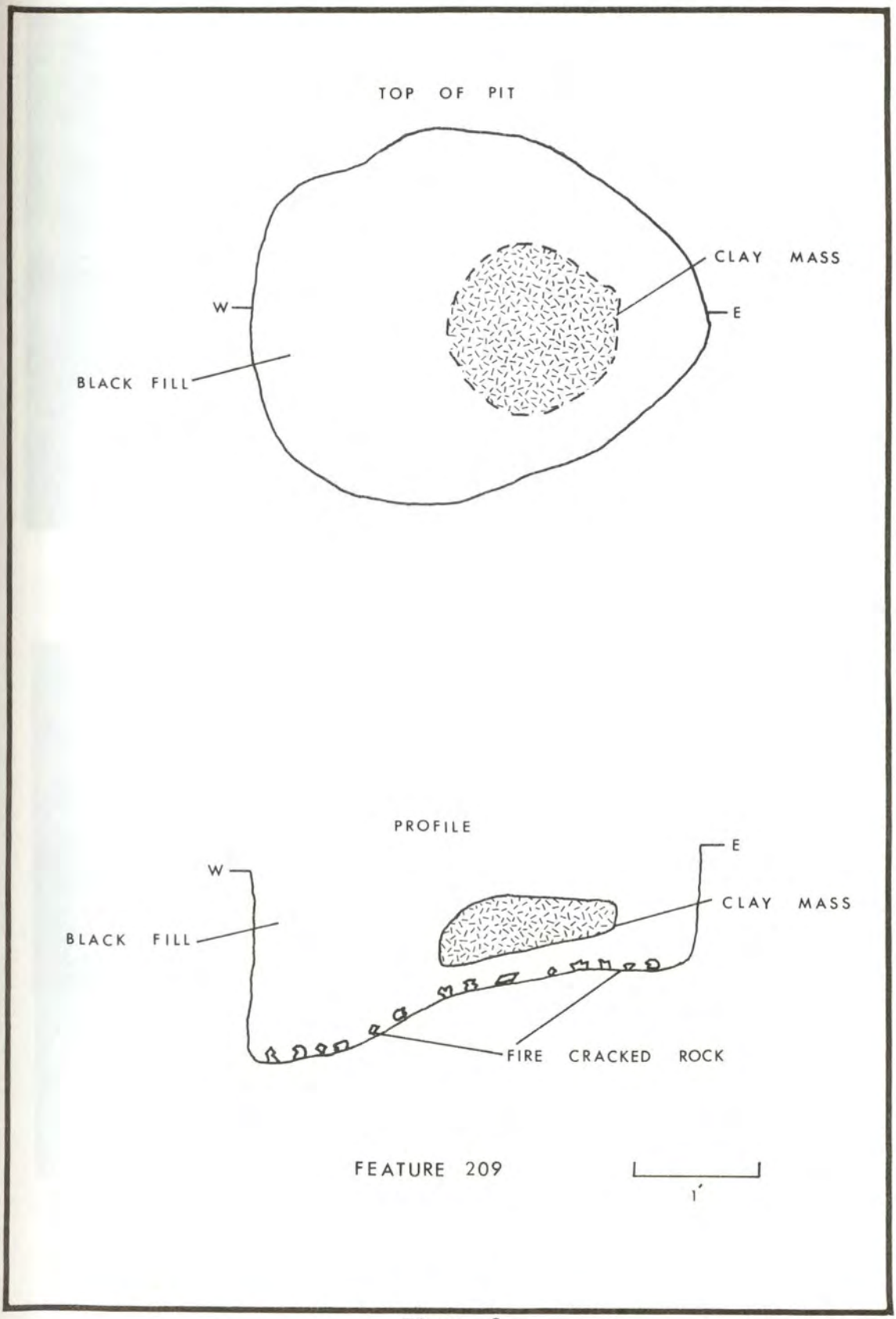

TOP OF PIT
CLAY MASS
W
E
BLACK FILL
PROFILE
E
W
CLAY MASS
BLACK FILL
FIRE CRACKED ROCK
FEATURE 209
1'

Figure 9

PLATE XI
Feature 209 at $Bn^{V}29$, Initial Excavation

PLATE XII
Feature 209, Excavated to Top of Clay Mass

Thirteen sherds and two chips were found in the fill from this feature. Although no human bone was recovered, the nature of the fill was such that a burial pit is indicated. The feature was located inside House M near the northwest wall, and it is possible that the pit was associated with this structure.

Feature 211. This feature was probably also associated with House M. It was circular, measuring 2.1 feet in diameter and extended to a depth of one foot. Unlike most of the other pits, the fill was stratified. It was observed at the base of the plow zone as a circular area of grey humus surrounded by a rim of mottled yellow clay. Once the grey soil was removed, the mottled yellow clay was continuous across the pit. This layer extended to a depth of roughly .5 foot below the surface where a purplish brown zone was encountered. This dark zone continued to the bottom of the pit. Seven sherds and one flake were recovered from the grey humus. The other strata were devoid of cultural materials. Based on the yellow fill, the fact that the grey humus could represent body cavity slump, and the possibility that the organic zone might have resulted from the decay of burial furniture, this pit too probably contained a burial at one time.

Feature 212. This was a well preserved clay hearth located in the center of House M. It consisted of a red clay collar surrounding a fairly deep U-shaped clay basin. It was ovoid in outline and measured some 2.4 feet by 2.1 feet. The basin was 1.6 feet deep and measured approximately 1.5 feet across. Its

blue-grey and brown ashy fill contained 23 sherds, 3 animal bone fragments, 3 unmodified flakes, and 1 projectile point. Unlike many of the hearths, Feature 212 did not have a burial pit beneath it.

Feature 213. This was a very complex feature composed of four distinct components, including three shallow basins with clay-lined bottoms incorporated within a large shallow refuse filled depression (Figure 10; Plate XIII, XIV). The basins contained a mottled yellow matrix that graded into a dark brownish-black fill in the depression. The entire unit was over ten feet long and eight feet wide. However, it was never more than .5 foot deep. The dark fill contained numerous specimens, including 788 sherds, 212 pieces of animal bone, 65 flakes, and 5 projectile points. Pottery discs, mica fragments, and charred wood and plant remains were also recovered along with two polished stone axes, a hammer-stone, and a clay figurine fragment. Palisade H ran through the center of the depression as an intrusion. This feature was the first in a series of enigmatic depressions along the length of Palisades G and H whose function is not entirely clear, but which may have served as roasting pits and were later filled with refuse dumped along the palisades (Plate XV).

Feature 215. This feature consisted of a large, almost circular depression 5.3 feet by 4.8 feet that extended to a depth of one foot below the plow zone. It was filled with a dark humic soil that produced a moderate amount of artifacts, including

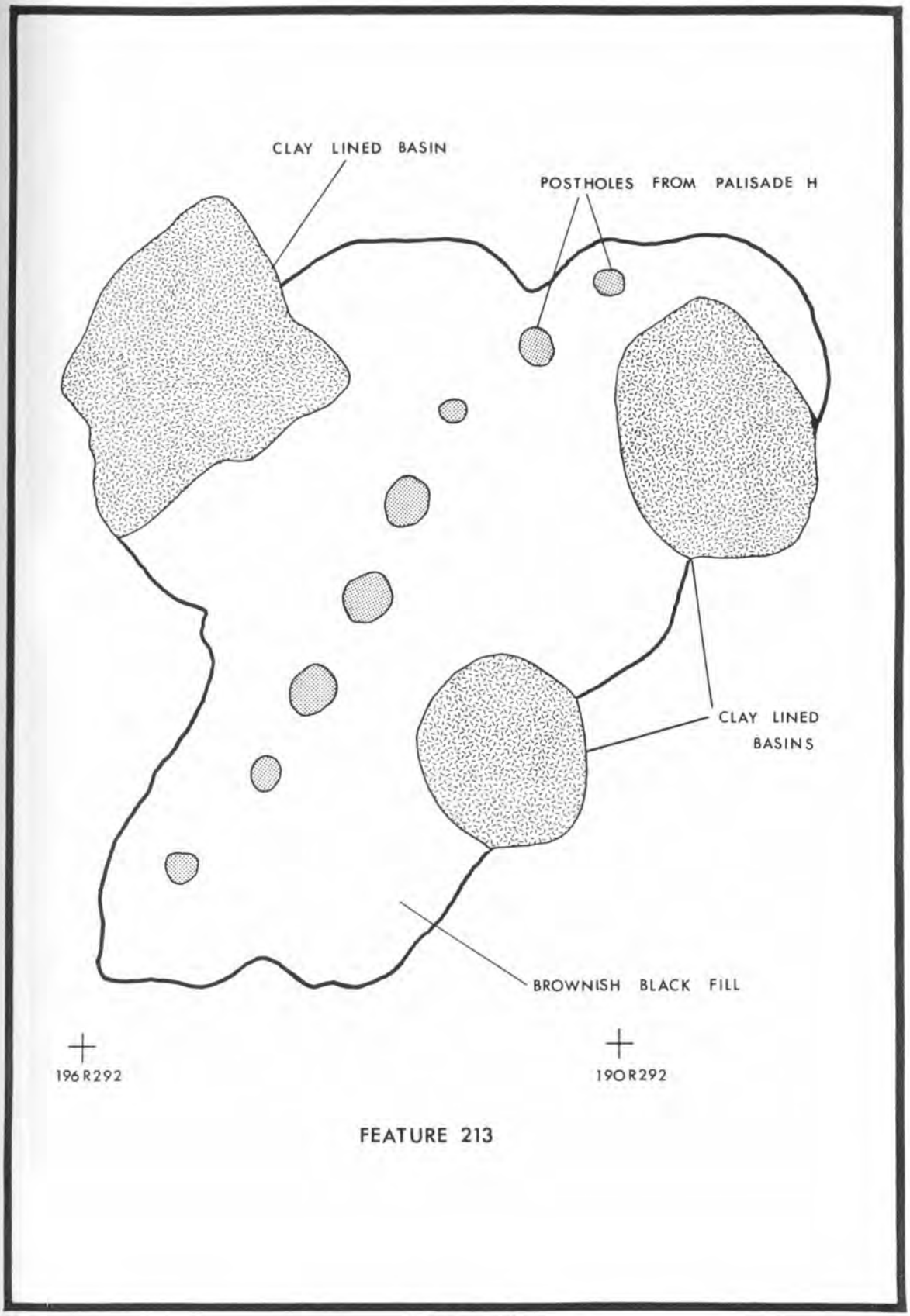

CLAY LINED BASIN
POSTHOLES FROM PALISADE H
CLAY LINED BASINS
BROWNISH BLACK FILL
196R292
190R292
FEATURE 213

Figure 10

PLATE XIII
Feature 213 at $Bn^{V}29$, Clay Lined Basin Excavated

PLATE XIV
Feature 213 Completely Excavated

PLATE XV
Large Features Between Palisades G and H at $Bn^{v}29$

79 sherds, 82 animal bone pieces, 14 chips, and 1 arrow point. In addition, a stone disc, three bifacially worked blade fragments, and numerous fragments of charcoal were also recovered. Several fist-sized stones were present in the bottom of the feature, and it is possible that it served as a pit hearth. The feature was earlier than Palisade H as several of the palisade postholes were excavated through it.

Feature 216. This roughly circular feature was located between Feature 213 and Feature 217, and it was part of Feature 219. It consisted of a basin-like depression approximately 3.5 feet in diameter and .5 foot in depth. The upper portion of the fill was almost black and contained most of the artifacts and a large clay lump. Beneath this layer was a brown zone that lay on top of an orangish-yellow clay lining along the bottom of the pit. It was very similar to the clay-lined areas found in Feature 217. Artifacts included 69 sherds, 94 animal bone fragments, and 15 random flakes. A clay bead and a bifacially worked knife were also recovered.

Feature 217. This unit was aligned in a northwest-southeast direction with Features 215, 216, and 213, and it lay between Palisades H and G. Artifacts included 64 sherds, 250 animal bone fragments, 4 flakes, a clay pipe, and miscellaneous carbonized plant materials. The latter were particularly prevalent in the upper layer of the fill which was composed of a dark organic layer that contained most of the specimens. It measured roughly five

feet by three feet and averaged about .5 foot in depth. Beneath the black zone was a grey lens overlying a tan charcoal mottled clay in some areas of the feature. Two separate clay-lined areas were noted in the southern and eastern edges of the feature. The stratigraphy of the eastern basin consisted of a purplish brown zone overlying a sandy brown soil that rested on top of a mottled clay lined bottom. The southern basin contained black fill overlying the bright clay lining. When the lining was removed, a thin dark band of soil was noted on top of the subsoil. This feature probably also functioned as a roasting pit.

Feature 219. This feature represented an extention of Feature 216 and consisted of an irregular depression that was intruded by Palisade H. It measured 7.5 feet by approximately 4.5 feet and was no more than .5 foot in depth. The top part of the feature consisted of a dark brown or black humic fill similar to that prevalent in the other large shallow roasting pits. This layer overlay an orange clay band in the east-central section that had several large stones resting on it. Charcoal was scattered throughout the fill and some of the rock was fire-cracked. Again, most of the artifacts were gleaned from the black fill. Included in the collection were 35 pot sherds, 3 flakes, and 1 projectile point.

Feature 222. Located near the center of House N was a badly disturbed hearth area. It was first observed as two red clay collared basin fragments that had been smeared together by plow

action. However, during excavation, a third basin was recognized adjacent to the eastern basin fragment. Except for this latter basin, the fill had been plowed out. It, however, contained a small amount of tan ashy soil but no artifacts.

Feature 227. This feature was first recognized in the bottom of the plow zone as a dark area of animal bone concentration. When the bone was removed, a mottled clay circular area 2.7 feet in diameter appeared. It was thought that this fill was indicative of a burial pit; however, it was only a thin smear overlying another thin lens of black fill that rested upon a compact yellow clay lining covering the pit bottom. The entire depth of the feature below the plow zone was only .3 foot. It is hard to guess the feature's function, but it could represent the remnant of a larger feature similar to Features 217 and 219.

Feature 228. This feature was represented by a small fragment of a red clay hearth collar that rested on top of a circular pit 3.3 feet in diameter. It was located between Palisades G and H and approximately mid-way between Houses N and K. The fill was a mottled yellow clay like that usually associated with burial pits. This fill, in conjunction with its association with the hearth fragment, led to the assumption that the feature was dug as a burial pit, although no human bone was found. Artifacts were also sparse and included only 27 sherds, 6 animal bone fragments, and 1 projectile point.

Feature 229. This unit was the most productive, complicated, and meticulously excavated feature at the Warren Wilson site. Approximately 400 man-hours spanning two summers were spent taking it out. It was located between Palisades G and H and just north of House N. The feature was intruded by Palisade G. It measured 13 feet by 6.3 feet and was almost a foot deep at its deepest point (Figure 11; Plate XVI, XVII, XVIII). It was first observed in the bottom of the plow zone as an area of heavy bone concentration.

It contained a convoluted stratigraphy that made taking it out very similar to a small scale mound excavation. A stratigraphic summary is as follows:

Zone 1 - This layer defined the surface of the feature. It consisted of a dark humic soil that was turgid with animal bone and large fitting potsherds.

Zone 2 - This zone was comprised of a reddish-brown mottled soil that was more compact than Zone 1. It contained a considerable amount of charcoal and burned bone but not much else. It was not as extensive as Zone 1.

Zone 3 - This was a tan clay containing a lot of ash and charcoal but little else. It was thickest in the western section of the feature and thinned out rapidly to the east and south.

Zone 4 - This layer represented a thin lens of brown humus that contained a lot of charcoal and animal bone and was present only under Zone 3.

Zone 5 - Zone 5 defined a bright yellow, almost sterile clay that rimmed the feature and covered most of the bottom.

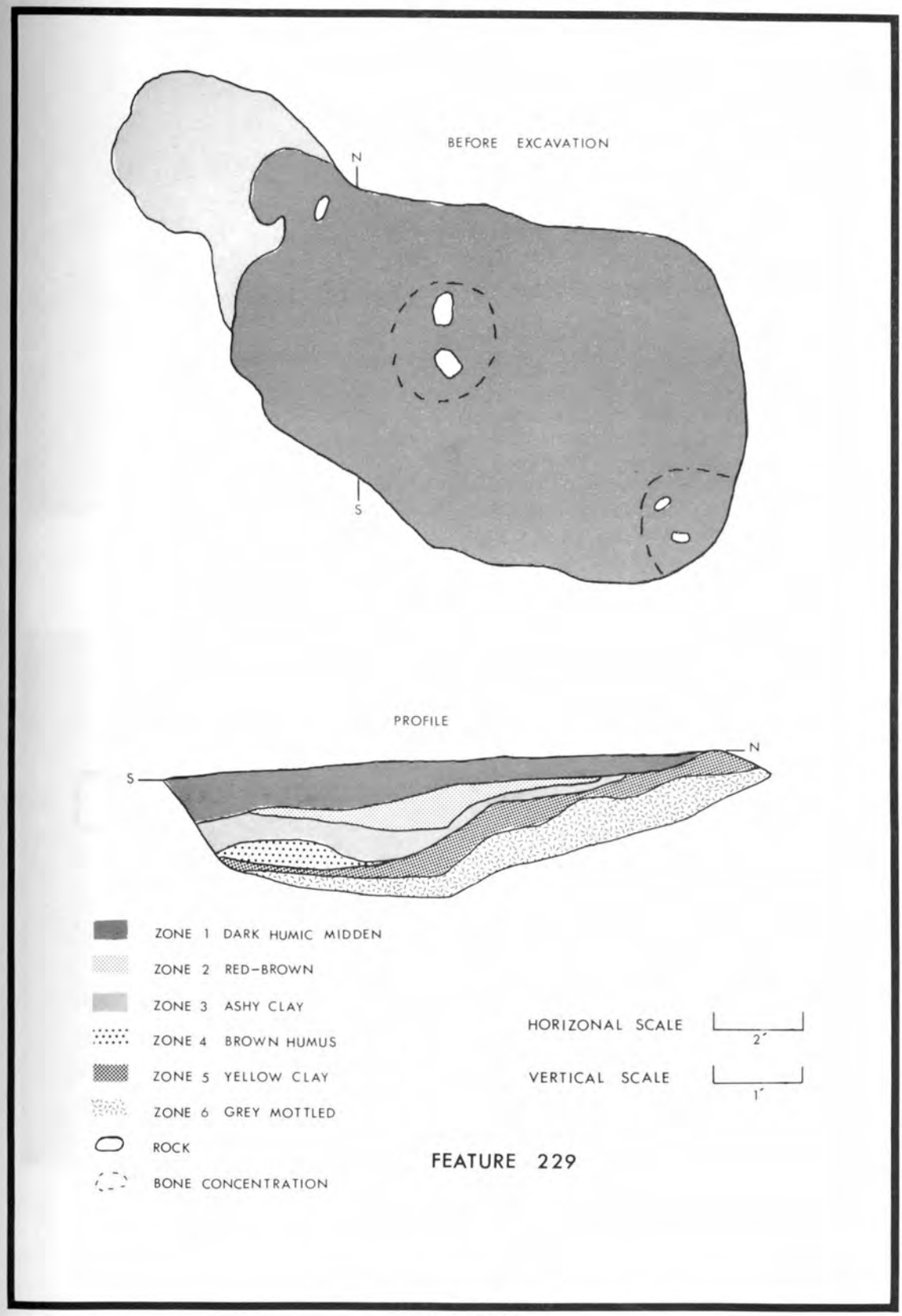

BEFORE EXCAVATION
N
S
PROFILE
S
N
ZONE 1 DARK HUMIC MIDDEN
ZONE 2 RED-BROWN
ZONE 3 ASHY CLAY
ZONE 4 BROWN HUMUS
ZONE 5 YELLOW CLAY
ZONE 6 GREY MOTTLED
ROCK
BONE CONCENTRATION
HORIZONAL SCALE
2'
VERTICAL SCALE
1'
FEATURE 229

Figure 11

PLATE XVI
Feature 229 at $Bn^{V}29$ at the Base of the Plow Zone

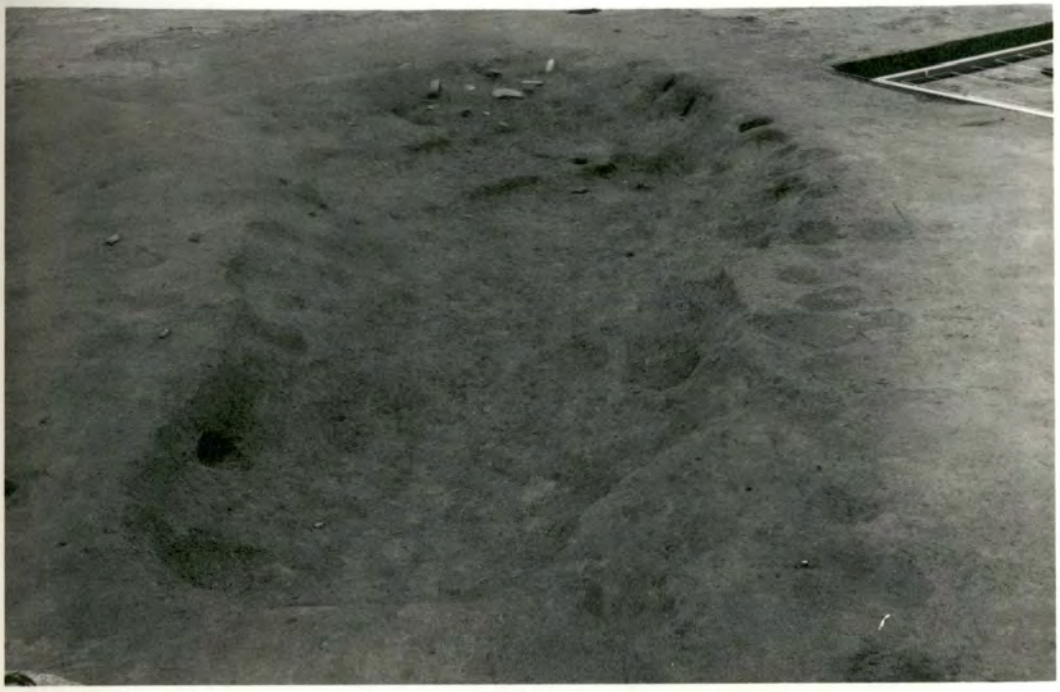


PLATE XVII
Feature 229, Completely Excavated

PLATE XVIII
Feature 229, Excavated to the R330 Profile

Zone 6 - This layer rested on the subsoil and was especially thick in the east central part of the depression. It was made up of a grey mottled soil with lens of ash and charcoal that was generally sterile, except in the thicker section which produced a great deal of well preserved animal bone.

Artifacts from the feature included 1,750 potsherds, well over 2,000 animal bone pieces, 40 flakes and 11 projectile points. In addition, there were numerous clay discs, grinding and hammerstones, fresh water mussel shell, one fragment of quahog shell, mica pieces, and a tremendous amount of charred plant material.

It is felt that Feature 229 also served a function similar to the other large depressions. However, in addition to serving as a roasting pit, it also appears to have been a dump site where the spoils from the other roasting pits and perhaps household hearths were deposited over a short, perhaps episodic, time span. The lensing and stratigraphy of the feature is not unlike that which would be expected from the ceremonial cleaning of the village during a Busk or similar ceremony (c.f. Haywood 1823:256).

Feature 230. This was a red clay collared hearth located near the center of House K. Only half of the feature was excavated as it extended into the north profile of the 200 line under several large trees. It was intact except for part of the collar that had been plowed off and was relocated to the south. The red clay basin contained black fill and lens of white and brown ashy clay. The part that was excavated measured 1.7 feet by 1.1 feet and was .3 foot thick. No artifacts were associated.

Feature 231. This feature was an ovoid clay-lined pit located just east of House K in the vicinity of three other clay-lined features. Its maximum diameter measured almost 2 feet, and it was .7 foot deep. The most striking characteristic of the feature was the fact that it was almost entirely lined with a layer of yellow clay less than .1 foot thick. It contained a dark organic fill that produced 3 sherds, 2 chips, and a pipe bowl fragment. The feature probably functioned as a storage receptacle that was emptied and later filled with top soil. Based on spatial proximity, it may have been associated with House K.

Feature 232. Located inside House K was another circular shallow clay-lined feature (Figure 12). It was 2 feet in diameter and only .3 foot deep. This feature also contained a dark brown fill that had only one sherd in it.

Feature 234. This clay-lined pit was located just southwest of Feature 231. It measured almost 2 feet in diameter and was a little over .5 foot deep. Its construction and composition was very similar to the other clay-lined basins in the vicinity of House K. The dark fill contained only two sherds, five small bone fragments, and one chip.

Feature 236. This was also a clay-lined feature located inside House K, southwest of Feature 232 (Figure 12; Plate XIX, XX). This pit, however, was more rectangular in outline than the others, measuring 2.6 feet by 1.8 feet. It was only .2 foot

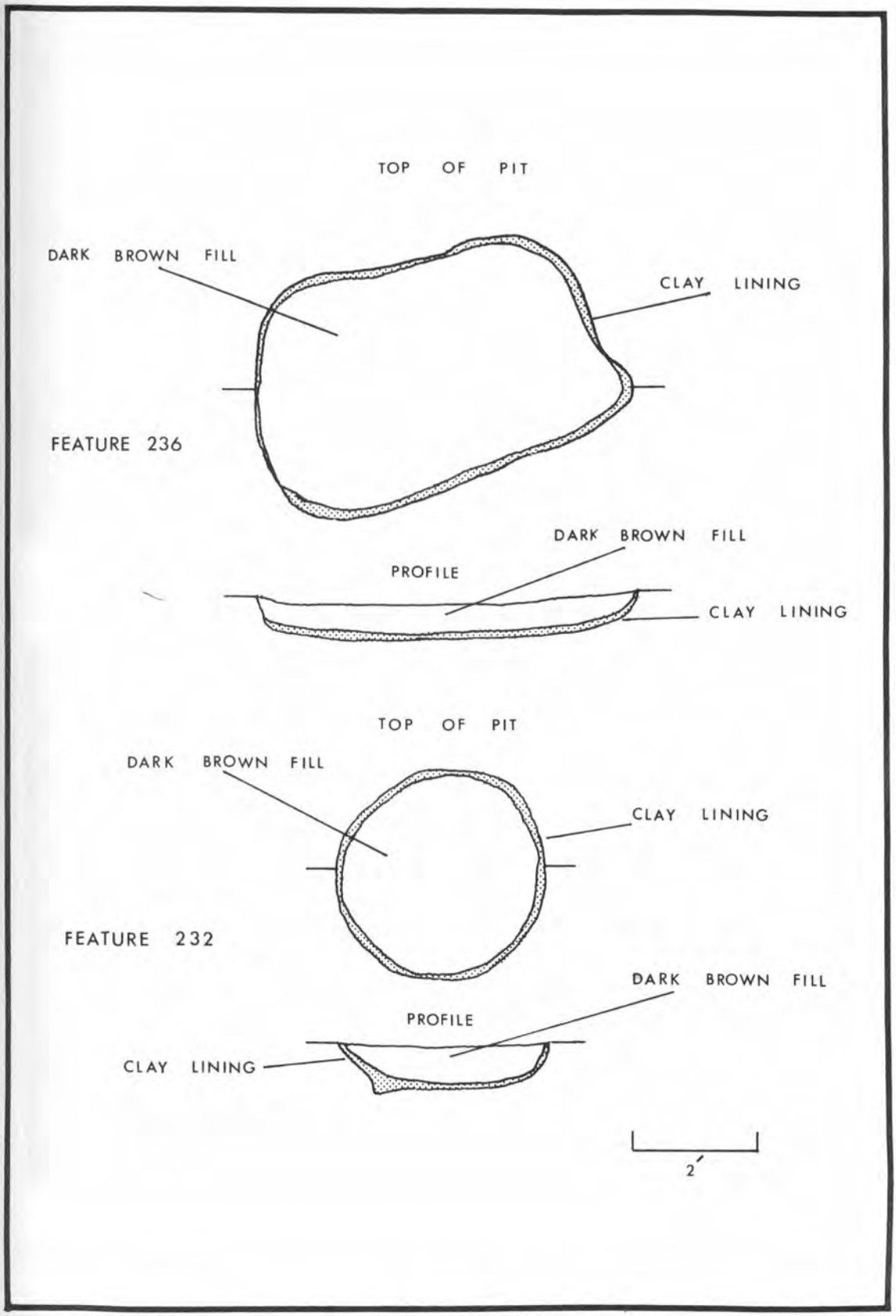

TOP OF PIT
DARK BROWN FILL
CLAY LINING
FEATURE 236
DARK BROWN FILL
PROFILE
CLAY LINING
TOP OF PIT
DARK BROWN FILL
CLAY LINING
FEATURE 232
DARK BROWN FILL
PROFILE
CLAY LINING
2'

Figure 12

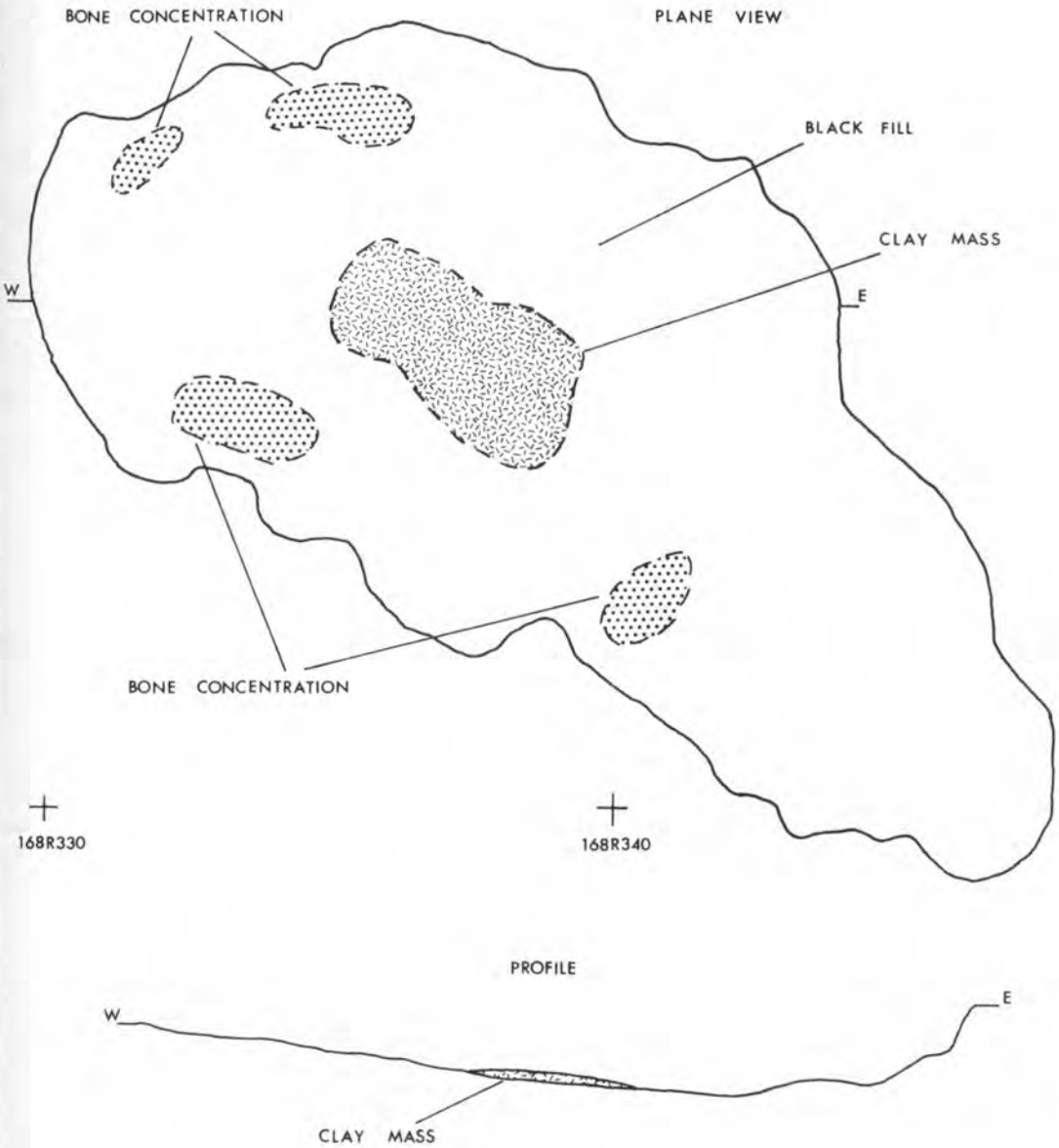
PLATE XIX
Feature 232 at $Bn^{V}29$ at the Base of the Plow Zone

PLATE XX
Feature 232, Completely Excavated

deep. The dark fill yielded only two sherds and five bone fragments. All the clay-lined features probably served as storage bins and could be associated with House K. Their shallow depth is somewhat misleading when the fact that at least one foot of the original surface has been plowed away, and today only the very bottoms remain.

Feature 244. This feature denoted another large shallow depression containing a fairly homogeneous greyish black fill with sherds and animal bone (Figure 13; Plate XXI). It measured a little over 20 feet long, 9.6 feet wide, and was almost parallel to Feature 229 on the opposite side of Palisade H. In addition to the sherds and bone, numerous fragments of fire-cracked rock and charcoal were scattered throughout the fill, although the material tended to be concentrated around a clay lump located in the approximate center of the depression. The lump measured a little over 2 feet wide, and .3 foot thick. This clay was identical to that in Zone 5 of Feature 229. Several pieces of daub and fired clay were also present in the fill that produced 1,400 sherds, 250 animal bone fragments, 49 flakes, and 9 projectile points. Other specimens included stone and clay discs, a bone awl, a hammerstone, and one large grinding stone. It is believed that this feature is similar to the other depression and functioned as a giant roasting pit.

Feature 246. This final feature was very similar to Feature 244, although it was located south of Palisade G, just east of House N. It measured 13.9 feet by 11.2 feet and was a foot deep



FEATURE 244

Figure 13

PLATE XXI
Feature 244 at $Bn^{V}29$, Completely Excavated

at its deepest point. The fill was a homogeneous dark brown firable soil that contained a great deal of ceramics and bone but not as much as Feature 244. It did, however, contain considerably more carbonized material. Several large fragments of fire-cracked rock were scattered throughout, and a concentration of stones averaging over .5 foot in diameter was found on the east central floor area. Inventoried remains included 597 sherds, 100 animal bone fragments, 20 flakes, and 5 projectile points. There were also a few clay and stone discs, some uncut mica sheets, and three grinding stones. Due to the large amounts of charcoal and fire-cracked rock, along with the large stones in the bottom of the depression, there is little doubt that this feature functioned as some kind of roasting facility.

Feature Categories

Based on all the work at Warren Wilson, there are six general categories of features defined by content, volume, and function. Of course, these criteria are interrelated, but function presumably plays the role of an independent variable and determines how large and what goes into the different facilities. To confuse matters in some cases, the same feature may have functioned in very different behavioral contexts. It is a well known fact that at many sites, storage pits were often cleaned of their curated contents and then used as garbage receptacles. This kind of functional variation is usually evident, but in some instances,

the contents from the last use of a facility may have obliterated the clues to its original function.

Different types of features also have different preservation potentials, again dictated to some degree by function but also by the form and construction of the feature. For example, a hearth used for roasting plant foods has a higher potential for producing ethnobotanical remains than does a borrow pit. However, if the hearth consists of a shallow puddled clay basin, the charred remains that may have fallen into it are more likely to be removed from their context by plowing or erosion than the remains that found their way into a deeper borrow pit.

There are many other cultural and natural variables that can intervene to confuse the functional interpretation of features, and although these problems were encountered at $Bn^{V}29$, there does appear to be six classes of features whose functions can be guessed at fairly accurately. These include borrow pits, storage pits, burials without human bone, clay hearths, pit hearths, and a somewhat confusing category tentatively identified as roasting pits (Table 2). This latter category which evidenced the most variability will be discussed first.

The roasting pits were typified by the large shallow depressions in the area of Palisades G and H and Feature 7 along Palisade D. As previously mentioned, these facilities were located around the edge of the village. All were probably not in use at the same time, and as new installations were constructed,

Table 2. The Warren Wilson Site
Feature Type Frequencies

Borrow Pits	Storage Pits	Burials Without Human Bone	Clay Hearths	Pit Hearths	Roasting Pits
3	136	47	1	54	7
4	137	53	87	57	37
5	231	196	140	86	213
6	232	210	147	107	216
8	234	211	152	108	217
55	236		154	143	219
170			179	144	229
172			212	146	244
177			222	167	246
189			228	209	
190			230	215	
194					
199					
Total 13	6	5	11	11	9

the old ones were filled with village debris. The filling was not uniform in intensity nor was it structured identically. Features 216, 217, and 219 were characterized by fairly homogeneous fill with only a moderate mixture of sherds, bone, and other refuse. Features 213, 244, and 246 also contained homogeneous fill, but it was characterized by a denser concentration of refuse (Table 3). Feature 229 was unique in that it contained a very convoluted, stratified fill that apparently reflected dumping episodes from various areas of the site over a short period of time. The fact that many of these units were partially lined with clay necessitated a considerable amount of clay mining that could explain the fairly high frequency of occurrence of the borrow pits.

The exact way these features were used is not known and perhaps unknowable. It is suspected that they were covered in some fashion and fires were kindled on top, while the foodstuffs to be roasted or baked were placed inside. Because most contained large numbers of fired and fire-cracked rock, heated stones were also placed on top or perhaps inside. Eventually, the covers collapsed and the charred contents inside were buried. In most cases, once the roasting pits were no longer in use, they were filled with village refuse. Separating this later fill from that resulting as a consequence of use was impossible and has made it extremely difficult to develop a clear picture of the features' function.

Table 3. The Warren Wilson Site
Feature Output--Roasting Pits

Feature Number	Primary Location	Ceramics	Bone	Lithics	Projectile Points
7	100R310	1135	1601	29	2
37	110R310	26	63	9	0
213	190R300	788	212	65	5
216	180R310	69	94	15	0
217	180R310	64	250	4	1
219	180R310	35	0	3	1
229	160R330	1750	2000	40	11
244	170R340	1400	250	49	9
246	140R350	597	100	20	5

A search of ethnohistoric literature failed to turn up any descriptions of similar food preparation facilities. The only account of baking or roasting that was remotely similar was an observation recorded by Adair while visiting the Creek.

> When they intend to bake great loaves, they make a strong blazing fire, with short dry split wood, on the hearth. When it is burnt down to coals, they carefully rake them off to each side, and sweep away the remaining ashes: then they put their well-kneeded broad loaf, first steeped in hot water, over the hearth, and an earthen bason above it, with the embers and coals a-top. This method of baking is a clean and efficacious as could possibly be done in any oven; when it is done they take it off, they wash the loaf in warm water, and it soon becomes firm, and very white (Adair 1775:407-408; quoted in Swanton 1946:356).

Archaeologically similar features have been frequently encountered at Sauratown. They have also been reported for the Late Woodland Cashie phase in the North Carolina Coastal Plain. This phase is thought to represent the remains of the proto-historic Tuscarora (Phelps, personal communication). Similar features, referred to as "hearth pits", were reported at the Crab Orchard site in southwest Virginia. This is a Late Woodland site of as yet undetermined cultural affiliation (Egloff and Reed 1980:130-147). Hopefully, additional excavations at $Bn^{V}29$, and the other areas will clarify the function of these strikingly large, rich features.

The pit hearth category was comprised of Features 54, 57, 86, 107, 108, 143, 144, 146, 167, 209, and 215 (Table 4). These installations were smaller than the roasting pits and had a more

Table 4. The Warren Wilson Site
Feature Output--Pit Hearths

Feature Number	Primary Location	Ceramics	Bone	Lithics	Projectile Points
54	100R320	116	6	33	1
57	100R330	1005	1594	61	3
86	130R280	218	2	33	3
107	140R240	208	19	7	1
108	140R250	235	21	11	1
143	140R220	294	15	30	1
144	200R290	7	0	4	0
146	50R280	976	400	46	7
167	170R220	83	0	3	0
209	170R300	473	600	9	2
215	190R290	79	82	14	1

circular shape. Fire-scarred stones were generally tightly compacted within the features, and there was good evidence that a fire was built on the floor of the pits prior to adding the stones. The association between one of these pits, Feature 167, and a somewhat unique structure has led to the speculation that they might have functioned to heat and steam sweat houses or winter quarters. Although the other representatives within this category could not definitely be tied to specific structures, postholes were present around all of them, and at least six were in close proximity to structures. Artifact densities varied somewhat, although most had moderately high outputs as a consequence of being filled with garbage after they no longer preformed their primary function.

The most frequently occurring class of features was borrow pits (Table 5). These features were variable in shape and size but were generally round to ovoid. They ranged from one to two feet in diameter and were rarely over a foot deep. The fill contained very little material, and they appeared to have been filled with top soil soon after they were dug. Although the house walls were evidently not plastered with daub (Dickens 1970: 158), there was considerable use of clay in constructing the hearths within the structures and in lining various features.

Puddled clay hearths were also frequently encountered (Table 6). When these had not been disturbed by the plow, they were well constructed and usually in the center of the houses.

Table 5. The Warren Wilson Site
Feature Output--Borrow Pits

Feature Number	Primary Location	Ceramics	Bone	Lithics	Projectile Points
3	120R310	27	3	19	0
4	110R310	30	12	19	3
5	120R310	13	35	11	0
6	110R310	9	3	14	1
8	120R270	18	0	2	0
55	120R320	21	0	16	1
170	170R230	0	0	0	0
172	190R250	1	13	0	0
177	160R250	1	0	0	0
189	180R270	23	4	0	0
190	180R260	28	0	0	0
194	190R270	28	0	0	0
199	160R260	30	0	0	1

Table 6. The Warren Wilson Site
Feature Output--Clay Hearths

Feature Number	Primary Location	Ceramics	Bone	Lithics	Projectile Points
1	120R280	0	6	2	0
87	130R240	0	0	0	0
140	200R240	0	0	0	0
147	90R290	0	0	0	0
152	110R350	0	0	0	0
154	140R220	0	0	0	0
179	180R270	0	0	0	0
212	150R290	22	3	3	1
222	150R320	0	0	0	0
228	170R330	27	6	0	1
230	190R330	0	0	0	0

Although a few were not associated with houses that were defined, e.g. Feature 212, it is still believed that structures were present. They were simply not visible to the archaeologist. Usually these hearths were made by digging out a shallow basin and then lining it with clay. The basin was next deepened by coiling a collar of clay around its periphery. Artifact outputs from these features were expectably low, since they were periodically cleaned and their contents dumped into a secondary context. The fill that did remain for the archaeologist consisted primarily of ash with flecks of charcoal and an occasional artifact.

There were only six features that were probably used primarily as storage facilities (Table 7). Although all appeared to have functioned as storage pits, there were two distinct subtypes in terms of form and artifact output. The first type was represented by only two units, Features 136 and 137. Both were almost circular, bell-shaped in profile, and measured approximately three feet in diameter. They were about two feet deep and only five feet apart. Feature 136 was filled with refuse after it was emptied, while Feature 137 contained refuse only in the upper zones. Potsherds from both features fit, however, suggesting garbage was disposed in each at the same time (Dickens 1970:184). These represent the only classic styled storage pits found at the site.

Table 7. The Warren Wilson Site
Feature Output--Storage Pits

Feature Number	Primary Location	Ceramics	Bone	Lithics	Projectile Points
136	70R310	502	1631	26	2
137	70R310	58	372	2	1
231	180R330	3	0	2	0
232	180R330	1	0	0	0
234	180R330	2	5	1	0
236	180R330	2	5	0	0

The remaining storage pits were more enigmatic. They were small, shallow, usually circular (although one was rectangular), and no more than 1.5 feet in diameter. All were located in close proximity to each other and apparently associated with House K. The fill was homogeneous and contained few artifacts. Their most striking characteristic was the fact that they were entirely lined with a thin layer of clay. The fact that they were so prepared suggests their use for storage, although their small size is atypical for such facilities.

The final feature class consisted of burial pits that were either unused or where the bone had decayed completely (Table 8). These features were usually ovoid or circular and from two to three feet in diameter. They were also usually about two feet deep and contained a mottled yellow clay fill that was virtually sterile. Sometimes old humus had collected in depressions at the tops of the pits. These depressions were created by slump filling the cavities left as the bodies decayed. This slump contained whatever village debris that was lying around on the surface at the time. Many of these pits were beneath hearths, and some contained a zone of organically stained soil at the bottom, resulting from the decay of the body and any wrappings or covers that might have been present.

Table 8. The Warren Wilson Site
Feature Output--Burials Without Human Bone

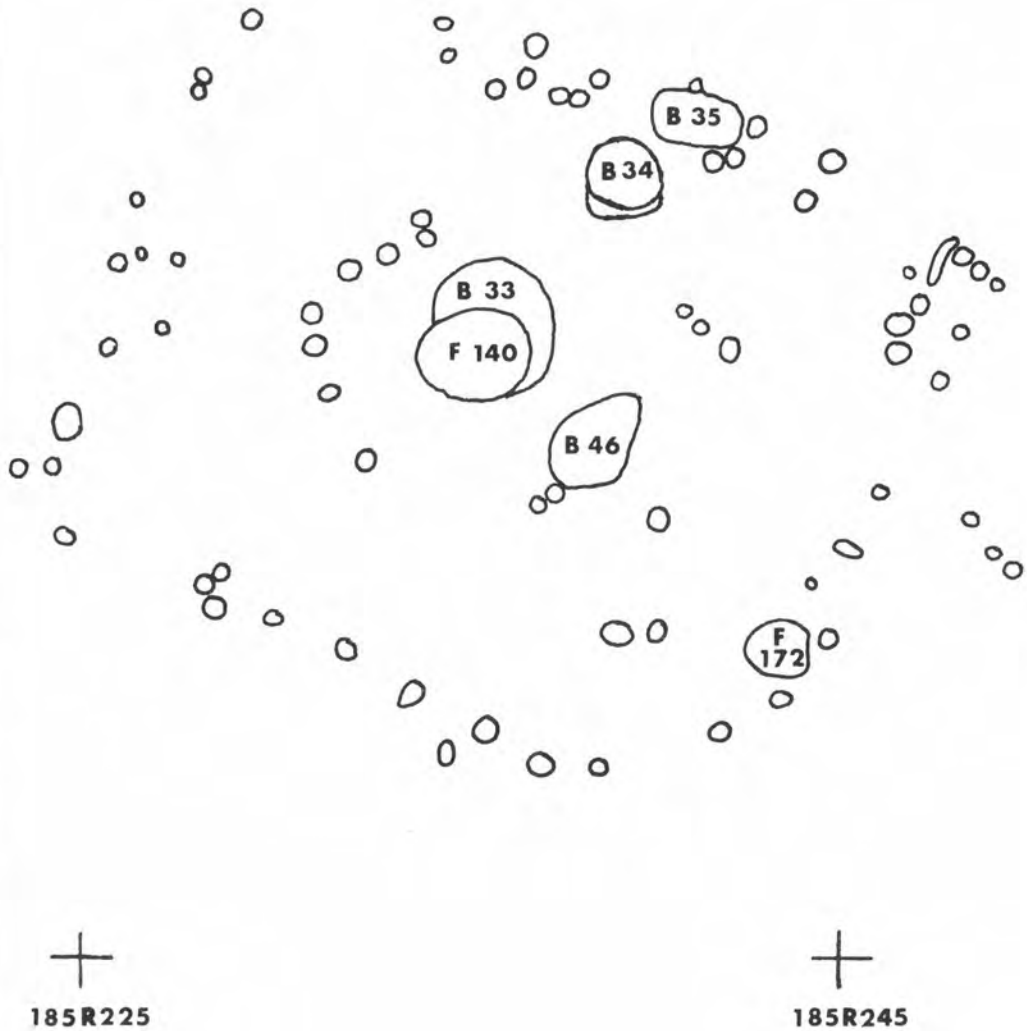
Feature Number	Primary Location	Ceramics	Bone	Lithics	Projectile Points
47	120R320	94	109	81	1
53	110R320	79	44	23	0
196	190R280	12	0	2	0
210	150R280	13	0	2	0
211	140R290	7	0	1	0

Houses

Since Dickens' work in 1970, there have been three new structures discovered, and three that were only suspected or partially uncovered at that time have now been completely excavated. Other patterns have been suspected due to the presence of hearth fragments or concentrations of postholes, but it has not been possible to define them because of root, rodent, and other natural disturbances, as well as intense aboriginal activity.

House H. Sections of three walls from House H were uncovered in 1968. Also discovered at this time was a clay hearth on top of a shaft and chamber burial (No. 33). Another shaft and chamber burial and a simple pit burial were located northeast of the hearth and burial complex. These latter burials (Nos. 34, 35) were infants, while the one under the hearth was that of an adult (Dickens 1970:154). The structure was completely excavated in 1970 and found to be aligned with Palisade G and centered in Square 200R240 (Figure 14). An additional burial (No. 46) and a borrow pit, Feature 172, were uncovered in the southeastern section of the house. The burial was a shaft and chamber type, but only two small fragments of bone were preserved in the chamber.

This house was rectangular with rounded corners and measured roughly 16 feet along the northeast axis and 20 feet northwest-southeast. Several large interior roof support posts were present, but there was no evidence of the distinctive Pisgah entry trenches.

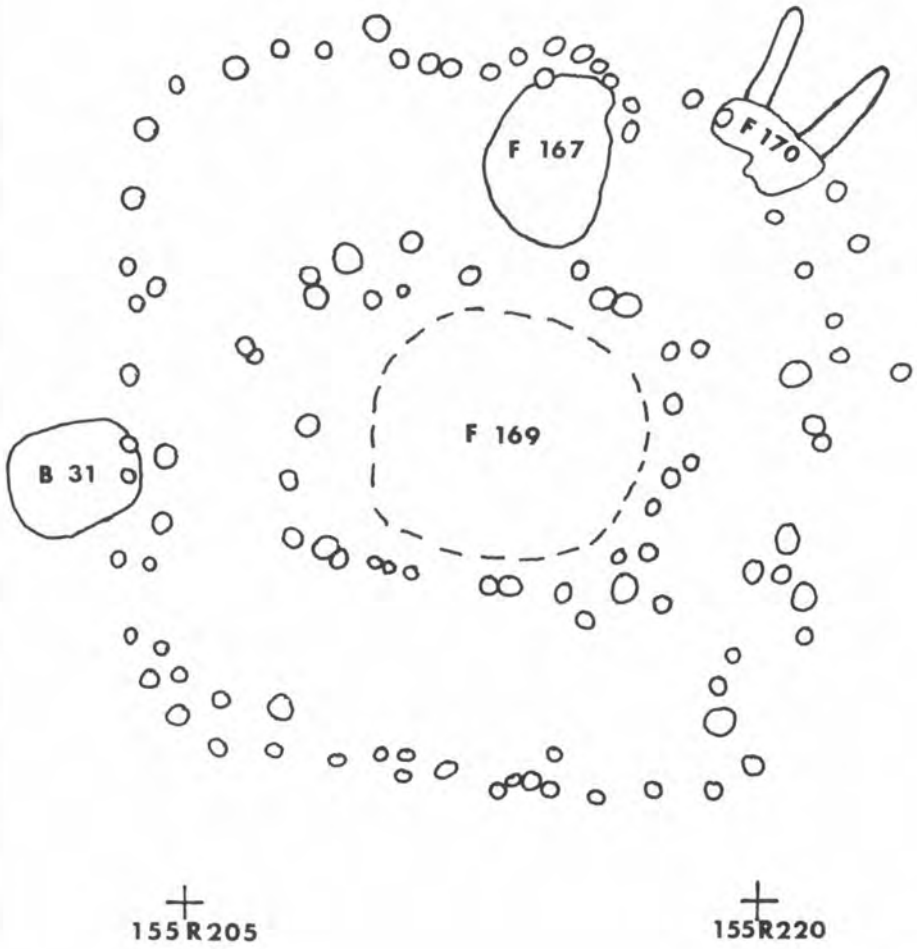


HOUSE H

Figure 14

There were, however, breaks in the postholes comprising the southeastern and southwestern walls that could very well have served as entrances. There was not much evidence for re-building along the walls, although the center roof support area did contain several postholes. The wall posts were spaced an average of one foot apart. They ranged from a little less than .5 foot to .8 foot in diameter, but the average diameter was around .5 foot. The depths of the posts were also variable. Some were as deep as .8 foot, but most were a little less than .5 foot. The center support posts were no deeper on the average than the wall posts. In general, this structure was not as well defined as some of the houses, e.g. C, B, M, but it was clearer than others, e.g. D, E, F, G, and did fit well into the rectangular wall post pattern characteristic of the site.

House I. This pattern was also partially uncovered in 1968 and was not completely excavated until 1970 (Figure 15). It was centered in Square 160R220. Nearly square in outline, it measured 17 feet by 18 feet and was oriented north-south. The wall posts were tightly spaced, usually less than a foot apart and almost formed a double line around the periphery. The center postholes were also numerous and fairly tightly compacted. The diameter of the posts averaged approximately .5 foot although there was some variation. Depth varied more with a range from .3 foot to well over a foot. The deeper posts were generally located around the center of the structure, but there was also considerable variation.

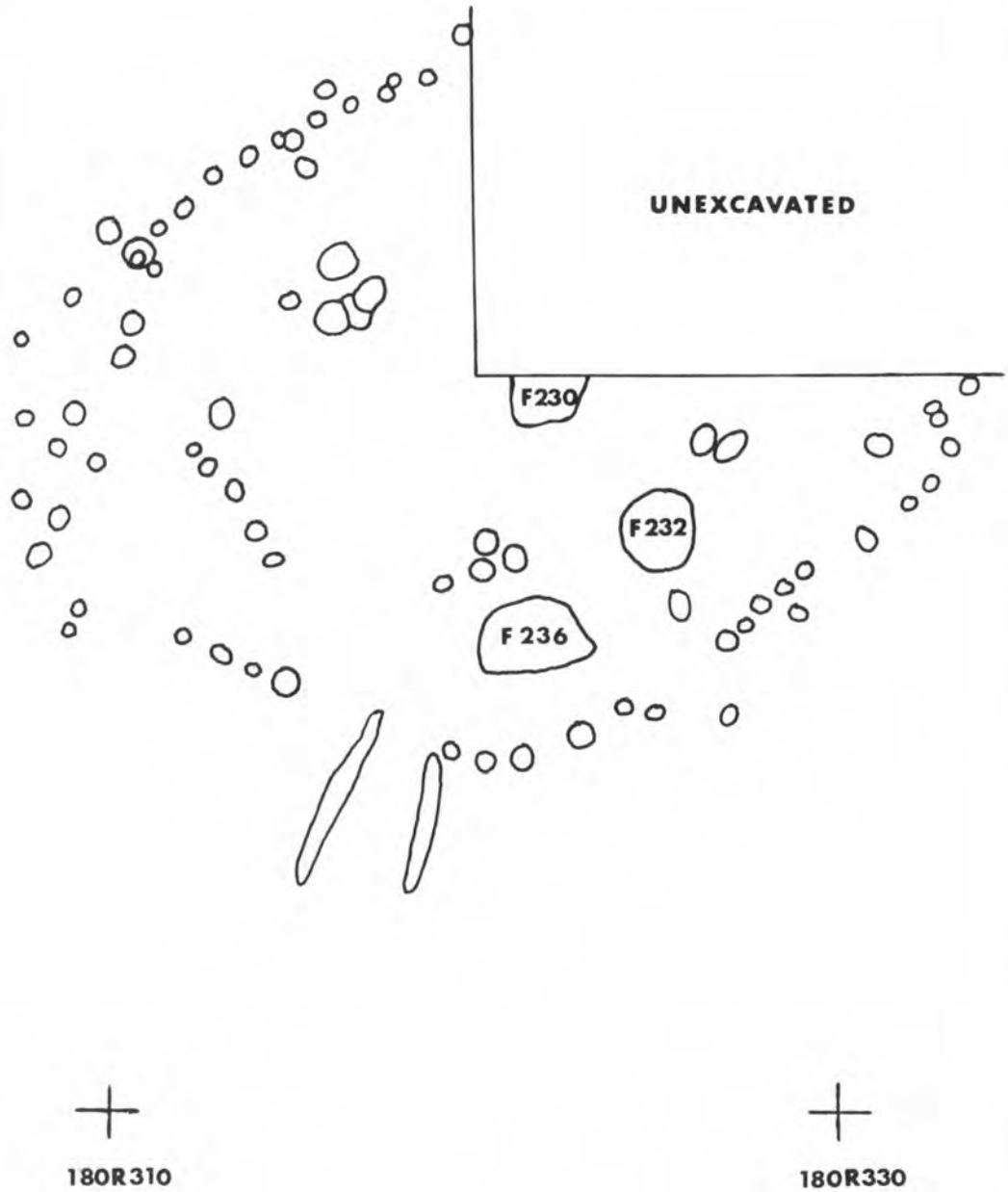


HOUSE I

Figure 15

A well defined set of wall trenches was located at the northeastern corner of the house. They were almost three feet in length and extended to a depth of .6 foot. They were devoid of any artifacts, but a small irregular pit, Feature 170, was excavated at the southwestern end of the trenches. In terms of the composition of the fill, it appeared to have been associated with the wall trenches. The center of the structure lacked a hearth, but it was marked by a saucer-like depression that resulted from repeated cleanings and compaction from trampling. This structure also contained the rock filled pit, Feature 167. There is some indication that it may have served as a hot house. The absence of a hearth in the center, although the old surface had not been plowed away, and the presence of Feature 167 with its heated stones tends to support this interpretation. The double line of tightly packed wall posts and its squatty appearance add further support for it serving as a hot house or winter lodge. Writing in 1765, Timberlake states that the Cherokee hot house ". . . is a little hut joined to the house in which a fire is continually kept, and the heat so great, that cloaths are not to be borne the coldest day in winter" (Timberlake 1927:61). Regrettably, no further details in terms of construction and size were given.

House K. A portion of the northwest wall of this house and some of the center support posts were uncovered in 1968, and in 1973 most of the remaining pattern was defined (Figure 16; Plate XXII). However, the complete structure could not be excavated because the



HOUSE K

Figure 16

PLATE XXII
House K at $Bn^{V}29$

northeast wall lay in squares that contained several large trees along an old fence line. It was centered in Square 190R300.

The postholes were variable in size and depth but were identical to those comprising the other structures. The wall posts and the central support posts were, however, somewhat spotty, and the southwestern corner was difficult to distinguish. Although the entire house was not excavated, it was rectangular in form and probably measured some 20 feet northeast-southwest by 18 feet northwest-southeast.

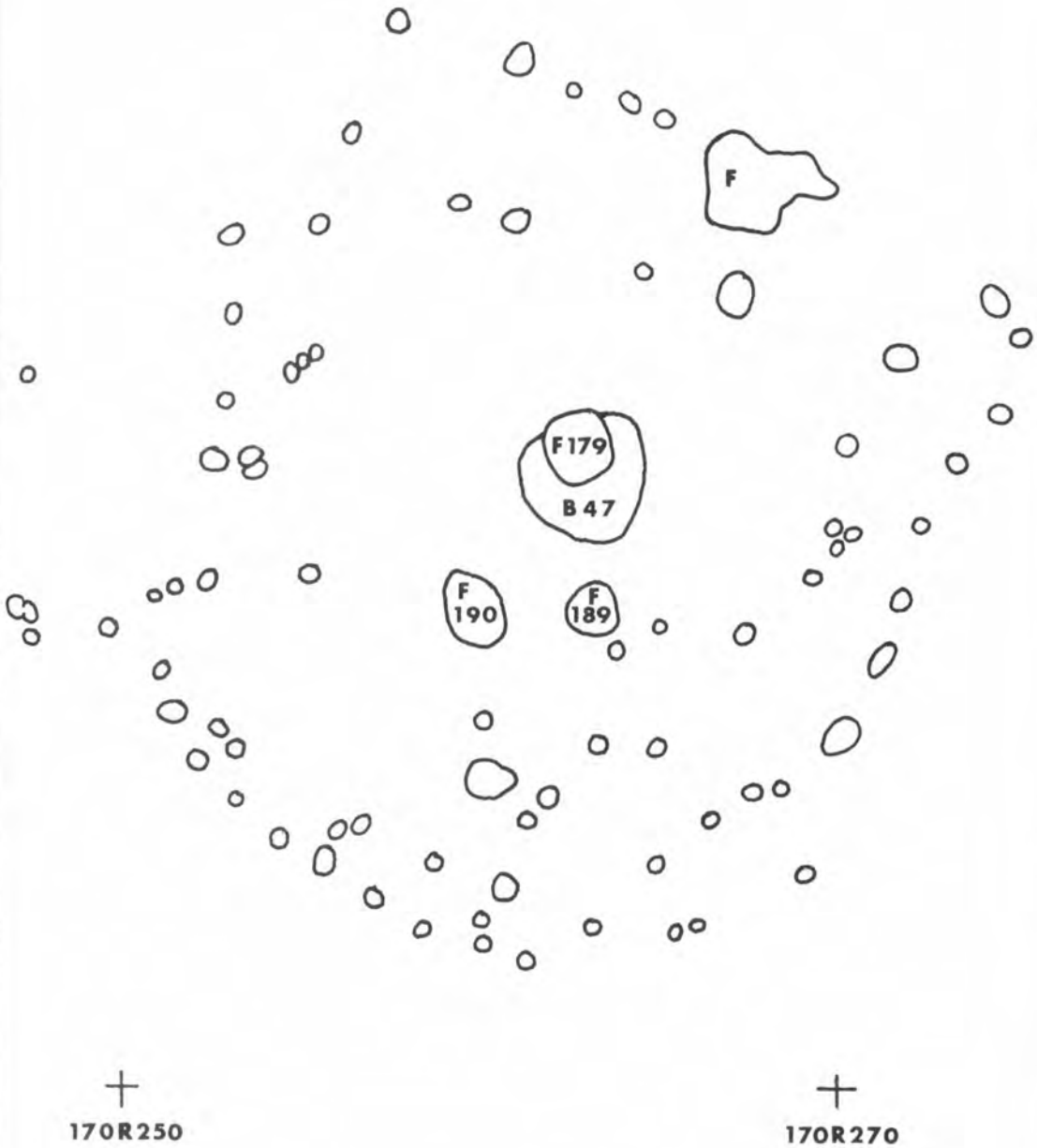
A pair of entry trenches were located at the southwest corner. They were almost two feet apart and of unequal length. The longer trench measured 4.3 feet while the shorter one was 3.7 feet long. Their depth also varied, with the longer trench being .5 foot deep and the shorter one averaging a little over .7 foot. A red clay collared hearth, Feature 230, was located in the center of the structure and extended into the north 210 profile. It was only partially excavated, but there was no evidence of a burial pit underneath. Two clay-lined pits, Features 232 and 236, were excavated along the southeastern wall, and two almost identical features were excavated just southeast of the wall. The four formed a rough square with the house wall cutting diagonally across.

The structure lay outside any currently defined palisade and represents the northernmost house to be excavated. Based on surface deposition from the adjacent field, this structure should be near the northern edge of the site.

House L. This house was aligned with House H and located some 10 feet southeast of it. It measured roughly 22 feet northeast-southwest. Although a little larger than House H, its overall configuration was very similar (Figure 17). The center support posts were not well defined, but a double line of wall posts suggests the structure was rebuilt at least once. The northwest, southwest, and southeast walls were well defined and the posts rather tightly spaced. In contrast, the northeast wall was comprised of posts spaced as much as two feet apart. There was also an opening in the northeast corner that might have served as an entryway in the absence of wall trenches.

