# THIRTEENTH CENTURY PUEBLO AGGREGATION AND ORGANIZATIONAL CHANGE IN SOUTHWESTERN COLORADO

By

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To the Faculty of Washington State University:

The members of the Committee appointed to examine the dissertation of EDGAR KURT HUBER find it satisfactory and recommend that it be accepted.

Chair

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Abstract

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My goal was to investigate variability in site function and community organization in 13th century Anasazi sites in southwestern Colorado, and how these might have been affected by the shift from settlement in small dispersed hamlets to residence in large villages. Organizational and social stresses caused by aggregation may have necessitated changes in community organization. Did community organization remain essentially the same with aggregation, or did it become more complex, and if so, how was complexity expressed? I compared architectural features and excavated assemblages from similar depositional contexts (secondary refuse deposits) and architectural units (kiva-suites) at two Late Pueblo III sites. The Green Lizard site (5MT 3901) is a small domestic habitation representing the dispersed community of small Pueblo III habitations dating from A.D. 1200 to 1250. Sand Canyon Pueblo (5MT 765) is a large aggregated community that formed rapidly in the A.D. 1250s to 1270s.

Drawing on recent archaeological models, I devised three scenarios of post-aggregation sociopolitical complexity and community organization; the egalitarian undifferentiated, specialized function, and elite residential models. It was argued that the three models would be differentiated on the basis of patterned variation in architectural formality and labor investment, household size, household wealth, specialized production, and resource intensification. Architectural and assemblage data were used to investigate these variables.

Results suggest that subtle changes and adjustments in social, political and economic patterns accompanied aggregation, but substantive change in postaggregation community organization is not supported. There is no distinctive signature of wealth accumulation at Sand Canyon kiva suites. Functionally specialized ritual and ceremonial facilities that appear to have served community integrative purposes are present at Sand Canyon Pueblo, while among domestic residential facilities there is evidence of limited economic and productive complementation. Thus, a limited development of functional or horizontal differentiation best fits the evidence . The picture of organization that emerges is of a community that is more complexly organized than the earlier dispersed one, but that is still basically egalitarian. The results of this research point out interesting developments in 13th century community organization that deserve further exploration.

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## Dedication

This dissertation is dedicated to Chom, Alexandra, and Michael without whose love and understanding I would never have achieved my goal.

# Chapter 1

# AGGREGATION AND SOCIAL CHANGE

In this chapter I define the problem orientation and goal of this research, and present an overview of the theoretical and methodological background to understanding the nature and organizational complexity of 13th century Anasazi communities in the northern San Juan area. The principal emphasis of the research is to explore the social, political and economic effects of Late Pueblo III aggregation in the Sand Canyon Locality (Figure 1.1, 1.2). The Sand Canyon Locality is 200 $km^2$ area defined by Crow Canyon researchers (Lipe and Bradley 1986, 1988) to include the community associated with Sand Canyon Pueblo. Thus, the locality per se, is an heuristic device ensuring that research is done at a scale appropriate for one or many multisite communities (Lipe 1992). The Sand Canyon Locality is bounded on the north by Yellow Jacket Canyon and on the south by McElmo Creek. The western and eastern boundaries are defined by a 7.5 km radius west from Sand Canyon Pueblo and east from Goodman Point Ruin. The Locality forms part of the McElmo drainage unit of the Mesa Verde branch of the Anasazi tradition (Eddy et al. 1984). The research I report on here is an integral part of this much larger research effort undertaken by the Crow Canyon Archaeological Center in Cortez, Colorado.

The goal of the dissertation is to investigate and compare behavioral characteristics expressed in material culture as these relate to variability in site function, site size, aggregation and particularly, community organization. The question I am dealing with directly is how community organization is reflected at the level of the kiva suite. That is, do kiva suites at Sand Canyon Pueblo show any indications of differentiated community organization? I presume that if there is a significant departure from egalitarian undifferentiated organization at Sand Canyon Pueblo, it will be evident in the kiva suite data.

This comparative study is based on architectural data and excavated and artifact assemblages from similar depositional contexts and similar architectural facilities (kiva suites) at two Late Pueblo III period sites – Green Lizard (5MT 3901) a small domestic habitation, and Sand Canyon Pueblo (5MT 765), a large village. There is evidence that in the Sand Canyon Locality, settlement aggregation occurred rapidly about A.D. 1250. Green Lizard represents a late Pueblo III small settlement, dating from about the A.D. 1210s to 1260s. It appears to have functioned as part of a dispersed or transitional community, while Sand Canyon Pueblo represents a slightly later, fully aggregated community. Artifact assemblages and architectural data from these sites were compared to assess what changes, if any, in the material correlates of sociopolitical and economic behaviors occurred after aggregation.

Architecture provides a social space and reflects social meaning (Rapoport 1982). Buildings, therefore, can provide information about an individual or group's social standing, power and wealth. The long-lasting expression of social groups and of symbolic meanings that are expressed in architecture can be compared to evidence about social organization and status from associated artifact assemblages (Lipe 1992). To this end, I compared architectural data comprising kiva and room roofed areas and construction labor estimates from excavated kiva suites at both sites. Based on these architectural data, kiva suites were separated into groups at which domestic, special function, or elite uses were probable. These architecturally based groupings were then evaluated with data from the associated artifact assemblages. The combined results were used to infer whether changes in community organization might have occurred with aggregation and, if so, whether these changes resulted in increased horizontal or vertical differentiation.

## Research Dimensions and Variation

Lipe (1992) and Lipe and Bradley (1986; 1988) have proposed that <u>scale</u>, <u>intensity</u>, <u>differentiation</u>, and <u>integration</u> are research dimensions appropriate to understanding community organization in the Sand Canyon Locality. Comparisons of artifact assemblages from similar depositional contexts and architectural data between and among architectural units at the Green

Lizard site and Sand Canyon Pueblo are well-suited to these research goals. All four of the dimensions of variability are addressed in this research, but differentiation and secondarily, integration, are of principal interest.

The scale of a society refers to the spatial extent occupied or controlled by a community as well as the size of the population. The most critical aspect of defining the scale or spatial extent of a community is boundary definition. Boundary definition in archaeological communities requires a precise chronology to establish contemporaneity. To estimate the spatial extent of a community, it is necessary to establish contemporaneity between and among the residential units and sites (aggregated or dispersed) which potentially make up a community. Studies addressing the scale of the local Sand Canyon community and population density have been undertaken by Adler (1990) and Van West (1990).

Differentiation within a society can be divided into two dimensions – the vertical and the horizontal (Lipe and Bradley 1988; Lipe 1992; Lightfoot and Upham 1989a). Horizontal differentiation is the functional specialization of units of equal rank or status within a social system (Blanton et al. 1981:21). If a society is vertically differentiated then differential access to resources and sources of power exists. Thus, differentiation is a critical variable in assessing functional specialization and status differentiation in Sand Canyon Locality community organization.

Integration refers to the complexity and the means by which social groups are tied together to form a community, or supra-community organization. The character of integration can be defined archaeologically through characteristics such as the presence or absence of status-related items, food-stuffs, or other goods as well as the functional complementarity of architectural units or settlement types, and the presence of public architecture (Lipe et al. 1991:23). Integration can also be studied through analysis of site size hierarchies and other aspects of regional settlement pattern compiled as part of the Sand Canyon Project.

Intensity assesses the quality and quantity of materials, energy, and information which flow through a social unit (architectural unit, site, or community) on a per capita basis (Lipe 1992). Thus, as population density increases and community and complexity of social organization

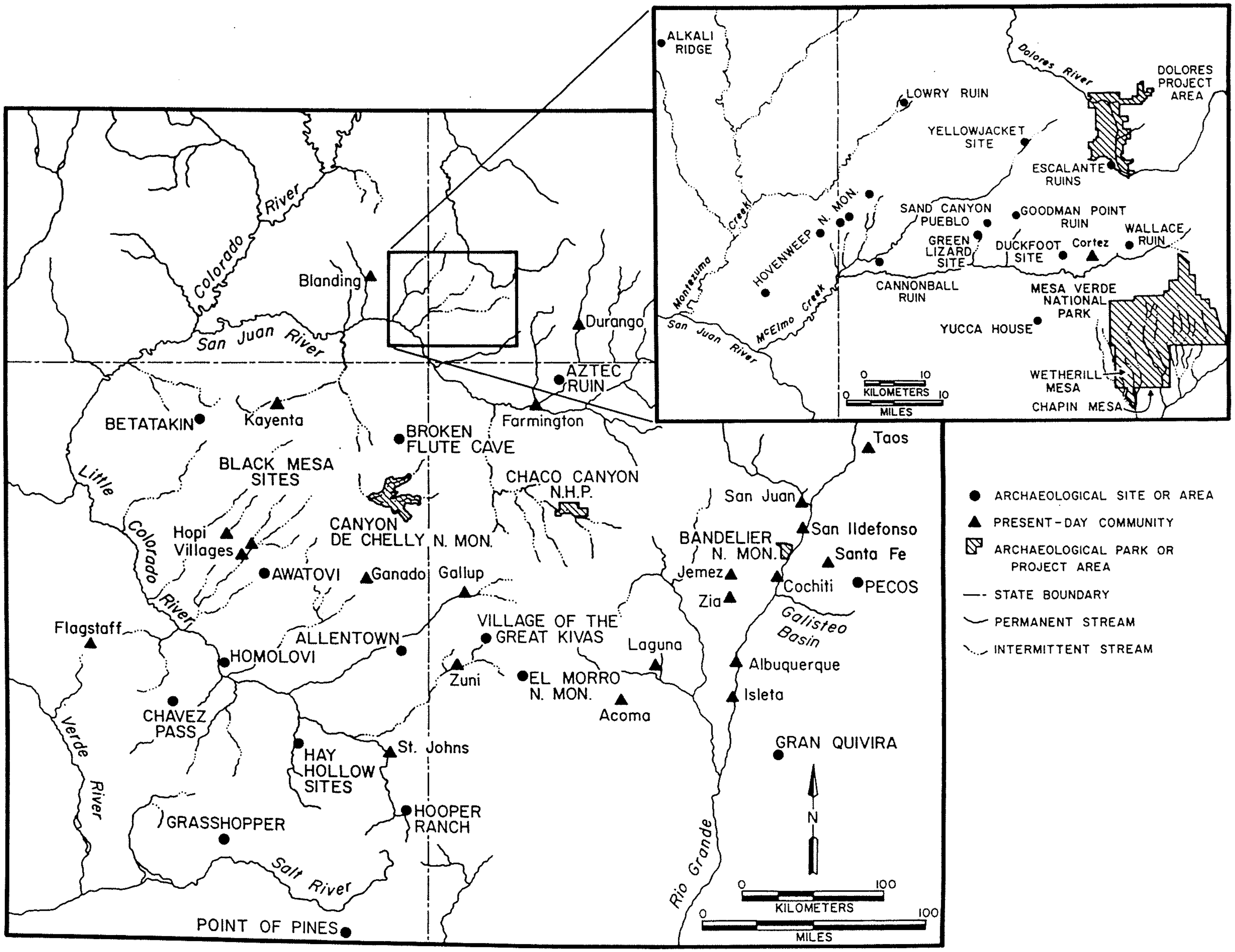



Figure 1.1: The Project Area in the American Southwest.

increases, the flow of goods and information may be expected to increase accordingly. As complexity continues to increase the potential for the growth of status differentiation is assumed to increase as well.

This research is concerned with the potential development of social complexity at levels between that of simple acephalous egalitarian organization and that of more complex ranked or chiefly forms of organization. To signify their poorly understood nature, such intermediate organizational configurations have been termed Middle Range ( Feinman and Neitzel 1984; Lightfoot and Upham 1989b). One form of Middle Range organization that has been recognized is the "complex tribe" (Habicht-Mauche et al. 1987; Habicht-Mauche 1988). Complex tribes are integrated at the regional level similar to chiefdoms and archaic states, but differ from them in the lack of centralized authority common to redistributive economies. Complex tribes form when tribal economic and social integration expands across local and ethnic boundaries, resulting in formation of a regional level of integration (Habicht-Mauche 1993:94).

Many of the archaeological variables of complexity discussed above readily differentiate complex societies from those that are simple and egalitarian. These distinctions are, however, less clear when attempting to distinguish undifferentiated egalitarian societies from those that are 1) complexly organized but still fundamentally egalitarian (horizontal differentiation) or, 2) at the initial stages in the development of nonegalitarian social systems (vertical differentiation), perhaps analogous to a "Big Man" society (Sahlins 1963), or other nonegalitarian formation at the Local Group level of integration (Johnson and Earle 1987; Kosse 1990). I am not, however, interested in assigning these settlements to a predefined sociopolitical type. Rather, I am interested in discovering whether vertical or horizontal differentiation changed as the first order community in upper Sand Canyon area aggregated into a single village – Sand Canyon Pueblo. The central question is, therefore, did community organization become more complex with aggregation, or did it remain essentially the same?

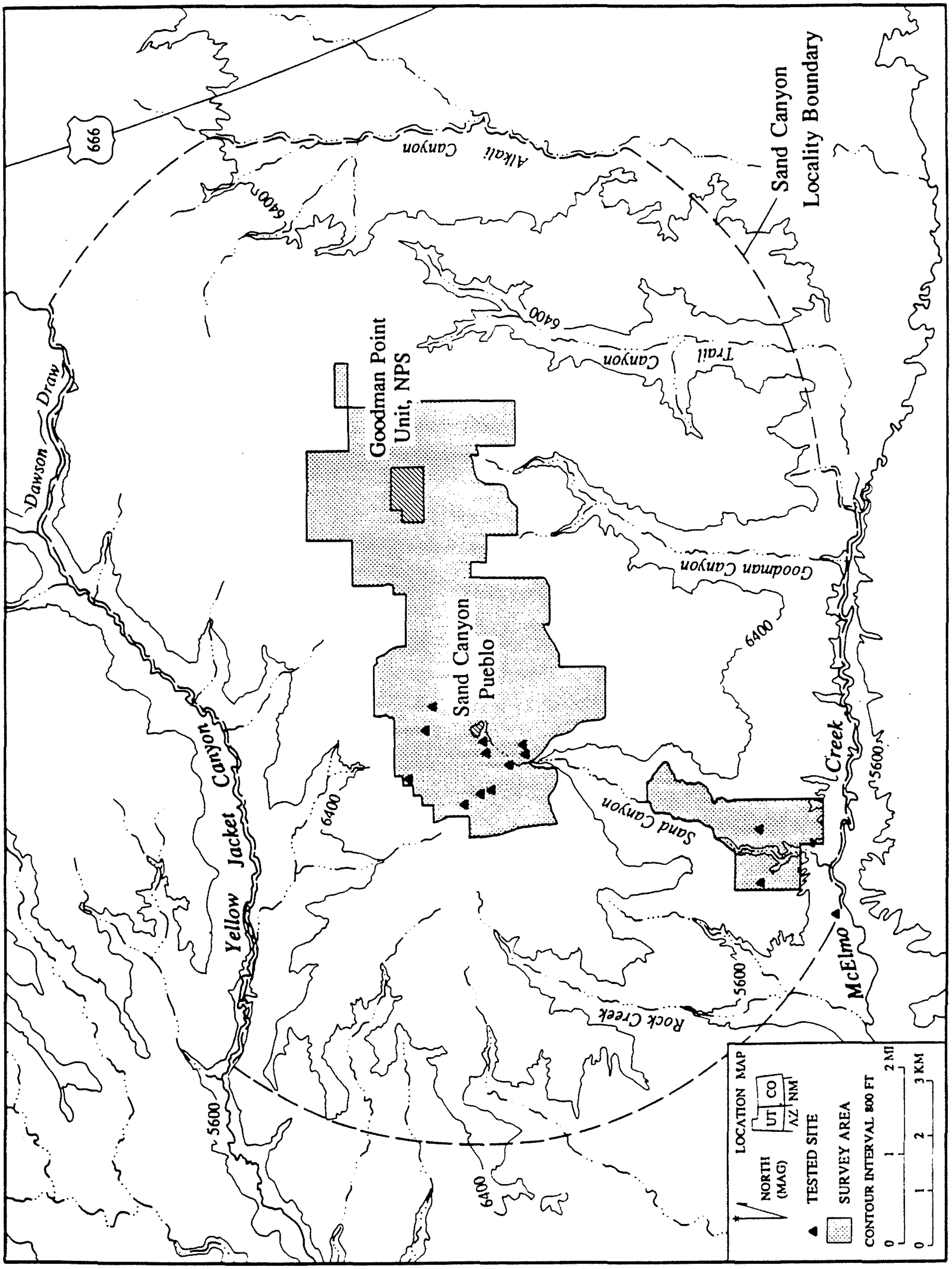



Figure 1.2: The Sand Canyon Locality in Southwestern Colorado.

## Research Setting

Interest in the complexity of prehistoric Puebloan social organization has had a long history (Cordell 1989; Upham and Plog 1986; Lightfoot and Upham 1989a). Recent research into archaeological manifestations of social complexity in the Southwest has resulted in diverse opinions about the degree of complexity in prehistoric Puebloan societies. Much of this research has focused on the presence of regional site size hierarchies consisting of many small sites and a few large sites with accompanying differences in the kind and frequency of features and material remains thought to be indicative of the presence of elite leaders. Some researchers, positing a linkage between site size hierarchies and social hierarchies, have suggested that residential elites were present at larger prehistoric sites in some parts of the northern Southwest (Lightfoot 1984; Lightfoot and Upham 1989a; Upham 1982; F. Plog 1985; Upham et al. 1989).

Others, basing their arguments upon the lack of elite control and status differentiation in historic Pueblo societies, argue that the existence of settlement hierarchies among prehistoric Puebloan groups does not necessarily imply the presence of nonegalitarian hierarchical organization at larger sites (Graves et al. 1982; Reid 1985; Hantman 1989; Reid and Whittlesey 1990). Thus, two contrasting theoretical positions of prehistoric Puebloan social complexity have been advanced in the recent literature. These may be termed the egalitarian and hierarchical organizational models.

Recently, research into historic Puebloan social organization has suggested that levels of complexity beyond that of the generally accepted egalitarian, acephalous ethnographic Puebloan model may once have existed in the form of elites who controlled ritual and ceremonial knowledge (Brandt 1980; Upham 1982, 1989; Whiteley 1985, 1986, 1988; Rushforth and Upham 1992; Schlegel 1992). Levy (1992) furthers the argument by suggesting that control of the most productive community lands accompanied possession and control of more numerous or more powerful ceremonial offices. Thus, some evidence is present to suggest that control of esoteric ritual knowledge may have engendered low-level nonegalitarian community organization among early historic, and perhaps prehistoric, Puebloan groups.

Researchers in the Mesa Verde region have also offered explanations for the existence of site size hierarchies during the Pueblo III period. Arthur Rohn (1983) interpreted large sites as both residential and ritual centers for a dispersed but acephalous and egalitarian population residing in surrounding communities of small hamlets. E. Charles Adams (1984, 1985, 1986) proposed that large sites such as Sand Canyon Pueblo may have lacked residential populations and functioned primarily as loci of ritual activities for a dispersed community, essentially functioning as "empty" ritual centers. Both Rohn's and Adams' models imply elite status holders, perhaps controlling ritual knowledge.

Recent research by the Crow Canyon Archaeological Center suggests that, at least in the Sand Canyon Locality, true site size hierarchies similar to those proposed in other regions of the Southwest were probably absent during Late Pueblo III, at least not on the Locality scale, in southwestern Colorado. It appears that many, if not all, small habitation sites in the upper Sand Canyon area were abandoned as primary residences as construction of Sand Canyon Pueblo began in the A. D. 1240-1250s (Lipe 1992; Varien et al. 1992).

It is likely, therefore, that residents of dispersed communities of small habitations aggregated into much larger settlements in the mid- 13th century. It seems that aggregation into large villages such as Sand Canyon Pueblo occurred over a period of years as the original population living in dispersed settlements declined. In the Lower Sand Canyon area, however, reasonably good chronological data indicate that a large central site with a surrounding community of dispersed smaller sites centered on Castle Rock Pueblo may have existed (Varien et al. 1992).

However, the development and growth of nonegalitarian decision-making hierarchies might also occur without the development of true site size hierarchies. This is one of the focal points of this research. Social responses to aggregation, especially aggregation into settlements as large as that of Sand Canyon Pueblo, perhaps wrought changes in the organization of the local community, and thereby provided a stimulus for development of social, political and economic differentiation (Johnson 1978, 1982). Changes in community organization with aggregation might have provided the impetus for the development of functional differentiation or nonegalitarian forms of organization which may be reflected in site features and material culture.

## Problem Statement

Aggregation and its effects on social, political and economic organization is the central theme of this dissertation. I approach the question of the presence of differentiation and complexity in large aggregated 13th century Anasazi settlements in southwestern Colorado through a series of detailed comparisons of assemblage and architectural data. In this research I attempt to answer three basic questions.

1) What are the assemblage and architectural characteristics which define a "typical" small, domestic Pueblo III habitation forming part of a dispersed, presumably egalitarian, community in the Upper Sand Canyon area?

2) Are patterned differences in architecture and artifact assemblages present between household level architectural units (kiva suites) in a large aggregated community on the one hand, and a small site that is part of a slightly earlier, dispersed community on the other?

3) Are such differences indicative of functional or status differences among kiva suites, and do these mark significant organizational changes with aggregation, or do they indicate simple intersite and interhousehold variation?

I address the first question by presenting architectural and assemblage data from the excavation of a small, late Pueblo III habitation, the Green Lizard site. I consider Green Lizard to be representative of other small Pueblo III sites in southwestern Colorado – site function, general architectural features and artifact assemblages are all similar to those found at other small Pueblo III habitations in southwestern Colorado and in the Sand Canyon Locality (Martin 1938; O'Bryan 1950; Lister 1965; Rohn 1977; Gould 1982; Luebben 1982, 1983; Varien 1990; Kuckelman et al. 1991; Morris 1991; Varien et al. 1992).

I address the second and third questions by using a series of architectural and artifact assemblage-based variables to compare the Green Lizard site with Sand Canyon Pueblo, a large, late Pueblo III village in the Upper Sand Canyon area. Architectural and assemblage expectations were devised to identify potential behavioral differences that may have marked changes in community organization coinciding with the shift from dispersed to aggregated settlement systems. If there is no evidence of differentiation between sampled kiva suites at Sand Canyon Pueblo and Green Lizard, then it is likely that any differences in architecture and assemblage are the result of "normal" variability in household size and organization.

The sample of architectural facilities (kiva suites) and associated discard assemblages used in this comparative study is relatively small – 6 kiva suites from Sand Canyon Pueblo and 1 from the dispersed/transitional community represented by the Green Lizard site. Three additional discard assemblages are linked less directly to activities at architectural blocks containing several kiva suites (AB 300, AB 600, AB 800). Although the sample size is small, it is the largest data base applicable to this problem in this area (and it took years to acquire this one). The data are well controlled for data quality, comparability and chronology. The cases I am working with, therefore, are quite good.

## Data Sources

Portions of the Sand Canyon Pueblo have been sampled by the Crow Canyon Archaeological Center (Bradley 1992; Lipe 1992). The Center has also sampled a number of small Pueblo III settlements as part of the larger Sand Canyon Project (Lipe and Bradley 1986; Lipe 1992; Lipe et al. 1991; Huber and Lipe 1992; Varien 1990; Kuckelman et al. 1991; Varien et al. 1992). One of these smaller settlements, the Green Lizard site, excavated in 1987 and 1988, provides comparative data for this study (Chapter 3). Green Lizard is a hamlet-sized site of two kivas and approximately 20 surface structures occupied during the very early A.D. 1200s to middle A.D. 1200s (Figure 3.4). Based on depth and size of midden deposits, remodeling sequences, abandonment and reuse, the site appears to have been intensively occupied for perhaps 50 or 60 years (Huber 1989; Huber and Bloomer 1988; Huber and Lipe 1992).

Sand Canyon Pueblo is the source of the contrasting data set from a large, aggregated site. It is a walled settlement of approximately 420 rooms, 90 kivas, 14 towers, a D-shaped bi-walled structure, a Great Kiva, several informal plazas and evidence of preplanned construction in the site's enclosing wall (Figure 1.3). Work at Sand Canyon Pueblo (Bradley 1986, 1987, 1988, 1990, 1991, 1993; Kleidon and Bradley 1989) has shown that many, and perhaps most parts of this large site appear to have been residential. The occupation at Sand Canyon is documented by tree-ring dates and is approximately 30 to 40 years duration, from the early A.D. 1250s until abandonment of the region about A.D. 1280 (Lipe 1992).

## Aggregation and Organizational Change

Aggregation and its causes are of interest, but only insofar as it is the backdrop to associated social and organizational changes The primary emphasis of this research is the investigation and comparison of similarities and differences in the material expression of behaviors in dispersed small sites and large aggregated sites – particularly in relation to potential changes in community organization that might have attended this shift in settlement systems. A brief review of current research into the causes and processes of aggregation and its potential social consequences is necessary to provide an understanding of social processes forming the background setting to this research.

### Processes of Aggregation

The movement of communities and populations from dispersed to aggregated settlements and sometimes back, are complex and probably multicausal. Studies of the underlying cause(s) of aggregation have resulted in numerous, often conflicting, explanations. Among these are: 1) climatic deterioration resulting in population movement and community contraction into the most agriculturally favorable areas (Graves et al. 1982); 2) as a means of providing group defense in response to real or perceived increases in conflict (Johnson and Earle 1987); 3) as a method of avoiding conflict with neighboring groups through reduction of intergroup contact that might lead to conflict, but that is not based on defensive measures (Hunter-Anderson 1979); 4) as a response to climatic or edaphic conditions favorable to aggregation and intensification under conditions of population growth (Orcutt et al. 1990); 5) through reduction in competition and conflict over access to land and resources, and facilitation of resource pooling (Kohler 1989; Kohler and Van West 1993); 6) as a response to population increases through internal growth or in-migration resulting in circumscription of favorable agricultural lands (Cordell 1980); 7) as a response to the need to decrease spatial distance and thereby improving systemic efficiency between groups as levels of intergroup interaction increase with increasing population density (Glassow 1977); or 8) as a response to increased population which circumscribes mobility and access to land, depletes local wild resources and results in larger population aggregates to intensify production of available lands through improved labor organization (Kohler 1992; Leonard and Reed 1993) and facilitates resource pooling (Kohler and Van West 1993).

Aggregation should be understood as both a condition and a process. The aggregated condition in the Southwest is well-defined archaeologically through the existence of large, permanently settled, and architecturally complex sites. However, identifying the process or processes involved in moving from dispersed small sites to aggregated large sites is less straightforward. As this brief review illustrates, scholarly explanations of aggregation among prehistoric farming communities vary. However, some commonalities are evident. In the majority of these archaeological cases, population density is cited as an influential variable, or as a trigger to aggregation. It is likely, therefore, that high effective population density (defined as the relationship between population size at a particular technological capacity and environmental carrying capacity) is an important variable prompting or at least setting the stage for aggregation. If, however, population increase is a primary cause of aggregation, the density threshold at which aggregation occurs is likely to vary with respect to local and/or regional environmental, technological and cultural conditions.

Some authors, notably Johnson and Earle (1987) and Haas (1986) regard warfare and raiding – in the context of increasing population density – to be a key trigger in aggregation, and of

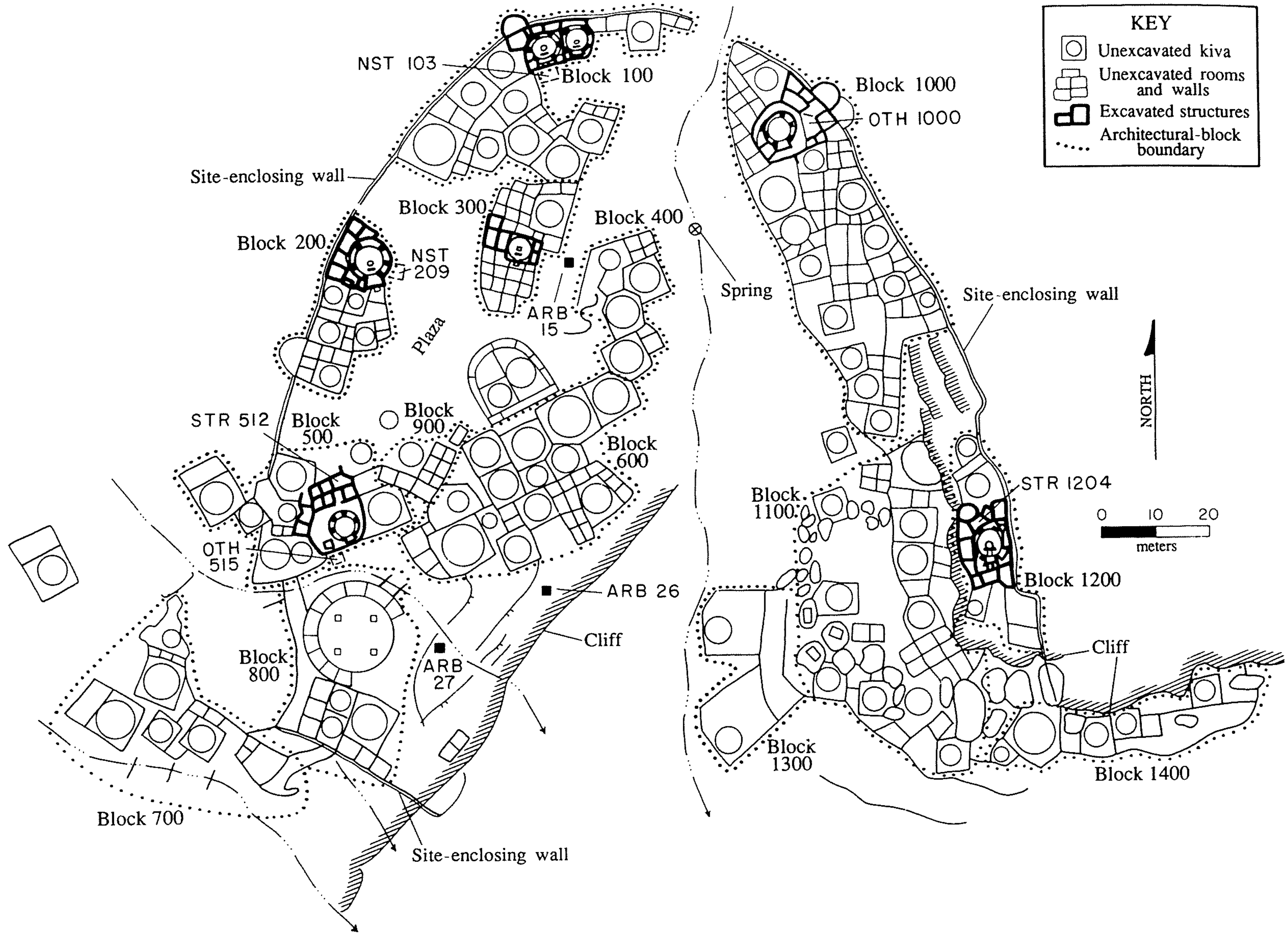



Figure 1.3: Sand Canyon Pueblo Plan.

changes in sociopolitical complexity. However, it is likely that warfare, like land and social circumscription, intensification, conflict-avoidance behaviors, and resource depletion, are derivative, epiphenomenal responses to population-resource imbalances conditioned by local and regional conditions. According to Carneiro (1970), Stuart and Gauthier (1981) and Binford (1983), as population increases, mobility becomes increasingly constrained, and eventually results in land and/or social circumscription. In the absence of effective cultural control mechanisms such as mobility or population reduction through warfare and infanticide, population increases will lead to increased insecurity and increased societal stress. This may have necessitated responses such as aggregation. Once a population is aggregated, processes leading to sociopolitical and socioeconomic change may be triggered.

Adler's (1990) study of Anasazi communities in the Sand Canyon Locality suggests that understanding the process of aggregation involves asking "why" aggregation occurs and "how" aggregated communities might be socially integrated. Aggregation, in Adler's view, represents a change in the social landscape of a society, and is a process resulting in formalization of the community's definition of access to critical local resources such as arable land or water. Formalization encompasses permanent modifications of the communal landscape such as demarcation of agricultural fields, construction of water and erosion control devices, and construction of communal integrative facilities and habitation sites associated with specific critical resources. This process of formalization, therefore, sharply defines access rights to important communal resources. The close association of large aggregated Pueblo III sites in the Sand Canyon area (e.g., Sand Canyon Pueblo and nearby Goodman Point Ruin) and springs suggests that control of water sources was an important consideration in site location. Communal rights to resources were defined, therefore, through placement of permanent structures in their vicinity.

Clearly Adler's (1990) model of aggregation as a social process implies the need to define and defend critical communal resources by aggregation and demarcation. It necessitates changes in social organization from that of the earlier, nonaggregated condition. Adler concludes that aggregation accompanies high population density in relation to carrying capacity (Adler 1990;

1992). These factors appear to have been present among the 13th century Anasazi communities in the Mesa Verde region.

Van West (1990), provides yet another view of the causes of aggregation and its relationship to land circumscription, intensification, and defense of critical resources. She suggests that southwestern Colorado contained sufficient high quality arable land during the Pueblo III period to support large regional populations, even during the relatively severe climatic downturn of A.D. 1276-1299. This scenario appears to be true of the central Sand Canyon Locality as well. Van West suggests, however, that Anasazi agricultural practices may have focused on utilizing the most productive arable lands with the best cost-benefit ratio, while ignoring less productive lands with lower cost-benefit ratios. Under conditions of high population density, such agricultural practices could have constrained both mobility and access to productive resources through intensified competition for the most productive lands. Under these conditions, and in the absence of extensive food-sharing networks, this might have resulted in the inability of some groups to produce sufficient maize to sustain themselves (Van West 1990; Van West and Lipe 1992).

Van West's research, therefore, suggests that even with abundant arable land, at times of deficient soil moisture or short growing season population densities might have exceeded local carrying capacity. This especially would be true if accompanied by constraints on mobility and access as might have happened on Mockingbird Mesa located just to the north of the Sand Canyon Locality (Van West 1990; Van West and Lipe 1992). Thus, the 13th century aggregation at Sand Canyon Pueblo might have maintained communal access to critical resources, but factors other than total arable land per capita may have influenced aggregation. Perhaps, as Adler (1990) implies, water was considered a critical limiting resource for the Sand Canyon area Anasazi during the 13th century. On the other hand, aggregation might also have been triggered by shortages of other critical wild resources, or as a response to the threat of warfare triggered by environmental, social, and economic stresses (Haas 1986; Kohler 1989).

This discussion serves to illustrate complexities in the causes of aggregation and the difficulty in separating cause from effect. Though high population density intensified by environmental conditions may have been a key factor in aggregation processes, social and adaptive responses to increased population densities are likely to have been flexible. Population increase can lead to aggregation, however, the particular paths leading to aggregation and its social consequences were probably influenced by cultural and environmental circumstances. In this study aggregation, whatever its ultimate causes, serves only as the critical setting for changes in social, political, and economic organization in the Sand Canyon Locality.

## Organizational Responses to Aggregation and Scalar Stress in the Sand Canyon Area

Gregory Johnson (1978, 1982) identified scalar stress, or social stress in communication and decision-making systems of society, as a significant social consequence of increasing group size. He indicates that there are two possible responses to scalar stress in noncomplex societies (sequential hierarchies); either the organizational structure of society collapses or it must increase in complexity. In the latter case, a simultaneous hierarchy may develop. He suggests that the development of nonegalitarian, complex decision-making hierarchies is a function of increasing group size. As the scale of organization increases, scalar stress (social stress caused by growth in the size of decision-making units) in egalitarian sequential hierarchies also increases. Decision-making hierarchies, whether sequential or simultaneous enable the coordination of more tasks and integration of more organizational segments of a society than would be the case if a decision-making hierarchy did not exist (Johnson 1978, 1982). In sequential (horizontal) hierarchies complexity in decision-making organization enhances the number or decision-making segments while maintaining an existing level of integration and decision hierarchy. In simultaneous (vertical) hierarchies on the other hand, the number of hierarchies of decision-making units and the level or integration increases (Johnson 1978, 1982). In Johnson's view, therefore, a group undergoing decision-making stress must either fission into smaller units, increase the complexity of its decision-making organization while maintaining an existing level of integration (sequential hierarchy), or it must increase the complexity of its integration and decision-making structures, thereby becoming a nonegalitarian simultaneous hierarchy. Thus, as a group grows in size, more levels of consensual decision-making are required. The decision-making process can become increasingly slow and inefficient and may eventually break down.

Aggregation into larger coresidential groups may result in increased social stress in group decision-making systems and decision implementation as the scale and number of interactions increases. Where the limits of a sequential hierarchy have been reached and fissioning is constrained through land or social circumscription (i.e., long-term or permanent aggregation), then differential wealth, power and prestige, and a simultaneous hierarchy, is likely to develop (Johnson 1982). Aggregation of dispersed social units into large villages, as occurred during the mid A.D. 1200s in the Sand Canyon Locality, probably resulted in some – perhaps even substantial – increase in scalar stress that might have required changes in decision-making systems and complexity of integration.

Kosse (1990) suggested that the social processes leading to higher levels of integration are highly correlated with growth in population size. According to Kosse (1990:292), "In scalar terms, a new level of integration is created when the size of the significant face-to-face group exceeds the numerical constraints of the previous level." I suggest, therefore, that aggregation of dispersed communities, increases scalar stress. Kosse (1990) uses ethnographic data, to show that numerical thresholds of communities are linked to levels of integration, settlement size, settlement pattern, and size of the regional network. Aggregated settlement systems with individual settlement size on the order of that at Sand Canyon Pueblo (e.g., around 500 inhabitants) tend to be acephalous and organized at the Local Group level, but may be a "Big Man" society if a two tier settlement hierarchy and size of individual settlements exceeds 500 (Kosse 1990, Table 5). Emerging inequality is first evidenced at the Local Group level. Thus, development of decision-making groups and increased ritual and ceremonial activity that serve to integrate the community should be found. Aggregation in the Sand Canyon area may, therefore, have resulted in higher levels of integration and increased sociopolitical complexity. Increased community complexity may be evident in the organization and use of architectural space in a site, increased ritual, and potential differentiation in material culture.

Applying Kosse's (1990) argument to southwestern Colorado, the development of either functional (horizontal differentiation) or status inequality (vertical differentiation) are considered as possible outcomes of Pueblo III aggregation in the Sand Canyon Locality and the Mesa Verde region. By functional differentiation, I refer to the " . . .functional specialization among parts of equivalent rank within a system" (Blanton 1981:21). Functional differentiation of parts of the social system, while still remaining fundamentally egalitarian is one potential outcome of aggregation. In this case, aggregation did not result in the development of a higher level of integration. Societal stresses associated with aggregation were relieved through development of a sequential hierarchy allowing larger groups to make decisions, while retaining their egalitarian character. Functional differentiation may have occurred in ritual and ceremonial organization, the development of low-level craft specialization, labor organization, development of different patterns of resource use and in food-sharing and exchange. Nonegalitarian leadership and the development of status differentiation constitutes a fundamental change in community organization, and is considered a potential outcome of aggregation. The alternative to functional or vertical differentiation in response to aggregation is, of course, that the extant undifferentiated and egalitarian social system was maintained.

Aggregation, therefore, may have caused no change in community organizational structure, it may have caused internal functional differentiation, or it may have engendered the development of elites and nonegalitarian organization. Whether aggregation in 13th century Sand Canyon area led to the development of increased social complexity, or whether the scale or integration and differentiation was little changed after aggregation can be explored through the comparison of architectural spaces and the material correlates of household level community behaviors. Such comparisons enable investigation of whether Late Pueblo III aggregation was of sufficient scale to promote the development of residential elite leaders, or whether primarily egalitarian organizational systems were an adequate means of managing aggregation-caused social stresses. Within the range of possible responses is, on the one hand, an egalitarian organization that is simple and acephalous, while on the other hand, nonegalitarian leaders and status differentiation occur.

## Archaeological Correlates of Complexity in Middle Range Societies

Development of social complexity has been an area of anthropological and archaeological interest for several decades (Service 1962; Fried 1967; Cohen and Service 1978; Harris 1979; Johnson and Earle 1987; Sebastian 1988; Cordell 1989). Anthropologists have studied and categorized living societies into general levels of sociopolitical complexity. They also developed detailed insights of how societies are structured and organized at different levels of complexity. Typological classifications such as that of band, tribe, chiefdom and state provide convenient ways of analyzing and describing of social complexity cross-culturally.

Archaeologists, in their search for the origins of social complexity, have adapted these analytical units of sociopolitical complexity. It has become clear, however, that these typological categories define broad segments of a multivalent continuum, and often do not conform well to the kind of social complexity actually observed (Feinman and Neitzel 1984; Johnson and Earle 1987; Lightfoot and Upham 1989b). This has resulted in the recognition that at the lower end of the complexity continuum, that is, the Middle Range, societal organization is diverse and difficult to define (Feinman and Neitzel 1984; Lightfoot and Upham 1989b).

Johnson's (1978, 1982) and Kosse's (1990) research has provided an understanding of how egalitarian societies might change and the scale of resulting social differentiation. The distinction of horizontal and vertical differentiation is useful in that it enables study of social responses to stress. Horizontal differentiation (sequential hierarchy) enables a society to reorganize by allowing relatively large, equivalent segments of a community to make decisions. Sequential hierarchies might also allow these social segments to have varied, perhaps complementary, economic and religious specialties provided they were equivalent in status and power (Lipe 1992), while still maintaining its original, primarily egalitarian structure. Vertical differentiation (simultaneous hierarchy) results in the development of functional and status and rank differentiation within a society (Lipe 1992). I believe it is likely, as Johnson (1982) has suggested, that social units that are horizontally differentiated, in situations where fissioning is not possible, inevitably become vertically differentiated.

As archaeological data consist of the material remains of past cultural behaviors, assessing levels of sociopolitical complexity and determining how and why complex social formations came into being are necessarily grounded in the archaeologically recoverable material remains of past behaviors. Certain classes of material remains have been found to be useful in identifying complex social systems. It is clear, however, that the nature of the archaeological record limits the extent to which we can understand the origin and development of cultural complexity in prehistoric societies. In the following section, I discuss these material indicators of complexity and their applicability to determining the nature of postaggregation community organization, and summarize the archaeological correlates of horizontal and vertical differentiation that I will use in this study.

### Archaeological Correlates of Functional Differentiation (Residential vs. Special Use)

Archaeologists working in the Mesa Verde Anasazi region have long assumed that the general similarity in form and internal features between historic Puebloan kivas and prehistoric "kivas" also indicated functional equivalence (Lekson 1988, 1989; Lipe 1989; Wilshusen 1989). Lekson (1988, 1989), however, has argued that there is no functional equivalence between ethnographic kivas and prehistoric "kivas" and that until Pueblo IV, "kivas" were primarily domestic rather than ritual structures. Most archaeologists, however, disagree with Lekson's interpretation, and suggest instead that prehistoric kivas, especially those used during the Pueblo II and Pueblo III periods, served both domestic and ritual functions, while others were used by organizations whose membership was drawn from numerous kin segments (Ferguson 1989; Lipe 1989; S. Plog 1989). In this view, most kiva suites (kivas and associated surface rooms) represent residential architectural facilities used by nuclear and extended family social units, while other architectural units containing kivas were nonresidential and were used by sodalities or other groups whose activities integrated social units larger than this. That is, operated at the sodality or higher level of organization.

Wilshusen (1989), contra Lekson (1988, 1989), explored the problem of when kivas that are functionally analogous to those of ethnographic Puebloan groups first developed. Based on pitstructure form, size and the presence of ritual features such as paho marks, altars, ceremonial vaults and complex sipapus, Wilshusen (1989:105) suggests that " . . . if kivas are defined as community ritual structures, then kivas first appear in the large Pueblo I villages." Kivas, therefore, may have developed early in the Puebloan period, and these kivas were functionally, distinct from domestic pitstructures. Although Wilshusen's model is applicable only for the Pueblo I and II periods, where this functional difference is backed by evidence, it is possible that this distinction continued into the Pueblo III period. Thus, during the Pueblo II and Pueblo III periods, most standard small, "kivas" served combined domestic and ritual functions, while others had predominantly ritual and ceremonial functions. To use Wilshusen's (1989) terminology, they were community kivas integrating social units above the household level, and were functionally different than domestic or corporate kivas, which functioned at the household level of integration. Community kivas in the Mesa Verde region tend to be both larger than corporate kivas, and tend to contain more elaborate ritual and ceremonial features (Wilshusen 1989).

Bradley (1990, 1992, 1993), has undertaken detailed studies of the architectural characteristics of architectural units and individual kiva suites at Sand Canyon Pueblo. His analysis of construction, use and abandonment sequences indicates that the pueblo was formed rapidly in the A.D. 1250s through 1270s. Individual kivas suites often were preplanned and formed the core around which later rooms were added. Bradley (1993) found that clusters of rooms and kivas, defined as distinct architectural blocks, could be separated into those with high room-to-kiva ratios (kiva-dominated), those with very low room to kiva ratios (room-dominated) and those with intermediate room to kiva ratios (standard units). Bradley's (1993) architectural analyses employing room to kiva ratios, kiva suite construction labor investment indices, and room access analyses of kiva suites at Sand Canyon Pueblo indicates that some individual kiva suites in kiva-dominated roomblocks may have been functionally specialized, while others in standard roomblocks appear to be primarily domestic. Special function kiva suites contained fewer rooms per kiva, had greater labor investment and somewhat larger kiva areas than was the case for the kiva suites designated as domestic units. Based on the above characteristics, Bradley (1992, 1993) identified two excavated areas that contained special function kiva suites (Structures 102, 107 and 108 in one area and Structure 208 in the other) and three areas that contained domestic kiva suites (Structures 501, 1004 and 1206).

It is possible that these functionally specialized kiva suites were nonresidential facilities, perhaps used by sodalities. Following Wilshusen (1989), such structures might, therefore, have been larger or more elaborate than domestic kiva suites. They might also have possessed associated discard assemblages that are distinct from those associated with domestic kiva suites. This is an argument which I introduce below and more fully develop later in this study.

Wilshusen, generally, and Bradley, specifically for Sand Canyon Pueblo, suggest that functionally differentiated structures representing a relatively complex form of organization existed among Mesa Verde Region Anasazi. In Bradley's view, therefore, community organization at Sand Canyon Pueblo may have been more complex than in communities where functional differentiation of structures and kiva suites did not occur. However, without additional supporting evidence, the presence of nonresidential, special function structures alone does not necessarily imply the existence of nonegalitarian social organization. It is equally plausible to suggest that nonresidential special function sodality kiva suites are a response to aggregation that necessitated greater community integration, but within an overall egalitarian social context (Eggan 1950; Steward 1955). One way in which the need for greater integration might have been expressed was through increased communal ceremonial activity. Increased ritual and ceremonialism has been identified by Johnson (1982) as one way in which scalar stress within the community can be deflected.

The expectations of functional differentiation are largely relational. That is, the material correlates of behaviors related to functional differentiation of kiva suites into residential or nonresidential special use includes expectations that special use nonresidential kiva suites may 1) be larger than residential kiva suites, 2) may incorporate more ritual/ceremonial space, 3) may demonstrate greater investment in construction labor relative to domestic (high or low status) residential kiva suites and, 4) community-wide ritual events held at nonresidential kiva suite suggests that few artifacts associated with domestic residential activities should be present. That is, little evidence of food preparation is expected (few grayware jars), while food consumption is expected (whiteware bowls). I also expect that use of these facilities was episodic, resulting in lower artifact discard rates.

If special use kiva suites were a locus of communal integrative activities, by sodalities or other ritual/ceremonial groups, certain kinds or sizes of ceramic vessels associated with large ritual and ceremonial gatherings may be present in higher frequency than in high or low status residential kiva suites. It is likely, therefore, that special function nonelite facilities should contain assemblages that are, at the very least, substantially different from nonelite domestic residential kiva suite assemblages.

The material correlates of behaviors related to elite residential kiva suites (elite corporate kivas) include expectations that residential high status kiva suites should 1) have larger overall room surface area per kiva suite than found at either special function or nonelite residential facilities, 2) have overall construction labor investments lower than that of special function facilities, but higher than that of nonelite residential facilities, 3 ) have domestic discard assemblages similar in general content to that of nonelite domestic units, 4) have greater frequencies of discarded high status nonlocal/exotic items, 5) have evidence or craft specialization in the form of discarded manufacturing byproducts and, 6) have evidence of greater use of high quality plant and animal food remains.

Kiva suites that are neither high status nor special function (nonelite domestic residential facilities) can be differentiated from elite residential and special function facilities 1) by surface room areas intermediate between that of special function or elite facilities, 2) in lower construction labor investments in comparison either elite residential or special function facilities, 3) in low frequencies of discarded wealth and status, no evidence or craft specialization, and lower overall frequencies of high quality food remains.

## Archaeological Correlates of Status Differentiation

Archaeologists have focused on several major variables or classes of material remains which have been correlated with to the presence of organizational complexity. Central to interpreting social complexity in prehistoric societies is that the development of differential status, a hallmark of nonegalitarian social organization, is expressed in restricted access to exotic materials and goods. Cross-cultural studies indicate that nonegalitarian elites from "Big Men" to Chiefs tend to be accumulators of material wealth (Fried 1967; Service 1962; Johnson and Earle 1987). In Big Man societies, wealth is primarily used in gifting and feasting ceremonies that both enhance prestige and reinforce status. The presence of elite individuals with differential access to wealth and with the ability to control or influence the productive labor and resources of their group is thought to produce a discernible signature in the archaeological record (Hayden and Gargett 1990; Lightfoot 1984; Upham 1982). However, while this is undoubtedly true of highly complex social systems such as chiefdoms and states, the archaeological signature is expected to be significantly less distinct in low level elite societies, and societies where status differentiation is only beginning to emerge (White 1985; Johnson and Earle 1987; Kosse 1990). As Johnson and Earle (1987:313-314) point out, complexity is an evolutionary continuum involving change in a constellation of variables. Each society, through differences in local conditions and history, will tend to have a unique expression of complexity along the continuum. Clearly the same is true of the ways in which social complexity is expressed in material culture.

Hayden and Gargett (1990:16) studied the operation of modern Maya "cargo" systems to understand the origin of wealth accumulation and development of elite statuses in subsistence-oriented societies. Hayden and Gargett's model provides a useful recent model of elite development that confirms many of the variables of elite development identified in previous models. The inclusion of archaeological implications of elite behaviors provide useful guidelines to developing appropriate archaeological expectations and measures of complexity. Through their research they have derived a series of archaeological implications of emerging social complexity, summarized below.

1) The emergence of individual elite accumulators from egalitarian traditions is linked to an increase in the abundance and reliability of resources as well as their resistance to overexploitation. Increases in resources are linked to improved technology, subsistence strategy or environment. 2) The initial emergence of elites should be linked to evidence of specialized ritual and display structures that may have associated feasting-related refuse and ritual paraphernalia. 3) Prestige items suggesting private wealth accumulation, as well as differential mortuary accompaniments may be linked to differential access to wealth items. 4) Regional exchange systems should exist which serve to provision feasting and gifting ceremonies as well as providing exotic ritual and prestige items. 5) Population densities should be significantly higher than those of generalized foraging populations. Accumulators also appear to devote considerable effort to increasing economic production. Because labor is a key element in increasing production and therefore wealth in subsistence-oriented societies, elite accumulators actively try to increase their access and control of labor. Local populations may therefore demonstrate increase through internal growth and recruitment. 6) Large household storage facilities should accompany the presence of accumulators indicating privately controlled resources which can be hidden and hoarded in times of subsistence stress.

Agricultural intensification, larger storage facilities, regional exchange systems, differential access to wealth and prestige items, specialized ritual architecture, and control of production and labor in a context of increasing population density were considered by Hayden and Gargett (1990) to be key indicator variables of developing social complexity. Lightfoot's (1984) earlier model of prehistoric complexity in the Southwest identified many of the same key variables. Additional indicators of complexity have been defined by other researchers, and include the presence of settlement hierarchies, craft specialization, larger household size and formalized ritual and ceremony (Upham 1982; Lightfoot 1984; Lightfoot and Upham 1989a, 1989b).

The presence of settlement hierarchies is considered an indicator of social complexity (Johnson 1977; Peebles and Kus 1977; Upham 1982; Upham et al. 1989; Lightfoot 1984; Lightfoot and Upham 1989a, 1989b). Small, undifferentiated settlements with little variation in site size are considered characteristic of noncomplex societies, while settlement systems characterized by large, archaeologically complex central sites surrounded by smaller, less complex outlying sites, are thought to indicate the presence of greater social complexity. Complex settlement systems, therefore, indicate the presence of "... complex decision-making organizations ... reflected in well-developed settlement hierarchies and the differential distribution of settlements, storage space, nonlocal goods, nondomestic architecture, high-status burials and evidence of subsistence intensification" (Lightfoot 1984:49).

Craft specialization has also been associated with the presence of nonegalitarian, complex social systems (Peebles and Kus 1977; Lightfoot and Feinman 1982; Lightfoot and Jewett 1986; Lightfoot 1984; Lightfoot and Upham 1989a, 1989b; Costin 1991; Peregrine 1991; Underhill 1991). Both full-time and part-time craft specialists are found in complex societies, but full-time craft specialization generally occurs in more complex societies, while part-time specialization is common in less complex societies. Elites seek to initiate the production and control of items – frequently status-related – that are useful in exchange, especially where local access to desirable raw materials exists. Evidence of craft specialization includes high densities of manufacturing tools and debris associated with specialist households. Part-time craft specialization, commonly occurring at the household level, is often difficult to discern in the archaeological record.

Larger household size is strongly correlated with the ability to produce surpluses. Larger families usually exhibit increased flow of material wealth, another factor commonly linked to the presence of elites (Watson 1978; Kramer 1979; Hayden and Cannon 1983; Wilk 1983; Lightfoot 1984; Hayden and Gargett 1990). Formation of larger elite households can result from several factors including improved diet thereby improving reproductive success and increasing rates of infant survival, polygyny to increase productive capacity and alliance formation, recruitment of individuals through ties of kinship and recruitment of unattached individuals into the leader's household. Elite households in nonstate societies are, therefore, usually larger than commoner households. Differential household size, in conjunction with other supporting lines of evidence is, therefore, considered a useful indicator of differential status.

The availability and use of surplus labor, that is, labor effort devoted to the construction of specialized ritual and ceremonial architecture (Lightfoot 1984; Upham 1990), construction of soil and water control features related to agricultural intensification, or construction effort investments in excess of that required for sound construction and devoted to the symbolic aspects of household architecture is also considered a mark of nonegalitarian social configurations (Rapoport 1982; Wilk and Rathje 1982; McGuire and Schiffer 1983). The production and storage of large agricultural surpluses is often viewed as a concomitant of elite-driven agricultural intensification. Surplus production provides elite decision-makers with the means to increase followers, initiate important ceremonies, support specialists and to participate in exchange networks (Lightfoot and Upham 1989a).

In summary then, evidence for the presence of elites and nonegalitarian social formations include differential access and accumulation of wealth, agricultural intensification, production and storage of agricultural surpluses, the presence of exotic prestige items, differential mortuary accompaniments, the existence of regional exchange systems, differentially increasing population, differentially larger household size, settlement hierarchies, craft specialization and access to and control of a group's labor efforts. These will vary in the ease with which they can be recognized in the archaeological record.

## Community Organization and Aggregation in the Sand Canyon Locality

Three kinds or levels of societal response are considered likely with aggregation into villages in the latter half of the A.D. 1200s in the Sand Canyon Locality. I consider these expected responses to aggregation to be useful heuristic devices. Although general in nature, they encompass the likely range of responses to aggregation by an egalitarian horticultural society. The first potential response is that no change in social structure or organization occurs, and society remained primarily egalitarian and acephalous. The second potential response is that functional differentiation increases, perhaps in ritual and ceremonial aspects of society. In this case, the society also remained predominantly egalitarian. The third potential response is that social adjustments to aggregation involve the development of status differentiation and low-level nonegalitarian social organization.

If there is no change in societal configuration or complexity (basic egalitarianism is maintained) the archaeological record of individual kiva suites should be largely undifferentiated. Independent variables used to measures complexity in this case would indicated that Green Lizard and Sand Canyon Pueblo kiva suites are largely indistinguishable from one another. In this view, the construction of Sand Canyon Pueblo is assumed to be the result of individual efforts by small groups, perhaps loosely coordinated by egalitarian community leaders. Aggregated 13th century sites in the Mesa Verde region are, therefore, spatial loci into which residents of small habitations, from long-term dispersed communities, gathered. These small sites were then abandoned as habitations with the shift from dispersed to aggregated communities. I have assumed that the political authority and managerial capacity needed to plan, organize and manage the construction of large sites such as Sand Canyon Pueblo originated and resided in the extant egalitarian community. That is, the community could accomplish this construction and deal with the stresses caused by living in close proximity by using existing mechanisms for group decision-making and social control. Thus, egalitarian community organization remained largely unchanged after aggregation.

Even though elements of Sand Canyon Pueblo such as the site enclosing wall were clearly preplanned and community-wide integrative structures and possibly a centralized storage facility are present (Bradley 1991, 1993) indicating that elite leaders might be present, such large-scale nondomestic architecture does not necessarily require the presence of nonegalitarian decision-makers. Thus, the continued egalitarian and undifferentiated social structure should be reflected in architectural and assemblage similarities with smaller, domestic habitations, such as Green Lizard, and among individual kiva suites at Sand Canyon Pueblo. However, the presence of communal architecture suggests that the nature of community organization may have changed with aggregation. In summary, if community organization did not change after aggregation, then the social configuration at Sand Canyon Pueblo should be isomorphic with the earlier, undifferentiated dispersed egalitarian community in the upper Sand Canyon area. It is possible that residential proximity of kin groups and subsequent accretional growth resulted in the distinct form of discrete roomblocks or architectural blocks at Sand Canyon Pueblo. Adler (1990) has suggested that there are directly equivalent. Rohn (1977) has suggested a similar pattern, constrained by location in an alcove, at Mug House on the Mesa Verde.

Functional (horizontal) differentiation of elements of the society is the second possibility. I assume in this case that functional differentiation occurred within a primarily egalitarian social milieu, but stress-related social adjustments to aggregation resulted in a form of social adaptation that may have required increased social integration and complexity. One way, and by no means the only way, in which such social integration might have occurred was through increased ritual and ceremony (ritual regulation) – especially through cross-cutting organizations such as sodalities. Application of a sodality organization model invokes Western Pueblo ethnographic analogy. Among Western Pueblos, sodality structure serves to integrate a community; perhaps the best known of these is the Katsina cult (Titiev 1944; Eggan 1950; Adams 1991). The need for social adjustments to relieve or deflect internal stresses caused by aggregation may have resulted in the formation of cross-cutting associations or, more likely, the increased activity and/or formalization of such organizations that already existed in the dispersed community prior to aggregation. The activities of such organizations may, therefore, have necessitated the development of special function, nonresidential kiva suites. These then became the locus of communal integrative activities that alleviated social stresses caused by aggregation that could have led to internal friction and fissioning. The basic social context for such increased ritual activity would have remained egalitarian, but would have been more complexly organized than before aggregation.

As Kane (1986) points out in an analysis of Pueblo I social complexity at the Dolores Archaeological Program, it is possible that some people – covert leaders – may have been able to accumulate prestige and influence, but that their power was muted by an organizational structure that was still egalitarian. Thus, some individuals may have had significant prestige and influence, but did not possess power and authority. As discussed by Brandt (1980), Upham (1989), and other researchers into the nature of power relations in ethnographic Puebloan contexts, access and control of ritual and ceremonial may be one axis along which inequality developed among prehistoric Puebloan societies. Functional differentiation expressed in ritual-related nonresidential structures could, therefore, be an indicator of community-wide ritual ceremonial activities, perhaps controlled or influenced by covert leaders. However, detecting the presence of such individuals is difficult, although not impossible (S. Plog 1989). It may be possible, however, to distinguish facilities that became largely devoted to ritual as a result of this process.

Status differentiation, as used here, incorporates elements of nonegalitarian managerial models offered by Upham (1982), Lightfoot (1984) and Lightfoot and Upham (1989a). The size of Sand Canyon Pueblo clearly rivals that of aggregated villages argued to have been central places and the home of residential administrative elites elsewhere in the Southwest (Upham 1982; Lightfoot 1984). In this view, Sand Canyon Pueblo could have been a residential site housing "leaders" or "elites" as well as "nonelites." Researchers exploring the implications of aggregated settlement systems in the northern Southwest have suggested that status and power in prehistoric Anasazi communities is archaeologically definable and testable in several dimensions including production and control of surpluses, controlling access to exotic/rare items, agricultural intensification and craft specialization (Upham 1982; Lightfoot 1984). I propose that aggregation into very large villages, even without the presence of outlying smaller sites, could have resulted in the development of nonegalitarian social organization (a simultaneous decision-making hierarchy in Johnson's [1978, 1982] terms).

Thus, the development of large late Pueblo III villages in the northern Southwest may have necessitated or have been accompanied by change in community organizational and decision-making structures. Social adjustments to aggregation may have enabled or fostered the ability of some individuals to attain higher status and prestige within the community. The formation of nonegalitarian social systems and status differentiation is expected to be reflected in the archaeological record to a variable extent, depending on intensity and duration of such a social system at a site.

## Archaeological Evidence of Differentiation at Sand Canyon Pueblo

This discussion and review of the relationships between functional differentiation and nonegalitarian social processes and their material correlates, indicates that several variables are key to understanding the nature of postaggregation social structure and community organization at Sand Canyon Pueblo. I have selected those variables that appear to be the most useful in eliciting pertinent social patterning from available artifact assemblages and architectural features. Some variables such as mortuary differentiation could not be assessed due to the sparsity of comparative data between Green Lizard and Sand Canyon Pueblo. The presence of a settlement hierarchy requires a larger regional study and is outside the scope of this study. Sand Canyon Pueblo may be a central site for other smaller aggregates. If so, it is likely to show some evidence of differentiation, but I do not have the data to address this. It is possible local aggregation alone may have been sufficient to have caused differentiation. Estimation of surplus storage capacity was also excluded from the comparative analyses as assessments of room function and storage capacity are subject to significant interpretive difficulties. That is, definition of room function has historically been at the mercy of several variables, notably interpretation of abandonment mode and abandonment assemblages and the potential for room function to change through time, that have made clear interpretation difficult (Ciolek-Torrello 1978, 1984, 1985; Hantman 1989; Lightfoot and Most 1989).

The general social variables selected for the assemblage and architectural feature comparisons at Green Lizard and Sand Canyon Pueblo are: 1) kiva suite architectural construction characteristics, 2) household size, 3) household wealth, 4) specialized production and, 5) resource intensification.

Architectural variables will be used to compare and contrast excavated kiva suites at Green Lizard and Sand Canyon Pueblo (Chapter 4). Based on these comparisons and data from

Bradley's (1993) study, I identify kiva suites at which there is evidence of 1) domestic residential use, 2) specialized nonresidential use or, 3) high status use.

Additional relevant information is available that may have a bearing on the nature of community organization at Sand Canyon Pueblo. At Sand Canyon Pueblo large, nondomestic storage facilities are present that are not directly associated with any of the kiva suites used in this study. Architectural Block 300, the great kiva in the 800 Block with attached storage rooms and the D-shaped bi-wall structure with upper level storage facilities may indicate the presence of some degree of centralized accumulation, either under the control of elite leaders, or under the control of religious sodalities or covert leaders. I address the implications of these facilities to interpretations of community organization at Sand Canyon Pueblo in the conclusions (Chapter 6).

Three scenarios of post-aggregation organization have been presented. A series of independent social variables and measures are used to examine the possible trajectory or directionality of social changes, if any, accompanying aggregation at Sand Canyon Pueblo. The first scenario – the egalitarian undifferentiated model, posits that there is no change in community organization, as indicated by no significant differences in the selected architectural and assemblage characteristics between the kivas suites at Green Lizard and Sand Canyon Pueblo. That is, there is relatively little variability among kiva suites at Sand Canyon Pueblo and Green Lizard falls within this range. Thus, no strong directional trends should be evident when comparing this sample of excavated kiva suites. Nonelite domestic kiva suites can be differentiated from special function facilities by greater room area relative to kiva area, lower construction labor estimates and the presence of domestic discard assemblages. They are distinguished from elite facilities by lower kiva suite room area relative to kiva area, lower construction labor estimates and a discard assemblage containing few or no wealth or status items. Also, use group size at nonelite domestic facilities, roughly indicated by serving vessel size, while expected to vary, should be smaller than at either elite or special function facilities.

The second scenario, termed the specialized function model, suggests that distinct differences between kiva suites at Green Lizard and Sand Canyon Pueblo exist in the selected architectural and assemblage characteristics. The specialized function model assumes that these special function facilities were nonresidential. Differences between Green Lizard and Sand Canyon Pueblo domestic kiva suites and Sand Canyon Pueblo special function facilities should be evident in low frequencies of domestic artifact assemblages and greater labor investment in architecture. Thus, a directional trend in construction labor estimates, kiva to room areas and the absence of domestic refuse should distinguish special function facilities from elite and nonelite residential facilities at Sand Canyon Pueblo. If users of special function facilities engaged in feasting hosting activities in the course of ritual and ceremonial observances, serving vessel size may be equal or larger than at elite facilities, but larger than at nonelite facilities.

The third scenario – the elite residential model, suggests that strong directional trends along the wealth and household size and other architectural variables should be exist that distinguish commoner households and specialized function kiva suites from elite residences. Residential high status kiva suites may be differentiated from nonresidential special use facilities by larger overall surface room area, there presence or significant quantities of domestic trash containing discarded status items and lower construction labor investment compared to special use facilities. Elite residential facilities are expected to have had the largest households and should, therefore, have serving vessel sizes larger than at nonelite households, but may be equal or smaller in size than at special use facilities.

Since elite households are residential, it is likely that in some cases individual social variables and measures used in the comparison may not be able to distinguish elite residences from nonelite kiva suites in all cases. I expect, however, that the directionality indicated by the combined variables will be sufficient to distinguish nonelite, special function and elite facilities from one another and, therefore, indicate which of the three scenarios of community organization is most likely.

It is also possible that only elite and nonelite households were present at Sand Canyon Pueblo. In this case, the same variables in scenario three, above, will distinguish elite from commoner households. Finally, it possible that all three, special function, elite and nonelite facilities were present simultaneously at Sand Canyon Pueblo. If this was the case, then the expectations for items 1 through 3 above should distinguish these facilities from one another. In any case I expect that the directionality exhibited by the aggregate of the variables will differentiate commoner, special function kiva suites and elite facilities in whatever combination they may appear.

In summary, individual measures may not always clearly distinguish or select the three scenarios, but when the aggregate of all measures are evaluated, directionality indicating which of the three is most likely should be evident. This dissertation can serve as a pilot study of the detailed architectural and assemblage-based approach to understanding community organization that I have developed and present in subsequent chapters. If I achieve some promising, or even interesting results, my work can help orient future research into this problem

## Structure of the Dissertation

In this chapter I discussed the theoretical underpinnings of my approach to understanding the social consequences of aggregation by 13th century Anasazi communities in southwestern Colorado. I then discussed the material correlates of changes in community organization, and offered three scenarios or models of postaggregation community organization that are tested in subsequent chapters. In Chapter 2, I provide a discussion of the environmental and cultural background in which this research is set. A brief section describing the history of archaeological research in southwestern Colorado, follows. Chapter 3 details the archaeology of the Green Lizard site and describes the architectural and assemblage characteristics of a small domestic habitation in the Sand Canyon Locality. In Chapter 4, I discuss the relationship between social complexity and its architectural expression. I evaluate architectural evidence of kiva suite function and assign Green Lizard and Sand Canyon kiva suites into those most likely to have been domestic residential, special function, or elite residential facilities. I then test these assignments against additional architectural evidence and evaluate the results. In Chapter 5, I evaluate these architecturally-derived expectations of kiva suite function against assemblage-based evidence of organizational differences at individual kiva suites and less directly associated architectural blocks. In Chapter 6, I summarize the evidence and discuss the most probable form of post-aggregation of community organization at Sand Canyon Pueblo. I then discuss the implications of this result for our understanding of community organization at other late Pueblo III aggregations in the northern San Juan area.

# Chapter 2

# BACKGROUND: ENVIRONMENT, CULTURE AND PREVIOUS RESEARCH

This chapter describes the cultural and natural environment in southwestern Colorado in regional and project specific contexts. Discussion of the environment emphasizes the resources available to the Anasazi, and the constraints imposed by the natural environment. Following this is a brief discussion highlighting trends in Anasazi culture change in southwestern Colorado. The chapter concludes with a brief section describing the history of archaeological research in the Mesa Verde area and in the Sand Canyon Project area.

## NATURAL ENVIRONMENT

The setting of this research is the Colorado Plateaus, a physiographic province covering an area of approximately 241,000 $km^2$ in the states of Utah, Arizona, New Mexico and Colorado (Baars 1983). Elevations on the Colorado Plateaus generally increase from southeast to northwest, with many of the Plateaus above 1524 m (5000 ft), and some laccolithic peaks reaching 3353 m (11,000 ft). The Sand Canyon Project area is situated on the western margin of the Canyon Lands section of the Colorado Plateaus (Fenneman 1931; Hunt 1967), and is located on the McElmo dome, a prominent, nearly circular uplifted area (Ekren and Houser 1965:2). Its maximum elevation is 2157 m (7004 ft) at Goodman Point overlooking McElmo and Sand Canyons (Figure 1.2).

The project area is drained by McElmo Creek, and its major tributary, Yellow Jacket Creek. These drainages form the southern and northern boundaries of the Sand Canyon Project area. Rock and Alkali Canyons, smaller tributaries of the McElmo, define the western and eastern boundaries of the project area. The major aquifers in the area are the Cretaceous Dakota and

Jurassic/Triassic Navajo sandstones (Gregory 1938; Ekren and Houser 1965). Potable water is primarily present in small intermittent and permanent springs occurring at the exposure of facies changes between permeable sandstones and impermeable clays and shales.

## Modern Climate

Southwestern Colorado is semi-arid. Climatic data from the Cortez, Colorado weather station, 16 kilometers (10 mi) east-southeast of the project area at an elevation of 1829 m (6000 ft) show mean annual precipitation for the period 1951 through 1973 at 319.5 mm (12.6 in). The greatest mean monthly precipitation for this period was 42.2 mm (1.7 in), in August, and the lowest mean monthly precipitation was 11.4 mm (0.4 in), in June (Bye and Shuster 1984:91-92).

July had the highest daily mean maximum temperature, at 31.8$^0$ C (89$^0$ F), and the lowest mean maximum daily temperature was 5.2$^0$ C (41$^0$ F) in January. July was also the month with the highest daily mean minimum temperature of 17.7$^0$ C (64$^0$ F), and the lowest daily mean minimum temperature of -9.9$^0$ C (14$^0$ F) occurred in January.

In southwestern Colorado the precipitation pattern is bi-seasonal. Summer precipitation is highly localized and frequently intense for short durations, resulting in heavy runoff and local flash-flooding. The average length of the growing season (based on a 50% probability of frost) is 131 days at the Cortez weather station. The mean monthly precipitation during the growing season (from May through September) was 135.1 mm (5.3 in) with much of that precipitation occurring in the latter half of that period. Winter precipitation is also important for agriculture as snow melt raises soil moisture levels critical to seedling germination during the dry early spring period in late May and June (Bye and Shuster 1984).

## Paleoclimate

Reconstruction of past climates is vital to understanding the scope of climatic constraints and potentials on early agricultural societies in the Southwest. Much of the paleoenvironmental information currently available is based on long-term regional studies extended to the general

Southwest (Euler et al. 1979; Dean et al. 1985; Gumerman 1988). The resulting reconstructions track large-scale, long-term cyclical trends well, but tend to mask less severe short-term local changes affecting local populations.

Studies by Fritts et al. (1965), Petersen and Mehringer (1976), Petersen (1988), Dean and Robinson (1977), Rose et al. (1982) and Van West (1990) indicate that the past environment in southwestern Colorado was quite variable, and could at times have severely affected the Anasazi farmers in the area. The most detailed paleoclimatic data for southwestern Colorado are Petersen's (1986, 1988) climate reconstructions for the Dolores Archaeological Program. The following discussion is based on Petersen's (1988) reconstruction of southwestern Colorado paleoclimate and agricultural potential for the period A.D. 550 to 1300.

A.D. 550-600: Dryland farming was not possible in most of the Dolores Project area. It was probably too cold at higher elevations and too dry at lower elevations.

A.D. 600-750: There appears to have been a substantial increase in summer and winter precipitation and dryland farming was probably possible in most project areas.

A.D. 750-900: Winter precipitation appears to have decreased, but summer precipitation increased over the preceding period. Dryland farming belt was probably restricted to mid-slope elevations.

A.D. 900-950: Winter precipitation continued to be low and summer precipitation decreased. The growing season in the Dolores Valley appears to have dropped below 110 days and valley sites were abandoned. The dry farming belt was greatly contracted throughout the area, and farming was probably limited to southern slope exposures, increasing solar insolation, and thereby increasing soil temperatures and effectively extending the growing season.

A.D. 950-1130: Winter and summer precipitation apparently increased and summer temperature increased as well. The dryland farming belt probably expanded to include both high and low elevation areas.

A.D. 1130-1200: Winter precipitation during this period appears to have been low, but summer precipitation remained high. The dry farming belt probably contracted somewhat to midslope elevations.

A.D. 1200-1300: Winter precipitation continued to be low, and summer precipitation appears to have declined as well. The growing season was probably too short at higher elevations, while insufficient moisture was available at lower elevations to support dryland farming.

Post A.D. 1300: Shortly after A.D. 1300, summer temperatures continued to cool. In combination with later summer rains and cooler temperatures, perhaps the first pulse of the Little Ice Age, the probability of early killing frosts increased and may have resulted in the effective disappearance of the dry-farming belt.

Demographic and settlement patterns in the Mesa Verde Region and the Sand Canyon Locality clearly were influenced by climatic factors that affected agricultural productivity. It is important to note however, that Petersen's temperature reconstructions are probably the weakest part of his model. Schlanger (1988) studied the interrelations of cyclical population growth and decline and favorable growing conditions using archaeological survey data for the Mockingbird Mesa, Woods Canyon and Dolores Archaeological Project area (Fetterman and Honeycutt 1986; Schlanger 1985, 1988). She supplemented this with paleoclimatic reconstructions as proxy data for agricultural conditions (Burns 1983; Petersen 1988; Rose et al. 1982). Schlanger's study suggests that throughout the period of Anasazi occupation in the Mesa Verde region, large areas may have been unoccupied or only lightly settled as climatic conditions favored agricultural activities in some areas of the Mesa Verde Region over others, and as populations appear to have shifted to take advantages of favorable areas in the region through time. Van West (1990) has constructed a detailed, year-by-year climatic reconstruction from A.D.900-1300 in an attempt to relate climate, soil quality and productivity and population size in southwestern Colorado. Her research indicates that even during severe climatic events such as the drought of A.D. 1276-1299, sufficient arable land was available to sustain relatively high population densities. Thus, factors other than climate and arable land may have caused regional abandonment in the A.D. 1280s (Van West 1990; Van West and Lipe 1992).

## Geology

The study area is characterized by horizontally bedded and deeply dissected sedimentary formations and exposed igneous laccoliths. Sleeping Ute Mountain is an intruded laccolithic structure of late Cretaceous age. A second prominent structural feature is the McElmo Dome, an uplifted area of sedimentary formations encompassing the Sand Canyon Locality. The origin of the McElmo Dome may be related to formation of the adjacent Ute Dome, the result of late Cretaceous basement rock uplift, late Tertiary folding, or movement of a salt dome formation

(Ekren and Houser 1965). The following description of the geologic section in Sand Canyon is drawn from Ekren and Houser (1965), to which I refer the reader desiring more detail.

The most ancient exposed sandstone formation in Sand Canyon is the Triassic/Jurassic Navajo Sandstone, a unit of the Glen Canyon Group that includes Wingate Sandstone, the Kayenta Formation and Navajo Sandstone. Near the confluence of Sand Creek and McElmo Creek, Navajo Sandstone is exposed to a thickness of 91 m (300 ft), and is generally pale-orange to orange.

Overlying the Navajo Sandstone is the Late Jurassic San Rafael Group. From oldest to most recent, the formation is composed of Entrada Sandstone, the Summerville Formation, and Junction Creek Sandstone. Together these formations are approximately 305 m (1,000 ft) thick in the Sand Canyon Locality. The Entrada Sandstone in a section measured near the mouth of Sand Canyon is 32 m (106 ft) thick and is composed of two units, the Dewey Bridge Member and the Slick Rock Member. The Dewey Bridge Member is a red, easily weathered, bench-forming sandstone overlying Navajo Sandstone. Above this is the Slick Rock Member grading from orange/light pink at the bottom to white/pale brown at the top. Within the Sand Canyon drainage, it forms alcoves that frequently contain late Anasazi cliff dwellings. The Summerville Formation is a bench-forming stratum overlying the Entrada. It is predominantly deep red to red-brown in color and ranges in thickness from 38 - 46 m (125 - 150 ft). Junction Creek Sandstone overlies the Summerville Formation and tends to form conspicuous slick-rock cliffs. It is generally light red to pink, and averages 83 m (280 ft) thick.

Overlying the Junction Creek Sandstone is the Late Jurassic Morrison Formation composed of four members (from oldest to youngest): the Salt Wash Sandstone Member, Recapture Shale Member, Westwater Canyon Member and the Brushy Basin Shale Member. The Morrison Formation is complexly stratified and consistently averages about 152-198 m (500 - 650 ft) thick.

The Salt Wash Member ranges in thickness from 27 - 34 m (90 - 110 ft) in the western part of McElmo Canyon to 61 - 76 m (200 - 250 ft) at a section measured near Trail Canyon. It consists of white/pale gray to pale yellow sandstone lenses interbedded with dark red-purple and red-brown mudstones and, rarely, gray to green-gray mudstone. The overlying Recapture Shale

Member is absent north of McElmo Canyon. To the south, it is thin and contains interbedded light gray to brown gray sandstone, and red, red-green and pale green mudstones. Overlying sandstones of the Westwater Canyon Member are pale yellow to yellow-gray or yellow, and tend to form rounded irregular cliffs. The Westwater Canyon Member intertongues and intergrades with the overlying Brushy Basin Shale Member. The Brushy Basin Member ranges in thickness from 46 to 91 m (150 - 300 ft), and is composed of many-colored slope-forming bentonitic mudstones, beds of fine siltstones and sandstones, and conglomerates.

The overlying Burro Canyon Formation is of Early Cretaceous age, and is 9 - 61 m (30 - 200 ft) thick. It is composed of green nonbentonitic sandstones with interbedded white to light-gray conglomeratic sandstone and conglomerate. Red mudstones are sometimes present near the bottom of the formation. The top of the Burro Canyon is an erosional disconformity. The Late Cretaceous Dakota Sandstone Formation disconformably overlies the Burro Canyon Formation and averages about 38 m (125 ft) in thickness. It is composed of yellow-gray to tan sandstone interbedded with gray to dark-gray mudstones and coal. Overlying the Dakota Sandstone is the Mancos Shale, which is present only as small remnant patches on the McElmo dome, but is up to 579 m (1900 ft) thick south of the Ute Dome. Dakota Sandstone is the uppermost remnant formation in the Sand Canyon Locality. On the McElmo Dome it is capped by Quaternary eolian loess forming arable mesa top sediments.

## Green Lizard Setting

The Green Lizard site is located within Sand Canyon, 1 km down-canyon from Sand Canyon Pueblo, and approximately 6.2 km (3.8 mi) up-canyon from the junction of Sand Creek with McElmo Creek, at a point where the canyon narrows considerably. The site is on a small south-facing erosional bench immediately above the main Sand Canyon drainage at an elevation of 2024 m (6640 ft) in a mixed pinyon-juniper woodland characteristic of much of the upper reaches of Sand Canyon. The site commands a view down the canyon to its confluence with McElmo Creek, and of the northern flanks and peaks of Sleeping Ute Mountain.

Green Lizard is located on a colluvial bench resulting from erosion of the Brushy Basin Shale Member of the Morrison Formation with some contribution from the overlying Burro Canyon Formation. Many of the abiotic resources likely to have been exploited by the occupants of Green Lizard, such as stone for forming flaked and ground stone tools, stone for construction, and clays for manufacturing ceramics, are readily available in the exposed sedimentary formations around the site. The Morrison and Burro Canyon Formations are the source of tool stone and clays, and the Dakota Formation is a good source of stone for ground stone tools and stone for construction purposes (Leonhardy and Clay 1985).

Marginally arable sediments are found on broad colluvial terraces within 1 km south of the site. Numerous smaller colluvial benches that might be arable are also present in the immediate vicinity of the site, and highly productive mesa-top sediments occur within a few hundred meters of the site, thought at a higher elevation.

A now dry spring isolated at the head the small side drainage in which Sand Canyon Pueblo is located at the contact between the Dakota sandstone and an underlying mudstone. Of minor importance are small, ephemeral pools in naturally formed cisterns or potholes in the exposed slickrock surfaces of the Dakota Formation above the site. Nearer to Green Lizard is a spring-fed pool that is the most reliable modern water source in Sand Canyon. The pool retained water through much the dry portion of summers of 1987 and 1988 (Huber 1989). It is located approximately 30 m southeast of the site within the main canyon drainage, and may have been one of the factors involved in site location.

## Vegetation and Fauna

Vegetation communities in southwestern Colorado vary according to both topographic and edaphic factors. Three vegetation associations are recognized in the Sand Canyon Project area: riparian, sagebrush shrubland, and pinyon-juniper woodland (Petersen 1987). The riparian community exists predominantly along McElmo Creek. Smaller riparian communities occur within Sand Canyon in areas of sufficient water-retaining alluvium, or in association with springs. The riparian community is characterized by cottonwood (*Populus fremontii*) and willow (*Salix exigua*). The sagebrush shrubland community consists of stands of big sagebrush (*Artemisia tridentata)* intermixed with rabbitbrush (*Chrysothamnus nauseosus)* and antelopebrush (*Purshia tridentata*), grasses and forbs and scattered pinyon and juniper trees. The pinyon-juniper woodland is dominated by pinyon pine (*Pinus edulis*) and juniper (*Juniperus osteosperma*) trees interspersed with stands of Gambel oak, and sagebrush, along with forbs and grasses.

The modern vegetation regime of the Sand Canyon Locality is a pinyon-juniper woodland where it has not been displaced by modern disturbances. The pinyon-juniper climax zone is the lowest forested zone of the Rocky Mountains (Erdman et al. 1969). Pinyon-juniper woodlands occur in an elevationally defined belt from approximately 1524 - 2134 m (Elmore 1976; West 1988). At the upper end of the elevational range, pinyon pine dominates, while juniper dominates at lower elevations (Shelford 1963). Throughout the pinyon-juniper woodland a great variety of other understory plant types are also present.

The mammals of southwestern Colorado are within the Dolores-San Juan Faunal District of the Colorado Plateau Faunal Area. The fauna of the area possesses xerophytic adaptations to the semi-arid conditions of the Colorado Plateau, and reflects a high degree of ecological diversity (Armstrong 1972). Faunal lists for southwestern Colorado are found in Anderson (1961), Bissell and Dillon (1982), Chase et al. (1982) and Neusius (1986). Archaeological studies of southwestern Colorado fauna were undertaken by Neusius (1985, 1986) for the Dolores Archaeological Program area, and more recently by Walker (1990a and 1990b) for the Sand Canyon Project area. The principal nondomesticated, mammals exploited by the Anasazi farmers in southwestern Colorado were cottontail rabbit (*Sylvilagus* spp.), jack rabbit (*Lepus californicus*) mule deer (*Odocoileus hemionus*), bighorn sheep (*Ovis canadensis*) and elk (*Cervus elaphus*) (Neusius 1985, 1986). Many other species were also exploited for food and nonfood purposes (Walker 1990a, 1990b).

## Cultural Background

During the Late Archaic the Anasazi culture emerged from antecedents such as the Picosa Culture (Irwin-Williams 1967, 1973). The aspect of the Picosa Culture found in the northern Southwest is known as the Oshara Tradition (Irwin-Williams 1973). Subsistence adaptations, settlement patterns, and social organization for the Late Archaic (pre-Basketmaker) period remain poorly understood (Lipe 1983; Spielmann 1990). It can best be characterized as consisting of small, highly mobile, sparsely distributed, egalitarian bands with a broad-spectrum hunting and gathering economy (Lipe 1983; Cordell 1984; Speth 1990). Irwin-Williams (1973, 1979) suggests that the Anasazi emerged from local Archaic antecedents However, the Anasazi culture may also have resulted from migrations from other areas of the Southwest (Berry 1982; Berry and Berry 1986). Recently Matson (1991) has proposed migration of maize farmers from the Sand Pedro phase of the Cochise culture in southeastern Arizona and adjacent New Mexico and the adoption of maize farming by local Archaic populations.

### Basketmaker II

The Basketmaker II period (ca. 500 B.C. to A.D. 450) is characterized by adaptations that are not transitional from Late Archaic to later Basketmaker III populations. Matson (1991) has argued that early Basketmaker II groups in the Four Corners area were largely sedentary, practiced agriculture, constructed pitstructures and tended to live in rockshelters. Hunting and gathering, however still constituted an important part of the resource mix. Late Basketmaker II populations appear to have lived increasingly on mesa tops in both deep and shallow soils, were highly dependent on maize and built shallow pitstructures. A considerable body of evidence has been amassed in recent years indicating that maize constituted up to 80% of Basketmaker II diet (Aasen 1984; Matson 1991; Matson and Chisholm 1991).

Basketmaker II sites are generally located in areas with access to several environmental zones, and settlement consists of generally dispersed, isolated structures and limited activity sites. However, Matson et al. (1988) and Matson (1991) indicate that large base camps or clusters of a few widely spaced houses are sometimes found near canyon-head springs and divides on Cedar Mesa in Utah. Rock shelters are often used as camps, for storage and for burial. Residential architecture consists of generally shallow circular pitstructures with central hearths and interior storage cists such as those found at Talus Village near Durango, Colorado (Morris and Burgh 1954), or those on Cedar Mesa (Dohm 1988; Matson et al. 1988; Matson 1991). No distinctive ceremonial architecture or artifacts are known for this period. The settlement pattern data suggest that social organization may have been organized at the level of egalitarian bands and that clusters of pitstructures may have constituted loosely organized local communities. Individual houses may have been the focus of nuclear and/or extended family groups, and a series of households may have been organized into kin units or informal marriage networks (Dohm 1988). Basketmaker II sites in the northern Southwest have been found on Cedar Mesa in southeastern Utah (Matson et al. 1988; Matson 1991), at Talus Village near Durango, Colorado (Morris and Burgh 1954), on Black Mesa (Bearden 1984; Smiley 1985; Smiley et al. 1986) and nearby Marsh Pass (Kidder and Guernsey 1919) and in the Navajo Reservoir District, in northwestern New Mexico (Eddy 1961, 1966).

In the vicinity of the Sand Canyon Locality, Basketmaker II sites are reported in the Hovenweep National Monument area (Winter 1975, 1976). In the Sand Canyon Locality, however, no clearly definable Basketmaker II habitation sites are known, but lithic scatters with projectile points that may be of Basketmaker II affiliation, and isolated finds of Basketmaker dart points indicate the possibility of their presence in the project area on a limited basis (Van West et al. 1987; Adler 1988, 1990; Gleichman and Gleichman 1989).

## Basketmaker III

The Basketmaker III period (ca. A.D. 450 - 750) is significant in that it represents the first substantial occupation by the Anasazi in southwestern Colorado, as well as the Sand Canyon Locality. Breternitz (1985) reports that the earliest Basketmaker III sites in the Mesa Verde region date to the A.D. 470s in Mancos Canyon, and are often associated with brown-ware ceramics, usually interpreted as of Mogollon derivation (Eddy 1966). These structures predate the earliest Basketmaker III sites on the Mesa Verde by 100 years.

Basketmaker III subsistence is dominated by agricultural products; beans are added to the diet and the complete Upper Sonoran Agricultural Complex of corn, beans and squash is present (Ford 1985). Turkey remains found in sites of this time period show evidence of domestication (Breitburg 1988). Reliance on maize continued to increase from that of earlier Basketmaker II populations (Minnis 1989). The standard housing unit of the time is a subterranean pitstructure roughly D-shaped to circular in plan. Hearths, storage pits, mealing areas, and occasional sipapus clearly indicate that a range of household and perhaps ritual activities occurred in pitstructures. Round, usually noncontiguous, surface structures, to which a storage function is attributed, are often present, especially toward the end of the period.

Most sites of this time period consist of isolated structures, or small clusters (hamlets) of two or three household units (Wheat 1955; Bullard 1962; Rohn 1975, 1977; Lipe 1983). Large clusters of up to 50 structures, as at Shabikes'chee at Chaco Canyon are present, but rare (Roberts 1929; Wills and Windes 1989). Some of these aggregated sites also possess very large pitstructures or large, shallow, slab-lined depressions. At Shabikes'chee, a large circular pitstructure was labeled a Great Kiva (Roberts 1929). The household appears to be the dominant social unit during this period (Birkedal 1976; Kane 1986). Larger hamlets and village clusters suggest the presence of some form of supra-household organization. The presence of the "great kivas" may indicate that in some cases there was a need to integrate and communicate at a community or even locality-wide level.

Significant changes in material culture occur during the Basketmaker III period. Ceramic containers for cooking and storage appear as a significant component of material culture for the first time. The bow and arrow also gradually replaces the atl-atl, but the atl-atl may have remained a part in the hunting tool inventory for a substantial amount of the period. Plant food processing equipment becomes more efficient. Troughed metates along with larger two-handed manos become common (Lipe 1983; Cordell 1984; Nickens and Hull 1982).

Ornaments manufactured of olivella and glycimeris shell from the Pacific coast of California continue to be present in frequencies similar to Basketmaker II. Marine shell indicates the presence of an extensive long-distance exchange network. Turquoise from various sources throughout the Southwest are also a not infrequent occurrence at Basketmaker III sites (Lipe 1983). The precise nature and intensity of the exchange systems which provided these goods is unclear, especially in terms of its possible interrelation with social status differentiation.

Basketmaker III sites are well represented in the Sand Canyon Locality (Van West et al. 1987; Adler 1989; Adler and Metcalf 1990, 1991; Gleichman and Gleichman 1989). The majority of the sites are located on deeper mesa top sediments but are also found in colluvial terraces within Sand Canyon itself (Gleichman and Gleichman 1989:32). This pattern conforms to that observed in the Dolores Project area, Mockingbird Mesa to the north and Mesa Verde to the southeast (Kane 1986; Hayes 1964; Rohn 1977; Smith 1987; Fetterman and Honeycutt 1986).