The remains of a clay hearth, Feature 179, were located in the center of the house at 187R263. Beneath the hearth was Burial 47 that consisted of a shaft and chamber containing the remains of an adult female. Immediately southeast of the hearth was a small circular borrow pit, Feature 189, and located a little over one foot west of this feature was another similar pit, Feature 190. Both features could have functioned within the activity structure of the house. Another vague, irregular depression, Feature 194, was located in the northeast wall and may also have had something to do with the household activities.

House M. This house was uncovered in 1971 and excavated in 1972. It was generally well defined and formed a square approximately 20 feet on a side (Figure 18). It was oriented northeast-southwest like Houses A, H, and L and was in a northeast-southwest



HOUSE L

Figure 17

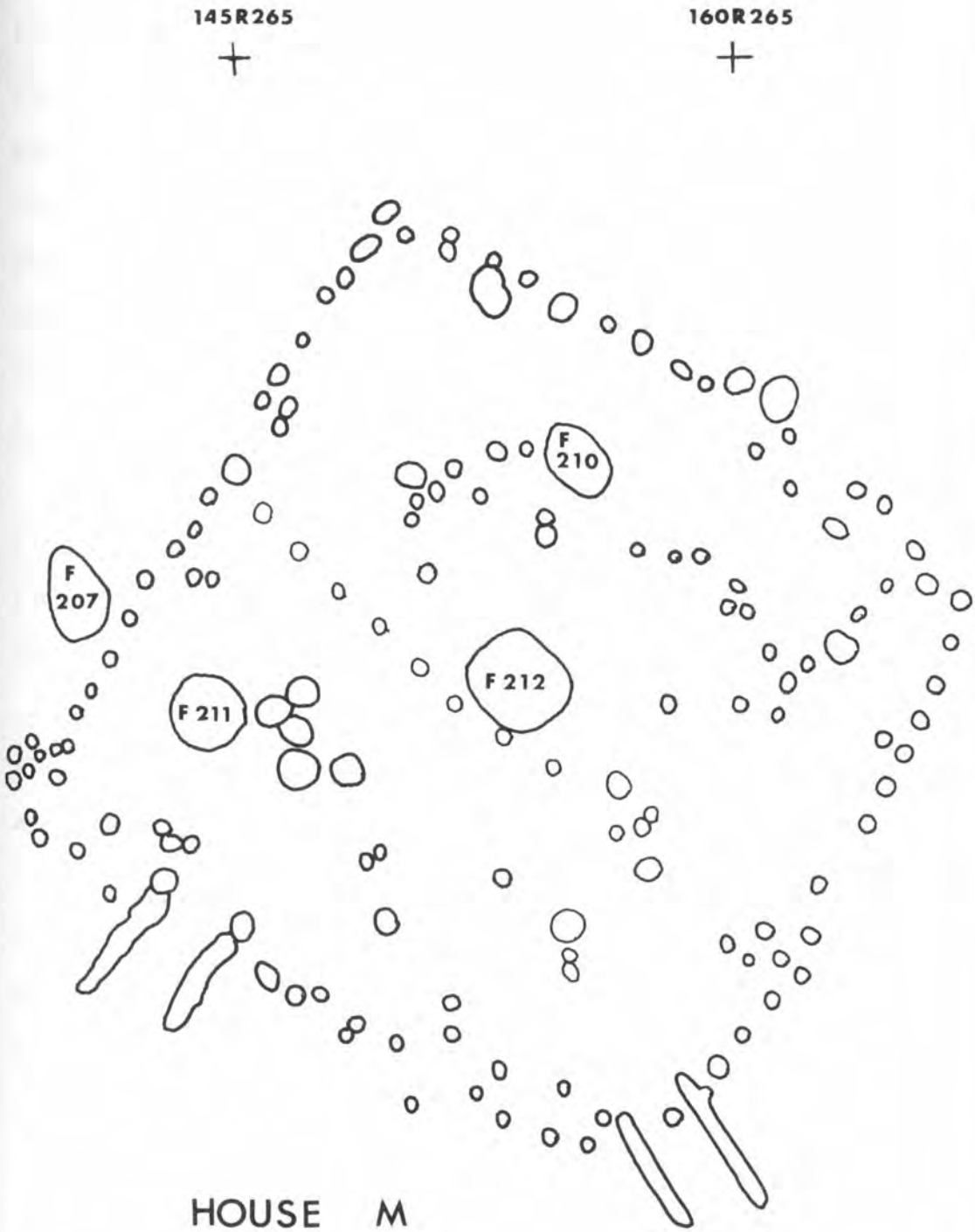


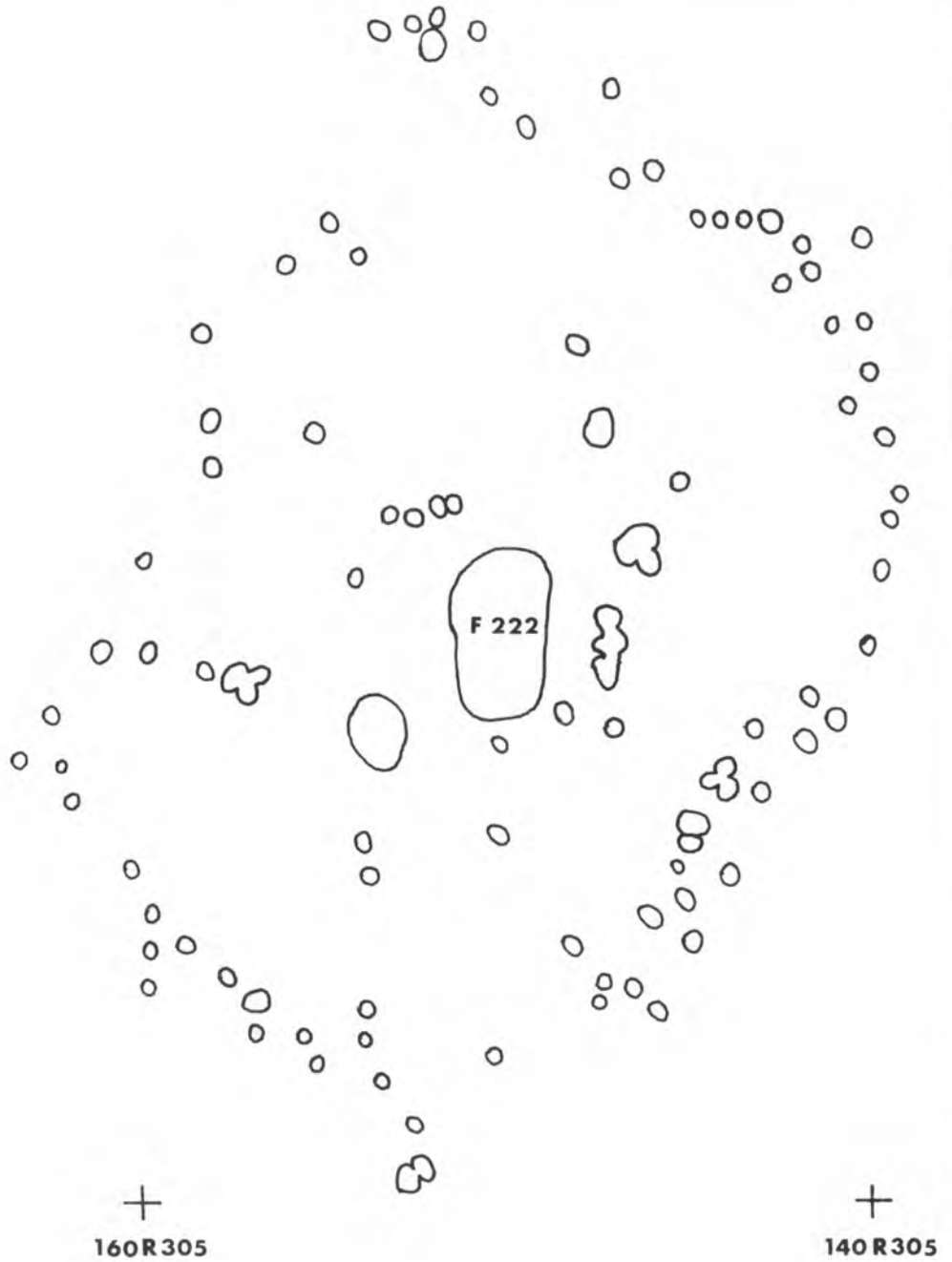
Figure 18

line with House A. The postholes were clear and ranged from a little over .3 foot in diameter to a foot. The wall postholes appeared somewhat deeper on an average than is typical and exhibited less variation. The center posts were well defined and averaged a foot in diameter and over a foot in depth. Lines of post running through the center of the house and across from the northwest corner suggest it was partitioned. The single line of wall posts and the general clarity of the structure indicate that it was not rebuilt or extensively repaired.

Two sets of entry trenches were present, one in the northeast corner and one off the east wall near the southeastern corner. The northeast pair were uneven with one trench measuring 4.3 feet and the other 3.4 feet. Both were approximately one foot wide and only .3 foot deep. The entry trenches off the east wall were roughly even with both measuring almost 3.5 feet in length. They averaged approximately .9 foot in width and were also .3 foot deep.

A well preserved collared clay hearth, Feature 212, was found in the center of the house at 155R285. However, there was no evidence of a burial pit beneath it. Two other roughly circular pits, Features 218 and 211, were located in the southwestern half of the house. Although no bone was preserved, both contained fill reminiscent of burials. A similar pit, Feature 207, was located just outside the southwest wall.

House N. This structure represents one of the more ephemeral outlines isolated at the site (Figure 19; Plate XXIII). The center portion was, however, well defined by a saucer-like depression



HOUSE N

Figure 19

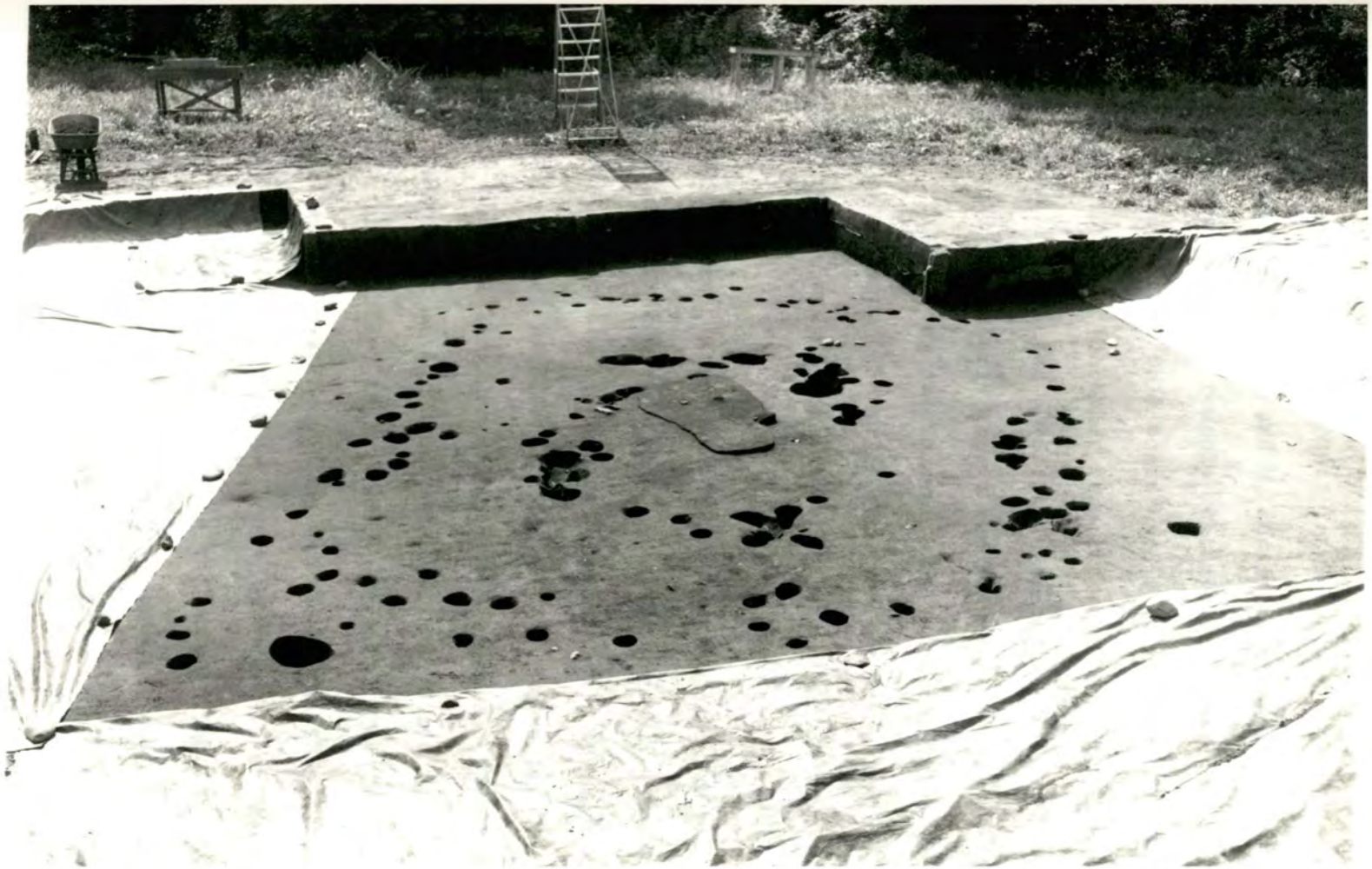


PLATE XXIII
House N at $Bn^{V}29$

around a clay hearth, Feature 222. It was oriented in the same direction as Houses A, H, L, and M, and appeared to be aligned with Palisade G. The house was roughly rectangular, measuring some 22 feet by 18 feet. The wall posts were similar in size and depth to those described for the other structures. The center support posts were usually at least a foot in diameter and over a foot deep. They were spaced irregularly around the central floor and evidenced quite a bit of clustering due to superimposition resulting from repair and replacement. The walls also reflected repairs and rebuilding, particularly along the southeastern and southwestern sides.

The only feature within the structure was the hearth which was plow smeared and centered at 150R320. It was somewhat anomalous in that three distinct basin areas were identified during excavation. These probably reflect rebuilding with only one being in operation at any given time. A large roasting pit, Feature 246, was located immediately southeast of the house, and Palisade G and Feature 229 were adjacent and parallel to the northeast wall. The latter feature contained the most fecund deposit of refuse thus far discovered on the site. It is not known, however, if or how these features articulated behaviorally with the house. The fact that they were in close physical proximity and did not overlap suggests the possibility that activities associated with each were interrelated.

The Palisades

No new palisades have been discovered since 1968; however, many gaps have been filled, particularly in the northern Palisades, G and H. Both extended diagonally across the site in a northwest to southeast direction, and although the current maps do not cover this area, these palisades, as suspected by Dickens (1970:164), were discovered to connect with I and J at approximately 120R370. So, in effect, continued excavations have reduced the total number of palisades by two. A possible bastion was isolated just south of the entrance to House K. Although its configuration is confusing because of the impossibility of separating overlapping posthole patterns, it appears that some form of roughly circular construction was part of both the palisades at this point.

The series of large depressions, Features 213, 215, 216, 219, and 244, that possibly functioned as roasting pits were located immediately north of Palisade G and intruded by Palisade H. The large trash filled unit, Feature 229, was intruded by Palisade G. Although they were not all in use at the same time, these features are probably roughly contemporaneous and pre-date the construction of both palisades. Like the palisades, they were located around the periphery of the village, and after they were no longer in use, provided convenient trash receptacles and kept the garbage out of the interior of the village.

Based on the relative alignments of Palisades G and H, they appear to represent a double wall surrounding the village (Plate XXIV). This assumption rests primarily on the fact that

PLATE XXIV
Palisades G and H at $Bn^{V}29$, Feature 229 in the Process of Excavation

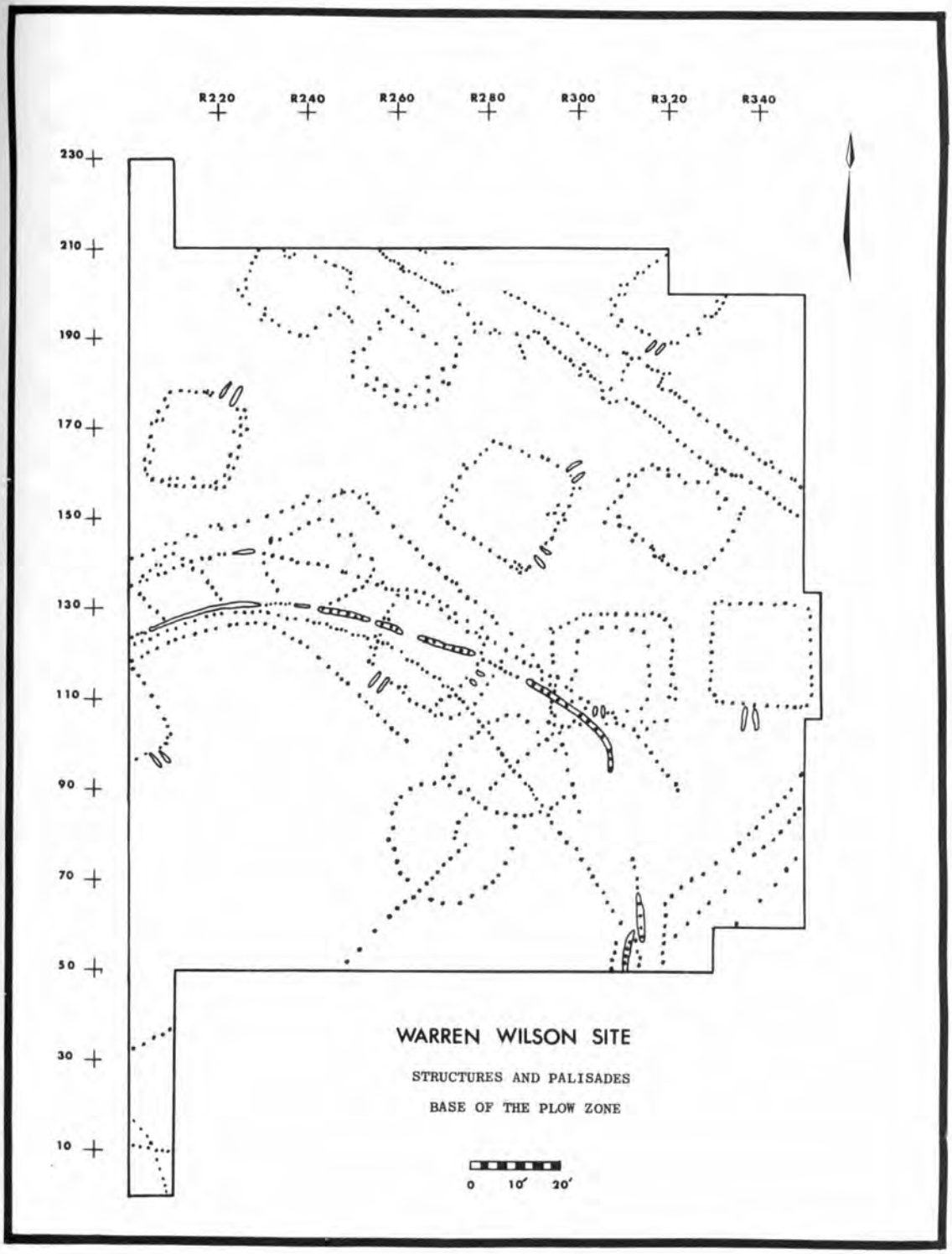
for their entire length, some 300 feet, they remain parallel, spaced approximately six feet apart. It is hard to imagine how the construction of one palisade without the knowledge of the other could have proceeded without some overlapping. This contemporaneity is also supported by the fact that the postholes comprising the bastion intermingled with those of both palisades, indicating its construction was shared by the two lines. The final supporting evidence for the double line comes from the postholes themselves. The fill from posts in both palisades was identical, and both lines were visible with equally sharp resolution. There are some ethnohistoric accounts of double palisades in the Southeast. One of the earliest and clearest comes from the Desoto narratives and describes the wall around a town supposedly located in Alabama. This description also mentions a bastion being associated with the palisades (Swanton 1946:434).

Although it is currently not possible to make an accurate estimate of the total area enclosed by the double palisade, it was probably in the neighborhood of 50,000 square feet. This estimate is based on the fact that there have been almost 25,000 square feet excavated within the double palisade enclosure. The surface deposit indicated that there are at least another 75,000 square feet of site that have not been excavated, and based on the configuration of the palisades, approximately a third of this area should fall within the double line. This figure also conforms with Dickens' estimate that within Palisade E there were roughly 30,000 square feet (Dickens 1970:165).

The palisade alignments clearly point to two broad bands of occupation and perhaps a third beyond House K (Figure 20). All of the structures within the inner palisade lines were later than the palisades (Dickens 1970:164), but their exact temporal relationships to the outer band of structures surrounded by Palisades G and H is not clear. Although there were no clear structural outlines within the inner palisades, there were numerous postholes hinting that structures surrounded by the inner palisades were present (Dickens 1970: Figure 13). However, based on artifact and feature distributions, this area was never intensively occupied and probably served primarily as a plaza. There is the possibility that all the structures within Palisades G and H were roughly contemporaneous and represent a relatively short occupational span. More will be said concerning this interpretation later.

Houses, Features, and Palisades: Intra-site Relationships

The houses uncovered since 1968 continue to reinforce the basic patterns defined then. All were roughly rectangular to square and averaged a little less than 20 feet on a side. Except for House I, all contained evidence for a central hearth basin surrounded by a puddled clay collar. Entry trenches were present in three of the six structures, the same ratio as in 1968. Central roof supports were detected in all instances; however, irregularities were universally present due to repair and vagaries in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WARREN WILSON SITE
STRUCTURES AND PALISADES
BASE OF THE PLOW ZONE
0 10' 20'

Figure 20

interpreting the sometimes confusing excavation surface.

Rebuilding and sometimes fuzzy resolution are problems that have always been present at the site, but some areas have been harder to read than others because of variations in erosion, soil conditions, and general occupational intensity. The northeastern quadrant has been the most difficult to interpret and certainly has lacked the clarity of the southern and western sections that were first excavated. Work during the summers of 1978 and 1979 in the southern and northeastern section of the site (not included in the current study) clearly demonstrated the varying sub-plow zone surface conditions. The southern area was much easier to interpret, and examing the photographic records from previous field seasons, these same conditions prevailed over the years.

Even with these difficulties, two distinct structural configurations are obvious. Houses such as C, B, and M had straighter walls, sharper corners, and were generally better defined, perhaps indicating a greater durability and longer periods of occupation without extensive repair and re-building (Figure 20, 21). In contrast, structures such as F, G, H, L, K, and N were more rounded, sometimes exhibiting only vague wall outlines, and overall were more ephemeral and usually evidenced extensive re-building. At any rate, neither type of structure resembles the Cherokee houses described by Timberlake, who observed waddle and daub buildings, sometimes two stories high, that measured 60 feet by 16 feet (Timberlake 1927:84).

The differences between the houses were noted early in the work at the site, and it has been suggested that they might reflect temporal distinctions (Dickens 1970:158). Based on the results of excavations through 1969, Dickens felt that the site initially covered no more than a half an acre and was enlarged seven times as indicated by the concentric ring of palisades (Dickens 1978:127). If, as Dickens suggested, there were temporal differences between the two types of houses and the site was expanding through time, it would be expected that one form would be more characteristic of the periphery, while the other would be restricted to the interior portion. But both types of structures were found in all areas of occupation. Houses F and G (the rounded type), as well as A and B (the rectangular type), were also all intruded by the inner Palisades C, D, and E. Although Houses A and M (both rectangular) were oriented along the same axis, House M was also aligned with Houses H, L, and N (all rounded). On the other hand, Houses B and C, which were very similar in construction to A and M, were aligned on a north-south axis, almost 45 degrees off the orientation of Houses A and M and most other structures. If alignment of structures was indicative of some kind of overall plan, it could be concluded that Houses B and C were temporally distinct from the remaining structures in the village.

Dickens' statement that Houses A, B, D, F, and G all overlay one or more of the inner palisades is generally correct, but a close scrutiny of the field records and excavation photographs

clearly shows that the hearth, Feature 1, in House A was intruded by the postholes and wall trench of Palisade D. This palisade also intruded Feature 7 which, in turn, was intruded by House B. Obviously, House A was constructed before Palisade D and House B. Although temporally distinct, both structures were of the same basic style.

It is now believed that the site area was not necessarily expanding through time. It is possible that the village assumed its basic configuration and size at or near the beginning of its history. Obviously, there were internal changes, and all the structures, features, and palisades visible today were not in use at the same time. Nonetheless, they may have been roughly contemporary and reflect a relatively restricted occupational span of perhaps no more than 50 years. This estimate, of course, is highly speculative, but given the site plan and the fact that the life span of wooden post and thatch structures would be fairly short, it does not seem entirely unreasonable.

Regardless of the exact sequence of constructions, a different plan of internal spatial organization is now proposed. First it is suggested that the inner palisades were not constructed as protective walls surrounding the village but rather to provide enclosures around an area that was reserved for various ceremonial and socio-political activities. This area would have been similar to the "square ground" described ethnohistorically for the Cherokee and other Southeastern groups (Swanton 1946).

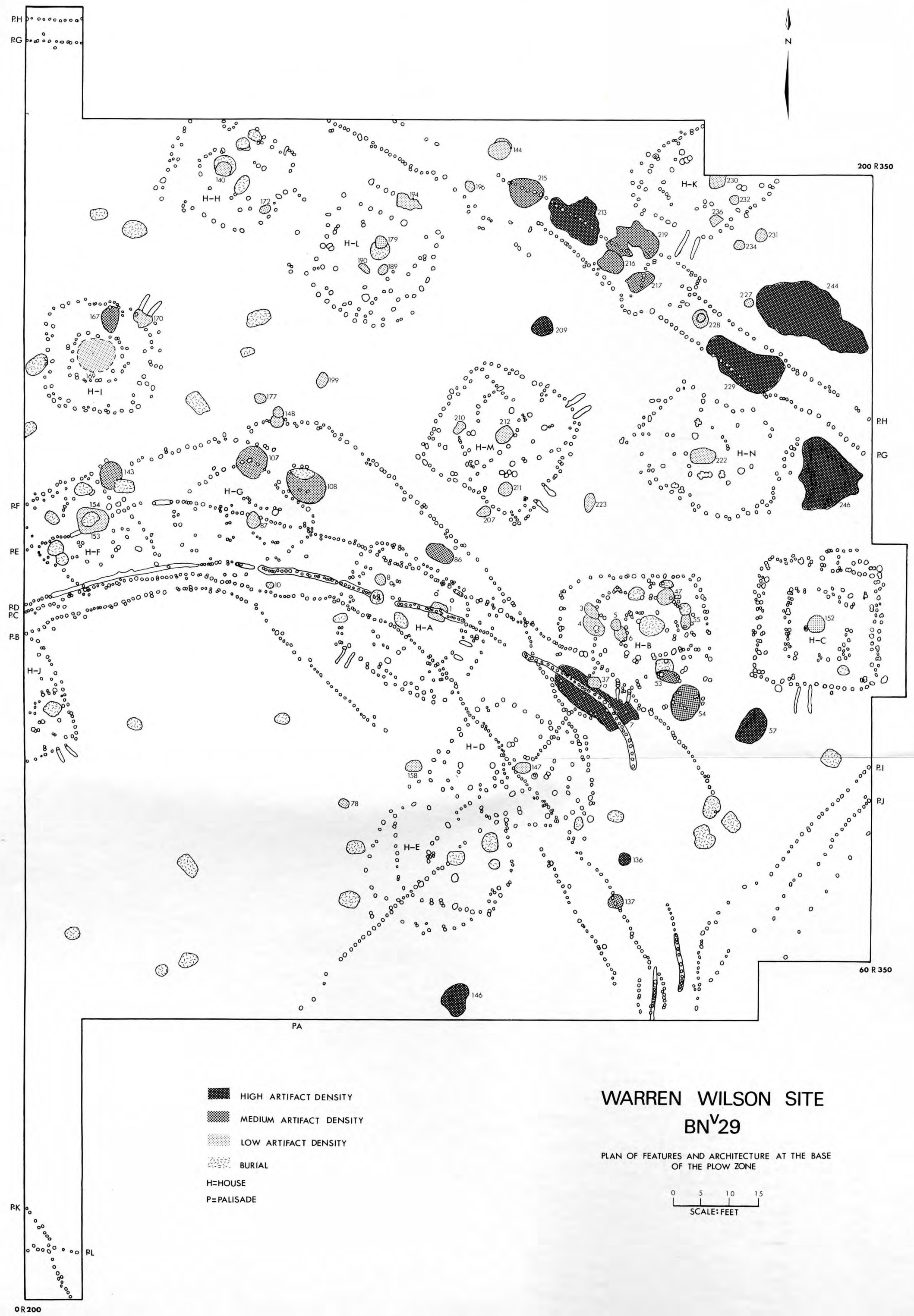
Haywood, describing a Cherokee square ground in 1768, wrote that:

> Four sentinels are now placed, one at each corner of the holy square, to keep out every living creature as impure, except the religious order and the warriors, who are not known to have violated the law of the first fruit offering . . . (Haywood 1823:257).

Although square grounds were apparently not palisaded during the historic period, there are accounts of them being enclosed by terraces and banks (Swanton 1928:175).

Houses were located around the various inner palisades and radiated out from them. At some point, the double walled, outer palisades were constructed probably for defensive purposes. These were constructed late in the history of the site since the palisades intruded Features 213, 215, 216, 217, and 219, and it is believed that the content in these features resulted from refuse output from the houses in the same vicinity, i.e. Houses C, L, M, and N (Figure 21).

This reconstruction of the site plan is also based on other considerations. First, the differences in form between the palisades in the interior of the site and the double-walled enclosure were evidently functional. The double-walled palisades would have made a much more effective defensive enclosure, since anyone managing to scale the outside wall would then be trapped between it and the inner wall. The single-walled palisades of the interior could have easily provided the privacy and secrecy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H-M
H-N
HIGH ARTIFACT DENSITY
MEDIUM ARTIFACT DENSITY
LOW ARTIFACT DENSITY
BURIAL
H=HOUSE
P=PALISADE
WARREN WILSON SITE
BNV29
PLAN OF FEATURES AND ARCHITECTURE AT THE BASE OF THE PLOW ZONE
0 5 10 15
SCALE: FEET

Figure 21

characteristic of Southeastern ceremonialism. The presence of a bastion in the outer palisades also points to its function as a defensive enclosure. Bastions were not present along any of the inner walls. In addition, the fact that there was very little evidence of occupation either in the plow zone or in the subsoil within the inner palisades certainly suggests that they were not built for protection since they would have protected little.

Finally, there is plow zone evidence in the form of artifact densities that indicates considerable refuse disposal took place along the inner palisades. There was also considerable in situ evidence of refuse disposal along the outer walls. Since there was only sparse evidence of occupation within the inner palisades, the inhabitants of the site were probably living in a band between the inner and outer walls and keeping this area clean by dumping their garbage to either side of the occupied area.

A detailed ceramic analysis of materials from Feature 229 and Feature 7 is currently under way in an effort to determine the temporal-spatial relationships across the site. Additional analyses of feature content and ceramic attribute minutiae are also planned to not only sort out temporal-spatial relationships but also hopefully isolate socially significant variables.

Artifact Distributions: The In Situ Structure

The content of the features varied considerably within as well as among the various classes (Tables 3-8). In order to put this

variation in a spatial perspective, the SYMAP program was to calculate contour, trend surface, and residual maps of the different artifact types, i.e. ceramics, bone, lithics, and projectile points. The total feature output per 10 foot grid unit was calculated, and this value was assigned to the data point designating that square. If a feature lay in more than one square, its output values were assigned to the square containing the largest portion of the feature. No effort was made to proportion the output among different data points because of the imprecision involved and the fact that there were few features not primarily contained within a single square. If two or more features were found within the same square, their contents were totaled and these values were assigned to that data point. This statistical mapping of feature output was not meant as a substitute for actual excavation map data, but rather designed to aid in understanding the spatial structure of the site and the relationship between the plow zone and the undisturbed site structure.

In addition to the SYMAPs, correlation coefficients were calculated between the various artifact classes to add another dimension to the analysis. These data complemented the map distributions and provided another measure of how the various artifact classes were spatially related. These proceedures were discussed in detail in Chapter II.

In order to look at the feature output data, each artifact category will be discussed individually and its distribution related to the various features. Spatial variation among the

artifact categories will also be compared, and the overall in situ site structure will be discussed.

Before beginning a discussion of the patterns displayed by the maps, it should be pointed out that the contour and residual maps in this chapter, as well as the next, were traced from the actual computer maps. For clarity, only the heaviest densities were outlined. The more detailed computer print-outs are reproduced in the appendices in the same sequence as the traced maps, and in some instances, these may provide a sharper focus on the patterns discussed since they are copies of the original maps used during the analysis. The trend surface maps are also reproduced in the appropriate appendices.

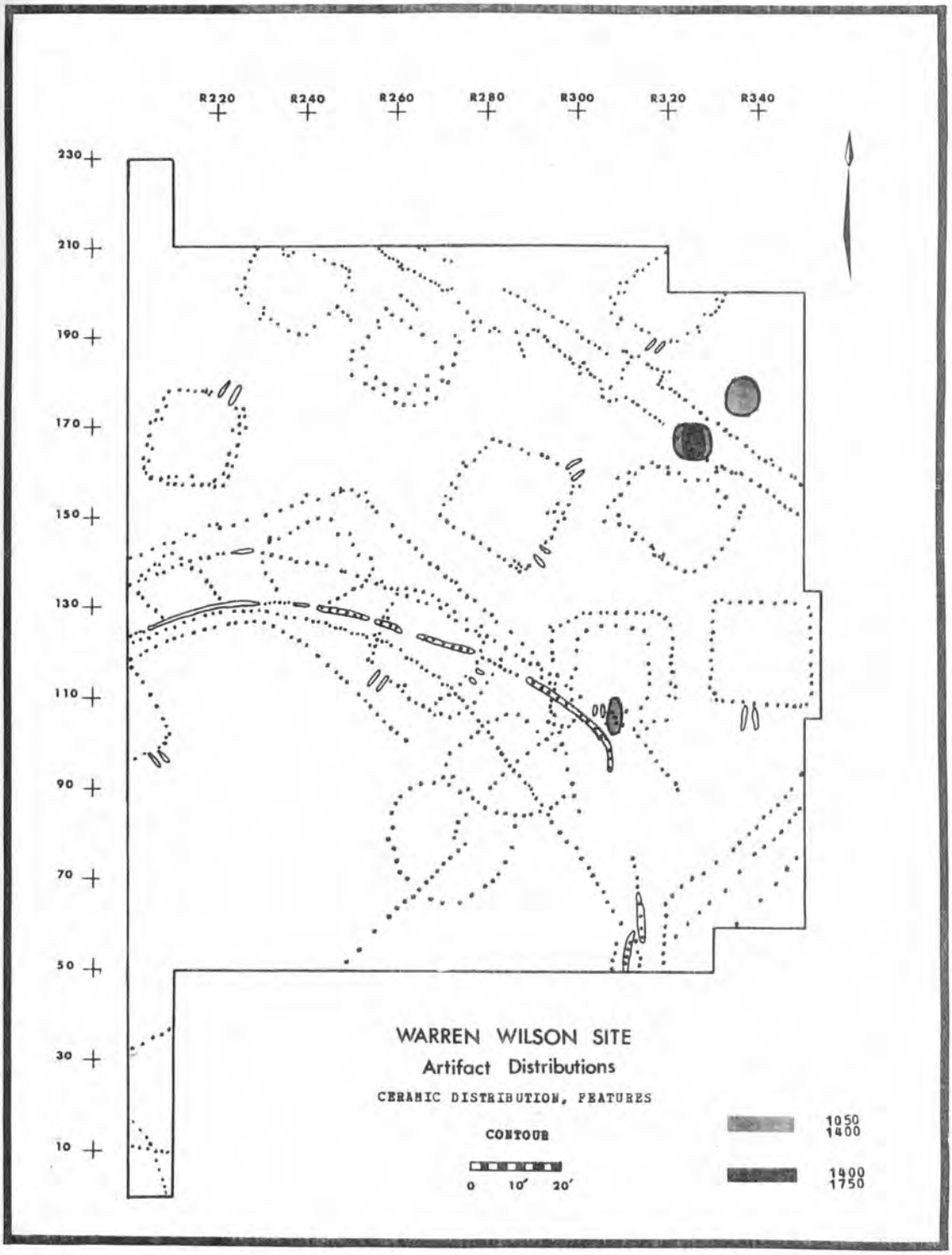
In addition to the maps, the appendices contain keys to the SYMAP symbolism for each artifact category, as well as quantitative data for the trend surfaces. Most used during the analysis were the correlation coefficients which indicate the goodness of fit of the various surfaces. As can be seen, most of the plow zone maps from both sites fit the data very well, usually over $\underline{r} = 0.5$ (Appendices B and D). These scores are considered to be quite high in light of the many avenues for uncontrolled error to enter any archaeological data set. The correlation coefficients calculated for the various feature distributions were predictably low because of the sporadic, sometimes restricted spread of the data points with values above 0 (squares that contained features) and the extreme variance in these values. However, as with the plow zone materials, the primary concern was with the residuals, and

by comparing the feature residuals with the actual feature contents and their spatial distributions, these maps accurately portray the in situ spatial configurations.

Ceramics. In terms of ceramic output, the large roasting pits along Palisades G and H were easily apparent on the contour map (Figure 22). Features 7, 57, 146, and 209, considered to have functioned as roasting pits or hearths, were also apparent. The only feature that had a moderate output on the contour map that was not in these categories was Feature 136, which was one of the few storage pits that had been later filled with refuse (Appendix A).

The third order trend surface map, indicated a low concentration of ceramics from features in the southwestern corner of the site, in the plaza or ceremonial area and in the northwestern corner in the vicinity of Houses H and I. The very southeastern tip of the site also produced a low reading, while the remainder of the excavated surface reflected a uniform trend distribution (Appendix A).

The ceramic residual map from the third order trend surface duplicated the contour densities but provided a somewhat finer resolution by isolating Features 143, 107, and 108, all of which were pit hearths between Palisades F and E (Figure 23; Appendix A). These latter features, however, exhibited only slight ceramic output when compared with the facilities along Palisades G and H and Features 7, 57, 146, and 209.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WARREN WILSON SITE
Artifact Distributions
CERAMIC DISTRIBUTION, FEATURES
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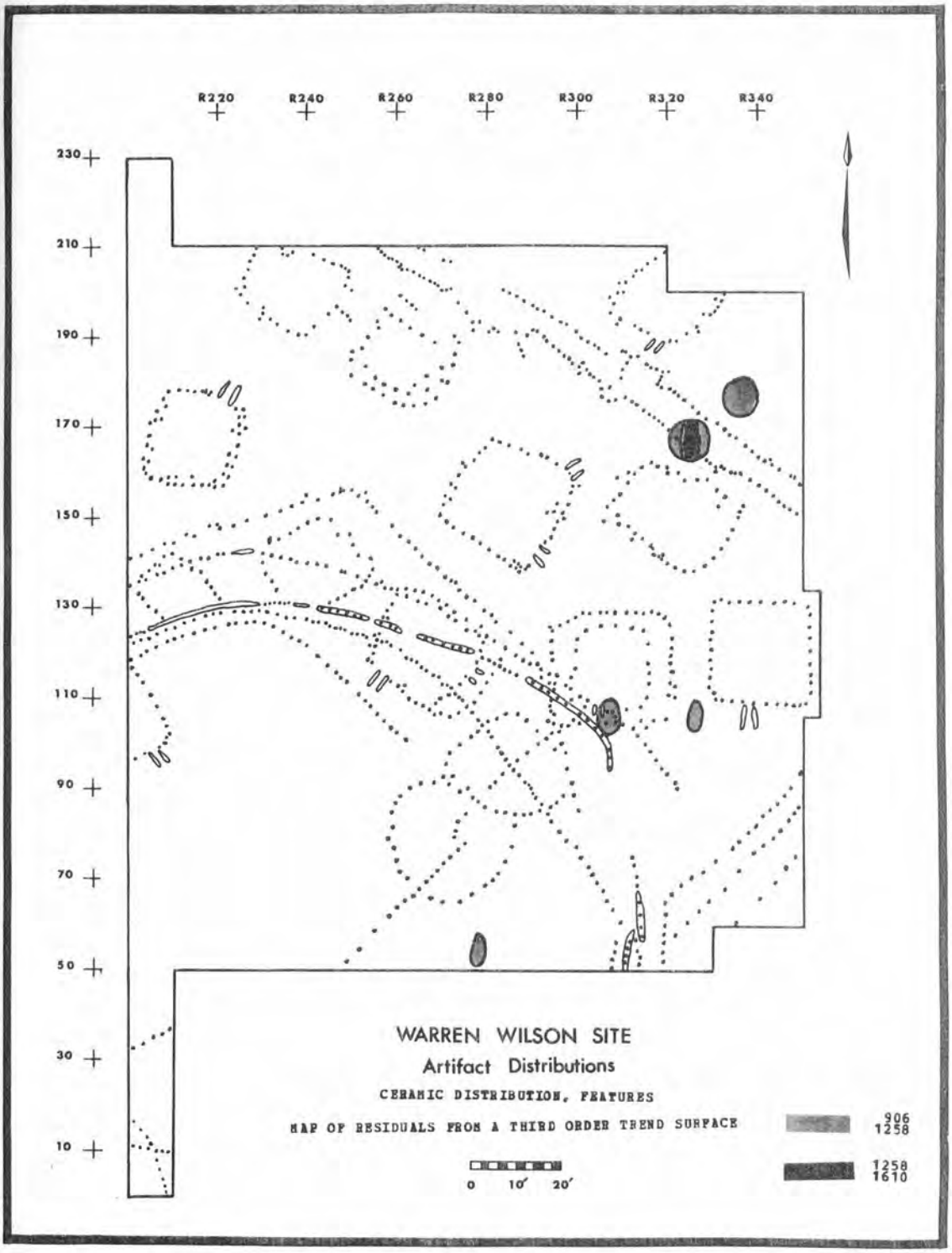
Figure 22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WARREN WILSON SITE
Artifact Distributions
CERAMIC DISTRIBUTION, FEATURES
MAP OF RESIDUALS FROM A THIRD ORDER TREND SURFACE
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Figure 23

Bone. In general, the bone contour map showed a distribution similar to that of the ceramics (Figure 24). Features 7, 57, 136, and 209 were indicated with high to moderate densities. Only Feature 229, however, was reflected along Palisades G and H, and the bone output was not sufficiently strong to register Features 146, 215, 244, 246, all of which had sufficient ceramic content to be contoured (Appendix A).

The third degree trend surface indicated generally low bone output along a band roughly 40 feet wide (Appendix A). This band extended the entire length of the site along the western edge. In the other areas of the site, the trend surface evidenced a uniform feature content distribution. The residual plot from this surface was nearly identical to the contour map except that Feature 146 was vaguely registered on the former (Figure 25; Appendix A). All in all, the bone and ceramic density distributions reflected by the SYMAPs and a correlation coefficient of 0.75 (Table 9) were very similar. The bone feature content was, however, more restricted and almost non-existent in features located in the western half of the site (Appendix A).

Lithics. The lithic contour distributions were generally similar to those of the ceramics and bone, but there was a high concentration of lithic debris indicated in the vicinity of House B (Figure 26). This concentration reflected the lithic output of Feature 47, which contained the highest concentration of lithic material on the site. In addition to Features 3, 4, 5, 6, 53, 54, and 55 also contained a high number of chips. Except for

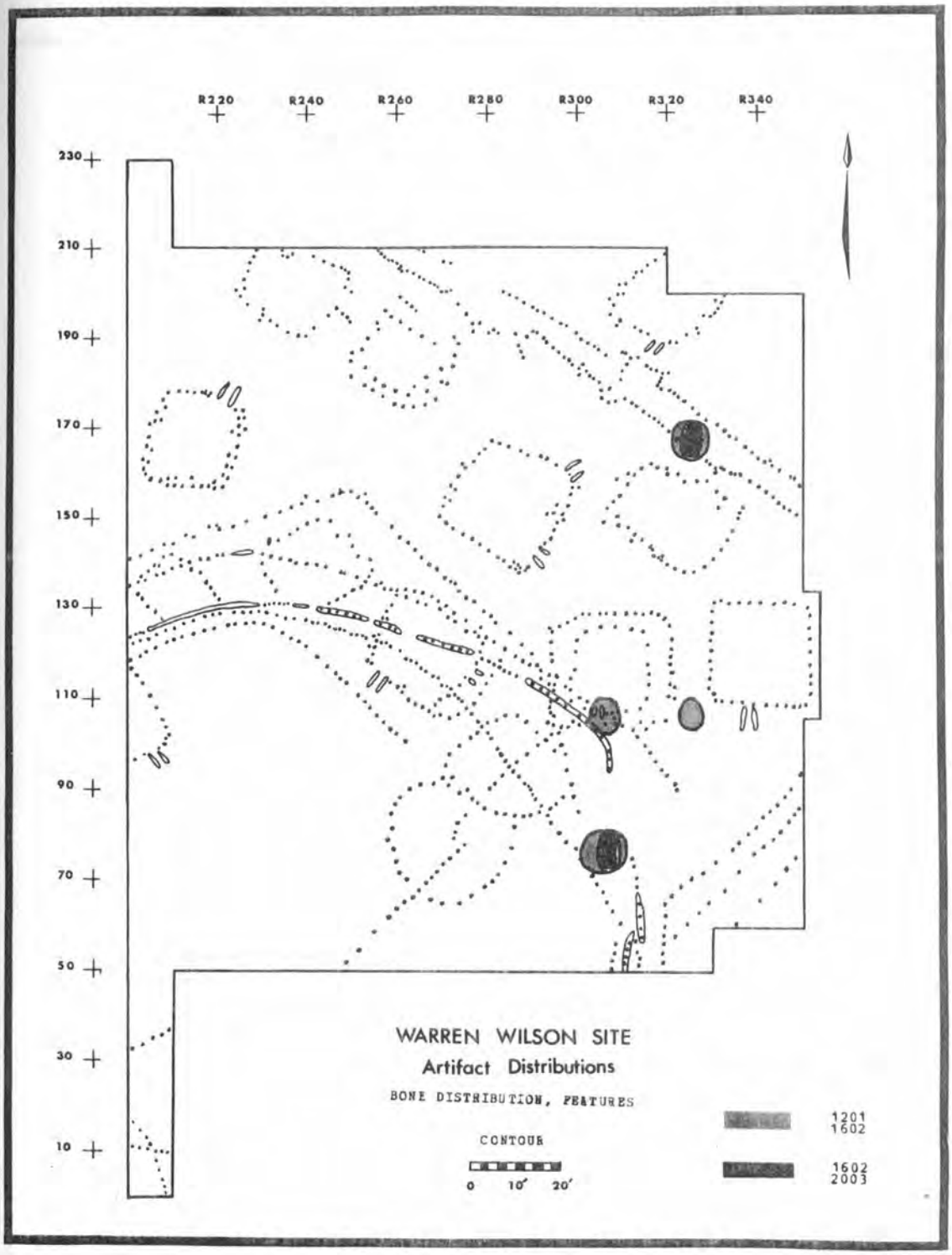
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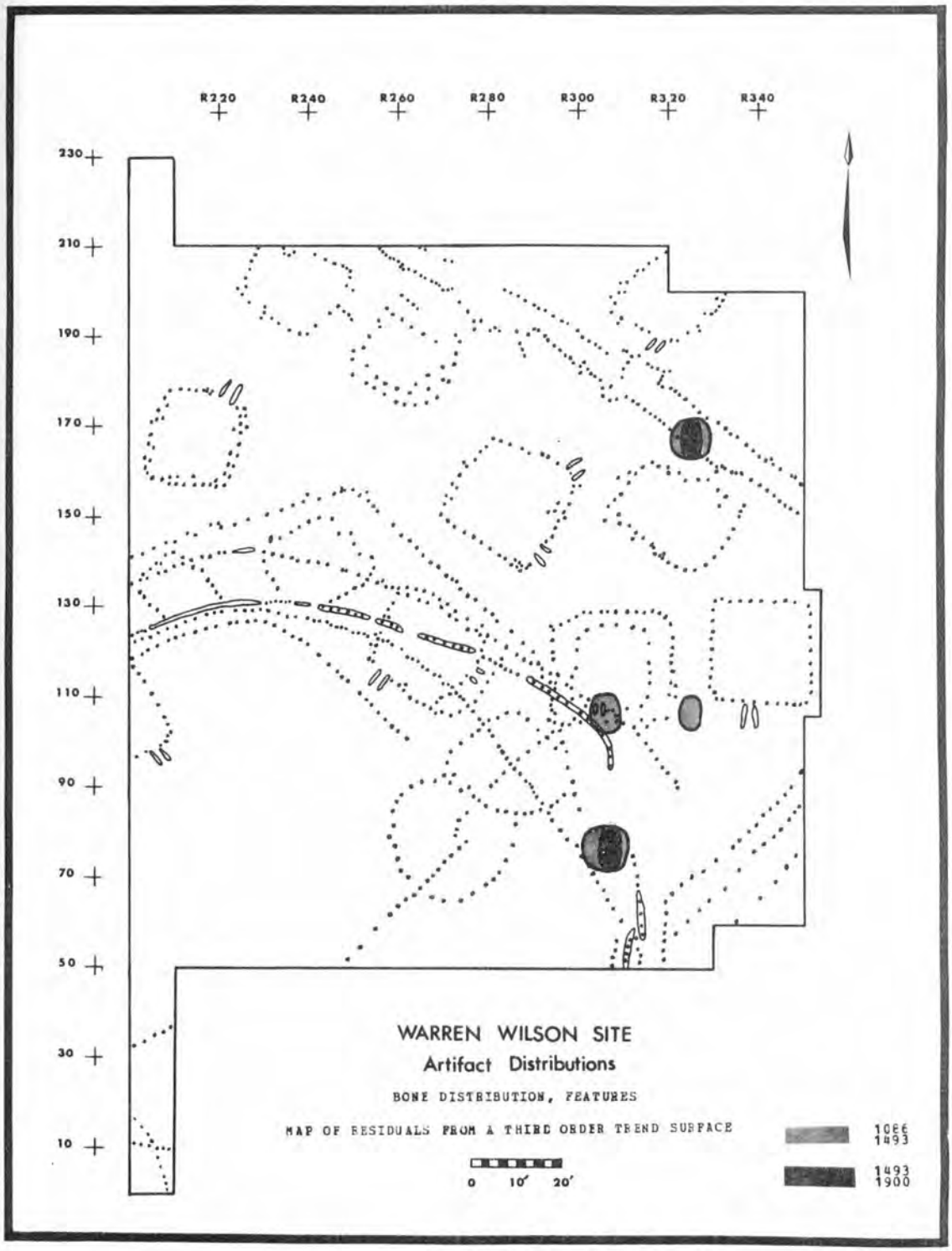
Figure 24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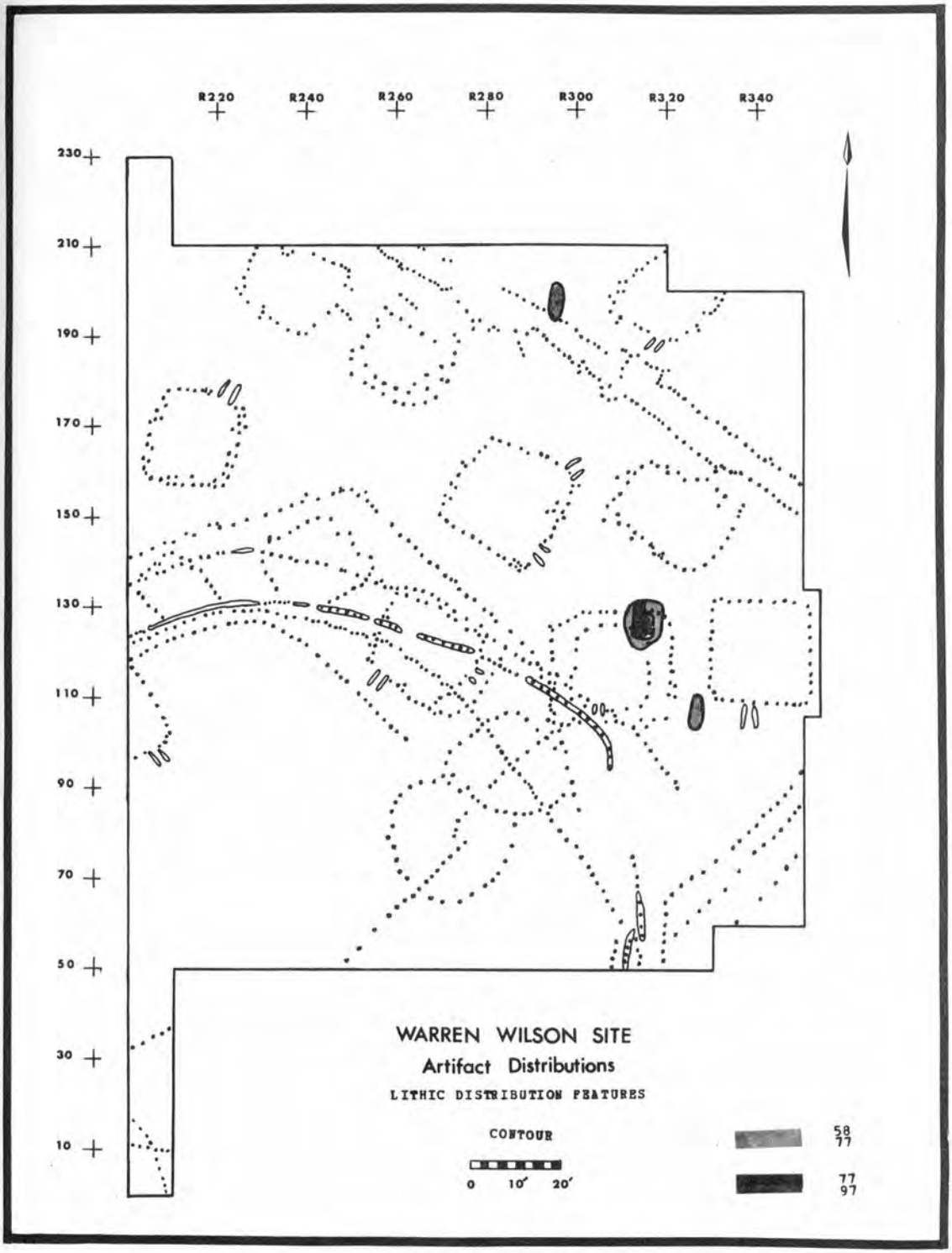
WARREN WILSON SITE
Artifact Distributions
BONE DISTRIBUTION, FEATURES
MAP OF RESIDUALS FROM A THIRD ORDER TREND SURFACE
0 10' 20'
1066
1493
1493
1900

Figure 25

Table 9. Correlation Coefficients between $Bn^{V}29$ Plow Zone and Feature Variables
Feature Variables Denoted By F

	Ceramics	Lithics	Bone	CSPP	Ceramic (F)	Lithics (F)	Bone (F)	CSPP (F)
Ceramics	1.00	0.42	0.24	0.46	-0.10	0.00	-0.06	-0.13
Lithics	0.42	1.00	0.12	0.24	-0.24	-0.04	-0.22	-0.18
Bone	0.24	0.12	1.00	0.17	0.29	0.35	0.47	0.13
CSPP	0.46	0.24	0.17	1.00	0.04	0.06	-0.07	0.00
Ceramic (F)	-0.10	-0.24	0.29	0.04	1.00	0.55	0.75	0.85
Lithics (F)	0.00	-0.04	0.35	0.06	0.55	1.00	0.31	0.62
Bone (F)	-0.06	-0.22	0.47	-0.07	0.75	0.31	1.00	0.48
CSPP (F)	-0.13	-0.18	0.13	0.00	0.85	0.62	0.48	1.00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R240
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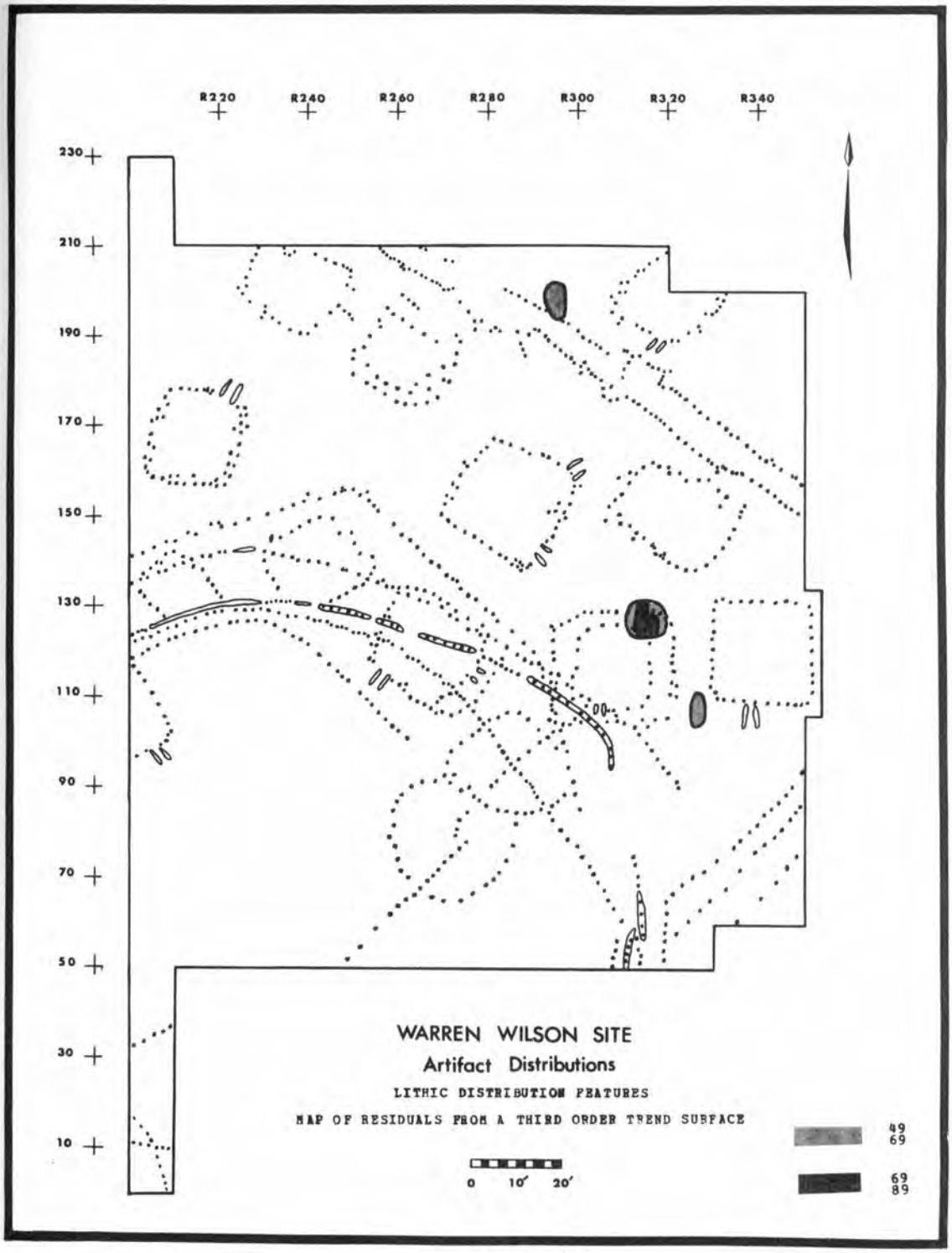
R280
R300
R320
R340
230
210
190
170
150
130
110
90
70
50
30
10
WARREN WILSON SITE
Artifact Distributions
LITHIC DISTRIBUTION FEATURES
CONTOUR
0 10' 20'
58
77
77
97

Figure 26

lithic debris, most of these units had low artifact outputs. Since they appear to be associated with House B, apparently intense chipping activity took place in and around the structure.

The trend surface was almost identical to that fitted for the bone except the low output band in the eastern part of the site was more concave near its center (Appendix A). The residual map was coincident with the contour distribution (Figure 27). Except for the more intense concentration in the vicinity of House B and the greater concentration around Features 143 and 108, the lithic densities generally coincided with the ceramic feature outputs. But this coincidence was apparently not as close as that between the bone and ceramics. The correlation coefficient calculated between ceramics and lithics was only 0.6, while the correlation between bone and lithics was even less, 0.3 (Table 9).