## Pueblo I

The following Pueblo I period (ca. A.D 750 - 900) is characterized by local abandonments resulting in an uneven distribution of populations and highly aggregated settlements in some areas during the later part of the period. Reliance on agricultural products, primarily maize, is probably as great during the latter half of the period as during Pueblo III (Decker and Tiezen 1988; Minnis 1989). Dispersed clusters of isolated household units are common during the early part of the period, but large aggregated settlements and villages occur late in the period. Aggregated units and villages occur at higher elevations and in large, well-watered alluvial river valleys such as the Animas and La Plata drainages, Middle Dolores River, and sections of the San Juan River. Diversity in structural types also increases: pitstructures, surface storage and living structures, field houses, limited activity loci and "great kivas" are fairly common during this time. Although present in Basketmaker II (in some areas) and Basketmaker III (Dohm 1988), it is in Pueblo I that the distinctive south-north orientation of midden, pitstructure and surface structure becomes distinctive and is formalized.

It is during Pueblo I that the unit-type pueblo (Prudden 1914, 1918) first develops (Lipe 1989). The primary residential structure is still the pithouse. Pitstructures have undergone significant structural changes from the preceding Basketmaker III period; antechambers are replaced by ventilation tunnels, pitstructures are rectangular or square with rounded corners and are frequently two meters or more in depth. Floor features are still primarily domestic, but ritual related features such as sipapus and floor vaults become more common. Surface structures during this time are constructed primarily of wattle-and-daub (masonry is used in some situations), and are formally divided into storage and habitation sections. The front-oriented living rooms generally contain hearths, bins and other floor features and are backed by smaller rooms lacking floor features which appear to have served a storage function.

Material culture has undergone little substantive change from the preceding Basketmaker III period. Ceramics include decorated red and white wares used as serving bowls and ollas, and undecorated utilitarian grayware vessels used for cooking and storage. Deep trough metates and two-handed manos are very common. Long distance and regional exchange networks which first appear during Basketmaker III are still active during Pueblo I. Marine shell, obsidian and turquoise are never common materials found in Pueblo I sites, but they are present in higher proportion than in later time periods. In the Dolores area, and in the Mesa Verde region as a whole, there is an extensive importation of redware ceramics which appear to have been produced almost exclusively in southeastern Utah (Breternitz 1982; Kane 1986; Blinman 1986, 1988).

Ceremonial architecture and related ritual features become more elaborate through time. Late during the Pueblo I period in the Dolores Project, "super pitstructures" with functions interpreted to have been largely integrative and ritual appear for the first time and are sometimes associated with distinctive "horseshoe-shaped" roomblocks (Kane 1986). Great kivas are present throughout the Anasazi-occupied Southwest during this period.

Social organization during Pueblo I appears to become more complex as larger aggregated settlement clusters form through time. In the Dolores Project area, and apparently much of the rest of the upland Southwest at this time, several levels of organization are manifested in architecture.

There are single pitstructures with a "suite" of paired front and back rooms equivalent to an architectural facility used extended family (interhousehold unit). Clusters of two or more pitstructures with a group of associated surface structure suites may be the architectural analog of more than one related extended families (interhousehold clusters). Roomblock clusters with several pitstructures and contiguous suites of surface rooms may be the equivalent of lineage groups comprised of related nuclear and extended families (Kane 1986). Interhousehold clusters and roomblock clusters may be analogous to corporate kin groups described by Hayden and Cannon (1982).

The Pueblo I period is relatively well represented on Mesa Verde (Hayes 1964, Rohn 1977, Smith 1987). The Dolores Project area is densely settled during Pueblo I, especially in the A.D. 800s (Kane 1986). Pueblo I sites are also present in higher elevation areas outside of the Dolores Project area (Wilshusen 1991). In the Sand Canyon Project area, Pueblo I sites are present, but difficult to distinguish from earlier Basketmaker III sites as most occur in plowed mesa top areas (Adler 1992). No sites dating to the Pueblo I period have been discovered in low elevation areas of Sand Canyon (Gleichman and Gleichman 1989).

## Pueblo II

The Pueblo II period (ca. A.D. 900-1150) represents the maximum geographic expansion of the Anasazi culture in the Southwest during a favorable climatic cycle (Dean and Robinson 1977; Petersen 1988; Gumerman 1988). Many of the areas in the northern Southwest, so densely settled during the preceding Pueblo I period, were abandoned during a brief, but severe climatic downturn in the last decade of A.D. 800s through early A.D. 900s (Petersen 1988). In general, regional population levels in southwestern Colorado during much of this time were probably greater than during late Pueblo I, but probably lower than during Pueblo III (Schlanger 1988). Subsistence appears to have been heavily dependent on agricultural products, but wild plant and animal foods are still a substantial part of the resource mix (Stiger 1975; Minnis 1989). A new more productive strain of maize (eight-row corn), may have been introduced during Pueblo II

(Galinat and Gunnerson 1963; Lipe 1983). This new variety, coupled with a favorable climatic cycle, may have facilitated the expansion onto more marginal soils, and the general Pueblo II geographic expansion in the upland Southwest. Agricultural terraces and grids to utilize runoff appear in agriculturally favorable areas with relatively high population densities, such as Mesa Verde. This may signal that some degree of intensification of corn agriculture is underway.

During the early A.D. 900s, much of southwestern Colorado appears to be only sparsely settled. Hayes (1964), however, suggests that Ackmen Phase (early Pueblo II) population on Wetherill Mesa at Mesa Verde, while not as great as in the preceding Piedra Phase (late Pueblo I), was still larger than during later Pueblo II and Pueblo III phases. Sites are small, typically comprising only a single household unit. Sites during the early part of the period tend to be located on mesa tops. By the early A.D. 1000s, however, a dramatic increase in the number of sites occurs (Neily 1983; Rohn 1977; Fetterman and Honeycutt 1986). The general settlement pattern in the Mesa Verde region during this period tends to be one of small, one or two household units with some larger aggregates of up to six or more organized into distinct dispersed communities and that are often centered on great kivas or great houses (Rohn 1977; Adler 1990). A second, highly distinctive settlement pattern of nucleated pueblos with a surrounding community of smaller habitations associated with the "Chaco Phenomenon" occurs during the latter half of the period (Judge 1984; Lekson 1984; Vivian 1990).

Pueblo II expansion onto marginal lands may have been a result of increased demographic pressures on more productive lands. Occupation of the Dolores Archaeological Project area during this time is very sparse (Kane 1986). On Mockingbird Mesa, north of the Sand Canyon Project, Fetterman and Honeycutt (1986) report that the Pueblo II occupation covered much of the available arable lands on the mesa top, and that inferred population densities were higher that any previous period.

Pitstructures change in form from rectangular to circular, at which point archaeologists have traditionally called them kivas. Many of the domestic activities still present in Pueblo I pitstructures may have been replaced to some extent by ritual and ceremonial activities (Nickens and Hull 1982; Cordell 1984). However, Lekson (1988) challenged this and suggested that kivas of the Pueblo II to Pueblo III time period are not functionally similar to ethnographic Pueblo kivas, and served primarily as domiciles. However, Lekson (1989) has since altered some of these ideas, but still maintains that true kivas of the ethnographic type do note appear until Pueblo IV. The consensus today is that most Pueblo II and later Pueblo III kivas served relatively small social units and consequently were probably used for a combination of ritual and domestic activities, carrying on a pattern first established during Pueblo I or earlier (Dohm 1988; Lipe 1989, 1992; Wilshusen 1989), but see Cater and Chenault (1988) for a contrary opinion. Early in the period, pitstructures (kivas) are round, primarily earth-lined, often lack benches and pilasters, and retain a four post roof support system (Rohn 1977). By the latter half of the period, pitstructure architecture is increasingly formalized with masonry upper and lower lining walls, masonry pilasters, cribbed-log roofs and diameters of 4 or more meters. Surface structures early in the period appear to be little changed from the preceding Pueblo I period. By the middle of the period masonry construction largely replaced jacal. Material culture is, aside from increasing elaboration in the style and construction of ceramics, basically unchanged from preceding Pueblo I times (Lipe 1983; Nickens and Hull 1982).

Ceremonial architecture during Pueblo II is characterized by continued formalization of pitstructures. Wilshusen (1989) states that many of the features commonly attributed to increased ritual activities in Pueblo II pitstructures – for example, sipapus, wall niches, paho marks and foot drums (ceremonial vaults) and other nondomestic floor features – were actually established in Pueblo I. He contends that two kinds of kivas were present in the northern Southwest from Pueblo I through Pueblo IV. The first is the corporate kiva used by distinct residential or social groups that integrated a small number of households that contained fewer and less elaborate ritual features. The second is the larger community kiva containing may elaborate ritual features that served community rituals and are argued by Wilshusen (1989, 1991) to be analogous to Western Pueblo kivas. However, evidence of community kivas in Pueblo II and Pueblo III is scarce. Great kivas, oversized kivas thought to have entire integrated communities, continue from earlier periods, and are highly formalized structures wherever they are found (Vivian and Reiter 1965). Where present, they are associated with clusters of small hamlet sites and Chacoan "Great Houses" (Powers et al. 1983; Vivian 1990). As in previous periods, great kivas are generally viewed as community and locality-wide integrative structures. Grebinger (1978), has suggested that great kivas served as places for the formal redistribution of goods, a characteristic of ethnographically described chiefdom level or ranked societies (Service 1962; Fried 1967). However, redistribution as a universal attribute of chiefdoms has been largely discredited (Peebles and Kus 1977; Feinman and Neitzel 1984).

Exchange systems during the Pueblo II period are still operative on regional and extraregional levels. However, the incidence of marine shell at Pueblo II sites is not greater than during Pueblo I times (Lipe 1983). Turquoise and exotic lithic material exchange continues from earlier times and there appears to be widespread exchange in ceramics throughout the northern Southwest. Ceramics from the Chuska Mountain and Cibolan areas of New Mexico, and the White Mountain and Kayenta areas of Arizona are commonly found at sites in the Mesa Verde region. The presence of Chacoan related sites in the Mesa Verde region suggests that, whatever the nature and function of the Chacoan system might have been, the area had been influenced by, or integrated into, a pan-Anasazi regional system in the late A.D. 1000s and early 1100s.

In areas where dispersed households occur, community organization is unlikely to have been significantly changed from the previous period; that is, household nuclear and extended family units. At nucleated Chacoan "Great House" communities, differential statuses may have existed between those occupying the great houses and those in the surrounding community of dispersed sites (Judge et al. 1981; Marshall et al. 1979; Breternitz and Doyel 1987). All known Great House sites exhibit a considerable degree of preplanning indicating that some ability to organize and schedule labor was present. Sebastian (1988) argues that great houses in Chaco were the residences of politically powerful individuals or lineages. The presence of elites in Chaco was indicated by settlement hierarchy, architectural investment and elaboration and formality and preplanning of the major Chacoan buildings. Sebastian (1988) suggests that these indicate institutionalized leadership. After the collapse of the Chacoan system in the Mesa Verde region after ca. A.D. 1130, it appears that at least some of the Great Houses were reoccupied or reorganized and architecturally modified (Morris 1919; Irwin-Williams and Shelley 1980; Bradley 1988).

In the Sand Canyon Locality the Pueblo II period is sparse early and well-represented later in the period, suggesting a substantial population increase (Adler 1990; 1992). Several community clusters occur during the later part of this period in the Sand Canyon area. Among these are the sites clustered around the Casa Negra Great House and associated Great Kiva east of Sand Canyon Pueblo. Another group is present on the east rim of Sand Canyon, and another to the south of Goodman Point Ruin (Adler 1990; 1992). In the Sand Canyon Locality, a number of sites with components dating to this period are present (Van West et al. 1987; Gleichman and Gleichman 1989; Adler 1992). Green Lizard, excavated as part of the Sand Canyon Project, has an underlying ephemeral late Pueblo II component, as do many of the Late Pueblo III sites tested in the project area (Hegmon 1991; Huber 1989; Huber and Lipe 1992; Varien 1990; Kuckelman et al. 1991; Varien et al. 1992).

## Pueblo III

Pueblo III (A.D. 1150 to 1300) is the last period in which the Anasazi were present in the northern Southwest. Population in southwestern Colorado, at least during the first half of the period, appears to have been larger than during any preceding period (Fetterman and Honeycutt 1986; Schlanger 1988). Settlement patterns during the first half of the period consist primarily of small unit-type pueblos (Prudden 1903, 1918) comprised of a single kiva and an associated suite of rooms (a kiva suite), as well as linear aggregations of unit-types in which the walls of one discrete architectural unit was abutted to the next. Linear arrangements may be as small as two kiva suites to as large as a dozen or more contiguous kiva suites. Adler (1992) notes that contemporary clusters of one to four roomblocks, each containing one or more kiva suites occur as well. By the end of Pueblo III, large aggregated villages were present some areas of the upland

Southwest. In southwestern Colorado and other parts of the northern Southwest, late Pueblo III aggregation takes place in large, sheltered alcoves, as at Navajo National Monument, Mesa Verde and the lower part of Sand Canyon, or in large pueblos near reliable water sources at mesa edges and canyon head locations, as at Yellowjacket Ruin, the Hovenweep Ruins Group and Sand Canyon Pueblo itself. Aggregation into fewer and larger pueblos occurs late in the period, and is a general trend throughout the upland Southwest.

Based on the absence of sites constructed after A.D. 1280, population in southwestern Colorado appears to have stabilized or begun to decline at about this time, and perhaps somewhat earlier. Most of the northern Southwest was depopulated between about. A.D. 1275 and 1300 during a period of short-term intense drought and long-term spatial variability of precipitation (Dean and Robinson 1977; Petersen 1988). Abandonment of the upland Southwest has been attributed to many and varied causes including hostile Numic or Athapaskan speaking nomads (Ambler and Sutton 1989; Gladwin 1957), inter-Pueblo warfare (Davis 1965; Ellis 1951) and epidemic disease (Colton 1960). Environmental change in the form of a severe drought from A.D. 1276 - 1299 (Douglass 1929), the reduction of arable mesa top and alluvial sediments through environmental degradation caused by deforestation (Martin and Byers 1965; Wycoff 1977), or arroyo cutting (Bryan 1941; Hack 1942) have also been proposed. Petersen (1988) has suggested that cooler temperatures, perhaps representing the onset of the Little Ice Age, may have made farming in the northern uplands virtually impossible. Individually, each of these abandonment hypotheses lacks substantive confirmation from the archaeological, bioanthropological, and linguistic records. Current evidence suggests that severe environmental and/or cultural factors should have reduced the population only to the point where the remaining population could readapt to changed conditions. Thus, the old abandonment hypotheses do not account for the total abandonment of the region. Lipe (1992) suggests that the population and its social organization in the northern Southwest may have become so highly interconnected that it reached a point "self-organized criticality." In such a case, argues Lipe (1992), any change in the condition of the system can result in effects of an unpredictable scale and intensity.

Reliance on agricultural products in Pueblo III is very high (Stiger 1975; Decker and Tiezen 1988; Minnis 1989). Excavation data from Pueblo III sites in southwestern Colorado reveal that the incidence of turkey remains is much higher than at any previous time, perhaps indicating that turkeys were being intensively used as a source of feathers, and of bone tools and ornaments, as well as a source of food (Reed 1951; Hargrave 1965; Cattanach 1980; Breitburg 1988). Ceramic vessels tend to be thicker and more elaborately decorated than in Pueblo II times. Troughed metates drop out of the inventory and are replaced by thinner, carefully shaped slab metates which were incorporated into formalized grinding bins (Lipe 1983; Nickens and Hull 1982).

Kivas were generally fully masonry-lined and surface structure were of masonry as well. Pueblo III kivas were frequently linked to towers via tunnels. The function of towers is unclear but may have been both ceremonial and defensive (Lipe 1983; see also Chapter 3). Patterns in residential architecture begun in later Pueblo II are continued during the early part of Pueblo III, but appear to change substantially with Late Pueblo III aggregation. At some large, late villages, kivas were incorporated into roomblock architecture, although the distinction between kivas and rooms was still maintained. Great kivas and bi-walled structures, are present in southwestern Colorado during Pueblo III, but appear to be rare (Bradley 1991, 1993). Structures such as triwalls and/or biwalls which are often interpreted as ritual-related architecture may also be present; notably at Aztec Ruin in New Mexico, Sun Temple at Mesa Verde, Goodman Point Ruin east of Sand Canyon Pueblo, and at Sand Canyon Pueblo, a "D"-shaped bi-wall (Bradley 1991, 1993).

Of note during the Pueblo III period is the great decrease in exotic goods exchange so prevalent during preceding periods (Lipe 1983; Neily 1983). Obsidian and other nonlocal lithic materials are rare. Turquoise is rarely found in Pueblo III period sites and what little is found may have been curated. Long-distance ceramic exchange is greatly reduced and appears to be nonexistent during the latter half of the period.

## Pueblo IV

There are no architectural sites attributable to the Pueblo IV or Protohistoric period, A.D. 1300 to 1540, in the northern Southwest. Indeed, after the Pueblo III period, only Ute and Navajo sites are found in the area during this period. Puebloan ceramics dating to this period are found in the area indicating visitation, but not habitation. Generally, the Pueblo IV period is characterized by large-scale population shifts from the northern San Juan drainage to the south and east. By about A.D. 1450, the Puebloan populations had aggregated into very large sites (up to 1000 rooms), primarily in the Hopi Mesas area, the Zuni Mountains area, and in the Rio Grande area at Pecos Pueblo, sites in the Bandelier National Monument, and others such as Piro and Arroyo Hondo. Protohistoric Puebloan populations remained confined to these areas until Spanish contact in A.D. 1540 and thereafter (Riley 1990; Lipe 1983; Cordell 1984).

### Historic Pueblo

In the Historic Pueblo period, A.D. 1540 to present, the archaeological evidence suggests that the Mesa Verde region is uninhabited until sometime in the A.D. 1500s, when Numic-speaking Shoshoneans appeared. In the Dolores Project area, a site with the remains of a small wooden structure yielded a radiocarbon date of A.D. 1660 ± 50 (Kane 1986). Mica-tempered brownware ceramics, considered diagnostic of the spread of Numic-speakers, probably Utes, are found throughout the Mesa Verde region (Fowler et al. 1973). The first Europeans to reach the Mesa Verde region were probably members of the Rivera Expedition of A.D. 1765, and the subsequent Dominquez-Escalante Expedition of A.D. 1776 (Chavez and Warner 1976). The area was settled by Euro-Americans in the early 1870s, who found the region occupied by the Utes.

## The Archaeological Data Base

The archaeological data base in the Mesa Verde area, and in the Sand Canyon Project area is a substantial and rich one. The Mesa Verde region extends from the Piedra River in the east to the Colorado River north of the San Juan River in southeastern Utah. I have restricted this discussion to the central portion of the Mesa Verde region. Early research conducted in the area forms some of the earliest substantive contributions made in the history of American archaeology.

The abundant archaeological sites of Southwestern Colorado were brought to the attention of archaeologists by a series of United States government sponsored expeditions to the area in the last quarter of the 19th century (Newberry 1876; Jackson 1876, 1878; Holmes 1878). The first explorations and uncontrolled excavations of Anasazi sites in southwestern Colorado were carried out primarily by Richard Wetherill at Mesa Verde and southeastern Utah in the 1880s and 1890s (McNitt 1966; Fletcher 1977; Willey and Sabloff 1980; Cassells 1983; Lipe 1993). The first systematic excavation and reporting of archaeological sites undertaken at Mesa Verde and in the region was by Gustav Nordenskiold, guided by the Wetherills (Nordenskiold 1893; Arrhenius 1960; McNitt 1966; Smith 1987).

In the first decade of the 20th century, systematic reconnaissance and excavations of sites in the northern Southwest were undertaken by both academically trained archaeologists, and scientifically trained avocational archaeologists such as T. Mitchell Prudden. Prudden (1903), surveyed of many of the major drainages of the northern Southwest and excavated a number of small Pueblo III sites (Prudden 1914, 1918). As a result of these surveys and excavations, Prudden (1903, 1914, 1918), recognized that a kiva and an associated roomblock formed a characteristic feature of Anasazi site layout which he termed the "unit type" pueblo, a concept accepted and used by other southwestern researchers (Kidder 1924; Roberts 1939; Rohn 1965, 1971). In the early 20th century, reconnaissance surveys (Morley and Kidder 1917; Fewkes 1919) and excavations were carried on at many of the larger Pueblo III sites in the Mesa Verde region. Morley (1908) worked in the McElmo drainage; Fewkes (1909, 1911, 1916, 1918, 1921) and Nusbaum (1911, 1981) on Mesa Verde; and Kidder (1910) in nearby southeastern Utah.

Paul S. Martin of the Field Museum of Natural History conducted surveys and excavations at many sites in the Mesa Verde region some miles to the north of the Sand Canyon Project area at Ackmen-Lowry and Ruin Canyon in the 1920s and 1930s (Martin 1929, 1930, 1939, 1936, 1938). Martin's research encompassed both small unit type pueblos and large aggregated sites, including Lowry Ruin. In the 1930s, C. T. Hurst and V. F. Lotrich (1932, 1933) of Western State College conducted excavations at the very large, multicomponent Yellow Jacket site north of the Sand Canyon Locality (Figures 1.1, 1.2). Leonard L. Leh (1938, 1939, 1940, 1942) undertook limited excavations at the Wilson Ruins complex, as did Alfred K. Guthe (1949) and S.J. Tobin (1950) at the Cahone Ruin. These large sites north of the Sand Canyon Project area excavated by Hurst and Lotrich and Guthe and Tobin are poorly documented and reported.

North of the Sand Canyon Project area in the 1950s and 1960s, Joe Ben Wheat of the University of Colorado Museum and Arthur H. Rohn of Wichita State University conducted research at several small Basketmaker III through Pueblo III sites in the region (Brown 1975; Elwood 1978; Wheat 1955; Lange 1986; Rohn 1975; Gould 1982; Hill 1985). In Mancos Canyon to the south of Mesa Verde, Reed (1943, 1958) surveyed and excavated several sites on the Ute Mountain Ute reservation as part of a road salvage project. At Mesa Verde, excavation and stabilization of some of the major ruins as part of the Wetherill Mesa Project, as well as numerous other smaller salvage-related excavations were undertaken at Anasazi sites during the late 1940s through 1960s (Abel 1955; Cattanach 1980; Lister 1964, 1965, 1967, 1968; Hayes and Lancaster 1968, 1975; Lancaster et al. 1954; Lancaster and Watson 1954; O'Bryan 1950; Osborne 1965; Rohn 1965, 1971; Smiley 1949; Swannack 1969), as well as intensive surveys of Wetherill Mesa (Hayes 1964) and Chapin Mesa (Rohn 1966, 1977) .

Several large-scale surveys and excavations in the immediate Mesa Verde region have been conducted in the past 15 years. At Mesa Verde National Park, surveys and emergency excavations undertaken under the auspices of the University of Colorado's Mesa Verde Research Center were conducted from early 1960s through late 1970s (Lister 1964, 1965, 1967, 1968; Nickens and Hull 1982; Smith 1987). During this time the Mesa Verde Research Center conducted nonintensive reconnaissance surveys on BLM lands in Sand Canyon (C. Martin 1976), and other areas nearby such as Mockingbird Mesa (D. Martin et al. 1971), as well as survey and excavation of sites in Mancos and Johnson Canyons on the Ute Mountain Ute reservation (Nickens 1976).

The largest intensive survey and excavation program so far conducted in the region was that of the Dolores Archaeological Project from 1978 through 1985 (Breternitz 1983, 1984; Breternitz et al. 1986; Kane and Robinson 1988; Kohler et al. 1986; Lipe et al. 1988; Petersen et al. 1985). The focus of the project was data recovery and excavation of archaeological sites that were to be impacted by dam construction in the upper Dolores River Valley. Additional surveys and excavation were undertaken in conjunction with construction of irrigation canals and laterals associated with construction of the reservoir (Kuckelman and Morris 1988; Morris 1991).

West of Sand Canyon, a long-term extensive program of surveying and test excavation, principally of Pueblo III sites, was undertaken in the Hovenweep National Monument area by Joseph Winter of San Jose State University (Winter 1974, 1975, 1976, 1977, 1978, 1984). To the north of the Sand Canyon Project area, extensive surveys were undertaken at Mockingbird Mesa by the Bureau of Land Management in the early 1980s revealing that the Mesa was densely occupied during Basketmaker III, Pueblo II, and Pueblo III times (Fetterman and Honeycutt 1986). Neily (1983) intensively surveyed portions of Squaw Point and Cow Mesa near Ruin and Cross Canyons northwest of the Sand Canyon area, in an attempt to characterize Anasazi community organization through time. In the late 1970s intensive quadrat surveys were undertaken on Bureau of Land Management lands in and around the Sand Canyon Project area (Chandler et al. 1980). Finally, hundreds of small scale cultural resource management surveys and excavations too numerous to list here have been conducted throughout the region under the auspices of Federal cultural resource laws since the late 1960s.

Recently, small scale excavations in the Mesa Verde area have been undertaken by Gould (1982) in the 1970's at a small Pueblo II/III site near Goodman Point Ruin; Susan Kent (1991) at a small Pueblo II site north of the Sand Canyon Project area; and Bruce Bradley (1974, 1984, 1988) at Wallace Ruin, a Chacoan "Great House" site in the Montezuma Valley. Hallasi (1979) excavated and stabilized the Escalante site, a Chacoan outlier overlooking the Dolores River and Ralph Luebben of Grinnell College conducted excavations at three small Late Pueblo III sites near Yucca House National Monument (Luebben 1982, 1983; Luebben and Nickens 1982). In overview, a great deal of research has been undertaken in the Mesa Verde region, and in the Sand Canyon Locality in the course of more than a century of investigation. Much of the early excavation focused on larger, more visible sites, especially the alcove sites of Mesa Verde or the large, highly visible mesa top rubble mounds.

## The Sand Canyon Project

The Sand Canyon Project is an integrated research effort encompassing intensive survey, testing, and excavation of late Pueblo II and Pueblo III sites undertaken by the Crow Canyon Archaeological Center. The long term goals of the research effort in the Sand Canyon Project area are to 1) develop and test diachronic processual models of community sociopolitical and socioeconomic organization from the late A.D. 1100s to the late 1200s, 2) investigate the nature and degree to which the Anasazi of the Sand Canyon Project area were integrated into larger regional sociopolitical and socioeconomic systems and, 3) investigate the diachronic changes in social organization and how the collapse and abandonment of the region may have been related to such changes (Lipe and Bradley 1986, 1988; Lipe 1992).

The project was initiated in 1983 with the mapping of Sand Canyon Pueblo: excavations commenced the following year and, after a brief hiatus in 1989-1990, continued in 1991-1993 (Adams 1984, 1985; Bradley 1986, 1987, 1988, 1991, 1992, 1993). In 1986 and 1987, intensive surveys of sites around Sand Canyon Pueblo were conducted and limited testing of middens was undertaken at selected sites to obtain ceramics to improve chronological assessments (Van West et al. 1987; Adler 1988; 1990). In 1988, an ongoing program of rigorous test excavation at selected sites was undertaken to obtain chronological, architectural and assemblage data from Pueblo III period sites located during survey (Varien 1990; Varien et al. 1992). In 1987 and 1988, the Green Lizard site (5MT 3901) was selected for intensive excavation to obtain detailed architectural, assemblage and chronological data useful for comparison with data from Sand Canyon Pueblo and the tested sites (Lipe and Bradley 1986; Huber 1989, 1991, 1993; Huber and Bloomer 1988; Huber and Lipe 1992).

The Green Lizard site is a small Pueblo III Anasazi habitation. Its principal period of occupation occurred between A.D. 1175 and A.D. 1300. The Green Lizard site was first recorded by Crow Canyon Center researchers in 1984. The layout of the site is essentially that of two adjacent "Prudden Units" (Prudden 1914, 1918), and consists of two kivas, approximately 20 more or less contiguous surface rooms, an extensive and deep midden deposit located to the south of the architectural component of the site, and several check-dams or similar erosion control features located in small side drainages immediately to the west and east. The Green Lizard site provides comparative assemblage and feature data from a domestically-oriented site which are used to compare with data from Sand Canyon Pueblo in order to investigate community organization in the Sand Canyon area during the Pueblo III period.

# Chapter 3

# THE ARCHAEOLOGY OF GREEN LIZARD

## OBJECTIVES

In this chapter I present information about the excavation, sampling, stratigraphy, architecture, material culture, and chronology of the Green Lizard site (5MT 3901). Excavations in 1987 and 1988 were part of the larger Sand Canyon Project undertaken by the Crow Canyon Archaeological Center (Lipe and Bradley 1986, 1988; Lipe 1992; Huber and Lipe 1992). The archaeological record of Green Lizard is examined to infer duration and intensity of occupation, the range of activities suggested in the material culture, and the abandonment mode.

### Project History

The Green Lizard site is a small Pueblo III Period Anasazi habitation in the Montezuma-McElmo area of the Colorado Plateau, with underlying Pueblo II deposits. The principal occupation at Green Lizard was between A.D. 1180 and 1260 and may have been at least partially contemporaneous with that of Sand Canyon Pueblo (5MT 765), a large late Pueblo III site dating to about A.D. 1250-1280 that has been the focus of investigations by Crow Canyon Archaeological Center researchers since 1984 (E. C. Adams 1984, 1985; Bradley 1986, 1987, 1988, 1990, 1991, 1992; Kleidon and Bradley 1989). Researchers at Sand Canyon Pueblo have emphasized understanding the site's function in Anasazi society just prior to regional abandonments in the northern Southwest about A.D. 1300 (Lipe and Bradley 1988; Lipe 1992). Site artifact data used in this study are presented in Appendix B. These and additional data from the Green Lizard excavation are on file at the Crow Canyon Archaeological Center, Cortez, Colorado.

The Green Lizard site, first recorded by Crow Canyon Center researchers in 1984, consists of two adjacent "unit-type pueblos" or Prudden Units (Prudden 1914, 1918), together comprising two kivas, about 20 more or less contiguous surface rooms, an extensive and relatively deep midden deposit located south of the architectural component, and several check-dams or terraces located immediately to the west, east, and possibly to the north as well.

Green Lizard is on a colluvial bench within the upper reaches of Sand Canyon and immediately above the main canyon drainage. The bench on which the site is located slopes 5-7 degrees in the immediate site area. The architectural portion of the site is considerably less steep, whereas other areas of the site, notably the plaza/courtyard in the vicinity of the two pitstructures, are nearly level (Figure 3.1). Level parts of the site were created by the site's inhabitants. Excavation of the two pitstructures may have been facilitated by the sloping ground surface because less sediment needed to be removed than might have been the case had the ground surface been flat.

The Green Lizard site was selected for intensive excavation as it was likely to meet the overall objectives of the Sand Canyon Project (Lipe and Bradley 1986). Besides presumed contemporaneity with Sand Canyon Pueblo, these include:

1) the excavation of a small unit pueblo such as Green Lizard constituted an important initial step toward comprehending the structure of the Sand Canyon area community during the AD 1200s.

2) its potential for possessing an assemblage related primarily to habitation or domestic functions that can be contrasted and compared with assemblages from Sand Canyon Pueblo as well as other 13th century sites in the Sand Canyon Locality.

## Sampling Design

Green Lizard was sampled through complete excavation of selected architectural areas in the western kiva suite, and a stratified random sample of the primary midden deposit and adjacent site areas using 1 x 1 meter excavation units. I divided the site into six sampling strata. I defined the site boundaries on the basis of a fall-off in surface artifact densities, or at the midden's southern margin, by a abrupt increase in slope. Some artifacts eroded from the midden occur on the steeper slope below the southern midden boundary. I used a variable sampling rate in all but the architectural stratum (Stratum 2). In Stratum 2, the western pitstructure and associated surface architecture were excavated. The variable rate strategy was selected to provide a statistically valid sample of primary midden deposits, as well as to sample extramural areas of the site not normally the focus of excavations (Mueller 1974; Blalock 1979). Sample selection was initiated by assigning numbers to individual 1x1 meter units within individual sampling strata. Individual sampling units were then selected using a random number generator. Alternate sampling units were also drawn in the event a unit met rejection criteria: 1) the unit landed within a tree; 2) it landed in a looter's pit or; 3) it landed within the test unit that was excavated during the 1986 Sand Canyon Survey and Testing Program (Van West et al. 1987). However, a unit was not rejected because it landed on a large boulder or similar "stable" natural feature. The following discussion describes the six sampling strata, and the sampling strategy employed in each stratum (Figure 3.3).

Sampling Stratum 1 consisted of extramural site areas lacking obvious surface manifestations of cultural features to the north, east and west of the architecture and primary midden deposit. Four randomly selected 1x1 meter sampling units were removed to sterile sediments. This represents the minimum number of sampling units from which quantitative data can be subjected to statistical manipulation with valid results (Blalock 1979). An additional judgmentally selected 1 x 1 meter unit was also partially excavated in this stratum.

Sampling Stratum 2 consisted of the architectural component of the site including all rooms, kivas, and associated courtyard areas. This stratum was sampled through the excavation of the western “kiva suite,” including the pitstructure and associated surface architecture and courtyard. This constituted approximately 50 percent of the architectural space present in Sampling Stratum 2. Architectural features in the western kiva suite were completely excavated. Two kiva tunnels and portions of the plaza/courtyard area went unexcavated, or were only partially dug due to insufficient time and unsafe working conditions. Excavation in the eastern half of Stratum 2 was limited to a test trench to determine the location and depth of the eastern kiva. The excavation

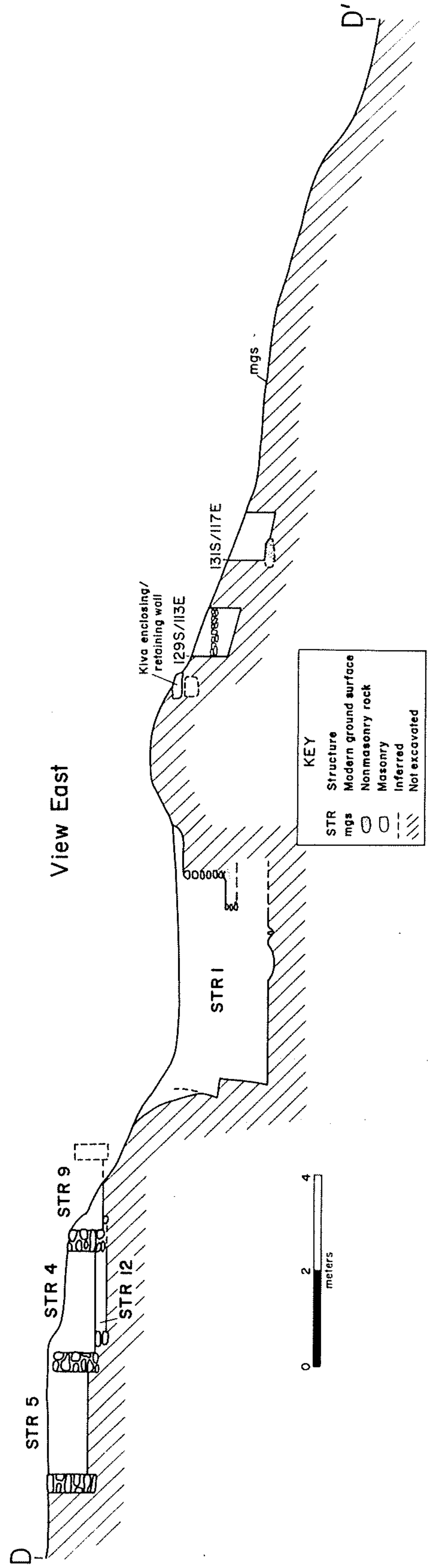



Figure 3.1: Green Lizard Site Cross-Section

of Stratum 2 produced a sample which was not strictly comparable to the randomly selected excavation units in the other sampling strata, it did, however, yield a sample comparable to the "kiva suite" excavation units employed at Sand Canyon Pueblo.

Sampling Strata 3 through 6 were located in the primary midden deposit, composed of a concentration of artifacts, ash, charcoal, and decomposed organic matter. Two sampling strata were proposed on the presence of an eroded east-west trending midden retaining wall which more or less divided the midden into upper "formal" and lower "down-slope" halves. The northern half appeared to be an accumulation of relatively intact midden , whereas the southern half contained eroded and reworked deposits exhibiting a greater density of surface lag artifacts. The northern and southern strata were further subdivided into eastern and western halves to enable future comparison of refuse which may be linked to deposition from western and eastern kiva suites. The net effect was to divide the midden into quarters: Stratum 3 in the northeast quadrant (71 1x1 meter units), Stratum 4 in the northwest (73 1x1 meter units), Stratum 5 in the southeast (69 1x1 meter units) and Stratum 6 in the southwest (70 1x1 meter units).

Five 1x1 m grid units were randomly selected from each stratum for a total of 20 units, and a sampling rate of 7.07%. We excavated nine of the 10 randomly selected units in the upper "formal" midden (Sampling Strata 3 and 4) – the tenth landed on a large boulder and was not excavated. Sampling units in the lower, eroded portion of the midden (Strata 5 and 6) were not excavated due to time constraints, but were surface-collected. Table 3.1 below, describes the population of units, gives the number of units sampled, and provides point estimates for the total number of artifacts in each sampling stratum. The point estimate for all nonperishable artifacts at Green Lizard is 194,005 ± 143,555. However, surface collected sample units in Stratum 5 and 6 were excluded from this estimate. The point estimate for Stratum 2, was not derived from a random sample and as such is not a statistically valid estimate. It does nevertheless, provide a useful estimate of the number of artifacts in the architectural sampling stratum. The point estimate for all artifacts, therefore, probably underestimates the population of artifacts at Green Lizard. If artifact totals in Stratum 5 and 6 are even half that of Stratum 4, then 250,000 artifacts might be a reasonable estimate of the population of artifacts. An artifact estimate this large suggests that the occupation of Green Lizard was long-term and intensive; probably at least a generation in length.

Table 3.1: Sampling Unit Data and Total Artifact Point Estimates.

| Sample Stratum Number | Population of Units | Number of Sampling Units | Sampling Proportion | Number of Artifacts | Stratum Point Estimate | Stratum Standard Deviation | 95% Point Estimate Confidence Interval |
|---|---|---|---|---|---|---|---|
| 1 | 502 | 4 | .0080 | 179 | 22,465 | 55.7 | 22,464 |
| 2 | 423 | 166[b] | .3924 | 7585 | 19,327 | 862.7 | 43,270 |
| 3 | 71 | 5 | .0704 | 7132 | 101,274 | 549.3 | 33,726 |
| 4 | 73 | 5 | .0685 | 3489 | 50,939 | 697.8 | 44,095 |
| 5 [a] | 69 | 5 | .0725 | 558 | – | – | – |
| 6 [a] | 70 | 5 | .0714 | 159 | – | – | – |

[a] Sampling Strata 5 and 6 are unexcavated midden sampling units. Only surface artifacts were recovered from these units. Point estimates are not comparable to excavated units and were not calculated. [b] This figure includes nonarchitectural extramural areas included in the architectural sampling stratum.

Surface artifact collections from randomly selected units in the lower, eroded portions of the midden provide assemblage data from this stratum. Excavation data from two units at the southern margin of the upper, "formal" midden strata contained substantially shallower deposits than units further upslope, and thereby tend to support the observation that deposits in the lower midden strata were shallower and more eroded.

## Excavation and Recording Methods

Excavation and analysis methods at Green Lizard were consistent with methods and standards described in the Crow Canyon Field and Laboratory Manual (Lightfoot and Bradley 1986; Schwab and Bradley 1987). All artifacts were analyzed at the Crow Canyon Archaeological Center, and a relational data base of artifact and provenience was constructed there.

Prior to excavating, a surface contour map was made showing cultural features. The principal site datum was located upslope and north of the western kiva suite (Figure 3.2). The datum is both the elevation and origin point for the site excavation grid. Elevation at the datum was

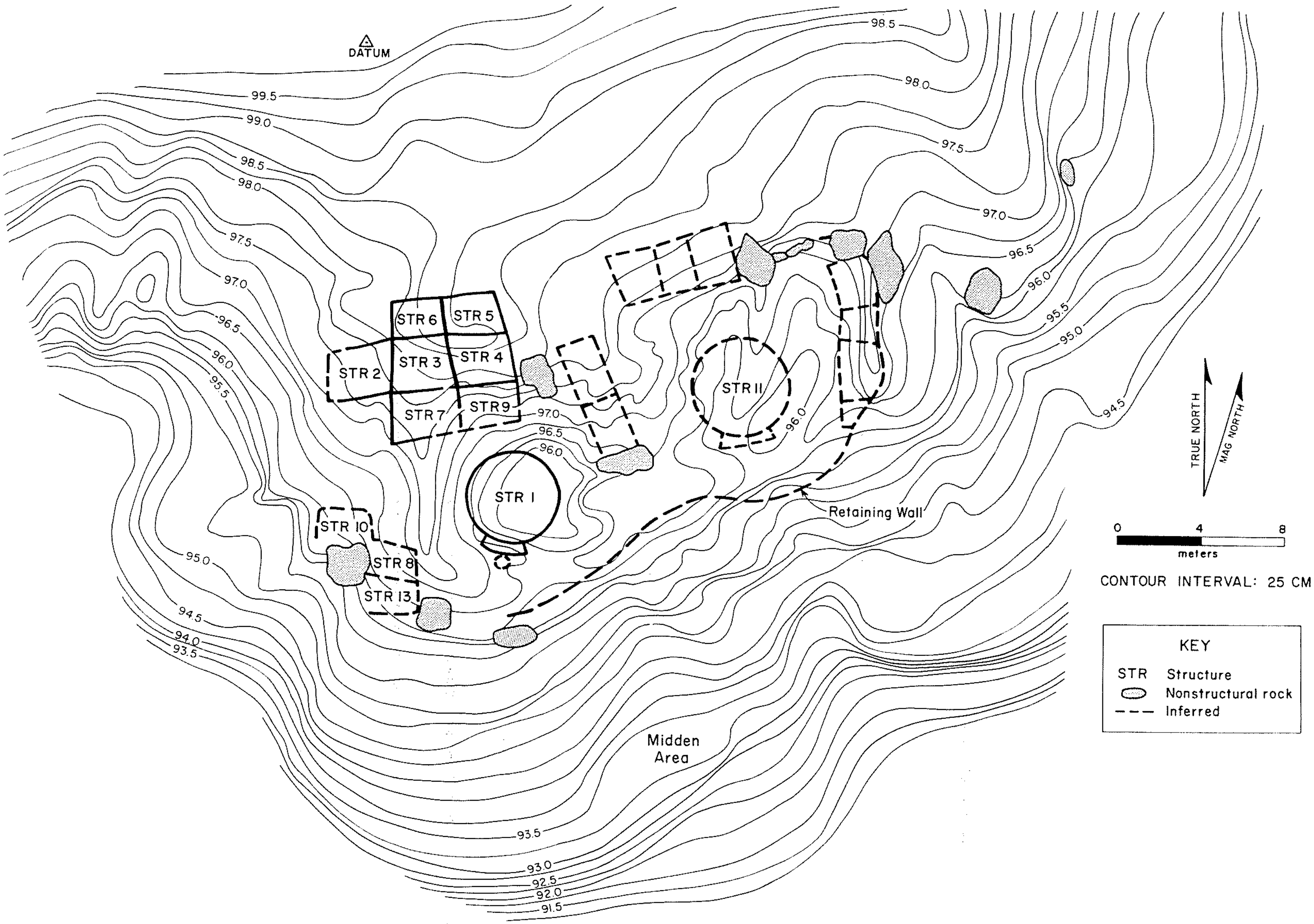



Figure 3.2: Green Lizard Site Countour Map

arbitrarily set at 100.0 m. All elevations were subsequently recorded in meters and centimeters below this elevation. Grid coordinates are measured in meters south and east of the datum which was arbitrarily designated as 100 m south and 100 m east on a True North grid orientation (1988 magnetic declination = $14^{0}$).

## Structure Excavation Methods

We excavated within structures by natural stratigraphic units where these were distinguishable and arbitrary excavation levels where they were not. Sediments, in all but a few cases, were screened through 1/4" hardware cloth and different classes of artifacts were bagged individually. Artifacts in use-surface and near use-surface contexts were point-located. Tables of point-located artifacts are presented in Appendix A. Where appropriate, botanical, palynological, fine screen, sediment, flotation, and microarchaeological samples were taken. Architectural and feature data also were recorded using standardized Crow Canyon recording forms. Features and point-located artifacts or clusters of artifacts were numbered consecutively within individual structures or other defined excavation units.

## Midden Excavation Methods

Midden test units were excavated in arbitrary 20 cm levels which followed the natural contours of the modern ground surface. That is, the floor of each excavation level paralleled the slope of the modern ground surface into which the unit was excavated. Each of these levels was assigned an individual P.D. (Provenience Designation) number. Vertical excavation control was achieved by taking depth measurements from each corner of the unit at modern ground surface. All units were excavated until culturally sterile sediments were encountered. All sediments removed from these units were screened through 1/4 inch mesh hardware cloth, and recovered artifacts placed into bags labeled with the appropriate provenience information. The stratigraphy of at least one wall of the six deepest midden units (124S/123E, 126S/120E, 124S/116E, 124S/117E and 126S/114-115E) was described and drawn in the field. Four liter fine screen samples, one liter flotation samples, and sediment samples of 225 grams were collected from the stratigraphic profile wall of three of these excavation units (124S/123E, 126S/120E, 124S/117E).

## EXCAVATIONS IN SAMPLING STRATUM 1

Sampling Stratum 1 comprises areas to the west, east and north of the midden and the architectural components of the site (Figure 3.3). Four randomly selected 1x1 meter sampling units were excavated to assess the nature of outlying site areas that contained few surface artifacts, and to determine, in a limited way, the presence of buried extramural features. We excavated units in this stratum in arbitrary 20 cm levels measured below modern ground surface. Excavations of Feature 1 (GEN 0), visible on the surface, and Arbitrary Unit 6 were not randomly selected. These were judgmental sampling units chosen to supplement data derived from randomly selected units. Artifact data for these units are presented in Appendix B.