Projectile Points. The projectile point contour map mirrored the other distributions to a large extent but was not as dense as the ceramics, bone, and lithics in the vicinity of House B (Figure 28; Appendix A). The trend surface almost perfectly duplicated the trend of the ceramics, and projectile points from features correlated at 0.9 with the ceramic feature output (Table 9). This coefficient represents the highest correlation between any two artifact classes encountered during the study, and it is supported by the nearly isomorphic fit between the two third degree trend surfaces. The projectile point residual pattern also most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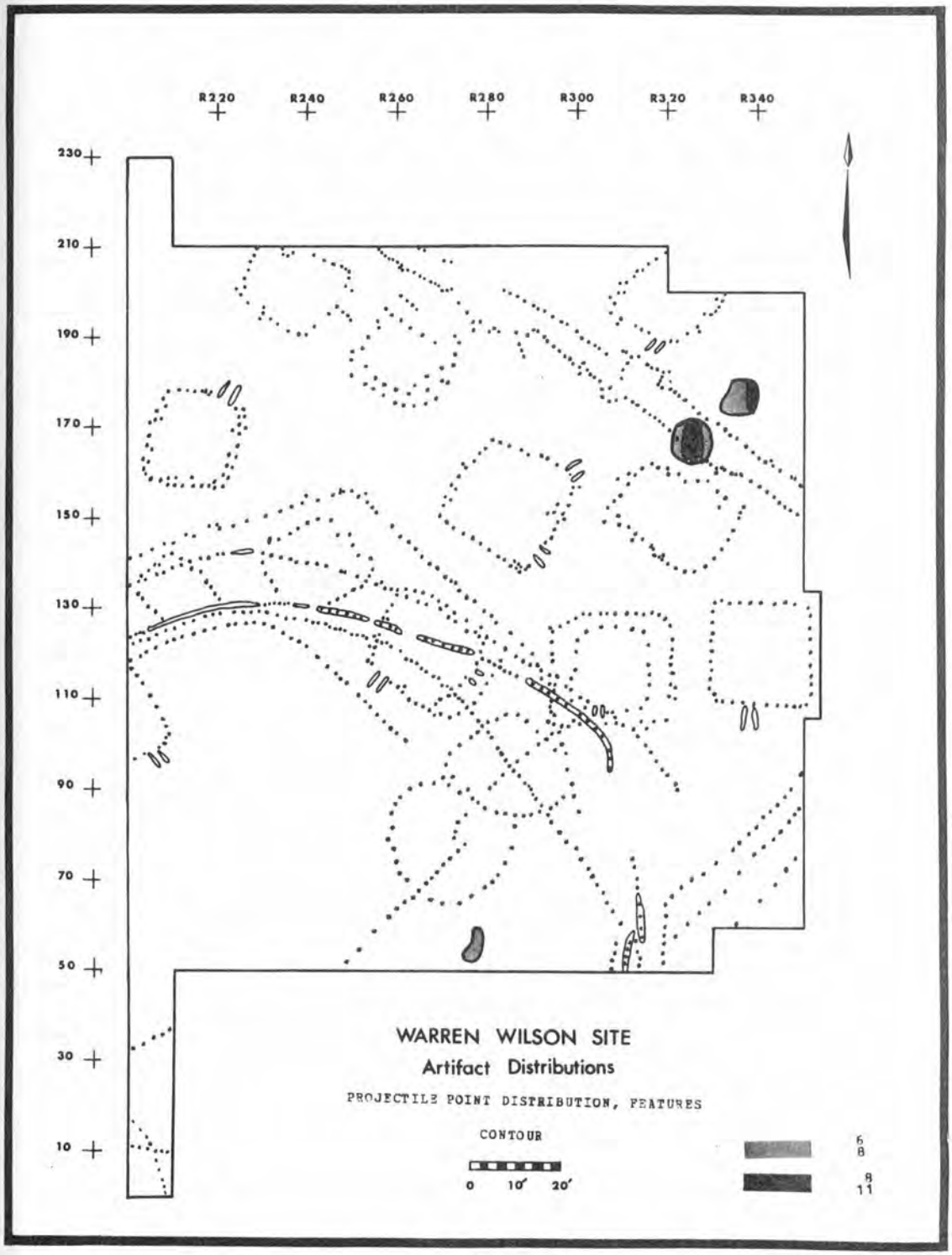
190
170
150
130
110
90
70
50
30
10
WARREN WILSON SITE
Artifact Distributions
LITHIC DISTRIBUTION FEATURES
MAP OF RESIDUALS FROM A THIRD ORDER TREND SURFACE
0 10' 20'
49
69
69
89

Figure 27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190
170
150
130
110
90
70
50
30
10
WARREN WILSON SITE
Artifact Distributions
PROJECTILE POINT DISTRIBUTION, FEATURES
CONTOUR
0 10' 20'
6
8
8
11

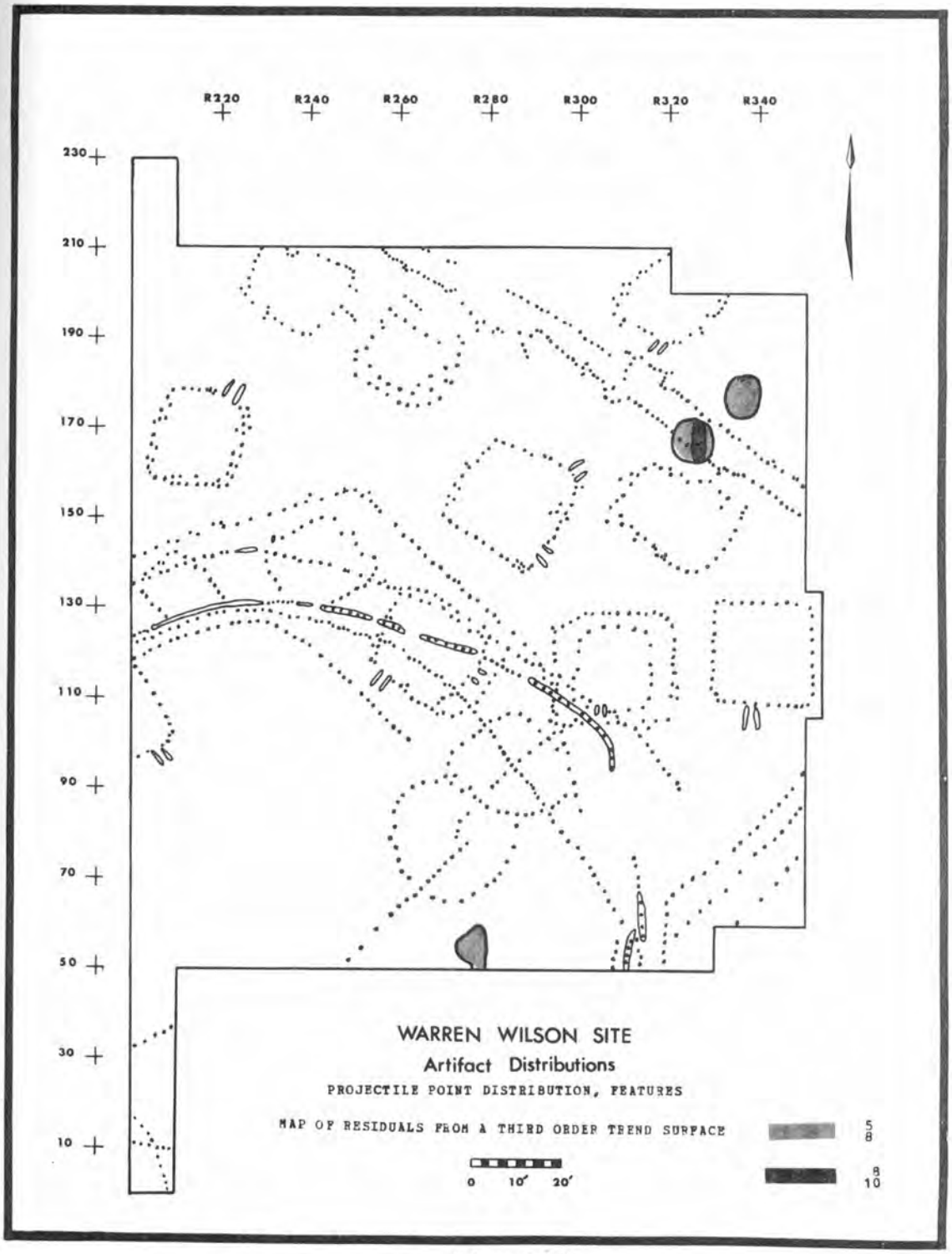
Figure 28

closely resembled that of the pottery residuals, although there were some minor variations in the densities of the two classes within the same features (Figure 29; Appendix A).

In general, all classes of refuse appeared to have been cleaned up and disposed of in a similar fashion, although some minor variations did exist. The bone concentrations were the most restricted, while the ceramics and projectile points displayed a fairly wide disposal distribution in the various features. By and large, all the material was in secondary context, although the lithic concentrations in features associated with House B may have resulted from de facto deposition associated with activities within or around the structure.

All categories of specimens were found in greater concentrations in features located in the eastern half of the site. This difference was particularly evident with the bone distribution. The western features displayed moderate output only in terms of lithic debris.

In general, the SYMAPs from the feature data indicate a refuse disposal pattern created by village debris being dumped along the edges of the site. The high output of the large roasting pits reflects this pattern, which becomes clearer after the plow zone distributions are presented.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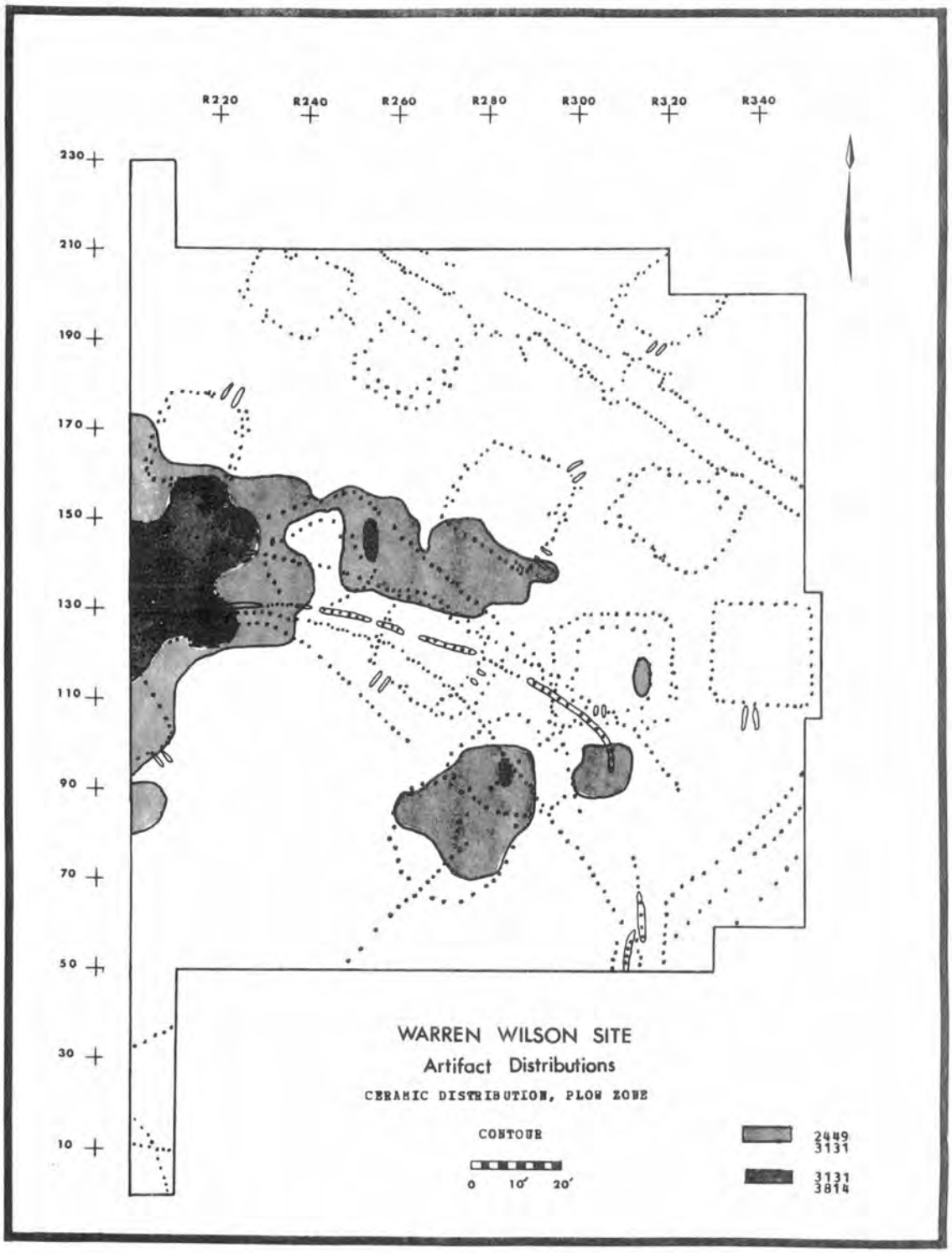
R280
R300
R320
R340
230
210
190
170
150
130
110
90
70
50
30
10
WARREN WILSON SITE
Artifact Distributions
PROJECTILE POINT DISTRIBUTION, FEATURES
MAP OF RESIDUALS FROM A THIRD ORDER TREND SURFACE
5
8
8
10
0
10'
20'

Figure 29

Artifact Distribution: The Plow Zone Structure

Ceramics. The heaviest concentration of ceramics in the plow zone contour map was centered at the western edge of the site at approximately 135R200 (Figure 30). This concentration fanned out in a band some 20 to 30 feet wide to the east and sloped slightly to the southeast. Another heavy concentration was centered at 85R275 and at 95R305. These two centers blended together and a tongue of high density extended to the north and west, almost intersecting the first concentration at 130R300. The remainder of the site was characterized by a moderately even distribution interspersed by several random areas of light density. Two fell roughly on houses, while others were between houses or in the plaza. The southern and particularly the eastern edge of the site were also marked by low ceramic densities (Appendix B).

The third order trend surface described a bifurcated bull's eye with the center intersecting the R200 line at the western edge of the excavation (Appendix B). The residuals from this surface generally coincided with the contour distribution (Figure 31). However, the dense band extending from 135R200 to R295 was comprised of three heavy concentrations at 150R220, 145R255, and 135R280. There was also a more intense concentration at the northern edge of the site near 210R265. The only other difference lay in the fact that the distribution along the eastern edge of the excavation was not as low as that registered on the contour map (Appendix B). However, it should be reiterated that the residual maps reflect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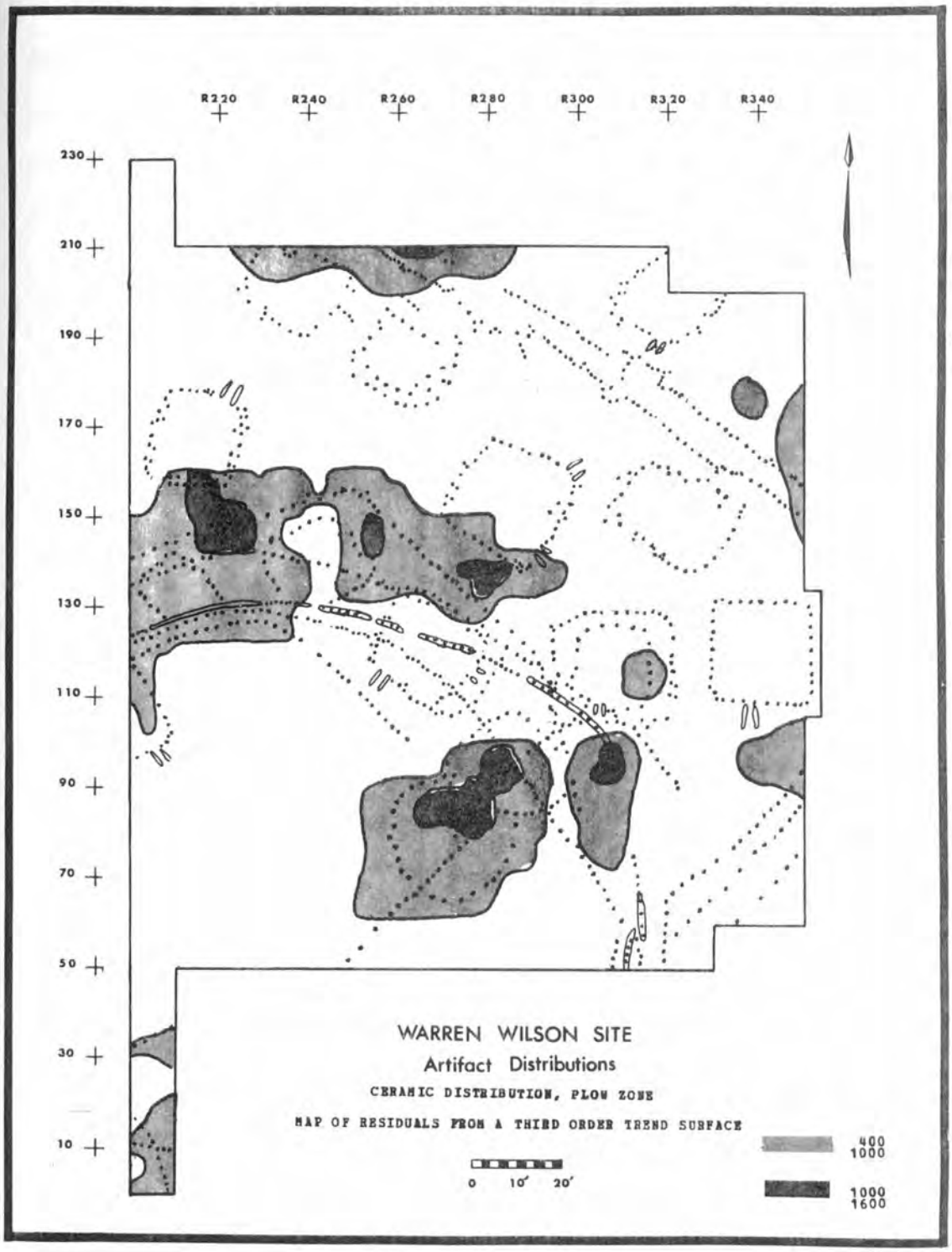
R260
R280
R300
R320
R340
230
210
190
170
150
130
110
90
70
50
30
10
WARREN WILSON SITE
Artifact Distributions
CERAMIC DISTRIBUTION, PLOW ZONE
CONTOUR
0 10' 20'
2449
3131
3131
3814

Figure 30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R240
R260
R280
R300
R320
R340
230
210
190
170
150
130
110
90
70
50
30
10
WARREN WILSON SITE
Artifact Distributions
CERAMIC DISTRIBUTION, PLOW ZONE
MAP OF RESIDUALS FROM A THIRD ORDER TREND SURFACE
0 10' 20'
400
1000
1000
1600

Figure 31

deviations from the trend surface. In this case, there was more unexplained variation from the trend in this area, and since the contour maps are based on actual sherd counts, they are more accurate indicators of the overall distributions. On the other hand, the residual maps are more sensitive to deviations or "hot spots" and provide for finer resolution.

From the ceramic data in the plow zone, it would be very hard to predict the intact spatial structure of the village. Comparing the excavation plot of the site and the ceramic feature output maps with the plow zone distributions reveals very few areas of overlap (Figure 21, 22, 23, 30, 31). In fact, the correlation coefficient between the plow zone ceramics and the feature ceramics was -0.1 (Table 9). The heavy concentrations of material in the western part of the excavation from 135R200 to roughly 135R290 had no counterparts in the feature outputs, nor did the concentrations in the south central section directly correspond with any feature densities.

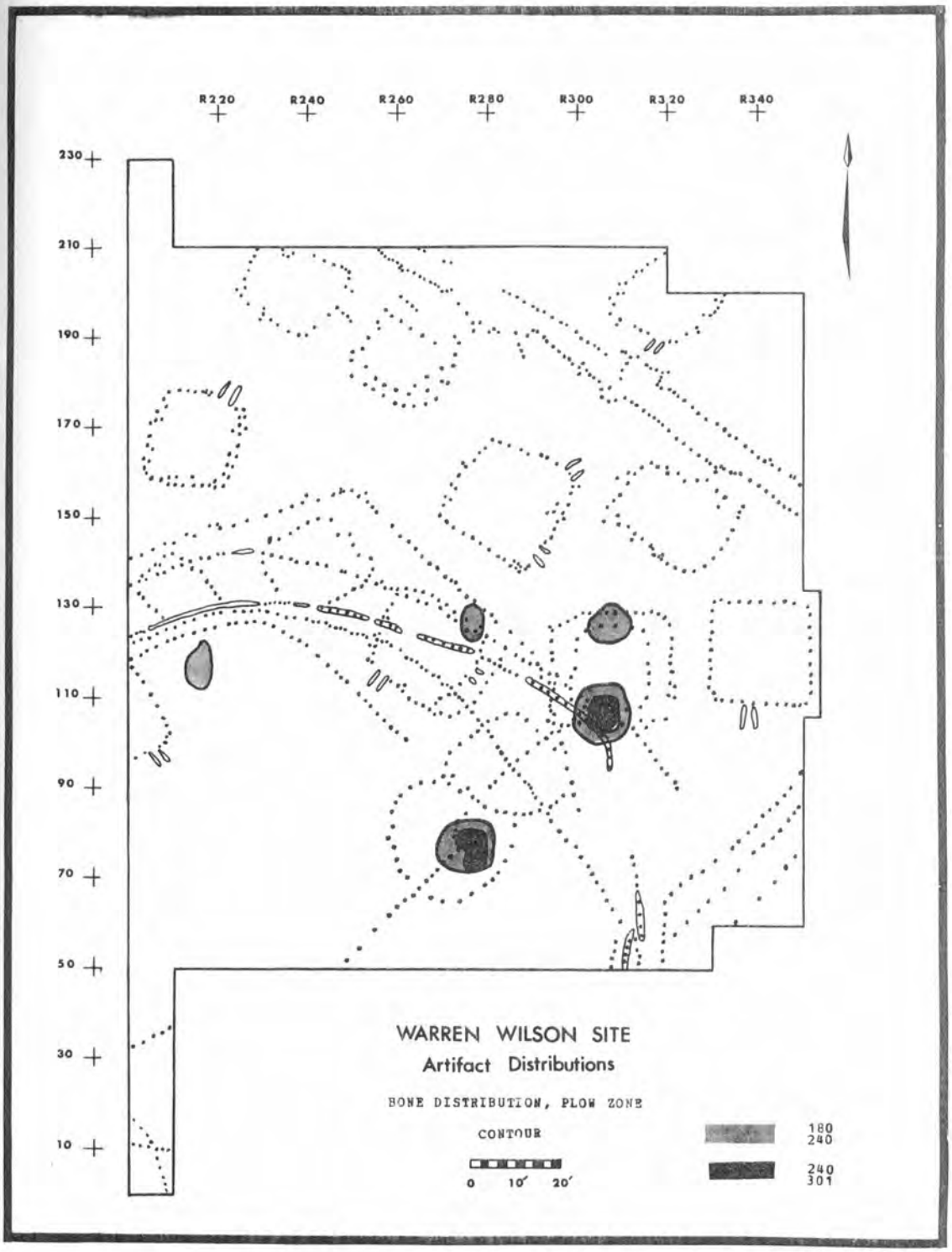
The plow zone ceramic distribution did, however, follow very closely the alignments of the palisades in the central part of the excavations, and the dense zone centered at approximately 85R265 closely paralleled Palisade A. The concentration in the vicinity of 95R295 fell between Palisades F and D. Based on the distributions plotted by the residual and contour maps, only a few features were hinted at in the plow zone. Feature 7 was indicated by the moderate peak reflected at 115R305 and Feature 229 may have been reflected

by a similar concentration near 175R330 (Appendix B). However, these were not strongly suggested, particularly considering the fact that they were the two most productive features that have been excavated. In general, the band of houses between Palisades F and M were in an area that was relatively clean. By virture of the fact that Houses A, D, E, F, and G were in the same area as the inner palisades, their location coincided with the heavy plow zone concentration. However, this correlation is probably more of a consequence of the structures being located in the palisade area rather than the houses themselves being responsible for high ceramic outputs. Although some of these structures may have been contemporary with the deposits along the inner walls, Feature 7 was intruded by House B, and since most of the houses intruded some of the palisades, they were probably built on top of already existing deposits with high ceramic density.

It is suggested here that the ceramic refuse was dumped along the palisades and into the roasting pits typified by Features 7 and 229. Either much of the debris along the inner palisades was dumped on the surface and plowed out, or the features it collected in were destroyed by plowing. The fact that ceramic concentrations were not reflected in the plow zone along Palisades G and H is perhaps partly a consequence of the fact that there were more depressions and pits in this area for the deposits to collect in and be protected from the plow. There was, in fact, a dense area evident

on both the plow zone contour and residual maps in the northern edge of the excavations between Palisades G and H where there were no in situ pits (Figure 31; Appendix B). Apparently here, too, the features were either plowed away or the ceramic debris was dumped on the surface. It should also be added that since soil was being plowed out of the field, the eastern features would have received more protection from soil accumulation than those nearer the center of the field.

Bone. As expected, the plow zone and feature bone contour distributions corresponded more closely than the ceramic plow zone and feature patterns (Figure 24 and 32). This overlap was also indicated by a correlation coefficient of 0.5 between the bone from features and the plow zone material. This correlation was the highest between any pair of plow zone and undisturbed variables (Table 9). Features 7 and 229 were indicated, and it appeared that bone from Feature 136 was probably also mixed with that plowed out of Feature 7, creating a general concentration roughly parallel to Palisade A. A slight concentration northeast of Feature 229 could indicate bone plowed and displaced from Feature 209. An area centered at 125R265 coincided spatially with Feature 86, but since only two fragments of bone were recovered from this feature, the plow zone concentration is probably not related to it. Similarly, there were no bone producing features in the western part of the site that could account for the dense concentration at 120R210 or the less dense deposit at 125R245 (Appendix B). These concentrations may represent "ghost" features or surface trash dumping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90
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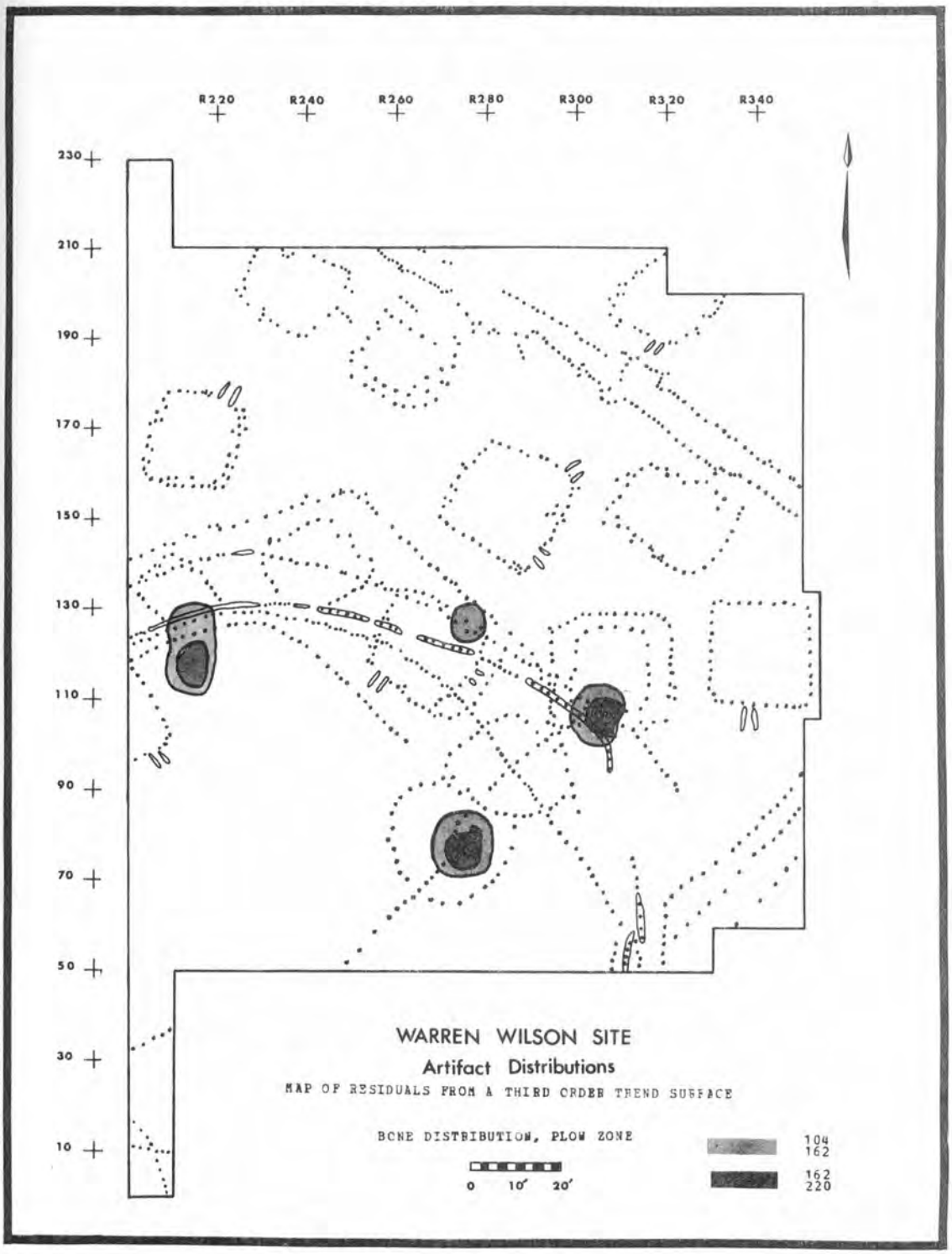
30
10
WARREN WILSON SITE
Artifact Distributions
BONE DISTRIBUTION, PLOW ZONE
CONTOUR
0 10' 20'
180
240
240
301

Figure 32

sites associated with the inner band of palisades in a fashion similar to the ceramic concentrations noted in the same general vicinity. The remainder of the site was relatively free of plow zone bone.

The trend surface map depicted an area of moderately high bone content in the east-central area of the excavation around Feature 7 and House B (Appendix B). The third order residual bone map was nearly identical to the contour plot except for the fact that more variation was displayed (Figure 33; Appendix B). The major concentrations were in the same site areas, but the clean area became more restricted and extended almost diagonally across the site from roughly 200R290 to the southwest corner, forming a band sometimes as wide as 60 feet. In this area there was a general absence of features and structures except for House M.

All in all, the plow zone bone was more reflective of the actual subsurface feature pattern. This correspondence was probably due to the fact that bone elements were broken up into smaller and smaller fragments with each successive plowing, the dispersed fragments consequently losing much of their survival potential. Therefore, only those pieces kicked up by the most recent plowings were still present in the plow zone, and since lateral displacement was minimal, these were still concentrated in relatively close proximity to the features. This interpretation is also suggested by the fact that the bone distribution pattern followed the palisades to the extent that the features did. Where the features or above ground deposits had been plowed


R220
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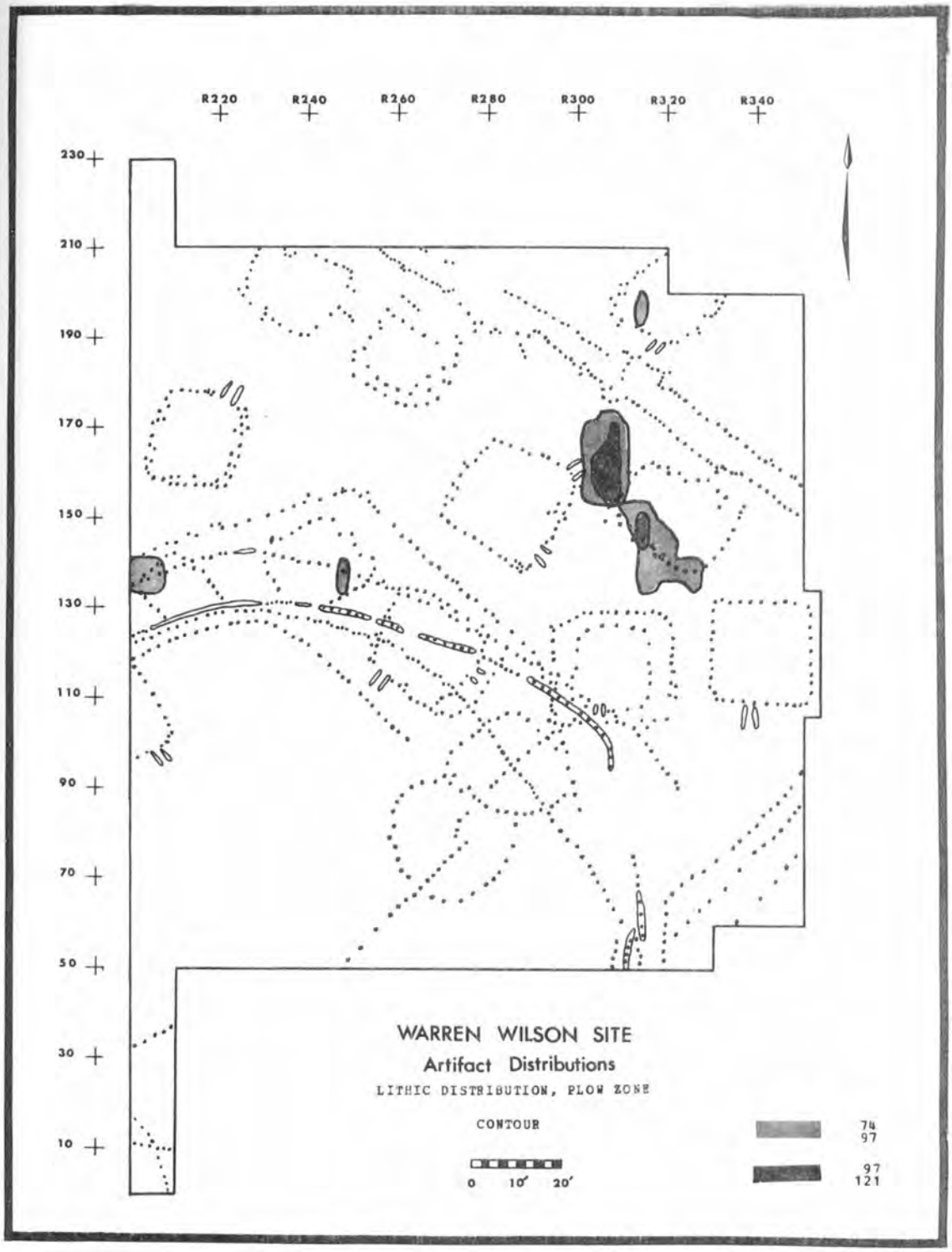
R300
R320
R340
230
210
190
170
150
130
110
90
70
50
30
10
WARREN WILSON SITE
Artifact Distributions
MAP OF RESIDUALS FROM A THIRD ORDER TREND SURFACE
BONE DISTRIBUTION, PLOW ZONE
0 10' 20'
104
162
162
220

Figure 33

away along the palisades, the bone had disintegrated in the plow zone as discussed above.

Lithics. The contour map revealed two heavy concentrations of lithic debris centered at roughly 160R305 and 140R320, between Houses M and N (Figure 34). Another concentration was located to the north, and as with the ceramics, a moderately heavy cluster abutted the R200 line at roughly north 135. None of these clusters were directly related to subsurface features, and the lithic feature output correlated with the plow zone output at only .04 (Table 9). On the other hand, there was a fairly close relationship between the plow zone ceramics and lithics, $r = 0.4$ (Table 9). Many of the structures were located in relatively clean areas and the debitage between Houses M and N might represent an activity structure similar to that of the projectile points, although these two classes were correlated at only 0.2.

The lithic trend surface fit was nearly isomorphic with the projectile point trend (Appendix B). Major differences lay in the moderately high density area along R200 and the fact that the moderate contour over most of the site was pinched in from the north and south, creating larger edge areas of low density. The residuals from the trend surface almost duplicated the contour patterns, except that the high density along the R200 line was reduced to two moderately dense clusters that were spread over a larger area (Figure 35).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R340
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170
150
130
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90
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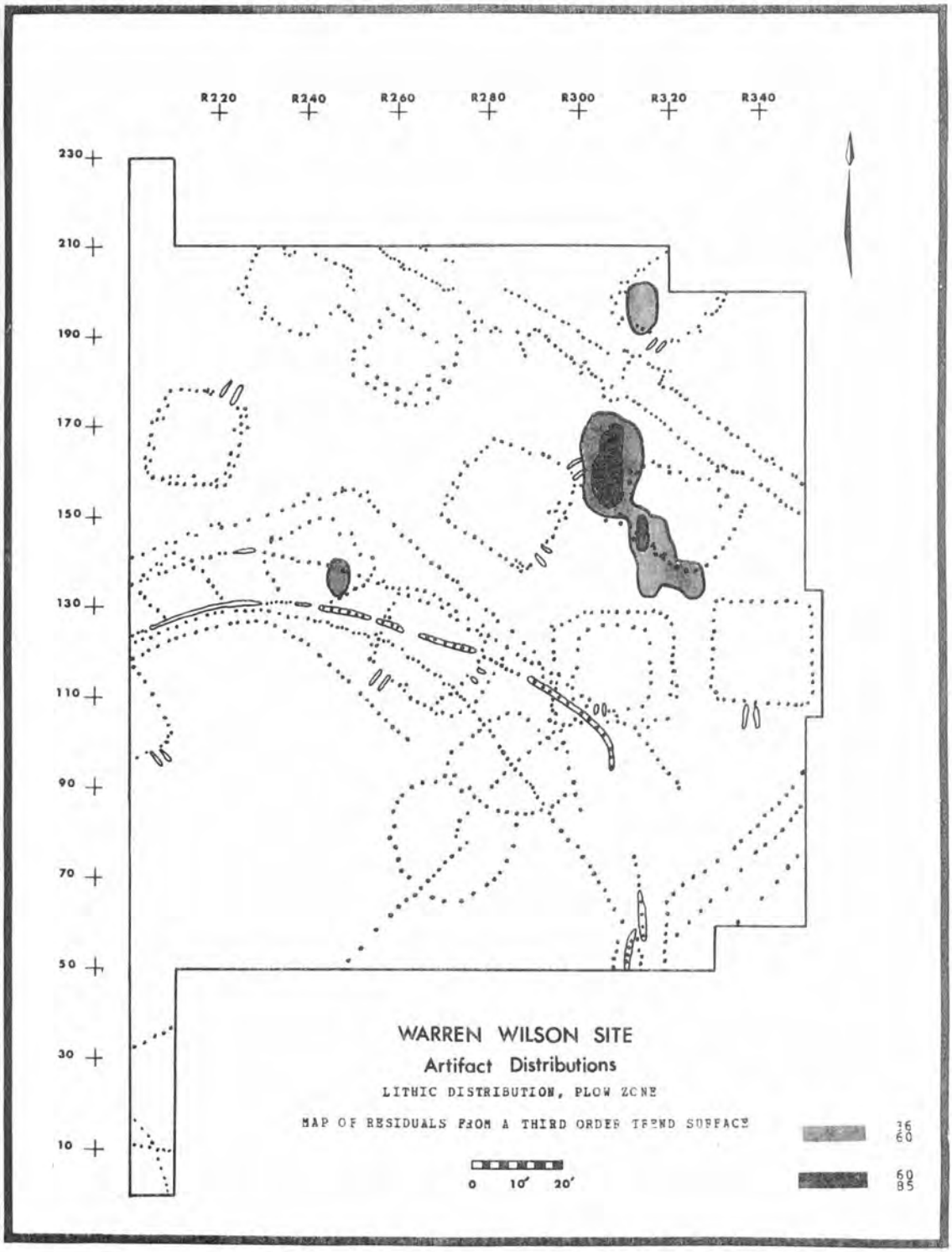
50
30
10
WARREN WILSON SITE
Artifact Distributions
LITHIC DISTRIBUTION, PLOW ZONE
CONTOUR
0 10' 20'
74
97
97
121

Figure 34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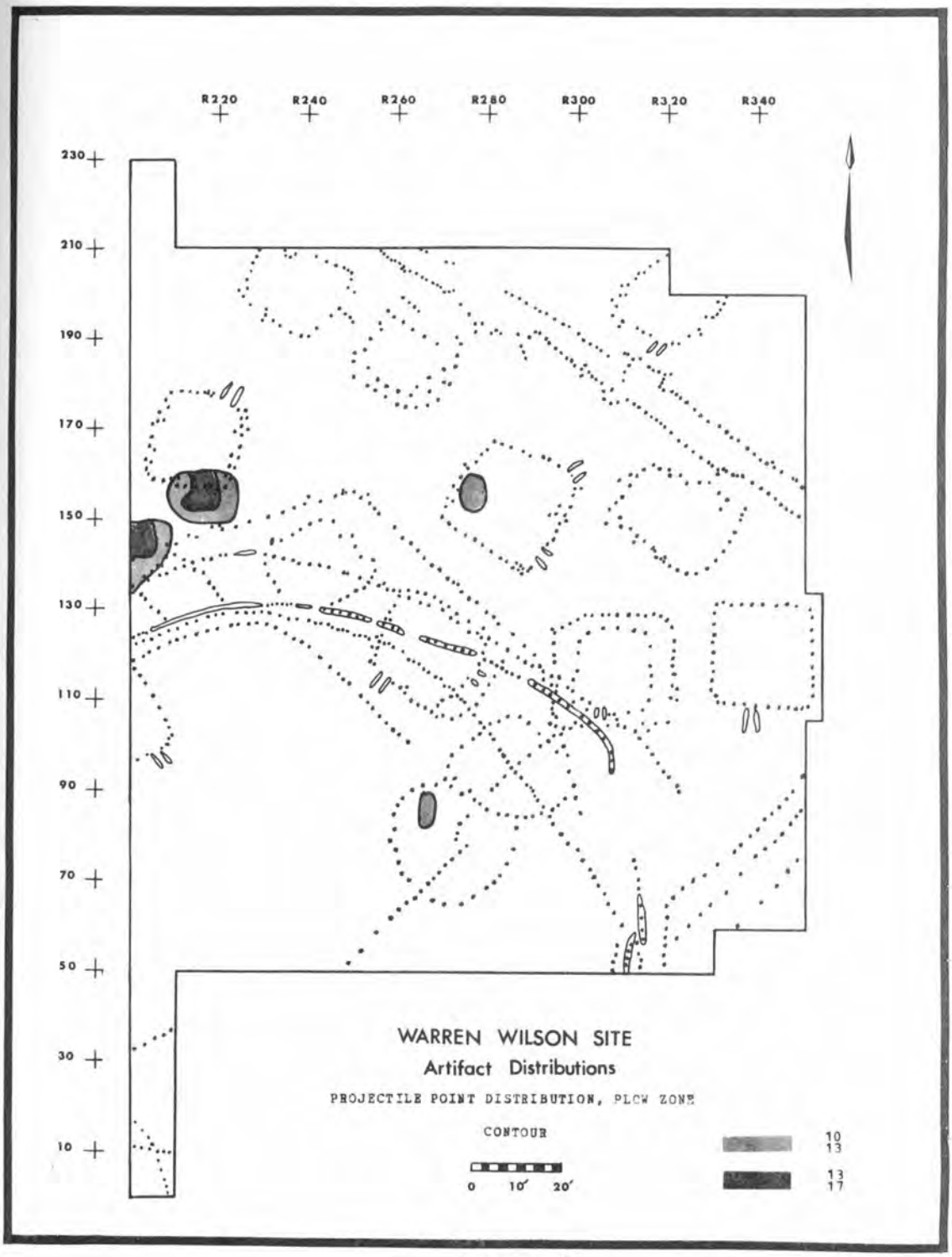
150
130
110
90
70
50
30
10
WARREN WILSON SITE
Artifact Distributions
LITHIC DISTRIBUTION, PLOW ZONE
MAP OF RESIDUALS FROM A THIRD ORDER TREND SURFACE
0 10' 20'
36
60
60
85

Figure 35

Site formation processes responsible for the lithic plow zone distribution are not clear. The only thing that seems certain is the low correspondence between the plow zone pattern and the in situ pattern of features. There may be some spatial relationship between the patterns of lithic disposal and the houses. The high density cluster between Houses M and N suggest tool manufacture or maintenance behaviors may have taken place outside the structure, and some of the plow zone lithic material may reflect a primary deposition context. On the other hand, the concentrations at the western edge of the site indicate a disposal mode like that of the ceramics. Many of the flakes were apparently swept up with the other debris and deposited secondarily around the edge of the village.

Projectile Points. The projectile point contour map was somewhat similar to the ceramic distribution, and the correlation coefficient between these two classes, 0.5, was the highest between any pair of variables within the plow zone (Table 9). This high correlation was at least partially a result of two heavy clusters of projectile points at 150R210 where a high concentration of ceramics was also present (Figure 36). Other areas of moderate density were scattered about the site. Of note were two concentrations outside House M, one along the west side of the structure and the other on the east side (Appendix B). The house area itself was characterized by a low projectile point density.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90
70
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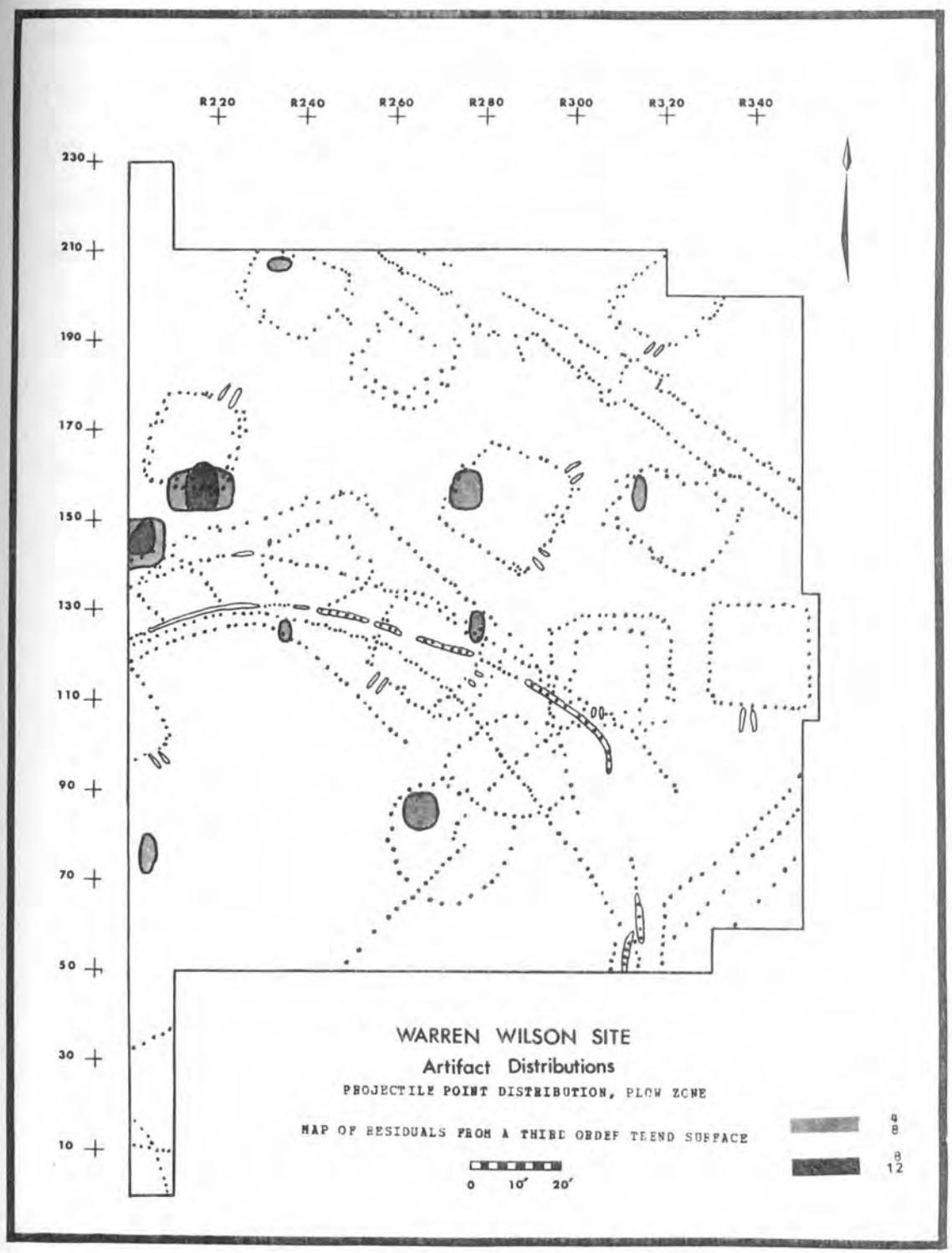
30
10
WARREN WILSON SITE
Artifact Distributions
PROJECTILE POINT DISTRIBUTION, PLOW ZONE
CONTOUR
0 10' 20'
10
13
13
17

Figure 36

A similar situation was noted in the area of House A where several moderately dense pockets surrounded a low density zone roughly defining the structure (Appendix B). Although the association of clusters around structures was not so clear in other areas of the site, there was a general trend for the denser concentrations to be located outside the houses, while the structures themselves were characterized by lighter densities.

The trend surface map was generally uninformative, showing a uniform distribution over most of the excavated surface (Appendix B). This spread thinned out around the edges except along the western R210 line where the heavy concentration mentioned previously was present.

The third order residual map was nearly identical to the contour map except that the low density areas were more restricted in extent (Figure 37). There was virtually no overlap between the feature output densities and the plow zone density distribution. As mentioned earlier, the feature content distribution was very similar to the feature ceramic outputs; however, none of the plow zone clusters matched up with features, nor did they appear to be aligned with the palisades like the bone and ceramics. The projectile points did appear to be spatially related to the structures, as many of the clusters were isolated around the edges of houses which themselves usually exhibited the lowest concentrations. This pattern is very similar to that of the lithics and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170
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70
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30
10
WARREN WILSON SITE
Artifact Distributions
PROJECTILE POINT DISTRIBUTION, PLOW ZONE
MAP OF RESIDUALS FROM A THIRD ORDER TREND SURFACE
0 10' 20'
4
8
8
12

Figure 37

perhaps resulted from the fact that although many projectile points were cleaned up along with other debris and dumped into a secondary context along the palisades, many more were lost in primary context around the houses where manufacturing and maintenance activities were carried out.

Artifact Distributions: Summary

The spatial distributions of the artifacts resulted from two types of refuse disposal that were specific to particular artifact classes. Both the spatial artifact structure in the plow zone and the in situ site structure define these refuse disposal modes. Without knowing the undisturbed structure, it would not be possible to understand the character of the plow zone patterns, nor would it be possible to fully appreciate the complexities of the site formation processes with only the intact features and architecture and their contents. Far more spatial, as well as other data, however, were contained in the in situ deposits than in the plow matrix.

The majority of the artifacts from the plow zone represent secondary dumping episodes along the palisades in the interior of the site. As previously discussed, this dumping also took place along the outer palisades, but in this case, the refuse was more or less sealed in depressions or pits. Such features did not exist along the inner palisades, or if they did, they were not deep enough to escape the plow. All the plow zone categories

peaked in various areas along the inner walls in an overlapping fashion to one degree or another. Of the two classes thought to be mainly in secondary context, ceramics and bone, the ceramics were more extensive and certainly occurred in considerably greater numbers. This latter characteristic probably makes pottery the best overall indicator of secondary refuse disposal patterns. Bone's capacity as an overall indicator is limited by the fact that once plowed out of in situ context, it rapidly disintegrates in the plow zone, causing a more restrictive distribution that is more tightly correlated spatially with subsurface facilities. Bone is, therefore, the best predictor of intact features.

Lithics and projectile points were generally more constricted spatially, and it appears that each category partially reflects at least a primary or de facto context. This pattern is particularly apparent with the debitage that was distributed between or inside the structures located outside the area of the heavy secondary dumping along the inner palisades. It is suggested that lithic tool manufacture or maintenance took place in these areas, with no concerted efforts made to clean up the waste and residue. As a result, many of the flakes entered the record in a de facto or primary context. The projectile point distribution is somewhat similar, though not as clear. Many of the lithics and projectile points also entered the record in secondary context as indicated by the density peaks in the area along the inner palisades. These specimens were probably cleaned up coincidentally with the more obnoxious garbage and redeposited.

The areas between the palisades, the plaza, as well as the houses, were generally clean except for the beforementioned debitage concentrations. This pattern is similar to that described by Binford at Hatchery West (Binford et al. 1970). It might be that the artifact distribution patterns and the resultant refuse disposal modes isolated at Warren Wilson reflect a broader pattern of Pisgah refusal disposal. The confirmation of such a pattern, however, will require a tremendous amount of work at other Pisgah villages.

CHAPTER V

SPATIAL DISTRIBUTIONS AT UPPER SAURA TOWN, $Sk^{v}1a$

Excavations and Site Description

In order to provide a background against which the Warren Wilson research could be compared and contrasted, plow zone and feature data from a Piedmont Siouan village were subjected to the same type of spatial analysis. The site, $Sk^{v}1a$, is located in southeastern Stokes County on the west bank of the Dan River (Plate XXV). It is one of a cluster of sites believed to be related to the early eighteenth century village of the Sara Indians usually referred to as Upper Saura Town (Wilson 1977). This cultural complex has been termed the Dan River phase, and it is closely related to the Clarksville and Occaneechi complexes (Coe, personal communication).

As a consequence of intense potting activity, the Research Laboratories of Anthropology began extensive excavations at the site in 1972. This work is continuing today. This chapter will deal only with the excavations conducted through 1976. Included are the results from some 10,800 square feet of excavation that were subjected to the same exacting techniques as the Warren Wilson

site. All the plow zone sediment was screened through 1/2 inch hardware cloth, while feature contents were wet screened through through mesh 1/16 inch.

The overall stratigraphy at Upper Saura Town is somewhat simpler than that at $Bn^{v}29$. At $Sk^{v}1a$ the plow zone sometimes overlies a thin humus zone that is nonexistent in other areas of the site, especially in the western section toward the center of the field (Plate XXVI). Intruding through this humus are numerous postholes and features that continue into the yellow clay alluvium comprising a B_1 horizon. There are no intact "living floors", as the plow has truncated the original surface to an average depth of approximately eight inches. However, as one moves toward the river, the deposits become deeper as a result of plowing practices and recent overbank deposition. Some of the squares closest to the river that were laid out along the levee show the Saura occupation to be buried by as much as six feet (Wilson 1977: Plate XIII). Obviously, plow zone contents in this area would be a poor predictor of in situ deposits buried so deeply. For this reason, none of these units were used in the present analysis. The general depositional pattern at $Sk^{v}1a$ is not unique and should serve as a warning to those who hazard settlement pattern reconstructions without deep testing alluvial bottoms (cf. Chapman 1977).

In contrast to $Bn^{v}29$, $Sk^{v}1a$ was apparently occupied by a single cultural group over a relatively short period of time, perhaps no

PLATE XXV
Overall View of $Sk^{V}1a$

PLATE XXVI
Typical Square at $Sk^{V}1a$, Features at the Base of the Plow Zone

more than a single generation. This occupation took place sometime during the early years of the eighteenth century and was terminated as the Siouan groups fled southward to escape the ever increasing pressures of white settlers.

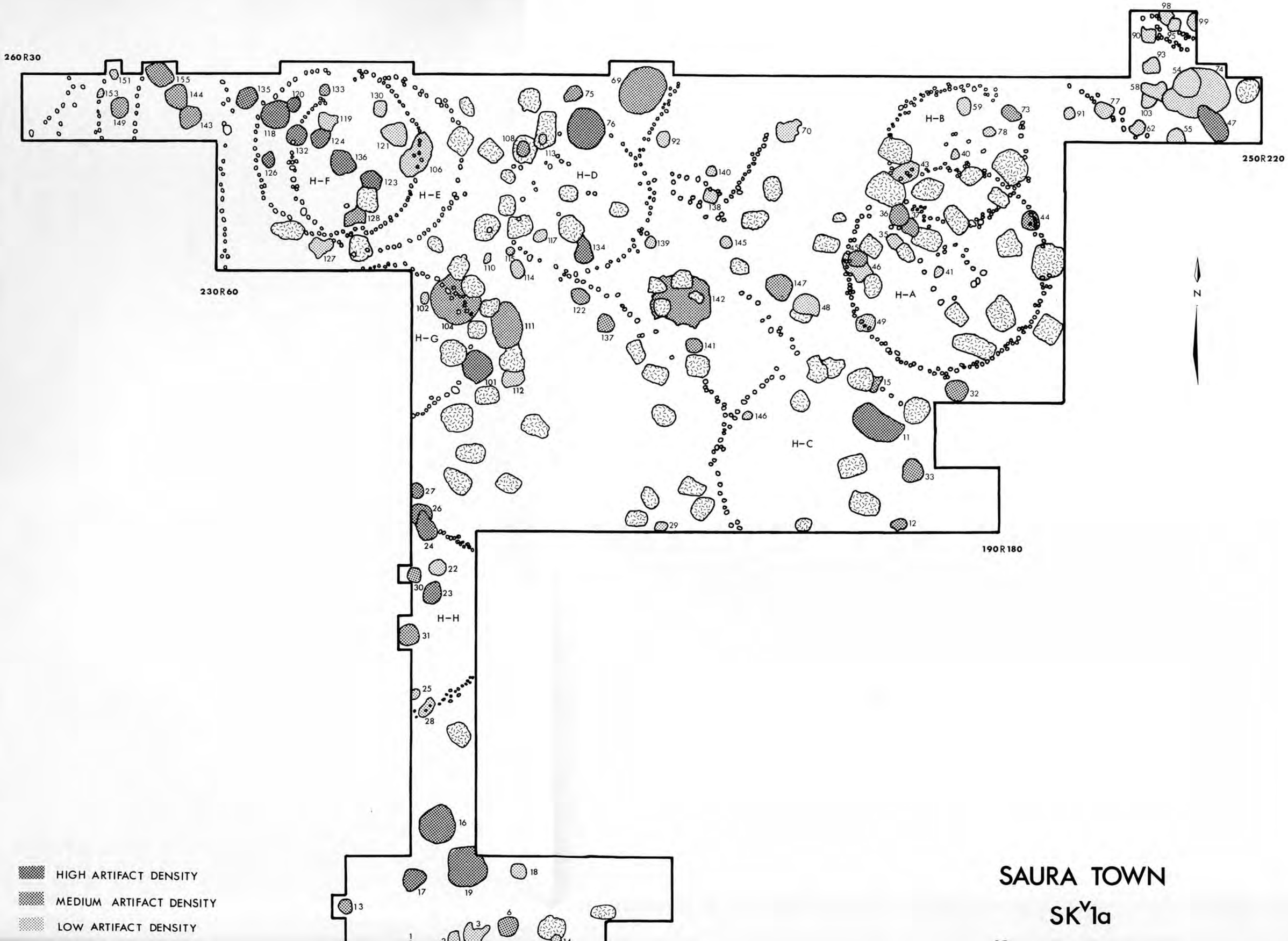
There are two striking characteristics of the site that are interrelated and should be mentioned for future reference. First, there is an impressive number of European trade objects, particularly glass beads. These beads have been found as decoration on clothing or as individual strands with almost every burial at the site. Other trade artifacts, also usually found with burials, include spoons, bracelets, brass gorgets, scissors, and hoes, as well as other items of colonial or European manufacture. Second, there is a large number and high density of burials indicating perhaps a more lethal European import, disease. It has been suggested, and with some seriousness, that no one left this site--they all died there.

A detailed study of the skeletal material is nearly completed and will be published as a Master's Thesis (Navey, in progress). In addition, the Dan River phase will be the subject of a forthcoming Ph.D. Dissertation. For these reasons, and the fact that a detailed description of the site is beyond the scope of this study, the individual structures and features will be given only a summary description in order to present a comparative background for the Warren Wilson data.

The houses were labeled A through J to facilitate a discussion of the intra-site structure. The features were numbered consecutively in the field beginning with number one; however, there are gaps in this sequence for various reasons. Some numbers were assigned to pits that turned out to be burials; others were assigned to large postholes, and still others were assigned and later dropped. These have not yet been filled or were filled after 1976. One further note, more area has been opened since 1976, but because of cataloging short cuts, these data could not be used without devoting considerable time to re-quantifying some of the artifact categories. For example, much of the bone cataloged since 1976 was labeled only as "2 bags" or "1 vial" without actual counts or weights. Consequently, the artifact counts from these units could not be used, but since some of the in situ structure has been clarified by these additional excavations, from time to time the later work will be referred to.

Houses

Excavations through 1976 isolated 10 houses (Figure 38). These were invariably circular in form and averaged some 25 feet in diameter. Some were as large as 30 feet, while others were as small as 20 feet. The postholes were usually at least .5 foot deep and a few extended as deeply as 1.5 feet below the base of the plow zone. The depth depended to a large degree on where they were


260R30
250R220
230R60
190R180
H-A
H-B
H-C
H-D
H-E
H-F
H-G
H-H
N
HIGH ARTIFACT DENSITY
MEDIUM ARTIFACT DENSITY
LOW ARTIFACT DENSITY
SAURA TOWN
SK^V1a

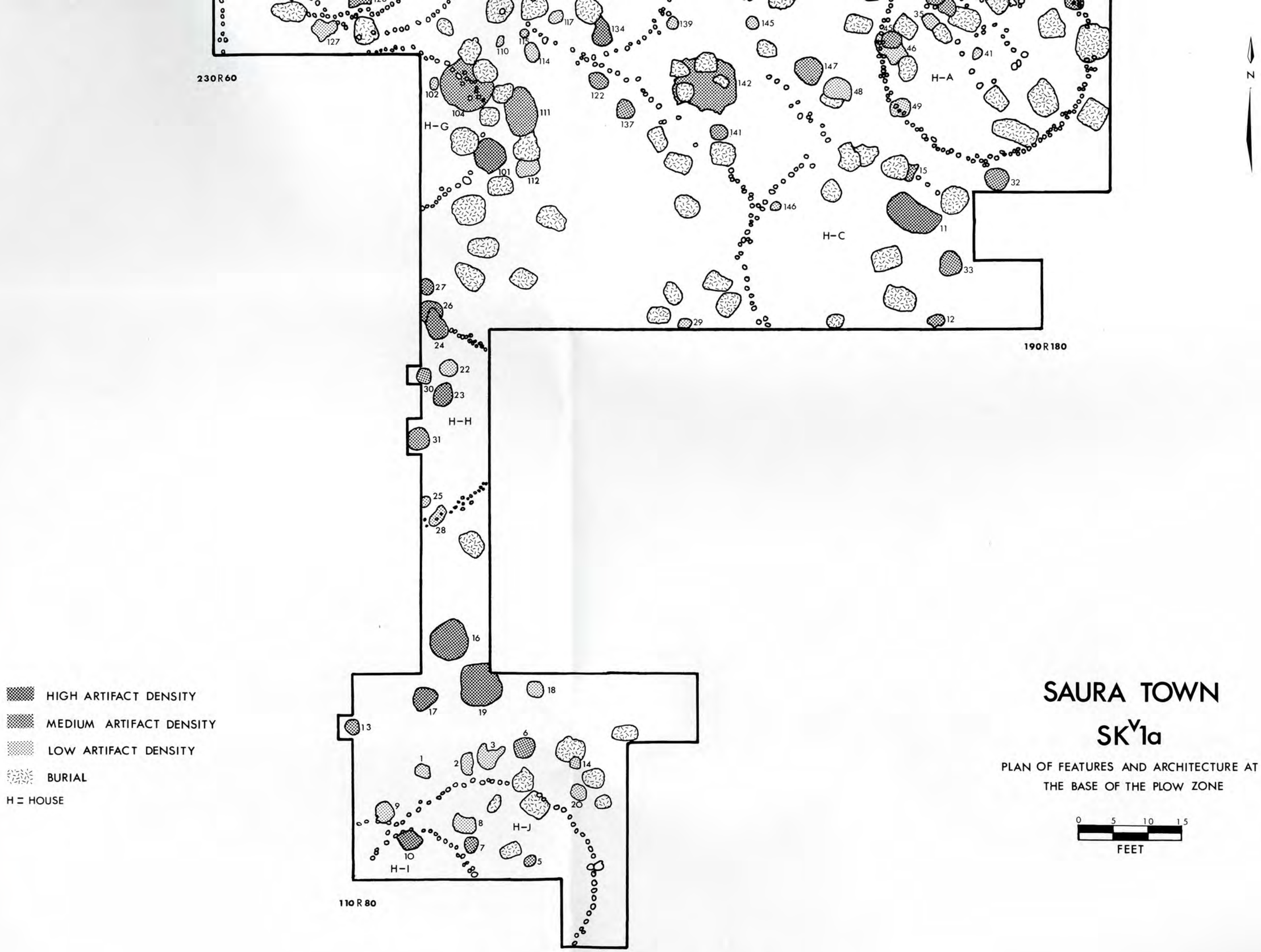

230R60
190R180
110R80
H-A
H-C
H-G
H-H
H-I
H-J
HIGH ARTIFACT DENSITY
MEDIUM ARTIFACT DENSITY
LOW ARTIFACT DENSITY
BURIAL
H = HOUSE
N
SAURA TOWN
SK^V1a
PLAN OF FEATURES AND ARCHITECTURE AT
THE BASE OF THE PLOW ZONE
0 5 10 15
FEET

Figure 38

located on the site. As a general rule, the more western postholes were shallower because dirt had been plowed out of this area and moved to the edge of the field along the river bank. This area of the site has also received less overbank deposition. Still there was considerable variation in posthole depth even within a single structure.

In contrast to Warren Wilson, a waddle and daub facade covered the walls, which were formed by tightly spaced posts seldom more than .5 foot apart. There was no evidence of entryways associated with any of the houses. This was probably due to the fact that entry gaps in the walls were obliterated by superimpositions and intrusions.

Center posts have been reportedly associated with one structure, but they have not been found with any of the others. The posts reported were no larger than the wall posts, raising some doubt as to their supporting role in the structure. It is currently believed that a bower type construction was used, with the upper sections of the wall saplings simply pulled together and tied to form the probably thatched or bark covered roof (Coe, personal communication).

Large storage pits were usually found inside the houses, but some have also been located outside structures. Burials, too, sometimes occurred inside houses, but most often they were located outside. Without some overlap and superimposition on the part of the postholes comprising the structures and the features and

burials, it is impossible to say with certainty that any two architectural components were contemporaneous.