This sampling scheme proved effective in assessing the nature of subsurface deposits relative to surface artifact distributions. Excavation failed to locate subsurface extramural site features. In the area west of the excavated kiva suite in Sampling Stratum 2, surface artifacts were present. Two excavation units (Arbitrary Units 4 and 5) fell into this area. Excavation was undertaken in arbitrary 20 cm levels revealing that artifacts in both units were restricted to the upper 10-15 cm, and culturally sterile sediments were encountered within 30 cm of modern ground surface. Most of the artifacts recovered in these units probably originated from the nearby trash-filled nonmasonry structures (8, 10 and 13) to the east.

Arbitrary Units 3 and 8 in Sampling Stratum 1 are located east of the unexcavated eastern kiva suite (Figure 3.4). Few artifacts were encountered and those recovered appear to derive from intermittent discard in the area, and/or slope-wash. Excavations in both units reached culturally sterile sediments within 30 cm of modern ground surface. Arbitrary Unit 6 is a judgmentally selected 1 x 1 meter excavation unit located north of Structure 6 in an area where sediments had accumulated to the top of the standing wall. Time did not permit the excavation of more than a

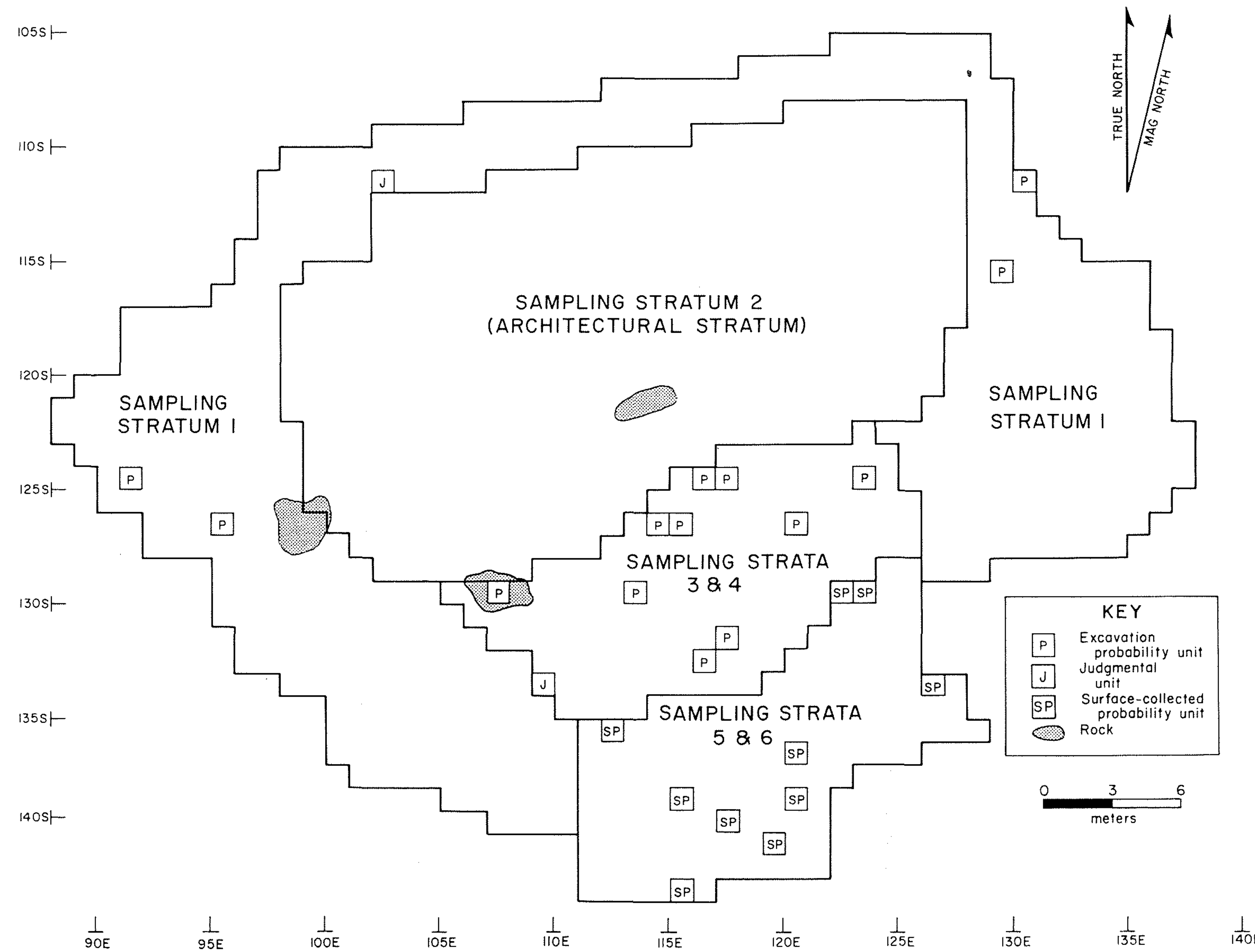



Figure 3.3: Green Lizard Sampling Strata.

single 20 cm level. Several flakes of Dakota quartzite were recovered in this level, but deposits appear to be predominantly colluvial, and clearly not the result of trash deposition.

## Feature 1

Feature 1 in Sampling Stratum 1 (GEN 0 in Appendix B) is located in the southwestern portion of Stratum 1, south of trash-filled Structure 8, and west of the midden (Figure 3.4). Surface indications consisted of three upright slabs forming a corner as well as several other upright slabs in alignment with these. Excavation proved the feature to be a slab-lined rectangular pit measuring 190 cm long, 95 cm wide, and averaging 45 cm deep. When originally constructed, the feature had been partially excavated into sterile sediments. The sandstone slabs bounding the feature exhibited a variable degree of fire-reddening suggesting one or more intensive episodes of burning. Sterile native sediments at the bottom of the feature, however, exhibited little oxidation in comparison to the degree of oxidation noted on the slab sidewalls suggesting relatively infrequent use.

The uppermost fill unit of the feature consisted of loose, light-brown, sandy loam containing numerous artifacts. These artifacts may have eroded from trash-filled jacal structures (Structures 8, 10 and 13) immediately to the north, or constitute a light scatter of sheet trash deposited after the feature had been abandoned. The middle fill unit consisted of 30 cm of calcareous gray sandy loam, possibly ash as well, and very few artifacts. The lowest fill unit consisted of a 4 cm thick layer of charcoal and small burned pieces of sandstone rubble with only a small amount of ash and no artifacts (Table 3.2).

Table 3.2: Feature 1 Artifact Assemblage

| Artifact Type | Level 1 Artifact No. | Level 2 Artifact No. | Artifact Total |
|---|---|---|---|
| Ceramics | 149 | 17 | 166 |
| Chipped Stone | 275 | 7 | 282 |
| Flaked Stone Tools | 2 | 0 | 2 |
| Nonflaked Stone Tools | 5 | 0 | 5 |
| Total | 431 | 14 | 455 |

The presence of considerable charcoal and sparse amounts of ash might indicate that the last fire in the feature was extinguished (intentionally or naturally) before much of the wood had burned to ash. Samples of this lower fill unit contained charred wood of sagebrush (*Artemisia*), saltbush (*Atriplex*), antelopebrush/cliff rose (*Purshia/Cowania)*, juniper (*Juniperus*), and pine (*Pinus*), and included thousands of pine bark scales indicating the use of a wide range of fuel woods. No economic plant parts were recovered (K. Adams 1989).

The function of this feature is unclear. The reddening observed in the sandstone slabs indicated that relatively hot fires occurred in the feature. The size, shape and construction indicate that the feature might have served as a pottery-firing kiln (Fuller 1984). However, the absence of sherd clinkers or wasters in the fill leaves this interpretation open to question. The absence of charred economic plant parts suggests that the feature's use did not extend to roasting plant foods, or else the feature was thoroughly cleaned after each use. Thus, its function remains obscure as does its temporal linkage with the Pueblo II or Pueblo III occupation of the site, although I infer the latter.

## Check Dams

Three check dams were mapped on the peripheries of the site. One was found northwest, one northeast, and one east of the architectural component. The western check dam had the most distinct surface expression consisting of a 6.15 meter linear alignment of large sandstone and conglomerate blocks that crosses a shallow drainage. A single course of stones which averaged some 40 cm in width and height was exposed in mid-channel. The stones did not appear to have been shaped, but the exposure made this difficult to determine. It is unlikely that this check dam ever stood higher than the single course now present since similar large stones which might have been displaced from the check dam are absent below it.

The two eastern check dams also crossed existing shallow drainages and were composed of somewhat smaller sandstone and conglomerate blocks than the western check dam. Check dam 2, located closest to the architectural component of the site, is the smallest of the three check dams at

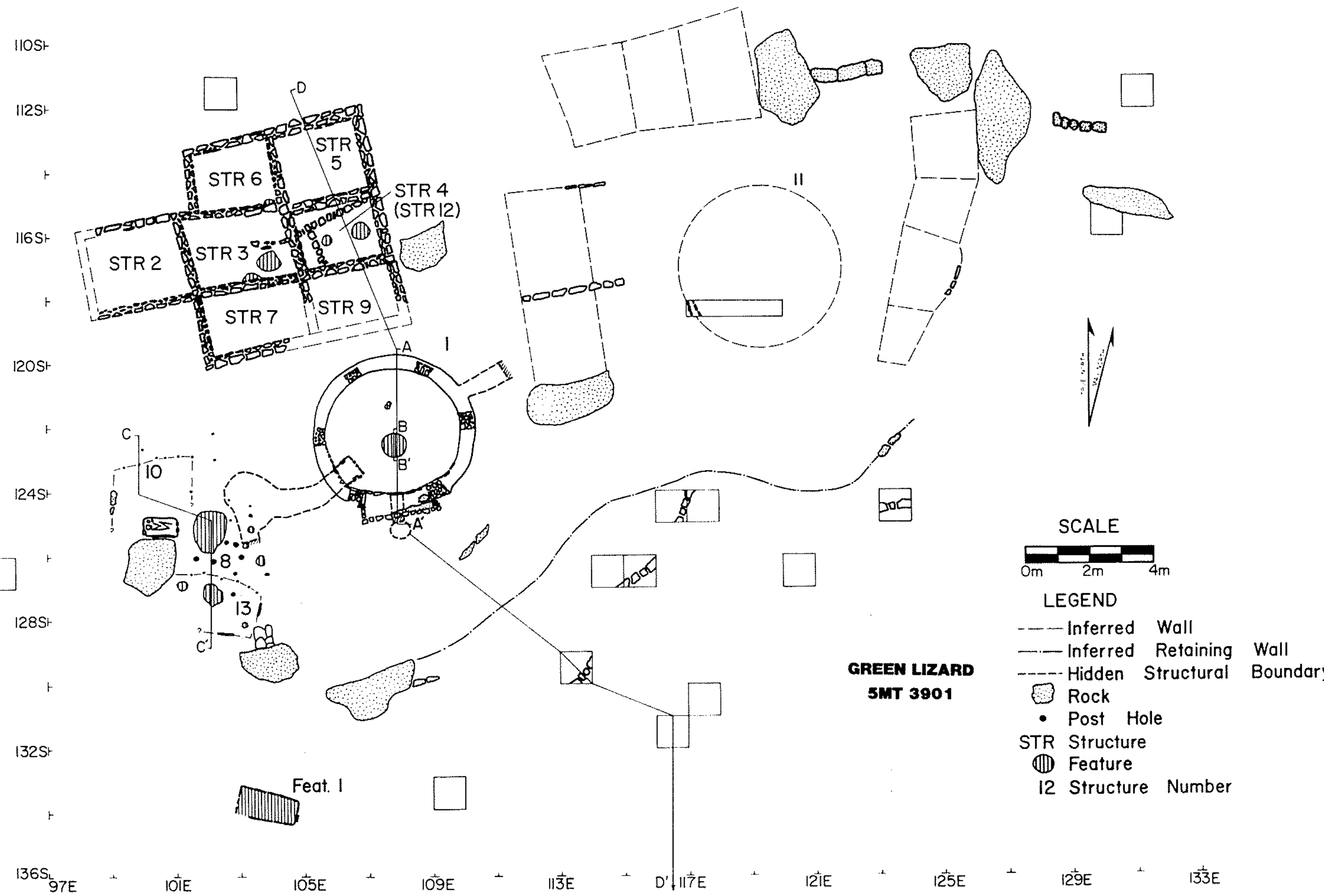



Figure 3.4: Green Lizard Plan.

approximately 2.5 m long, 30-40 cm wide and 25 cm in remaining height where exposed. Check dam 3 is discontinuous but its approximate course could be traced for a length of 8.1 m. As with the other check dams, only a single course of primarily sandstone blocks remains, with no evidence suggesting greater height in the past. Stones used in construction range from 25 to 40 cm wide and 15 to 20 cm high. Although check dam 3 also crossed a drainage, its course is sinuous and appears to conform to the slope contour perhaps indicating that it served for both run-off and erosion control. Check dams often have been found in association with Late Pueblo II and Pueblo III period sites and are commonly interpreted as a manifestation of some degree of agricultural intensification. Features similar to these at Green Lizard have been interpreted elsewhere as an indication of intensification (Rohn 1963; Lightfoot 1984).

### Stratum 1 Interpretations

Randomly selected excavation units in Sampling Stratum 1 reveal that most of the artifacts encountered on the surface west and southwest of the architectural area of the site resulted from natural depositional processes. Many of the artifacts recovered are in light sheet trash or were redeposited from secondary trash deposits overlying early-abandoned structures west of the excavated kiva suite. Few artifacts and no features were present in random units in the eastern portion of the site. It is possible that extramural features are present in this part of the site, but were not encountered. Feature 1 is an extramural feature that was visible on the surface. Colluviation, especially in the northern upslope portion of the site, could have obscured extramural features and activity areas, if present.

## EXCAVATIONS IN STRUCTURE 1 (PITSTRUCTURE)

The pitstructure (Structure 1) is similar in general form and internal characteristics to other Pueblo III kivas reported in the Mesa Verde region in that it possesses six masonry pilasters, a southern recess and a floor-level ventilator (Rohn 1977; Lipe 1989). However, it varies in some of the details of construction as described below. Its floor area of 14.2 $m^2$ is slightly larger than the mean floor area of 12.3 $m^2$ calculated for Pueblo III Mesa Verde region kivas (Lipe 1989: Table 1). The most notable structural characteristic of the kiva is its almost complete lack of masonry in the lower and upper walls, an unusual feature in a Pueblo III Anasazi pitstructure, a time when kivas with well-dressed masonry appear to have been the norm. A similar nonmasonry pitstructure dating to the Pueblo III period was found during test excavations at site 5MT 181 (Mad Dog Tower) in Lower Sand Canyon (Kuckelman et al. 1991:52-57).

Most of the lower wall consists of plastered sterile sediments rather than masonry. Aside from the six pilasters, masonry was restricted to the upper lining wall of the southern recess, and a partial masonry lining around the vent tunnel opening that extends on either side to Pilasters 1 and 6 (Figure 3.6). It is likely that masonry lining walls were necessary to stabilize these areas of the kiva when the builders encountered several boulders during excavation which could not be moved and were incorporated into its structural fabric. A section of one of these boulders intruding onto the floor of the kiva below Pilaster 6 was carefully pecked away to conform to the arc of the lower lining wall and floor.

Green Lizard is built on a sloping colluvial bench, and the builders used the natural slope to their advantage, as it required the removal of less sediment. However, the presence of several large boulders necessitated building up the southern recess in the pitstructure with masonry and an earthen berm, probably backed by dirt from the excavation of the pitstructure. This construction formed a level courtyard area stabilized by an outer retaining wall delimiting the courtyard and primary midden areas (Figure 3.4).

The pitstructure roof was supported by six masonry pilasters constructed of lightly shaped and pecked masonry blocks. Pilasters placed atop the bench surface were spaced relatively equidistantly around the circumference of the kiva. By convention, the pilasters were numbered 1 through 6, clockwise from the first pilaster west of the southern recess (Figure 3.6). Benches were subjected to a similar numbering scheme beginning with Bench 1 located between Pilasters 1 and 2. Kiva roof structure in the Mesa Verde region generally consisted of cribbed logs resting on the pilasters. It is assumed that the Green Lizard pitstructure was also roofed in this way.

## Masonry Construction

The masonry of the lining wall below Bench 6 is semi-coursed, consisting of irregular blocks and tabular sandstone, with the latter predominating. Shaping of stones in the lower lining wall is variable: 50 percent of the stones, mostly west of the vent tunnel, are pecked, the remainder are flaked or unshaped, none had been ground. Tabular stones west of the vent tunnel are generally large and most were pecked; tabular masonry on the east side of the vent tunnel is of smaller flaked stones that exhibit little pecking. The upper lining wall of the southern recess (Bench 6) is semi-coursed, single-stone masonry consisting of block, tabular and irregular sandstone. This wall is built upon a boulder in the western portion of the lining wall and is tied to Pilasters 1 and 6 to the west and east respectively. Pecked stone is found mostly in the basal two courses of the western wall. The majority of the stones in the upper lining wall are flaked or unshaped and exhibit little or no pecking.

Masonry construction of the six pilasters varies in the degree of shaping. In the majority of the pilasters, pecking is found on 30 to 50 percent of the stones on one of the three exposed pilaster faces. However, pecking is present on only 10 to 30 percent of the stones on Pilaster 6, while 80 to 90 percent of the stones in Pilaster 2 are pecked. None of the pilasters had blocks exhibiting ground faces or corners. The reason(s) for variability in degree of pecking of pilaster masonry is unclear. It may, however, indicate less emphasis on labor investment, and perhaps less formality of construction, than is the case in other Pueblo III pitstructures in the Mesa Verde Region. The fact that less effort was expended in shaping of masonry at Green Lizard kiva is consistent with the absence of masonry lining walls in most of the pitstructure. This could also reflect a less formal use of the structure and therefore signal a functional difference. Construction investment in the Green Lizard pitstructure contrasts sharply with masonry lined kivas at Sand Canyon Pueblo and elsewhere, where the majority of stones used in pilasters and lower lining walls were pecked and sometimes ground.

## Stratigraphy of the Pitstructure Fill

Kiva fill deposits indicate relatively rapid postabandonment colluviation. Three major depositional units were excavated – each composed of distinct strata described below (Table 3.3). These major depositional units were labeled 1 to 3 from top to bottom. The upper two units are of postabandonment and postoccupational origin. The lowest unit indicates the removal of the kiva roof beams at the time the structure was abandoned. Due to the Green Lizard's situation on a colluvial slope, postabandonment deposition was relatively rapid as indicated by thicknesses of depositional units 1 and 2 (Figure 3.5).

Natural Strata 1 through 4 comprised the latest depositional event, Unit 1, consisting of filling of the remaining kiva depression with dark brown silt, and some structural rubble and artifacts (Figure 3.5). The strong brown color, reflecting higher organic content, and finer compacted sediments in Unit 1, suggest increased plant growth within and at the margins of the pitstructure depression.

The boundary between Units 1 and 2 was characterized by a sharp change in sediment color from brown to red-brown. Unit 2 consisted of natural Strata 5-7 (Figure 3.5). Stratum 5 of Unit 2 was the thickest, and perhaps the most rapidly deposited stratum in the pitstructure. It was marked by large quantities of structural rubble and light red-brown, loamy colluvial sediments sloping steeply downwards toward the central and southern portions of the pitstructure. The fine sediments of Stratum 5 appeared to have accumulated with the structural rubble but extend well above the thickest rubble zone recording continued deposition after collapse of the masonry surface structures had stabilized. This deposit comprised roughly half of the pitstructure fill. The upper, generally rubble-free sediments of Stratum 5 derive primarily from colluvium washed over and around remnant portions of the northern roomblock.

The lower, rubble-laden portion of Stratum 5 was in near or direct contact with the floor in portions of the pitstructure, especially in its central and southern sections. The presence and position of several metate and mano fragments in this unit enable a brief reconstruction of the depositional sequence for this stratum. Subsequent to the dismantling of the pitstructure roof, courtyard surfaces and associated artifacts eroded into the pitstructure depression. This event may have preceded or occurred with the collapse of masonry surface structures. It appears to have been followed by erosion of floors and associated artifacts from Structures 7 and 9, and other areas immediately above or near the pitstructure depression (Figure 3.4). The presence of whole and fragmentary manos and metates in the southern portion of the pitstructure may derive from a mealing area associated either with Structures 7 or 9, or the plaza/courtyard area near the pitstructure depression. Several ground stone artifacts high in the fill, apparently originated in a mealing area in one of the collapsed Pueblo III rooms above the pitstructure. The locations of these artifacts indicate that the initial postabandonment deposition occurred in the northern part of the kiva, gradually filling from north to south, with the southern part of the pitstructure's floor and vent system filling last. A conglomerate metate was found in front of the vent tunnel opening and another thin slab metate was found north of it.

Table 3.3: Structure 1 Sediment Descriptions.

| Stratum No. | Depth below datum (m) [a] | Description |
|---|---|---|
| 1 | 96.00 - 95.60 | Organic surface sediments. Brown (7.5YR 5/2 to 5/4); friable, sandy silt loam; small pebbles and fine rootlets. |
| 2 | 95.59 - 95.20 | Combines 2a, 2b and 2c. Brown to dark brown (7.5YR 5/2 to 4/4); sandy silt with some clay; breaks into irregular peds in some areas (2a); abundant large sandstone chunks (wall fall) and small sandstone fragments; some charcoal, large roots. |
| 3 | 95.42 - 95.35 | Brown (7.5YR 5/4); sandy silty with clay; small to medium pebbles and sandstone fragments; small charcoal specks. |
| 4 | 95.34 - 95.12 | Brown to light brown (7.5YR 5/4 to 6/2); silty clay; infrequent small pebbles, cracks into irregular peds; small charcoal specks. |
| 5 | 95.25 - 94.00 | Brown to red brown (7.5YR 5/4 to 5YR 5/4); silty clay with some sand; small to large pebbles and sandstone; much wall fall rubble; large charcoal fragments and burned sandstone near bottom. |
| 6 | 96.95 - 94.80 | Light brown to brown (7.5YR 6/4 to 5/4); silty clay sand, small calcium carbonate coated pebbles; infrequent small charcoal. |
| 7 | 95.20 - 94.75 and 94.15 - 94.05 | Very dark brown to near black (7.5YR 3/2 to 2/0); present on bench some surfaces and overlying pitstructure floor; mostly decomposed vegetation; some ash present; some beam-impressed daub and wall fall rubble; artifacts intermixed. |
| 8 | 94.20 - 94.00 | Light brown (7.5YR 6/2 to 5/4); silty clay sand; structureless; numerous small (1-2 mm) multicolored angular clasts; similar to sterile sediments found elsewhere on site; roofing sediments collapsed into pitstructure as roof beams were removed. |
| 9 | 94.05 - 93.90 | Dark brown to very dark brown (7.5YR 4/2 to 3/2); fine, decomposed vegetal material; powdery consistence when dry; in contact with floor (Surface 1). |

a Measured at approximate pitstructure centerline.

The recovery of Pueblo II ceramics in pitstructure fill indicates that nearby areas containing Pueblo II deposits contributed as well. These include a partial Deadman's B/R seed jar (Vessel 24) and other sherd refits (henceforward termed SRs) from the same vessel (SRs 254 and 255), as well as a mineral and carbon painted portion of a Mancos B/W jar (SR 250). Pueblo II deposits associated with Structure 12 and an unnumbered room underlying Structure 3 are discussed below.

Strata 6 and 7 of depositional Unit 2, although different in color from Stratum 5, record similar postabandonment depositional events. Stratum 6 was a pale brown, graveley colluvium located above the benches and in part near the lower wall of the kiva. It was particularly noticeable in the northern half of the kiva where the builders had cut through more than a meter of sterile sediment. Stratum 6 thinned as it descended steeply towards the kiva floor. Structural rubble was present near the lower wall, and chunks of daub (some beam-impressed) were also present. Stratum 6 appears to have resulted from the erosion and slumping of the upper pitstructure wall. It was intermixed with Stratum 7, a layer of primarily decayed and naturally carbonized organic material, perhaps containing some ash, found on some bench surfaces. A thin layer of decomposed organic matter, similar in texture and composition to Stratum 7 was noted on top of the pilasters. The layer of organic material designated as Stratum 7 became diffuse within a few centimeters below bench level (Figure 3.5). Stratum 7 reappears or continues near the floor (Surface 1) of the pitstructure overlying Strata 8 and 9. Similar to the Stratum 7 deposits overlying the bench, it was also composed of naturally carbonized organic material, some of which may have been partially charred, as some ash was intermixed. This lower continuation of Stratum 7 occurred as a torus or ring adjacent to the lower pitstructure wall, where it was from 2 to 10 cm thick. Analysis of Stratum 7 from bench and near-floor contexts indicates that it is composed primarily of juniper twig ends, some sagebrush leaves and other small plant parts (K. Adams 1989). A number of point-located artifacts were recovered in this layer. Stratum 7 appears to record initial postabandonment deposition into the pitstructure after its roof had been removed. However, the possibility of some degree of roof erosion prior to dismantling, cannot be discounted.

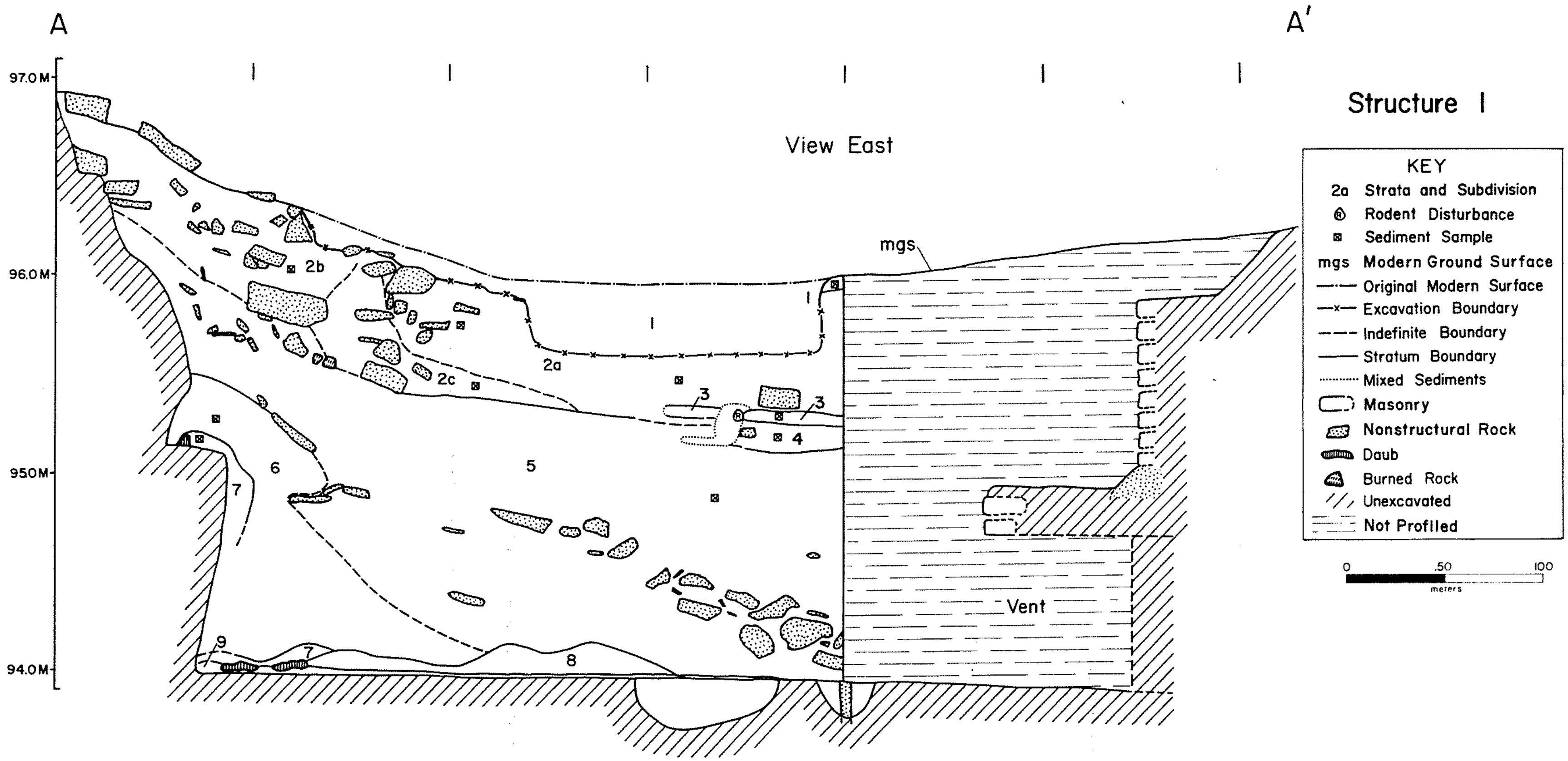



Figure 3.5: Structure 1 (Kiva) Stratigraphy.

Natural strata 8 and 9 constitute depositional Unit 3 - the initial depositional event in the fill sequence of the pitstructure – and mark events that occurred at or shortly after abandonment of Structure 1. I interpreted Stratum 8 as comprising roofing sediments that fell to the floor when the pitstructure roof was dismantled. Stratum 8 was pale brown with small (1 - 2 mm) angular clasts similar to those found in culturally sterile sediments encountered in excavations elsewhere in the site. It was discontinuous and irregularly distributed across floor and benches. It ranged from discrete chunks of adobe (many beam-impressed) near the lower wall and on the western benches, to thick layers in the north central and northeastern portions of the floor and on Bench 4 and 5, more so on Bench 5.

Stratum 9 of Unit 3 was a dark brown layer of fine, organic material mixed with ash. Near the lower lining wall, it was overlain and perhaps intermixed with Stratum 7. Stratum 9 was found in contact with the upper floor (Surface 1) and, in portions of the pitstructure was interspersed with the roofing daub of Stratum 8. Stratum 9 became increasingly indistinct toward the center and southern portions of the kiva where it appeared as a thin, powdery and discontinuous black layer. Many point-located artifacts in surface and near-surface contexts were present (Appendix A). Stratum 9 records activities associated with the final use of the pitstructure before removal of the roof.

Samples of organic material taken from Stratum 7 (and portions of Stratum 9, where intermixed with Stratum 7) in several pitstructure areas revealed a mix of economic and noneconomic plant remains dominated by juniper (*Juniperus osteosperma*) twig ends and some bark and a few sagebrush (*Artemisia tridentata*) leaves (K. Adams 1989). Economically useful seed and plant parts were also present in the samples and included saltbush (*Atriplex*), cactus (*Opuntia*), cheno-am (goosefoot/amaranth), squash (*Cucurbita*), beeweed (*Capparidaceae*), Indian rice grass (*Oryzopsis*), groundcherry (*Physalis*), nightshade and wolfberry (*Solonaceae*), yucca seeds (*Liliaceae*), and charred corn (*Zea mays*) cupules (K. Adams 1990, personal communication).

The depositional history of Stratum 7 is both problematic and intriguing. It is possible that the tens of thousands of juniper twig-ends and sagebrush leaves were remnants of closing material used in roofing the kiva. In this case the material may have been deposited in conjunction with dismantling the roof. It is unlikely that the builders intentionally selected only small juniper twig ends as a closing material without incorporating larger stems and branches. A sample of closing material from Kiva 3 at Hoy House contained both branches and twigs of pinyon, juniper, saltbush and squawbush (Nickens 1981:26). Alternatively, the material may have resulted from an abandonment-related ritual. Since the main beams in the kiva were removed for use elsewhere, this material might have been intentionally deposited in the kiva depression and partially burned as a substitute for roofing beams, perhaps in an abandonment ritual, thereby accounting for the presence of ash. Thompson et al. (1988:25) also have suggested that burned twigs found on bench and recess surfaces in a P III pitstructure at the Nancy Patterson site in southeastern Utah were intentionally placed to ignite roof timbers. At Green Lizard, however, charcoal from stems and branches of brushy vegetation was absent. Another explanation suggests that this organic material results from pack rat (*Neotoma spp.*) activities. Pack rat middens are characterized by large accumulations of vegetal material fused together by urine and feces. Since a number of rodent fecal pellets were found in analyzed samples, this possibility was explored. However, the accumulation lacked characteristics of a packrat nest (K. Adams 1989; P.J. Mehringer, Jr., 1989, personal communication). Moreover, fecal pellets, although present, were few and confined to the western area of the kiva in the vicinity of a known rodent-disturbed area below Pilaster 2, and on the surface of Bench 2. Wood rats undoubtedly visited the pitstructure after abandonment, but are unlikely to have been responsible for deposition of the vegetal mat in the kiva.

A more plausible interpretation, and the one favored here, hinges on the observation that the vegetal mat found in the kiva closely resembles woodland duff accumulations found beneath modern juniper trees. Since junipers are common to the slopes surrounding Green Lizard, the presence of this vegetal mat probably resulted from post-abandonment slope-wash and wind deposition into the kiva depression. Deposition of the vegetal layer might have been coincident with roof deterioration and subsequent roof dismantling, or occurred after dismantling of the roof, coincident with abandonment. However, this interpretation is not without its difficulties. It is troubling that other juniper plant parts common in modern duff accumulations such as seeds, cones, and larger twigs are absent from the several samples of this material analyzed.

Whatever the formation processes involved, Stratum 7 was deposited before significant deterioration of the masonry roomblock occurred. The presence of economic plant parts in this vegetal mat, including charred corn cupules, may result either from deposition into the pitstructure depression after the roof had been dismantled, or through activities resulting in the deposition of both the vegetal mat and economic plant parts within the pitstructure prior to its roof being dismantled. I conclude that the former is more probable than the latter.

In summary, I recognized three major depositional units. Deposition of Unit 3 has been linked to activities occurring prior to or soon after abandonment, including the deroofing of the pitstructure. This unit contained organic and inorganic deposits from dismantling of the roof, either as part of an abandonment process, or resulting from partial collapse of the roof through lack of maintenance and subsequent removal of roof beams after some period of abandonment. The second major unit (Unit 2) consisted of the rapid deposition of rubble derived from the natural or intentional collapse of the masonry rooms to the north and east of the pitstructure depression, and colluvium. The final depositional event (Unit 3) consisted of continued postabandonment colluviation.

## Structure 1 Features

Thirty-nine features were recorded in the pitstructure. These included 6 bench segments and pilasters, the ventilation system, 2 tunnels, 17 floor features associated with two distinct floors, and 7 niche features found in the lower wall. Table 3.4 summarizes feature data. Abandonment/use contexts of these features clearly demonstrate occurrence of at least one major remodeling event in the use-history of the pitstructure.

The bench was constructed by excavating the required shape and plastering with a fine red-brown silty-clay. With the exception of the inner rim of Bench 1 and Bench 6 (southern recess) no masonry was used in bench construction. Individual benches were fairly uniform in size and width. Average distance between bench-facing corners of pilasters for Benches 1 through 4 is 159 cm, but was greater for Benches 5 and 6 (185 cm and 190 cm respectively). Bench depth ranged from 80 cm for Bench 6, to 41 cm for Bench 2. Benches 2, 3 and 5 were the narrowest, averaging 42 cm in depth. Benches 1 (48 cm) and 4 (46 cm) were deeper than benches 2, 3, and 5. Their greater depth may be related to the presence of tunnels below Bench 1 and above Bench 4. The height of all bench segments measured at midline of bench surfaces to the floor averages about 96 cm. An interesting aspect of bench construction, excepting Bench 6, is that bench surfaces slope downward and inward relative to the kiva floor. Slumpage was present on some benches, but was evident and confined to a few centimeters of inner bench margins. Slumping is not considered a reasonable explanation for the observed bench surface inflection, which ranged from approximately 6.5 degrees at Bench 1 to 15 degrees in the central portion of Bench 4. Here, the pronounced slope is perhaps associated with access to Tunnel 2 (Feature 10). Bench inflection may in some way be related to projecting roof load force vectors outwards, but aside from areas beneath pilasters, benches generally are not considered to be load-bearing structures (Bradley 1986).

The six masonry pilasters (Features 23-28) in the pitstructure ranged from 48 to 54 cm tall (averaging 50 cm). Only the upper, inward-facing courses of Pilaster 6 had collapsed. Pilasters 1 and 6 defined the eastern and western margins of the southern recess (Feature 1, Bench 6). Both were tied to the masonry upper lining wall of the southern recess. With the exception of Pilasters 1 and 6, the length and width of the pilasters were also relatively uniform. The five complete pilasters leaned inwards toward the center of the pitstructure, and tended to be slightly wider at the base than at the top. This was apparently intentional on the part of the builders. Bradley (1987) has suggested that the inflection and the shape of the pilasters may have served to project kiva roof load vectors outwards for above ground kivas at Sand Canyon Pueblo. The builders of Green

Table 3.4: Structure 1 Features.

| Ft. No. | Feature Type/ Description | L (cm) | W (cm) | D/H (cm) | Fill Type | Abandonment Context |
|---|---|---|---|---|---|---|
| 1 | Bench 6 (South Recess) | 190 | 80 | 93 H | post-occ. | in use |
| 2 | Bench 1 [a] | 158 | 48 | 96 H | post-occ. | in use |
| 3 | Bench 2 [a] | 160 | 41 | 87 H | post-occ. | in use |
| 4 | Bench 3 [a] | 160 | 42 | 101 H | post-occ. | in use |
| 5 | Ventilator tunnel | 86[b] | 40 | 64 H | post-occ. | in use |
| 6 | Tunnel 1 (Opening)[c] | 65 | 53 | 59 D[d] | complex | in use |
| | Passage (to Subter. room)[e] | 240 | 70 | 70 | open/post-occ. | in use |
| | Subterranean room [e, h] | 184 | 180 | 90 | open/post-occ. | in use |
| | Passage (from Subter. room)[e] | 50 | 60 | --- | open/post-occ. | in use |
| 8 | Bench 4 [a] | 158 | 46 | 102 H | post-occ. | in use |
| 9 | Bench 5 [a] | 185 | 44 | 96 H | post-occ. | in use |
| 10 | Tunnel 2 [b] | 140 | 49 | 50 H | complex | in use |
| 11 | Hearth | 78 | 77 | 26 | ash/charcoal | in use |
| 12 | Niche | 20 | 12 | 8 H | post-occ. | in use |
| 13 | Niche | 15 | 30/35[f] | 15 H | post-occ. | in use |
| 14 | Niche | 8 | 14 | 12 H | post-occ. | in use |
| 15 | Niche | 14 | 21 | 20 H | post-occ. | in use |
| 16 | Niche | 19 | 25 | 20 H | post-occ | in use |
| 17 | Bell-shaped pit | 42 | 39/44[f] | 39 | complex | in use |
| 18 | Ash pit/ deflector socket | 74 | 38 | 19 | ash/charcoal | in use |
| 19 | Bell-shaped pit | 35 | 35/48[f] | 20 | complex | sealed |
| 20 | Cylindrical pit | 8 | 8 | 12 | sandy loam | unclear |
| 21 | Cylindrical pit | 8 | 9 | 20 | sandy loam | unclear |
| 22 | Basin-shaped pit | 8 | 8 | 4 | sand | sealed |
| 23 | Pilaster 1 [g] | 49 | 51 | 48 | --- | in use |
| 24 | Pilaster 2 [g] | 51 | 33 | 48 | --- | in use |
| 25 | Pilaster 3 [g] | 51 | 34 | 50 | --- | in use |
| 26 | Pilaster 4 [g] | 57 | 33 | 49 | --- | in use |
| 27 | Pilaster 5 [g] | 58 | 44 | 51 | --- | in use |
| 28 | Pilaster 6 [g] | 50 | 64 | 54 | --- | in use |
| 29 | Rounded wall cist | 47/73[f] | 57/80[f] | 66 | post-occ. | in use |
| 30 | Niche | 38 | 32 | 29 H | post-occ. | in use |
| 32 | Sipapu | 13 | 13 | 18 | sandy clay | sealed |
| 33 | Sipapu | 14 | 14 | 10 | sandy clay | sealed |
| 34 | Basin-shaped pit | 43 | 40 | 5 | sandy clay | sealed |
| 35 | Bell-shaped pit | 34 | 29/37[f] | 36 | complex | sealed |
| 36 | Basin-shaped pit | 14 | 14 | 3 | ash/sandy clay | sealed |
| 37 | Oblong basin-shaped pit | 37 | 13 | 10 | sandy clay | sealed |
| 38 | Basin-shaped pit | 12 | 12 | 6 | ash/sandy clay | sealed |
| 39 | Basin-shaped pit | 17 | 17 | 10 | sandy clay | sealed |
| 40 | Basin-shaped pit | 8 | 8 | 4 | sandy clay | sealed |
| 41 | Basin-shaped pit | 6 | 6 | 3 | sandy clay | sealed |

[a] These measurements are averages. Measurements for individual benches are inconsistent due to varying bench surface slopes and variability in original excavation. Height measurements were from center of bench surface to kiva floor. [b] Excavated dimensions. [c] Dimensions for tunnel opening at kiva floor . [d] Below kiva floor. [e] Measurements are averages. [f] First measurement is the maximum size of the feature opening; second is the maximum internal dimension of the feature. [g] Pilaster measurements reflect the largest dimension. Pilasters are generally narrower on the inner-facing side than on the outer-facing side. [h] Room is rounded in plan.

Lizard kiva might also have applied this principle either indirectly, as a cultural norm related to the construction of Pueblo III kivas in the region, or directly to alleviate roof load forces.

## Wall Features

All but one of the features discussed in this section were niches located in the lower pitstructure wall. Niches are also known to occur in upper lining walls and elsewhere (Rohn 1971:74). Six of the seven wall features in the kiva lower lining wall were small niches assumed to have had a ritual function (Roberts 1931; Brew 1946; Rohn 1971; Cattanach 1980). The seventh wall feature was a large, rounded cist (Feature 29) located below Bench 2. Similar lower-lining wall cists in Pueblo III kivas have been found at Sun Point Pueblo at Mesa Verde National Park and at Site 42 in the La Plata District (Lancaster and Van Cleave 1954; Morris 1939:113-115). Similar features are present in Structures 501 and 1004 (kivas) at Sand Canyon Pueblo, but their openings are at the juncture of bench and upper lining wall (Kleidon and Bradley 1989; Bradley 1990). Such features are relatively rare in Pueblo III kivas of the Mesa Verde region.

Feature 29 was excavated into sterile sediments in the lower lining wall below the northwestern bench (Bench 2). The lower portion of the opening is rounded, and a lip extends for several cm in a shallow arc from the juncture of floor and lower lining wall onto the kiva floor for several centimeters. I believe that Feature 29 was a storage bin. Feature fill consisted of decayed organic matter and postabandonment sediments. Numerous squash (*Cucurbita moschata*) seeds, a beeweed (*Cleome sp.)* seed, corn (*Zea mays*) cupules and a charred cob fragment were recovered from feature fill flotation samples suggesting that these might have been stored in the feature. The presence of juniper twig ends and sagebrush leaf fragments in the fill also indicate that the feature was open at abandonment. The possibility that some or all of the plant remains in the feature's fill might result from abandonment and/or postabandonment activities rather than storage within the feature cannot be discounted. Economic plant parts might have been brought into the kiva by rodents and deposited both within the feature and in Stratum 9 as indicated by a rodent disturbance area and rodent fecal pellets in Stratum 9 nearby, and on Bench 2. The rodents may have acquired the seeds from discarded plant remains. However, despite these uncertainties, a storage function is favored.

A mixture of charred wood also was recovered from the fill of Feature 29, including *Amelanchier*, *Ephedra*, *Artemisia*, *Juniperus*, *Pinus*, *Cercocarpus*, and *Purshia/Cowania*. Artifacts and ecofacts found in the fill of Feature 29, but not in direct functional association, include two turkey bone awls, another indeterminate large avian bone and a ground squirrel jaw fragment (*Spermophilus sp*). In summary, the function of this feature probably was storage, but the original fill contents may have been intermixed with postabandonment deposits rendering interpretation of original feature function and origin of the artifacts in the feature, uncertain.

Niches

At abandonment six niches localized in the northern and eastern quadrants of the kiva, were open and available for use. All were excavated into sterile sediments, and the resulting cavities plastered with fine red-brown silty-clay. The niches were of varied size and shape; several possessed rounded openings and one (Feature 30) was irregular. Because they contained postabandonment fill, all appeared to have been available for use at abandonment. No artifacts were found in direct association with the niches with the possible exception of Feature 30. Three of the features (Features 15, 16 and 30 ) were located at the juncture of floor and lower lining wall and opened onto the pitstructure floor. Two of the niches (Features 13 and 15) are stacked atop one another below Pilaster 4. Similar niche placement occurred in Structure 108 at Sand Canyon Pueblo, and in a late Pueblo III pitstructure (Kiva C) at Mug House (Rohn 1971:75; Bradley 1986). Double niches in kivas also are reported at Long House (Cattanach 1980).

Feature 12 was located below Bench 3 midway between floor and bench. It was slightly west of the traditional northern niche axis of vent opening, hearth and sipapu. Feature 13 was plastered and wider than it was high, and its interior was wider than its opening. It was located below Pilaster 4 just below the floor/bench midline and 8 centimeters above Feature 15. Feature 15, immediately below Feature 13, opened onto the pitstructure floor (Surface 1). It was round and well-plastered. Feature 16 also opened onto the pitstructure floor (Surface 1) and was located 25 cm west of Feature 15, below the northern bench (Bench 3). The opening of Feature 16 was a semicircle with the lower half of the circle flattened where it opened smoothly onto the floor (Surface 1).

Feature 30 was located beneath Bench 5. When viewed directly, the sides of the opening were parallel and slanted to the right at some 25-30 degrees from the vertical. The upper boundary of the feature was indistinct due to erosion, and the inner boundaries are irregular. The floor of the feature was plastered and blended smoothly with the pitstructure floor (Surface 1). However, the inner walls either were not plastered, or the plaster had been eroded. The feature contained a corrugated sherd, two flake fragments, one complete turkey bone awl and one fragmentary bone awl from a turkey-sized bird as well as three other turkey or probable turkey bones (Figure 3.8; Appendix A). The turkey bone awl was recovered from the floor of the feature and the others were associated with postabandonment feature fill in near-floor context.

Finally, Feature 13 was irregular in plan, heavily eroded, and located in the lower lining wall below Bench 4 at the approximate midline between floor and bench. Its original depth was uncertain as the lower wall surface had been eroded. Although little of the side walls of the feature remain, the back of the feature was plastered in a shallow, rounded shape.

Various interpretations, most stemming from ethnographic observation, have been advanced to suggest that niches were used to store ritual or other objects, or had ceremonial significance themselves (Brew 1946:213; Rohn 1971:75). Some of the various kinds of artifacts found in prehistoric kiva niches may have had special ritual or ceremonial significance. However, niche function in Pueblo III pitstructures is poorly defined; evidence from Green Lizard sheds no light on the matter. However, recent excavations in Structure 501, a kiva at Sand Canyon Pueblo, contained rare items (bifaces and small, painted rectangular ceramic boxes) within niches (Kleidon and Bradley 1989). The presence of these artifacts appears related to the intentional abandonment of the kiva and the site. These artifacts have been interpreted as having ritual and/or ceremonial associations, thereby lending strength to the inference that niches in some Pueblo III pitstructures had ritual and ceremonial significance (Kleidon and Bradley 1989).

## Floor Features

Fifteen floor features were associated with one of two plastered floors (Surface 1 and 2). The hearth (Feature 11) and the ashpit (Feature 18) were associated with both (Figure 3.6). The floors were numbered in the order of encounter. The earlier floor (Surface 2) consists of a thin layer of red-brown ashy plaster over sterile sediments. Eleven features – 19, and 32 - 41 – were associated only with this surface. These features appear to have been filled and sealed when Surface 1 was created. Surface 1 consisted of a 1-3 centimeter thick replastering with similar red-brown sediments with ash as in Surface 2. Two features, Feature 20 and 21, are associated only with Surface 1. Feature 17 also appears to be associated with Surface 1, but its fill was complex and apparently intentional, suggesting that it was probably no longer in use at abandonment. Feature 22 was capped with daub, but the seal over the feature was visible when Surface 1 was exposed. It is assumed that since it was visible, it was probably associated with Surface 1, but had been sealed some time prior to abandonment.

The distribution and shape of features associated with each floor is interesting. Features associated with Surface 2 are located predominantly in the western and northern portions of the pitstructure. Two of these are superimposed "sipapus." Surface 1 features, on the other hand, are restricted to the eastern half of the kiva and do not include a formal sipapu (Figure 3.6; Table 3.4). Below, I present a discussion of the potential significance of these differences in relation to kiva function.

### Surface 1 Floor Features

Feature 11 is a rounded, deep hearth and Feature 18 is an associated ash-filled pit to its south. Both are associated with Surface 1, and are believed to have been associated with Surface 2 as well. A thin layer of ash containing a few charcoal chunks filled the presumed ashpit and

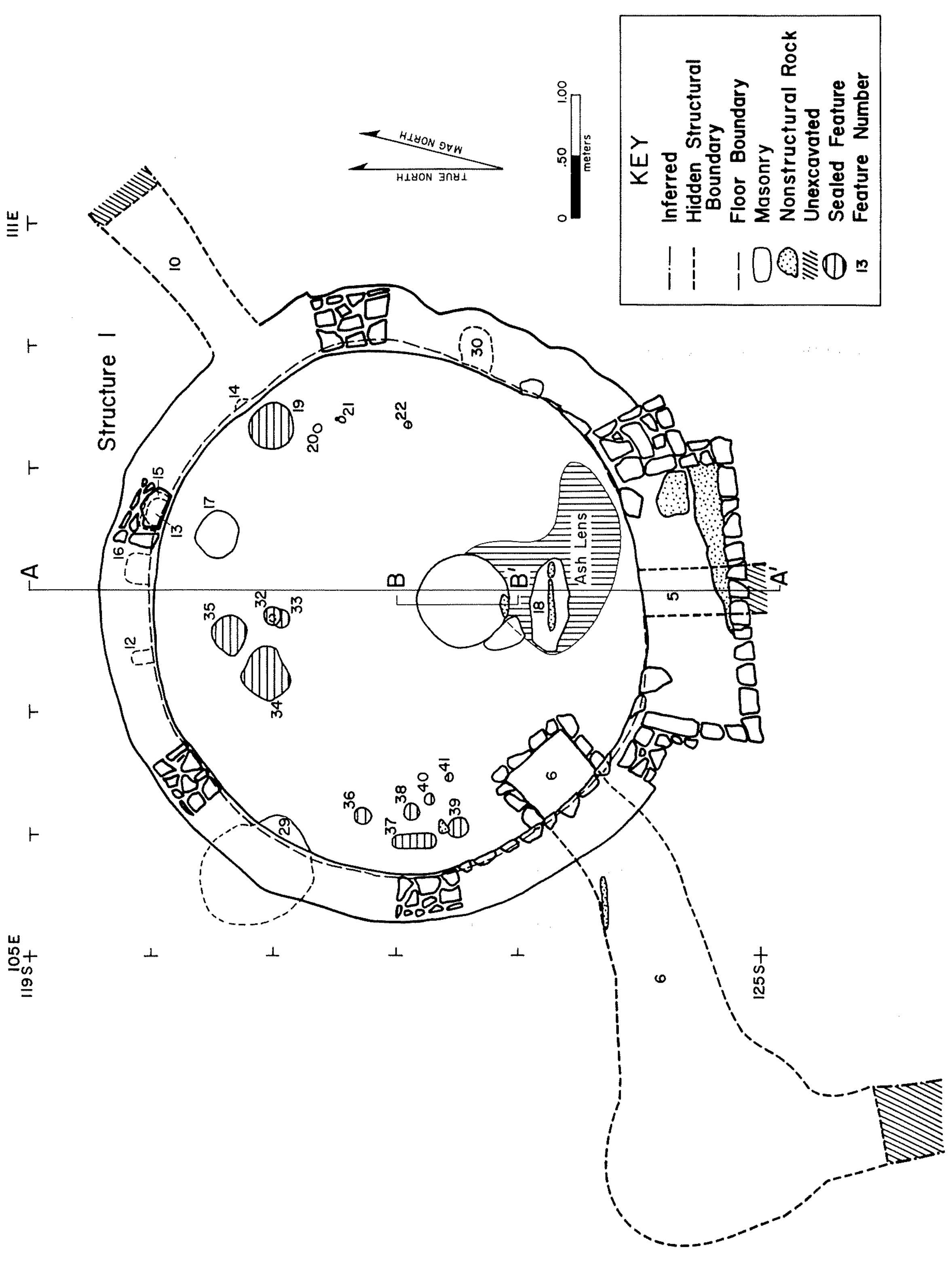



Figure 3.6: Structure 1 Floor Features.

covered portions of the floor to the west and south as well. The hearth is round in plan and a steep-sided basin in profile (Figure 3.7). The eastern portion of the hearth was slightly deeper than the western portion. A small, heavily oxidized piece of sandstone was incorporated into the southern rim of the hearth. The hearth lacked a raised clay coping. Its rim was flush with Surface1 and had an oxidation rind from which we collected archaeomagnetic samples (Table 3.5). Adjacent to the southwest rim of the hearth was a shallow depression, triangular in plan and approximately 3 cm deep, 35 cm long, and 20 cm wide. It appears to have been added to the existing hearth at some point after Surface 1 was created, suggesting that the hearth had been remodeled. This ancillary feature was well oxidized, contained ash and is interpreted as having served as a secondary warming or cooking area.

Hearth fill consisted of two distinct layers capped by abandonment and postabandonment roof debris and wall fall rubble (Figure 3.7). The western portion of the hearth was excavated as a single unit, while the eastern half was excavated by natural strata. The upper fill unit, Stratum 1, consisted of 8-9 cm of daub, sandy silt, charcoal fragments, and ash. A large charcoal fragment of juniper wood some 10 cm in diameter (PL# 203) was found on the floor southeast of the hearth in association with an ash lens (Appendix A). It is likely that this large charred wood fragment and associated ash lens resulted, at least in part, from roofing and other structural debris falling into the hearth and displacing some of its contents, perhaps coincident with dismantling of the pitstructure roof. It is also possible that the hearth and pitstructure filled with water after the structure had been abandoned and this large wood fragment and other smaller fragments and ash floated free. Several heavily oxidized pieces of sandstone were present in the hearth and may have served as vessel supports (fire-dogs). Hearth Stratum 2 consisted of some 12-15 cm of highly compacted light gray ash. A few charcoal fragments were found at the margins of the hearth in the upper part of the stratum. Stratum 2 spilled over the southern margin of the hearth onto the pitstructure floor. Also present were a few small pieces of burned sandstone, burned daub, and considerable amounts of chipped stone and fragmentary, calcined bone.

Feature 18 was located 10 cm south of the hearth. Its last use is inferred to have been for ash deposition. It was roughly triangular in plan with its long axis oriented east-west, and was "V" shaped in profile. The margins of the feature do not appear to have been oxidized. A single stratum consisting of ash, charcoal pieces and artifacts filled the feature. A thin upright sandstone slab fragment was found in the center of Feature 18 along with a piece of sandstone wedged against the eastern, lower margin of the slab. Although the feature was full of ash, it is likely that a shaped sandstone deflector slab (found leaning against the lower pitstructure wall below Pilaster 6) had been present in Feature 18 prior to its final use as a receptacle for ash.

Slab deflectors in other Pueblo III Mesa Verde region pitstructures tend to be socketed directly into floors and are sometimes supported by additional smaller slabs (O'Bryan 1950; Cattanach 1980; Lister 1968; Rohn 1971; Kleidon and Bradley 1989; Thompson et al. 1988). Kiva I at Long House provides an example of a displaced slab deflector recovered on the floor of the kiva. An oval pit, similar in size and depth to that at Green Lizard, is present immediately south of the hearth (Cattanach 1980:77, Figure 74). The slab within this feature may also be a remnant of the deflector slab support. So, it is likely that the deflector in the Green Lizard kiva was removed from its original position between the hearth and the ventilator tunnel opening some time prior to abandonment of the structure. Activities involving use of the hearth and reuse of the deflector socket as an ash pit continued until the structure was finally abandoned and the roof dismantled.

Hearth and Ashpit Discussion. The presence of artifacts in the hearth fill indicates that trash-generating activities occurred in the pitstructure. At least some of these artifacts were deposited in the hearth while the pitstructure was still in use. The presence of ash and artifacts in the pit where the deflector had been placed indicates that use of both hearth and ashpit occurred after the deflector had been removed since both hearth and ashpit contained undisturbed ash deposits. If the deflector was displaced as part of an abandonment process, then the presence of ash and artifacts in the deflector socket raises the possibility of reuse of the structure after some period of abandonment.

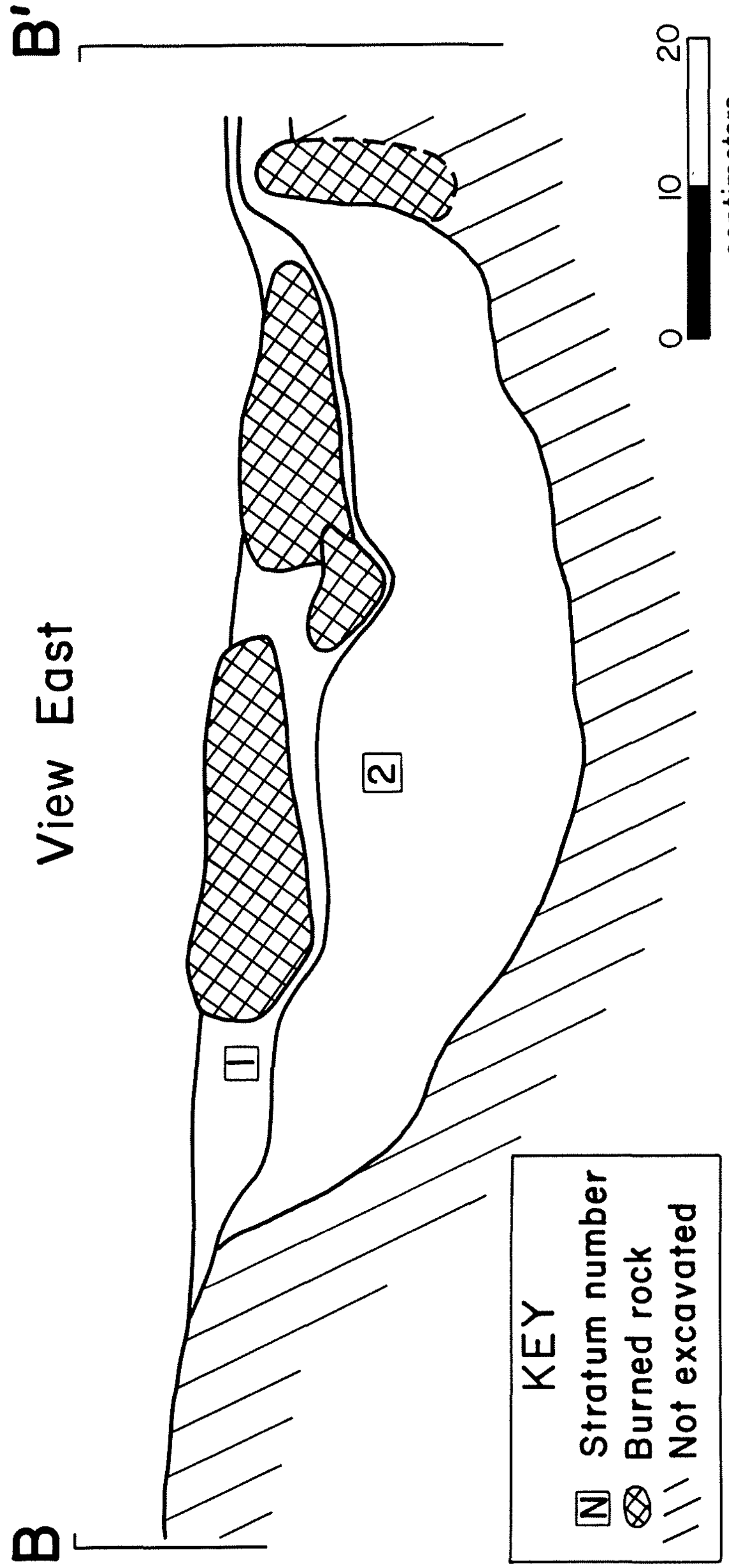



Figure 3.7: Structure 1 Hearth Profile.

Although it cannot be demonstrated that intentional displacement of the deflector constituted part of an abandonment process, continued use of the hearth after removal of the deflector may have resulted in direct drafts on the fire, perhaps blowing ash from the hearth and ashpit, as well as potentially impairing the efficiency of the hearth for cooking and heating. In any case, it is clear that the kiva was used after the removal of the deflector.

Remains in hearth fill include 5 sherds, 95 pieces of flaked stone debitage, one fragmentary sandstone abrader, 210 mostly fragmentary animal bones, including 16 small rodent bones, 3 large avian bones and 2 wood rat (*Neotoma sp.*) molars. All but one of the 224 bones recovered were burned. K. Adams (1989) reports that probable fuel woods recovered from hearth flotation samples include juniper (*Juniperus*), Mormon tea (*Ephedra*), pine (*Pinus*), serviceberry (*Amelanchier*), mountain mahogany (*Cercocarpus*), squawapple (*Peraphyllum*) and sagebrush (*Artemisia*). The eastern half of hearth Stratum 1 contained a single corrugated jar sherd and a fragmentary sandstone abrader. By contrast, the eastern half of Stratum 2 contained 3 sherds, 76 pieces of debitage, and 150 pieces of fragmentary burned bone. The western half of the hearth was excavated as a single unit and contained 1 sherd, 19 pieces of debitage and 74 pieces of bone, mostly burned. The majority of these artifacts probably originated in Stratum 2. The deflector socket contained six sherds, among them 3 Pueblo III whitewares, 10 pieces of chipped stone, one modified flake, 2 cores, 1 peckingstone, 1 two-hand mano fragment reused as an abrader, 1 sandstone abrader and 1 turkey bone awl.

The presence of large amounts of debitage of mostly local stone in the lower hearth stratum suggests that these materials were the byproduct of stone tool manufacture and/or maintenance in the structure, which was subsequently collected and discarded in the hearth. An informal technological analysis of the material indicates that most consisted of utilized flakes, small flakes and fragments, and shatter. One flake fragment exhibited bifacial retouch and may have been a broken projectile point preform. A small number of bifacial thinning and small pressure flakes were present. Overall it appears that the material represents primarily discarded flakes and fragments used as expedient tools as well as the byproducts of stone tool repair and maintenance and perhaps limited manufacture.

The burned, fragmentary bone in the same stratum suggests that one or more meals were perhaps prepared, but certainly consumed in the pitstructure, with the remnants discarded in the hearth. The presence of additional debitage, cores and a peckingstone in the ash pit tend to enhance the inference of limited stone tool manufacture and/or maintenance in the pitstructure. Still unanswered, however, is the question of whether these reflect the range of activities occurring in the pitstructure on a daily basis prior to abandonment; reflect only immediate preabandonment behaviors which perhaps differed from normal daily activities; or reflect abandonment period reuse of the structure.

Hearth and Ashpit Dating: Archaeomagnetic samples from the oxidized rim of the hearth and warming area yielded two potential age ranges of A.D. 1015 to 1125 and A.D. 1125 to 1300. The latter date fits the tree-ring and high precision C-14 ages best. Several samples of fuel wood from the hearth and ashpit were submitted for tree-ring dating. Two samples from the hearth yielded dates of A.D. 1118 vv and 1105 vv. However, three samples from the ashpit and PL# 203 found on the floor near the hearth were dated A.D. 1123 +vv, 1145 vv, 1154 +vv and 1141 +vv, respectively. Ahlstrom (1985:609) has suggested that fuel wood dates are commonly in error by 50 to 100 years due to use of old wood and combustion of outer rings during burning. This cluster may therefore date anywhere from the late A.D. 1100s to the mid A.D. 1200s. The range is consistent with the date midpoint and range of the corrected and calibrated high precision radiocarbon date of A.D. 1219 - (1259) - 1299 at one standard deviation, derived from postabandonment organic samples of Stratum 7/9 (Table 3.5).

Floor Cist. Feature 17 is a round, slightly "belled" floor pit in the northern half of the structure. Three distinct strata were recorded. Stratum 1, the uppermost, possesses an upper substratum of unburned vegetation similar in nature and probable origin to the vegetation mat in the rest of the structure (Stratum 9). The remainder of Stratum 1 consists primarily of unburned daub, a finding consistent with debris resulting from dismantling of the roof. Though artifacts were absent, the cist held botanical remains of sagebrush, hundreds of juniper twig ends and a single cheno-am seed. Stratum 2 possessed a sharply defined boundary with Stratum 1 above, and Stratum 3 below. It was a 6 - 7 cm thick layer of intermixed ash, charcoal and unburned daub. A single corrugated grayware jar sherd was the only artifact. Stratum 2 also contained a fragment of human cranium identified as a neonate frontal bone with an eroded outer table (Kice 1991; Katzenberg 1992). Its position within the feature crossed the boundary between Strata 1 and 2. Botanical remains from this stratum consist of numerous juniper twig ends. The fill and juniper twigs suggest to me that this stratum resulted from cultural deposition into the feature prior to abandonment in addition to abandonment-related debris from roof dismantling activities recorded in Stratum 1. The presence of a human cranial fragment may also indicate that deposition of Stratum 2 coincided with activities related to structure and/or site abandonment. Stratum 3, the lower fill unit, consisted of loose, uncompacted light brown sandy sediments containing caliche particles and some unburned daub and charcoal. Three pieces of debitage were recovered from this stratum. Plant and animal remains were lacking. This stratum consisted of sediments and artifacts probably resulting from deposition related to intentional filling. Although this feature's function is tentatively interpreted as storage – based primarily on form – lack of botanical or other more concrete data limits the strength of the inference.

Other Features. Features 20 and 21 are small cylindrical pits aligned approximately north-south with each other and with Feature 22, a small basin-shaped pit located in the eastern half of the pitstructure. The features are round and approximately 8 cm in diameter. Artifacts were not recovered in association with any of these features. Feature 20 is 12 cm deep and contained fine sandy red-brown loam with some charcoal flecks. Feature 21 is 20 cm deep and was intentionally filled with a homogeneous deposit of gray sandy loam containing ash. Associated with Feature 21, adjacent to its northern margin was a small, cylindrical hole 2 cm in diameter and approximately 10 cm deep. Fill was similar to that of Feature 21. It too was sealed with plaster.

Feature 22 is 4 cm deep and contained clean yellow sand. After these features had been intentionally filled, they were capped with a thin layer of floor plaster. It is unclear how these features functioned, but the two deeper features might have served as socketing or post holes. Features 20, and 21, especially the latter with its secondary hole, resembles a class of features which have been called loom anchor holes (Mindeleff 1891; Rohn 1971; Cattanach 1980), but additional evidence to support this inference, such as subsurface anchoring stones, was lacking. Feature 22 might have served as a rest for a round-bottomed vessel, but such features are more commonly found in pitstructures of an earlier period. The fact that these features had been plastered over indicates that they were not in use when the structure was abandoned.

Surface 2 Floor Features

Features 19 and 35 are round, bell-shaped pit features in the northern half of the pitstructure, similar in size and inferred function to Feature 17 associated with Surface 1. Features 19 and 35, however, had been intentionally filled and plastered over. Three distinct strata were recorded in Feature 19. The feature was sealed by a thin layer of adobe overlying Stratum 1. Stratum 1 was composed of large and small sandstone rubble, chunks of unburned daub, ash and sand. Two pieces of debitage and a sandstone abrader were recovered. Botanical and faunal remains were absent. Stratum 2 consisted of a layer of ash, and small oxidized sandstone fragments. It contained 1 corrugated jar sherd and 1 flake. This stratum also contained 8 charred corn cupules. The association of charred corn cupules and ash mixed with burned sandstone fragments suggests that this stratum consisted of redeposited hearth material and does not reflect feature function. Stratum 3, the lowest fill unit, also contained sandstone rubble, some of it oxidized, in a matrix of red-brown sandy loam with occasional charcoal flecks. The lowest portion of Stratum 3 differs in character consisting of a thin, discontinuous layer of unburned daub. Stratum 3 contained the greatest number of artifacts and ecofacts: 6 sherds, 5 flakes, 2 modified flakes, and 1 complete pendant of gypsum or calcite. Two unburned bones of a turkey-sized bird and a cottontail rabbit were also recovered in addition to charred cheno-am and groundcherry seeds. With remodeling of the pitstructure and resurfacing of the floor, it appears that it had been filled with refuse prior to being sealed. All three strata record the pit's use as a convenient repository for trash and hearth sediments and subsequent abandonment and sealing after filling. Based solely on the feature's morphological characteristics, it may originally have been used for storage.

Feature 35 is also similar to Features 17 and 19 in location and construction. The fill of Feature 35 is characterized by stream-worn gravels and sandstone rubble intermixed with a red-brown sandy loam. The rubble layer comprises all but the lowest 10 cm of feature fill, which contains a 5 cm stratum of clean red-brown sand followed by a 5 cm layer of clean ash. No artifacts were recovered from this feature, and botanical sample data were not analyzed. The ash and red-brown sand layers may have resulted from use of the feature as a convenient dumping place, or from activities associated with its use. Alternatively, the ash layer might have resulted from intentional deposition, and the red-brown sandy layer may have been a byproduct of replastering the floor of the pitsructure. In this case, the feature might still have been available for use after reflooring, and then intentionally filled and capped later. In any case, it is clear that the feature was filled with rubble and plastered over. A storage function is inferred for this feature based on form, as with Features 17 and 19.

Sipapus. Based on size, shape and location, Features 32 and 33 are inferred to have functioned as sipapus. Both are associated with Surface 2 and both were intentionally filled with clean, red sandy clay covered by a layer of floor plaster. Truncation of Feature 33 by Feature 32 indicates that Feature 33 is earlier. Feature 33 did not contain a jar neck as is often found lining Pueblo III sipapus. The fill sequence of this feature is not complex and consisted of a single unit of dark, reddish-brown sandy clay. Feature 32 is deeper than its predecessor and contained the remnant of a Pueblo III painted whiteware jar neck. When this feature was in use or perhaps as a part of an abandonment process, it was filled with sediment similar to that used to fill the earlier sipapu

(Feature 33). Both sipapus were then plastered over as part of a general floor resurfacing. Thus, it would appear that a formal sipapu of the kind just discussed was not associated with the final pre-abandonment use of the structure (Surface 1).

Other Features. Features 34, and 36 - 41 were shallow, basin-shaped pits of various sizes and shapes excavated in sterile subfloor sediments; none contained artifacts, and all had been filled with similar red-brown, clastic sandy clay prior to having been plastered over. Feature 34, irregular in plan, was the largest of these features and was located near Features 32, 33, and 35. Features 36 through 41 formed a distinct cluster below Pilaster 2. Features 39, 40 and 41 are circular in plan. Feature 39 is distinguished by a fragment of burned sandstone embedded in its northern margin. Feature 37 is a shallow, elongated rectangle with rounded corners and with its long axis oriented north to south. The fill in Features 36 and 38 is slightly more complex than that of the features just described. Both are round, shallow basins but contained a thin layer of ash with charcoal flecks at the bottom of the feature followed by the same red-brown sandy clay found in the other features. After these features were intentionally filled, they too were plastered over. The sequence of ash and red-brown fill in these two features was similar to that found in Feature 35 and suggests that may be related functionally or in some other way. The ash in these features may be related to use or perhaps derives from incidental ash scattering related to use and cleaning of the hearth. The fact that similar sediments were used to fill these features suggests that they were intentionally filled at roughly the same time, perhaps as a prelude to or a consequence of floor resurfacing. The function of these features is unclear, but ritual and/or ceremonial functions have often been assigned to such ambiguous features.

## Ventilation System

The ventilating system appears to have been similar to others described for Pueblo III pitstructures in the Mesa Verde region. The vent system consists of a floor-level tunnel opening below the southern recess (Bench 6). The ventilator tunnel (Feature 5) is generally oriented on a north-south axis. The majority of the ventilator tunnel was excavated, but the vent shaft was not excavated. The ventilator tunnel is a rectangular opening in the veneer of single-stone masonry which forms a partial lower lining wall below the southern recess. The vent tunnel was built into sterile sediments and lacked the masonry lining often present in Pueblo III vent systems (Rohn 1971; Cattanach 1980; Bradley 1987; Kleidon and Bradley 1989). The vent tunnel floor, to the extent excavated, was well plastered and blended smoothly with the pitstructure floor (Surface 1). A masonry-lined ventilator shaft was not found near the exterior of the southern recess upper lining wall as is often present, suggesting this too lacked masonry, or perhaps that the vent tunnel continued for an unknown distance beyond the southern recess lining wall, emerging some distance from the pitstructure as has been noted in other Pueblo III sites (Luebben 1982, 1983). Excavated fill in the vent tunnel consisted of postabandonment sediments associated with the roof dismantling and collapse of adjacent masonry surface structures. Artifacts recovered from vent tunnel fill included sherds, flakes, fragmentary sandstone abraders, edge-modified flakes, animal bones and wood charcoal. Of particular interest is a redware sherd which refit to Vessel 24, a partial Pueblo II Deadman's B/R seed jar. Sherds refitted to this vessel were found in varied pitstructure fill contexts and appear to record the erosion of a Pueblo II abandonment assemblage perhaps associated with one or more Pueblo II structures underlying the Pueblo III roomblock. Botanical remains within the vent tunnel include charcoal of box elder, serviceberry/groundcherry, Mormon tea, juniper, pine and bitterbrush/cliffrose. As discussed previously, the deflector, an integral part of the ventilating system, had been removed from its normal position between the hearth and the ventilator tunnel opening at some time prior to the structure's final abandonment.

## Tunnels

Two tunnels, both apparently open and available for use at abandonment, were found and partially excavated. Tunnel 1, opening below Bench 1, leads to a subterranean room and continues beyond. Tunnel 2, opening above Bench 4, appears to lead to the middle unexcavated roomblock, but might also exit in the eastern pitstructure (Structure 11). Both tunnels were constructed in native sediments and lacked masonry lining.

Tunnels in pitstructures are not uncommon in Pueblo III period sites in the Mesa Verde area, and frequently lead to towers, surface rooms, or subterranean rooms, or sometimes connect two pitstructures (Prudden 1914, 1918; Martin 1938; Hayes and Lancaster 1975; Luebben 1983). The principal function of a tunnel appears to have been as a hidden passage or avenue of communication between structures. Tunnels have traditionally been assigned a ritual or ceremonial role by default since they connect other structures with pitstructures where ceremonial and ritual activities presumably occurred. Ethnographic analogy has also contributed to the ceremonial and ritual function assigned to tunnels (Ellis 1952; Luebben 1982). However, recent analyses of Pueblo III pitstructures suggests wide variation in the degree to which secular and ceremonial activities may have occurred within them (Cater and Chenault 1988; Huber 1989; Luebben 1982, 1983; Lekson 1989). Thus, tunnels, and the structures they connect, cannot be *a priori* assumed to have had solely a ritual and ceremonial function. A basis for understanding the function(s) of tunnels should be grounded in the fact that they must minimally have functioned as a hidden means of communication and access between structures. Alternative and additional functions for the tunnels, perhaps including escape routes and shelters during raiding, or areas for covert storage of food in times of dietary stress must also be considered.

Tunnel 1

The entrance to Tunnel 1 was through a rectangular opening in the kiva floor adjacent to the lower wall below Bench 1 (Table 3.4; Figure 3.6). The margins of the tunnel opening at floor level were lined with a double course of single-stone masonry. Two stones projecting into the tunnel entrance may have served as a hatchcover rests for the narrow slab found in the tunnel itself. A cloudburst during excavations in 1988 collapsed part of the nonmasonry lower lining wall of the kiva below Bench 1 revealing the presence of a small area of double-stone masonry beneath a thick plaster cap above the tunnel's floor entrance. This masonry was supported by a large slab resting horizontally on at least two unburned wooden lintel poles. Several artifacts, 2 two-handed manos, and a fragment of slab metate were incorporated into this plug. An unburned, highly eroded wood sample from one of the lintel members submitted for tree-ring analysis yielded a date of A.D. 989 ++vv, which is much earlier than the probable date the tunnel was constructed.

The plugged opening in the lower lining wall may have been the original tunnel entrance, later modified by closure with a masonry wall and excavation of a new subfloor entrance. The entrance modification may have been coincident with replastering of the kiva floor, but evidence linking tunnel and floor remodeling is lacking. It is also possible that the original tunnel opening extended from lower lining wall of the kiva out into the floor area. However, perusal of literature for Mesa Verde region's Pueblo III pitstructures reveals no known case in which access to a tunnel is found simultaneously in both lower lining wall and kiva floor (Cattanach 1980; Hayes and Lancaster 1975; Lister 1964; Luebben 1982, 1983; Martin 1939; Morris 1939; Rohn 1971, 1977). Aside from the entrance area, no masonry was used in the observed reaches of this tunnel.

The tunnel passage below floor level contained an ashy fill that incorporated a variety of artifacts, including sherds, flakes, several complete and fragmentary abraders, and a turkey bone awl, as well as unburned bones of turkey, an indeterminate large bird, cottontail and jackrabbit, wood rat, prairie dog, pocket gopher and a large amphibian. An isolated adult human parietal fragment was also recovered, but was not associated with a burial. Numerous pieces of juniper charcoal and a charred and modified serviceberry branch were also recovered from subfloor tunnel fill. Sherds refitted to Vessel 24, a partial Deadman's B/R seed jar found in subfloor tunnel fill, were also found in ventilator tunnel fill and several other pitstructure fill contexts. It is likely that these sherds probably derive from eroded Pueblo II abandonment assemblages similar to those present in Structure 12 or from an unnumbered structure underlying Structure 3 of the Pueblo III roomblock. The presence of sherds from Vessel 24 in all these contexts indicates that the tunnel entrance was available for use at abandonment and subsequently filled with abandonment and post-abandonment deposits.

The tunnel itself was partially blocked by a detrital cone immediately behind the masonry plug in the lower lining wall deriving from erosion of tunnel roof and sides. The westward oriented passage beyond the detritus was uncollapsed. The plastered floor of the tunnel was covered by a 10-20 cm layer of sediment. The potential for the tunnel to collapse was considered high so I limited clearing and exploration efforts. The tunnel floor rose only slightly from its entrance to a small underground chamber. This subterranean chamber was small and rounded, perhaps more akin to a widening of the tunnel for a turn-around area rather than being a true room. The chamber had been excavated into sterile sediments and was partially filled by an accumulation of wall and roof sediments. A south-trending, at least partially uncollapsed passageway led out of the underground chamber and began a steep rise some two meters past it. The projected exit point, if direction and angle are unchanged, is in the vicinity of Structure 13 and a fragmentary wall stub abutted to a boulder nearby (Figures 3.4 and 3.14). The wall stub could be the remnant of a dismantled structure, perhaps a tower or other room, to which the southern tunnel once led.

Tunnel 2

Tunnel 2 (Feature 10) is located above Bench 4 (see Table 3.4 for opening dimensions). It was first noted as a gray-brown fill unit in calcium carbonate rich sterile sediments of the upper wall, and appeared to have been open and available for use at abandonment. The tunnel had been excavated into sterile sediments and lacked masonry. Excavation revealed a plastered floor, sidewalls, and ceiling. The direction and gradual upward slope of the tunnel suggest that it may have opened into the floor of one of the unexcavated rooms located between the western and eastern pitstructures, or may have connected to the eastern pitstructure (Structure 11).

A thin layer of ash and charred or carbonized organic material was present on the floor of the tunnel. Artifacts were found on the tunnel floor near its entrance. Above this stratum lay a 10-15 cm lens of clayey sand containing small charcoal fragments, pebbles, sandstone rubble, and artifacts. The uppermost fill unit consisted of a layer of sandy clay containing pebbles and rock rubble interspersed with charcoal flecks and daub which pinched out near the end of the excavated portion of the tunnel. This stratum lacked artifacts.

No clear evidence of roofing material was encountered, suggesting that the passage had been excavated as a tunnel rather than having been trenched from the surface, roofed and then covered. Thus, the lowest stratum results from abandonment and postabandonment deposition. The second stratum may result from postabandonment erosion of the kiva margins either before or after the dismantling of the pitstructure roof. It may also include material derived in part from pitstructure roofing debris, and slumped/eroded tunnel ceiling and wall debris. Material derived from a collapsing surface room opening may have contributed to this stratum as well. The uppermost fill stratum consists of postabandonment deposits derived from masonry roomblock collapse and colluviation, filling both the pitstructure and the tunnel. At some point after abandonment, the tunnel ceiling appears to have slumped, and filled the tunnel completely.

In the lower tunnel fill units were found sherds, flakes, a fragmentary sandstone abrader and a single turkey bone. Analysis of the lowest fill unit revealed remains of sagebrush, charred wood of pine and cliffrose/bitterbrush, and charred corn cupules. Ceramic refitting trials from pitstructure surfaces and features reveal several interesting provenience linkages. Sherds refitted to SR 250, a portion of a mineral and carbon painted Mancos B/W water jar, were found in Tunnel 2, on the main chamber floor below Pilaster 5 and in the subfloor entrance fill of Tunnel 1. Sherds of SRs 192, 192 and 193, all appearing to be from the same P III B/W vessel based on similarities in size, design style and design application, were found near the pitstructure floor, in ventilator tunnel fill, on the surface of Benches 4 and 6, and in the fill of Tunnel 2. The variety of proveniences in which sherds were recovered from what appears to have been the same vessel is perplexing. In all cases sherds were found in proveniences interpreted as early in the depositional sequence, suggesting that these sherds might have been incorporated in roof sediments, were on the pitstructure's roof at abandonment, or were washed in some time after the roof had been dismantled and the site abandoned.

## Pitstructure Abandonment Assemblage

Floor and bench surface assemblages are diverse and include ground and flaked stone, ceramics, bone, botanical remains, and other mineral artifacts. The diverse artifact assemblage recovered from bench surfaces and pitstructure floor appears to have been related to the final use of the structure and is indicative of a planned, leisurely abandonment mode (Figure 3.8; Appendix A). The majority of the artifacts resting on and within 1 centimeter of bench surfaces have been interpreted primarily as de facto refuse, defined by Schiffer (1987:89) as abandoned but still useful artifacts, features and structures. However, the depositional status of artifacts above this arbitrarily defined one centimeter level is less clear. Many of these artifacts may have been associated with roof fall (Stratum 8), while others appear to have resulted from other noncultural postabandonment depositional processes, especially erosional displacement of artifacts. It is also possible that a few of these artifacts were deposited during a brief reuse of the structure after it was initially abandoned, but before the roof was dismantled and the site abandoned.

A few of the artifacts within one centimeter of bench surfaces were found resting on thin lenses of ash. The ash may derive from hearth use and cleaning, ash being blown from the hearth, or some other unknown cause. Others were found in direct contact with bench surfaces, suggesting that artifacts in contact with surfaces were deposited prior to artifacts resting on ash. The presence of ash on the benches also suggests that routine cleaning and maintenance activities may have been suspended for some time prior to the abandonment of the structure. It is also possible that the distinction between artifacts resting on surfaces and those resting on ash may record reuse of the structure after a brief period of abandonment.

The presence of whole and fragmentary slab metates and two-handed manos in floor and near floor contexts, may be in abandonment context or may represent postabandonment deposition, might have been deposited coincident with roof dismantling and/or erosion of courtyard and/or surface room floor assemblages (Structures 7, 9 and 12). Artifacts were also located in fill several centimeters above surfaces, probably in postabandonment context, interspersed with unburned roofing daub. Some of these postabandonment artifacts might have been deposited as trash soon after abandonment, or were present on the kiva roof/courtyard surface when the roof was dismantled and the became mixed with abandonment assemblage. It is clear that the assemblage recovered is significantly depleted of whole, useful artifacts, especially ceramic containers.

Whole or partially reconstructible ceramic vessels were absent. However, two partial Mesa Verde B/W bowls, one on the surface of Bench 4 (SR 209), the other near the kiva floor (Vessel 21) may have been sherd containers used as plates or saucers. The base of a corrugated jar, a sherd container shaped into a shallow saucer (Vessel 26), and the bowl of a small (0.65 liter capacity) McElmo B/W ladle lacking the handle (Vessel 27) were found several centimeters above the kiva floor intermixed with the vegetation mat (Stratum 7) suggesting either displacement from a bench or postabandonment deposition. A small, round Mesa Verde B/W jar sherd with ground margins (PL 38) was found on the surface of Bench 3. Wear marks on its convex outer surface indicate use, but function cannot be inferred.

Manos and metates are also present in surface contexts, but are fragmentary suggesting that these tools may have been recycled for uses other than primary plant food processing. A large biface of nonlocal material, 2 modified flakes and a utilized flake were found in surface contexts, as were a core, flakes and fragments of mostly local materials. The technological attributes of the flaked stone material suggest that some limited manufacture or maintenance of stone tools occurred. The biface was found in association with numerous small flakes and fragments of the same nonlocal material, suggesting that this tool had been flaked in the structure. The presence of 10 bone awls, most of turkey or turkey-sized bird, indicates their use in the pitstructure. The presence of several slightly modified and unmodified complete bird bones in various surface contexts and many fragmentary bird long bones suggests that bone awl or other bone artifact manufacture may have occurred. Sandstone abraders and other modified stone comprise the greatest number of artifacts in pitstructure surface and near-surface contexts. Such artifacts generally exhibit ground depressions and striations as well as pecking and polishing suggesting their use as general purpose artifacts perhaps used in the manufacture and maintenance of bone, stone and other artifacts.

Four polishing stones, 2 with percussion impact-damage on distal ends were found on Benches 4 and 5. Polishing stones have been interpreted as having been used in ceramic manufacture. However, their presence alone does not necessarily indicate ceramic manufacture in the pitstructure. Polished stones exhibiting impact damage lack a clear functional explanation. It has been suggested that such stones may be analogous to "lightning stones" used in modern kiva rituals (Jeançon 1923; Stubbs and Stallings 1953; B. Bradley 1990, personal communication). Other artifacts found in use-surface context were two pieces of hematite, one of which possessed grinding facets. Their presence indicates that iron oxide powder may have been produced for ritual or secular purposes, but there are no data to indicate how the powder may have been used.

In summary, the artifacts found in pitstructure surface contexts indicate their use or storage in this structure and suggest the presence of a wide range of domestic manufacturing and maintenance activities. The de facto abandonment assemblage seemingly reflects predominantly secular and domestic rather than ritual and ceremonial activities. However, this is not to suggest that ritual activities did not occur in the Green Lizard kiva. The presence of polished stones with end-impact as well as ground and faceted hematite fragments may constitute evidence of ritual and ceremonial activities. It is clear that the depleted nature of the abandonment assemblage in comparison to those at Sand Canyon Pueblo, does not permit a forceful argument for predominantly nonritual domestic use of the Green Lizard pitstructure. Rather, the abandonment assemblage merely reflects the fact that some portion of the activities prior to abandonment were domestic.

The mixture or relative proportion of ritual and domestic activities which might have occurred in Pueblo III and earlier pitstructures is a subject receiving considerable recent attention (Wilshusen 1989; Lekson 1988, 1989). However, the abandonment assemblage from Green Lizard pitstructure, in contrast to those at Sand Canyon Pueblo, sheds little light on the matter since its abandonment assemblage has been subject to curate behavior, and therefore, has been depleted of valued or high-cost items (Binford 1979), perhaps including ritual-related items. As a result,

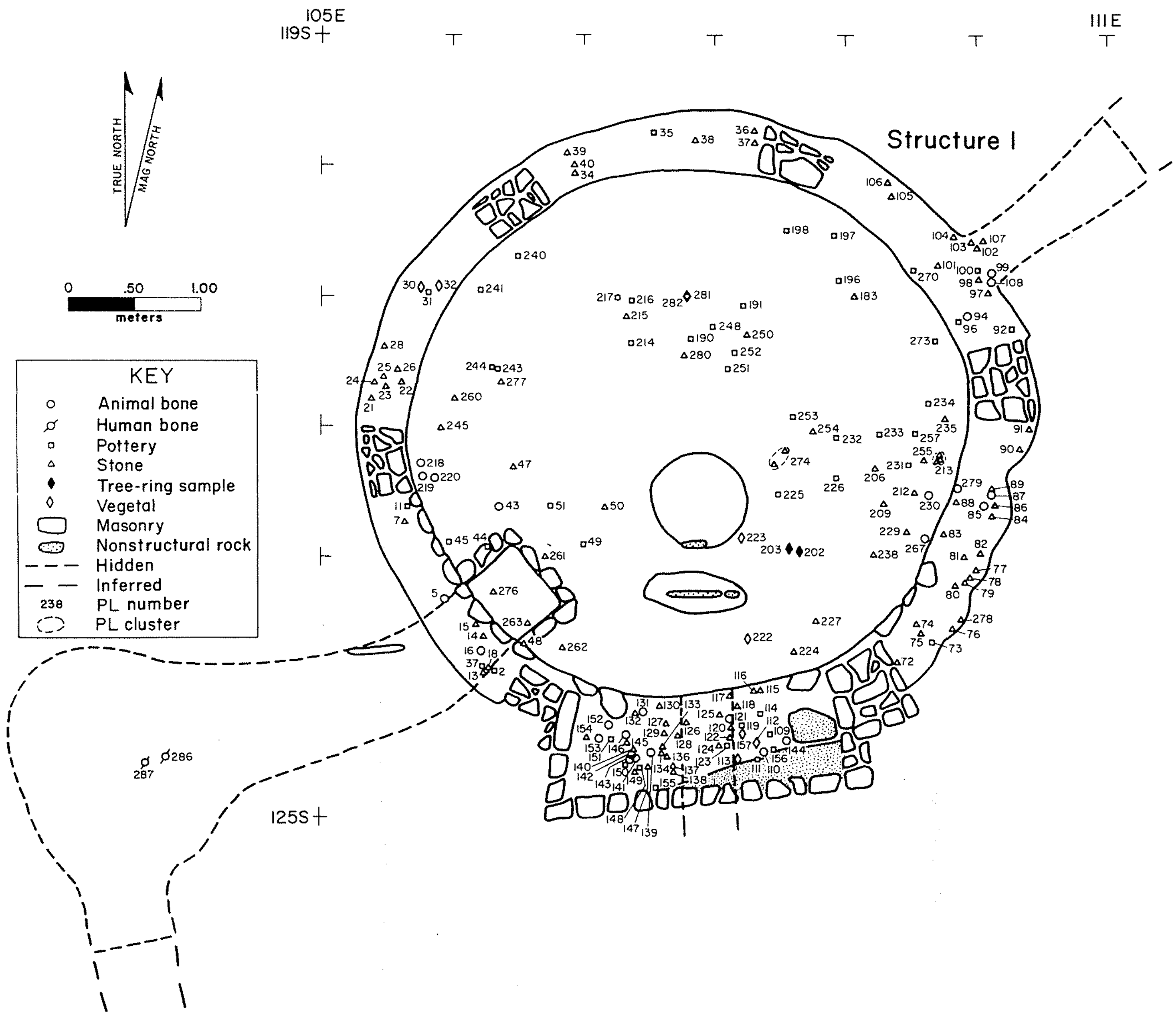



Figure 3.8: Structure 1 Surface Artifact Locations.

interpretation of pitstructure use history, at least in this case, is bedeviled by abandonment depletion of the assemblage critical to interpretation of final structure use.