Except for the Waddle and daub walls and the closely spaced wall posts, these houses conform well to those described by John Lawson, who was in the area in 1701.

> These Savages live in Wigwams, or Cabins built of Bark, which are made round like an Oven, to prevent any Damage by hard Gales of Wind. They make the Fire in the middle of the House, and have a Hole at the Top of the Roof right above the Fire, to let out the Smoke. These Dwellings are as hot as Stoves, where the Indians sleep and sweat all Night. The Floors thereof are never paved nor swept, so that they have always a loose earth on them (Lawson 1967:180).

In describing the construction of the houses, Lawson states that:

> In building these Fabricks, they get very long Poles, of Pine, Cedar, Hiccory, or any Wood that will bend; these are the thickness of the small of a Man's Leg, at the thickest end, which they generally strip of the Bark, and warm them well in the Fire, which makes them tough and fit to bend; afterwards, they stick the thickest ends of them in the Ground, about two yards asunder, in a Circular Form, the distance they design the Cabin to be, (which is not always round, but sometimes oval) then they bend the tops and bring them together, and bind their ends. . . then they brace them with Poles to make them strong; afterwards, cover them all over with Bark, so that they are warm and tight, and will keep firm against all the Weathers that blow (Lawson 1967:182).

In addition to the circular houses, two rectangular constructions have also been isolated. One intersected House D from the northeast and consisted of an almost square area roughly 13 feet long and enclosed on three sides. The northeastern end was open. Its exact function is unknown, but it may have served as some kind of shed or

pen. The other construction consisted of a parallel line of posts between Houses D and C. One of the lines connected the two structures, extending a distance of 33 feet. The other line did not run the full distance between the houses but extended some 15 feet northwest of House C. The lines were 14 feet apart in the area of House C, and in appearance, the configuration is very similar to the construction extending from the northeast area of House D. It is unclear if or how these posthole patterns articulated with the structures. It is not known whether they actually connected the two houses or were part of a separate facility associated only with House D.

Features

There were six classes of features represented at $Sk^{v}1a$ that reflect functional differences. Five of these were the same as those previously discussed at $Bn^{v}29$: storage pits, roasting pits, borrow pits, unused burials, and clay hearths. In addition, there were some pits that appeared to have been dug for the primary purpose of refuse disposal (Table 10). In discussing the features, the general characteristics will be described, and one specific unit from each class that typifies these characteristics will be discussed in detail. It should be added that twelve features from the site were the subject of a recent ethnobotanical study and have been described in some detail. Included were Features 11, 22, 23,

Table 10. Upper Saura Town Feature Type Frequencies

Borrow Pits	Storage Pits	Refuse Pits	Clay Hearths	Earth Ovens	Burials Without Human Bone
1	6	5	22	11	29
2	10	7	40	19	33
3	12	16	41	32	35
8	13	42	65	47	
9	15	120		69	
14	17	132		76	
18	23	133		101	
20	24	149		111	
25	26			142	
43	27			143	
46	28			144	
55	30			147	
58	31				
59	36				
75	37				
77	44				
78	45				
90	48				
91	54				
93	62				
95	70				
98	73				
102	74				
106	92				
110	99				
112	103				
113	104				
115	108				
119	114				
121	117				
124	118				
127	122				
130	123				
138	126				
139	128				
140	134				
145	135				
146	136				
151	137				
153					
Total 40	39	8	4	12	3

47, 50, 52, 60, 63, 65, 92, 108, and 111 (Wilson 1977). Of these, two (Features 60 and 63) were located on the eastern edge of the site in an area not covered by the current research and one (Feature 108) represented slump over a burial and is also not included in the present study. The nature of these features is described in the above reference in some detail and will not be repeated here.

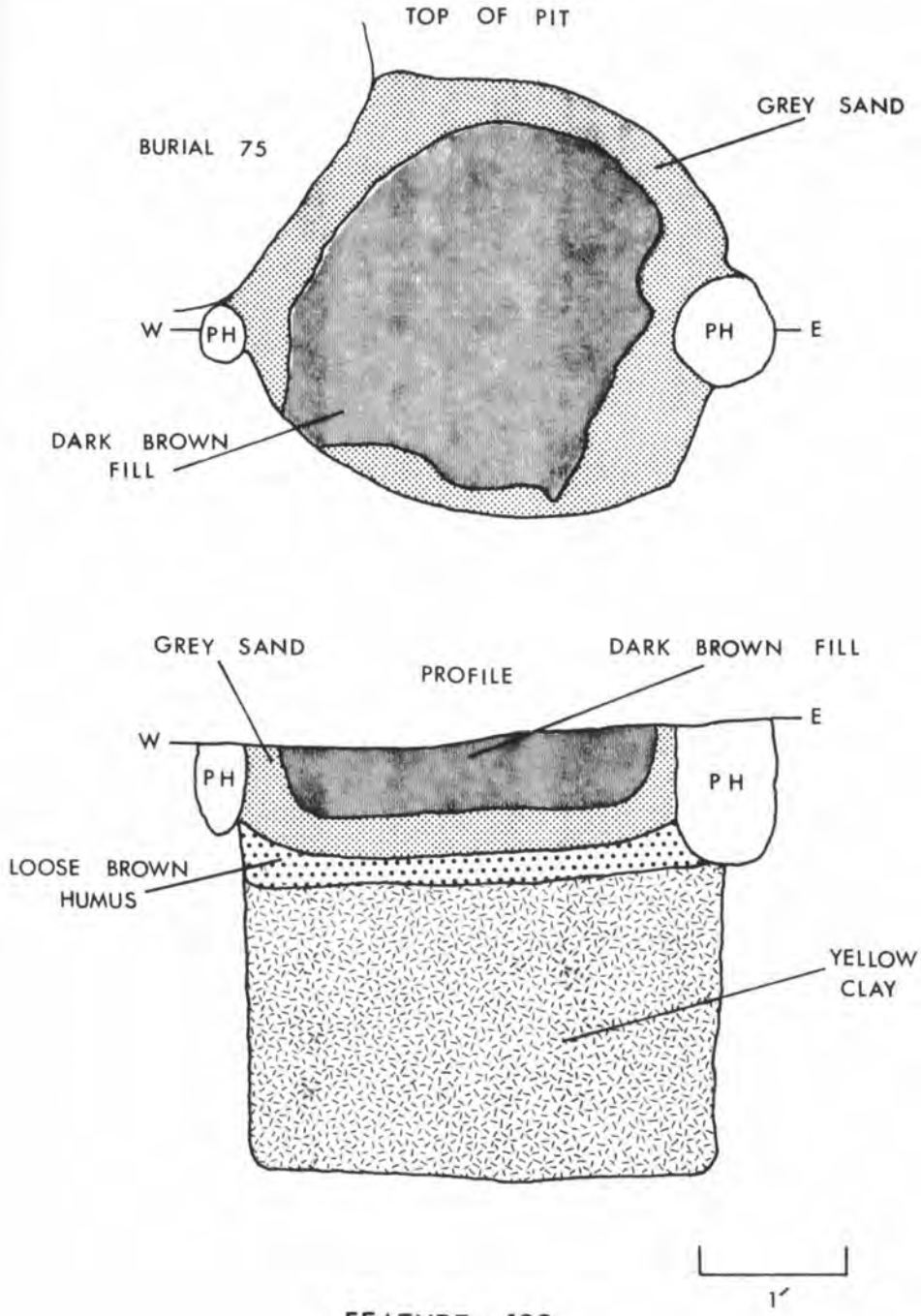
Storage Pits. These features tied with borrow pits as the most frequently occurring class at the site (Table 11). There were thirty nine in all, and they are one of the more distinguishing traits at the site. Although there was considerable variation among the different pits, they also shared a number of important characteristics. In outline, they were circular and ranged from a little over two feet in diameter up to 4.5 feet. The sides were usually straight but some flared outward at the bottom, producing the well documented bell-shaped profile. Depth below the base of the plow zone varied from no more than a foot to over four feet. The average storage pit was around three feet in diameter and three feet deep. Another trait that most shared was the fact that they had been refilled with refuse. This refilling usually required several dumping episodes creating a stratified matrix of fill. Layers of soil containing varying kinds and amounts of refuse were dumped into the pits at different intervals. Their overall artifact output was high except in a few cases where the storage pits were not recycled as garbage receptables.

Table 11. Upper Saura Town Feature Output--Storage Pits

Feature Number	Primary Location	Ceramics	Bone	Lithics	Projectile Points
6	120R110	75	170	37	0
10	110R90	450	609	78	10
12	190R170	84	280	19	0
13	130R90	52	155	21	0
15	210R170	151	23	31	9
17	130R100	253	109	85	3
23	180R100	301	558	89	20
24	190R100	481	817	68	5
26	190R100	105	35	25	1
27	190R100	104	74	19	0
28	160R100	13	24	7	0
30	180R100	39	0	8	0
31	170R100	290	511	104	14
36	230R170	369	10	51	4
37	230R170	0	35	0	3
44	230R190	39	20	75	1
45	230R160	214	45	31	0
48	220R160	229	25	35	3
54	250R210	91	11	15	0
62	250R210	24	0	1	0
70	250R150	1	0	2	0
73	250R190	174	0	5	0
74	250R220	19	0	8	0
92	250R130	103	7	14	1
99	260R210	34	1	9	2
103	250R210	31	5	32	1
104	220R100	296	178	44	6
108	240R110	147	5	6	1
114	230R110	43	5	3	0
117	230R110	12	0	12	0
118	250R70	282	50	73	19
122	220R120	107	12	6	1
123	240R90	213	210	34	4
126	240R70	246	235	50	16
128	230R90	145	85	34	2
134	230R120	738	195	72	10
135	250R70	542	200	110	11
136	240R80	484	667	212	20
137	220R120	472	55	63	8

Since the fill was usually layered and between the layers there were no unconformities due to erosion and other natural disturbances, the pits were evidently kept covered after they no longer served as storage facilities. It appears that as the storage pits were emptied of their contents, they were refilled with garbage as the need arose. New storage facilities were dug on occasion, and there were probably several of these features in various stages of use and re-use associated with individual or groups of structures. As stated previously, some were located inside houses, while others were apparently located on the outside. These spatial distinctions probably reflect functional variabilities, but at present the nature of this variability is unclear. In fact, it may never be apparent because of the near impossibility of establishing contemporaneity and identifying spatial relationships of association.

A typical storage facility was Feature 123, located within the overlap between Structures E and F in Square 240R90 (Figure 39). It was intruded by Burial 75 and two postholes. In outline the feature was nearly circular and measured 3.6 feet east-west by 3.3 feet north-south (Plate XXVII, XXVIII). It extended to a depth of three feet below the base of the plow zone. The fill was comprised of four distinct strata. The first zone contained a dark mottled brown soil that overlay a grey sandy layer. The sand, in turn, covered a relatively thin band of loose brown humus which covered a more compact, thick layer of mottled yellow clay. The



FEATURE 123

Figure 39

PLATE XXVII
Feature 123 at $Sk^{v}1a$ at the Base of the Plow Zone

PLATE XXVIII
Feature 123, Completely Excavated

mottled clay extended to the bottom of the pit. In addition to the specimens listed in Table 11, the feature produced one bifacially worked tool, six clay pipe fragments, one bone fish hook, one bone awl, three antler tine drifts, and a number of mussel shells and charred plant remains, including two corn cobs. Trade items consisted of a gun flint and several glass beads. The majority of these specimens were recovered from the brown humus matrix, although all the zones produced materials.

Evidently, the pit was almost completely filled with the mottled clay soon after it was emptied of its stored contents. Potsherds, animal bone, and other refuse were mixed in with the clay, but not in concentrated amounts. At this point, it seems that the primary objective was simply to fill the hole. After the clay was deposited, a thin but rich layer of refuse was dumped in, then covered with a layer of sand containing very little cultural material. Apparently, the sand was laid down to cover the noxious contents in the brown humus. The final dark brown mottled layer resulted as the fill settled and represents slump that collected in a fortuitous manner from the general village refuse.

Borrow Pits. There were also forty features assigned to this category which in some ways is a catch-all term (Table 12). These pits may represent clay mining activities. There was much variety in size and shape, but they usually contained very little cultural remains when compared with other features. They were never as deep or as regular as storage pits, although in a few

Table 12. Upper Saura Town Feature Output--Borrow Pits

Feature Number	Primary Location	Ceramics	Bone	Lithics	Projectile Points
1	120R100	87	60	7	0
2	120R100	29	43	4	0
3	120R100	40	22	2	0
8	110R100	32	58	29	1
9	110R90	59	0	12	2
14	120R120	1	17	0	0
18	130R110	19	16	4	0
20	120R120	28	0	0	0
25	160R100	3	0	0	0
43	230R190	38	0	5	0
46	230R160	0	0	0	0
55	250R210	29	1	2	0
58	250R210	30	9	0	0
59	250R180	24	0	2	1
75	250R120	5	0	2	0
77	250R200	48	0	4	1
78	250R180	3	0	0	0
90	260R210	7	0	2	0
91	250R200	10	0	10	0
93	260R210	14	6	3	0
95	260R210	13	5	2	0
98	260R210	12	6	0	0
102	220R100	30	4	3	0
106	240R100	2	15	0	0
110	230R100	15	0	0	0
112	210R110	85	108	0	0
113	240R120	0	20	0	0
115	230R110	8	4	0	0
119	250R80	10	5	1	0
121	250R90	19	20	10	0
124	250R80	58	25	27	0
127	230R80	75	40	14	1
130	250R90	4	0	1	0
138	240R140	0	0	1	0
139	230R130	3	0	0	0
140	240R140	7	2	0	0
145	230R140	17	5	1	2
146	200R160	1	0	0	2
151	250R50	2	5	0	0
153	250R50	14	5	2	1

instances they were quite large, measuring up to six feet in length, 3.5 feet in width, and .5 foot in depth. The fill from these features was usually homogeneous and appeared to represent general village surface soil used to cover the holes after the clay was removed. In all likelihood, this soil filled these features in a random, natural fashion. The borrow pits were located in almost all areas of the site in a seemingly unpredictable pattern. They were inside houses, outside houses, and between houses. The large amounts of daub at the site were no doubt responsible for the profusion of the borrow pits.

A typical example was Feature 3. It had an irregular ovoid outline that measured 3.5 feet north-south by 3.4 feet east-west. Its maximum depth from the base of the plow zone was a little less than .5 foot. It had an uneven bottom and contained a uniformly brown, gravely fill that produced a relatively small amount of cultural remains. The feature was intruded by several postholes and lay just outside the wall of House J and was in line with two similar installations, Features 1 and 2. Except for two clay pipe fragments, there were no artifacts recovered in addition to the specimens listed in Table 12.

Roasting Pits. These features were large, usually shallow, and had a circular to ovoid shape. They were at least four feet across and rarely over .7 foot in depth. The fill from the ovens was the richest of any of the features (Table 13). Invariably, wood charcoal and often large amounts of carbonized plant remains,

Table 13. Upper Saura Town Feature Output--Roasting Pits

Feature Number	Primary Location	Ceramics	Bone	Lithics	Projectile Points
11	200R170	711	59	23	7
19	130R100	289	491	47	4
32	210R180	50	30	13	3
47	250R220	583	130	52	14
50	250R220	422	115	138	20
69	250R130	416	5	217	3
76	250R120	688	391	111	10
101	210R100	396	365	33	4
111	220R110	183	105	6	0
142	220R140	123	0	5	0
143	250R60	85	105	7	0
144	250R60	395	60	24	3
147	220R150	131	5	2	0

including corn, beans, squash, peach pits, and nut shell were recovered. In addition, burned cane fragments were frequently found (Wilson 1977:31-51). Firecracked rock was scattered through the fill and an occasional lump of unfired clay was encountered along with numerous pot sherds. In general the fill was homogeneous, but in some cases different strata were defined on the basis of the frequency of occurrence of such items as ethnobotanical remains or animal bone.

These features probably represent the bottoms of roasting pits used in food preparation. This assessment is based on their size and shape and the fact that they contained large amounts of carbonized food remains. The fill was very distinct from that of the other features at the site, although some of the zones in the storage pits could easily evidence the cleaning of one of the roasting facilities. Because there was rarely any evidence of intense burning in the pits themselves, i.e. the bottoms and sides never showed evidence of firing, these pits were probably covered in some fashion and the fires kindled on top of the covers. Once the roasting of plant and animal foods was completed, the ovens were cleaned and re-used until cleaning was no longer feasible, or perhaps they were abandoned when the tops collapsed. This would account for the heavy accumulation of charred debris in the fill. It is also suspected that the large numbers of sherds were a consequence of these features also being used as kilns. Although a few roasting pits were located in or close to houses, most were

not associated with structures. More recent excavations have found them to be associated with the palisades around the edge of the villages, much like Features 47, 50, 144, and 143.

A typical example is Feature 76 intrusive into the wall of House D in 250R120 (Figure 40). This unit was almost circular and measured some 6.8 feet northeast-southwest by 5.6 feet northwest-southeast and was deeper than usual, extending .9 foot below the base of the plow zone (Plate XXIX, XXX). It contained two zones: a black humic fill with some yellow clay mottling above a brown clayish layer which was actually a transitional zone between the black fill and the yellow clay comprising the pit bottom. The sides sloped inward at the bottom and gave the feature an almost boat-shaped profile. The bottom was somewhat uneven and slightly deeper in the northeast quadrant. In addition to the specimens listed in Table 13, Feature 76 contained four pipe bowl fragments, several lumps of ocher, two glass beads, a copper bead, several bags of charred plant food remains, and a large quantity of daub.

Refuse Pits. There were eight features at $Sk^{v}1a$ that may have been dug for the primary purpose of burying garbage (Table 14). They were on the average not as large as the storage pits, usually measuring less than 3 feet across and less than one foot deep. These features were circular and had straight to insloping sides. The fill was homogeneous and usually rich in ethnobotanical and faunal remains. Many of the features may have been originally excavated as borrow pits and simply refilled with a handy load of trash. Except for the fact that they were

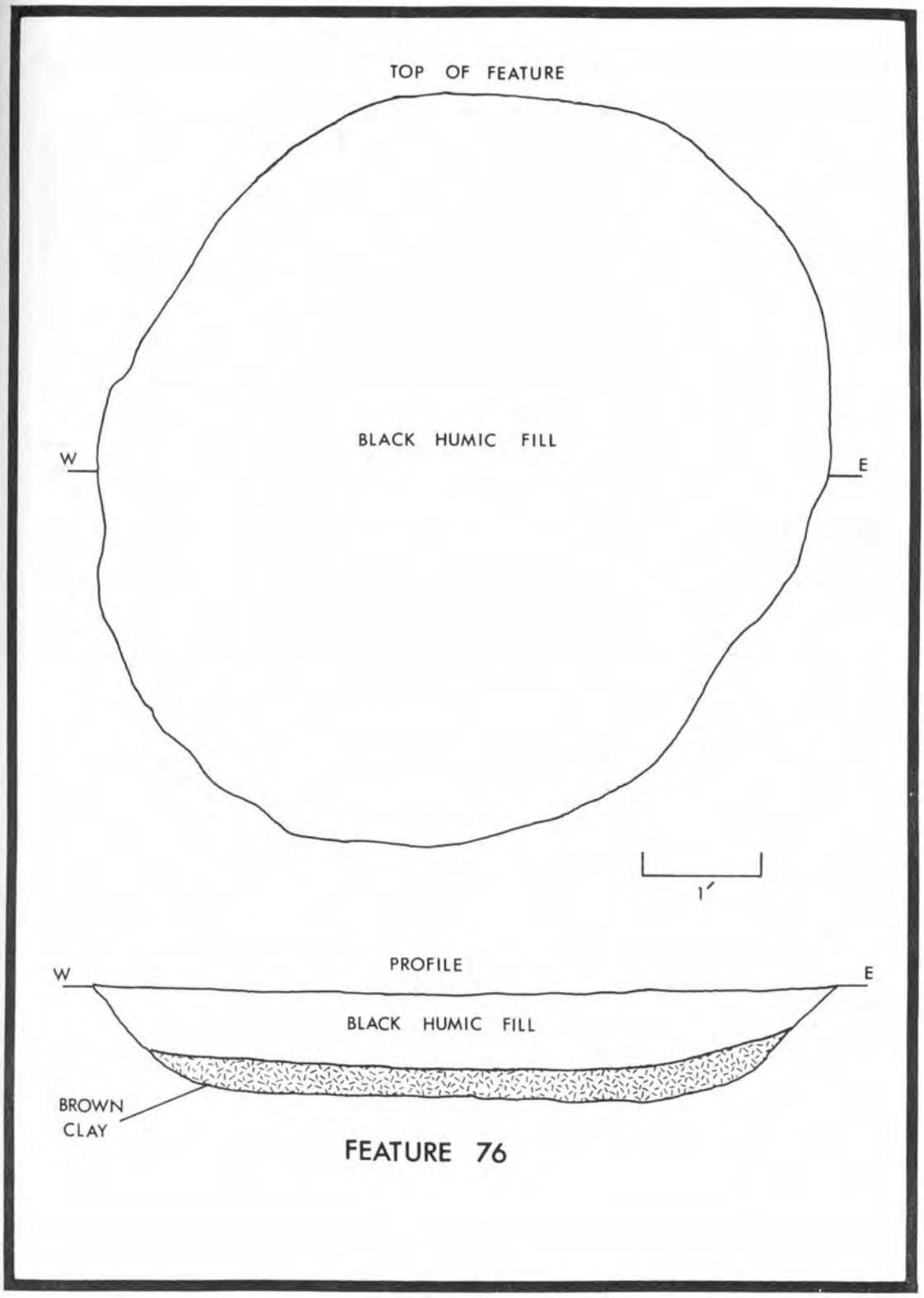

TOP OF FEATURE
BLACK HUMIC FILL
W
E
1′
PROFILE
W
E
BLACK HUMIC FILL
BROWN
CLAY
FEATURE 76

Figure 40

PLATE XXIX
Feature 76 at $Sk^{v}1a$ at the Base of the Plow Zone

PLATE XXX
Feature 76, Profiled

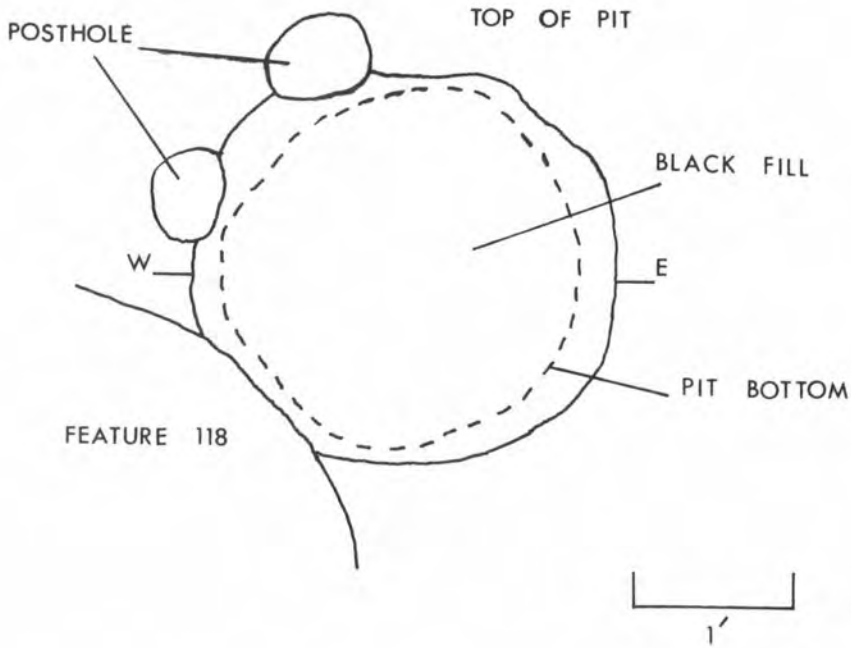
Table 14. Upper Saura Town Feature Output--Refuse Pits

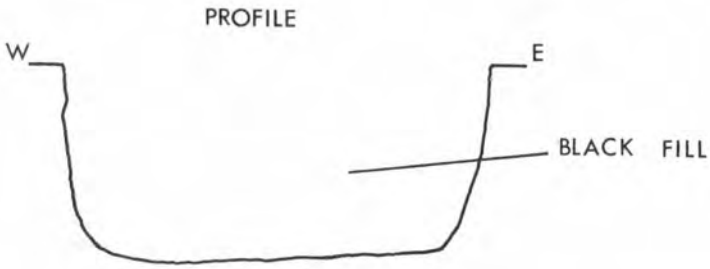
Feature Number	Primary Location	Ceramics	Bone	Lithics	Projectile Points
5	110R110	82	74	17	2
7	110R100	136	352	47	3
16	140R100	602	789	100	24
42	230R190	181	11	24	0
120	250R80	217	175	111	8
132	250R80	158	35	22	4
133	250R80	77	10	29	1
149	250R50	86	185	3	1

refilled in one episode soon after they were dug, little more can be said. Most of the pits were located inside houses, although it is not possible to say with certainty that they were contemporary with the structures.

Feature 120 was typical of this category, although it was a little deeper than usual (Figure 41). The feature was circular, 2.5 feet in diameter, and just over a foot deep (Plate XXXI, XXXII). It was intruded by Feature 118, a large storage pit, and two postholes. The feature contained a homogeneous matrix of loose black fill that yielded, in addition to the specimens in Table 14, a bifacial tool, 3 pipe bowl fragments, a rolled copper bead, 68 glass beads, mussel shell, and numerous plant food remains and daub. It was located in the northwest quadrant of House F and may have been associated with the structure and the large storage pit, Feature 118.

Burial Pits Without Human Bone. There were only three units assigned to this category (Table 15). These were pits that in terms of size and shape were identical to burial pits. They also had the shelves typical of the single axis shaft and chamber burials and the fill was usually a relatively sterile mottled yellow clay. The one instance where there was a lot of cultural material in the fill, Feature 33, resulted from midden slumping into the depression created by the burial cavity floating to the top of the pit. In all likelihood, these features were burials where all traces of bone had disappeared due to soil and moisture





FEATURE 120

Figure 41

PLATE XXXI
Feature 120 at $Sk^{V}1a$ at the Base of the Plow Zone

PLATE XXXII
Feature 120, Completely Excavated

Table 15. Upper Saura Town Feature Output--
Burials Without Human Bone

Feature Number	Primary Location	Ceramics	Bone	Lithics	Projectile Points
29	190R130	7	0	0	0
33	220R180	154	4	38	1
35	230R170	0	7	54	0

conditions. Since the burials are the subject of a study in progress, no attempt will be made here to discuss any of these features in detail.

Clay Hearths. Unfortunately, the hearths were usually plowed out of the structures; however, in four instances circular burned clay areas were isolated (Table 16). Three of these were located in or near the center of Houses A, B, and H, while a fourth was located in Square 250R210 and may be associated with a house pattern that has yet to be identified and excavated. Most of these hearth areas measured a little over two feet in diameter and in one instance, Feature 40, remnants of a collared basin remained. This feature measured 1.8 feet by 1.6 feet and the basin depth was .3 foot. No ash or other cultural remains were left intact.

Palisades

In addition to the structures and features, there is evidence of at least three palisade lines enclosing the village (Figure 38). These do not intrude the structures nor do they cross each other. There is the possibility that they were at least partially contemporary. Features were found between the palisades, and recent work has uncovered a series of roasting pits along the eastern palisade lines similar to the situation described at Warren Wilson.

Table 16. Upper Saura Town Feature Output--Clay Hearths

Feature Number	Primary Location	Ceramics	Bone	Lithics	Projectile Points
22	180R100	0	31	2	1
40	240R180	0	0	0	0
41	230R180	0	0	0	0
65	250R210	4	0	1	0

Artifact Distributions: The In Situ Structure

The procedures used to map the feature contents were the same as those described for $Bn^{v}29$. Each category, ceramics, bone, lithics, and projectile points will be discussed individually in terms of the various SYMAP distributions. The trend surface maps from the features are not included in this section, but they are reproduced in the appendices. As with the Warren Wilson data, an array of correlation coefficients was also calculated for the various categories from the plow zone and the features. These correlation coefficients generally reinforced the map data and aided in the comparison of the various maps.

Ceramics. In general, the contour map depicted a ceramic feature distribution that clustered in areas coinciding with the locations of houses (Figure 42). There was a dense pocket in the vicinity of Houses E and F that reflected output from features located within or adjacent to the structures (Appendix C). Houses D and G and the remaining structures were also characterized by feature densities surrounding them. In all cases, the features within or adjacent to the houses showed high ceramic output. Areas devoid of structures were also devoid of features with high ceramic content.

The third order trend surface map generally reflected high feature ceramic content in areas that contained houses (Appendix C). High density areas were indicated in the northwest, southeast, and

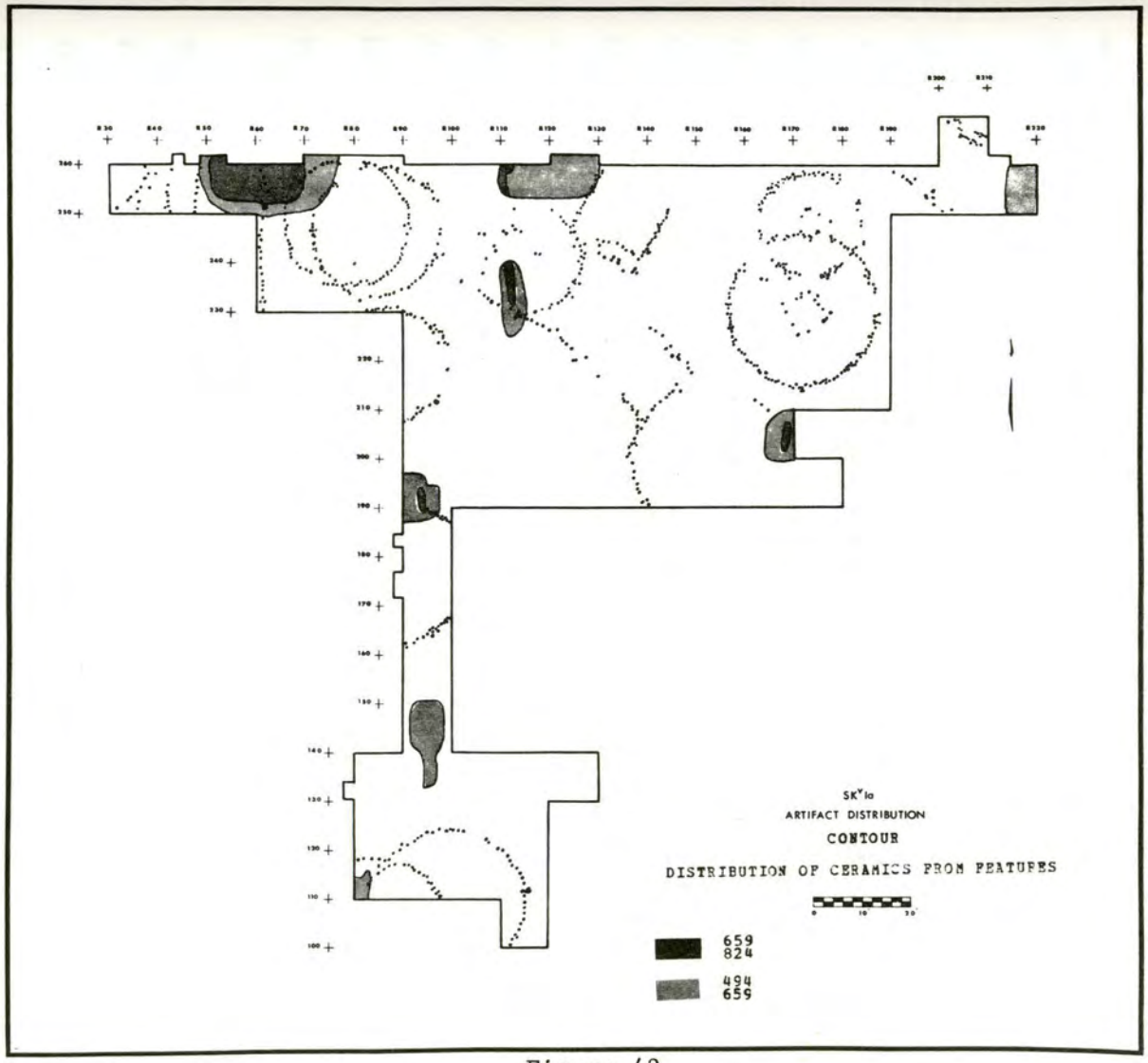

SK^V Ia
ARTIFACT DISTRIBUTION
CONTOUR
DISTRIBUTION OF CERAMICS FROM FEATURES
659
824
494
659

Figure 42

southern portions of the site. The areas between where houses were not located showed a low density trend. The residual map was identical to the contour plot except for the fact that the clusters were more defined and restricted (Figure 43). Again, it was obvious that the features with high ceramic content were located in the same general vicinities as the houses.

Bone. The contoured bone distribution was similar to that of the ceramics, but it was more restricted spatially (Figure 44; Appendix C). Except for a light concentration in the southeastern corner near House C, the structures in the eastern portion of the site were not typified by features with high bone output. This distribution contrasted with that of the western and southern sections where many of the units that peaked with ceramic output also peaked with bone content. This coincidence was also indicated by a relatively high correlation coefficient between the feature bone and feature ceramics, $r = 0.58$ (Table 17). The highest correlation, however, was between bone and projectile points, $r = 0.65$.

The trend surface clearly indicated the concentration of bone in the features from the western site area (Appendix C). Only from R100 westward were moderate to high contours plotted. The remainder of the trend surface depicted a uniformly light distribution. The residual map again picked up the same high points as the contour but also indicated a moderate concentration in features near Houses A and B (Figure 45; Appendix C).

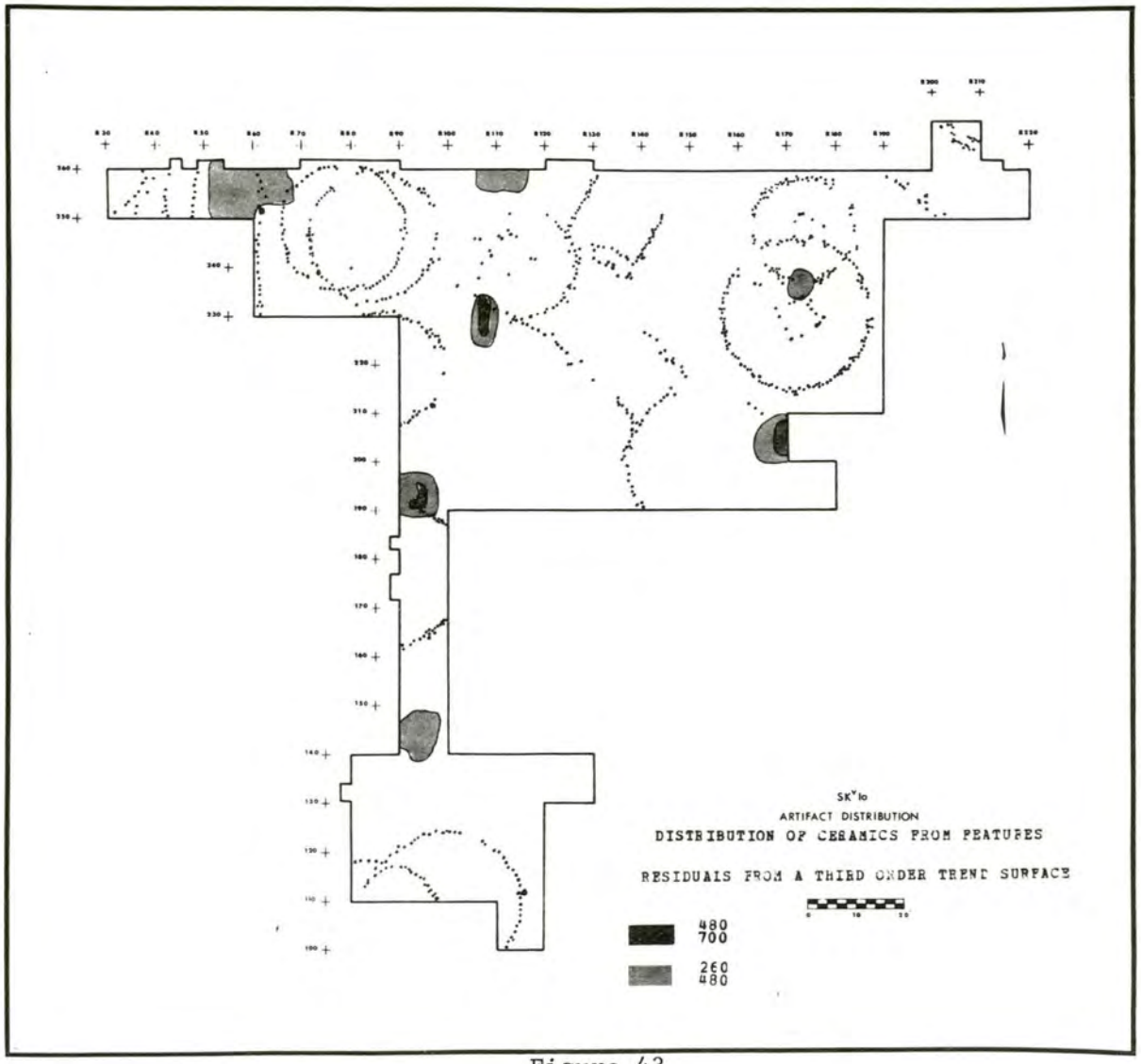

SK^Y lo
ARTIFACT DISTRIBUTION
DISTRIBUTION OF CERAMICS FROM FEATURES
RESIDUALS FROM A THIRD ORDER TREND SURFACE
480
700
260
480

Figure 43

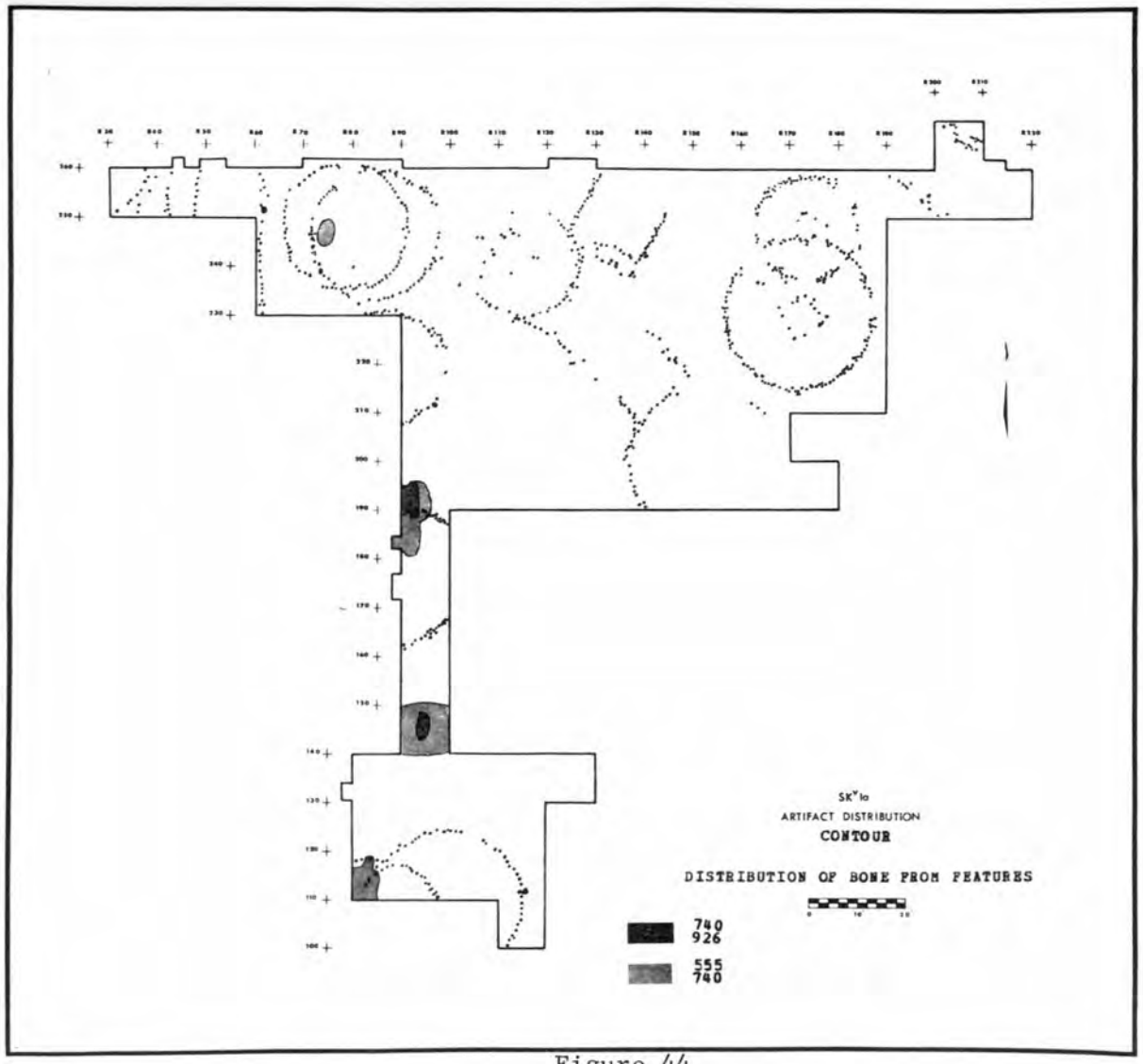

SK"Ia
ARTIFACT DISTRIBUTION
CONTOUR
DISTRIBUTION OF BONE FROM FEATURES
740
926
555
740

Figure 44

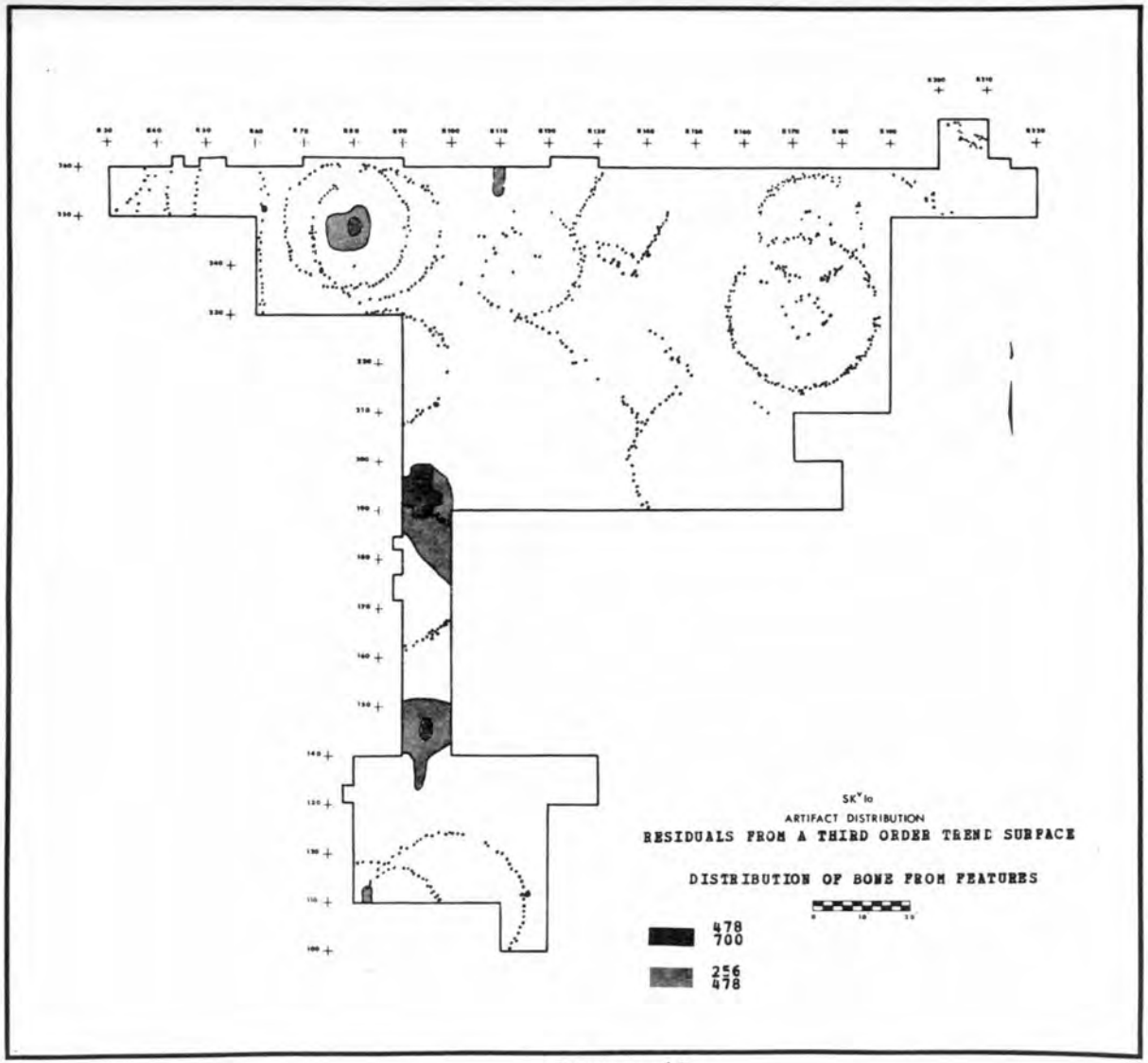

SK^Y Io
ARTIFACT DISTRIBUTION
RESIDUALS FROM A THIRD ORDER TREND SURFACE
DISTRIBUTION OF BONE FROM FEATURES
478
700
256
478

Figure 45

Table 17. Correlation Coefficients Between $Sk^{v}1a$ Plow Zone And Feature Variables
Feature Variables Denoted By F

	Ceramics	Lithics	Bone	CSPP	Ceramic (F)	Lithics (F)	Bone (F)	CSPP (F)
Ceramics	1.00	0.44	0.49	0.61	0.03	0.08	0.39	0.18
Lithics	0.44	1.00	0.35	0.52	0.11	0.27	0.34	0.36
Bone	0.49	0.35	1.00	0.40	0.23	0.31	0.43	0.53
CSPP	0.61	0.52	0.40	1.00	0.22	0.24	0.44	0.44
Ceramic (F)	0.03	0.11	0.23	0.22	1.00	0.72	0.58	0.73
Lithics (F)	0.08	0.27	0.31	0.24	0.72	1.00	0.58	0.70
Bone (F)	0.39	0.34	0.43	0.44	0.58	0.58	1.00	0.65
CSPP (F)	0.18	0.36	0.53	0.44	0.73	0.70	0.65	1.00

Nonetheless, those features with high bone output were located inside or adjacent to the houses in the western section of the site.

Lithics. The contoured distribution of the lithics from features was very similar to the other categories (Figure 46). The highest correlation was between lithics and pottery, $r = 0.72$ (Table 17). However, as with the bone there were ceramic concentrations that were not reflected by the lithic pattern. The peak at 200R170 was not duplicated nor was the concentration at 220R90 (Appendix C).

The third order trend surface showed the highest densities trending toward the northwest, southwest, and northeast corners. The remainder of the site exhibited a uniformly low spread (Appendix C). The residuals from this trend were almost identical to the contoured lithic pattern (Figure 47).

Projectile Points. The projectile point contour distribution was nearly identical to that of the bone and ceramic contours (Figure 48). The correlation coefficient, 0.73, between the ceramics and projectile points from features was the highest for any pair of variables from either site (Table 17). Except for concentrations at 220R90 and 230R190, all the ceramic peaks were duplicated in the projectile point distribution (Appendix C). The features in the vicinity of Houses E, F, I, and J were well represented, but as with the bone, the feature concentrations in the areas of Houses A, B, and C were not as productive.

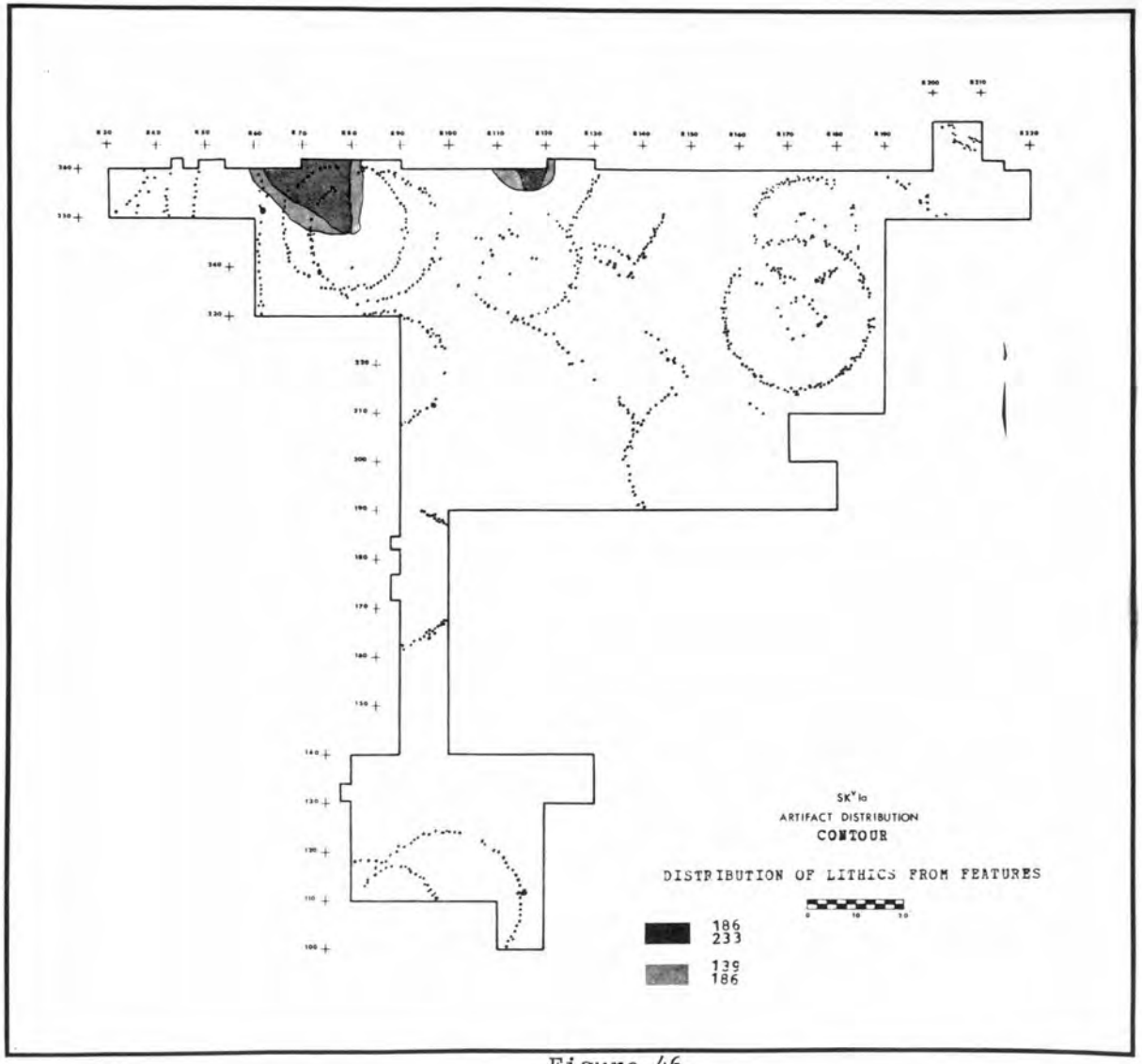

SK^V Ia
ARTIFACT DISTRIBUTION
CONTOUR
DISTRIBUTION OF LITHICS FROM FEATURES
186
233
139
186

Figure 46

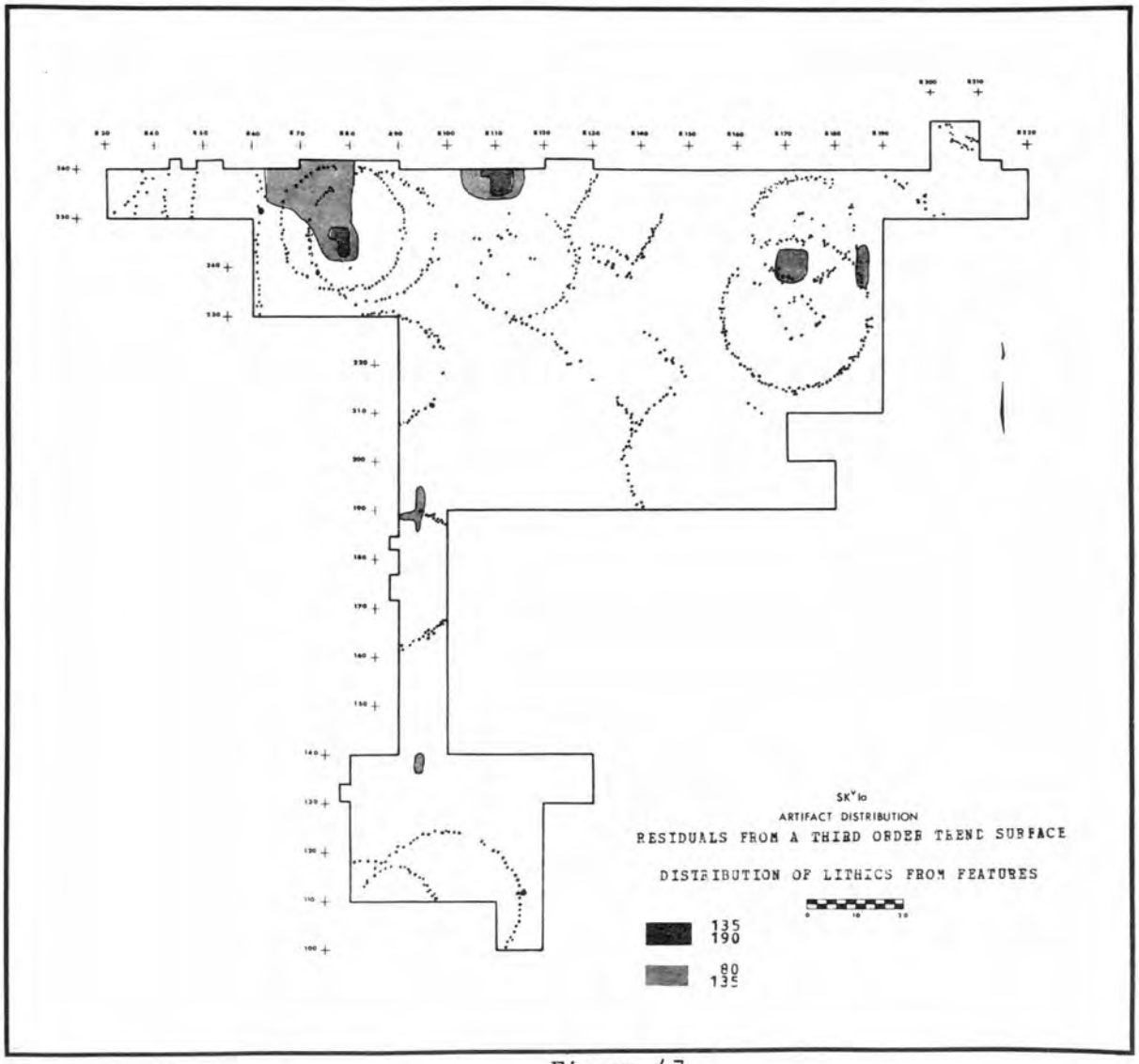

SK'lo
ARTIFACT DISTRIBUTION
RESIDUALS FROM A THIRD ORDER TREND SURFACE
DISTRIBUTION OF LITHICS FROM FEATURES
135
190
80
135

Figure 47

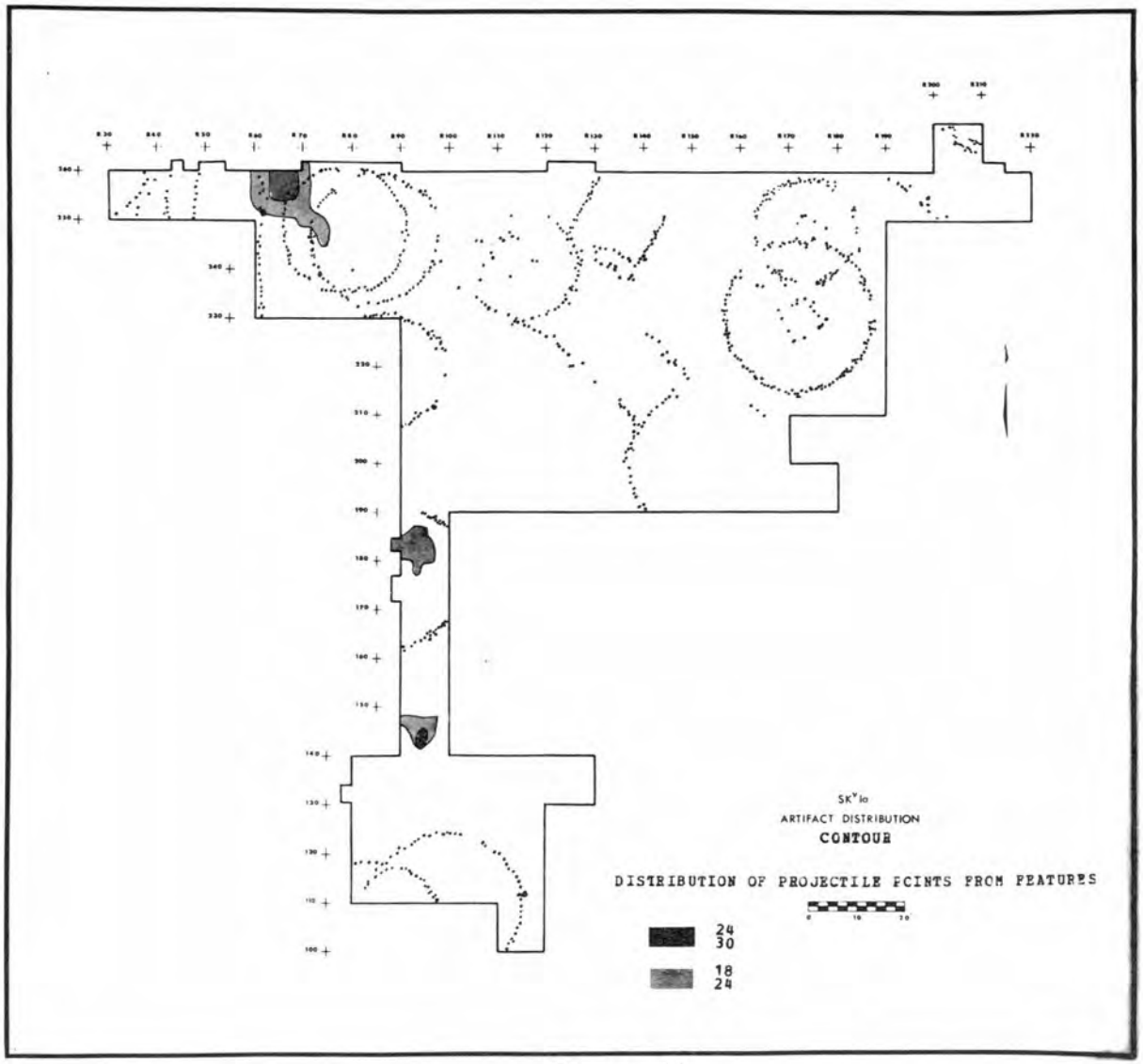

SK'Ia
ARTIFACT DISTRIBUTION
CONTOUR
DISTRIBUTION OF PROJECTILE POINTS FROM FEATURES
24
30
18
24

Figure 48

The third order trend surface very closely resembled that of the bone, indicating a heavier concentration of features producing projectile points along the western edge of the site (Appendix C). In addition, the trend showed higher concentrations in the northeast corner. The remainder of the site area was characterized by low density. The residuals from the trend plotted, in general, a distribution very similar to the contour map (Figure 49). But as with the other artifact classes, the residual map was more sensitive to variations and produced a more detailed plot (Appendix C). A concentration depicted at 220R90 was not evident on the contour map.

The most striking characteristic of all the maps was their similarity. Because of their large numbers and ubiquitous nature, it was not surprising that the ceramic map displayed the greatest amount of concentrations across the site. Bone was the most restricted in distribution, occurring almost exclusively in the western one third of the site. Still, the maps and the relatively high correlations among the different classes reflect a similar disposal mode for the various classes of refuse. Most of this material was in secondary context and resulted from cleaning debris from within and around the houses. This refuse was then dumped, for the most part, into empty storage pits. Some of the deposits in the roasting pits might be reflective of primary deposition, particularly the charred food remains, but again much of the residue probably represents garbage that was collected and dumped in, once the units were no longer being used for their primary function.

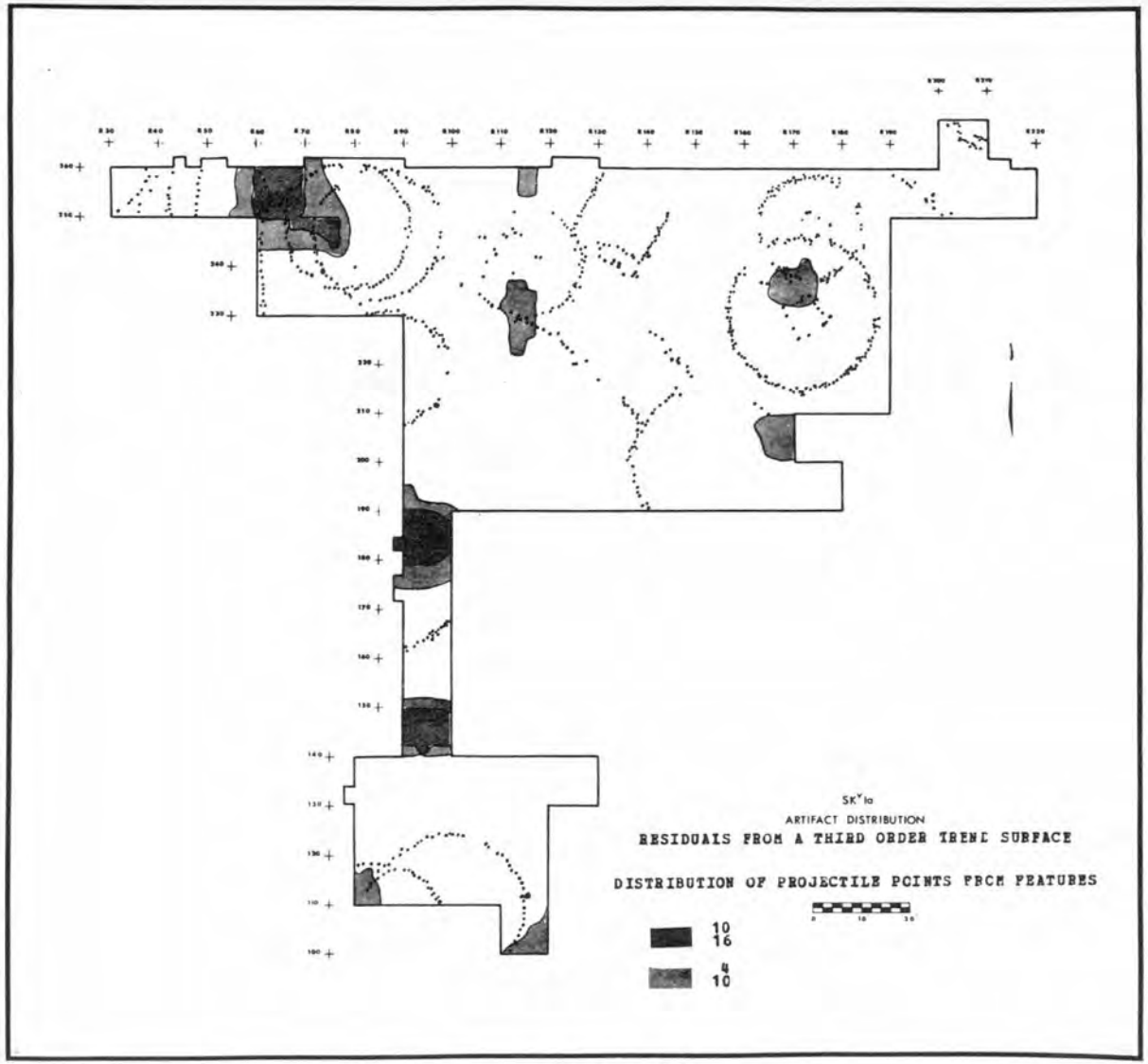

SK^Y 1a
ARTIFACT DISTRIBUTION
RESIDUALS FROM A THIRD ORDER TREND SURFACE
DISTRIBUTION OF PROJECTILE POINTS FROM FEATURES
10
16
4
10

Figure 49

The central part of the site was relatively free of features but did contain a large number of burials. This area was probably recognized as a cemetery and activity was limited here. The general lack of features with high outputs in the area of Houses A, B, and C when compared with the feature outputs from Houses E, F, and G, however, cannot be explained at this time.

Artifact Distributions: The Plow Zone Structure

Ceramics. The distribution pattern of the plow zone contour map was very similar to that of the feature map (Figure 50). The cluster of features in the area of Houses E and F were indicated, as well as Feature 16, a potted trash pit. Other features in the vicinity of Houses I and J were also visible in the plow zone. The only subsurface units in the western part of the site that were not visible were the storage pits just north of House H. Feature 11, located inside House C, and other facilities with high to moderate output inside House A were not evident from the plow zone pattern. The features in the northeast corner of the site were also invisible in the plow zone (Appendix D). Nonetheless, the correlation coefficient between the feature ceramics and the plow zone ceramics, $r = 0.03$, was surprising, given the general degree of similarity between the two mapped distributions. More will be said concerning the low r score later.

The trend surface map was also similar to the feature trend in that heavy densities were plotted in the western and southern parts of the site (Appendix D). It differed from the feature map

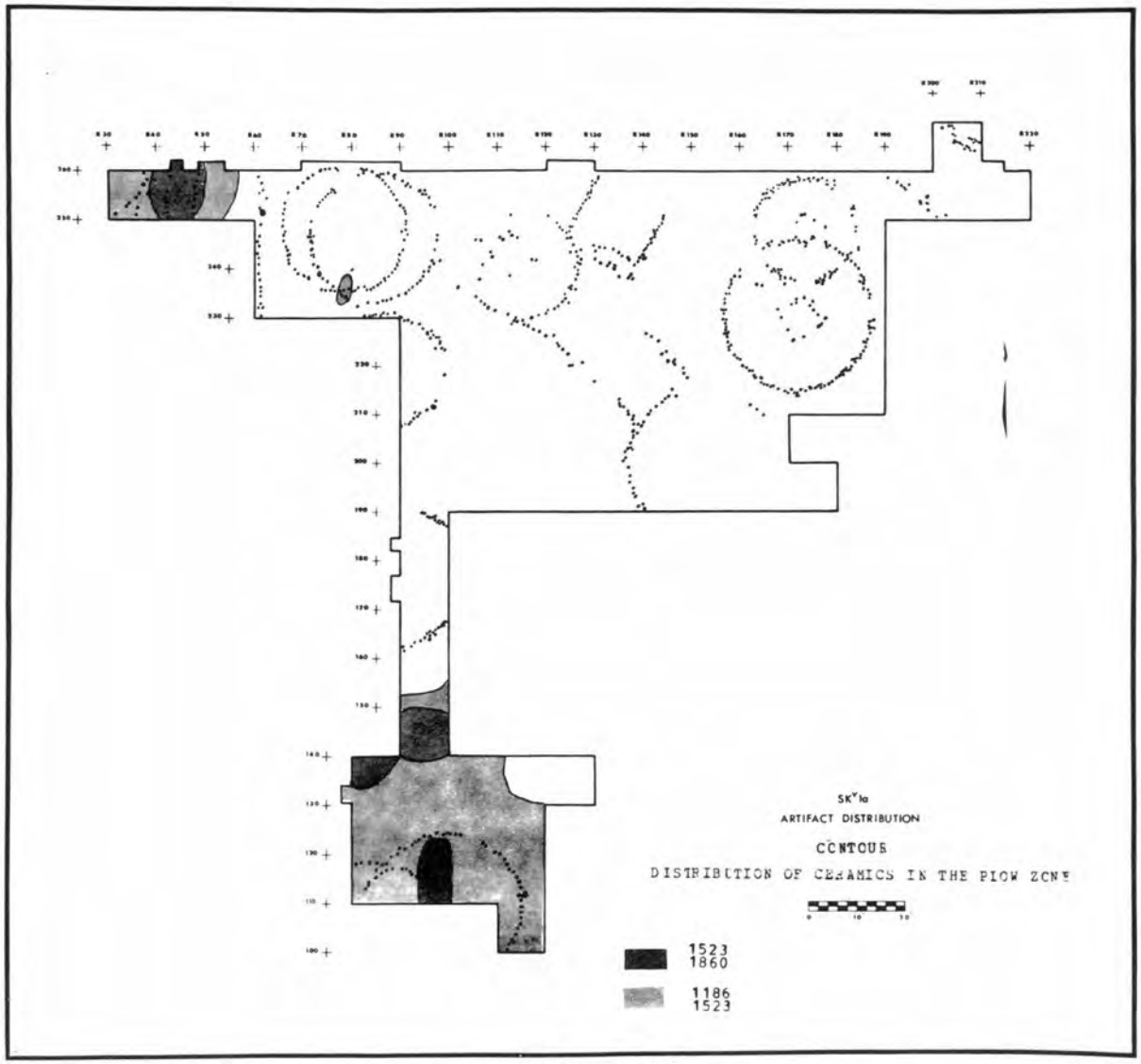

SK'la
ARTIFACT DISTRIBUTION
CONTOUR
DISTRIBUTION OF CERAMICS IN THE PLOW ZONE
1523
1860
1186
1523

Figure 50

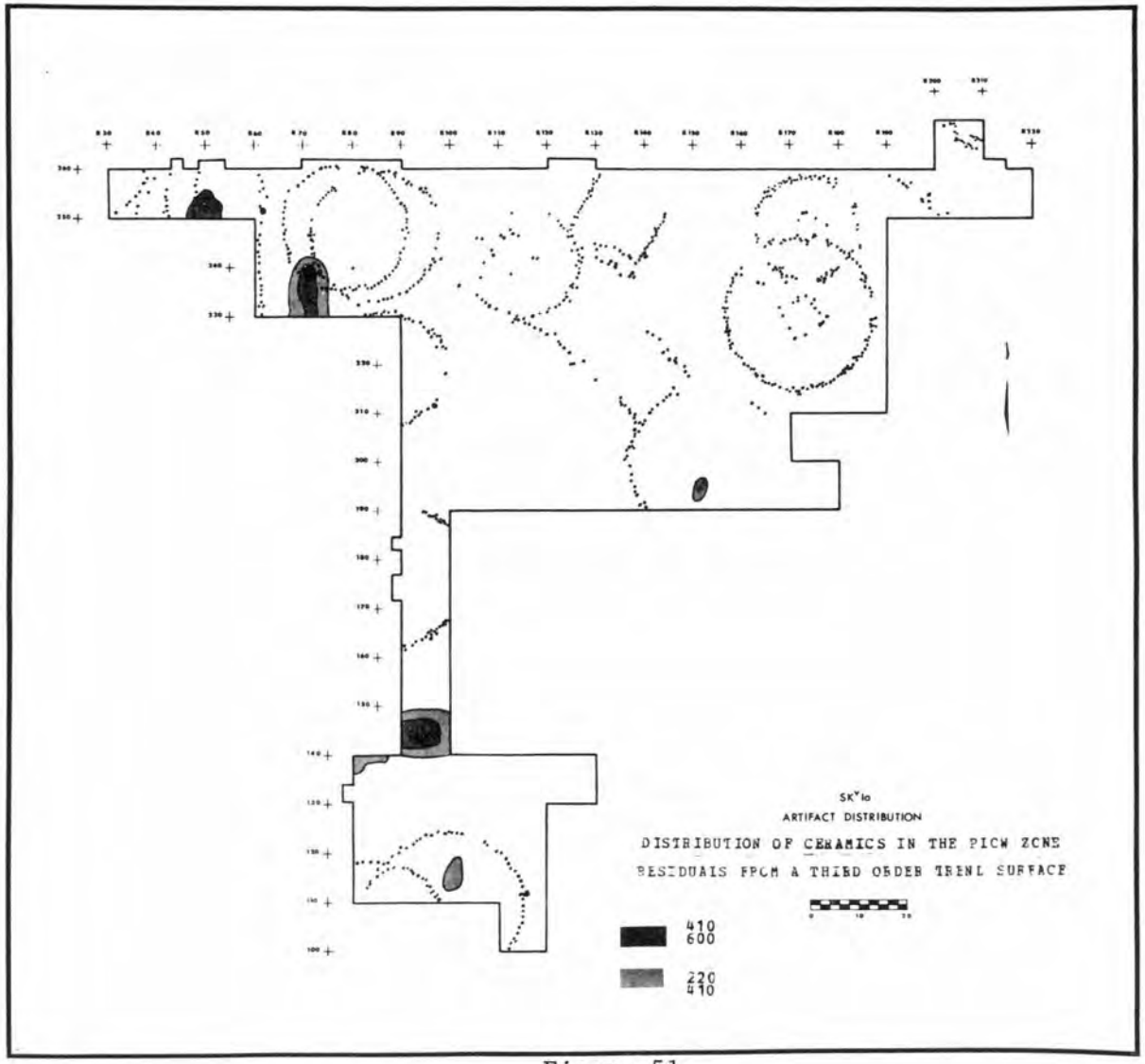

SK^Ia
ARTIFACT DISTRIBUTION
DISTRIBUTION OF CERAMICS IN THE PICW ZONE
RESIDUALS FROM A THIRD ORDER TREND SURFACE
410
600
220
410

Figure 51

along the eastern edge. Here a light spread was indicated as opposed to the density peak in the northeast corner of the feature trend surface.

The residual map, in contrast to the contour map, did reflect some densities in the eastern part of the site that roughly coincided with the peaks around House A that were plotted on the feature maps (Figure 51; Appendix D). A moderate peak was also indicated in the northeast corner, but the heavy concentration around Features 24 and 26 at 195R95 still was not picked up in the plow zone. Neither was the concentration associated with Feature 11. On the other hand, a heavy plow zone concentration was indicated at 235R75 in an area where the feature output was only moderate. Except for Feature 16, the spatial relationships between the patterns of concentrations in the plow zone and in the undisturbed subsoil were general and not specific. Part of the nature of this relationship results from the way the data were organized, i.e. features lumped by 10 foot units, but it is also a function of plow movement and disturbance.

Bone. The contour map showed a very close relationship between the locations of concentrations of bone in the plow zone and from the features (Figures 44, 52). The correlation coefficient between the bone from the two contexts, $r = 0.43$, was also relatively high (Table 17). All except one of the western peaks were indicated to one degree or another. The exception was a high density area in the southwestern corner

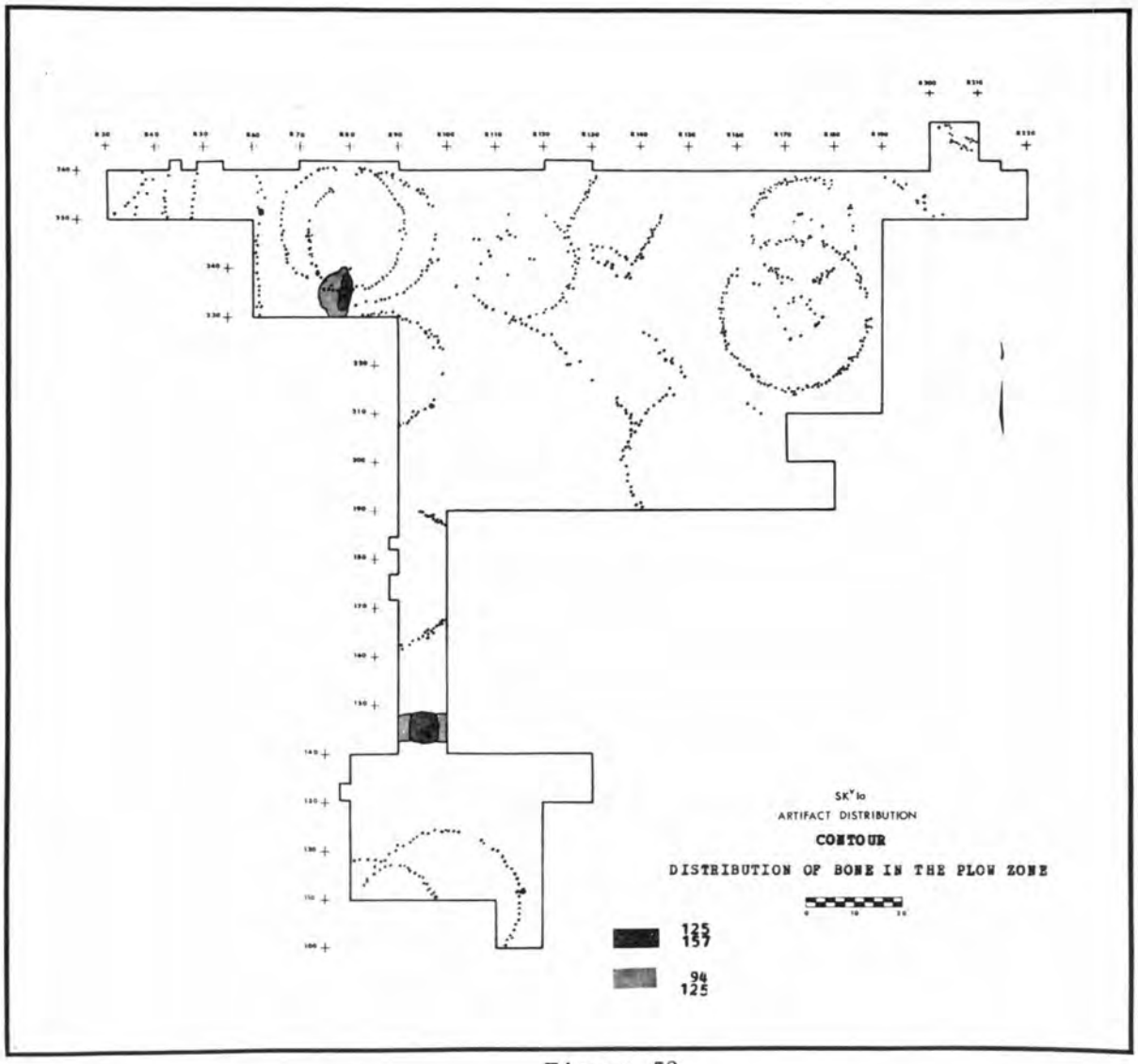

SK'Ia
ARTIFACT DISTRIBUTION
CONTOUR
DISTRIBUTION OF BONE IN THE PLOW ZONE
125
157
94
125

Figure 52

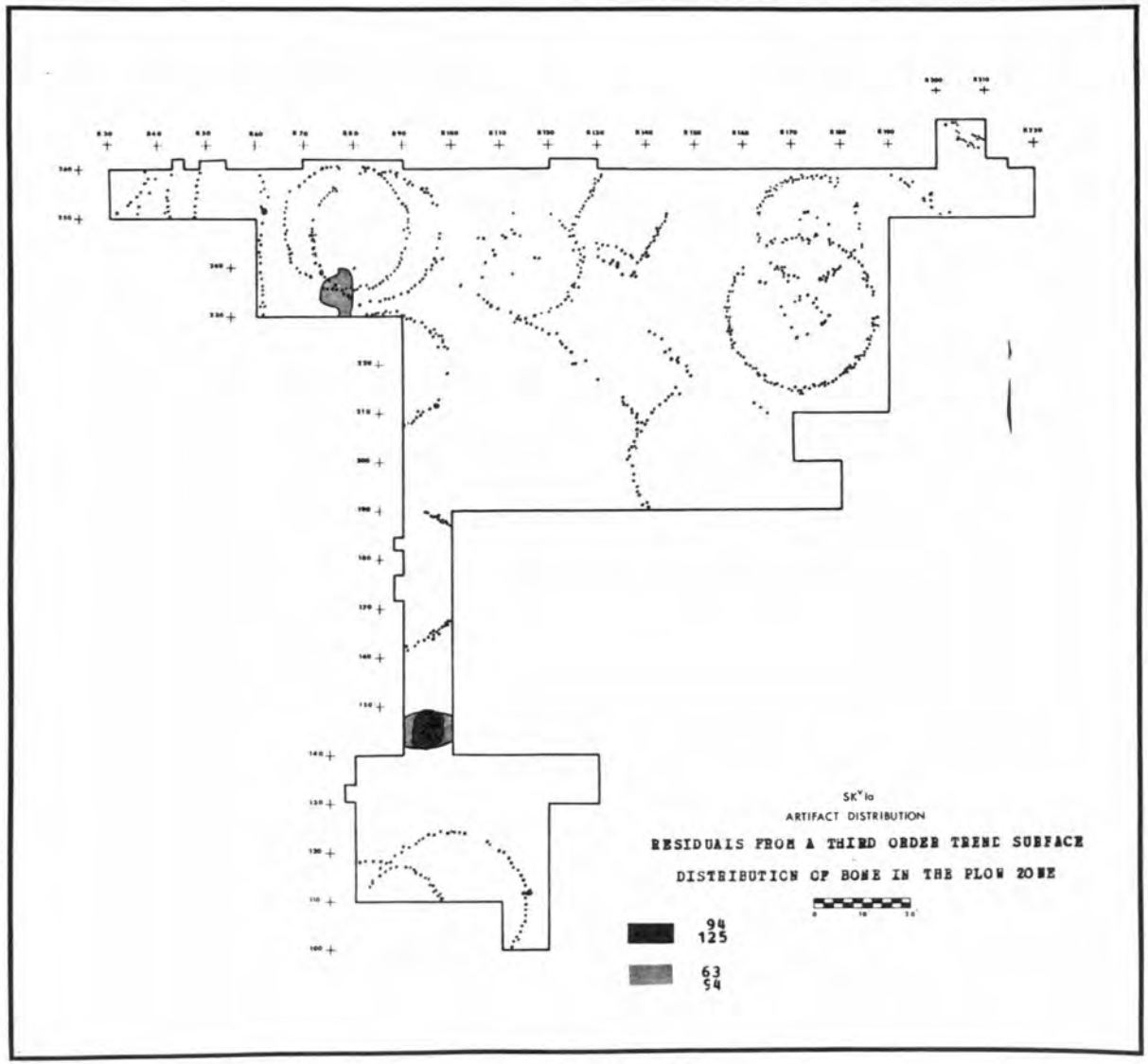

SK^Y Ia
ARTIFACT DISTRIBUTION
RESIDUALS FROM A THIRD ORDER TREND SURFACE
DISTRIBUTION OF BONE IN THE PLOW ZONE
94
125
63
54

Figure 53

associated with Feature 10, a storage pit just inside House I. At the north-central edge of the site, Feature 76, a roasting pit, was also not recorded in the plow zone; and another storage pit, Feature 12, located in the southeastern corner was not detected in the plow zone (Appendix D).

The trend surface map of the feature bone was virtually identical to that of the plow zone distribution (Appendix D). The only difference was the lack of any concentrations showing up in the plow zone at the southwest corner of the site. The residual map of the feature bone was very similar not only to the plow zone bone but also to the plow zone ceramic pattern (Figures 45, 53). A moderate spread was indicated over a large area overlapping Houses A, B, and C, one that generally matched the feature residuals associated with Feature 11 and a cluster of units in the northwest section of House A (Appendix D). However, Feature 76, the roasting pit near the northern edge of the site that intruded House D, was still not reflected in the residual plot. All the features along the western edge were, again, generally indicated except Feature 16, which was specifically isolated.

Lithics. The plow zone contour lithic map again reflected, in general, the feature map and was quite similar to the other plow zone patterns, particularly the projectile point distribution (Figures 54, 56). The plow zone-feature lithic correlation, however, was not very high, $r = 0.27$, but the plow zone

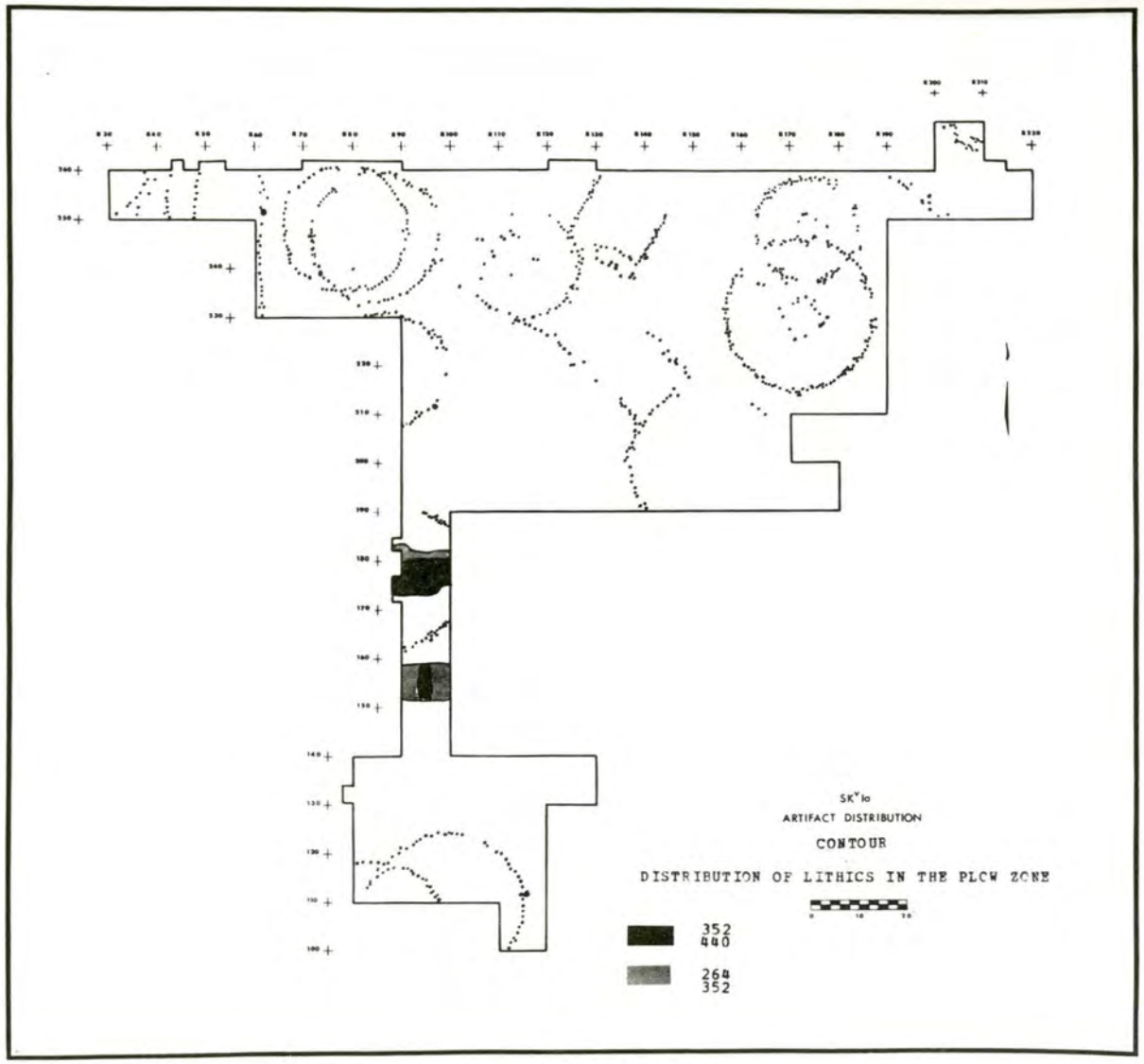

SK'lo
ARTIFACT DISTRIBUTION
CONTOUR
DISTRIBUTION OF LITHICS IN THE PLOW ZONE
352
440
264
352

Figure 54

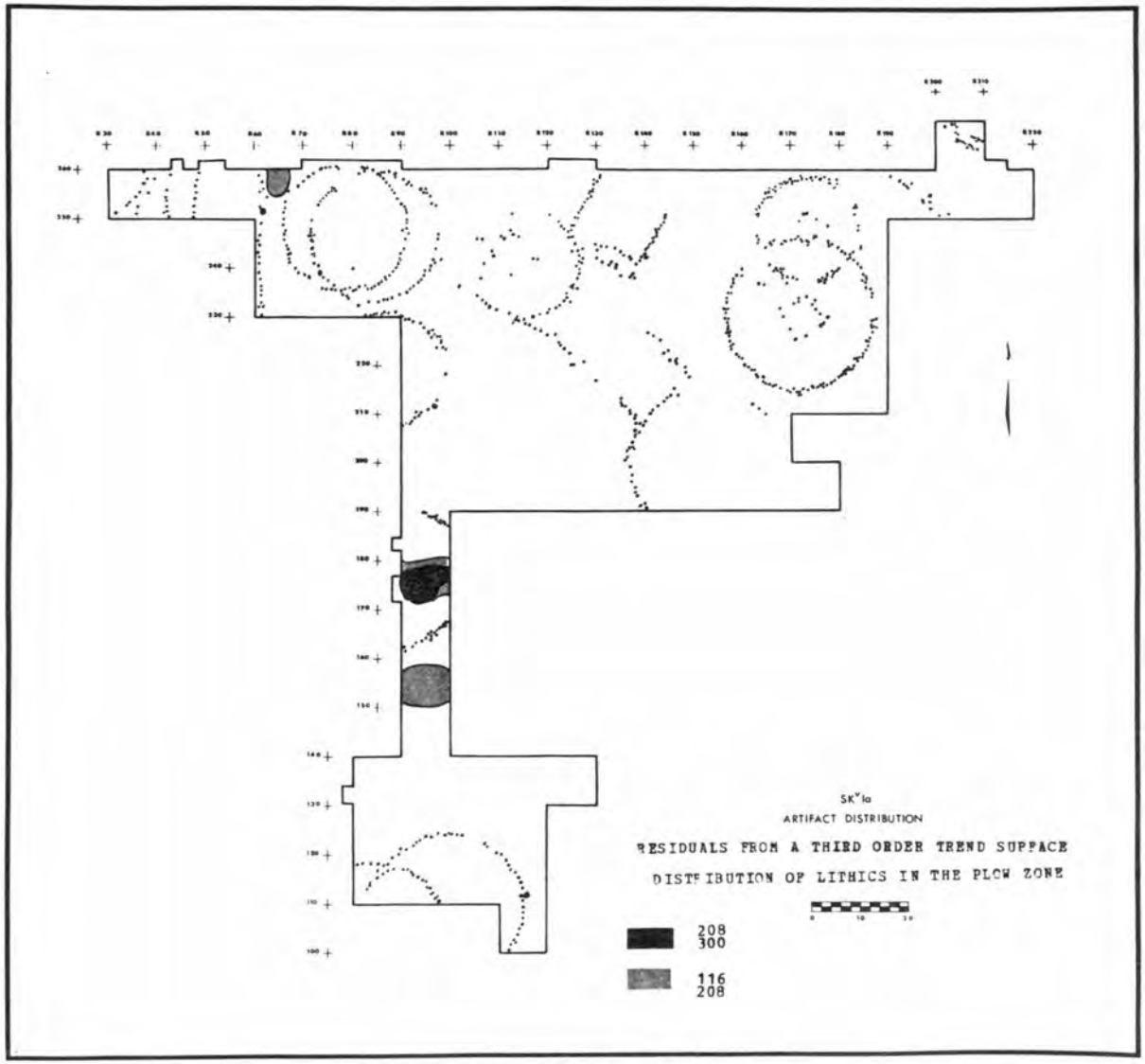

SK"la
ARTIFACT DISTRIBUTION
RESIDUALS FROM A THIRD ORDER TREND SURFACE
DISTRIBUTION OF LITHICS IN THE PLOW ZONE
208
300
116
208

Figure 55

projectile point and lithic correlation was $r = 0.52$ (Table 17). As with the other plow zone maps, the features in and around Houses E and F were evident, as was Feature 16 and the facilities in the area of House H. There were also areas with moderate densities in the plow zone that were not spatially related to features. The southern edge of the main excavation was one such area, and a moderate cluster was plotted in the area of Feature 11, while the output from the feature was not sufficient to be plotted on the feature contour map (Appendix D). Also, Feature 76, which was characterized by a large amount of lithic debris, was not isolated in the plow zone contour plot.

The third degree trend surface map was also very similar to the projectile point trend (Appendix D). However, the heavy concentration noted in the southwestern corner for the projectile points was marked by a light lithic distribution. The plow zone trend was dissimilar to the feature distribution primarily because of the concentration noted earlier along the southern edge of the large excavation block. The residuals from the trend plotted a distribution similar to that of the contour map (Figure 55). The correspondence to the map of feature lithic residuals was close, and most of the areas indicating peaks on the two maps overlapped to one degree or another. The exception was the concentration centered near 195R135 mentioned earlier.

Projectile Points. Although some of the features were reflected in the contour plow zone map, the distribution here was more widespread than that indicated by feature output (Figure 56; Appendix D).

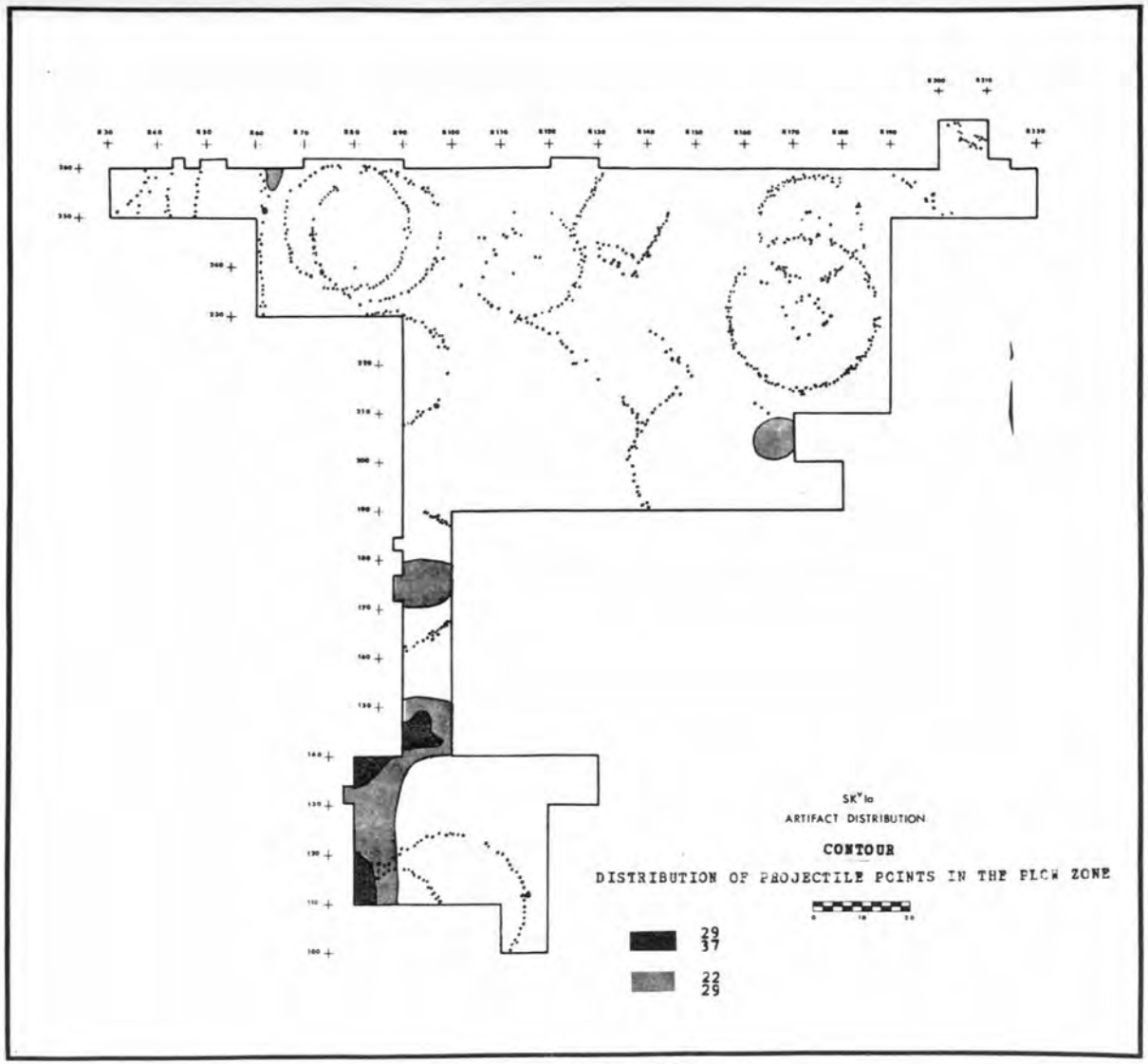

SK^Y Ia
ARTIFACT DISTRIBUTION
CONTOUR
DISTRIBUTION OF PROJECTILE POINTS IN THE PLOW ZONE
29
37
22
29

Figure 56

There were also some features that were not mirrored in the plow zone. This lack of correspondence was reflected by a correlation coefficient of 0.22 (Table 17). There were particularly heavy plow zone concentrations in the southwest corner of the site. Again, Feature 16 was obvious along with the cluster of storage pits in the area of House H. The same was true for the cluster of features located in the western half of House F. In the area of House C, a heavy concentration was plotted, while feature output from here was light. Except for Feature 11, there was only one storage pit, Feature 12, and an unused burial, Feature 29, in this vicinity.

The trend surface pattern was different from that of the feature map (Appendix D). This plot was also different from the ceramic and bone plow zone trend surfaces. The heaviest trends were isolated in the southwestern corner with a moderate band extending along the southern edge of the main excavation block. There was also a moderate trend indicated in the northwestern corner that corresponded quite closely with the feature map.

There was considerable correspondence between the residual maps from the plow disturbed and the in situ context (Figures 49, 57). Almost all of the areas of concentration in one were also reflected in the other (Appendix D). The only significant exception was along the southern edge of the large excavation block mentioned previously in the discussion of the contour pattern. It should also be noted that similar concentrations of pottery and

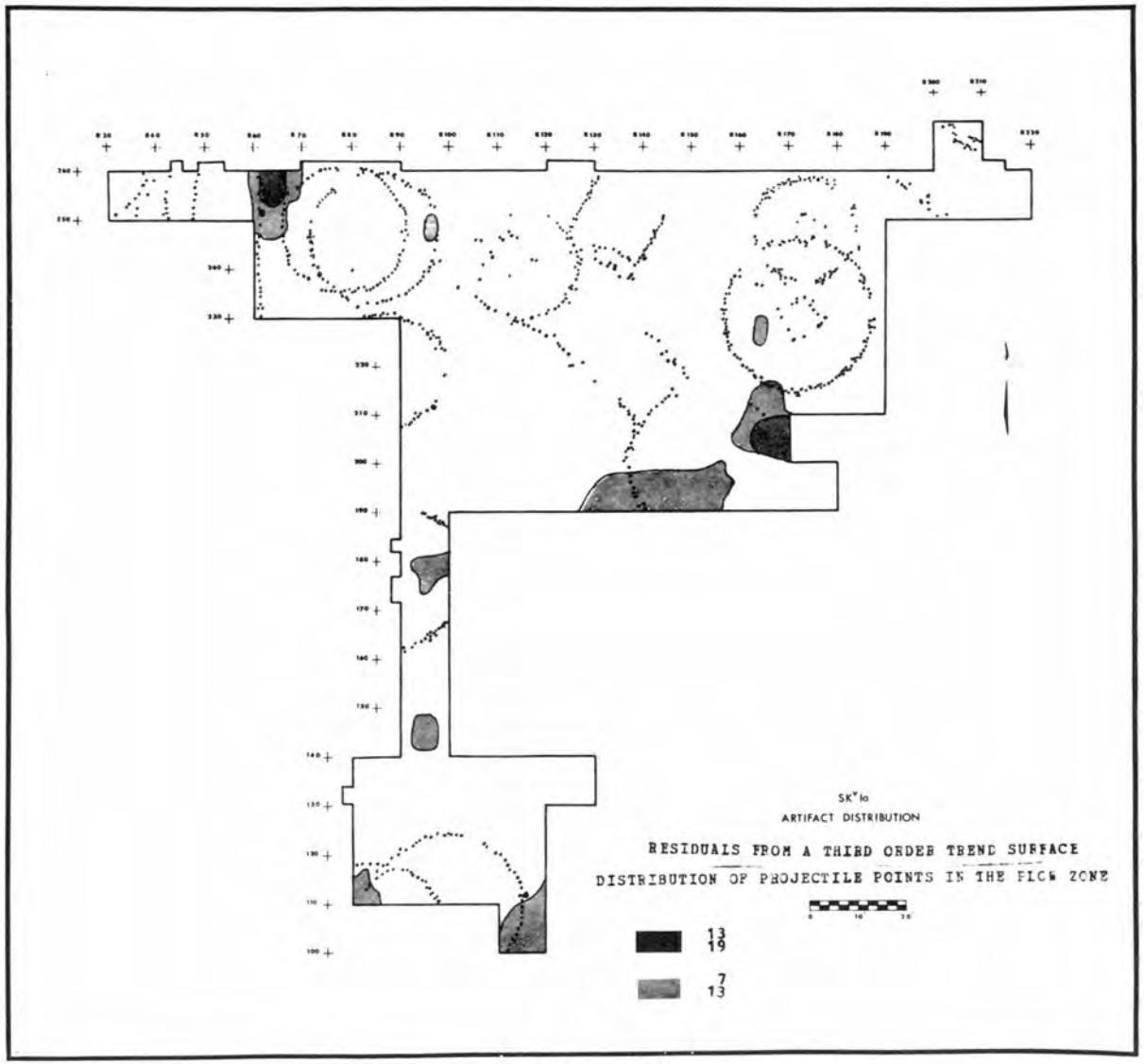

SK"lo
ARTIFACT DISTRIBUTION
RESIDUALS FROM A THIRD ORDER TREND SURFACE
DISTRIBUTION OF PROJECTILE POINTS IN THE FLOW ZONE
13
19
7
13

Figure 57

bone were also evident in the plow zone in this same area. With this degree of coincidence, a higher correlation coefficient was expected, but again the r scores do not take spatial relationships into account (Table 17). A few highly deviant values can skew the correlation coefficients considerably and without mapped data, these spurious values would not be detected.

Artifact Distributions: Summary

The most noteworthy characteristics of all the plow zone distributional patterns were their similarity and their correspondence to the densities indicated by actual feature content. In all cases, most of the feature areas were suggested by variations in the plow zone artifact densities. The plow zone ceramic and projectile point maps appeared to be the best overall predictors of the in situ structure, while the plow zone bone appeared to be an excellent predictor of features that contained bone. The degree of resolution obtained by the projectile points was surprising considering the small numbers and the correspondingly low values assigned to the various data points.

Invariably, features in the western part of the site were picked up in the plow zone. Although the eastern features were generally suggested by plow zone densities, they were usually not as clear and did not have the degree of overlap that characterized the western features. This variation is a consequence of plowing practices. The western area of the site is oriented toward the

interior of the field and as soil is plowed out of the field, the plow cuts deeper and turns up fresh materials from the features. In contrast, the eastern side of the site is along the edge of the field where soil is accumulating as a consequence of plowing. Here the features are more protected by this accumulation, and the plow is not as likely to cut into their undisturbed contents. This protective layer of plow zone was evident in squares excavated recently (1980) on the edge of the field. Here the depth of the plowed soil varied in one 10-foot unit from 8 inches in the western half to almost 16 inches in the eastern half (Wilson, personal communication).

There were some features that were not detectable in the plow zone, yet they had high outputs of all the artifact classes. Most striking was Feature 76, a large roasting pit in the center near 252R117 at the northern edge of the site. A review of the excavation notes turned up nothing to distinguish this unit from the other roasting pits that were reflected in the plow zone. Apparently, it was capped with a relatively sterile deposit that was plowed out. This zone protected the rich layer that was left at the base of the plow zone.

Also of interest was the area extending into the south profile of the large excavation block that consistently produced moderate to high plow densities of all the artifact classes. Yet there were no features in the area that could account for these concentrations. This output could indicate a "ghost" feature that was completely plowed away, an area of primary disposal on the old surface, or

the scatter from a feature that lies under the unexcavated portion of the site.

Given the amount of random "noise" that characterized these kind of data, the correlation coefficients were generally in line with the mapped distributions. The only category that correlated abnormally low in light of the spatial overlap between the feature and plow zone data was the ceramics. This low correlation no doubt resulted from the extreme variance in the sherd samples, and the fact that almost all the squares had large numbers of plow zone sherds relative to the feature counts. In several instances there were no feature sherds represented at the various data points. This problem occurred with all the correlations, but it was most acute in the case of the pottery. This same factor, operating in reverse, probably also accounted to some degree for the higher correlations between the plow zone and feature projectile points and the plow zone and feature bone. The variance within these categories was not as great because of their relatively smaller values at the various data points.

The refuse disposal pattern at $Sk^{v}1a$ as reflected by the plow zone and the in situ structure is one of secondary or de facto disposal in subsurface facilities. These facilities usually took the form of abandoned storage pits, but some pits were also excavated for the explicit purpose of trash burial. Apparently, any subsurface facility that became unsuited for its primary function, e.g. roasting pits, might also be quickly filled with

garbage. Only the small shallow borrow pits were not used in this fashion, at least, very often as most appeared to have been filled fortuitously with ordinary village debris rather than with deliberate dumps of garbage.

The sherds and bone probably represent secondary deposition, while many of the small flakes and projectile points were probably inadvertently swept up with the other trash and represent de facto deposition. This non-deliberate disposal pattern would appear to be applied particularly to the projectile points, since most of the specimens were still in a serviceable condition.

The use of subsurface storage facilities, their recycling as garbage pits, and the excavation of other pits solely for trash disposal, stands in sharp contrast to the above ground storage and disposal patterns at $Bn^{V}29$. In fact, ethnohistoric data indicates that the use of subsurface pits for storage was rare throughout the Southeast. Most accounts describe cribs or other above ground facilities. Subsurface pits were only mentioned by Stachey describing the storage techniques of the Powhatan in Virginia (Swanton 1946:379). What this pattern means in terms of cultural interpretation and explanation is not clear. Some ideas in the form of preliminary hypotheses will be presented in the next chapter.

CHAPTER VI

CONCLUSIONS

The Research Objectives and the Data

The primary objective of this study was to determine to what degree the artifact distributions in the plow zone reflected the distributions of artifacts from undisturbed deposits. Could the pattern of artifact distributions in the plow zone be used to predict the pattern of structures and features at $Sk^{v}1a$ and $Bn^{v}29$? Based on the data from the two sites, the answer to this question is yes and no. As with most archaeological interpretations, there is a complex web of natural and behavioral factors affecting the relationship between the plow disturbed and in situ contexts.

The most important natural factor is the way the sites were plowed. Warren Wilson and $Sk^{v}1a$ had similar plowing histories, plowing histories that are also similar to most other bottomland sites in the North Carolina Piedmont and Blue Ridge provinces. Over the years the fields containing the sites have been plowed from the outside to the inside moving soil and artifacts outward to accumulate along the edges of the fields. As a consequence, each successive plowing over most of the site areas has gone a little deeper and brought fresh specimens into the plow zone from

the tops of features. Those areas of the sites near the edges of the fields have been more protected because of an accumulation of plow zone and flood deposits. Here the plow zone content from features is more dispersed and diluted, since the tops of the features are no longer being plowed through.

The contents from individual features, as well as other in situ deposits, have become swirled together in the plow zone and dispersed across the sites. This situation is analogous to a series of chimneys in close proximity where the smoke from each fans out and blends with its neighbor until eventually all are inseparable in a single cloud. But since much of the surface level of both sites is also being lowered in most areas by successive plowings, fresh remains are constantly entering the plow zone near their points of origin where in situ deposits remain buried. These "puffs" can provide spatial data that can complement the analysis of the sub-plow zone remains.

More important than plowing in determining the degree of correspondence between the in situ and disturbed site structures are the cultural processes that dictated the patterns of storage and refuse disposal. A distinct and different form of storage and garbage disposal was practiced at each site. At $Sk^{v}1a$, most of the garbage was disposed of in abandoned storage pits frequently associated with houses. In contrast, the Warren Wilson data indicate that the overwhelming bulk of the refuse was dumped along the palisades either on the surface or in shallow depressions.

These patterns are not unlike that described by Binford for the Mask site, where the disposal mode defines a distribution that is inversely related to patterns of use intensity (Binford 1978:356). At both sites, high density zones for the most part reflect disposal and not activity areas.

At $Bn^{v}29$, very few trash or storage receptacles were dug, directly indicating an above ground refuse disposal mode and indirectly the presence of above ground storage facilities. As a consequence, there was very little correlation and overlap between the patterns of artifact output in the plow zone and in the in situ site structure. On the other hand, the $Sk^{v}1a$ data showed a fairly strong predictive relationship between the two contexts. These different patterns were reflected in the various SYMAPs, as well as the array of correlation coefficients.

A second objective was to determine if certain artifact classes in the plow zone were better predictors of the undisturbed site structures. Although the degree of correspondence between the plow zone and what lay beneath it varied from site to site, the data indicate that, where refuse was disposed of in subsurface pits, bone in the plow zone is a fairly strong indicator of the locations of such facilities. This relationship was detected by the various SYMAPs and reinforced by the correlation coefficients from both sites. Although at $Sk^{v}1a$ there were several high correlations ($\underline{r} \geq 0.4$) between plow zone and feature content, the only correlation above 0.4 at $Bn^{v}29$ was derived when feature

content was compared with plow zone bone output. Also as expected, lithic debris and projectile points were not as frequently found in secondary contexts as bone or pottery. This pattern was particularly prevalent at $Bn^{v}29$, where the plow zone distribution reflected a general coincidence between lithic debris and house structures, while the ceramics and bone were found mainly along the palisade alignments. At $Sk^{v}1a$, there was also some indication of spatial overlap between lithic materials and houses, but there was also a fairly strong correlation between the plow zone output and feature output. The picture was confused to some degree by the fact that many of the large storage trash pits were also in areas where houses were present. The ceramics at both sites were in secondary contexts. At $Sk^{v}1a$, they were concentrated in the plow zone in areas containing storage pits or other refuse disposal facilities, while at $Bn^{v}29$ the pottery was concentrated in areas along the palisades.

Inter-site Comparisons

From the previous discussions, it is obvious that Warren Wilson and $Sk^{v}1a$ are similar in some respects and vastly different in others. In terms of size, they are about the same. Both exhibit an overall plan of houses, enclosed by palisades, arranged around a central area of light domestic activity. Although very different in shape and construction, the houses contain about the same amount of living space, roughly 400 square feet. $Sk^{v}1a$ displays a much larger number of features that exhibit greater

variety, but large roasting pits are important at both sites, suggesting similar food preparation habits.

In addition to the differences in storage and refuse disposal noted previously, some other differences become apparent when the gross artifact counts from the two sites are compared. Even taking into account the larger number of excavation units at $Bn^{v}29$, there is still a much denser ceramic concentration here than at $Sk^{v}1a$. The mean number of sherds per unit of plow zone is almost three times as great, although the feature average is about the same (Tables 18, 19). Perhaps a more intense occupation over a longer period of time is responsible for this difference. Some support for this interpretation lies in the fact that there is more evidence of structural superimpositions and repairs at Warren Wilson.

The bone totals, on the other hand, have a similar density at both sites although there is a much larger proportion of the bone contained in features at $Sk^{v}1a$ (Tables 18, 19). This variation again points out the difference in refuse disposal patterns between the sites. The subsurface features at $Sk^{v}1a$ protected the bone from the plow, whereas much of the above ground dumping behavior at $Bn^{v}29$ resulted in a larger (compared with $Sk^{v}1a$) proportion of the bone refuse ending up in the plow zone. This difference is even more pronounced when the fact that roughly ninety percent of the feature bone from Warren Wilson came from the fortuitous filling of the large roasting pits along the palisades.

One of the most interesting differences between the two sites is in the number of lithic specimens. Although over twice as much area and twice as many data points were used in the $Bn^{v}29$ calculations, there are almost two thousand more flakes from $Sk^{v}1a$ (Tables 18, 19). Similarly, there are almost one thousand more projectile points from the smaller excavation. This difference is reflected in an average of 8 projectile points and 75 flakes per square at $Sk^{v}1a$ and only 4 projectile points and 33 flakes per square at $Bn^{v}29$ (Tables 18, 19). The higher standard deviation of the plow zone lithics and projectile points at $Sk^{v}1a$ indicates more clustering and is a consequence of the correlation and overlap between the features and the plow zone distributions.

Several hypotheses might be offered to account for the increase in lithic refuse and projectile points at $Sk^{v}1a$. It does not seem out of line to suggest that since $Sk^{v}1a$ was a historic site containing a considerable number and variety of European trade items, perhaps the large numbers of projectile points and debitage were a consequence of increased hunting and hide-curing activities resulting from the Siouans' participation in the fur trade. However, if this was the case, it would be expected that the bone density would also be higher at $Sk^{v}1a$, but it was not. Animals not needed for food may have been skinned in the field and the carcasses left to decay. Needless to say, any explanations at this point are highly speculative and may be offered

Table 18. Sk^{v}la Plow Zone and Feature Variables
Feature Variables Denoted By F

Variable	N	Mean	Standard Deviation	Sum
Ceramics	102	658.1	405.6	67130
Lithics	102	75.1	70.8	7658
Bone	102	13.9	25.1	1419
CSPP	102	8.3	8.3	842
Ceramic (F)	60	244.2	237.1	14654
Lithics (F)	61	46.3	56.7	2824
Bone (F)	61	158.2	217.9	9651
CSPP (F)	60	4.7	6.7	282

Table 19. $Bn^{V}29$ Plow Zone and Feature Variables
Feature Variables Denoted By F

Variable	N	Mean	Standard Deviation	Sum
Ceramics	242	1673.7	687.8	405035
Lithics	242	32.9	17.1	7970
Bone	242	29.9	49.3	7230
CSPP	242	4.0	2.9	974
Daub	242	4.0	22.7	970
Ceramic (F)	47	242.6	412.0	11400
Lithics (F)	46	15.9	21.5	731
Bone (F)	47	210.3	509.0	9883
CSPP (F)	46	1.4	2.5	64

only as rudimentary hypotheses that can be developed and tested in the future.

Most of the differences in terms of artifact distributions between the sites can be explained by the different ways each group stored its goods and disposed of its garbage. But why did the prehistoric Cherokee at Warren Wilson build cribs and sheds, while the historic Siouans at Saura Town dug holes in and around their houses for the same purpose? The Cherokee were not unique in the construction of sheds and cribs, as the ethnohistoric accounts of the different Southeastern Indians are replete with descriptions of above ground facilities (Swanton 1946:377-381). While visiting the Eighteenth Century Cherokee, Henry Timberlake observed that "The unwada li, or storehouse for corn, beans, dried pumpkins and other provisions, was a feature of every Cherokee homestead and probably common to all the southern tribes" (Mooney 1900:433). Interestingly, one of the most vivid descriptions of cribs was provided by John Lawson in 1700, while he was visiting the Santee, a Siouan group in South Carolina.

> They make themselves Cribs after a very curious Manner, wherin they secure their Corn from Vermin; which are more frequent in these warm climates, than Countries more distant from the Sun. These pretty Fabricks are commonly supported with eight Feet or Posts, about seven Foot high from the Ground, well daub'd within and without upon Laths, with Loam or Clay, which makes them tight, and fit to keep out the smallest Insect, there being a small Door at the gable End, which is made of the same Composition. . . (Lawson 1967:23).

Lawson further states that "They have other sorts of Cabins without Windows, which are for their Granaries, Skins, and Merchandizes . . ." (Lawson 1967:182). Traveling in the late Seventeenth Century, Lederer described the storage facilities of the Siouan Eno as ". . . a little hovel made like an oven, where they lay up their corn and mast, and keep it dry" (Alvord 1912:157; quoted in Swanton 1946:380). It is suspected that Lederer's "little hovels" were actually covers over large pits similar to those at $Sk^{V}1a$.

As with the differences in frequencies of projectile points and lithics between the two sites, there are many possible explanations for the differences in storage facilities and refuse disposal patterns. Although it is beyond the scope of this research to delve into the various explanations, one possibility is that, as with the flakes and projectile points, the event of European contact was at least partially involved. From the large number of burials at the site during its relatively short occupation (103 compared with 52 from $Bn^{V}29$), it is obvious that European diseases were taking their toll. The cultural system must have been undergoing tremendous stress in coping with this decimation, as well as the less direct consequences of contact. In this context, the pits may have been used as a substitute for more elaborate facilities such as those described by Lawson. They would have required less time and manpower to construct and may reflect a disorganization in the aboriginal cultural system.

Another possibility is that these two patterns of surplus storage and refuse disposal are indicative of cultural systems whose social organizations exhibit different levels of stratification. The cribs and above ground facilities of the Cherokee reflect the conspicuous display of goods and produce by relatively large, nonequalitarian social units (clans). On the other hand, the subsurface facilities of the Siouans indicate smaller, more equalitarian units of production and consumption (extended families). Again, these interpretations are offered only as preliminary hypotheses that should be elaborated on and tested as part of a broad study of cultural change during the early contact period.

The Future of Plow Zone Archaeology

The spatial patterns isolated at Warren Wilson and Sk^{v}la necessitate a re-assessment of the two most prevalent assumptions concerning plow disturbed deposits. They cannot simply be bulldozed or shoveled away as many have suggested (Binford 1964, Smith 1978, Faulkner and McCullough 1979), nor can the plow zone alone--and this certainly applies to surface materials also--be expected to encapsulate data sufficient to allow for an accurate analysis of intra-site activity structure as others have implied (House and Wogaman 1978; Talmage et al. 1977; Fisher 1980). Certainly, plow zone deposits cannot simply be assumed to be in primary context!

The complexities and subleties of site formation processes require that disturbed context data be studied as part of an overall spatial analysis that also relies on in situ structural data. The evidence from $Bn^{v}29$ and $Sk^{v}1a$ underlines the need for more extensive excavations on sites where both types of data can be carefully controlled before realistic predictive trends and spatial models can be formulated. This effort needs to be directed toward the small homesteads and campsites, as well as the large villages where disturbed and undisturbed site structures are present. One sufficient quantities and varieties of sites have been studied and the structural components compared, hopefully predictive patterns of disturbed context data can be isolated that will aid in the spatial analyses of sites whose total content is contained in the plow zone. Based on the results presented here, plow zone data should be used to complement in situ observations, not as a substitute. Without undisturbed deposits, spatial analyses of plow zone sites can provide only descriptive distributional information that lacks functional, behavioral correlates within systemic context. At the same time, studies based solely on non-plow disturbed deposits can be very misleading in the search for spatially relevant behavioral inferences.

Several investigators, primarily in the field of Cultural Resource Management, have assumed that many shallow plow zone sites have spatial structures sufficiently preserved to allow intra-site activity analyses. This assumption can no longer be

accepted. It is true that there may be important spatial data in the plow zone, but without in situ features and architecture, it is impossible, at this point, to accurately assess the meaning of these data, at least in the Southeast.

Certainly assumptions are necessary for there to be progress in any discipline. These assumptions, however, must ultimately be grounded in some empirical reality or else the discipline runs the grave risk of becoming stagnant in a quagmire or erroneous information and effete theory. Today, more than ever, archaeologists need to critically evaluate many of the ideas and assumptions concerning the natural and cultural factors that affect site formation processes, if we are to avoid the quagmire.