In comparison to extraordinarily rich abandonment assemblages at some Sand Canyon Pueblo kiva units (Kleidon and Bradley 1989), and some other late Pueblo III alcove sites at Mesa Verde, the abandonment assemblage at the Green Lizard kiva was depleted; a consequence of planned, leisurely abandonment. With few exceptions (notably the polishing stones on Benches 4 and 5), items of high symbolic value, items with significant remaining use life, or items otherwise difficult to replace are completely lacking. Bone tools, a biface and the polishing stones and polishing/hammerstones (lightning stones) found on bench surfaces appear still to be useful. It is possible that these items were easily replaced, lost or forgotten. Unless the abandonment of some or all of these items was intentional and linked to an abandonment ritual, it is unclear why they were not removed at abandonment or not salvaged at the time the roof was dismantled if this occurred after abandonment. In summary, the abandonment assemblage of the pitstructure has been depleted. Whole ceramic containers, and grinding implements and other valued items seem to have been removed. The range of artifacts found in the rich Sand Canyon Pueblo abandonment assemblages may, if functional similarity is assumed, suggest the nature of the removed assemblage. However, other evidence such as differences in construction labor investment, formality and floor features (lack of a "formal" sipapu) seem to indicate that functional similarity cannot be assumed. Thus, the abandonment assemblage in the Green Lizard pitstructure suggests a diverse range of primarily domestic activities occurred at or just prior to abandonment.

### Pitstructure Discussion: Construction, Use and Abandonment

Pueblo II components appear to be common to Pueblo III sites in the Sand Canyon Locality (Kuckelman et al. 1991; Van West et al. 1987; Varian 1989, 1990; Varian et al. 1992). It is possible, though unlikely, that the Pueblo II occupation at Green Lizard might have been year-round and included surface rooms and a pitstructure. Had this been the case, the most likely place for a Pueblo II pitstructure would have been precisely where the Pueblo III pitstructure was located. It is not clear, however, that the Pueblo II component was a year-round habitation. Pueblo II ceramics were found in fill of the Pueblo III pitstructure derived from postabandonment erosion of Pueblo II deposits into the pitstructure depression. It is possible, though not likely, that remodeling or rebuilding during the Pueblo III occupation of the site completely obscured evidence which might have confirmed a Pueblo II origin for the pitstructure. The fact that the kiva is not fully masonry could, superficially, be said to support this view. However, the lack of Pueblo II ceramics in sealed floor feature contexts argues against this. The pitstructure was probably built during the Pueblo III occupation of the site. The Pueblo II component probably consisted only of a small field station or other seasonally occupied structure(s) without an accompanying pitstructure. Similar small Pueblo II components have been found at several tested Pueblo III sites in the Sand Canyon Locality (Varian et al. 1992).

Sequences of floor feature construction and abandonment indicate that at least two remodeling events, one minor and one major, occurred during the life of the structure. It is unclear when in the life of the pitstructure Tunnels 1 and 2 were constructed. The first minor remodeling is evident in the abandonment of the first sipapu (Feature 33), and its subsequent truncation by a later sipapu (Feature 32). The second major remodeling event is visible in the sealing of a number floor features in the western portion of the pitstructure, both sipapus originating in Surface 2, the possible remodeling of Tunnel 1 and resurfacing of the pitstructure floor (Surface 1).

After the new floor (Surface 1) was in place, several features were excavated into it and through the lower floor (Surface 2). Associated with Surface 1 was a large, deeply inset rock (PL # 180) with a ground circular depression in its surface. Given this artifact's placement adjacent to the plastered-over sipapus in Surface 1, as well as to the structure's vent, hearth, and northern niche alignment, it may have served as a less "formal" equivalent of a sipapu.

A final event in the use of the structure is was the removal of the deflector slab some time prior to the last use of the hearth and use of the deflector socketing pit as an ash receptacle. The final abandonment of the structure appears to have been a leisurely one in that artifacts which are costly to procure or produce are generally absent from the final assemblage (Schiffer 1987).

Lastly, either concurrent with final abandonment or briefly thereafter, the roof of the kiva was deliberately dismantled and the roof beams salvaged resulting in the deposition of some artifacts into the depression from original roof, courtyard and surface structure contexts. I cannot discount intentional postabandonment deposition of refuse into the pitstructure depression, perhaps during postabandonment reuse of some areas of the site.

## Construction and Abandonment Dating

Dating the construction and subsequent abandonment of the pitstructure is difficult since datable construction-related material had been removed. Tree-ring dates from the pitstructure appear to be on fuel wood and therefore were not useful in establishing construction and abandonment dating (Table 3.5). However, fuel wood dates, an archaeomagnetic date, ceramic cross-dating and a high precision radiocarbon date together provided reasonable support for an occupation date beginning in the late A.D. 1100s to early A.D. 1200s and terminating in the A.D. 1250s to 1260s .

Two of several tree ring samples collected from a variety of pitstructure contexts yielded post A.D. 1150 vv dates and several others cluster near the mid- A.D. 1100s. These fuel wood dates may indicate a potential use in the late A.D. 1100s to early A.D. 1200s, if fuel wood dates tend to be 50 to 100 years too old, as has been suggested by Ahlstrom (1985). Archaeomagnetic samples from the hearth yielded two possible date ranges for the last hot fire of A.D. 1015-1125 and A.D. 1125-1300. The latter range is considered the more likely. The wide range may be a result of hearth remodeling, perhaps coinciding with remodeling of the pitstructure, or may be a function of the archaeomagnetic dating method.

A carefully culled sample of only juniper twig ends was recovered from the vegetal mat (Stratum 7) in the kiva. The sample was submitted for high precision C-14 dating at the University of Washington Quaternary Research Center with the intention of achieving a date with high accuracy and high precision. High precision dating has the potential of routinely yielding sample standard deviations of 20 years or less if sample requirements are met (Stuiver and Pearson 1986;

Jope 1986). Unfortunately, sample size after pretreatment was smaller than desirable and resulted in reduced precision, but nonetheless still retains high accuracy. The calibrated date range and midpoint (in parentheses) at on standard deviation was A.D. 1217 (1259) 1277. This midpoint and range are virtually identical with another high precision sample described in the midden section of this chapter, below. The calibration was performed using the program CALIB 3.0, developed by Stuiver and Reimer (1993). The calibrated dates have been corrected for C-13 fractionation, but have not been corrected for laboratory error.

Table 3.5: Structure 1 Dating.

High Precision Radiocarbon (Assay No. QL - 4391)

| C-14 Age | Calibrated A.D. | Calibrated BP | Calibrated A.D./B.C. |
|---|---|---|---|
| 780 ± 40 | 1259 ± 40 | 691 ± 40 | 2 sigma - 1163 (1259) 1281 |
| " | " | " | 1 sigma - 1217 (1259) 1277 |

Archaeomagnetic Dating (Curve SWCV 588)

| Provenience | Date Ranges |
|---|---|
| Hearth (Feature 11) | A.D. 1015-1125 and A.D. 1125-1300 |

Structure 1 Tree-ring Dates

| Provenience | Tree-ring Date |
|---|---|
| Postabandonment Fill Units | A.D. 915 vv |
| Postabandonment Fill Units | A.D. 1190 vv |
| Postabandonment Fill Units | A.D. 1086 + vv |
| Tunnel 1 (Feature 6) Fill | A.D. 989 ++ vv |
| Surface 1 (PL# 203) [a] | A.D. 1141 + vv |
| Hearth (Feature 11) [a] | A.D. 1105 vv |
| Hearth (Feature 11) [a] | A.D. 1118 vv |
| Ashpit (Feature 18) [a] | A.D. 1123 + vv |
| Ashpit (Feature 18) [a] | A.D. 1145 vv |
| Ashpit (Feature 18) [a] | A.D. 1154 + vv |

[a] Probable fuel wood dates.

Although not as precise a date as was hoped, the one and two standard deviation age ranges clearly indicate Pueblo III period deposition of the juniper twig-rich vegetation mat (Stratum 7) in the pitstructure (Table 3.5). A probability distribution calculation program in Stuiver and Reimer

(1993) yielded a two standard deviation date range indicating that the relative area under the probability distribution was 0.03 at cal. A.D. 1163-1175 (787-775 BP) and 0.97 at cal. A.D. 1188-1282 (762-668 BP). A similar probability calculation at one standard deviation yielded a relative area under the probability distribution of 0.81 at cal. A.D. 1212-1265 (728-685 BP) and 0.19 at cal. A.D. 1266-1276 (684-674 BP). The latter probability distribution narrows the age range significantly clearly indicating that the material was deposited during Pueblo III and probably in the early to middle A.D. 1200s.

Hegmon (1991), in an attribute-level analysis of ceramic design styles in Sand Canyon Project sites, suggests that Green Lizard possesses a ceramic assemblage similar to that of later sites such as Sand Canyon Pueblo and the associated Lester's site that have secure construction dates in the A.D. 1250s to 1270s (Varian et al. 1992; Bradley 1993). Several other small tested sites fairly securely dated in the mid- A.D. 1200s have lower attribute rankings than the painted ceramic assemblage at Green Lizard. Hegmon's comparisons indicate that Green Lizard was occupied and abandoned as late or later than the tested sites in the locality, but earlier than either Sand Canyon Pueblo or Lester's site. That is, sometime around A.D. 1250-1260.

## Summary of Formation Processes of Fill and Assemblages

Artifacts found in the upper fill units of the kiva (Depositional Units 1 and 2), both in the main chamber and over the benches, are the result of postabandonment erosion of the masonry roomblocks adjacent to the pitstructure, the nonmasonry structures to the west and from the courtyard and roof of the pitstructure. In terms of the amount of sediment and rubble in the pitstructure, it is clear that the majority of fill volume derives from the collapse of the masonry rooms north and east of the pitstructure. Excavation of the jacal structures (Structure 8, 10 and 13) indicates that they had been filled with trash after they had been abandoned. Some of this trash may have washed into the pitstructure depression as it filled (Table 3.6). Artifacts in pitstructure fill do not appear to have been deposited as a result of postabandonment trash dumping. The volume of fill in the pitstructure has been conservatively calculated at 24.5 $m^3$. This figure is based on an average main chamber diameter at floor level of 4.25 m and an average fill depth of 2.2 m, and excludes the areas over the six benches. The average number of artifacts per cubic meter of pitstructure fill is 129.4. In comparison, a low artifact density 1 x 1 meter midden unit, 124 S/123 E, with a depth of 1.0 meter, had an artifact density of 539.0 per cubic meter, or approximately four times greater.

Much of the rubble, especially that found in the southern portion of the kiva and some of the artifacts found directly on Surface 1, resulted from dismantling the pitstructure roof and subsequent erosion of roof margins before and certainly after the removal of the roof. Artifacts resting on bench surfaces have been interpreted as de facto refuse. Some of the artifacts in surface and near-surface contexts in the main chamber of the pitstructure may have originally been de facto refuse located on bench surfaces but were displaced by post-abandonment depositional processes. Other artifacts in floor and near-floor contexts may have originally been incorporated in roofing material, or were on the roof when it was dismantled.

Table 3.6: Structure 1 Fill Unit Assemblage.

| Artifact Type | Number | Percent |
|---|---|---|
| Ceramics | 1964 | 69.44 |
| Chipped Stone Debitage | 723 | 25.57 |
| Flaked Stone Tools | 26 | .92 |
| Other Nonflaked Stone Tools | 39 | 1.38 |
| Grinding Implements | 17 | .60 |
| Ornaments | 7 | .25 |
| Modified Bone | 52 | 1.84 |
| Total | 2828 | 100.00 |

Note: Includes the following excavation units. Stratum 1 (P.D. 2, 8, 10); Stratum 2 (P.D. 32, 45); Stratum 3 (P.D. 63, 74, 161, 188); Stratum 4 (P.D. 75, 187, 192); and Bench Fill Units (P.D. 64, 65, 68, 149, 150, 158, 159, 176, 185). Excavation Stratum 1 equates to Depositional Unit 1. Excavation Strata 2, 3 and 4 equate to Depositional Unit 2. Bench fill units combine Depositional Units 1 and 2.

It is clear that some of the artifacts found on the floor of Structure 1 are de facto refuse, whereas others may result from both cultural and natural post-abandonment depositional processes. Artifacts found on bench surfaces are, however, more readily interpreted as de facto refuse and are useful in inferring activity and structure function. Post-abandonment deposition was recorded by the presence of artifacts intermixed with the remains of organic material (Stratum 7) apparently deposited after the pitstructure roof had been removed. This mat of organic material composed primarily of juniper twigs and sagebrush might also have resulted from a deliberate (but failed) attempt to burn the kiva by filling it with flammable brush and twigs.

## Functional Inferences

The sequence of at least one clearly documented remodeling event suggests a long structural history. Numerous floor features and two sipapus fell into disuse, were sealed, and were replaced by other floor features. Niches appear to have been in use at the time of abandonment, and perhaps were in use throughout the structure's life span. It is not clear when the tunnels were first excavated, nor is the sequence of construction evident. It is clear, however, that both tunnels were available for use at abandonment.

Sealed enigmatic shallow floor features associated with the earlier floor (Surface 2), and two formal sipapus may, arguably, signify ritual and ceremonial events in the structure. However, it is far from clear whether ritual and ceremony were dominant activities in the structure. The presence of bell-shaped floor pits and a lower wall cist in association with both earlier and later surfaces suggests that storage in some form occurred through most, if not all, of the structure's use. Lower wall cists are an uncommon, but not unknown feature in Pueblo III pitstructures. However, although a storage function is inferred, the nature of the items stored is problematic. Such features might equally have been used to store ritual paraphernalia, foodstuffs or other items. The absence of a "standard" sipapu in the later floor (Surface 1) and the presence of enigmatic floor features and two sipapus in association with the earlier floor (Surface 2) hints that pitstructure function might have changed through time, perhaps in the direction of increasing secular and domestic activities.

The pitstructure's artifact assemblage is clearly depleted in the sense that valued portable items are absent from the inventory, indicating a planned, leisurely abandonment (Stevenson 1982; Schiffer 1987). It also suggests that the former inhabitants of Green Lizard were aware of where they were next going to reside. The bench artifact assemblages indicate that immediately prior to abandonment, a diversity of tools were in use or were being stored in the pitstructure. Artifacts remaining on benches do not, however, clearly indicate whether the activities in the pitstructure just prior to abandonment, and depletion of the extant systemic assemblage were primarily domestic or ritual, although domestic activities are suggested.

In summary, the support of feature and artifact data for either ritual or domestic functions associated with Surface 1 is equivocal. Pitstructure function associated with Surface 2 is also equivocal, but artifact and feature data tend to favor an interpretation of primarily domestic activities. This interpretation may, however, be biased by an abandonment assemblage which may poorly represent the range of preabandonment activities.

## SURFACE ROOMS

Jacal and masonry surface structures were associated with the construction and use of the pitstructure (Structure 1). An additional set of unexcavated rooms, perhaps related to the Structure 1 kiva suite, was located between the two pitstructures at Green Lizard. However, only the northern masonry rooms and the nonmasonry structures west of Structure 1 have been excavated (Figure 3.4). It is suspected that the central masonry rooms are related to the use of Structure 1 since a partially excavated passage (Tunnel 2) originating in Structure 1 appears to lead to one of these rooms. Surface artifact assemblages in the Pueblo III masonry structures, are depleted of high value and still useful artifacts, reflecting a planned abandonment like that observed in Structure 1. The following discussion treats jacal and masonry structures separately.

### Masonry Surface Structures

The excavation in the northern roomblock encountered a Late Pueblo II period component underlying the Pueblo III roomblock. Architectural evidence consisted of Structure 12, of roughly shaped and unshaped single stone construction, and another unnumbered P II structure of which only a discontinuous portion of the basal course of masonry remains. These structures were discovered below the floors of Structures 3 and 4 (both Pueblo III rooms). Subfloor excavation was undertaken in Structures 5 and 9 to determine the nature and extent of the Pueblo II occupation. Evidence of a Pueblo II structure below Structure 5 was absent, while the limited excavation below Structure 9 was equivocal. Definitive evidence of additional rooms, which would support the inference that the Pueblo II component was a year-round habitation, was lacking. Available data favor seasonal rather than permanent habitation for this Late Pueblo II component at Green Lizard. The near absence of Pueblo II ceramics in the midden also supports this inference.

Pueblo III masonry rooms north of the pitstructure were constructed with double-stone walls, and exterior wall faces tended to posses larger stones than interior walls. During the generation or more of Pueblo III occupation at Green Lizard, the roomblock grew in an accretional fashion from an initial construction core of two rooms to a final total of seven contiguous rooms (Figure 3.9). Based on wall bonding and abutment information, Structures 4 and 5 appear to have been the first Pueblo III rooms constructed. Structures 3 and 6 were built simultaneously and their walls were in turn abutted to the west walls of Structures 3 and 4. Following this, Structure 2 was constructed and abutted to the west wall of Structure 3. Structures 7 and 9 also were added to the south walls of Structure 3 and 4, respectively. It is unclear when the unexcavated middle set of rooms located between the Structure 1 and Structure 11 were constructed. However, they appear to be affiliated with the western kiva suite, based on the probable link between Tunnel 2 in Structure 1 and one of these surface rooms.

The masonry construction is similar in all of the excavated Pueblo III surface rooms, where the preferred construction style consisted of semi-coursed double-stone masonry [double-simple in Lekson (1984)] and walls ranged in thickness from 30 to 40 cm. Exceptions are found in the single-stone masonry of the dividing wall between Structure 7 and 9 and the massive single-stone blocks in the north wall of Structure 2. The floors in all of these structures were unprepared and appear never to have been plastered. In many cases, the floor consists, at least in part, of a use-

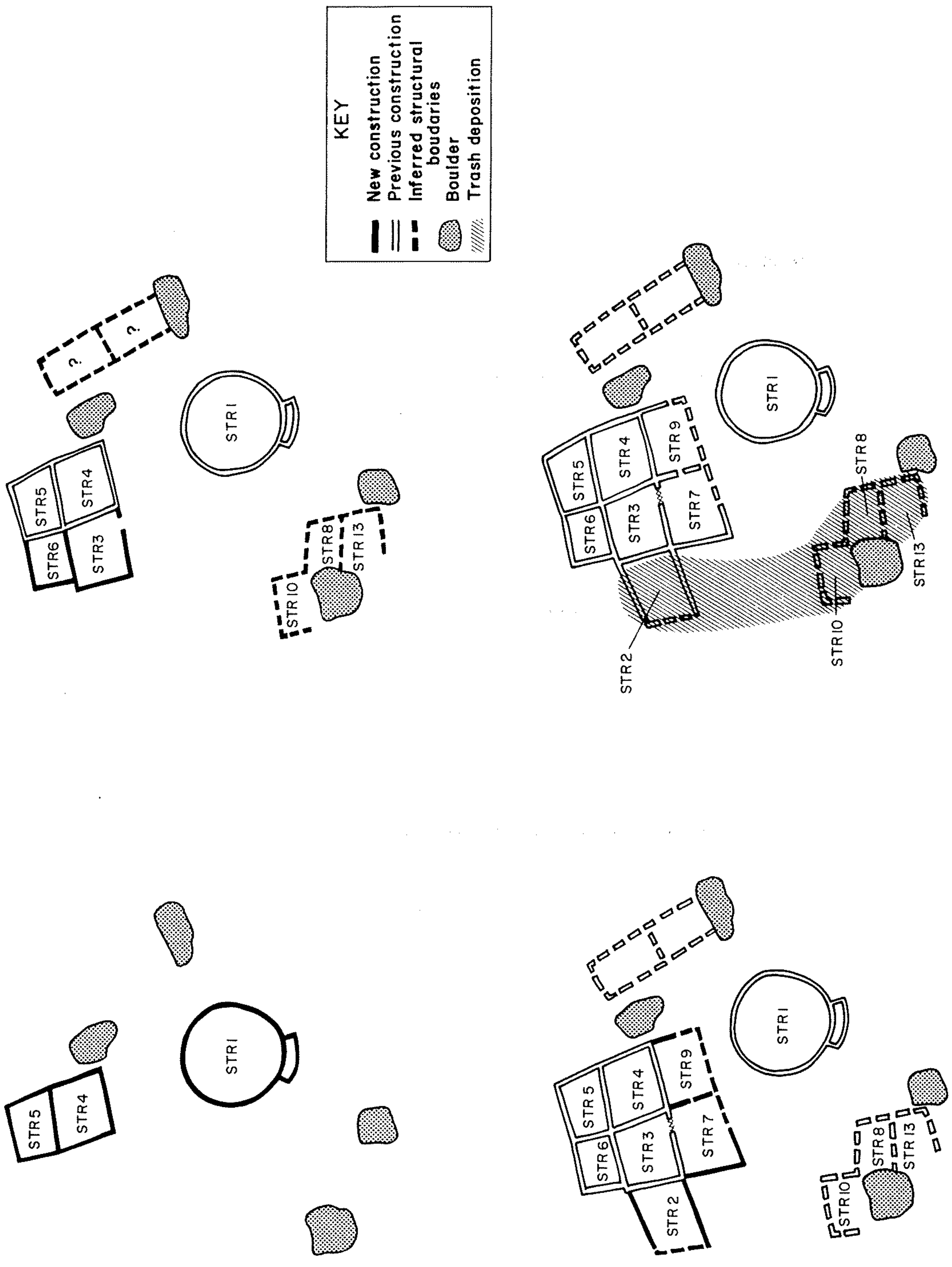



Figure 3.9: Kiva Suite 1 Construction Sequence.

compacted surface overlying intentional constructional fill used to level the floor. In the case of Structures 3, 4, 7 and 9, intentional fill covered earlier Late Pueblo II rooms and use-surfaces.

The preponderance of Pueblo III secondary refuse and the nearly complete lack of Pueblo II ceramics in jacal structures encountered west of the excavated pitstructure (Structure 1) indicate that these rooms probably date to the Pueblo III occupation of the site. The existence of these structures is shown by the presence of aligned rows of postholes as well as use-compacted surfaces associated with them. Clear evidence indicating whether these structures possessed both roofs and walls or were roofed without walls is lacking. In the latter case, the structures may have been analogous to ethnographically described ramadas, or perhaps unroofed screening walls (Mindeleff 1891; Moore 1980; Jett and Spencer 1981). However, in at least two of the structures (Structures 10 and 13) floors were fairly well defined, suggesting that some protection from the elements might have been provided by enclosing roofs and walls. These jacal structures illustrate a complex pattern of use, modification, abandonment and reuse for secondary refuse deposition. An extensive zone of secondary refuse is present from Structure 2 on the north to Structure 13 on the south indicating that the jacal structures had been abandoned and were being reused as trash areas some time prior to the final abandonment of Green Lizard.

## Masonry Surface Room Fill Stratigraphy

The fill sequence of the Pueblo II component underlying the Pueblo III roomblock consists of intentional constructional fill containing small numbers of artifacts. This fill was in some cases used to cap the earlier component with the construction of the later Pueblo III rooms. Postabandonment fill sequences of the Pueblo III rooms were not complex. Two principal strata were present in all of the Pueblo III rooms. The upper fill unit consisted of wall fall rubble overlain by compacted colluvial sediments containing few artifacts. Roof fall was generally not distinguishable, and wall rubble lay directly on structure floors except in trash-filled Structure 2. Ceramic wall chinking was observed in the wall of at least one room (Structure 4) and may have been used in other rooms as well. Structure 2 was the only masonry room containing a substantial number of artifacts in Pueblo III secondary refuse.

As noted, evidence for roofing material in these Pueblo III masonry structures is minimal or nonexistent. Small amounts of daub, perhaps derived from roofing daub or wall mortar were occasionally observed in floor and near-floor contexts. Roofing wood was entirely lacking due to natural decay or salvaging of major beams. The absence of disintegrated wood or wood-derived organic deposits, while not definitive, suggests that usable construction material was salvaged at abandonment, as were roofing beams in the pitstructure (Structure 1).

I interpreted the jacal structures west of Structure 1 as belonging to the Pueblo III occupation of the site. The structures in this western area of the architectural sampling stratum exhibit a complex pattern of use, modification, abandonment, and subsequent use of the area for secondary refuse deposition.

<u>Structure 12</u>

Structure 12 is a masonry room constructed during the Pueblo II occupation of the site. The abandonment ceramic assemblage, containing a partial, medium-sized Mancos B/W bowl (Vessel 3), suggests that the room was last used in the late A.D. 1000s to early A.D. 1100s. Portions of the northern and western walls are located below the floor of Structure 4, a Pueblo III room, and the southern wall appears to intrude into the overlying floor of Structure 9, a Pueblo III surface room, to the south. The long axis of the room appears to be oriented somewhat differently than the later Pueblo III rooms (Figures 3.4, 3.10). Structure 12 is rectangular and is constructed of unshaped or minimally shaped block and tabular sandstone masonry. Excavated dimensions are 180 cm east-west and 170 cm north-south yielding a floor area in excess of 3.06 $m^2$. The exact dimensions of Structure 12 are unknown as the room continues under the eastern walls of Structures 4 and 9. Prior to construction of the Pueblo III rooms, the walls of Structure 12 were partially dismantled, and its stones probably recycled for use in Pueblo III room construction. The room was filled with refuse-bearing fill, which subsequently formed the floor of Structure 4. Remains of a probable footing wall extend west of the west wall of Structure 12 indicating that

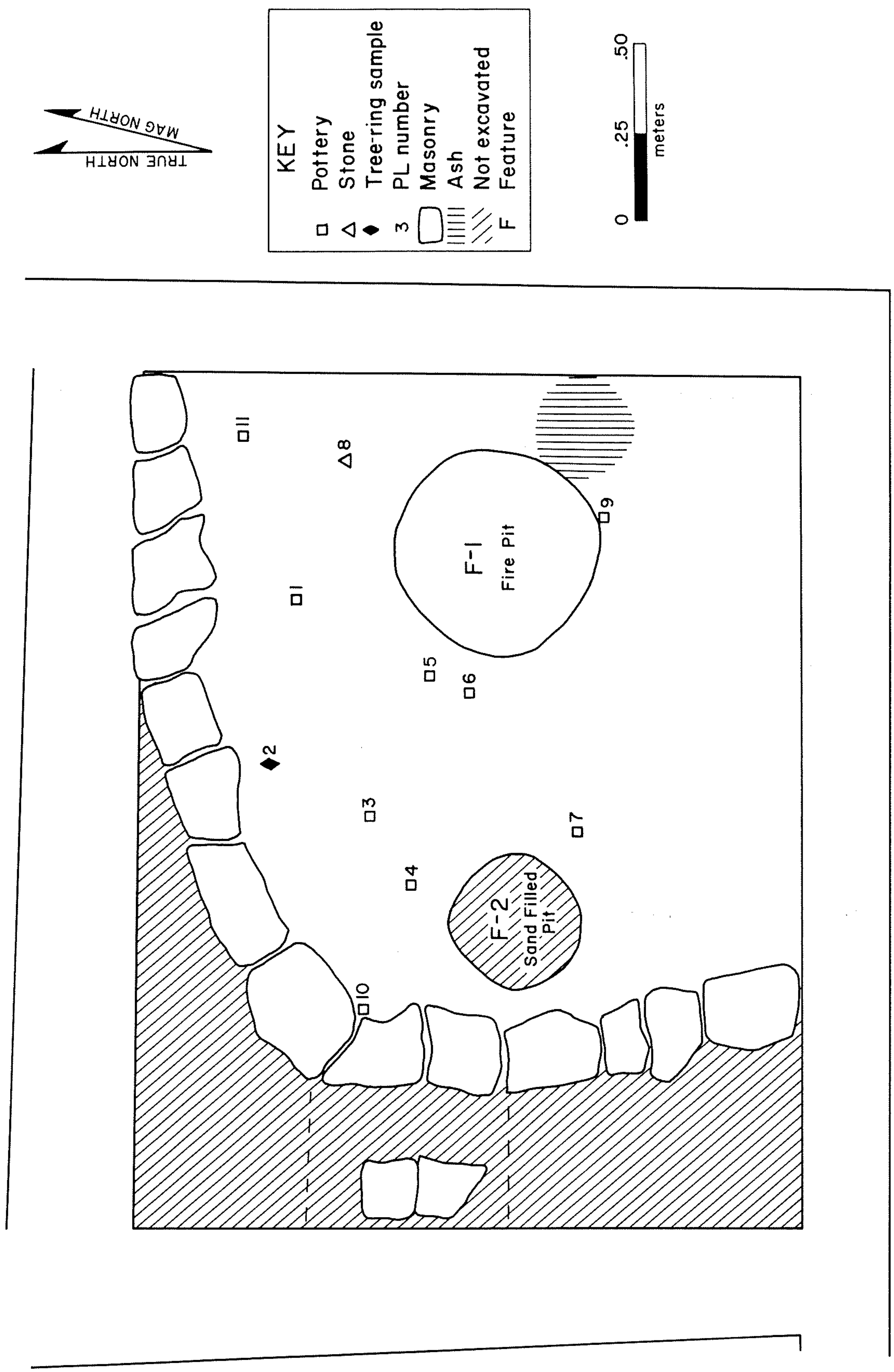



Figure 3.10: Structure 12 Plan and Surface Artifact Locations.

another dismantled Pueblo II structure was probably present, and may have abutted the west wall of Structure 12. Evidence of roofing material or a roof fall zone was absent. The floor of Structure 12 was excavated into sterile sediments and was use-compacted and unplastered. Above-floor artifacts were of Pueblo III origin linked to the construction of the later rooms, while floor surface artifacts were late Pueblo II in origin and appear to be de facto refuse. Two floor features were present: a shallow, basin-shaped fire pit (Feature 1), and a round, sand-filled pit (Feature 2) that was not excavated (Figure 3.10; Table 3.7). The fire pit (Feature 1) contained many charred corn cupules and an array of wild plant foods including charred cheno-am and ground cherry seeds and several fragments of Indian rice grass indicating that these plants were being exploited as foodstuffs. The presence of pine bark scales suggests that this might have been one source of fuel wood (K. Adams 1989).

Table 3.7: Structure 12 Features.

| Feat. No. | Type/Description | Length (cm) | Width (cm) | Depth/ Height (cm) | Fill | Use context |
|---|---|---|---|---|---|---|
| 1 | Fire pit | 55 | 55 | 3 | ash/charcoal | open[b] |
| 2 | Sand-filled pit[a] | 36 | 36 | – | sandy loam | unclear |

[a] Unexcavated; true dimensions unknown. [b] Open at abandonment.

Eleven artifacts or artifact clusters and one tree-ring sample in floor context were point located and mapped (Figure 3.10; Appendix A). A lightly charred wood fragment, probably fuel wood, was found slightly above the floor and yielded an inconclusive date of A.D. 1003 +vv. Aside from a possible mano (PL 8), floor artifacts were dominated by ceramics. Among these were sherds of a partially reconstructed Mancos B/W steep-sided bowl (Vessel 3), a segment of a Mancos Corrugated jar, and two oxidized sherds of another, different Mancos B/W bowl. The orifice diameter of Vessel 3 was estimated at 21 cm. No flaked stone artifacts were recovered in floor context.

Floor features and the limited assemblage suggest that primarily domestic activities occurred in Structure 12, and minimally included food preparation and cooking, as well as serving and consumption. The abandonment mode inferred from this assemblage is one of planned, leisurely abandonment. After an unknown span of time, the walls of this structure were dismantled and covered with constructional fill of Pueblo III origin.

Structure 2

Structure 2 is the westernmost of the masonry Pueblo III rooms, abutting the western wall of Structure 3 (Figures 3.4, 3.11). The room is inferred to have been 2.7 m in its east-west dimension based on the presence of a line of displaced masonry, and 2.45 m in width, yielding an estimated floor area of 6.6 $m^2$ making it the largest of the excavated Pueblo III rooms. The north wall of Structure 2 was built of single stone masonry composed of massive blocks of unshaped conglomerate and sandstone. The west wall was completely eroded. The south wall was of double-stone masonry, similar to that observed in other Pueblo III rooms, and stood two courses high. The floor of Structure 2 was indistinct and difficult to discern. The floor surface of Structure 2 appears to have been use-compacted, and at least partially excavated into sterile sediments. No artifacts could be associated with the floor due both to the difficulty in recognizing the floor and the presence of trash fill lying directly on the floor. The paucity of wall fall rubble within the structure or in the adjacent excavation unit (ARB 1) suggests that the walls of Structure 2 may have been intentionally dismantled, perhaps accompanying its use as a trash dump. It is also possible that the structure was abandoned before it was finished. The refuse in Structure 2 forms part of an apparently continuous zone of secondary refuse deposition on the western margin of the architectural sampling stratum. It is likely that the abandonment and subsequent reuse of Structure 2 as a refuse area coincided with the abandonment of the nonmasonry structures. The use of this structure prior to its abandonment and use for trash deposition is unclear since neither floor features, nor an abandonment assemblage indicative of function were present.

Structure 3

Structure 3 is east of Structure 2 with which it shares a wall. Its inner dimensions are 3.0 meters east-west, and 2.1 meters north-south. A floor area of 6.3 $m^2$ makes it the largest of the fully measurable Pueblo III masonry rooms. Construction is similar in detail to that of the other excavated Pueblo III rooms. Upper fill strata contained few artifacts, and those recovered may have been incorporated in wall and roofing sediments, or were on the roof.

Thirty point-located individual or clusters of artifacts were recovered on the floor of Structure 3 (Figure 3.11; Appendix A). Most of these were corrugated sherds – almost all of these refit to a nearly complete sooted cooking jar (Vessel 1), and a sherd container (Vessel 2). Vessel 1 is a heavily sooted medium-sized Mesa Verde corrugated jar with a volume was estimated at 2.7 liters and an orifice diameter of 11.5 cm. The bottom of the vessel was heavily abraded and its interior surfaces were moderately pitted. Rim sherds of Vessel 1 were recovered in fill some 5 to 10 cm above floor suggesting that the jar was resting on the floor and smashed after some degree of sediment had accumulated on the floor of the structure. It is also possible that the jar was suspended from a roof beam or was on the roof when the room was abandoned. Vessel 2 was a shallow plate or saucer (estimated volume of 0.45 liter) made from the basal portion of a large corrugated jar. A single flake, two sandstone abraders, several pieces of marginally modified stone, which might originally have been incorporated into walls as chinking, and two pieces of untempered raw clay comprised the remainder of the floor abandonment assemblage.

A portion of a sealed doorway (Feature 1), was found in the southern wall of Structure 3. It was the only feature in the room and the only doorway or aperture found in the excavated Pueblo III rooms (Table 3.8). The door was sealed at some point prior to site abandonment, and signaled a change in structure function or association, perhaps related in some way to the later addition of Structure 7. The sill of the doorway is approximately 25 cm above the floor in Structure 3. Rohn (1971:51) reports that sill heights of Pueblo III T-shaped doorways at Mug House averaged 30 cm above floor level and width averaged 38 cm. Rectangular doorways were somewhat wider. The door segment in Structure 3 falls within the range for T-shaped doors reported by Rohn suggesting that it may have been the lower portion of a T-shaped door or perhaps of a narrow rectangular door. If the door was T-shaped, it is possible that only the lower half was sealed as has been reported at Long House (Cattanach 1980, Figure 6). Thus, access to Structure 3 may have been restricted rather than blocked prior to or after the addition of Structure 7.

Feature 1 – the doorway – dates to the Pueblo III occupation of the room, while the two remaining features listed in Table 3.8 are inferred to have been associated with a dismantled masonry structure, perhaps dating to the Late Pueblo II occupation of the site, and predating the construction of Structure 3. These features were located within 3-5 cm of the floor of Structure 3. A number was not assigned to this possible structure with ill-defined margins ill-defined, because time did not permit further excavation.

Two features were noted and recorded. Feature 2 appears to have been a round, ash-filled firepit extending under the south wall of Structure 3. Feature 3 was a large, irregularly shaped ash and charcoal concentration which might have been another shallow hearth or other indeterminate ash lens. Several sherds and flaked stone artifacts were also excavated. On refitting, some of these sherds were of a Mancos B/W jar (SR 4), appearing to confirm a Pueblo II use of this dismantled structure and its contemporaneity with Structure 12.

Table 3.8: Structure 3 Features.

| Feat. No. | Type/Description | Length (cm) | Width (cm) | Depth/ Height (cm) | Fill | Use context |
|---|---|---|---|---|---|---|
| 1 | Doorway | 36 | 34 | 30 | rubble | sealed |
| 2 | Firepit[a] | 62 | 62 | – | ash/charcoal | sealed |
| 3 | Large pit, unspecified[a] | 65 | 62 | – | ash/charcoal | sealed |

[a] Not excavated; dimensions are approximate. Fill description based on surface indications.

The presence of a plugged doorway indicates that at some time during the occupation of the site, access to this room was altered or restricted. A thin, highly fragmented sandstone slab found in near-floor context, if a door rather than a roof hatch slab, may support the inference that access was restricted rather than altered. However, the slab was significantly thinner than those

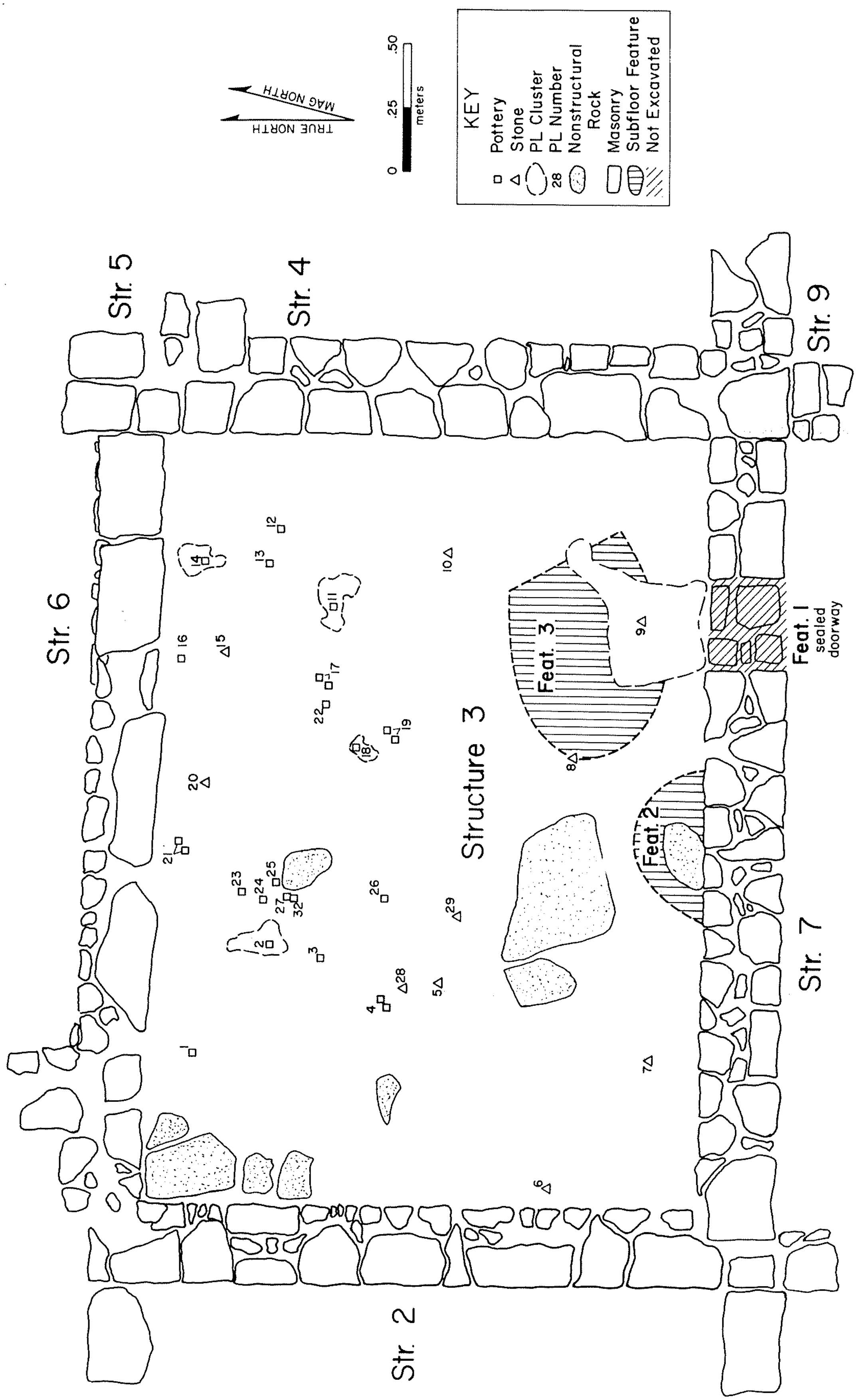



Figure 3.11: Structure 3 Plan and Surface Artifact Locations.

commonly used as door slabs. Since floor features of Pueblo III origin are absent and lack of floor features is generally considered an indication of a nonhabitation use, room function may not have changed significantly after access was altered or restricted. However, hearth features, frequently used to confirm a habitation function, appear to be lacking in many Pueblo III surface structures, so room use is equivocal.

In summary, as the roomblock grew, access to Structure 3 changed or was otherwise restricted. It is unclear if structure function or association changed as access was altered. Floor artifact assemblages were sparse and do not clearly differentiate between storage or habitation; in addition, sealed or restricted access seems to suggest storage. The two reconstructed vessels, a cooking jar and a sherd container, clearly relate to domestic activities. Thus, neither storage nor habitation functions are easily inferred.

Structure 4

Structure 4 is the smallest of the excavated Pueblo III masonry rooms. Interior dimensions are 2.4 m east-west and 1.8 m north-south, resulting in a floor area of 4.32 $m^2$ (Figure 3.12). Walls were double-stone, and construction was similar to that noted in Structures 3 through 6. As in Structure 3, above floor fill units contain few artifacts, but a few corrugated sherds were found in the Stratum 2 (wall fall). They probably had once been incorporated into one or more of the walls as chinking material – some grayware sherd were still embedded in the standing portion of the west wall. The floor of Structure 4 was a use-compacted surface on constructional fill overlying Structure 12, a Pueblo II room. No features of any kind were found in this room. However, an ashy area intermixed with artifacts was noted on the floor at the midline of the eastern wall. A single stone in this wall is lightly oxidized, but surrounding masonry is neither oxidized nor sooted suggesting that some of the masonry used in construction may have been reused. Neither the surface beneath the ash nor the artifacts intermixed with the ash had been oxidized. It is possible that this area might have been used as an informal hearth. It is also possible that the ash was intentionally dumped into the room at some point prior to abandonment. The latter explanation is preferred.

Access to Structure 4 might have been through the roof, but doorway access cannot be ruled out. An unshaped block of sandstone set into the floor might have served as a sill stepping stone through a doorway in the south wall. This block of sandstone had been set into the floor in a location similar to where the door in adjacent Structure 3 had been placed. Standing wall height in the north, west and east was high enough to indicate that doorways were probably not present in these walls. However, only a few courses of the southern wall remained so traces of a door, if present, may have collapsed. Many of the artifacts in upper fill units were apparently incorporated in wall and roof sediments or were on the roof at abandonment. A section of the west wall of Structure 4 had been chinked with grayware sherds indicating one source of fill artifacts. Structure 4 also contained the largest abandonment assemblage of any of the Pueblo III surface rooms with artifacts recovered from the floor of Structure 4 more diverse than the abandonment inventory recovered in Structure 3.