APPENDIX A

QUANTITATIVE DATA AND SYMAP DISTRIBUTIONS OF ARTIFACTS FROM FEATURES, $BN^{V}29$

BN29

CERAMIC DISTRIBUTION, FEATURES

THIRD ORDER TREND SURFACE

MINIMUM	0.0	350.00	700.00	1050.00	1400.00
MAXIMUM	350.00	700.00	1050.00	1400.00	1750.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00

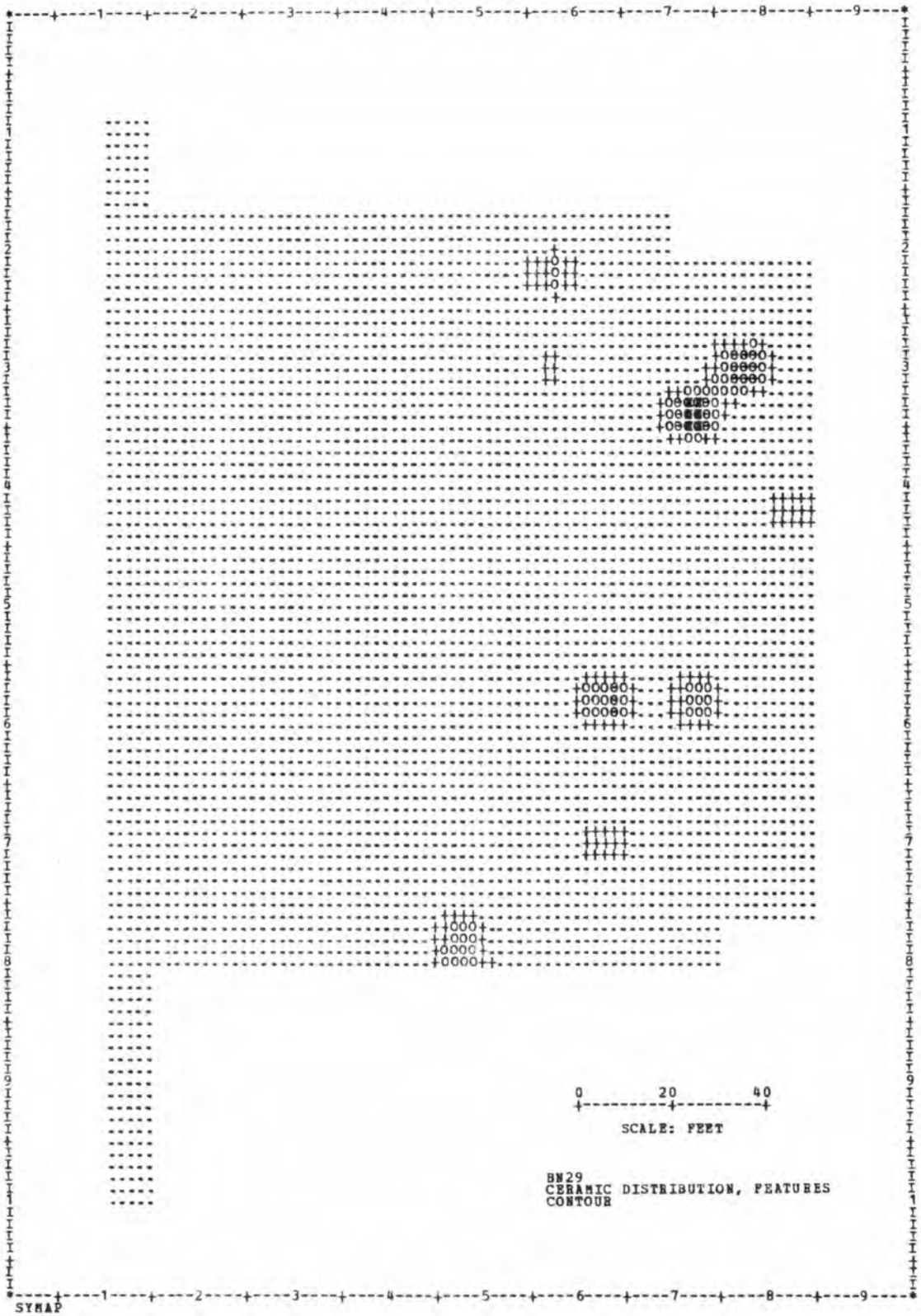
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

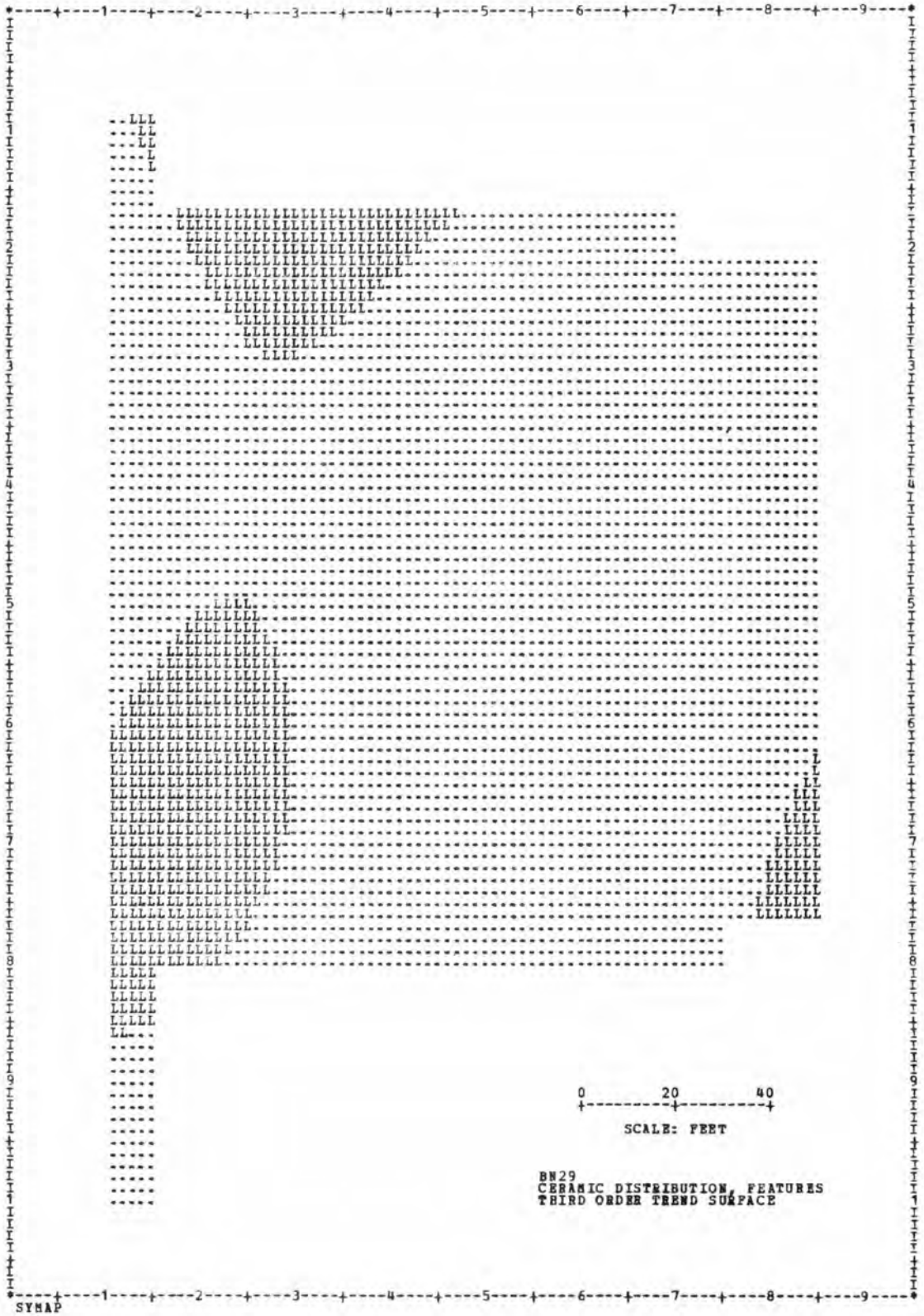
LEVEL	1	2	3	4	5
	.....	+++++++++	000000000	@@@@@@@@@	■■■■■■■■■
	.....	+++++++++	000000000	@@@@@@@@@	■■■■■■■■■
SYMBOLS	....1....	++++2++++	000030000	@@@@40@@@@	■■■■5■■■■
	.....	+++++++++	000000000	@@@@@@@@@	■■■■■■■■■
	.....	+++++++++	000000000	@@@@@@@@@	■■■■■■■■■
FREQ.	233	3	3	1	2

MINIMUM AND MAXIMUM VALID DATA VALUES ARE 0.0 AND 1750.000

ERROR MEASURES

VARIATION EXPLAINED BY SURFACE	0.48716900E 06
VARIATION NOT EXPLAINED BY SURFACE	0.91465810E 07
TOTAL VARIATION	0.96337500E 07
COEFFICIENT OF DETERMINATION	0.05056899
COEFFICIENT OF CORRELATION	0.22487551


0 20 40
SCALE: FEET
BN29
CERAMIC DISTRIBUTION, FEATURES
CONTOUR
SYMAP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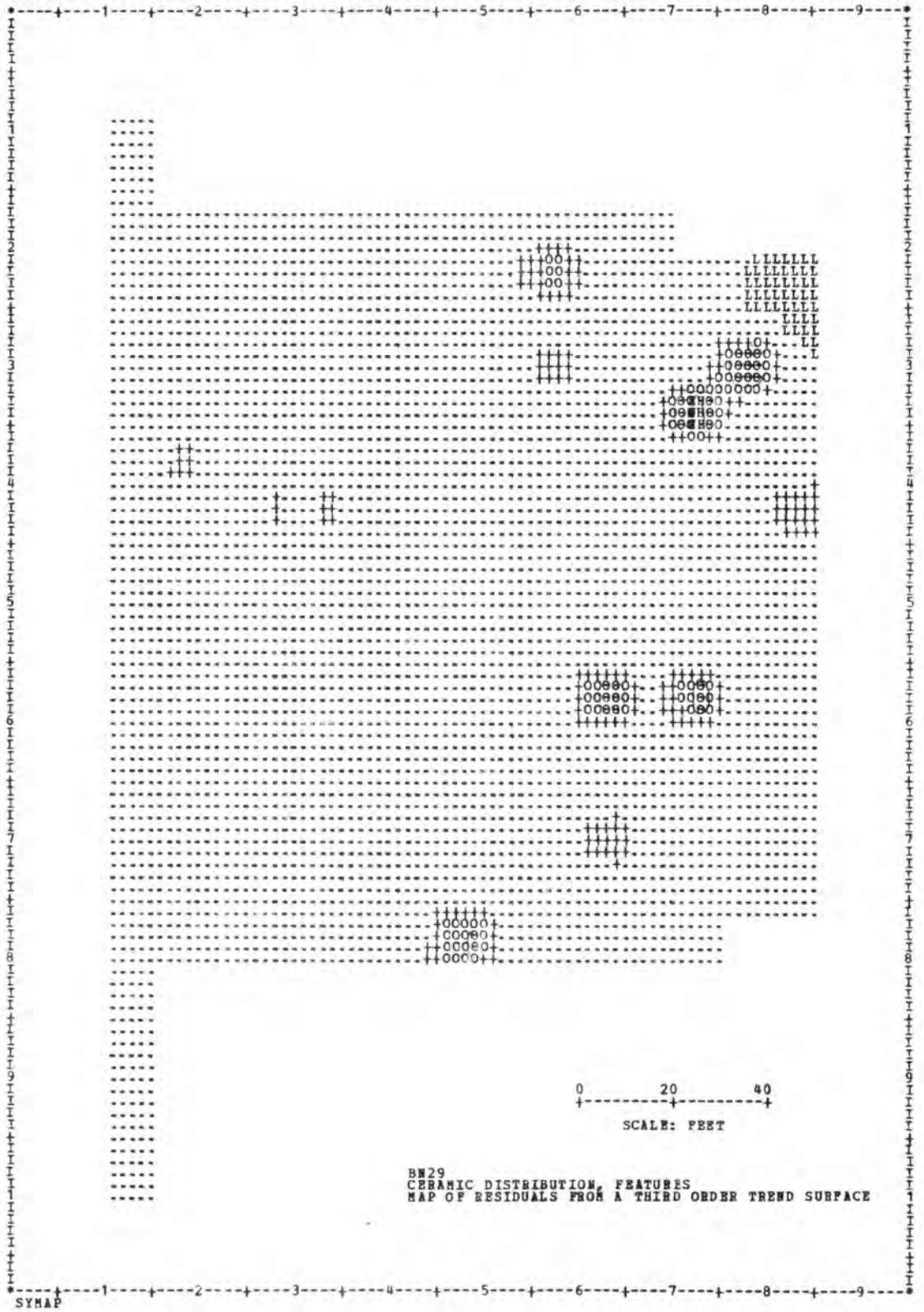
BN29
CERAMIC DISTRIBUTION, FEATURES
THIRD ORDER TREND SURFACE
SYMAP


0 20 40
SCALE: FEET
BN29
CERAMIC DISTRIBUTION, FEATURES
MAP OF RESIDUALS FROM A THIRD ORDER TREND SURFACE
SYMAP

BN29

BONE DISTRIBUTION, FEATURES

THIRD ORDER TREND SURFACE

MINIMUM	0.0	400.60	801.20	1201.80	1602.40
MAXIMUM	400.60	801.20	1201.80	1602.40	2003.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00

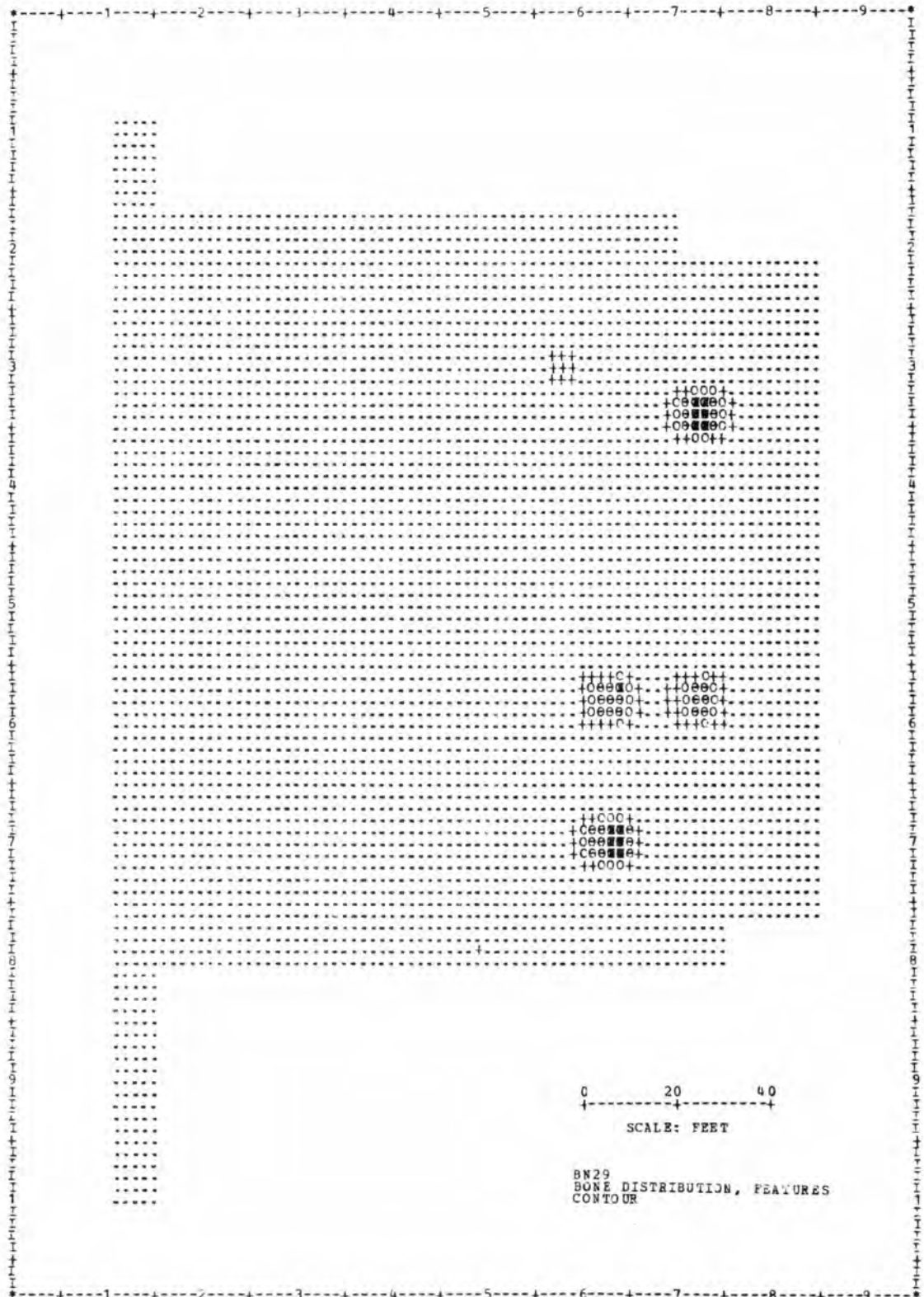
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

LEVEL	1	2	3	4	5
SYMBOLS	....1....	+++++++++ +++++++++ ++++2++++ +++++++++ +++++++++	OOCCCCCCC OOCCOOCCO OOOO3OOOO OOCOCCCCC OOCOOOCCC	eeeeeeeee eeeeeeeee eeee4eeee eeeeeeeee eeeeeeeee	■■■■■■■■■ ■■■■■■■■■ ■■■■5■■■■ ■■■■■■■■■ ■■■■■■■■■
FREQ.	237	1	0	2	2

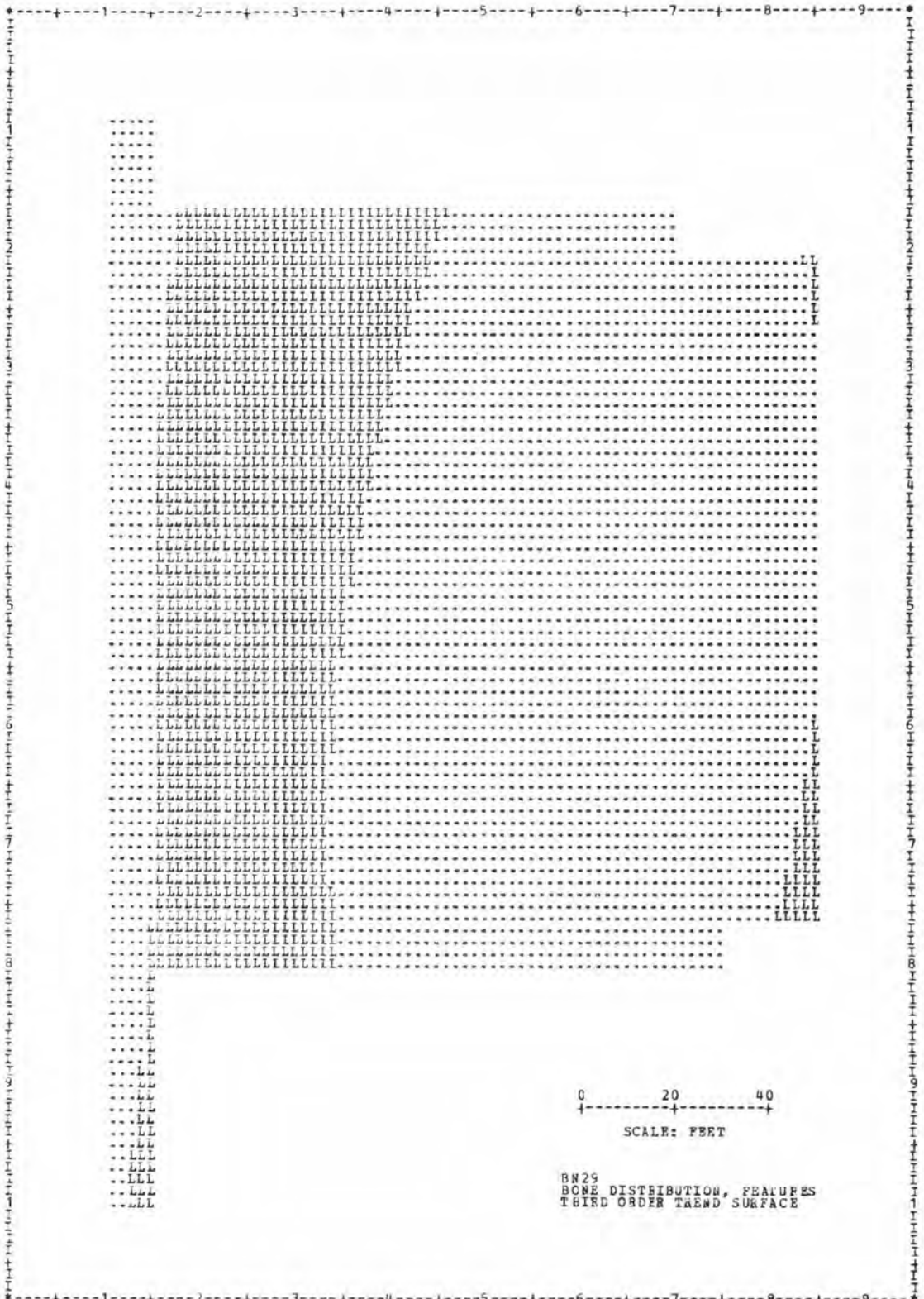
MINIMUM AND MAXIMUM VALID DATA VALUES ARE 0.0 AND 2003.000

ERROR MEASURES

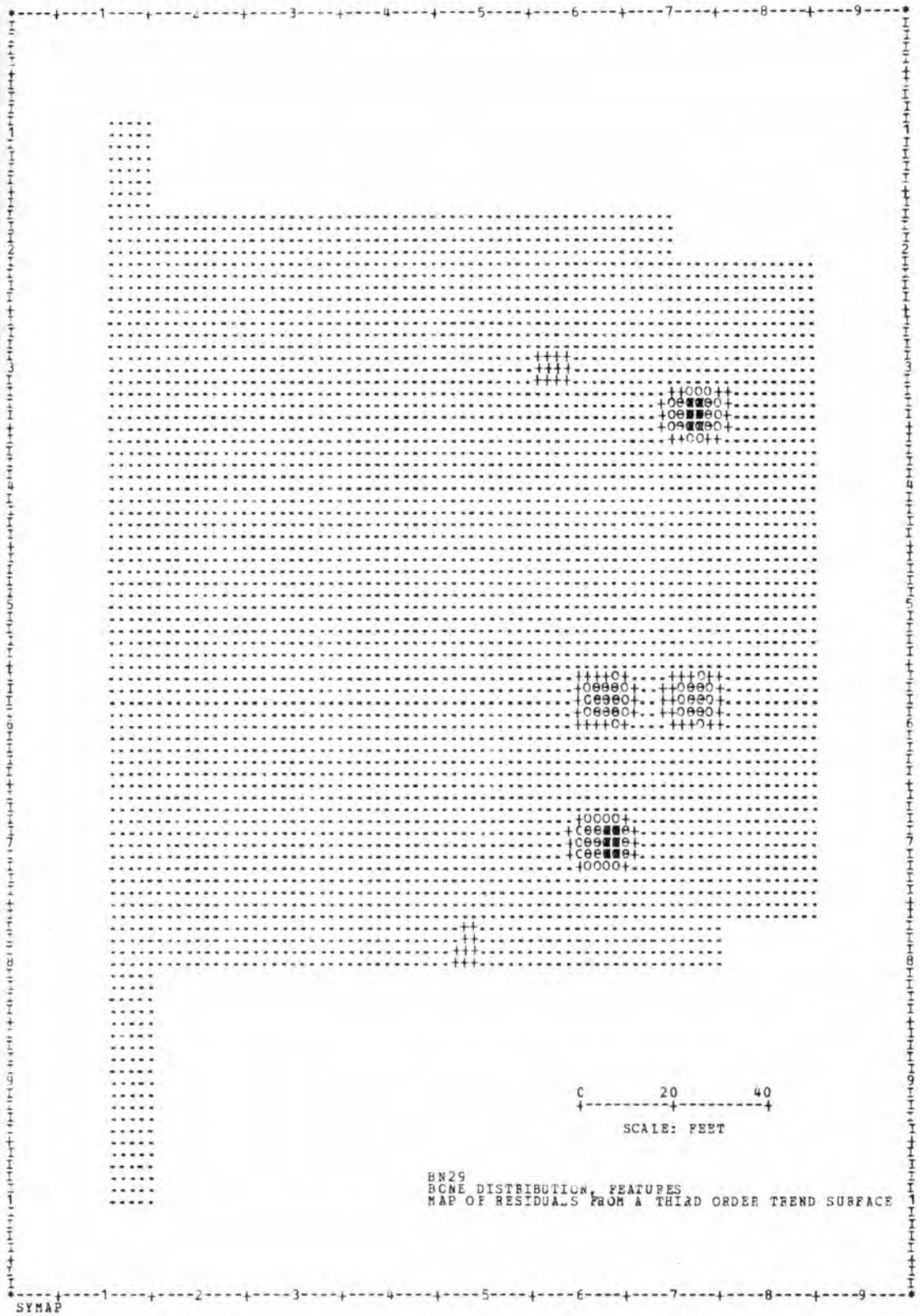
VARIATION EXPLAINED BY SURFACE	0.62463100E 06
VARIATION NOT EXPLAINED BY SURFACE	0.12897994E 08
TOTAL VARIATION	0.13522625E 08
COEFFICIENT OF DETERMINATION	0.04619155
COEFFICIENT OF CORRELATION	0.21492219



SYMAP


0 20 40
SCALE: FEET
BN29
BONE DISTRIBUTION, FEATURES
THIRD ORDER TREND SURFACE

SYMAP



BN29
BONE DISTRIBUTION, FEATURES
MAP OF RESIDUALS FROM A THIRD ORDER TREND SURFACE

SYMAP

BN29

LITHIC DISTRIBUTION FEATURES

THIRD ORDER TREND SURFACE

MINIMUM	0.0	19.40	38.80	58.20	77.60
MAXIMUM	19.40	38.80	58.20	77.60	97.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00

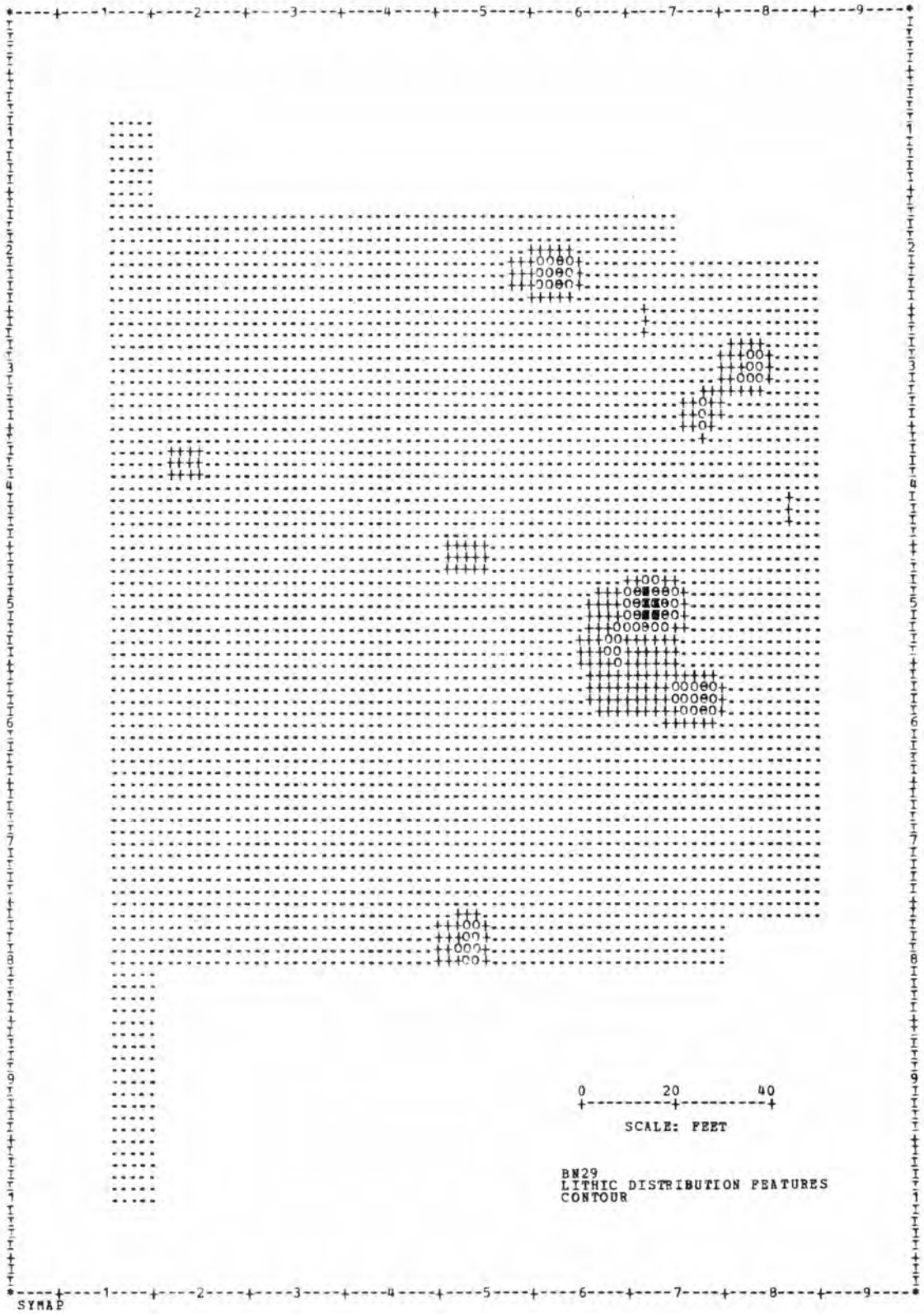
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

LEVEL	1	2	3	4	5
	.....	+++++++++	000000000	⊖⊖⊖⊖⊖⊖⊖⊖⊖	■■■■■■■■■
	.....	+++++++++	000000000	⊖⊖⊖⊖⊖⊖⊖⊖⊖	■■■■■■■■■
SYMBOLS	....1....	+++++2+++++	000030000	⊖⊖⊖⊖4⊖⊖⊖⊖	■■■■5■■■■
	.....	+++++++++	000000000	⊖⊖⊖⊖⊖⊖⊖⊖⊖	■■■■■■■■■
	.....	+++++++++	000000000	⊖⊖⊖⊖⊖⊖⊖⊖⊖	■■■■■■■■■
FREQ.	227	8	4	2	1

MINIMUM AND MAXIMUM VALID DATA VALUES ARE 0.0 AND 97.000

ERROR MEASURES

VARIATION EXPLAINED BY SURFACE	0.22416445E 04
VARIATION NOT EXPLAINED BY SURFACE	0.27913152E 05
TOTAL VARIATION	0.30154797E 05
COEFFICIENT OF DETERMINATION	0.07433790
COEFFICIENT OF CORRELATION	0.27264977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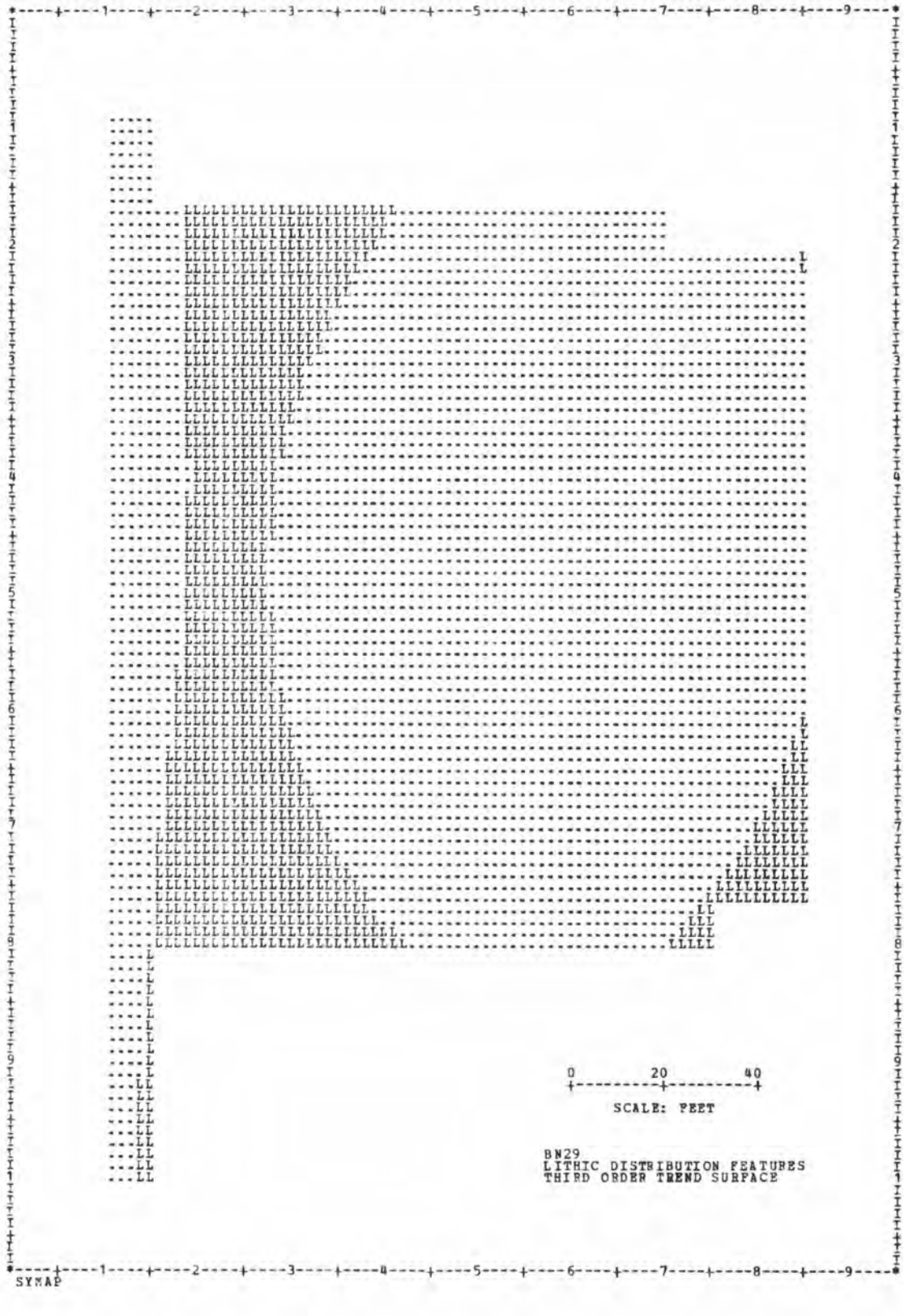
SCALE: FEET
BN29
LITHIC DISTRIBUTION FEATURES
CONTOUR
SYMAP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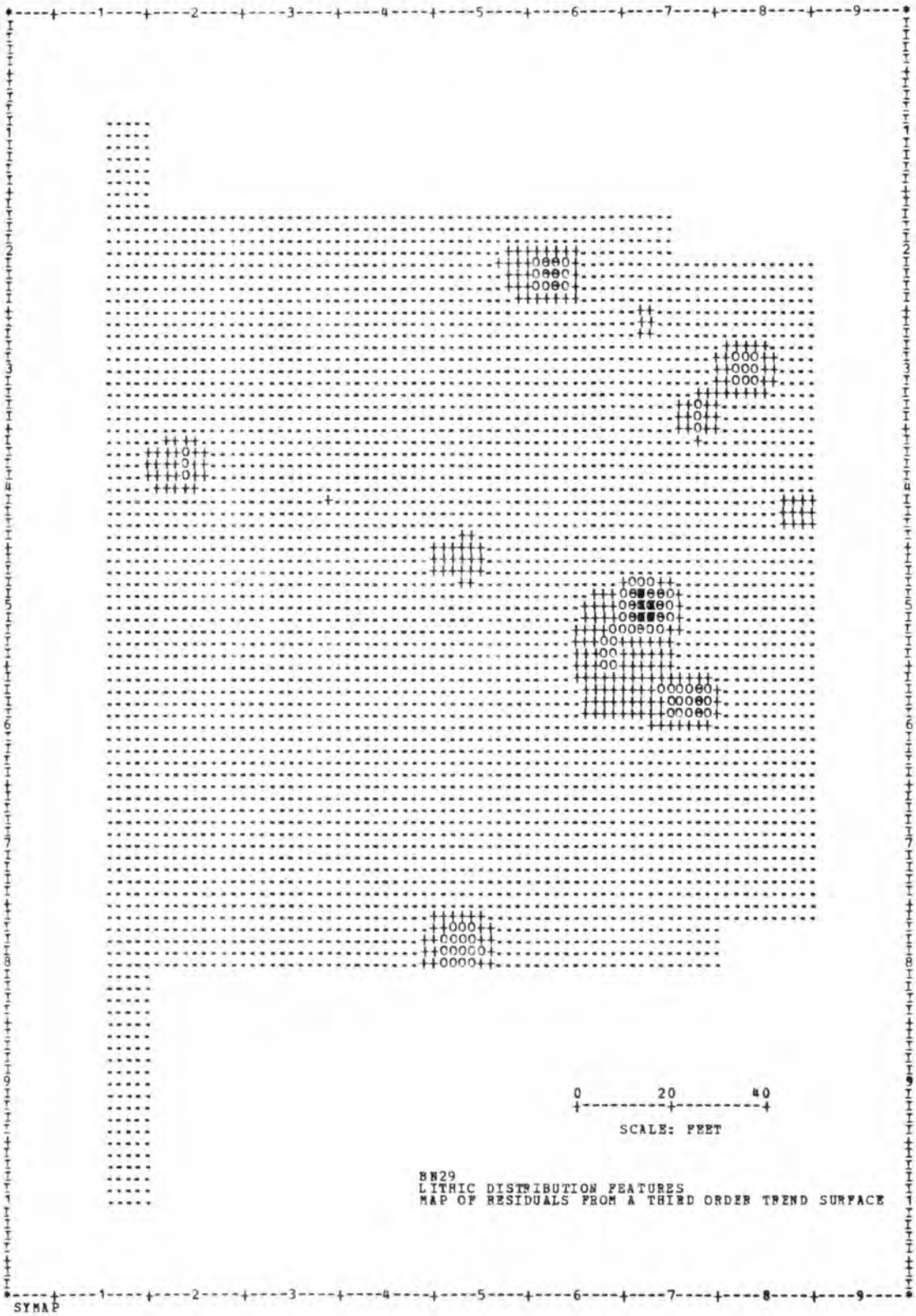
BN29
LITHIC DISTRIBUTION FEATURES
THIRD ORDER TREND SURFACE
SYMAP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SCALE: FEET
BN29
LITHIC DISTRIBUTION FEATURES
MAP OF RESIDUALS FROM A THIRD ORDER TREND SURFACE
SYMAP

BN29

PROJECTILE POINT DISTRIBUTION, FEATURES

THIRD ORDER TREND SURFACE

MINIMUM	0.0	2.20	4.40	6.60	8.80
MAXIMUM	2.20	4.40	6.60	8.80	11.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00

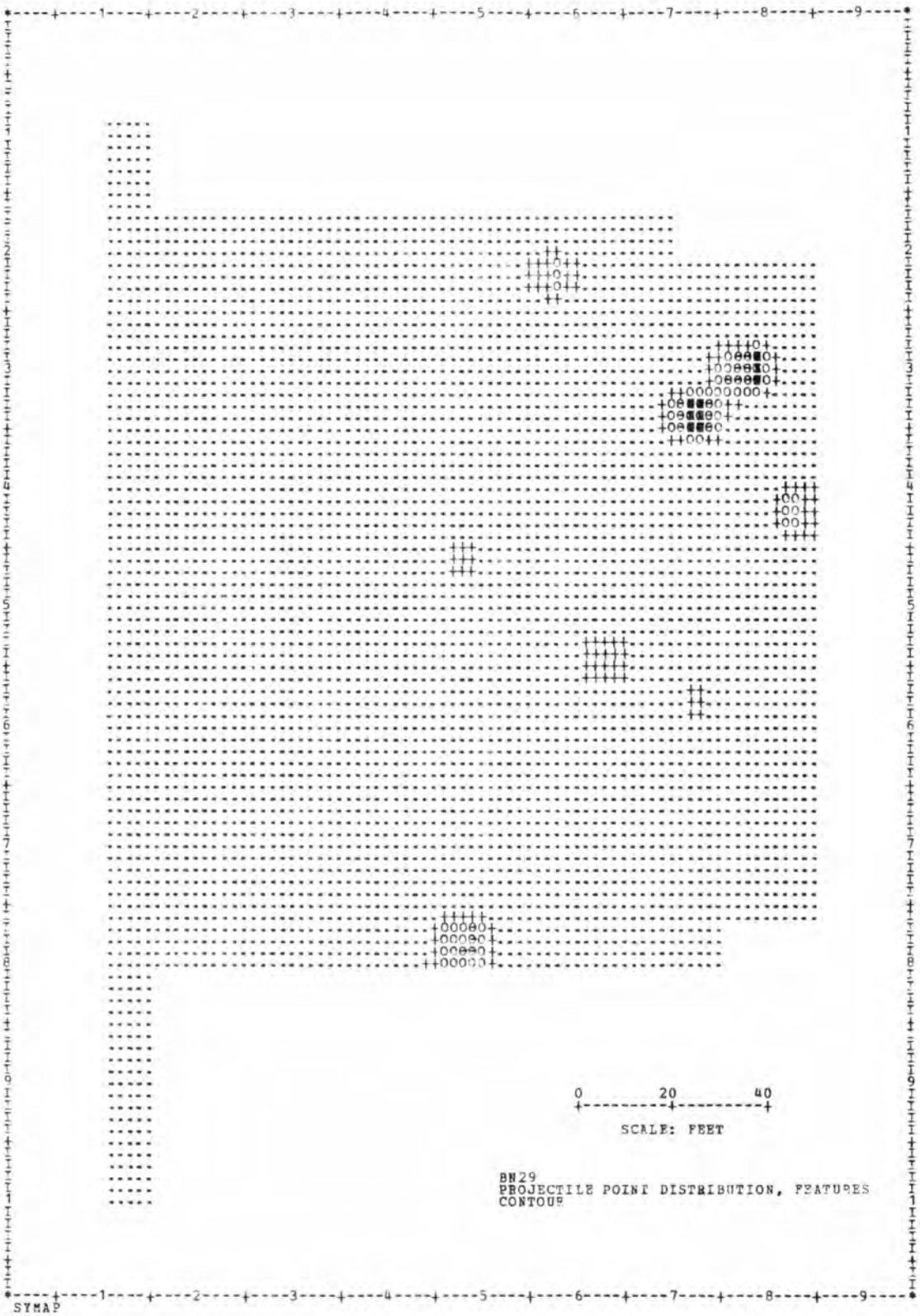
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

LEVEL	1	2	3	4	5
SYMBOLS	.....1....	+++++2+++++	000030000	000040000	00005000
FREQ.	234	3	2	1	2

MINIMUM AND MAXIMUM VALID DATA VALUES ARE 0.0 AND 11.000

ERROR MEASURES

VARIATION EXPLAINED BY SURFACE	0.22330566E 02
VARIATION NOT EXPLAINED BY SURFACE	0.32074365E 03
TOTAL VARIATION	0.34307422E 03
COEFFICIENT OF DETERMINATION	0.06508958
COEFFICIENT OF CORRELATION	0.25512660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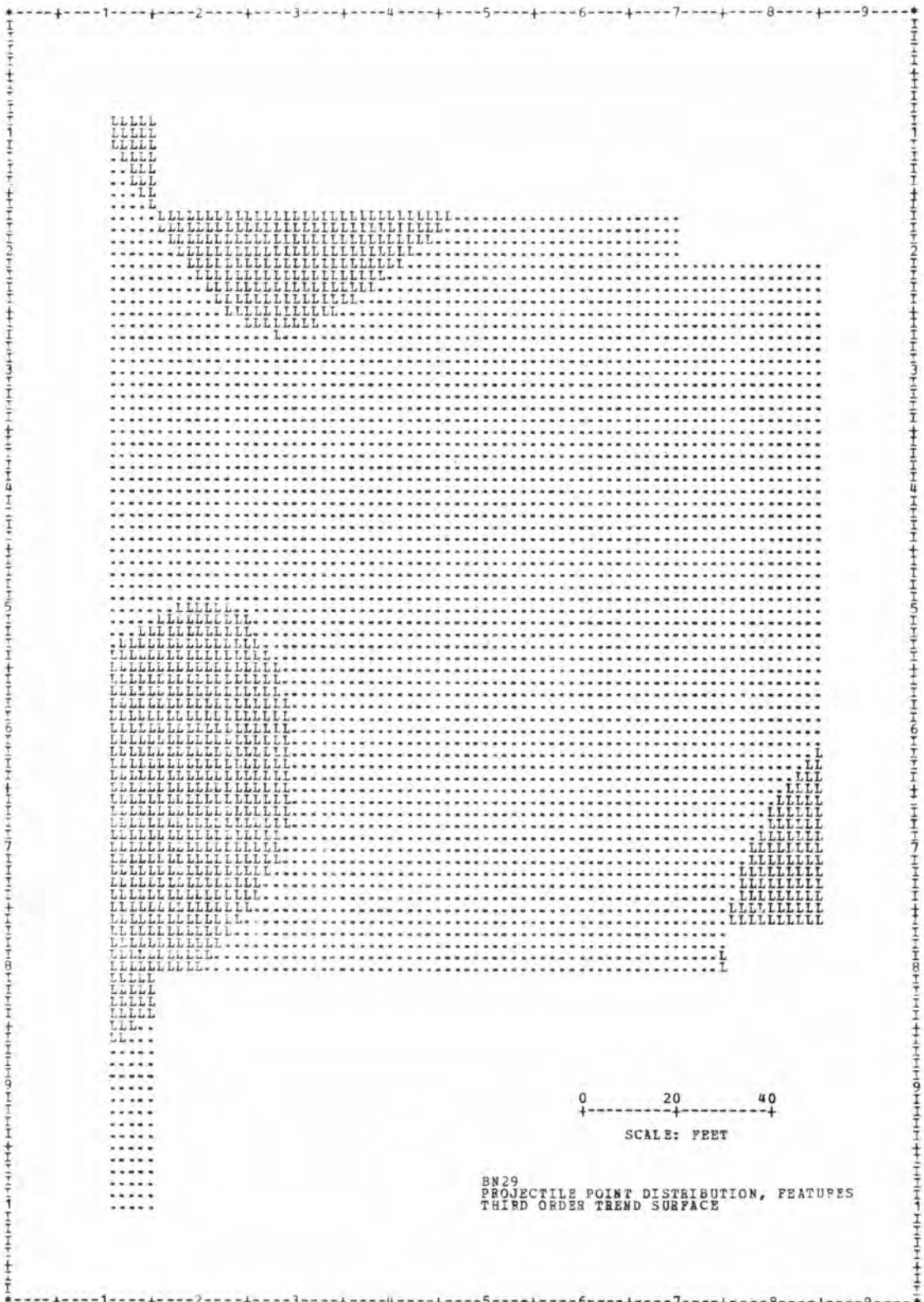
SCALE: FEET
BN29
PROJECTILE POINT DISTRIBUTION, FEATURES
CONTOUR
SYMAP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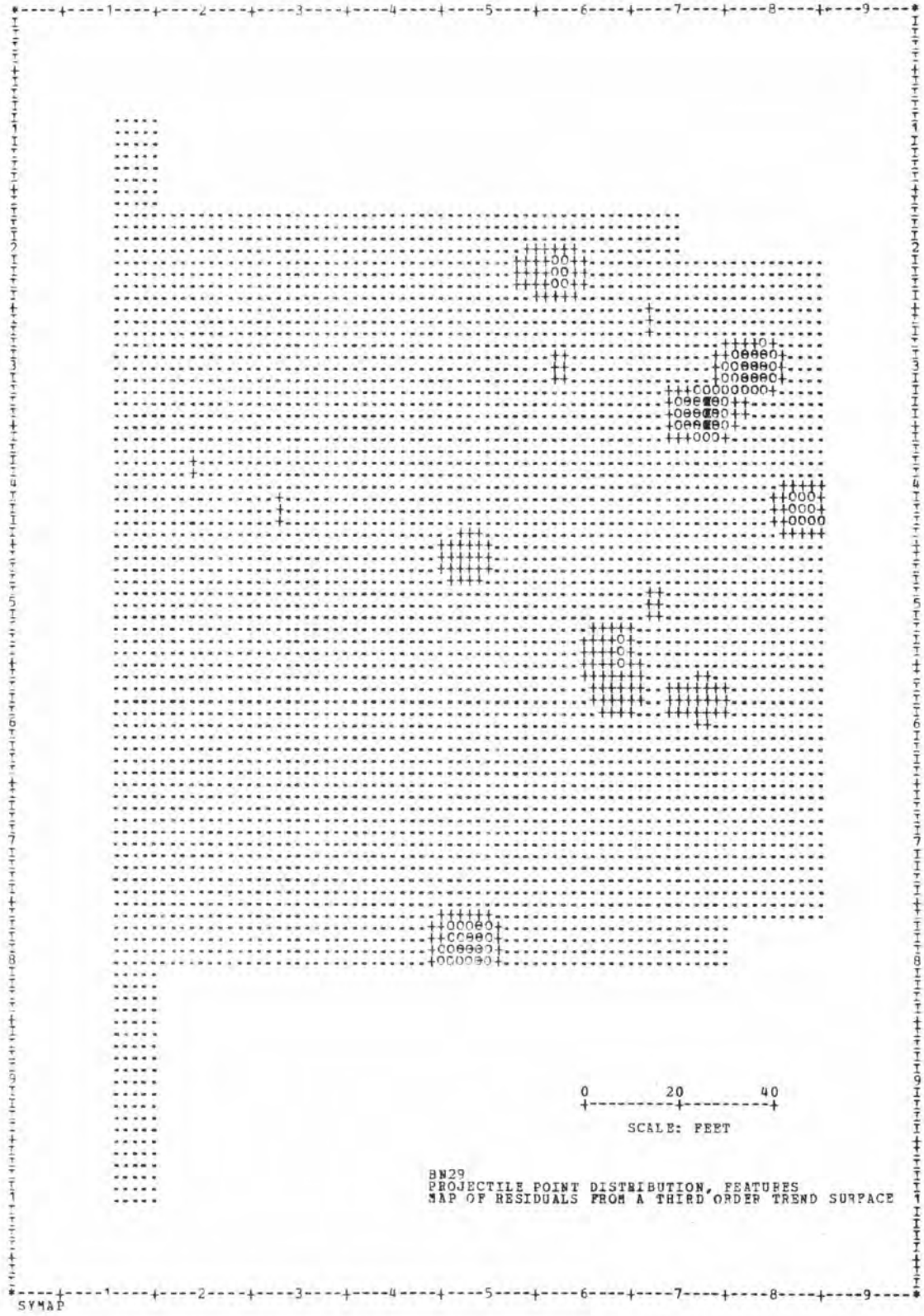
SCALE: FEET
BN29
PROJECTILE POINT DISTRIBUTION, FEATURES
THIRD ORDER TREND SURFACE
SYMAP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SCALE: FEET
BN29
PROJECTILE POINT DISTRIBUTION, FEATURES
MAP OF RESIDUALS FROM A THIRD ORDER TREND SURFACE
SYMAP

APPENDIX B

QUANTITATIVE DATA AND SYMAP DISTRIBUTIONS OF ARTIFACTS FROM THE PLOW ZONE, $BN^{V}29$

BN29

CERAMIC DISTRIBUTION, PLOW ZONE

THIRD ORDER TREND SURFACE

MINIMUM	403.00	1085.20	1767.40	2449.60	3131.80
MAXIMUM	1085.20	1767.40	2449.60	3131.80	3814.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00

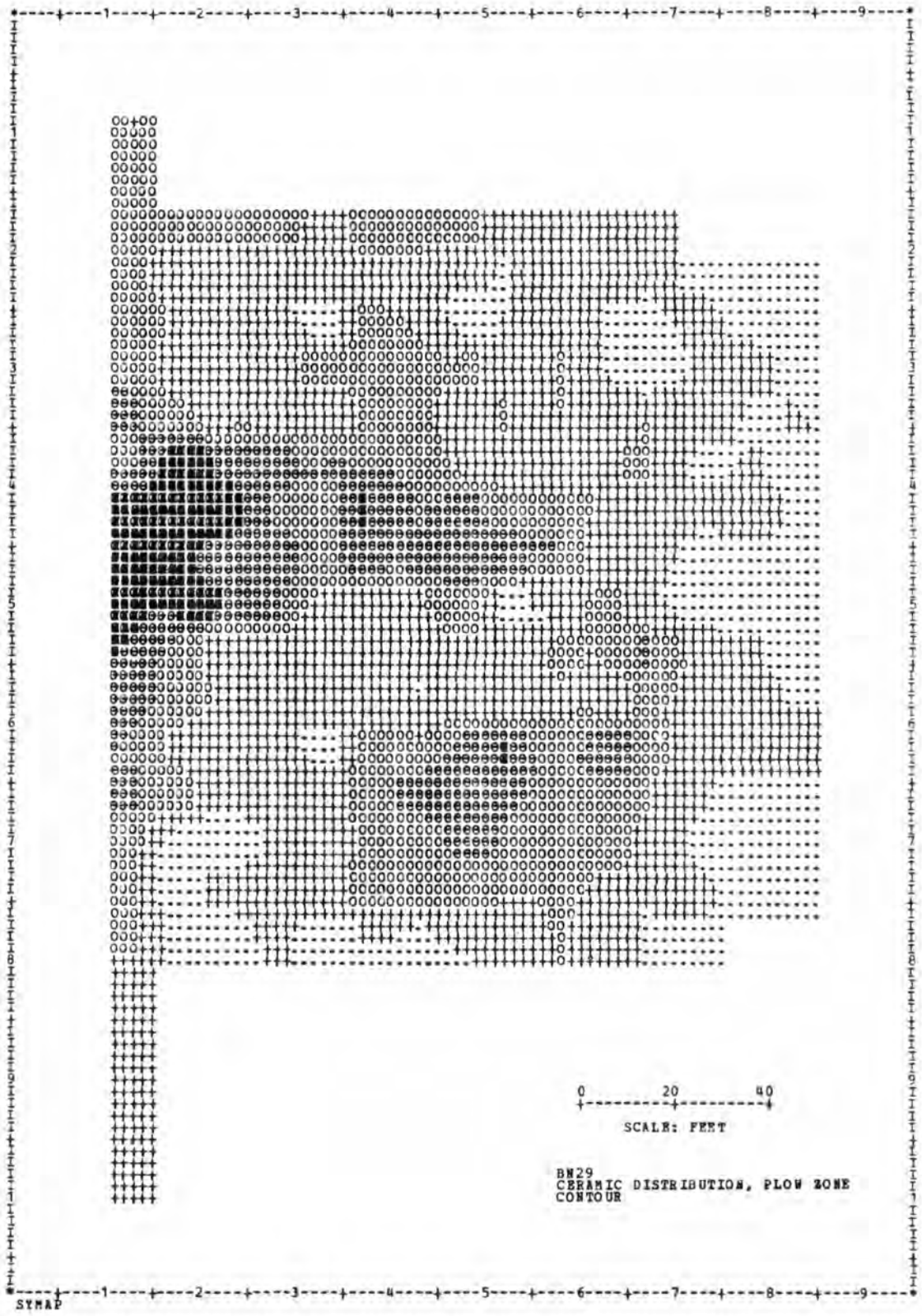
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

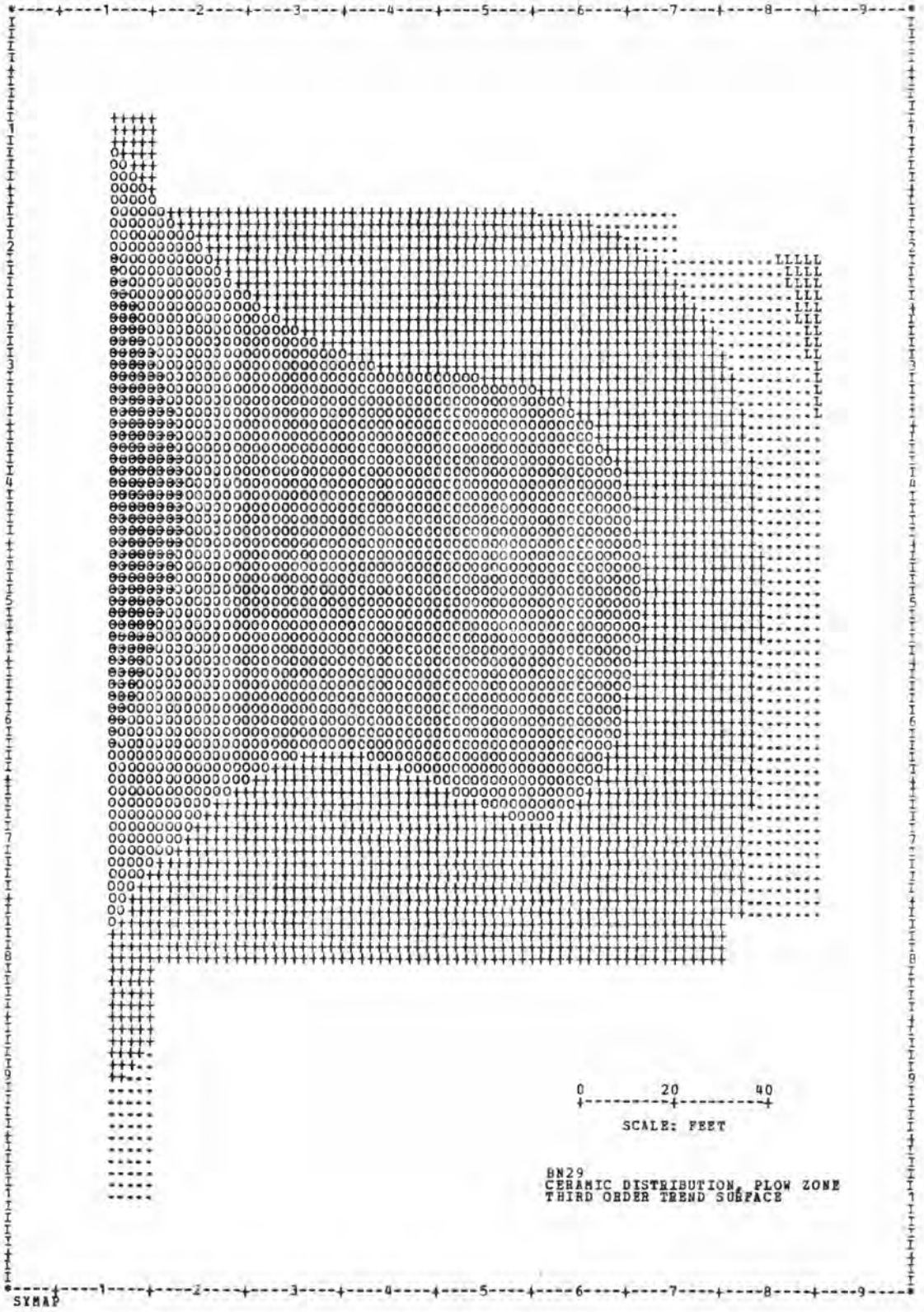
LEVEL	1	2	3	4	5
	.....	++++++++	000000000	eeeeeeeee	■■■■■■■■■
	.....	++++++++	000000000	eeeeeeeee	■■■■■■■■■
SYMBOLS	....1....	++++2++++	000030000	eeee4eeee	■■■■5■■■■
	.....	++++++++	000000000	eeeeeeeee	■■■■■■■■■
	.....	++++++++	000000000	eeeeeeeee	■■■■■■■■■
	45	100	63	24	10

MINIMUM AND MAXIMUM VALID DATA VALUES ARE 403.000 AND 3814.000

ERROR MEASURES

VARIATION EXPLAINED BY SURFACE	0.50399840E 08
VARIATION NOT EXPLAINED BY SURFACE	0.63578784E 08
TOTAL VARIATION	0.11397862E 09
COEFFICIENT OF DETERMINATION	0.44218677
COEFFICIENT OF CORRELATION	0.66497129


0 20 40
SCALE: FEET
BN29
CERAMIC DISTRIBUTION, PLOW ZONE
CONTOUR
SYMAP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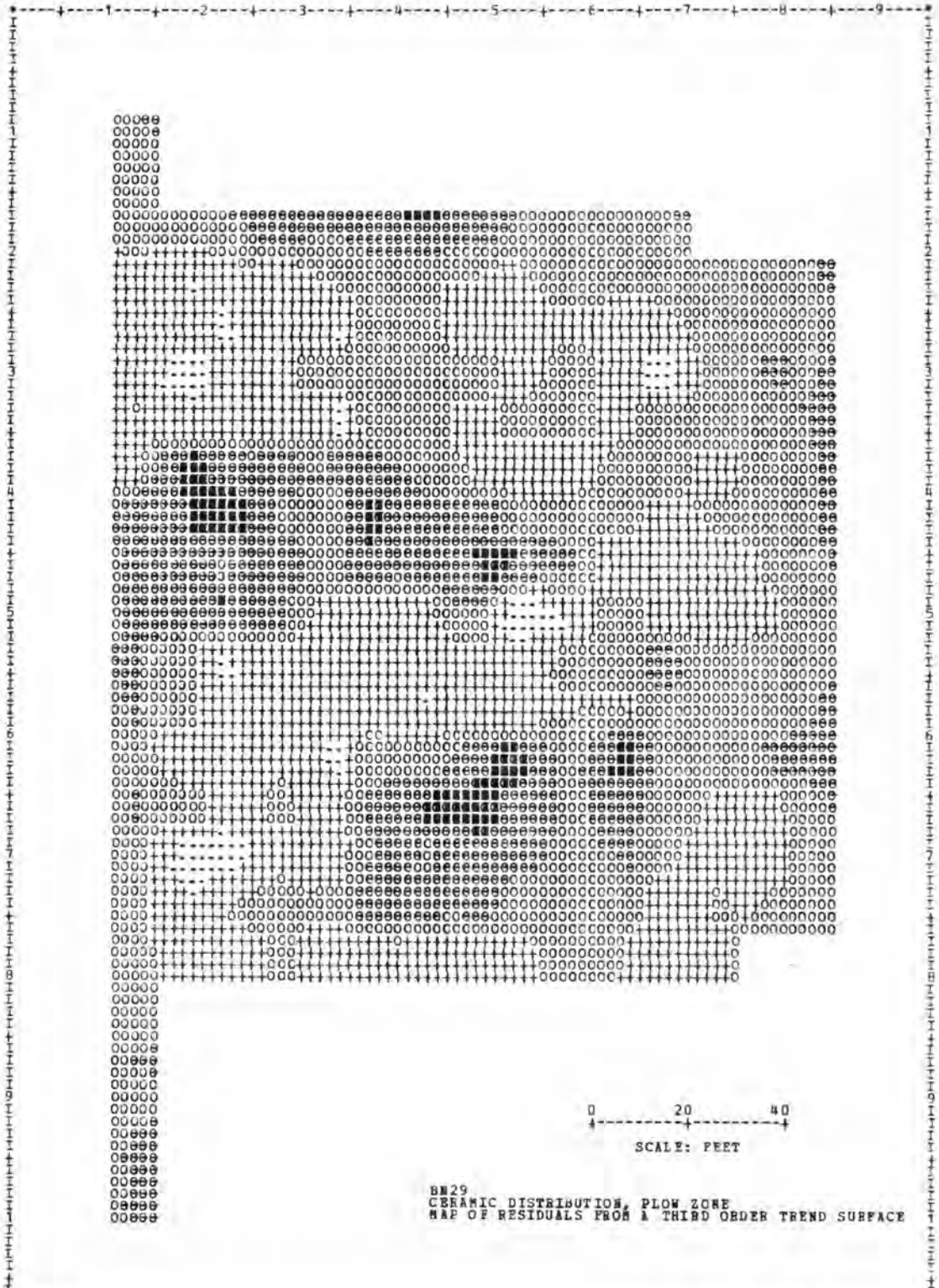
SCALE: FEET
BN29
CERAMIC DISTRIBUTION, PLOW ZONE
THIRD ORDER TREND SURFACE
SYMAP



BN29
CERAMIC DISTRIBUTION, PLOW ZONE
MAP OF RESIDUALS FROM A THIRD ORDER TREND SURFACE

SYMAP

BN29

BONE DISTRIBUTION, PLOW ZONE

THIRD ORDER TREND SURFACE

MINIMUM	0.0	60.20	120.40	180.60	240.80
MAXIMUM	60.20	120.40	180.60	240.80	301.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

LEVEL	1	2	3	4	5
SYMBOLS	.....1....	+++++2+++++	000030000	eeee4eeee	■■■■5■■■■
FREQ.	200	27	10	3	2

MINIMUM AND MAXIMUM VALID DATA VALUES ARE 0.0 AND 301.000

ERROR MEASURES

VARIATION EXPLAINED BY SURFACE	0.17646050E 06
VARIATION NOT EXPLAINED BY SURFACE	0.40961781E 06
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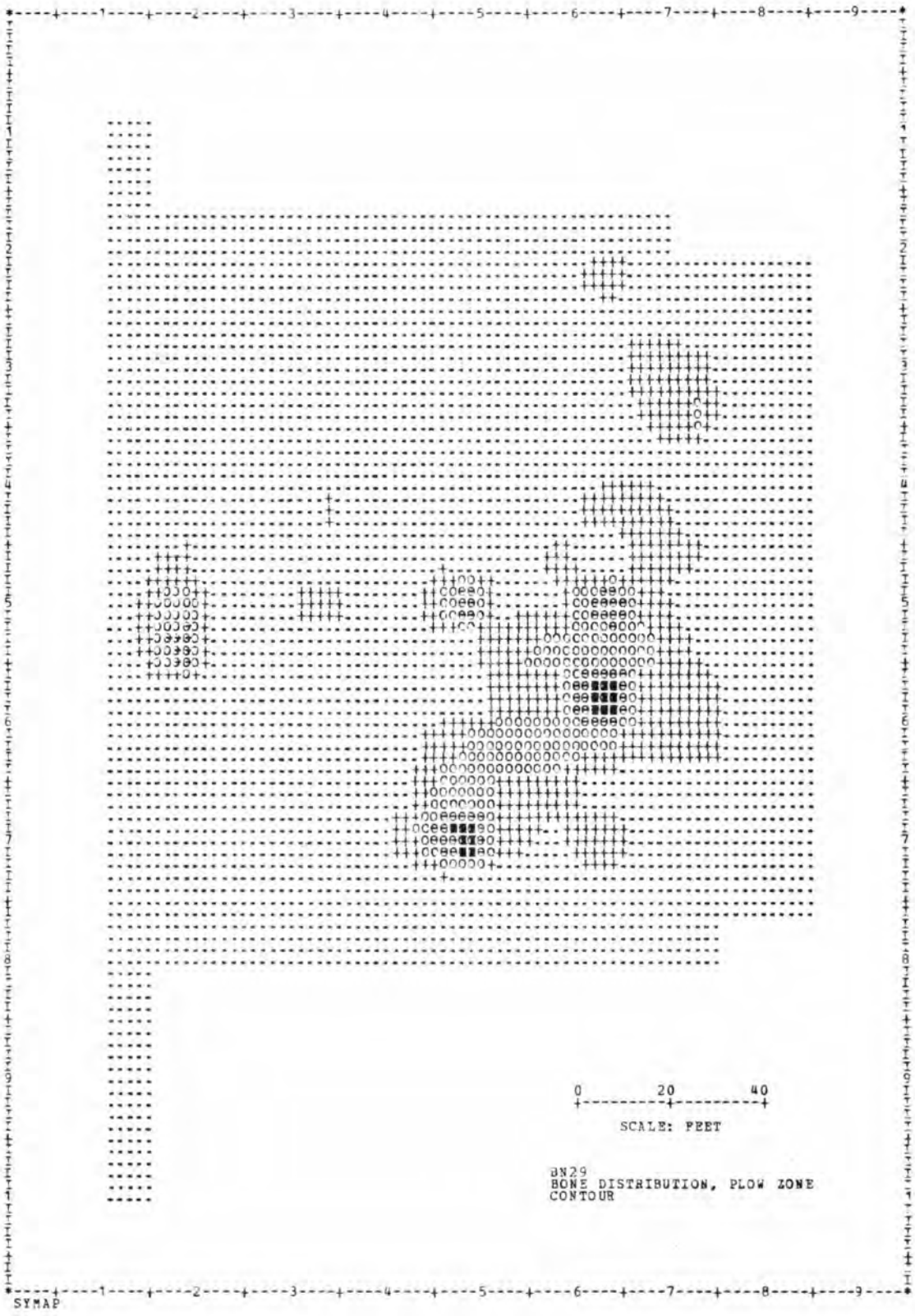
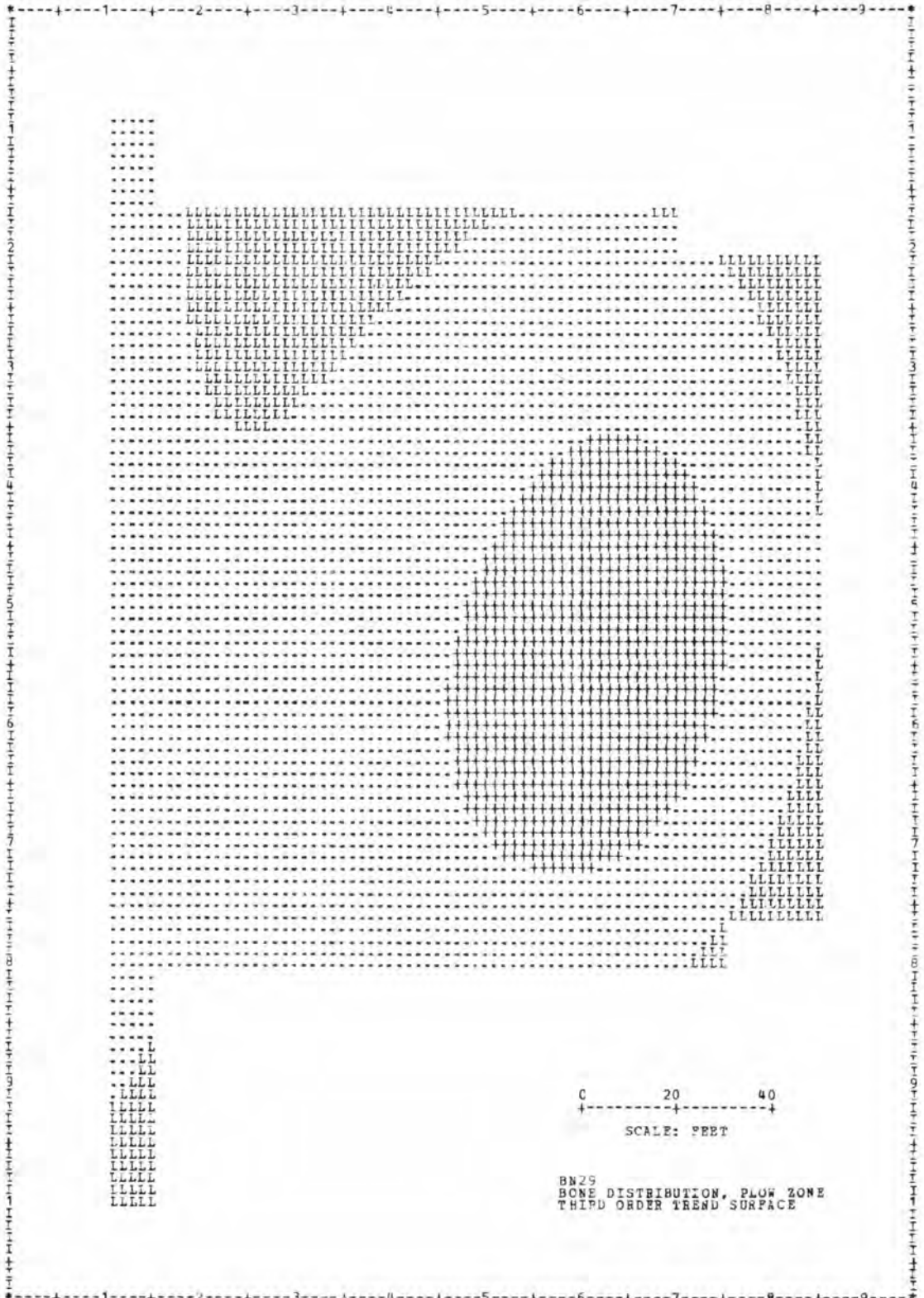
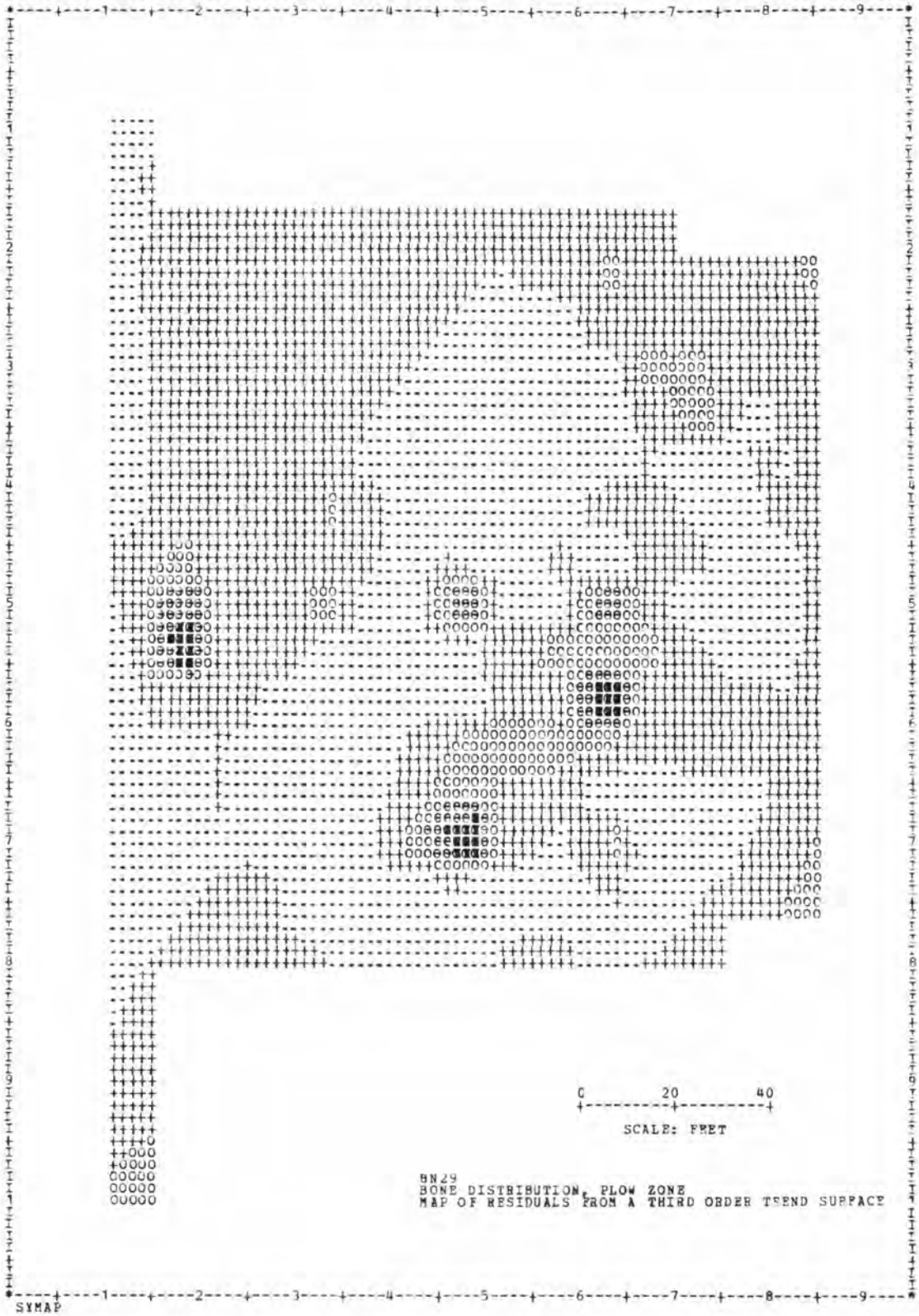

0 20 40
SCALE: FEET
8N29
BONE DISTRIBUTION, PLOW ZONE
CONTOUR
SYMAP


C 20 40
SCALE: FEET
BN29
BONE DISTRIBUTION, PLOW ZONE
THIRD ORDER TREND SURFACE
SYMAP



BN29
BONE DISTRIBUTION, PLOW ZONE
MAP OF RESIDUALS FROM A THIRD ORDER TREND SURFACE

SYMAP

BN29

LITHIC DISTRIBUTION, PLOW ZONE

THIRD ORDER TREND SURFACE

MINIMUM	5.00	28.20	51.40	74.60	97.80
MAXIMUM	28.20	51.40	74.60	97.80	121.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00

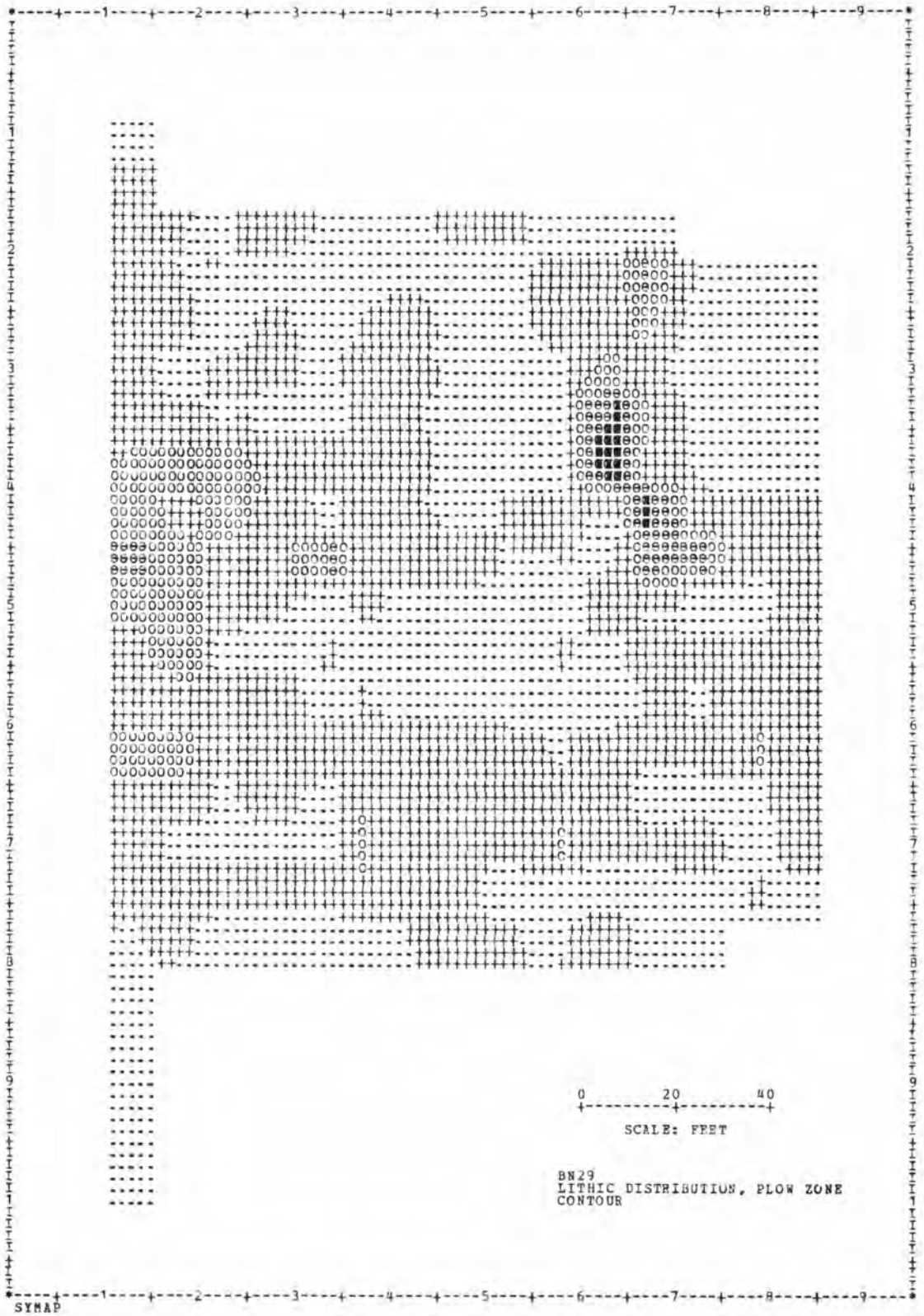
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

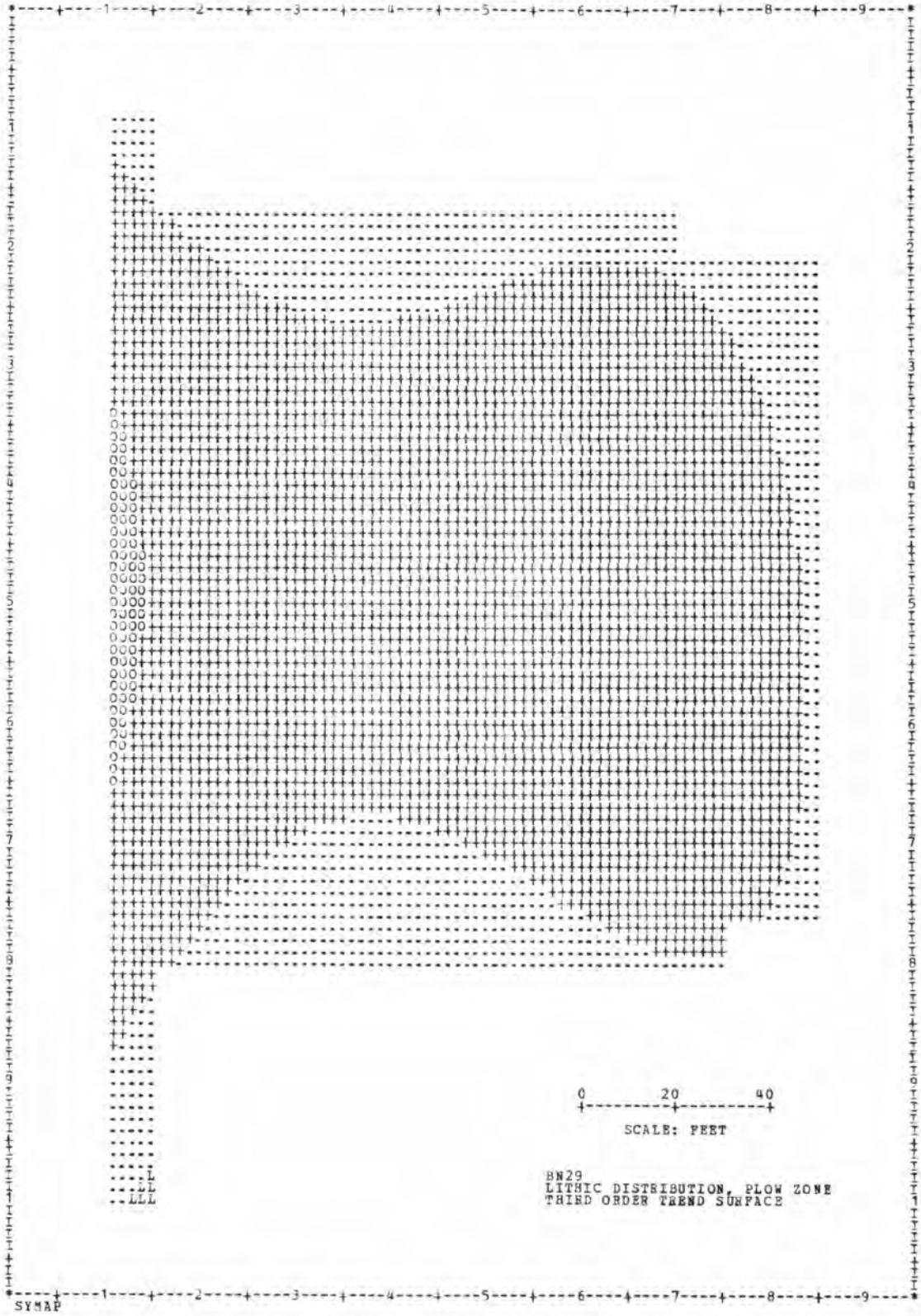
LEVEL	1	2	3	4	5
SYMBOLS	.....1.....	+++++2++++	00C030C00	@@@@4@@@@	■■■■5■■■■
FREQ.	105	112	17	5	3

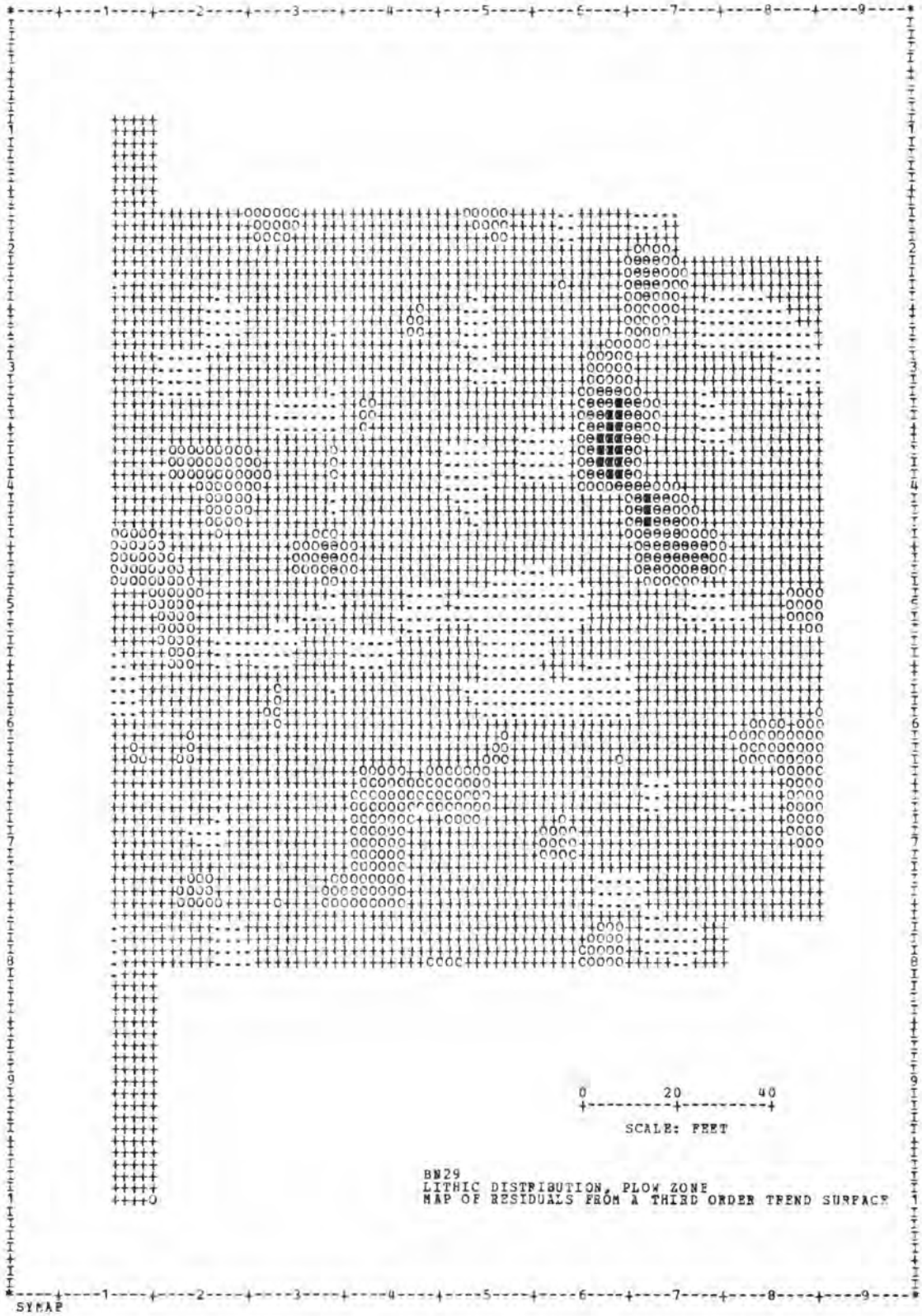
MINIMUM AND MAXIMUM VALID DATA VALUES ARE 5.000 AND 121.000

ERROR MEASURES

VARIATION EXPLAINED BY SURFACE	0.11488840E 05
VARIATION NOT EXPLAINED BY SURFACE	0.58656160E 05
TOTAL VARIATION	0.70145000E 05
COEFFICIENT OF DETERMINATION	0.16378701
COEFFICIENT OF CORRELATION	0.40470606


0 20 40
SCALE: FEET
BN29
LITHIC DISTRIBUTION, PLOW ZONE
CONTOUR
SYMAP


0 20 40
SCALE: FEET
BN29
LITHIC DISTRIBUTION, PLOW ZONE
THIRD ORDER TREND SURFACE
SYMAP


0 20 40
SCALE: FEET
BN29
LITHIC DISTRIBUTION, PLOW ZONE
MAP OF RESIDUALS FROM A THIRD ORDER TREND SURFACE
SYMAP

BN29

PROJECTILE POINT DISTRIBUTION, PLOW ZONE

THIRD ORDER TREND SURFACE

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00

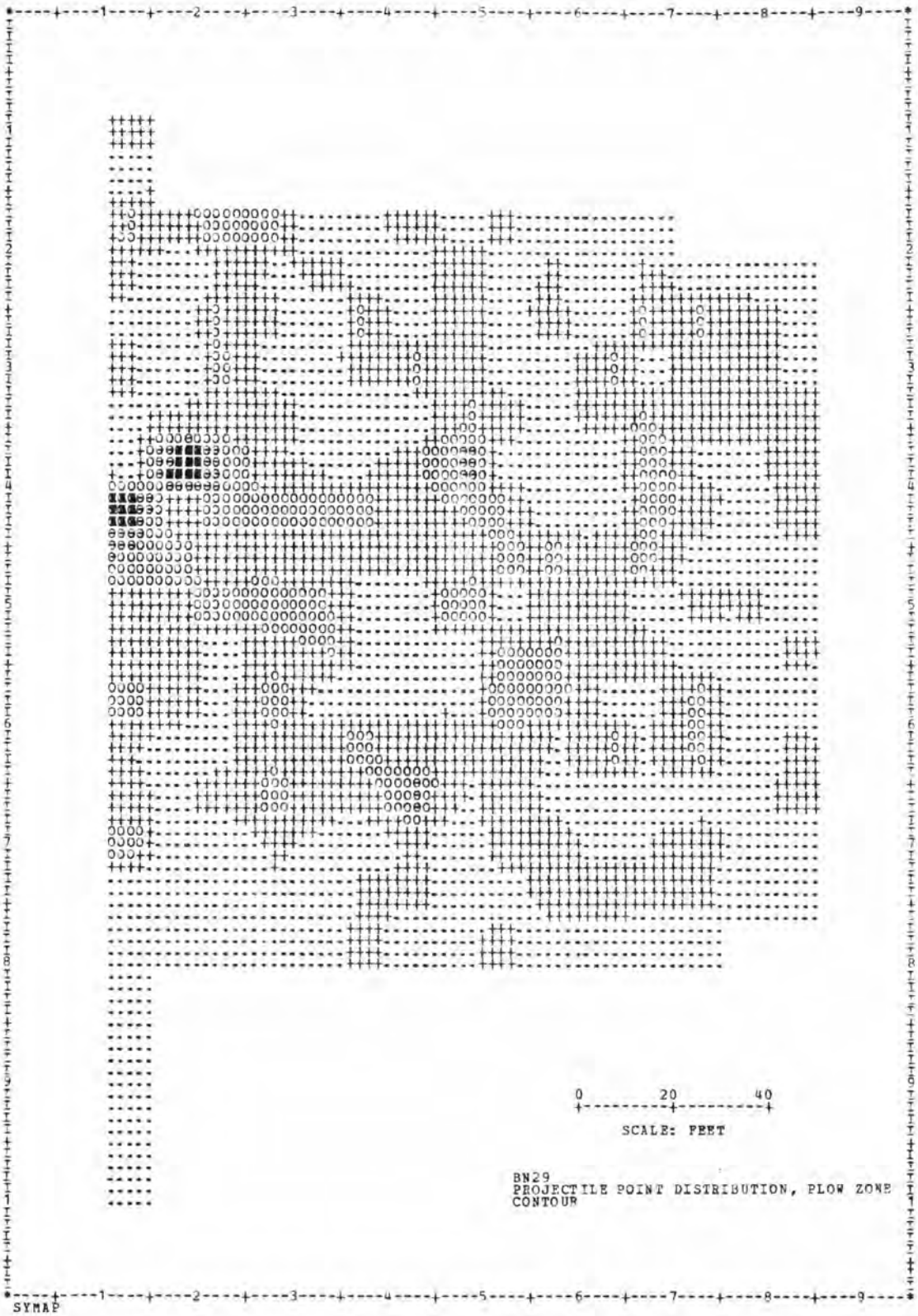
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

LEVEL	1	2	3	4	5
	---------	+++++++++	000000000	eeeeeeeee	■■■■■■■■■
	---------	+++++++++	000000000	eeeeeeeee	■■■■■■■■■
SYMBOLS	....1....	++++2++++	000030000	eeee4eeee	■■■■5■■■■
	---------	+++++++++	000000000	eeeeeeeee	■■■■■■■■■
	---------	+++++++++	000000000	eeeeeeeee	■■■■■■■■■
	115	80	42	3	2

MINIMUM AND MAXIMUM VALID DATA VALUES ARE 0.0 AND 17.000

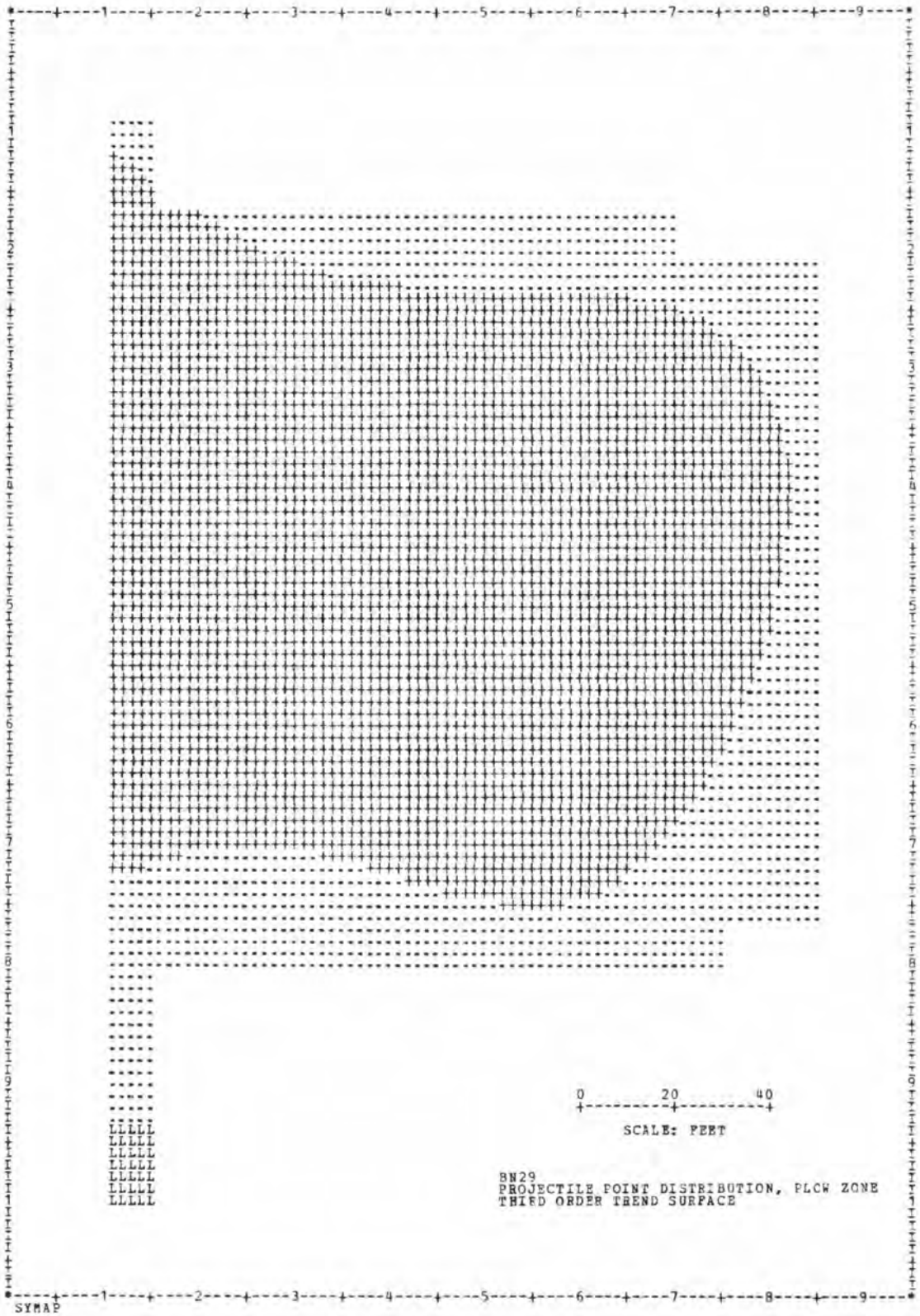
ERROR MEASURES

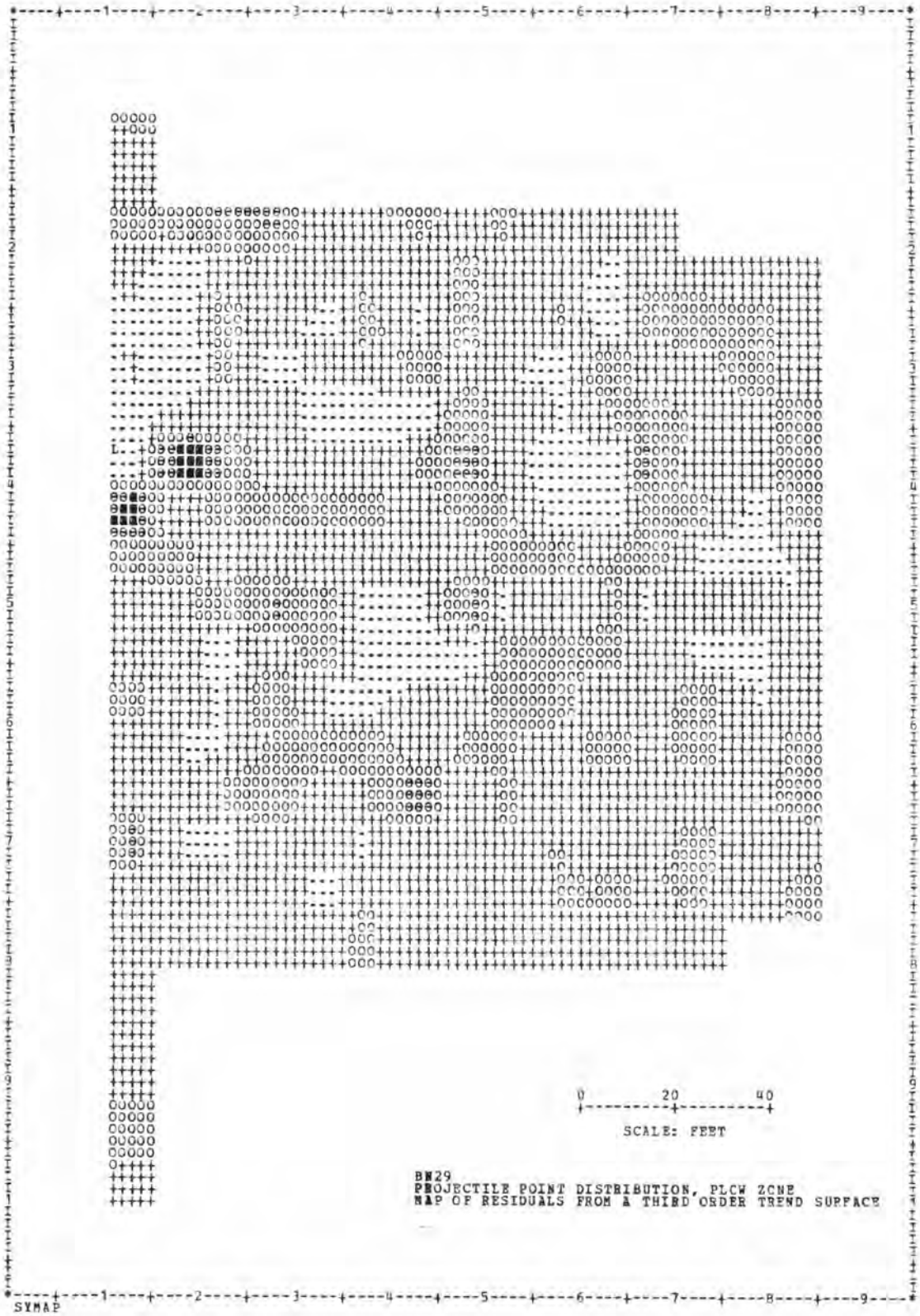
STANDARD DEVIATION	2.63
VARIATION EXPLAINED BY SURFACE	0.29971948E 03
VARIATION NOT EXPLAINED BY SURFACE	0.16641318E 04
TOTAL VARIATION	0.19638513E 04
COEFFICIENT OF DETERMINATION	0.15261817
COEFFICIENT OF CORRELATION	0.39066374



BN29
PROJECTILE POINT DISTRIBUTION, PLOW ZONE
CONTOUR

SYMAP


0 20 40
SCALE: FEET
BN29
PROJECTILE POINT DISTRIBUTION, PLOW ZONE
THIRD ORDER TREND SURFACE
SYMAP



BN29
PROJECTILE POINT DISTRIBUTION, PLCW ZONE
MAP OF RESIDUALS FROM A THIRD ORDER TREND SURFACE

SYMAP

APPENDIX C

QUANTITATIVE DATA AND SYMAP DISTRIBUTIONS OF ARTIFACTS FROM FEATURES, $SK^{V}1a$

SK1A

DISTRIBUTION OF CERAMICS FROM FEATURES

THIRD ORDER TREND SURFACE

MINIMUM	0.0	164.80	329.60	494.40	659.20
MAXIMUM	164.80	329.60	494.40	659.20	824.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00

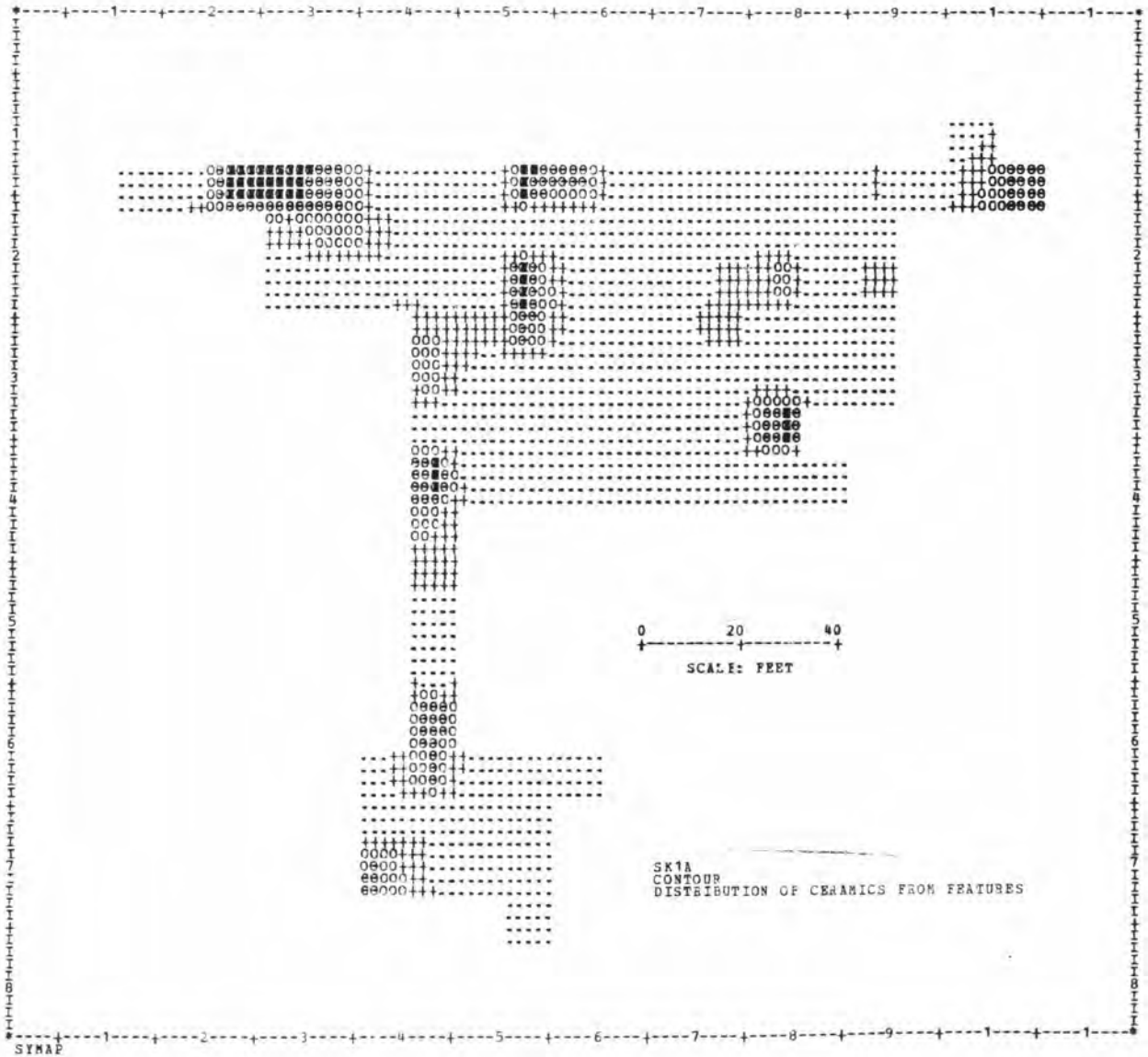
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

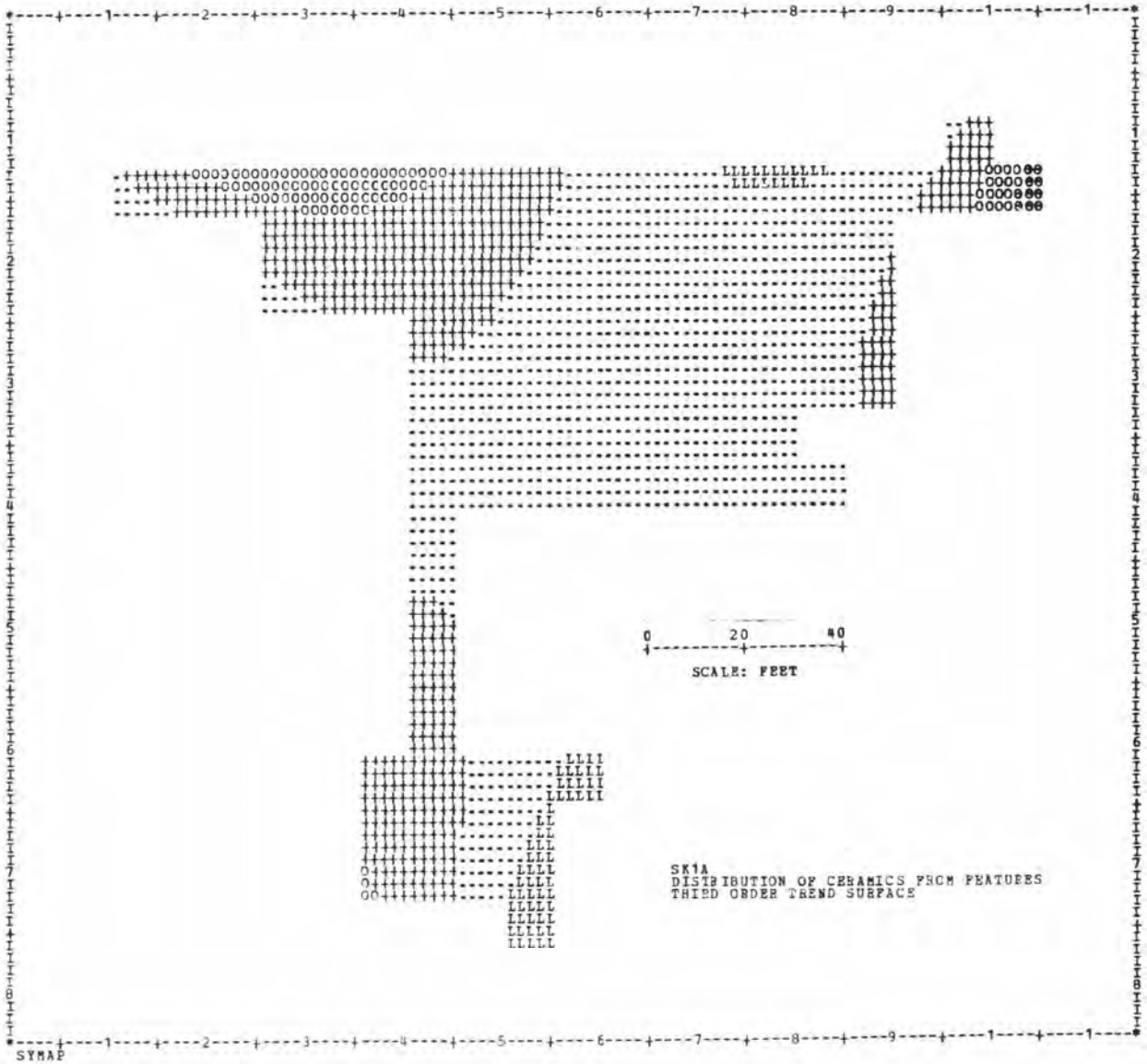
LEVEL	1	2	3	4	5
SYMBOLS	....1....	+++++++++ +++++++++ ++++2++++ +++++++++ +++++++++	OOOOOOOOO OOOOOOOOO OOOO3OOOO OOOOOOOOO OOOOOOOOO	eeeeeeeee eeeeeeeee eeee4eeee eeeeeeeee eeeeeeeee	■■■■■■■■■ ■■■■■■■■■ ■■■■5■■■■ ■■■■■■■■■ ■■■■■■■■■
FREQ.	74	11	4	7	6

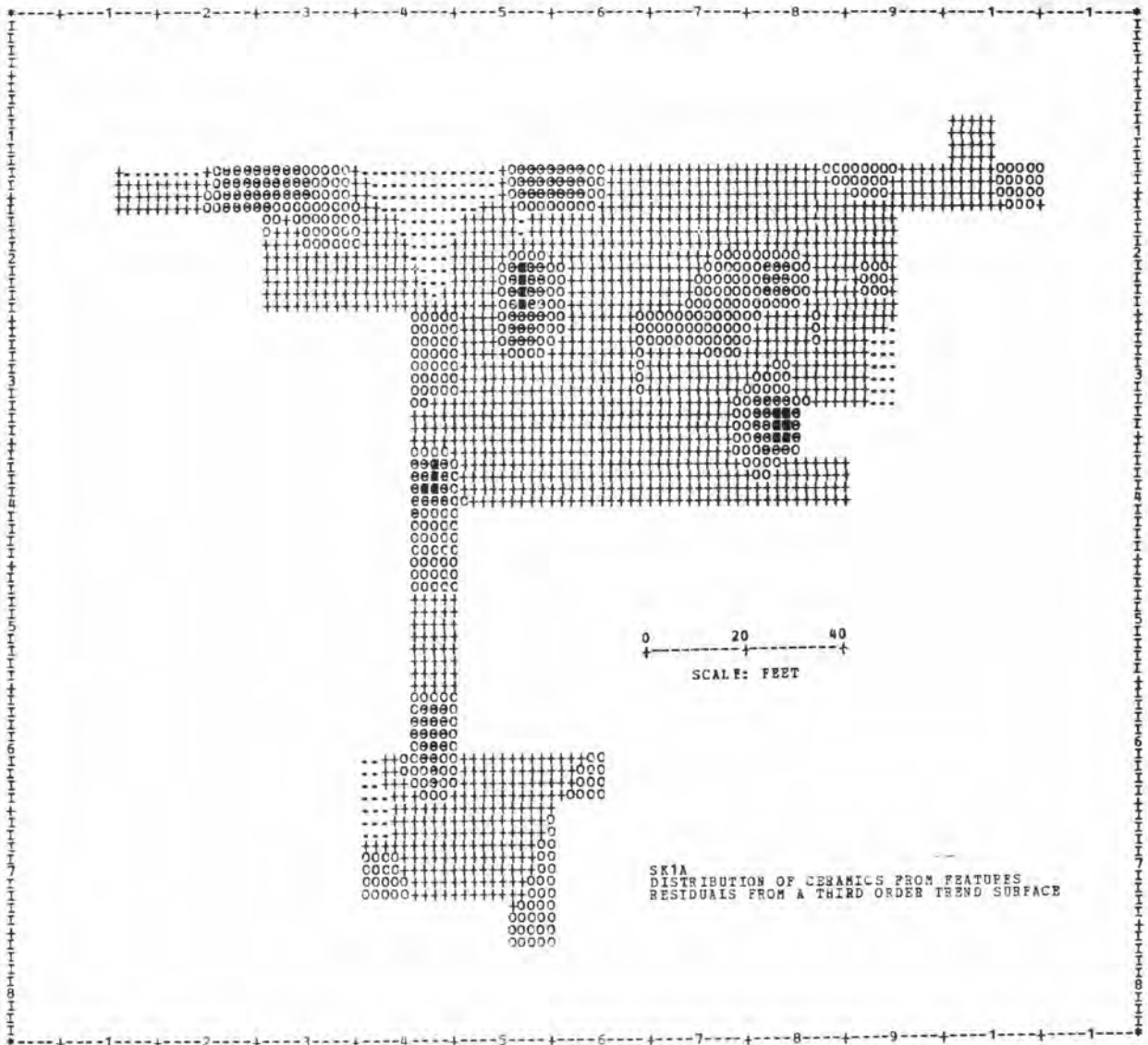
MINIMUM AND MAXIMUM VALID DATA VALUES ARE 0.0 AND 824.000

ERROR MEASURES

VARIATION EXPLAINED BY SURFACE	0.97953600E 06
VARIATION NOT EXPLAINED BY SURFACE	0.38113250E 07
TOTAL VARIATION	0.47908610E 07
COEFFICIENT OF DETERMINATION	0.20445925
COEFFICIENT OF CORRELATION	0.45217168


0 20 40
SCALE: FEET
SK1A
CONTOUR
DISTRIBUTION OF CERAMICS FROM FEATURES
SYMAP


0 20 40
SCALE: FEET
SK1A
DISTRIBUTION OF CERAMICS FROM FEATURES
THIRD ORDER TREND SURFACE
SYMAP



SK1A
DISTRIBUTION OF CERAMICS FROM FEATURES
RESIDUALS FROM A THIRD ORDER TREND SURFACE

SK1A

DISTRIBUTION OF BONE FROM FEATURES

THIRD ORDER TREND SURFACE

MINIMUM	0.0	185.20	370.40	555.60	740.80
MAXIMUM	185.20	370.40	555.60	740.80	926.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00

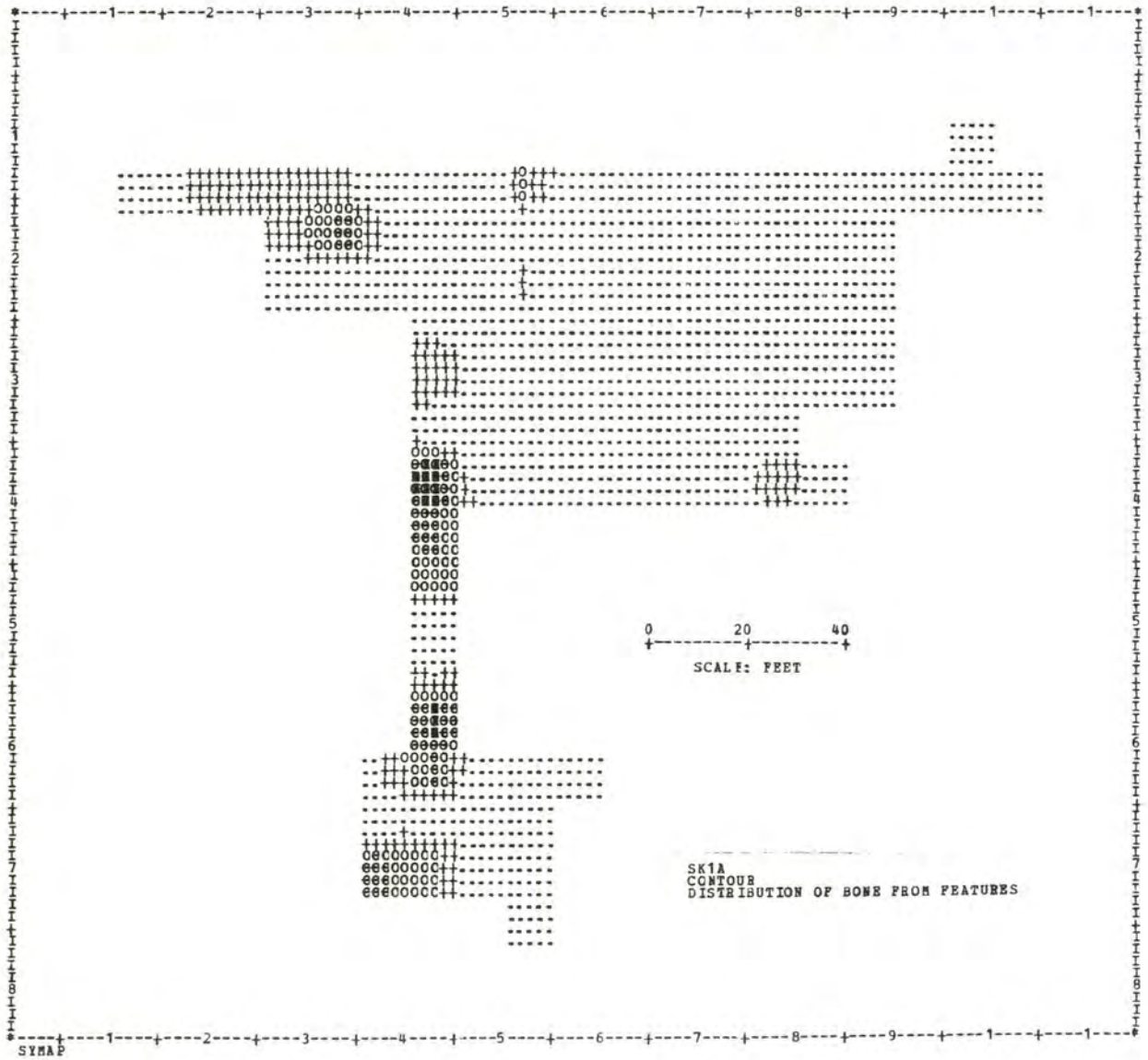
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

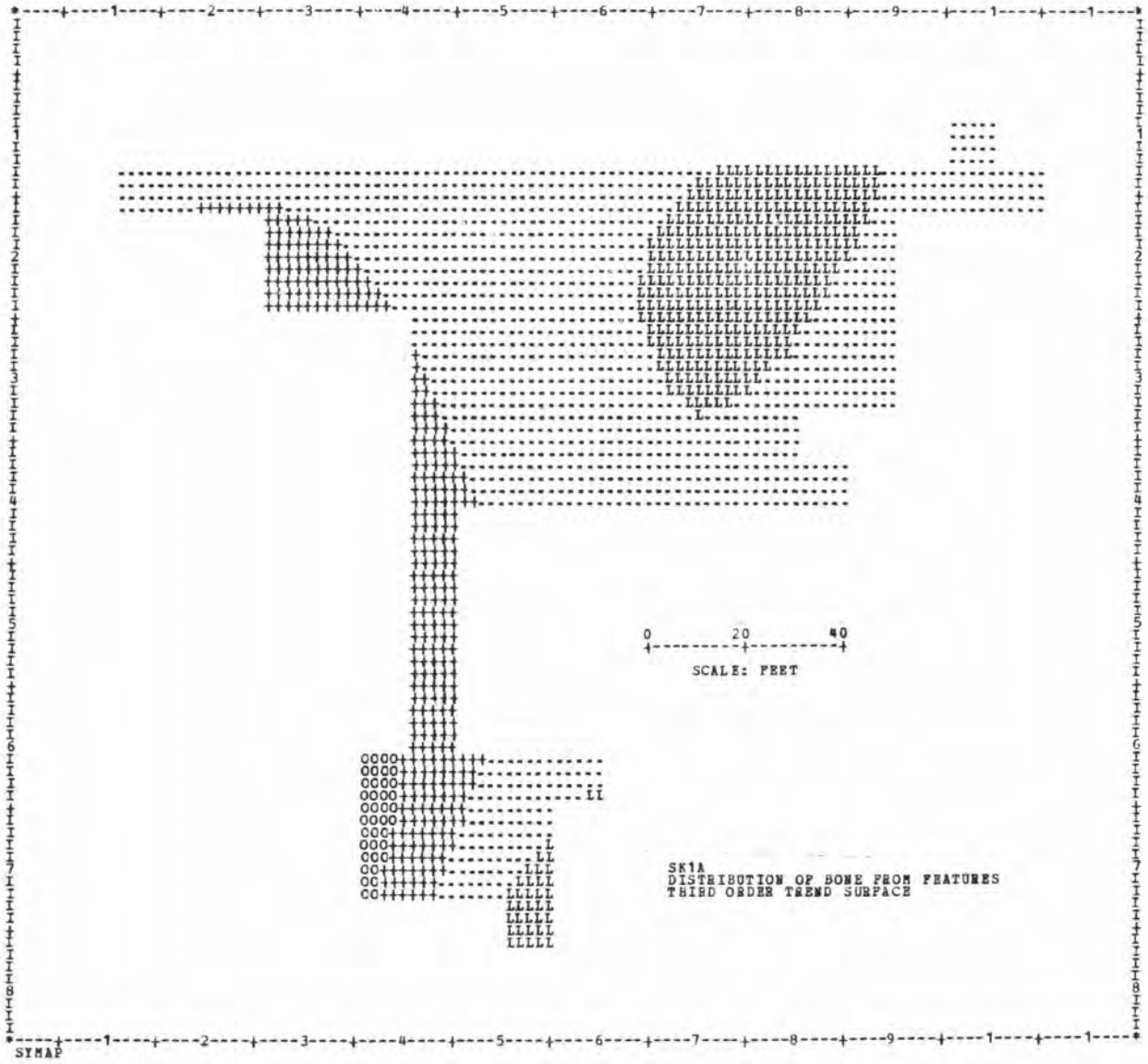
LEVEL	1	2	3	4	5
SYMBOLS	.....1.....	++++2++++	000030000	000040000	■■■■5■■■■
FREQ.	84	9	3	4	2

MINIMUM AND MAXIMUM VALID DATA VALUES ARE 0.0 AND 926.000

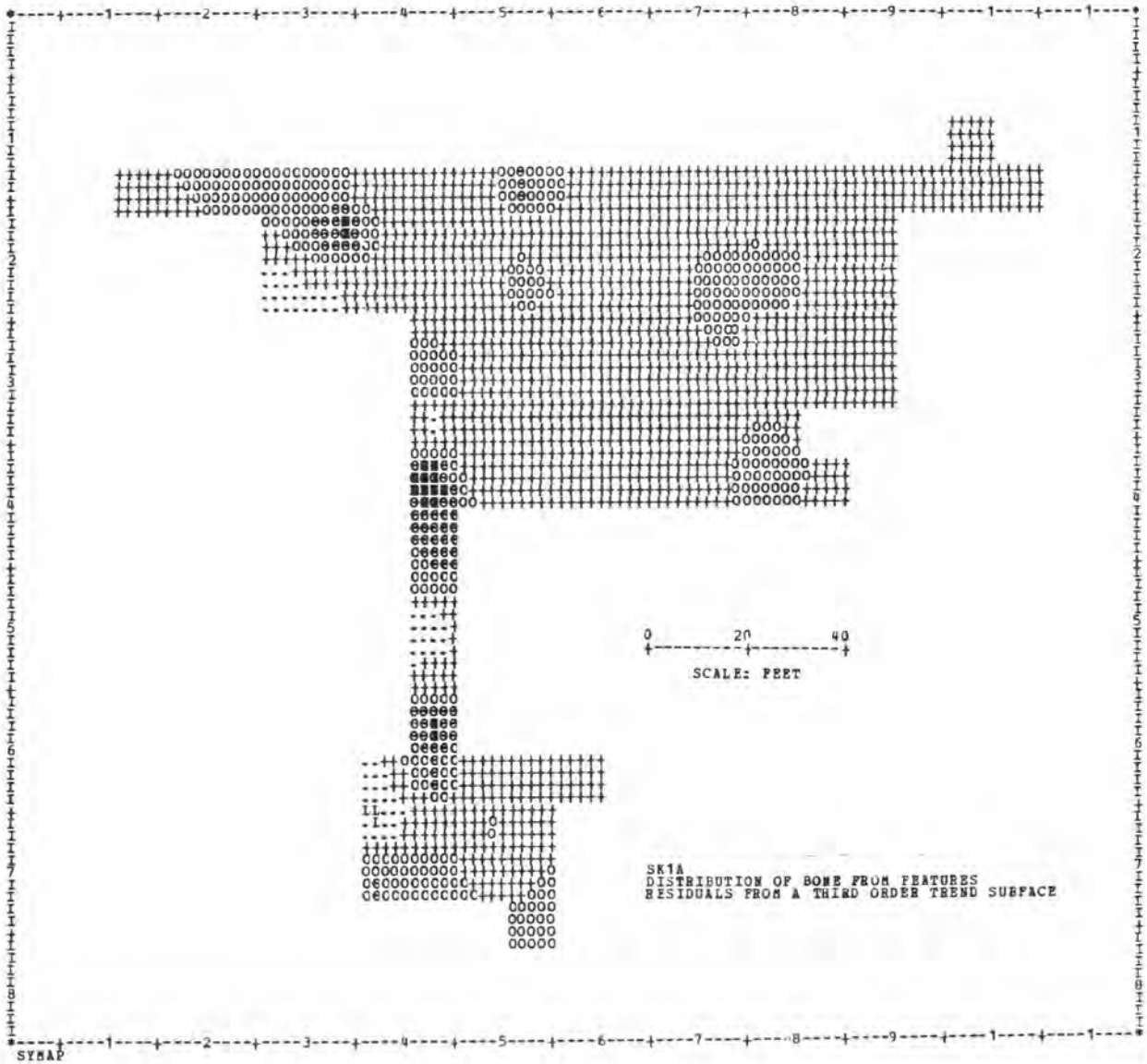
ERROR MEASURES

VARIATION EXPLAINED BY SURFACE	0.11561620E 07
VARIATION NOT EXPLAINED BY SURFACE	0.23071140E 07
TOTAL VARIATION	0.34632760E 07
COEFFICIENT OF DETERMINATION	0.33383477
COEFFICIENT OF CORRELATION	0.57778436


0 20 40
SCALE: FEET
SK1A
CONTOUR
DISTRIBUTION OF BONE FROM FEATURES
SYMAP



SK1A
DISTRIBUTION OF BONE FROM FEATURES
THIRD ORDER TREND SURFACE



SK1A
DISTRIBUTION OF BONE FROM FEATURES
RESIDUALS FROM A THIRD ORDER TREND SURFACE

SK1A

DISTRIBUTION OF LITHICS FROM FEATURES

THIRD ORDER TREND SURFACE

MINIMUM	0.0	46.60	93.20	139.80	186.40
MAXIMUM	46.60	93.20	139.80	186.40	233.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00

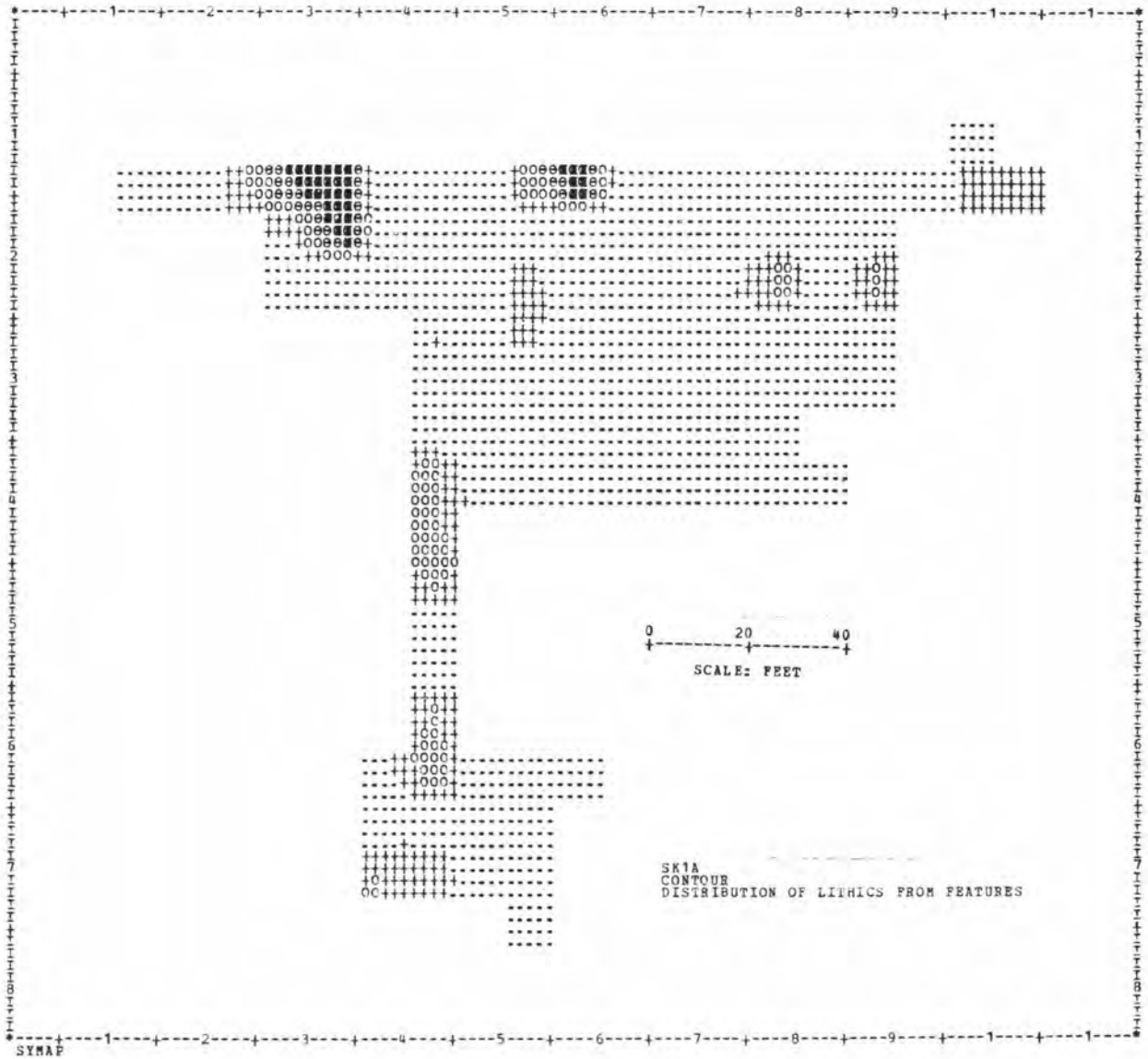
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

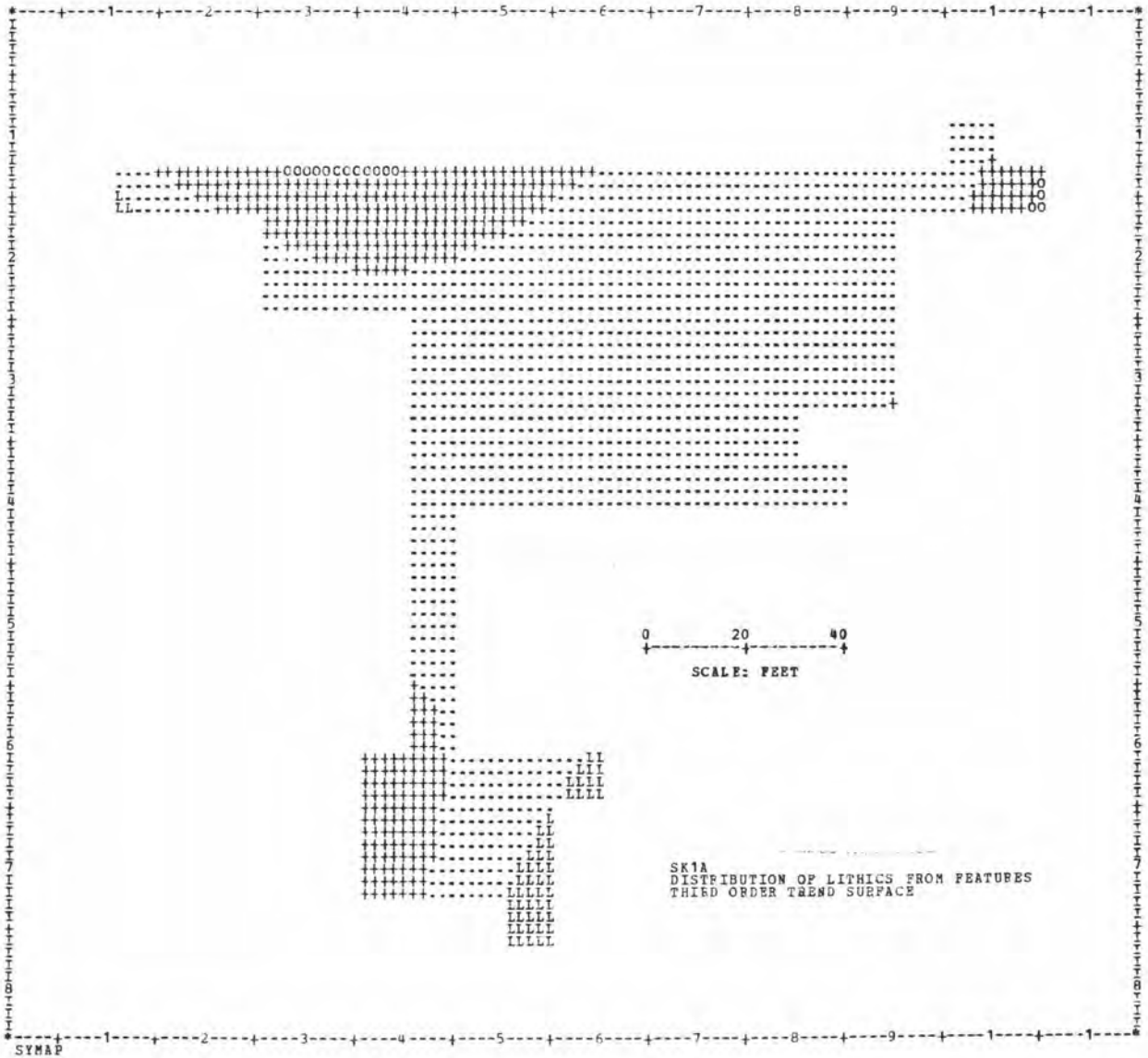
LEVEL	1	2	3	4	5
SYMBOLS	.....1....	+++++++++	OOCCOOCOO	eeeeeeeee	■■■■■■■■■
	.....	+++++++++	OOCCCOCCO	eeeeeeeee	■■■■■■■■■
	.....	++++2++++	OOCO3OOOO	eeee4eeee	■■■■5■■■■
	.....	+++++++++	OOOOOOOOO	eeeeeeeee	■■■■■■■■■
	.....	+++++++++	OOCOOOCOO	eeeeeeeee	■■■■■■■■■
FREQ.	81	9	8	1	3