Forty-five individual artifacts or clusters of artifacts were recorded on the floor of Structure 4 (Figure 3.12; Appendix A). As in Structure 3, most were corrugated grayware body sherds. The majority of these sherds refit to Vessel 25, a sherd container, or to one of several sherd refits (SRs) 241, 242, 243 and 249. Several whiteware sherds refit to form Vessel 23. Vessel 25 was formed by marginal chipping along coil breaks at the base of a large corrugated grayware jar. The bottom coils were heavily abraded and the sherd container in its final form had an estimated capacity of 0.5 liter. Sherd Refit 243 was the midsection of a large corrugated jar and might also have been a sherd container, but evidence of marginal shaping and bottom abrasion was absent. Sherds of SR 241 and 243 were found in both floor and near-floor fill contexts suggesting that these might have been on the roof when it collapsed or perhaps had been dumped in the room after some sediment had accumulated on the floor. Vessel 23, a portion of a ladle bowl, exhibited a flattened rim abrasion and grinding (rather than rounded rim abrasion common to ladle bowls) suggesting its reuse as a scoop. The flaked stone assemblage included six flakes or flake

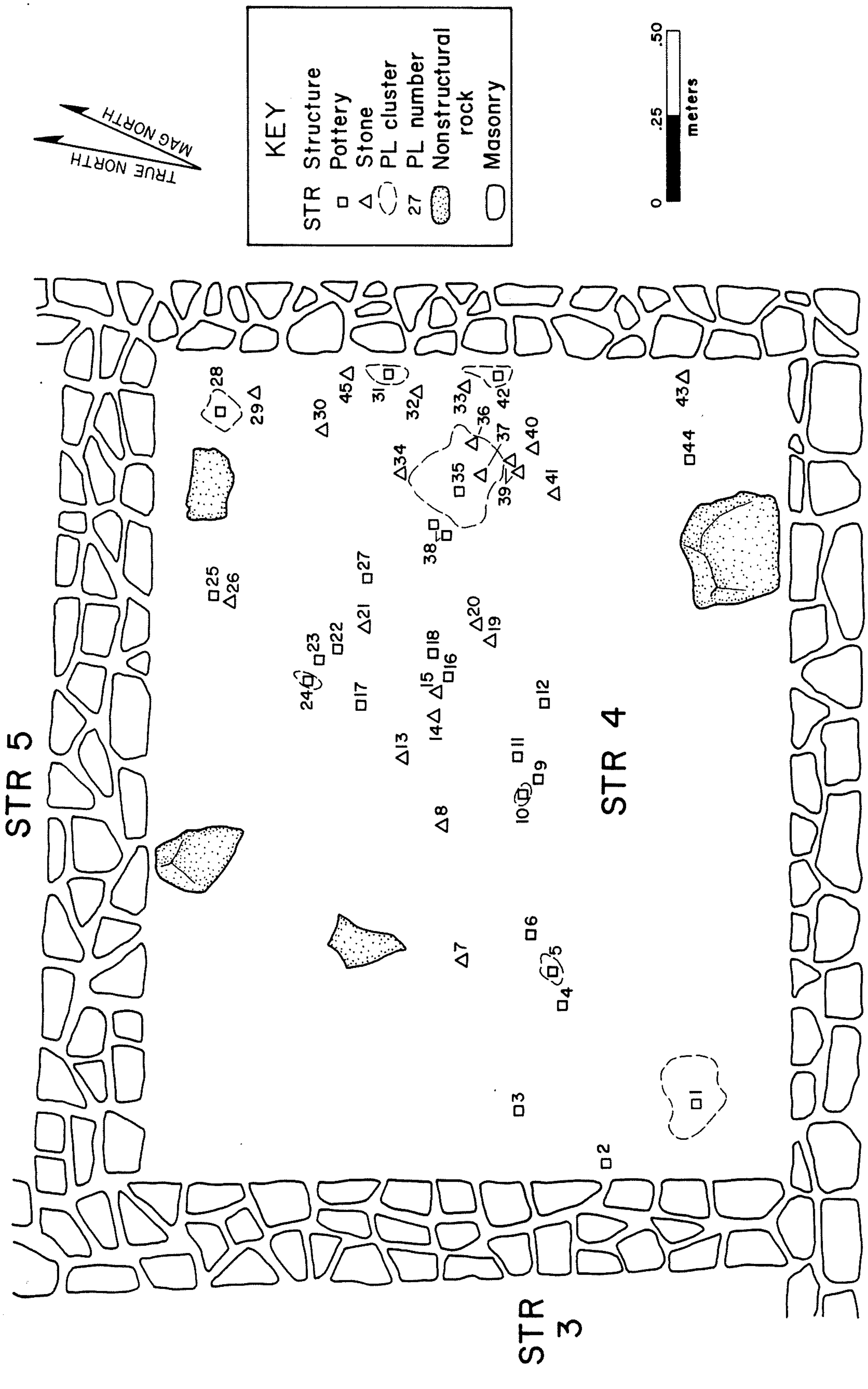



Figure 3.12: Structure 4 Plan and Surface Artifact Locations.

fragments, three edge-damaged flakes, and a modified flake and a tabular core, all of the same locally available Morrison Formation quartzite. Two sandstone abraders, a peckingstone and several other pieces of modified or utilized stone were also present. A complete two hand mano and two fragments of an exhausted, faceted two hand mano which conjoin (PLs 19 and 21) were also recovered in floor context.

Ceramic floor artifacts (Vessels 21 and 23) suggest activities related to food serving and consumption, while edge-damaged and modified flakes suggest cutting and/or processing activities. Unmodified flakes, a core and the single peckingstone suggest stone tool manufacture and or maintenance might have occurred in Structure 4. The presence of abraders, other modified stone and a broken exhausted mano reused as an abrader indicate generalized manufacturing, processing and/or maintenance activities. In the absence of a metate, the presence of a complete two-handed mano on the floor of the structure cannot be used to infer plant food processing; it may also have been used for other processing activities. Charred botanical remains on and near the floor included charred corn cobs, cupules and kernel fragments as well as pine bark scales and needles, and juniper twigs, and seed fragments. These botanical remains were recovered from several floor and near floor contexts.

Pine and juniper fragments may originally have been incorporated in roofing material. Charred corn parts may have been deposited with roof fall, either because they were on the roof, or were previously incorporated in roofing material; alternatively, they may have been deposited as a result of ephemeral cooking activities within the structure. A single leporid long bone shaft fragment was recovered near the floor, but was unmodified and uncharred. Pueblo rooms used for habitation are generally assumed to contain domestic features including hearths, storage bins, and mealing bins, among others (Ciolek-Torrello 1985; Rohn 1971).

Lack of a clearly defined fire feature would appear to suggest a storage or other nonhabitation function for Structure 4. The abandonment assemblage, on the other hand, suggests a broad range of domestic activities occurred. In the absence of a formal fire hearth and on the assumption that the ash concentration may not be a hearth, interpretive weight is given to floor artifacts which suggest domestic activities and a habitation function for Structure 4. It is also possible that the final assemblage represents light discard into an abandoned room or a room that was used only peripherally. Less likely alternatives suggest that floor artifacts might also result from activities occurring after the site was initially abandoned and reused, or perhaps from activities occurring on the roof of the structure.

In summary, a range of domestic activities, perhaps excluding food preparation and cooking, probably occurred in this structure. This suggests active use of the room for purposes other than simple storage, thereby placing this room into a functional category akin to that of living rooms despite its apparent lack of fire features.

Structure 5

Structure 5, along with Structure 4, was one of two rooms comprising the initial nucleus of the Pueblo III roomblock (Figures 3.4 and 3.9). Its interior dimensions are 2.5 m east-west, and 2.1 m north-south; it has a floor area of 5.25 $m^2$. Masonry construction and artifact content in above floor fill units were similar to other excavated Pueblo III rooms at Green Lizard. The floor of Structure 5 is a use-compacted surface on mixed constructional fill and sterile deposits. No features of any kind were found in this structure. Evidence of a doorway is lacking but the remaining walls are not tall enough to have preserved evidence or an elevated doorway; access might also have been through a roof hatch.

The floor artifact assemblage consisted of a single incomplete, side-notched projectile point of nonlocal material. Neither botanical nor faunal remains were found in above-floor fill or on the floor. The lack of floor features and surface artifacts, as well as its position relative to Structure 4, which probably was a habitation room or at least a room in which a range of domestic activities occurred, suggests that Structure 5 might have been used for storage. The function of this structure remains equivocal although a storage use is a likely possibility.

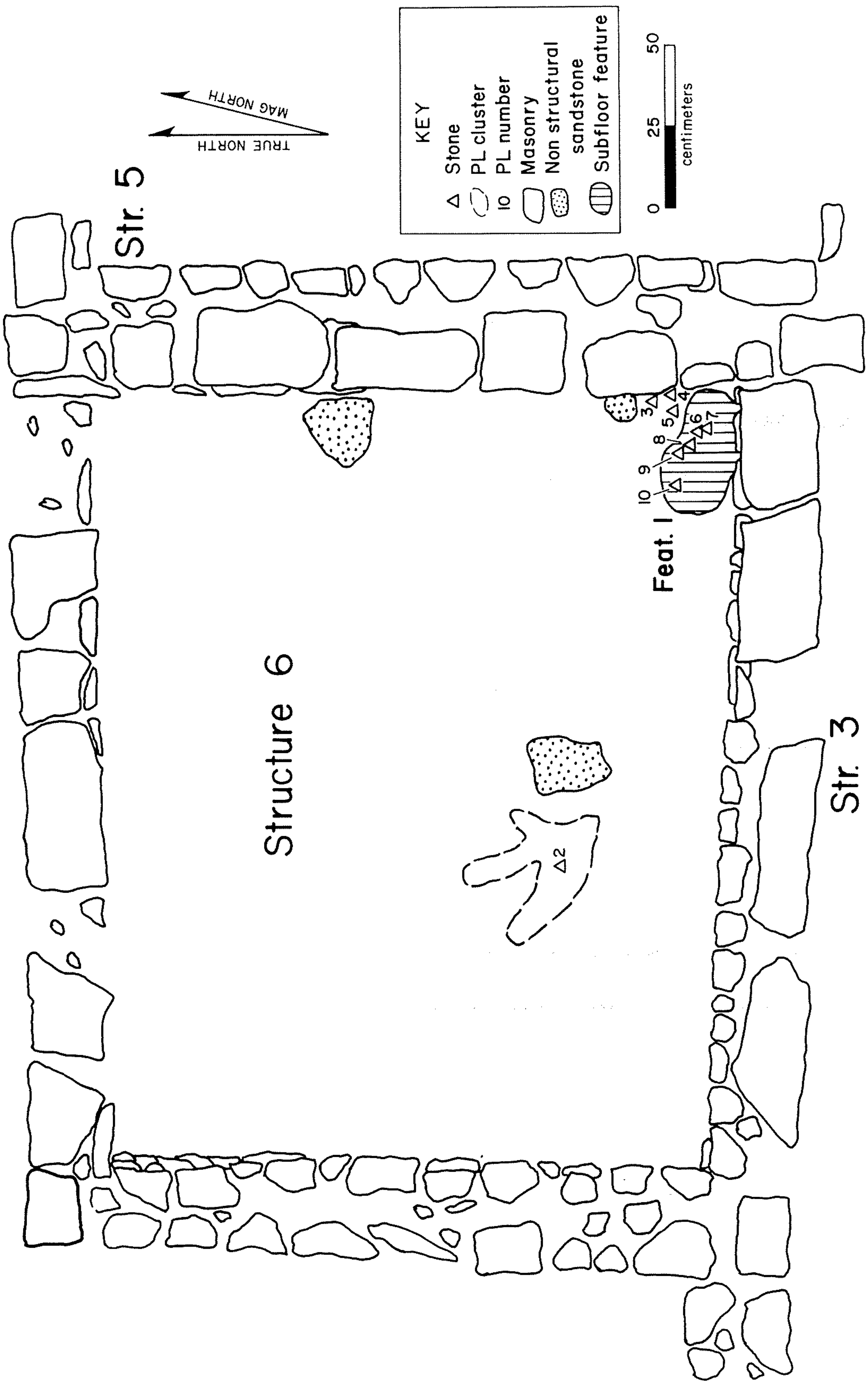



Figure 3.13: Structure 6 Plan and Surface Artifact Locations.

Structure 6

Structure 6 is a relatively small room whose interior dimensions are 2.3 meters east-west, 1.9 meters north-south; floor area is 4.37 $m^2$ (Figure 3.13). This room has double-stone walls in common with Structures 3 and 5 and its northern and southern walls are abutted to Structures 4 and 5. The masonry in this room was identical to that previously described for the other structures in this roomblock. The floor of Structure 6 is use-compacted over sterile sediments and was uneven and difficult to discern. Above-floor fill units contained very few artifacts. Clear evidence of an entry-way is lacking. However, a large, shaped sandstone slab was discovered, along with rubble above the floor in the northwestern part of the structure near the eastern wall. It is likely that this slab was a roof hatchcover, or a door slab for a doorway connecting Structures 5 and 6. Standing wall height at the east wall averages 60 cm indicating that if a doorway between Structures 5 and 6 existed, it possessed a relatively high sill. According to Rohn (1971:51), door sill heights at Mug House range from 66 to 86 cm above the floor, therefore, a door between Structures 5 and 6 is plausible. Carefully shaped corner stones or "quoins" were not in evidence in the rubble in the vicinity this door slab. However, corner stones forming the doorway of Structure 3 to the south were not as carefully shaped. Perhaps shaping of doorway corner stones was not emphasized here as it was in surface masonry rooms of Sand Canyon Pueblo.

Nine individual lithic artifacts or clusters thereof were found on the floor of Structure 6; all were of locally available Dakota quartzite (Figure 3.13; Appendix A). The majority of these were concentrated in a dense cluster (PL #2). This concentration probably represents a collection of chunks and flakes accumulated and stored for later modification in this room. Thus, a quantity of relatively high quality lithic material had been stored in this room at abandonment. Several point located flakes or flake fragments of similar material were found in the southeast corner of the room near Feature 1, and on portions of the floor which appear to have slumped into Feature 1 fill. Neither botanical nor faunal remains were recovered in floor or near-floor contexts.

Table 3.9: Structure 6 Features

| Feat. No. | Type/Description | Length (cm) | Width (cm) | Depth/ Height (cm) | Fill | Use context |
|---|---|---|---|---|---|---|
| 1 | Pit, not specified | 37 | 20 | 9 | sandy loam | sealed |

Feature 1, a small irregularly shaped pit of indeterminate function, was found in the southeast corner of the room (Table 3.9). This feature had been floored over, and appears to have extended partly under the south wall suggesting a use-surface in this area that may predate Structure 6. The presence of an earlier use-surface is consistent with inferred room construction sequences indicating that this room is a later addition.

The lack of floor features directly associated with use of this room suggests a storage function, but clear-cut evidence of storage beyond that provided by the flake concentration is lacking. This assessment of room function for Structure 6 is equivocal, but available evidence, or rather lack of evidence to the contrary, makes storage a plausible interpretation.

Structure 7

Structure 7 was built and abutted to the south wall of Structure 3 indicating that it was added after Structure 3 and 6 had been appended to the original roomblock nucleus of Structures 4 and 5. The southeastern portions of the walls and floor have eroded into the pitstructure depression along with any associated artifacts and features. Its western and southern walls were similar in construction to the rest of the western roomblock. Structure 7 and 9 share a common single-stone wall. This structure's interior dimensions were 3.13 m east-west and 1.9 m north-south yielding a floor area of 5.95 $m^2$. The remaining floor in Structure 7 was use-compacted. Although subfloor excavations were not undertaken, it is likely that the floor rests on a layer of constructional fill. This is supported by the observation that the highest standing course of the southern wall (a footing wall) is below the level of the floor. Postabandonment fill consisted of a single above-floor fill unit that was shallow, averaging 30 cm and containing wall fall and a few artifacts.

A single unmodified turkey bone (PL #1) and two corrugated jar sherds (PL #2) were the only artifacts recovered from the floor (Appendix A). A charred corn cob fragment and a modified flake of local stone were recovered from near the floor. Floor features were absent, but may have been present in eroded areas of the structure. An ambiguous thin ash lens in the northeastern corner of the room might have been a small ash dump. Neither the surface beneath the ash nor the masonry nearby appeared fire-reddened or sooted. Thus, evidence of a fire feature was equivocal, as was the case in Structure 4.

It is possible that several whole and fragmentary manos and metates found in near-floor fill contexts in Structure 1 might have originated from a mealing area subsequently eroded into the pitstructure, but supporting evidence in the form of in situ grinding equipment or slabs which might have formed the sides of mealing bins is lacking. The only feature present is the plugged doorway associated with Structure 3. It is unclear whether this doorway was open while Structure 7 was in use. Nor is it clear that the doorway was sealed or otherwise restricted before, after, or in conjunction with the construction of Structure 7. Evidence of another access route was absent, but if one was present, it may once have opened onto the kiva courtyard in the badly eroded south wall. With only a minimal abandonment assemblage and lack of floor features, structure use cannot be determined.

Structure 9

Structure 9 was added after the original core unit, consisting of Structures 4 and 5 were constructed. Since it shares a wall with Structure 7, it may have been built at the same time. However, supportive evidence in the form of common or bonded southern walls has been eroded. All of the southern wall and the majority the eastern and western walls as well as a substantial portion of the floor appear to have eroded into the pitstructure depression (Figures 3.1, 3.4). This room's inferred interior dimensions were 2.49 m east-west and 1.7 m north-south yielding an estimated minimal floor area of 4.23 $m^2$. The floor of Structure 9 is use-compacted, but was difficult to discern. Limited subfloor excavation indicated that the floor was built on constructional fill similar to that observed in adjacent Structure 4. Several stones, apparently comprising a portion of the southern wall of Structure 12, a Pueblo II room below Structure 4, protrude through the floor of Structure 9. Neither floor artifacts nor features were encountered in Structure 9.

Two modified sherds and three sandstone abraders were found in above-floor fill contexts. A charred wood fragment collected from above-floor fill in association with a small lens of ash and charcoal yielded tree-ring date of A.D. 963 vv. Subfloor excavations south of the presumed south wall of Structure 12 confirmed the presence of constructional fill. Excavation was halted at 30 cm below the floor of this structure before sterile sediments were encountered. The absence of artifacts and features, as well as the significant amount of erosion provides no evidence of room function. However, excavations in the upper strata of the pitstructure depression on the slope below Structure 9 encountered a number of whole and broken manos (Figure 3.1, 3.5). Whole and fragmentary slab metates and manos were also recovered in near-floor fill contexts in Structure 1. It is possible that these grinding implements may derive from Structure 9. If so, a mealing area may once have existed in the southern portion of Structure 9. It is also possible that these grinding tools were derived from extramural mealing areas associated with the courtyard surfaces south of Structures 9 and 7.

## Masonry Room Discussion: Construction, Use and Abandonment

Site occupation predating construction of the Pueblo III roomblock is evident in Structure 12 and a second mostly dismantled masonry room found below the floor of Structure 3. Masonry construction style and associated ceramic assemblages suggest that these rooms were built and occupied during the late A.D. 1000s to early A.D. 1100s. The subsequent construction and growth of the Pueblo III roomblock apparently occurred in three stages. The first construction stage of the Pueblo III roomblock appears to have been initiated with the almost complete dismantling of the earlier Pueblo II walls. Wall bonding and abutment indicates that Structure 4 and 5 were the first to have been built, and that they formed the core to which later Pueblo III rooms were appended. The second stage of construction is present in the abutment of Structures 3 and 6 to the western walls of Structure 4 and 5. I do not know how much time passed between construction of the original two-room nucleus and the addition of Structures 3 and 6, but it is possible that the rooms are contemporary, or nearly so. The third and final stage occurred when Structures 7 and 9 were abutted to the south walls of Structures 3 and 4, respectively, and Structure 2 was abutted to the west wall of Structure 3. It is not known if Structure 2 was added concurrently with Structure 7 and 9. Nor is it clear how much time may have passed between the construction of Structures 4 and 5 and 3 and 6 and Structures 2,7, and 9. At some point, perhaps in the second or third growth stage, two unexcavated and currently unnumbered masonry rooms were constructed midway between the western and eastern pitstructures. Their association with the western kiva suite is predicated upon the presence of a tunnel (Tunnel 2) that may link Structure 1 and one of these rooms. However, as the tunnel was not completely excavated, it may also have connected to the eastern kiva (Structure 11). After an unknown span of time, Structure 2 was abandoned and secondary refuse accumulated in it prior to abandonment of the other surface masonry rooms, which was concurrent with site abandonment.

At some point after Structure 3 was in use, the doorway in its southern wall was plugged or the opening was restricted. Sealing or restriction of this doorway may have coincided with construction of Structure 7, but may also have occurred before or after. Since this was the only apparent entrance to Structure 3, it is possible that had it been completely plugged, and that entrance to the room was altered, possibly signaling a shift in room function or association. A probable door slab found in Structure 6 may indicate communication between Structures 5 and 6, but may also indicate roof access. It is possible that another doorway was present in the south wall of Structure 4. However the only evidence to support this was the presence of a large rock on the floor of Structure 4, flush against the south wall which may have served as a "step." Other evidence, including shaped corner stones was absent. Evidence of the mode of access was lacking in Structures 2, 7 and 9. Accretional growth of the Pueblo III roomblock, the sequence of changing access or association of rooms, and the abandonment of at least one room prior to abandonment of the rest, indicates considerable intensity and duration of occupation at Green Lizard. In light of the long occupation at Green Lizard, the lack of hearths in surface rooms is intriguing and suggests that the pitstructure functioned as a primary domicile with some ritual/ceremonial functions as well. This interpretation is not identical to Lekson's (1988, 1989) recent proposal that prehistoric pitstructures were predominantly domiciles. It is likely that most Pueblo III pitstructures were both domiciles and places in which household level ritual and ceremony occurred (Lipe 1989).

## Summary of Fill and Assemblage Formation Processes

Aside from secondary refuse deposited in Structure 2, fill sequences are similar in all of the excavated Pueblo III rooms. Structures 3, 4, 5, 6 and 7 possess abandonment assemblages in surface contexts, which have been interpreted as primarily depleted de facto refuse. It is also possible that artifacts on or in roofs may have contributed to these abandonment assemblages as well. Floor assemblages in all of the structures are clearly depleted, indicating that valued artifacts were removed during a planned abandonment. Evidence of roof beams was lacking in all of the rooms. It is likely that this is due to natural decay processes, but confirmation is lacking. The possibility that the roofs were dismantled and removed as part of an abandonment process cannot be ruled out. Following abandonment, rooms rapidly filled with wall rubble and colluvial sediments containing few artifacts. The last use of the roomblock probably coincides with abandonment of the site as part of a functioning community, but the site may still have been used occasionally, perhaps by inhabitants of nearby sites such as Sand Canyon Pueblo. The absence of significant sediment accumulations in rooms below wall fall strata suggest that any such occasional reuse would have occurred soon after abandonment and was of short duration. Roomblock floor assemblages probably reflect the activities carried out at the end of the main occupation of the site.

Functional Inferences

Traditional functional inferences about Pueblo rooms based solely upon room location and the occurrence of certain classes of features such as hearths or mealing bins is rendered difficult because the roomblock in its final form does not possess a front room and back room layout, and rooms lack distinctive features commonly used to distinguish room use. It is possible that the traditional front room = habitation, back room = storage functional dichotomy was present at Green Lizard when Structures 4/5 and Structures 3/6 were in use, but entrance and perhaps function may have changed as the number of rooms grew and access or association changed.

Traditionally, the lack of formal internal features, especially hearths, in the excavated set of Pueblo III rooms at Green Lizard would indicate that all of these rooms were storage structures. Primary habitation would therefore have occurred in the pitstructure (Structure 1). Hearths are common and distinctive features of habitation rooms in earlier periods, but seem to be somewhat less common in Pueblo III surface rooms. At Pueblo III alcove sites on Mesa Verde, there are 5.4 surface rooms per hearth at Long House, and 3.6 rooms per hearth at Mug House, exclusive of pitstructure hearths (Rohn 1971; Cattanach 1980). This figure is somewhat lower than in earlier periods in the Mesa Verde Region. It is possible therefore, that the majority of cooking and heating activities formerly undertaken in living rooms might have been performed in outdoor areas as indicated by the many courtyard hearths found in late Pueblo III alcove sites on Mesa Verde, or in pitstructure hearths. The presence of burned, fragmented bone in the kiva hearth (Structure 1) at Green Lizard suggests that consumption and perhaps cooking occurred there Relatively substantial abandonment assemblages suggesting a variety of domestic activities were present only in Structure 3 and 4. The remaining rooms either lacked floor assemblages or possessed sparse floor assemblages rendering functional interpretation difficult in the absence of floor features.

## Jacal Structures

Excavation of the area west of the pitstructure depression was originally undertaken in arbitrarily defined excavation units (ARB 1 and 2). Once excavation revealed that structures were potentially present, the designations were changed to a structure excavation unit. Excavation in the arbitrary units revealed posthole alignments and evidence of at least three nonmasonry structures (designated Structures 8, 10, 13) and associated use-surfaces indicating that nonmasonry structures of jacal or wattle-and-daub construction were present at one time (Figure 3.14). Of these three, Structure 10 was the best defined, possessing a relatively distinct floor, a low adobe ridge at the floor margin, and posthole patterns adjacent to the floor margin indicating the presence of walls. The margins of Structure 13 were somewhat less well-defined than Structure 10, but also possessed a distinct floor surface with associated features and a series of aligned postholes on the room's northern margin. Structure 8 was the least well-defined of the three and may have been a roofed and walled structure or perhaps an activity area between the other two structures. Although definitive chronological data is lacking, available ceramic and tree-ring evidence indicate that a Pueblo III origin for these structures is likely. Posthole and other feature data suggest that Structure 13 may postdate the construction of Structure 13, whereas the temporal relationship of Structure 10 to either of these is unclear.

## Jacal Structure Fill Description

Dense secondary refuse containing artifacts, ash, charcoal, burned and unburned sandstone spalls, daub melt and unconsolidated adobe chunks was the principal depositional unit overlying the area encompassing the nonmasonry structures. De facto abandonment refuse may also have been present on the floors of these structures, but if so, it had become intermixed with secondary refuse deposited on these surfaces. Ceramic data indicate that the refuse was deposited during the Pueblo III occupation of the site after these structures had been abandoned.

While the depositional nature of the fill units is straightforward, they were excavated in a somewhat more complicated manner. In Structure 10 and Arbitrary Unit 2 (an excavation unit overlying Structure 10 in part) artifacts and ecofacts were deposited in a medium gray-brown loam containing ash and charcoal. Stratum 1 sediments overlying Structure 8 were similar, as were Stratum 1 and 2 overlying Structure 13 – Stratum 1 and 2 in Structure 13 were originally excavated

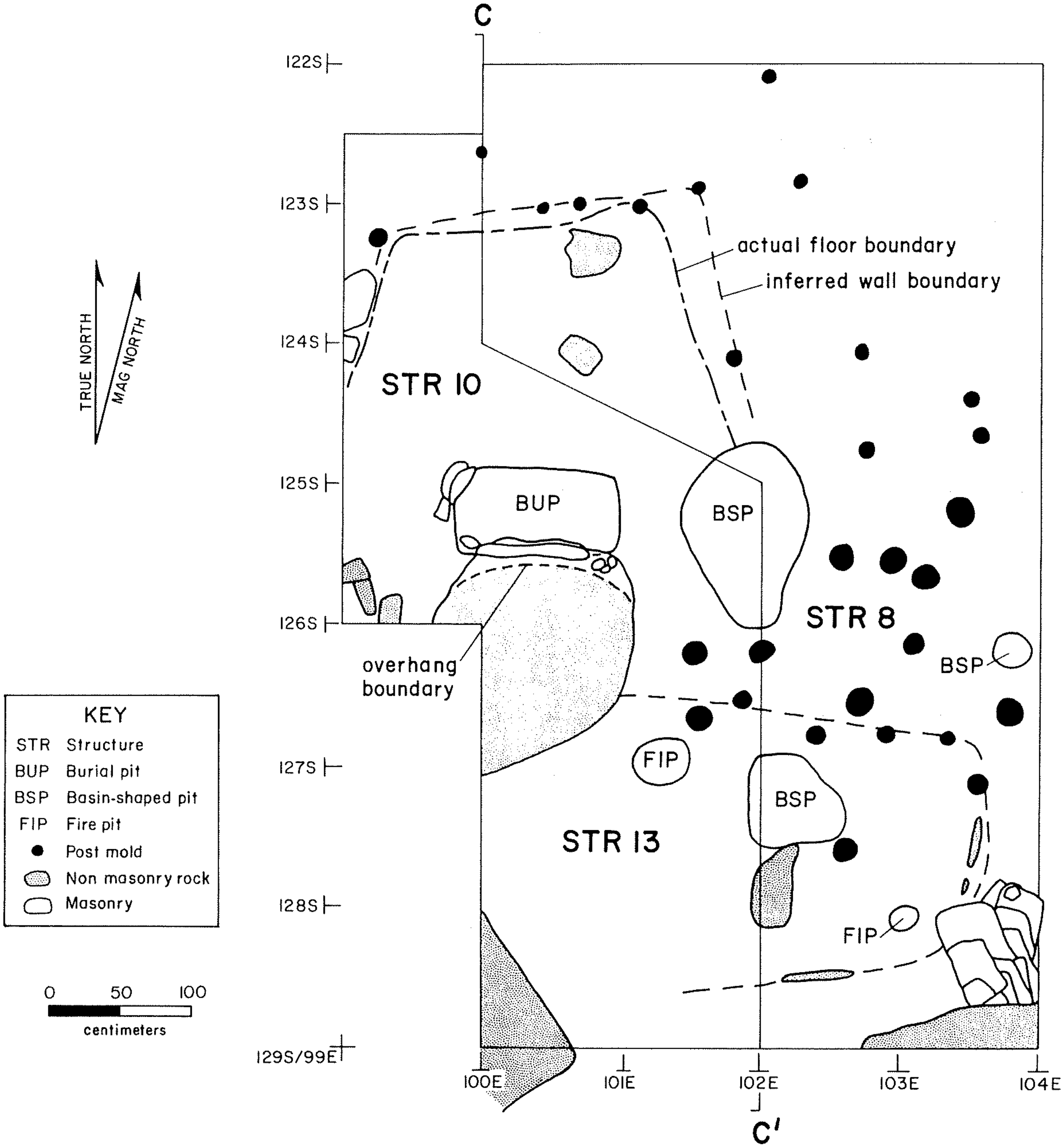



Figure 3.14: Jacal Structures Plan

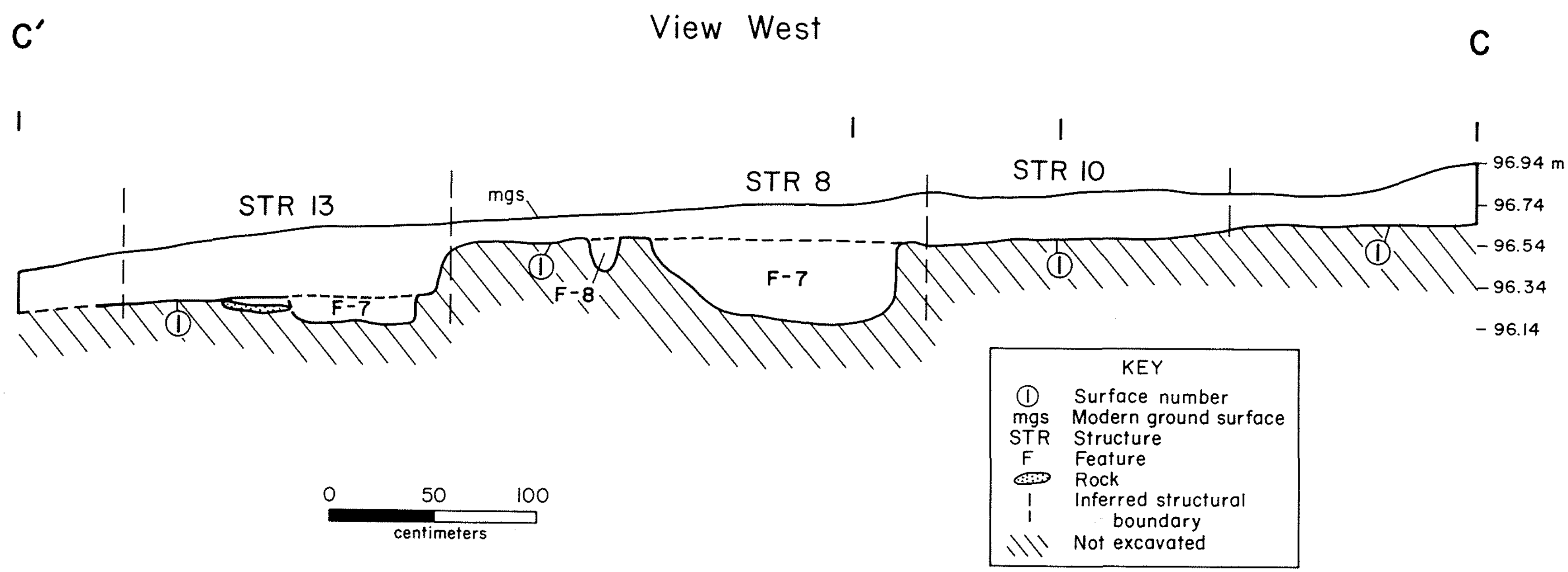



Figure 3.15: Jacal Structures Profile.

as part of Structure 8. Stratum 2 in Structure 8 contained mottled daub melt lenses interspersed with ash, charcoal chunks and numerous artifacts. Stratum 3 in Structure 13 was a light brown sandy loam containing lesser quantities of ash, charcoal but numerous artifacts.

In summary, sediments overlying Arbitrary Unit 2 and Structures 8, 10 and 13 are generally similar in character and deposition (Figure 3.15). This is largely borne out by the great number of sherd refits (more than 50) encountered between and among fill strata in these excavation units. Sediments in Stratum 2 of Structure 8 and Stratum 3 of Structure 13 are of different sedimentological character, but a large number of conjoinable ceramics exist between fill in these two units and overlying strata as well, indicating that while matrix composition differs, the postabandonment fill units overlying these structures are depositionally equivalent.

Structure 8

Prior to excavation, Structure 8 was originally defined on surface indications by an area of ash, charcoal, artifacts, and burned small sandstone, and a small masonry structure was expected. Excavation failed to establish the presence of a masonry walls, however. Instead, several postholes and a large pit feature (Feature 7) with indication of burning were found in association with a use-surface suggesting presence of a nonmasonry structure (Table 3.10).

The presence of a nonmasonry structure was supported by a compacted use-surface overlying sterile sediments, and the presence of eight postholes, most between 17 and 20 cm in diameter. However, posthole patterns did not clearly delimit structure boundaries. It is possible that the use-surface and associated features may indicate the presence of a roofed, and unwalled structure or perhaps unroofed extramural use-area possessing an elevated storage rack or poles. The use surface itself was overlain in some areas by compacted, mottled lenses of daub, possibly representing disintegrated roof and wall sediments. This material may also represent redeposited constructional material not associated with the collapse of a walled nonmasonry structure. Artifacts underlying and intermixed with this discontinuous layer indicate that secondary refuse was deposited at or soon after this structure and the other jacal structures were abandoned some time prior to the final abandonment of the site.

The area which has been defined as Structure 8 contained three additional features. Two were small, shallow unburned pits of indeterminate function. The third, Feature 7, was a large, irregular basin-shaped pit. The fill of this feature was complex and consisted of poststructural abandonment accumulations of ash, charcoal, rubble, ecofacts, and artifacts. Botanical samples from the fill of the feature yielded pine and juniper fuel wood, in addition to many charred corn cupules and cheno-am seeds. Although an economic function perhaps related to roasting of plants and other foods cannot be ruled out, the plant remains are clearly in a secondary refuse context probably unrelated to the feature's original function.

Table 3.10: Structure 8 Features.

| Feat. No. | Type/Description | Length (cm) | Width (cm) | Depth/ Height (cm) | Fill |
|---|---|---|---|---|---|
| 1 | Basin-shaped pit | 28 | 28 | 8 | ash/charcoal loam[a] |
| 2 | Posthole | 18 | 18 | 20 | ash/charcoal/artifacts[a] |
| 3 | Posthole | 20 | 20 | 15 | sandy loam/artifacts[a] |
| 4 | Pit, not specified | 20 | 20 | 11 | ashy loam[a] |
| 5 | Posthole | 16 | 14 | 20 | ash/charcoal/artifacts[a] |
| 6 | Posthole | 12 | 12 | 16 | ashy loam[a] |
| 7 | Basin-shaped pit | 130 | 100 | 36 | complex |
| 8 | Posthole | 17 | 17 | 19 | ashy/charcoal/artifacts[a] |
| 9 | Posthole | 16 | 16 | 17 | ashy loam[a] |
| 10 | Posthole | 17 | 17 | 12 | ashy loam[a] |
| 12 | Posthole | 15 | 15 | 12 | ashy loam[a] |

[a] These features contain ash, charcoal, small sandstone fragments and occasional artifacts indicating that the posts were removed at or some time prior to abandonment.

A large number of sherd refits between feature fill and overlying strata indicate that feature fills and overlying strata comprise depositionally similar units. The presence of ash, charcoal and some artifacts in posthole fills suggests that the postholes predate the secondary refuse deposits, and that the posts had been removed prior to or along with abandonment and reuse of the area for secondary refuse deposition. The two latest tree-ring dates from Green Lizard of A.D. 1230 vv and 1233 vv were obtained from the fill of Feature 7 and probably are on fuel wood. These dates indicate that trash in Feature 7 and the overlying strata were deposited around the mid- A.D. 1230s.

## Arbitrary Unit 1

Arbitrary Unit 1 was a trapezoid-shaped excavation area 3 m on its northern end, 2 m at its southern end and 4 m on its eastern end. The northern and eastern boundaries of this excavation were defined by the southern and eastern walls of Structures 2 and 7 (Figure 3.4). Limited excavation in this unit indicated that the deposits consisted of secondary refuse of Pueblo III origin similar to that found in Structure 2 and the nonmasonry structures to the south.

## Arbitrary Unit 2

Arbitrary Unit 2 was located south of Arbitrary Unit 1, and was a 4 m by 3 m rectangular area with its longest dimension oriented west-east (Figures 3.4, 3.14). Excavation revealed the presence of a secondary refuse deposit that overlay Structure 10 and an adjacent courtyard use-surface and several associated postholes (Table 3.11). One or more additional nonmasonry structures may have been present in this area, marked by the presence of several postholes which could not be considered part of Structure 10. Strata in Arbitrary Unit 2, which overlay the courtyard west of the pitstructure (Structure 1) and Structure 10, was composed of an artifact and ecofact-rich Pueblo III secondary refuse.

Table 3.11: Arbitrary Unit 2 Features.

| Feat. No. | Type/Description | Length (cm) | Width (cm) | Depth/ Height (cm) | Fill | Use context |
|---|---|---|---|---|---|---|
| 1 | Posthole | 13 | 13 | 12 | Sandy clay[a] | unclear |
| 2 | Posthole | 14 | 14 | 22 | Sandy clay[a] | unclear |
| 3 | Posthole | 12 | 12 | 16 | Sandy clay[a] | unclear |
| 4 | Posthole[b] | 10 | 10 | – | --- | --- |
| 5 | Posthole[b] | 7 | 7 | – | --- | --- |
| 6 | Posthole[b] | 9 | 9 | – | --- | --- |

[a] Ashy, dark gray-brown sediments with pebbles and charcoal flecks. [b] Unexcavated.

The courtyard surface was difficult to discern and where defined, consisted of use-compacted sterile sediments. The surface at the eastern margin of Arbitrary Unit 2 sloped down into the pitstructure depression indicating that this portion of the courtyard surface was eroded. Postholes were the only features found in association with the courtyard surface, but could not be interpreted as evidence of a structure. Three of these postholes were excavated, three others remained unexcavated.

It is not clear whether the postholes found in association with the courtyard surface are of Pueblo II or Pueblo III origin. However, the fill of the excavated postholes appears to be similar to that of Structures 8 and Structure 10 in that they contain ashy sediments with charcoal flecks suggesting that these posts may have been removed before secondary refuse was deposited over the area. Ceramics found on courtyard surface lacked Pueblo II or indeterminate mineral painted ceramics of Pueblo II origin suggesting that use of this area dates to the Pueblo III occupation of the site.

Structure 10

Posthole alignments and an associated use-compacted surface defining Structure 10 were encountered north of Structure 8 (Figure 3.14). Postholes and use-surface margins define the northeastern margins of the structure, but do not clearly fix the southern boundary of Structure 10. The western margins of the structure are also poorly defined, and may extend beyond the limits of excavation. The floor of this structure is use-compacted sterile sediment sloping gradually downwards to the southwest where it appears to have been eroded. The strata resting on and above the definable floor surface consist of secondary refuse deposited after the structure had been abandoned and perhaps dismantled, but while the site was still occupied. Some of the artifacts on the floor of Structure 10 may be de facto refuse, but if so, were indistinguishable from secondary refuse. Eight postholes, inferred to be associated with Structure 10 are present but were not excavated (Table 3.12). They are relatively small, none exceeding 10 cm in diameter. The diameter and placement of these postholes suggest light jacal walls. The apparent diameter of the posts indicates that a roof, if present, was also of jacal construction.

Table 3.12: Structure 10 Features.

| Feat. No. | Type/Description | Length (cm) | Width (cm) | Depth/ Height (cm) | Fill | Use context |
|---|---|---|---|---|---|---|
| 1 | Burial Pit | 120 | 60 | 45 | Complex | Sealed |
| 2 | Posthole[a] | 10 | 10 | -- | --- | --- |
| 3 | Posthole[a] | 8 | 8 | – | --- | --- |
| 4 | Posthole[a] | 7 | 7 | – | --- | --- |
| 5 | Posthole[a] | 7 | 7 | – | --- | --- |
| 6 | Posthole[a] | 7 | 7 | – | --- | --- |
| 7 | Posthole[a] | 6 | 6 | – | --- | --- |
| 8 | Posthole[a] | 6 | 6 | – | --- | --- |
| 9 | Posthole[a] | 9 | 9 | – | --- | --- |

[a] Unexcavated; dimensions are based on surface measurements.

Burial 1. The presence of a rectangular feature that turned out to contain a burial, was indicated by an upright slab visible in the southern portion of the excavation unit adjacent to a large boulder defining the northeastern margin of excavation area containing Structure 8. The upper fill overlying the burial pit contained Pueblo III secondary refuse. Excavation revealed a rectangular slab-lined pit containing a tightly flexed mature adult male and a small number of grave goods (Figure 3.16). The relationship of this burial to the use and abandonment of Structure 10 was unclear as Structure 10 boundaries are undefined in this area. However, the use-compacted surface of Structure 10 is adjacent to the burial pit, suggesting some relationship.

Two distinct fill strata were recorded in the field. The upper fill unit (Stratum 1) was a light brown loamy sand with a lens of hard daub in its center. Stratum 1 contained ash, charcoal and artifacts. A flotation sample collected from this fill unit contained juniper, pine and oak as well as a cob and charred cupules of corn (K. Adams 1989). This stratum terminates abruptly at a daub melt layer, and a slumped, horizontal sandstone slab overlying the upper portion of the burial. Notable in Stratum 1 were a small (0.79 liter capacity, orifice diameter 13.9 cm) complete Mesa Verde B/W bowl (PL #1, Vessel 10), and a number of sherds, which formed most of a large reconstructible Mesa Verde B/W bowl with mending holes (PL #2, Vessel 8). Vessel 10 was found in an inverted position and tilted downward toward the western end of the burial pit. The vessel bottom was slightly abraded indicating use. Vessel 8 was a medium to large bowl with an estimated capacity of 3.1 liter and an orifice diameter of 23.0 cm. Large conjoined sherds of this bowl were also found in an inverted position in the upper burial pit stratum. Remaining sherds to complete the reconstruction of Vessel 8 were found in the upper fill unit (Stratum 1) of adjacent Structure 8 indicating that the upper fill unit in the burial pit (Stratum 1) and Stratum 1 overlying Structure 8 are depositionally related. These vessels do not appear to have been directly associated with Burial 1. Their worn condition, their angle of repose, and the scattered sherds of Vessel 8 within and outside the burial pit suggests they may have been abandoned in fill above or near the burial pit, later becoming incorporated into upper burial pit fill through postabandonment formation processes. Sherds of a partially reconstructed medium-sized corrugated vessel with distinctive nail-impressed patterning (Vessel 11) were also found in upper burial pit fill and in floor and overlying strata of Structure 10. These vessel and sherd refit data conclusively demonstrate that the sediments in upper burial pit fill were depositionally similar to secondary refuse deposits overlying nonmasonry structures in this area.

Excavation of Stratum 2 initially encountered a badly fragmented portion of a right innominate encased in melted daub. Further excavation uncovered an equally deteriorated right femur and a portion of a tibia. After the remaining hardened daub fill of the northern portion of the burial pit had been excavated, it was clear that the burial continued under a slumped slab. The cranium and upper portion of the trunk were overlain by the slumped slab and partially encased in daub. Below the slab, the character of the fill changed from hard daub to loamy sand. Bones underlying the slab were in poor condition, but somewhat better than in other areas of the burial pit. The cranium was oriented to the west and the body was tightly flexed on its left side, facing north. Burial accompaniments consisted of a small, complete Mesa Verde B/W bowl (Vessel 4) with an exterior design of three mountain sheep, and Vessel 5, a complete Mesa Verde B/W mug

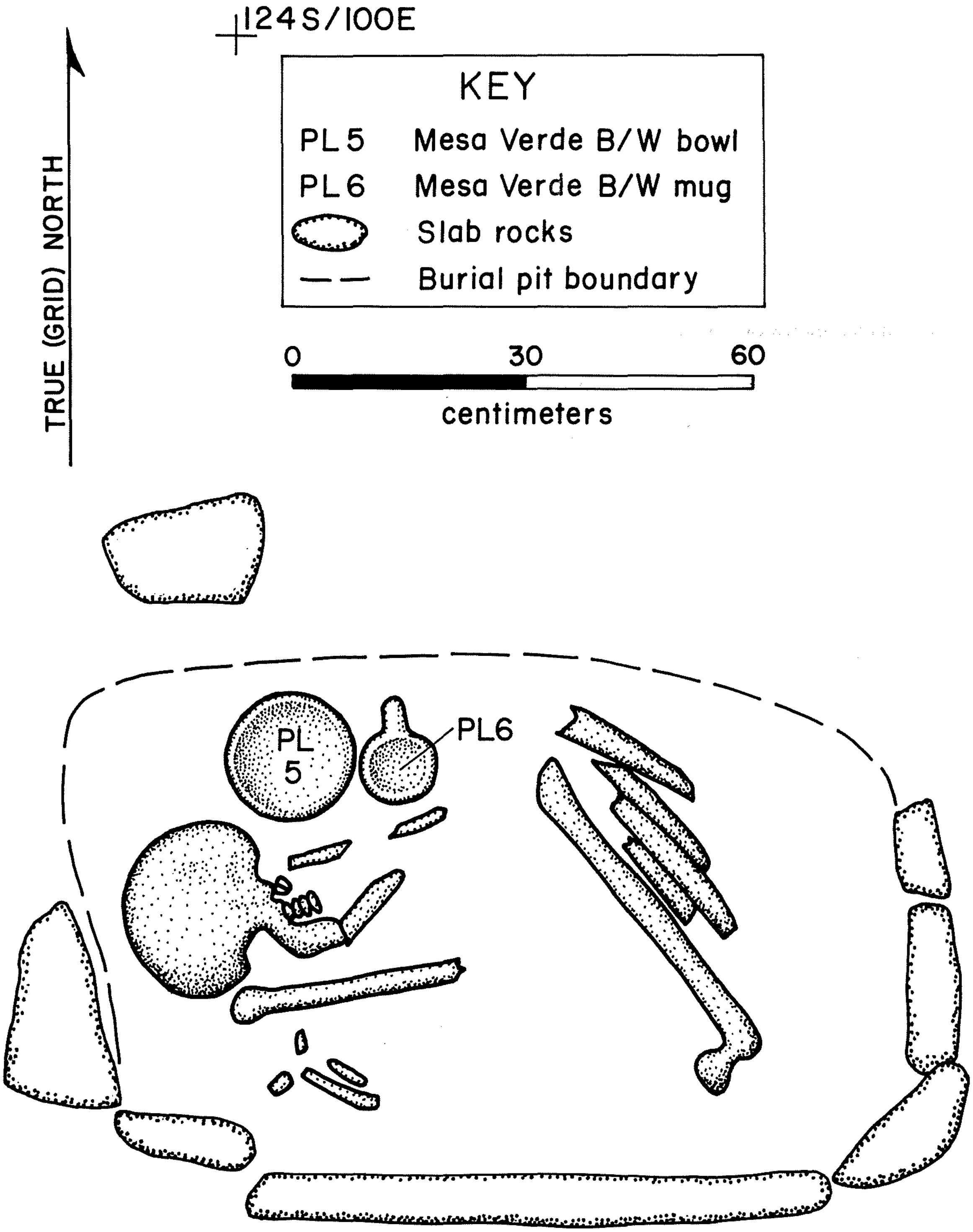



Figure 3.16: Burial 1 Plan.