MINIMUM AND MAXIMUM VALID DATA VALUES ARE 0.0 AND 233.000

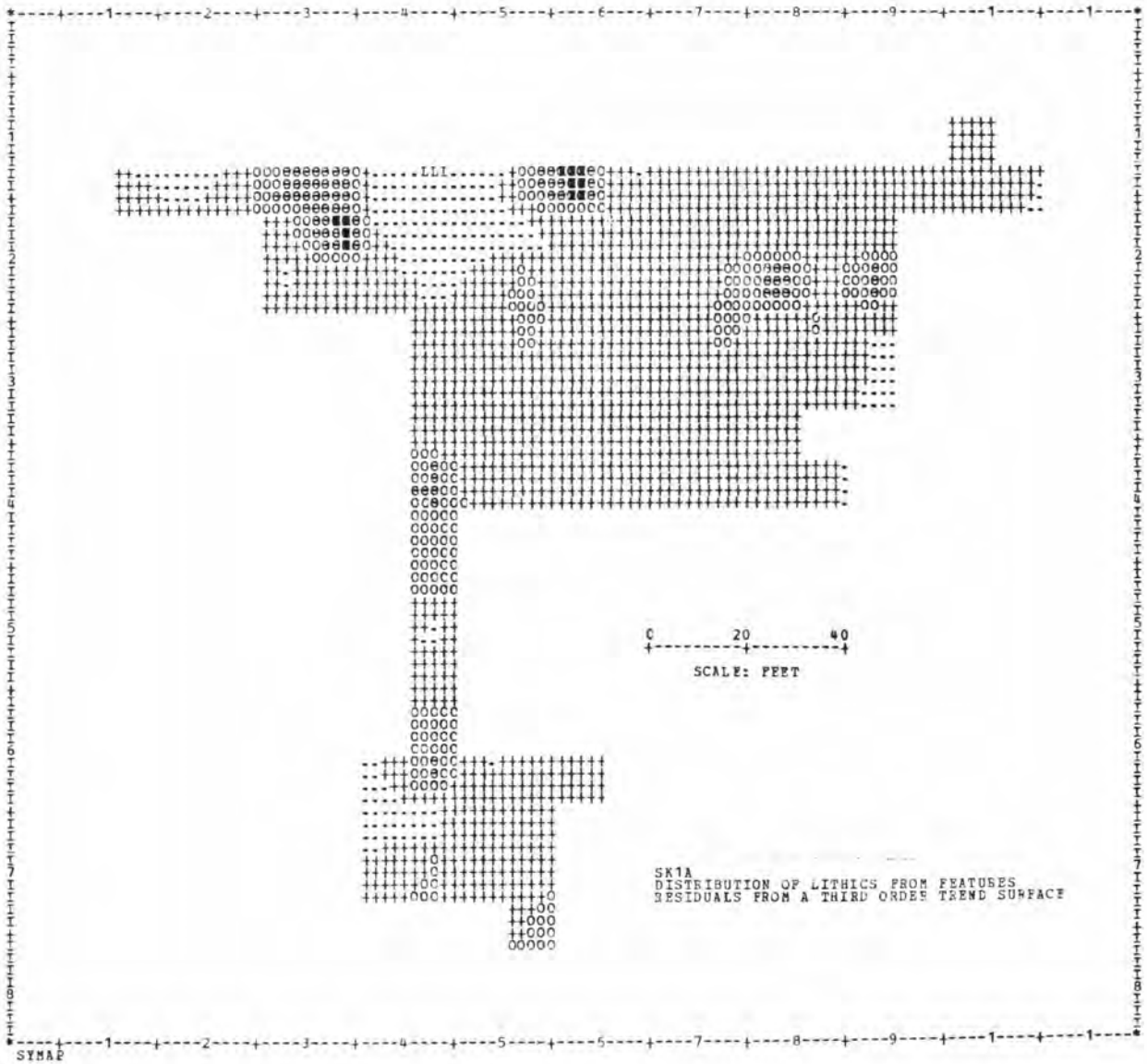
ERROR MEASURES

VARIATION EXPLAINED BY SURFACE	0.55067313E 05
VARIATION NOT EXPLAINED BY SURFACE	0.19052469E 06
TOTAL VARIATION	0.24559200E 06
COEFFICIENT OF DETERMINATION	0.22422272
COEFFICIENT OF CORRELATION	0.47352159


0 20 40
SCALE: FEET
SK1A
CONTOUR
DISTRIBUTION OF LITHICS FROM FEATURES
SYMAP



SK1A
DISTRIBUTION OF LITHICS FROM FEATURES
THIRD ORDER TREND SURFACE



SK1A
DISTRIBUTION OF LITHICS FROM FEATURES
RESIDUALS FROM A THIRD ORDER TREND SURFACE

SYMAP

SK1A

DISTRIBUTION OF PROJECTILE POINTS FROM FEATURES

THIRD ORDER TREND SURFACE

MINIMUM	0.0	6.00	12.00	18.00	24.00
MAXIMUM	6.00	12.00	18.00	24.00	30.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00

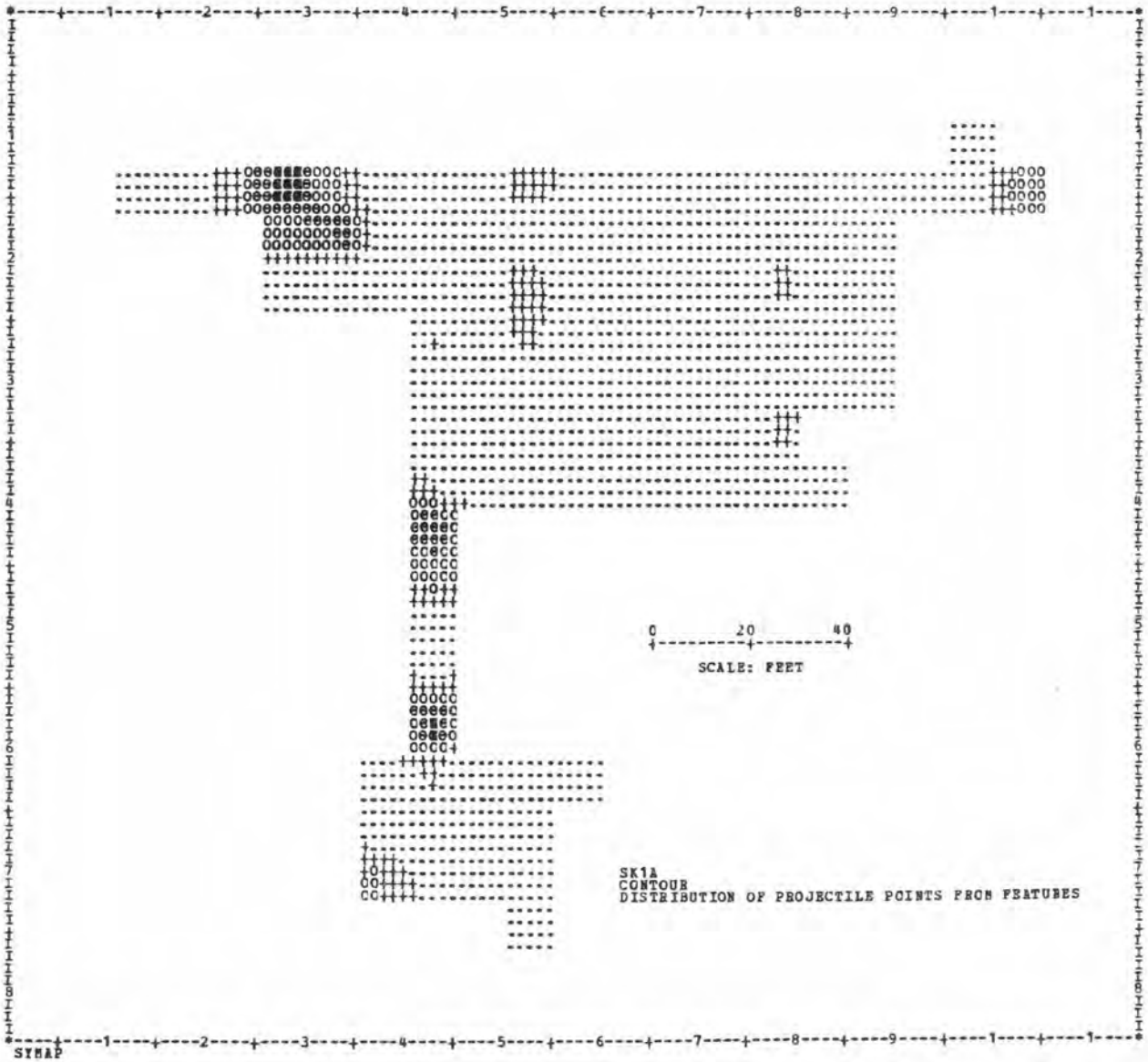
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

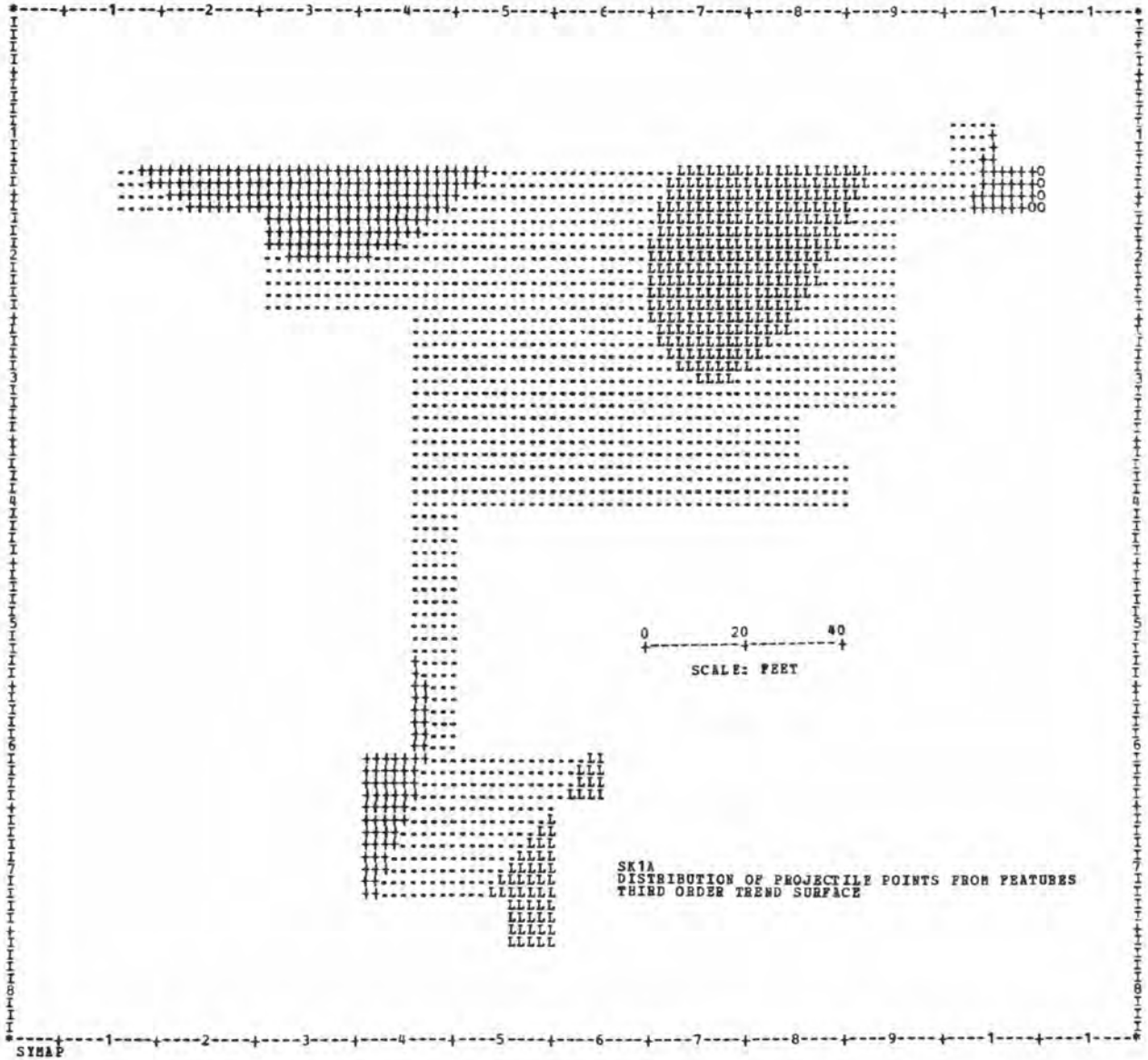
```
LEVEL          1          2          3          4          5
               ==========================================================
               .........  +++++++++  OOOOOOOOO  eeeeeeeee  ■■■■■■■■■
               .........  +++++++++  OOOOOOOOO  eeeeeeeee  ■■■■■■■■■
SYMBOLS        ....1....  ++++2++++  OOOO3OOOO  eeee4eeee  ■■■■5■■■■
               .........  +++++++++  OOOOOOOOO  eeeeeeeee  ■■■■■■■■■
               .........  +++++++++  OOOOOOOOO  eeeeeeeee  ■■■■■■■■■
               ==========================================================
FREQ.          84         9          5          2          2
```

MINIMUM AND MAXIMUM VALID DATA VALUES ARE 0.0 AND 30.000

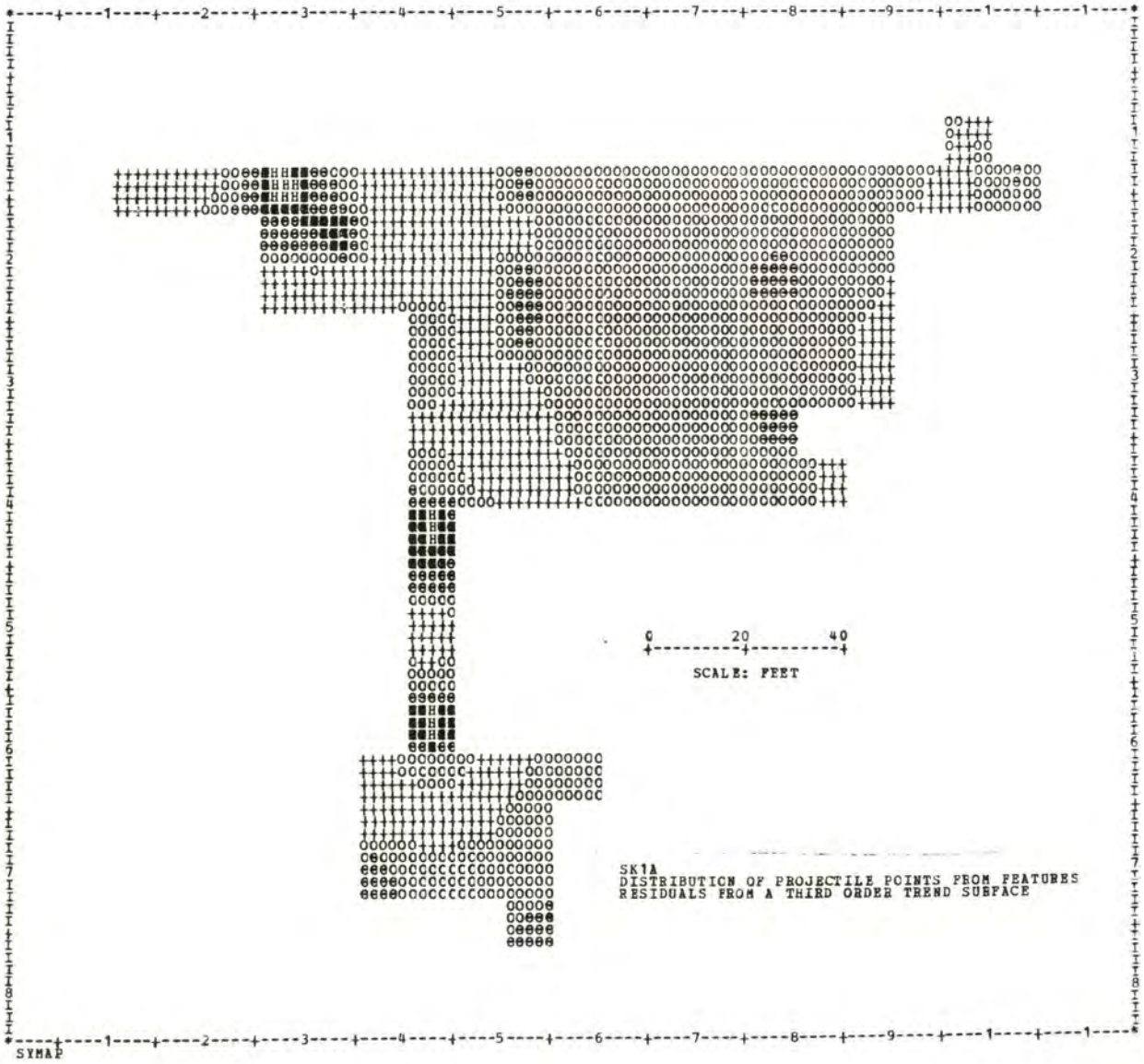
ERROR MEASURES

VARIATION EXPLAINED BY SURFACE	0.84276221E 03
VARIATION NOT EXPLAINED BY SURFACE	0.23734172E 04
TOTAL VARIATION	0.32161794E 04
COEFFICIENT OF DETERMINATION	0.26203829
COEFFICIENT OF CORRELATION	0.51189673


0 20 40
SCALE: FEET
SK1A
CONTOUR
DISTRIBUTION OF PROJECTILE POINTS FROM FEATURES
SYMAP



SK1A
DISTRIBUTION OF PROJECTILE POINTS FROM FEATURES
THIRD ORDER TREND SURFACE



SK1A
DISTRIBUTION OF PROJECTILE POINTS FROM FEATURES
RESIDUALS FROM A THIRD ORDER TREND SURFACE

APPENDIX D

QUANTITATIVE DATA AND SYMAP DISTRIBUTIONS OF ARTIFACTS FROM THE PLOW ZONE, $SK^{V}1a$

SK1A

DISTRIBUTION OF CERAMICS IN THE PLOW ZONE

THIRD ORDER TREND SURFACE

MINIMUM	176.00	512.80	849.60	1186.40	1523.20
MAXIMUM	512.80	849.60	1186.40	1523.20	1860.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00

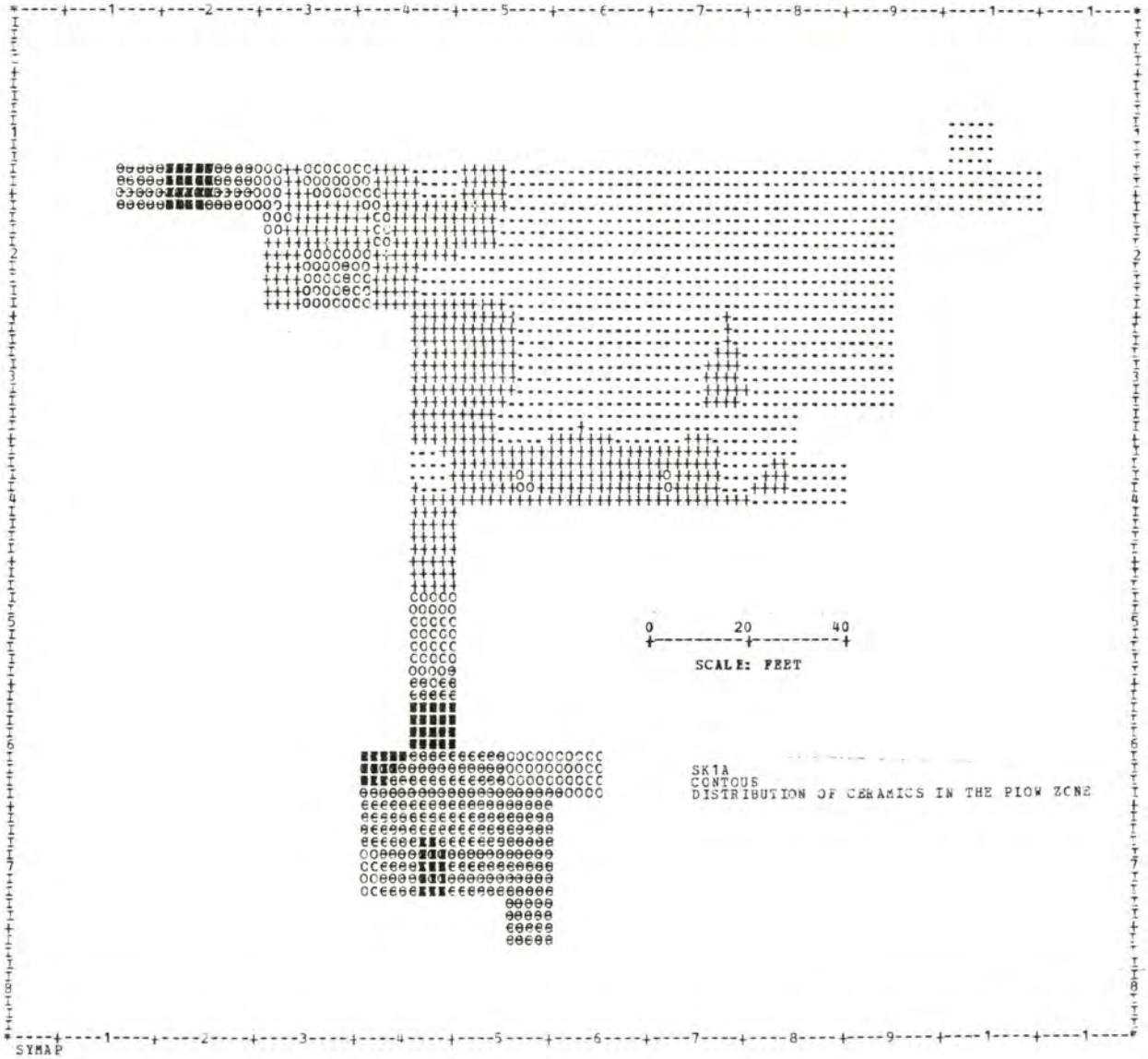
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

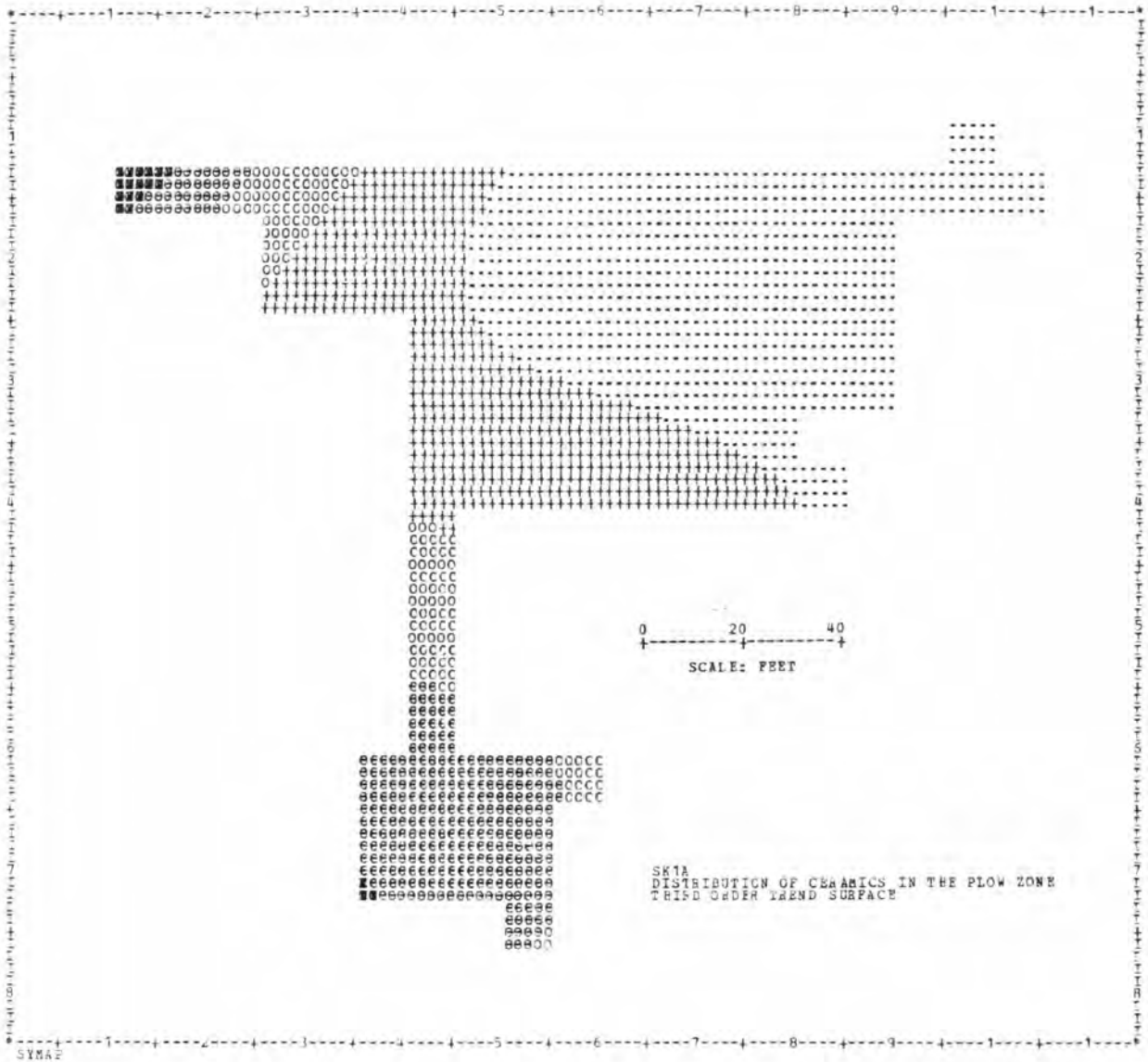
LEVEL	1	2	3	4	5
SYMBOLS	....1....	+++++++++ +++++++++ ++++2++++ +++++++++ +++++++++	OOOOOOOOO OOOOOOOOO OOOO3OOOO OOOOOOOOO OOOOOOOOO	eeeeeeeee eeeeeeeee eeee4eeee eeeeeeeee eeeeeeeee	■■■■■■■■■ ■■■■■■■■■ ■■■■5■■■■ ■■■■■■■■■ ■■■■■■■■■
FREQ.	53	24	9	12	4

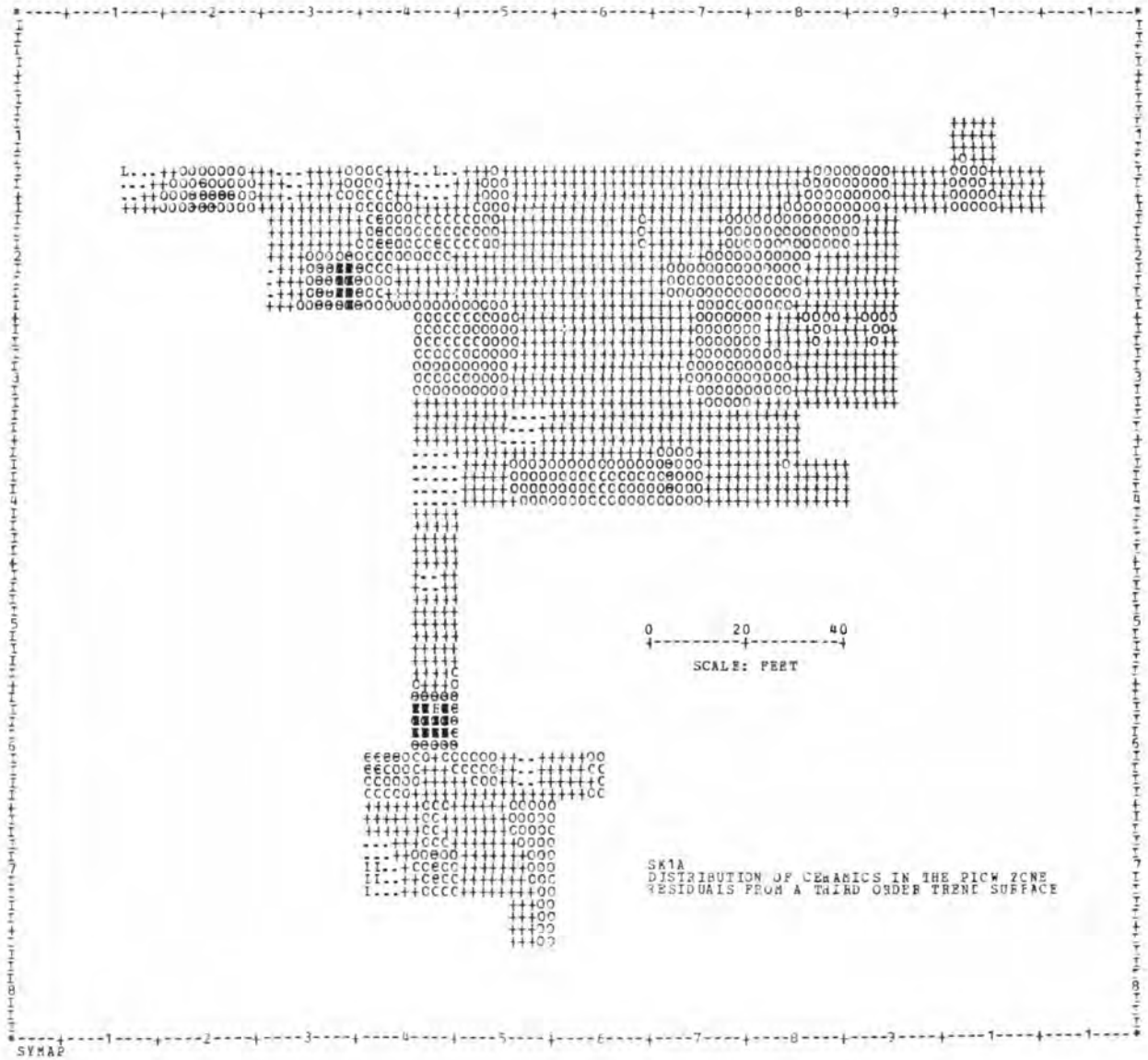
MINIMUM AND MAXIMUM VALID DATA VALUES ARE 176.000 AND 1860.000

ERROR MEASURES

VARIATION EXPLAINED BY SURFACE	0.14484250E 08
VARIATION NOT EXPLAINED BY SURFACE	0.21278620E 07
TOTAL VARIATION	0.16612112E 08
COEFFICIENT OF DETERMINATION	0.87190896
COEFFICIENT OF CORRELATION	0.93376064


0 20 40
SCALE: FEET
SK1A
CONTOUS
DISTRIBUTION OF CERAMICS IN THE PLOW ZONE
SYMAP


0 20 40
SCALE: FEET
SK1A
DISTRIBUTION OF CERAMICS IN THE PLOW ZONE
THIRD ORDER TREND SURFACE
SYMAP


0 20 40
SCALE: FEET
SK1A
DISTRIBUTION OF CERAMICS IN THE PICW ZONE
RESIDUALS FROM A THIRD ORDER TREND SURFACE
SYMAP

SK1A

DISTRIBUTION OF BONE IN THE PLOW ZONE

THIRD ORDER TREND SURFACE

MINIMUM	0.0	31.40	62.80	94.20	125.60
MAXIMUM	31.40	62.80	94.20	125.60	157.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

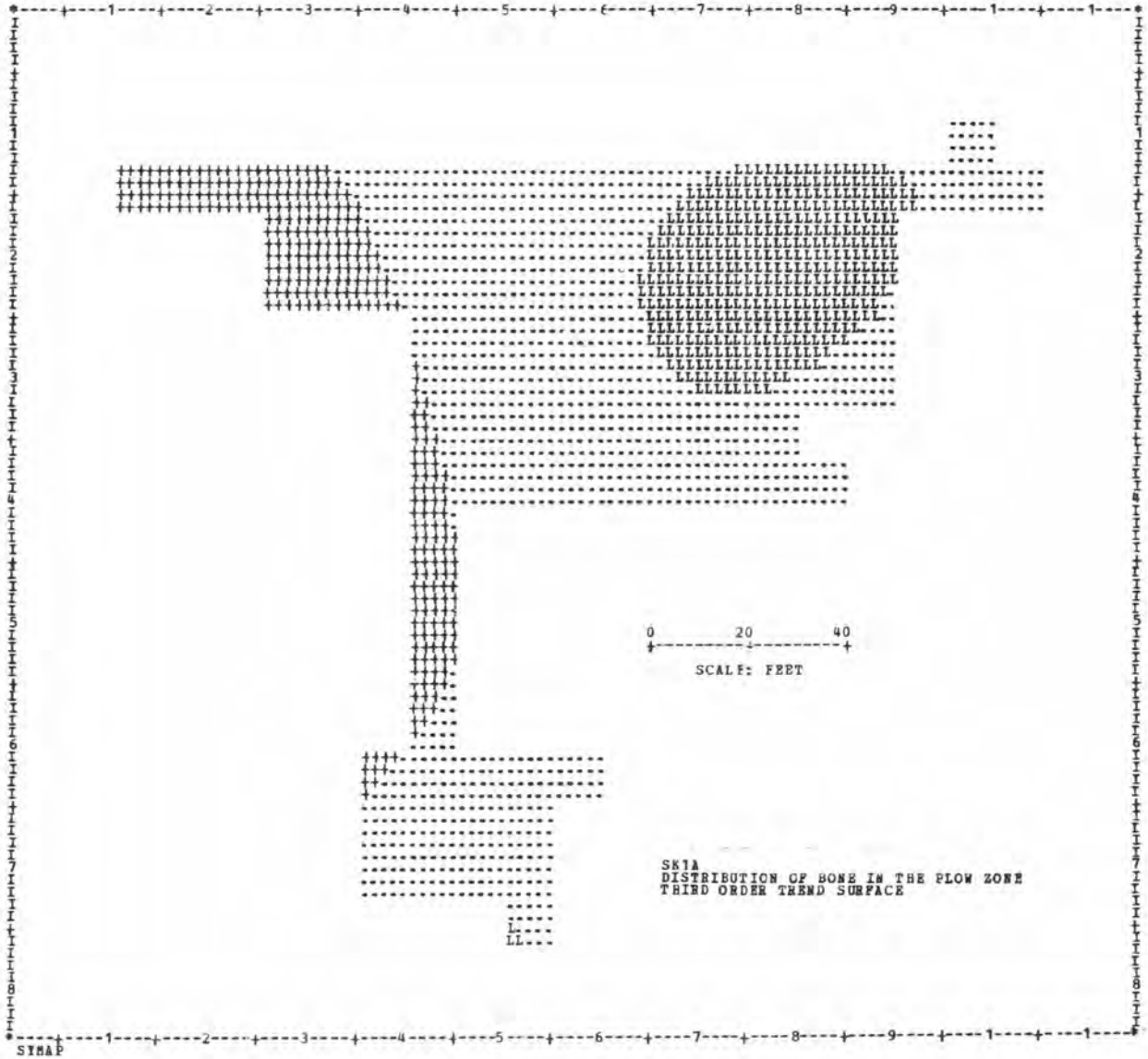
LEVEL	1	2	3	4	5
SYMBOLS	.....1.....	+++++2+++	00003	00004	00005
FREQ.	89	8	3	0	2

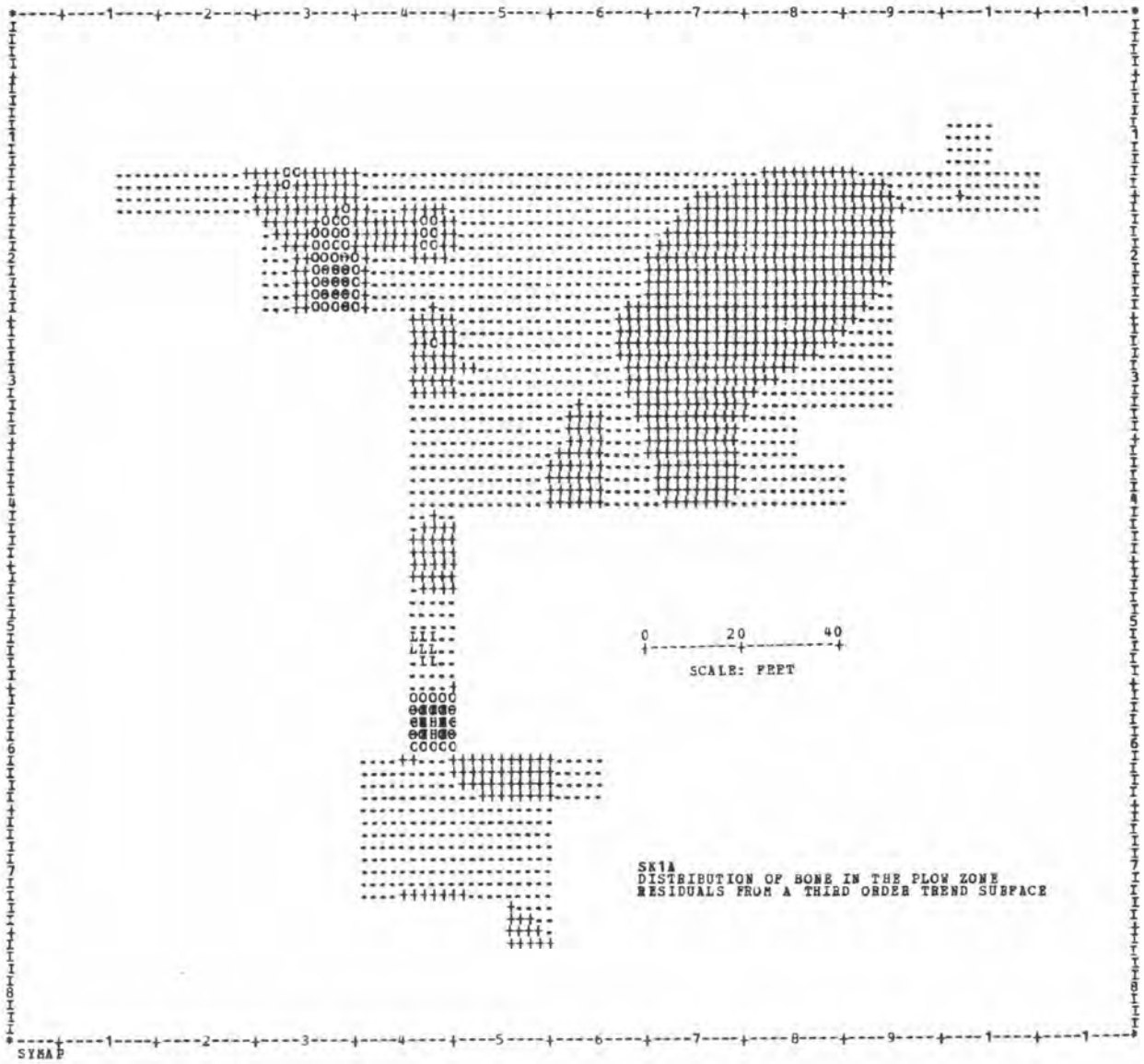
MINIMUM AND MAXIMUM VALID DATA VALUES ARE 0.0 AND 157.000

ERROR MEASURES

VARIATION EXPLAINED BY SURFACE	0.20304789E 05
VARIATION NOT EXPLAINED BY SURFACE	0.43287418E 05
TOTAL VARIATION	0.63592207E 05
COEFFICIENT OF DETERMINATION	0.31929678
COEFFICIENT OF CORRELATION	0.56506354


0 20 40
SCALE: FEET
SK1A
CONTOUR
DISTRIBUTION OF BONE IN THE PLOW ZONE
SYMAP


0 20 40
SCALE: FEET
SK1A
DISTRIBUTION OF BONE IN THE PLOW ZONE
THIRD ORDER TREND SURFACE
SYMAP



SK1A
DISTRIBUTION OF BONE IN THE PLOW ZONE
RESIDUALS FROM A THIRD ORDER TREND SURFACE

SK1A

DISTRIBUTION OF LITHICS IN THE PLOW ZONE

THIRD ORDER TREND SURFACE

MINIMUM	0.0	88.00	176.00	264.00	352.00
MAXIMUM	88.00	176.00	264.00	352.00	440.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00

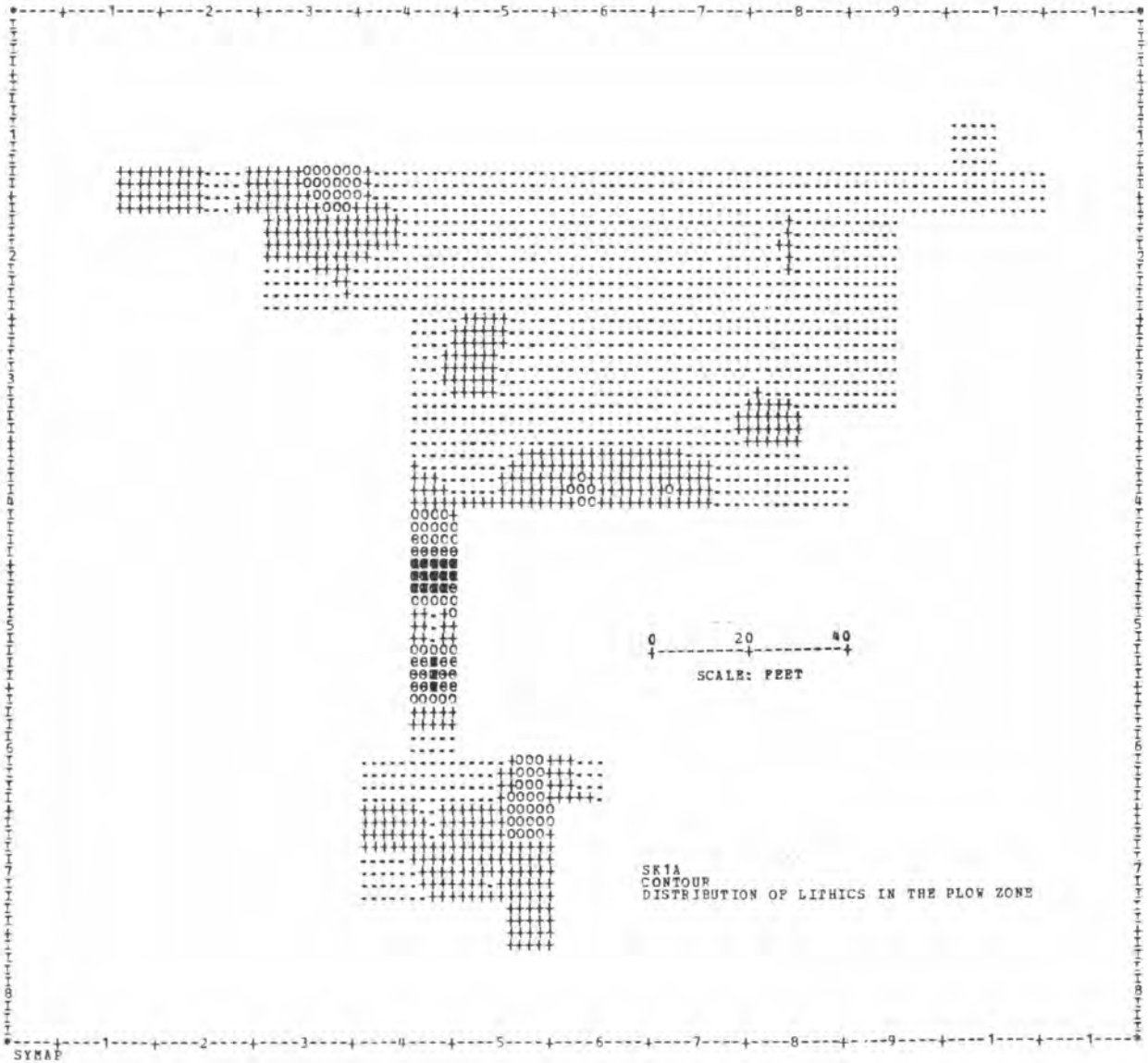
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

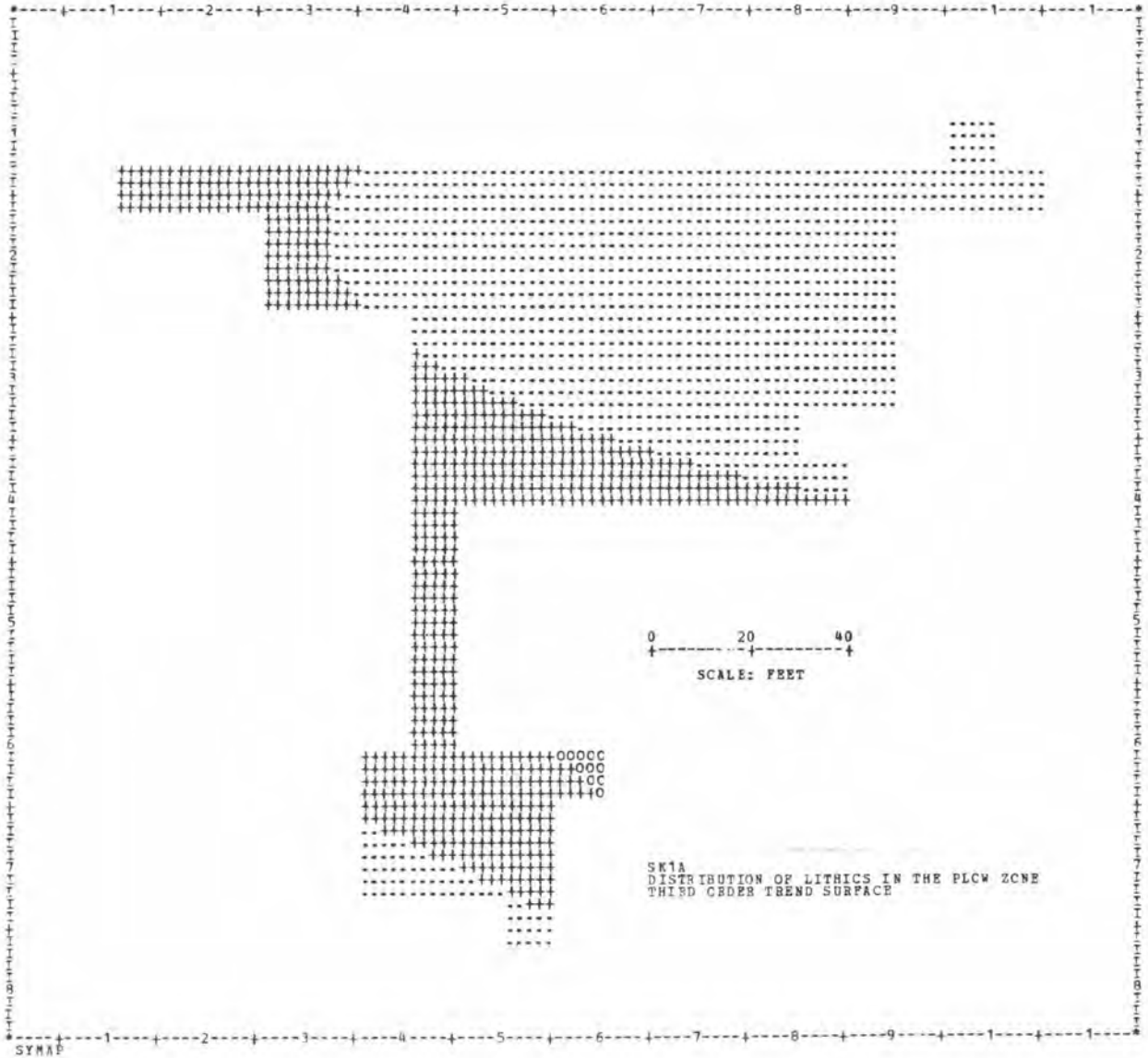
LEVEL	1	2	3	4	5
SYMBOLS	....1....	+++++++++ +++++++++ ++++2++++ +++++++++ +++++++++	000000000 000000000 000030000 000000000 000000000	000000000 000000000 000040000 000000000 000000000	■■■■■■■■■ ■■■■■■■■■ ■■■■5■■■■ ■■■■■■■■■ ■■■■■■■■■
FREQ.	73	22	5	0	2

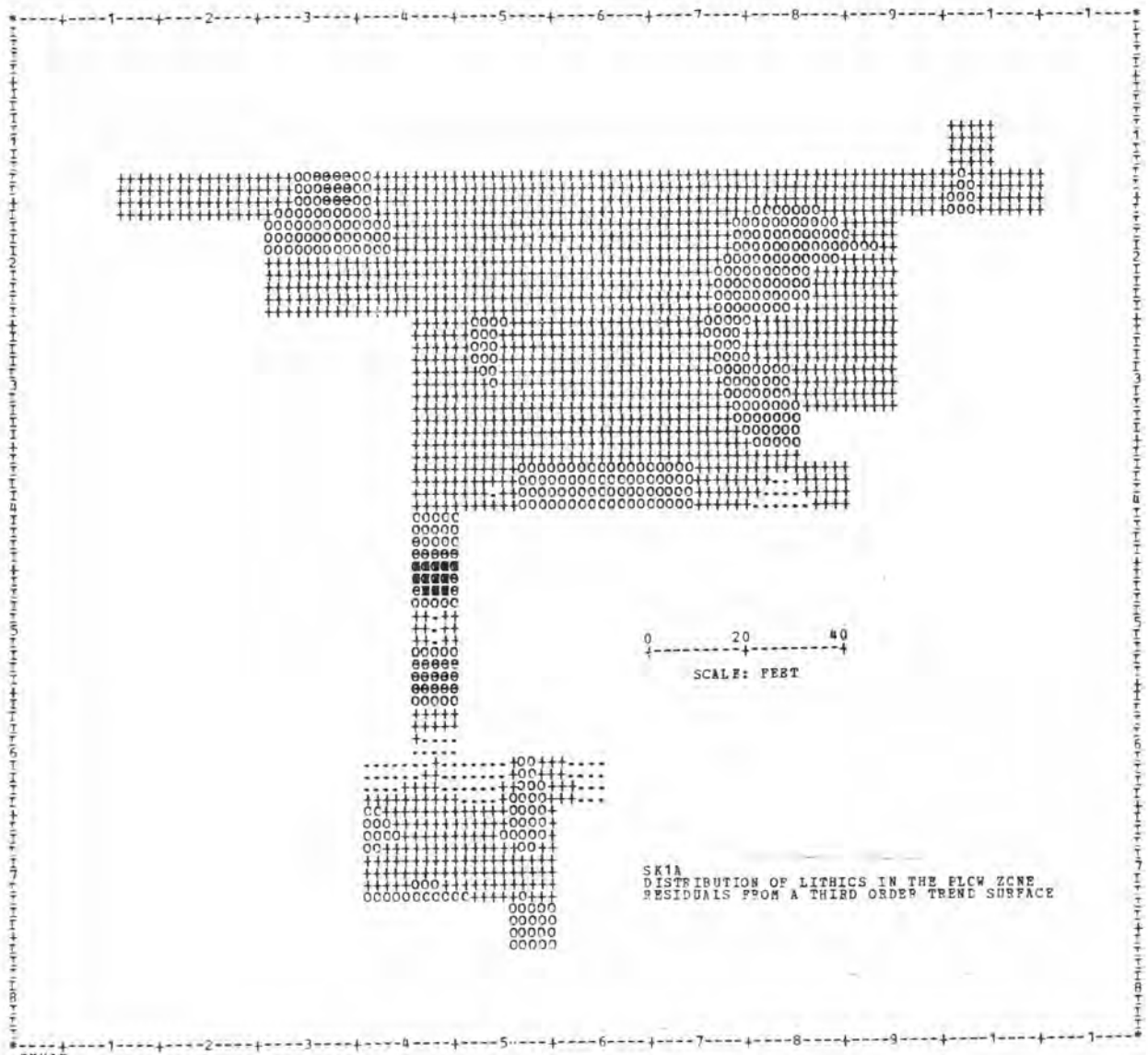
MINIMUM AND MAXIMUM VALID DATA VALUES ARE 0.0 AND 440.000

ERROR MEASURES

VARIATION EXPLAINED BY SURFACE	0.16980569E 06
VARIATION NOT EXPLAINED BY SURFACE	0.33613175E 06
TOTAL VARIATION	0.50593744E 06
COEFFICIENT OF DETERMINATION	0.33562583
COEFFICIENT OF CORRELATION	0.57933223


0 20 40
SCALE: FEET
SK1A
CONTOUR
DISTRIBUTION OF LITHICS IN THE PLOW ZONE
SYMAP


0 20 40
SCALE: FEET
SK1A
DISTRIBUTION OF LITHICS IN THE PLOW ZONE
THIRD ORDER TREND SURFACE
SYMAP



SK1A
DISTRIBUTION OF LITHICS IN THE FLOW ZONE
RESIDUALS FROM A THIRD ORDER TREND SURFACE

SK1A

DISTRIBUTION OF PROJECTILE POINTS IN THE PLOW ZONE

THIRD ORDER TREND SURFACE

MINIMUM	0.0	7.40	14.80	22.20	29.60
MAXIMUM	7.40	14.80	22.20	29.60	37.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

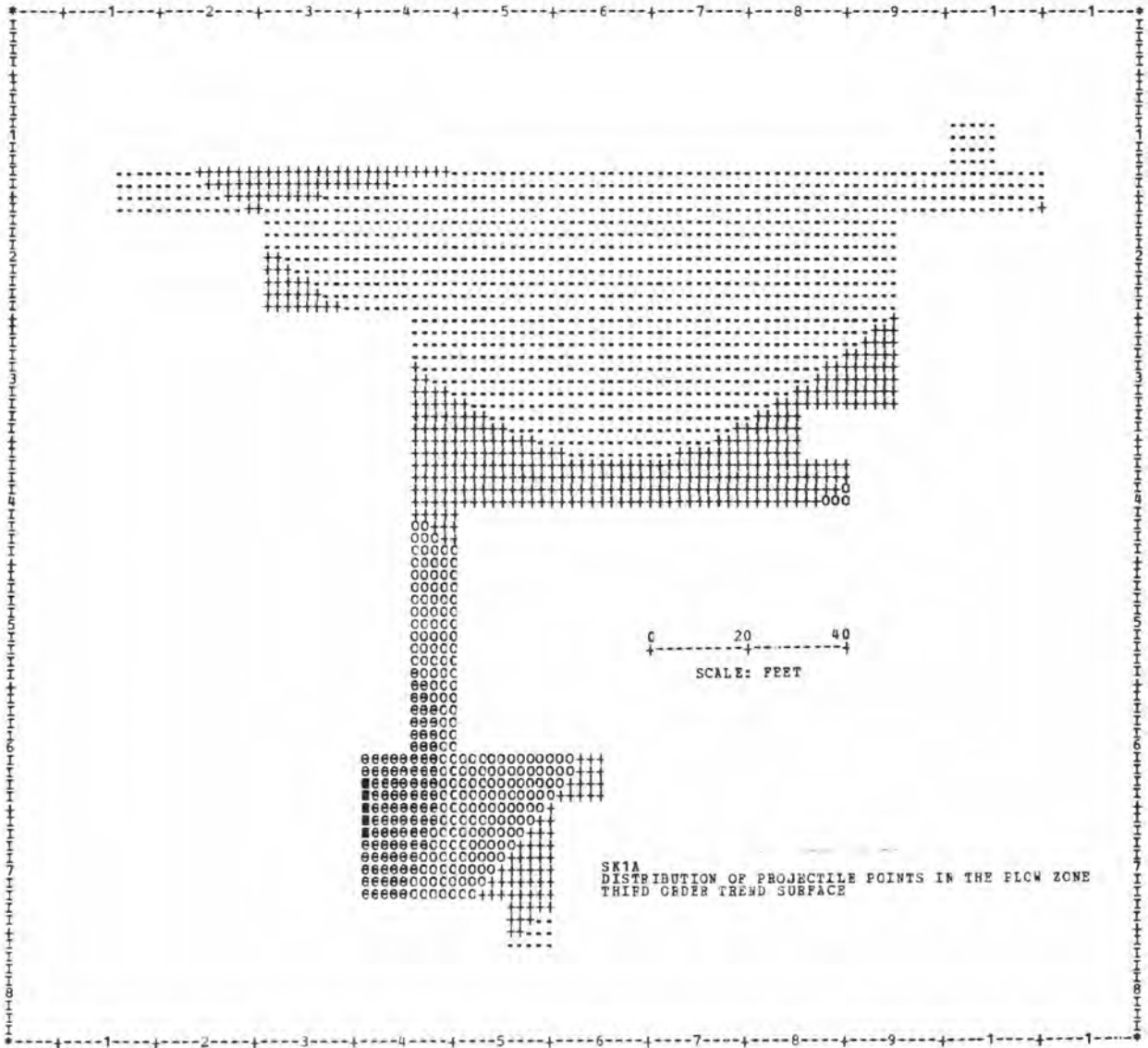
LEVEL	1	2	3	4	5
SYMBOLS	.....1.....	+++++2+++++	OOOOOOOOO	eeeeeeeee	■■■■■■■■■
FREQ.	62	20	13	4	3

MINIMUM AND MAXIMUM VALID DATA VALUES ARE 0.0 AND 37.000

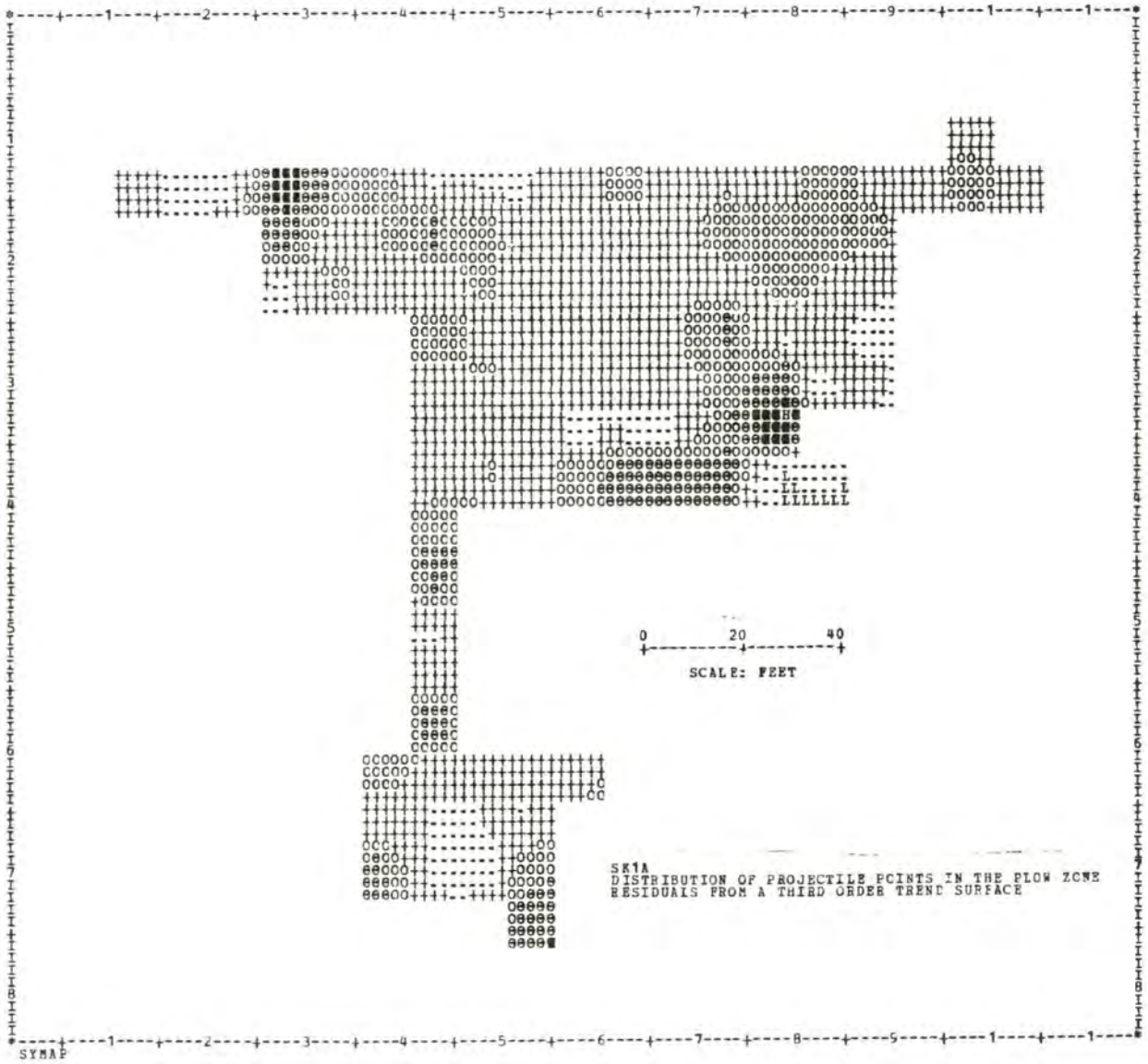
ERROR MEASURES

VARIATION EXPLAINED BY SURFACE	0.38268325E 04
VARIATION NOT EXPLAINED BY SURFACE	0.31245425E 04
TOTAL VARIATION	0.69513750E 04
COEFFICIENT OF DETERMINATION	0.55051446
COEFFICIENT OF CORRELATION	0.74196661


0 20 40
SCALE: FEET
SK1A
CONTOUR
DISTRIBUTION OF PROJECTILE POINTS IN THE PLOW ZONE
SYMAP



SK1A
DISTRIBUTION OF PROJECTILE POINTS IN THE FLOW ZONE
THIRD ORDER TREND SURFACE



SK1A
DISTRIBUTION OF PROJECTILE POINTS IN THE PLOW ZONE
RESIDUALS FROM A THIRD ORDER TREND SURFACE

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