(Figure 3.16). The volume of Vessel 4 is 0.89 liter with an orifice diameter of 14.9 cm. Light abrasion on the exterior bowl bottom indicated some degree of use prior to being included with the burial. The bottom of Vessel 5, a mug, with an orifice diameter of 8.0 cm and a capacity of 0.43 liter, also exhibited light bottom abrasion suggesting use.

The burial pit was located in a sloped area that has been subject to water erosion. As a result daub and slabs used to construct the pit were eroded and partially encased the burial. Water percolation and infiltration appeared to have contributed to the poor condition of the burial. The interment, based on the nature and degree of dental attrition and robusticity of the bones, was inferred to have been that of a mature adult male aged 35-50 years (Kice 1991; Katzenberg 1992). Pathologies were not evident on surviving bones, but linear enamel hypoplasias indicative of childhood developmental dietary or physiological stress were present (Kice 1991).

The relationship of the burial to the use of Structure 10 is unclear. Nor is it clear whether the slab lined feature containing the burial was initially constructed for the purpose of housing the burial or whether the burial was placed in an existing feature. A small tree-ring sample from Stratum 1 yielded a date of A.D. 871 vv. It is clear however, that the burial dates to the Pueblo III occupation of the site and occurred at or prior to the abandonment of the nonmasonry structure area and its subsequent use as a locus of secondary refuse deposition, and prior to the abandonment of the site. Tree-ring dates of A.D. 1230 vv and 1233 vv from adjacent Structure 8, along with the demonstrated depositional similarity of upper fill strata in Structure 8 and Burial 1 support a Pueblo III date.

<u>Structure 13</u>

The upper refuse bearing fill units (Strata 1 and 2) overlying Structure 13 were originally excavated as part of Structure 8 (Figures 3.14 and 3.15). Remaining fill units to the use-compacted floor of Structure 13 (Stratum 3 and 4) were also composed of Pueblo III secondary refuse. Structure 13 was defined by the presence of a basin-shaped use-compacted surface over sterile sediments and the presence of several features. A series of east-west aligned postholes define the northern wall and northeastern corner. These postholes had been excavated into an elevated area 20 to 30 cm above floor level. The elevated area appears to coincide with the compacted use surface which has been associated with Structure 8. On the east and south, the structure's margins are tentatively defined by the presence of single, well-separated thin upright stone slabs in each area. It is possible that these slabs might represent a dismantled mealing bin, but conclusive evidence is lacking. Postholes were encountered in the eastern and northern excavated portions of Structure 13 suggesting that portions of the room remained unexcavated. Postholes in the northern margin are similar in size to those of Structure 10 (Table 3.13).

Two firepits containing ash, charcoal and charred plant parts, and a larger unburned feature of indeterminate function were encountered. A reconstructible Mesa Verde B/W bowl (Vessel 6, PL #63) with a mending hole, was found overturned with additional sherds found in Stratum 3. Vessel 6 was encountered near the floor of Structure 13 and may form part of an abandonment assemblage. Estimated vessel capacity is 1.2 liter, vessel orifice diameter is 17.3 cm, and the presence of moderate exterior and interior abrasion suggests a considerable amount of use.

Table 3.13: Structure 13 Features.

| Feat. No. | Type/Description | Length (cm) | Width (cm) | Depth/ Height (cm) | Fill | Use context |
|---|---|---|---|---|---|---|
| 1 | Posthole[a] | 15 | 15 | – | --- | --- |
| 2 | Burned pit | 60 | 60 | 10 | ash/charcoal | in use |
| 3 | Posthole[a] | 12 | 12 | – | --- | --- |
| 4 | Posthole[a] | 12 | 12 | – | --- | --- |
| 5 | Posthole[a] | 11 | 11 | – | --- | --- |
| 6 | Posthole[a] | 13 | 13 | – | --- | --- |
| 7 | Basin-shaped pit | 115 | 70 | 17 | complex | unclear |
| 8 | Posthole[a] | 10 | 10 | – | --- | --- |
| 9 | Fire pit[a] | 22 | 22 | – | ash/charcoal | --- |

[a] Unexcavated; dimensions are approximate.

Many artifacts were point-located on the structure's floor, but because overlying strata consisted of secondary refuse, I could not distinguish de facto from secondary refuse.

Feature 2 is an ash and charcoal filled pit which appears to have served as a hearth. Flotation samples from this feature contained charred woody remains of sage, Mormon tea, juniper, pine and serviceberry/squawapple. Charred economic plant remains were also recovered from the fill of this feature and included cheno-am and yucca seeds, numerous corn cupules and a single corn kernel fragment suggesting that these foods might have been processed in or near this feature. Feature 7 is a large, shallow, basin-shaped pit of irregular dimensions and complex fill whose function is unclear. Contents of the feature include unburned daub, artifacts and small charcoal fragments, but lacked quantities of charcoal and ash common to fire-related features. Feature 9 is a small, unexcavated burned pit containing ash and charcoal that is presumed to have served as a hearth. The two burned features appear to have been in use when the structure was abandoned. The presence of refuse in Feature 7 indicates that it may have been open for use at abandonment. The presence of unburned daub, if not a result of secondary refuse deposition, may indicate the collapse or dismantling of Structure 13 prior to, or along with, the deposition of secondary refuse.

## Jacal Structure Discussion: Construction, Use and Abandonment

The nonmasonry structures in the western area of the architectural sampling stratum exhibit a complex history of construction, use, and abandonment. Three or more nonmasonry structures may have been present during the Pueblo III occupation of Green Lizard. Nonmasonry structures are common before Pueblo III times, but are less common during the late Pueblo III period in the Mesa Verde Region (Rohn 1971, 1977; Cattanach 1980). Jacal-walled structures appear to be somewhat more common during Pueblo III period in the Kayenta Region (Dean 1969:25).

It is possible that some or all of these nonmasonry structures are related to the Pueblo II occupation. However, the more than 3,600 sherds present on surfaces and overlying trash strata, only three type-identified Pueblo II period sherds were recovered – all in fill contexts. Five tree-ring samples were recovered in these structures (Table 3.14). A juniper fragment from Stratum 3 in Structure 13 yielded an A.D. 1119 vv date. Another juniper fragment from the upper fill of the burial pit (Feature 1, Stratum 1) yielded a date of A.D. 871 vv. A piece of juniper from on or very near the surface of Structure 13, near Feature 9, dated to A.D. 1204 vv.

Table 3.14: Tree-Ring Dates in Nonmasonry Structures.

| Study Unit | Provenience | Date |
|---|---|---|
| Structure 8 | Feature 7, East 1/2 | 1230 vv |
| Structure 8 | Feature 7, East 1/2 | 1233 vv |
| Structure 10 | Feature 1, East 1/2, Stratum 1 | 871 vv |
| Structure 13 | Stratum 3 | 1119 vv |
| Structure 13 | Stratum 4, PL# 140 | 1204 vv |

Two juniper fragments recovered from the fill of Feature 7 in Structure 8 yielded dates of A.D. 1230 vv and 1233 vv suggesting that the feature and perhaps Structure 8 could have been abandoned at or some time after the early A.D. 1230s. Although these dates on probable fuelwood are not useful in determining construction dates for Structures 8, 10 and 13; they do, however, provide a maximum age, after which these nonmasonry structures were used for secondary refuse deposition.

A low stub of a double-stone masonry wall abutted to a boulder at the southeastern corner of Structure 13 indicates that a masonry structure or perhaps a low masonry courtyard boundary wall may once have been present in the are west of the pitstructure(Figures 3.4, 3.14). The footing of the wall was not excavated, but appeared to rest on sterile sediments and was probably associated with a courtyard surface. The base of the wall stub was embedded in secondary refuse similar to that found overlying Structure 13 suggesting that the construction and subsequent dismantling of this room(s) or wall probably predates the secondary refuse deposit.

Construction and use of Structure 10 cannot be placed in temporal relation to Structures 8 and 13 based solely on stratigraphic or post hole data. Thus, it is unclear whether Structure 10 was contemporary with one or any of the nonmasonry structures. The relationship of Structures 8 and 13, although problematic, was somewhat clearer than was the case for Structure 10.

Stratigraphic data and posthole placements, suggest that Structure 13 may post-date the use-surface associated with Structure 8. This interpretation is supported to some extent by excavation data indicating that the surface associated with Structure 8 may have been truncated by the floor of Structure 13. A line of post holes defining the northern wall of Structure 13 also appears to have been excavated into the use-surface associated with Structure 8. Based on this, Structure 13 postdates the construction of Structure 8. Although Structure 13 may have been excavated partially through the surface of Structure 8, it does not necessarily indicate that Structure 8 was abandoned as a result. Structure 8 may have been remodeled to accommodate the presence of Structure 13.

Detailed structure abandonment sequences also cannot be defined. It is unclear whether Structures 8, 10 and 13 were abandoned at the same time or if the abandonment of one precedes that of the others. It is clear however, that all of the structures had been abandoned, probably at or after the A.D. 1230s, when Pueblo III refuse was deposited directly on the structure surfaces. The temporal relationship between the masonry wall stub and the construction and occupation of the jacal structures is poorly understood. Evidence which has been presented suggests that the construction of the wall also predates Pueblo III trash deposition in the area.

## Formation Processes of Fill and Assemblages: Refit-based Interpretation

Although strata overlying the nonmasonry structures are sedimentologically varied, they are depositionally equivalent. Stratum 1 and 2 in Structure 8 and Arbitrary Unit 2, and Stratum 3 in Structure 13 and Structure 10 contain many sherd refits and are depositionally indistinguishable. Several refit links between the fill of Feature 7 in Structure 8 and Stratum 1 and 2 in Structure 8, in addition to Stratum 3 in Structure 13 and Stratum 3 in Structure 10, indicate that the fill in the feature was deposited at the same time as secondary refuse forming Strata 1 and 2 in Structure 8 and Stratum 3 of Structures 10 and 13. The accumulation of secondary refuse in the area after the structures had been abandoned suggests a single depositional event or a series of closely related events. Postabandonment bioturbation is also a possibility, but the absence of distinguishable animal burrows and the lack of modern vegetation growing over this area, suggests otherwise.

Finally, the presence of artifacts in the fill of some postholes in the use-surface of Structure 8 indicate that they were open at abandonment. It is likely that some or all of the posts in Structure 8, and perhaps the other structures as well, may have been salvaged some time at or soon after the area's reuse for secondary refuse deposition. It is not unlikely that Structures 8, 10, and 13 were constructed, abandoned and reused as a locus of secondary refuse deposition within a relatively short time of one another. Secondary refuse deposits also occur in Arbitrary Unit 1 and Structure 2 to the north of Arbitrary Unit 2 suggesting that the entire western margin of the architectural sampling stratum from Structure 13 in the south to Structure 2 in the north was abandoned over a few years and used as a refuse area while the site was still occupied.

### Functional Inferences

The presence of fire pits in Structure 13 and economic plant remains from the fill of one of them (Feature 2) indicates that food preparation and cooking probably occurred in this structure. Aside from the hearth in Structure 12 and the pitstructure hearth, these are the only other fire features discovered at Green Lizard. The large basin-shaped pit in Structure 8 provides no evidence of structure or feature function, and the absence of floor features in Structure 10 also fails to provide evidence to assess function. Surface artifact assemblages in the nonmasonry structures, if present, were uninformative as they were intermixed with secondary refuse deposited on structure floors. Thus, aside from the fire-related features in Structure 13, which may indicate some aspects of habitation, structure function cannot realistically be determined for the other nonmasonry structures with the available evidence.

## MIDDEN EXCAVATION

The primary midden deposit at Green Lizard is located south of the architectural sampling stratum (Figures 3.1, 3.4). Ten units were excavated during intensive excavations in 1987 and 1988. Another unit was partially excavated as part of the 1986 Survey Testing Program (Van West et al. 1987) and is included with the current midden data (Appendix B). The midden was divided into four sampling strata, essentially four quadrants. The northern sampling strata (Strata 3 and 4) comprised the "formal" midden area where deposits appeared to have been relatively intact. The lower two midden strata (Strata 5 and 6) to the south encompass clearly eroded deposits. The midden was further subdivided into eastern and western halves (Strata 3, 5 and 4, 6 respectively) to allow study of any material culture differences existing between the western and eastern kiva suites (Figure 3.3). A total of 10.35 $m^3$ of midden sediments were excavated and screened in the eleven sampling units. The midden is an extensive area of secondary refuse that accumulated over a considerable span of time. It is characterized by a dense accumulation of ash, charcoal, artifacts, ecofacts and burned and unburned sandstone rubble. Midden accumulations characteristically contain the highest diversity and greatest density of artifacts in Anasazi sites. Midden materials represent redeposited material byproducts of activities occurring at the site, which generally encompass the range of behaviors at the site through the depositional history of the midden. Midden accumulations therefore provide an index of the diversity and intensity of the activities that generated nonperishable artifacts at a site.

### Stratigraphy and Correlation

Stratigraphy in the six deepest midden units located in the "formal" midden area (Figure 3.2, 3.4) near the kiva retaining walls as well as stratigraphic profiles from the three deepest midden units, 124S/123E, 124S/117E, and 126S/120E, indicated that depositional processes were similar across the main midden area (Figures 3.17, 3.18 and 3.19)). Three major depositional events can be distinguished on the basis of sediment color and composition (Bloomer 1988). Each of these general depositional units include one or more separately recognized strata. Deposits in the lowest stratum overlying sterile sediments were grayish-brown, compacted, and disturbed to varying degrees by natural processes. The middle depositional unit was reddish-brown and was by far the thickest of the three. The middle unit also contained the largest number of artifacts especially in units 124S/116E, 124S/117E, and 126S/120E. The uppermost depositional unit was again a dark gray-brown, but unlike the lowest stratum, was not compacted.

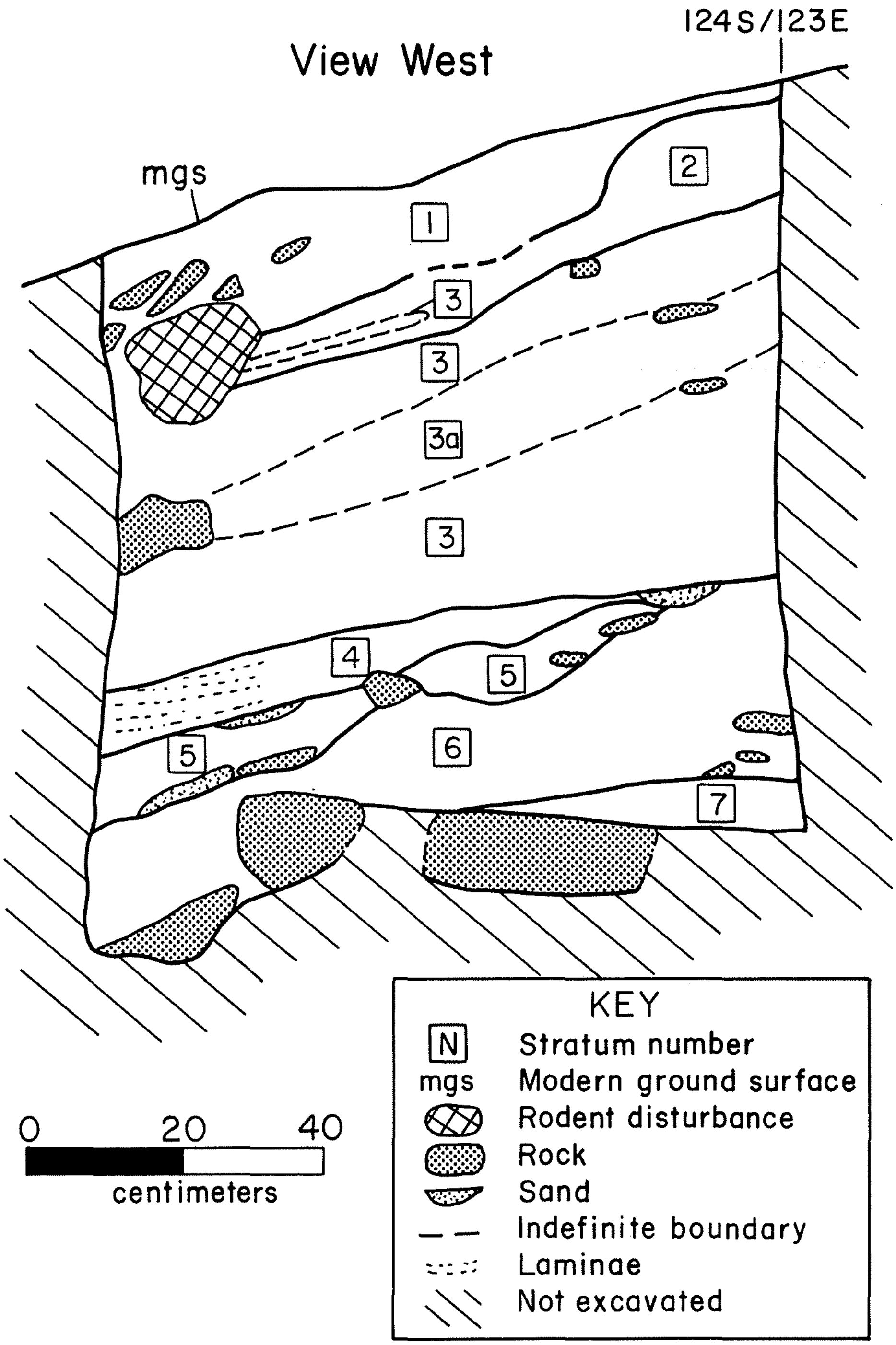



Figure 3.17: Grid 124S/123E Stratigraphy.

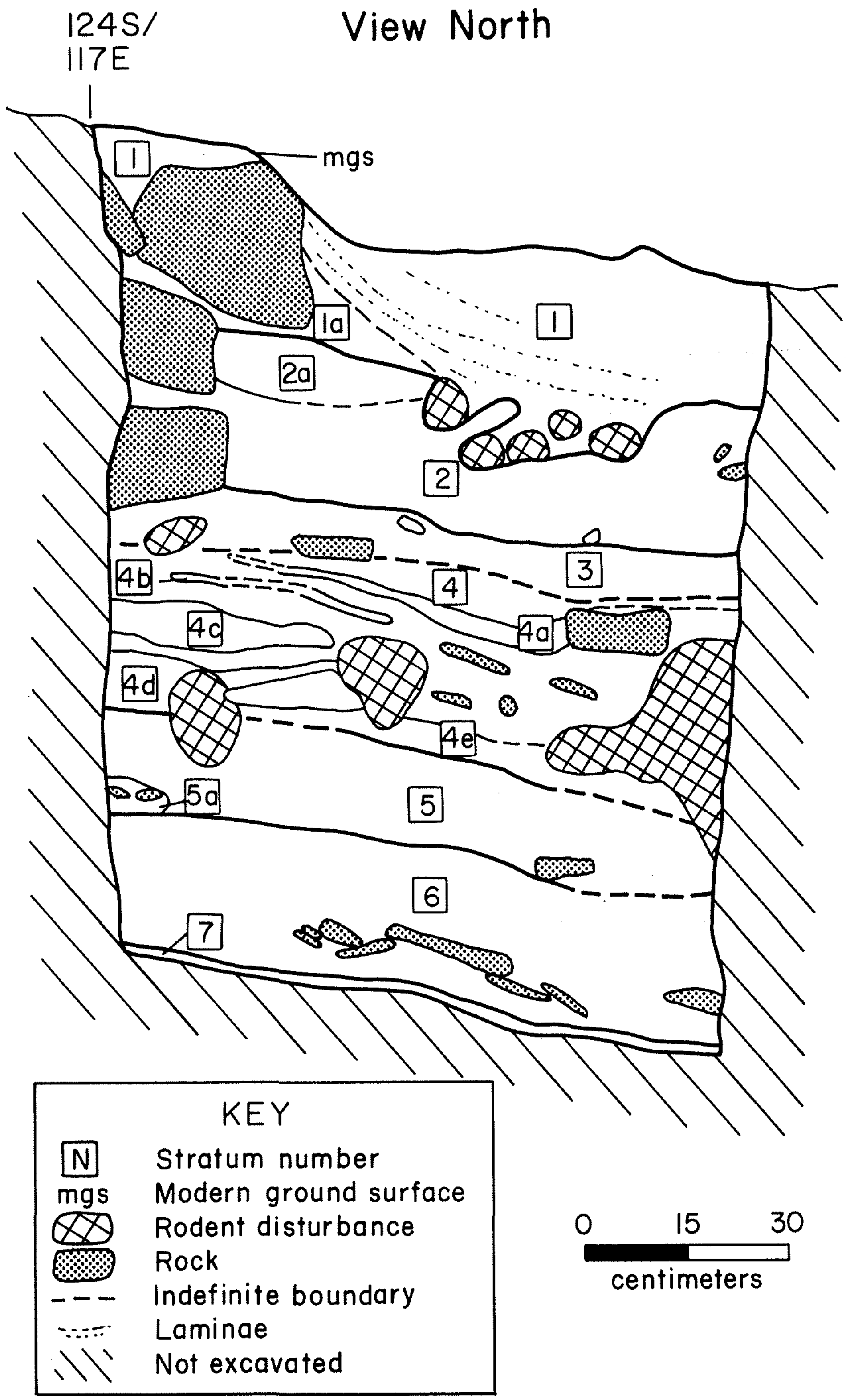



Figure 3.18: 124S/117E Stratigraphy.

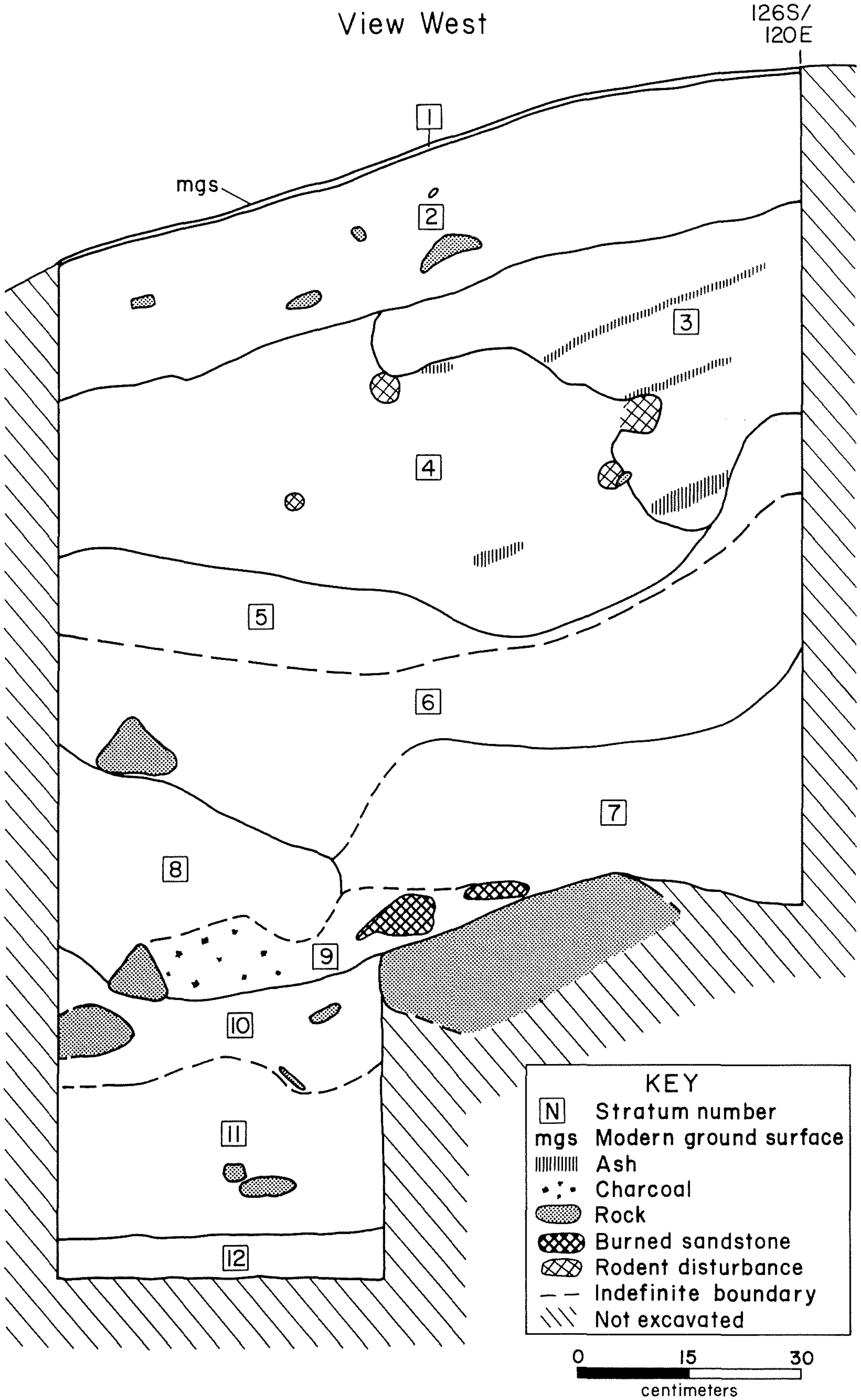



Figure 3.19: 126S/120E Stratigraphy.

Limited particle size analyses conducted on sediments from the upper two depositional units of test pit 124S/117E indicated that the substrata within the two units were sandy loam despite differing sediment color (Bloomer 1988). However, sediments from the middle depositional unit tend to contain slightly more sand and less silt and clay than in the upper unit. This indicates that the depositional environment from the middle to upper depositional units changed from higher to lower energy transport as midden sediment accumulated and slope angle decreased in this part of the midden (Bloomer 1988).

Two of the upper midden excavation units adjacent to the lower midden boundary (131S/117E and 132S/116E) were considerably shallower (60 cm) than other units located nearer the pitstructure retaining walls. Although shallower, these test pits contained at least as many artifacts as were recovered in some of the deeper units indicating the more southern areas of the midden probably have been eroded. Midden erosion was probably a continual process from the time secondary refuse was deposited and continues today. A judgmentally selected test unit, 133S/109E, was located on the extreme western margin of the midden sampling stratum. Although secondary refuse was encountered, sterile sediments were reached within 30 cm of modern ground surface. This refuse may have moved downslope from the secondary refuse deposit overlying the nonmasonry structures to the north, or may be part of a more extensive sheet trash deposit.

Retaining walls of large unshaped sandstone blocks were encountered within several of the midden test pits: 124S/123E, 129S/113E, 126S/114-115E and 124S/116-117S (Figures 3.1, 3.4). Each of these wall sections were considered "floating walls" in that they had been placed upon and subsequently covered by midden accumulations. Such walls are not uncommon in Pueblo III sites, and the reason for their construction has often been attributed to an attempt to prevent erosion of midden accumulations. It is unclear why this may have been important to the inhabitants of Green Lizard.

## Assemblage Characteristics

The midden assemblage contains a great diversity of artifact and ecofact types, all of which resulted from the intentional deposition as secondary refuse by the site's inhabitants. The dominant artifact categories recovered in the 11 excavated midden units (including the unit excavated in 1986) and the 10 surface collected units in the lower, eroded portion or the midden are, in order: ceramics (n=5,344), chipped stone (n=3,585) and nonhuman bone (n=2,825). The variety of artifacts present in the midden indicates that ceramics, flaked and ground stone tools, and bone tools were manufactured, maintained, used, recycled and ultimately discarded. Major artifact categories and their significance are discussed below.

### Ceramics

The ceramic artifact assemblage recovered from the 11 excavated 1 x 1 meter units, including the partial test unit excavated in 1986, was dominated by Pueblo III period ceramics (Table 3.15). Mesa Verde B/W was the dominant type-identified whiteware by a large margin. McElmo B/W and Mancos B/W formed significantly smaller percentages of the primary midden ceramic assemblage. Pueblo III ceramic types were more common than Pueblo II types at all levels, including the lowest. However, Pueblo II type frequencies tended to increase while Pueblo III types decreased with depth (Figure 3.20). In excavated midden contexts, the ratio of Pueblo III whiteware bowl sherds to corrugated grayware jar sherds is 0.48:1.

A rare variety of Mancos B/W – Tin Cup Polychrome – was found in Green Lizard excavated midden deposits. Six bowl sherds from two different vessels were recovered from middle to lower levels in two of the 1 x 1 meter units. In this type, bowl interior surfaces have an unpolished gray background and a broadline geometric design in polished white slip paint bordered by thin framing lines in black mineral paint , creating a white and black on gray polychrome.

Several of the Tin Cup Polychrome sherds also have exterior white slip, perhaps as part of a broad exterior band design. Its closest design affinities appear to be with early Citadel Polychrome dating from about A.D. 1115 to 1200 (Breternitz 1966) or Tusayan Polychrome, Style

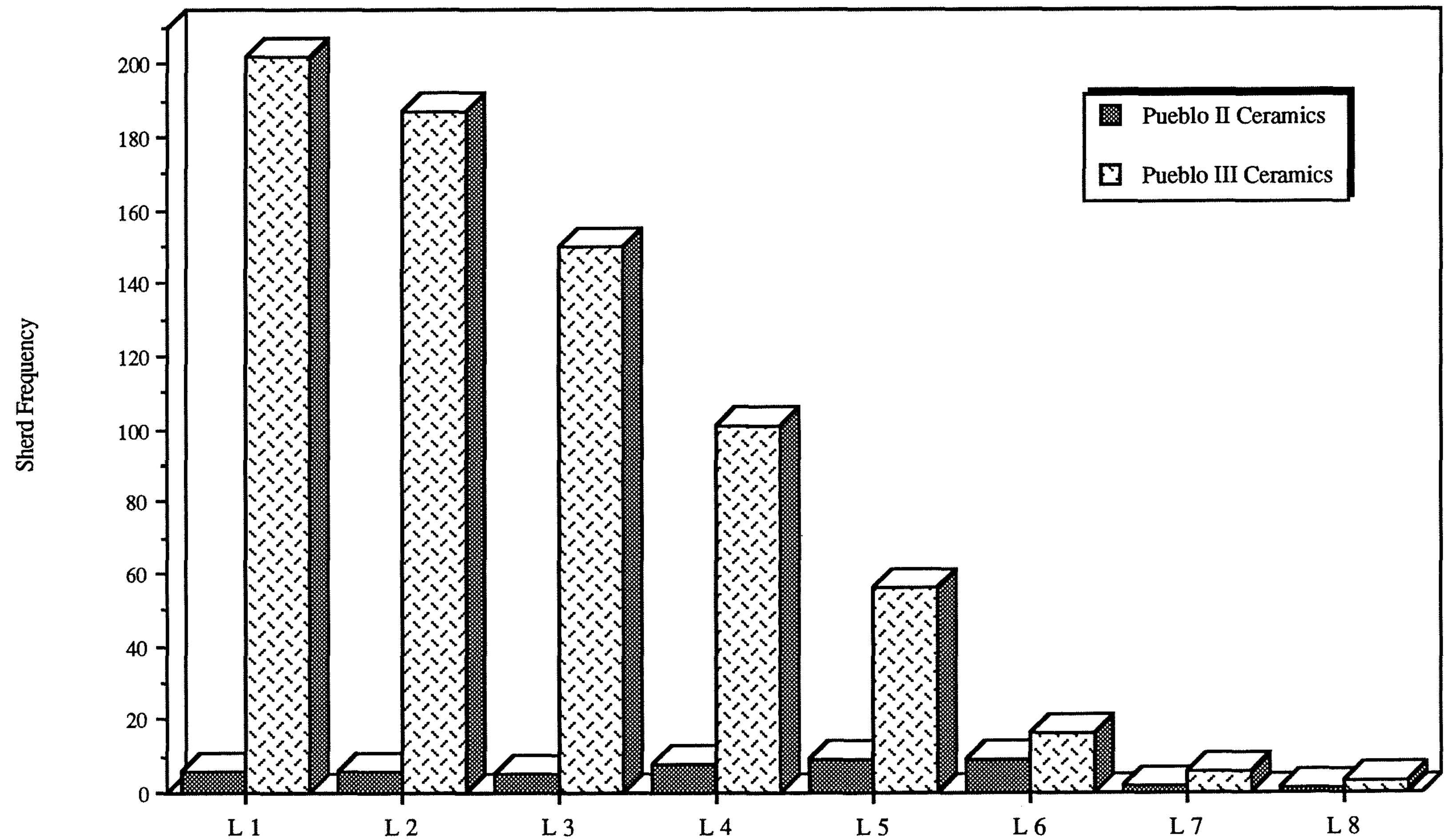



Figure 3.20: Pueblo II and Pueblo III Ceramics in Green Lizard Midden Excavation Levels. Levels 7 and 8 Present Only in Grid 126S/120E.

A, dating from A.D. 1150 to 1300 (Colton 1956; Blinman and Wilson 1989). If so, then it may have been a rarely produced neutral or reduction fired adaptation of the Tusayan Polychrome design style. However, it appears in ceramic assemblages in the Mesa Verde Region containing Mancos B/W dating from about A.D. 1000 to 1100 (Blinman and Wilson 1989). This is not inconsistent with dates for early Citadel and early Tusayan Polychromes – late A.D. 1000s and early 1100s.

Table 3.15: Ceramics: All Excavated and Surface Collected Midden Units. (The ceramic classification system is that used by Crow Canyon Archaeological Center)

| Ceramic Type | Number | Percent |
|---|---|---|
| Bluff B/R | 1 | .02 |
| Mancos B/W | 26 | .49 |
| McElmo B/W | 25 | .47 |
| Mesa Verde B/W | 163 | 3.05 |
| Pueblo II White, Painted | 4 | .07 |
| Pueblo III White, Painted | 562 | 10.52 |
| Late White, Painted | 768 | 14.37 |
| Late White, Unpainted | 940 | 17.60 |
| Indeterminate Local White | 1 | .02 |
| Indeterminate Local White, Unpainted | 2 | .04 |
| Other White, Nonlocal | 1 | .02 |
| Other Red, Nonlocal (White Mtn. Redware) | 5 | .09 |
| Indeterminate Local Red, Painted | 1 | .02 |
| Polychrome (Tin Cup Polychrome) | 6 | .11 |
| Indeterminate Neckbanded Gray | 2 | .04 |
| Indeterminate Local Plain Gray | 96 | 1.80 |
| Unknown Gray | 2 | .04 |
| Other Gray, Nonlocal | 6 | .11 |
| Mancos Corrugated | 11 | .21 |
| Mesa Verde Corrugated | 20 | .37 |
| Indeterminate Local Corrugated | 2,702 | 50.54 |
| Total | 5,344 | 100.00 |

Tin Cup Polychrome was first described and illustrated by Brew (1946:279-280; Figure 101: y, z, aa, cc) at Alkali Ridge in southeastern Utah who recognized it as a probable polychrome variant of Mancos B/W with which it co-occurred. It appears to exist in both bowl and jar form with jar forms being rare. It was first called Tin Cup Polychrome by Forsyth (1977), who gave it type status based on what he believed was a temporally and spatially distinct ceramic series in the Montezuma Canyon area of southeastern Utah. Tin Cup Polychrome has continued to be recognized by Bond (1985) and Blinman and Wilson (1989). The temporal distribution of Tin

Cup Polychrome is poorly understood, but since it seems to consistently co-occur in contexts containing Mancos B/W and perhaps McElmo B/W (Hallasi 1979:25; Blinman and Wilson 1989), a possible date range of A.D. 1050 to 1125 is considered reasonable. Spatial distribution of Tin Cup Polychrome ranges from Cedar Mesa in southeastern Utah to an area west of Cortez and Dove Creek in southwestern Colorado, and perhaps extending to Mesa Verde (Huber 1992).

Nonlocal ceramics are rare in the midden assemblage (0.5 percent of excavated midden ceramics). The indeterminate nonlocal gray and whitewares may be oddly tempered local ceramics, but White Mountain Redwares are clearly nonlocal. Five sherds of White Mountain Redware were recovered from middle to lower levels in three excavation grid units. One sherd has been tentatively identified as St. John's B/R; this type has a date of A.D. 1175 to 1300 and probably occurs more widely at the early end of the range (Carlson 1970).

The presence of Mancos B/W and Mancos Corrugated in lower midden levels records the Late Pueblo II use of the site already indicated by the abandonment assemblage found in Structure 12, and ceramics found below the floor of Structure 3. Tin Cup Polychrome also occurs in lower midden levels. However, the overall representation of Pueblo II ceramics is minor (n = 46 or 0.86 percent) in the midden, and supports the inference that the Pueblo II occupation of the site was probably seasonal and of limited duration.

## Other Ceramic Artifacts

Two ceramic artifacts, a shaped sherd and 52 modified sherds were recovered from midden contexts. The modified sherds exhibited abrasive use-wear on one or more margins. The single shaped sherd exhibits was deliberately shaped by grinding. Two objects in the ceramic artifact category are unusual – an unfired clay ball and a small molded clay object, possibly a crude animal effigy, however this interpretation is subject to argument. The high frequency of modified sherds suggests that sherds at Green Lizard were often reused as expedient, informal tools rather than being made into more formal sherd tools such as ornaments or scrapers used in ceramic manufacture.

## Flaked Stone Debitage

Chipped stone, comprising unmodified flakes, flake fragments, edge-damaged flakes and other angular debris, is the second largest artifact class, by count, recovered in midden contexts (Table 3.16). The dominant chipped stone material types are locally available Morrison Quartzite, Dakota Quartzite and Morrison Chert/Siltstone. The most common local sources of lithic material in the project area are found in the Dakota and Morrison Formations as discussed in Chapter 2.

Chipped stone of nonlocal origin, including unknown stone, is approximately 3.7 percent of the total material recovered, indicating that almost all the stone material requirements at Green Lizard were satisfied through local procurement. Nonlocal lithic material is considered here as comprising materials which are not generally recognized as originating within the boundaries of the Sand Canyon Locality (Figure 1.2). The vast majority of the chipped stone, 91.25 percent, derives from only two locally available material types, Morrison and Dakota quartzites.

Table 3.16: Nonstructure 1 Chipped Stone (Debitage) Material Distribution Frequencies.

| Material Type | Flake | Fragment | Edge damaged | Other | Sum | Percent |
|---|---|---|---|---|---|---|
| Morrison Quartzite | 932 | 728 | 56 | 807 | 2523 | 70.38 |
| Dakota Quartzite | 343 | 386 | 10 | 9 | 748 | 20.87 |
| Morrison Chert/Siltstone | 66 | 27 | 7 | 1 | 101 | 2.82 |
| Dakota Sandstone[a] | 28 | 32 | 1 | 0 | 61 | 1.70 |
| Other Igneous | 3 | 8 | 2 | 0 | 13 | .36 |
| Local, Other | 1 | 1 | 0 | 5 | 7 | .20 |
| Nonlocal Agate/Chalcedony | 4 | 7 | 1 | 3 | 15 | .42 |
| Washington Pass Chert | 0 | 0 | 1 | 0 | 1 | .03 |
| Obsidian | 0 | 1 | 0 | 0 | 1 | .03 |
| Nonlocal Chert/Siltstone | 7 | 26 | 0 | 2 | 35 | .98 |
| Nonlocal, Other | 1 | 4 | 0 | 1 | 6 | .17 |
| Unknown Stone[b] | 19 | 30 | 1 | 24 | 74 | 2.06 |
| Total | 1404 | 1250 | 79 | 852 | 3585 | 100.00 |

[a] Orthoquartzite. [b] Assumed to be of nonlocal origin. This table includes surface collected artifacts.

It is likely that access to, or the desirability, of nonlocal materials was markedly lower than in earlier periods. Neily (1983) has suggested that Mesa Verde region social networks contracted during the Pueblo III period resulting in reduced access to nonlocal material sources.

## Flaked Stone Tools

A variety of flaked stone tools were recovered from midden contexts (Table 3.17). Edge retouched flakes comprised the largest category of stone tools recovered, followed by bifaces, projectile points, other stone tools, drills and utilized stones. The majority of flaked stone tools (94.12 %) are of locally available materials, but nonlocal materials are present in slightly higher frequencies (5.88 %) than in the chipped stone debitage category as a whole. Three of the 5 tools of nonlocal material are projectile points, suggesting that nonlocal materials, perhaps with better flaking qualities, were intentionally procured. Perhaps in the course of hunting or other trips outside of the Sand Canyon Locality, or perhaps by collection from earlier sites where nonlocal material is more common.

Table 3.17: Nonstructure 1 Flaked Stone Tool Frequencies by Material and Type.

| Type | No. | % | Material Type | No. | % |
|---|---|---|---|---|---|
| Biface | 11 | 12.95 | Dakota Quartzite | 10 | 11.75 |
| | | | Morrison Quartzite | 1 | 1.18 |
| Other Stone Tool | 9 | 10.59 | Dakota Quartzite | 4 | 4.71 |
| | | | Morrison Quartzite | 5 | 5.87 |
| Drill | 2 | 2.35 | Dakota Quartzite | 1 | 1.18 |
| | | | Morrison Quartzite | 1 | 1.18 |
| Modified Flake | 53 | 62.35 | Nonlocal Agate/Chalcedony | 1 | 1.18 |
| | | | Chert/Siltstone | 1 | 1.18 |
| | | | Dakota Quartzite | 23 | 27.05 |
| | | | Morrison Chert/Siltstone | 2 | 2.35 |
| | | | Morrison Quartzite | 25 | 29.41 |
| | | | Unknown Chert/Siltstone[a] | 1 | 1.18 |
| Projectile Point | 8 | 9.41 | Nonlocal Agate/Chalcedony | 2 | 2.35 |
| | | | Chert/Siltstone | 1 | 1.18 |
| | | | Dakota Quartzite | 4 | 4.71 |
| | | | Nonlocal Chert/Siltstone | 1 | 1.18 |
| Utilized Stone | 2 | 2.35 | Chert/Siltstone | 1 | 1.18 |
| | | | Morrison Quartzite | 1 | 1.18 |
| Total | 85 | 100.00 | Total | 85 | 100.00 |

[a] Unknown material type defined as nonlocal.

The greater representation of nonlocal material in the chipped stone debitage and flaked stone tool categories might also result from sample size differences. The diversity of tools types in the midden indicated that a broad range of manufacturing, processing and maintenance activities occurred.

## Nonflaked Stone Tools

Nonflaked stone tools found in midden contexts are varied. Sandstone abraders, some of which are reused broken manos, cores, peckingstones and other modified stone are common, while hammerstones and mauls are rare (Table 3.18). Cores are of predominantly local material type, only one is of nonlocal material. This is consistent with Neily's (1983) inferences concerning the contraction of social networks and/or trading spheres during Pueblo III.

Table 3.18: Nonstructure 1 Nonflaked Stone Tool Frequencies by Material and Type.

| Type | No. | % | Material Type | No. | % |
|---|---|---|---|---|---|
| Abrader | 48 | 24.62 | Dakota Quartzite | 1 | .50 |
| | | | Sandstone | 47 | 24.10 |
| Core | 49 | 25.13 | Dakota Quartzite | 8 | 4.10 |
| | | | Morrison Quartzite | 39 | 20.00 |
| | | | Nonlocal Chert/Siltstone | 1 | .50 |
| | | | Quartzite | 1 | .50 |
| Hammerstone | 2 | 1.03 | Quartzite | 1 | .50 |
| | | | Unknown Stone[a] | 1 | .50 |
| Maul | 1 | .50 | Other Igneous | 1 | .50 |
| Modified Cobble | 1 | .50 | Other Igneous | 1 | .50 |
| Modified Core | 1 | .50 | Morrison Quartzite | 1 | .50 |
| Other Modified Stone | 64 | 32.82 | Chert/Siltstone | 21 | 10.77 |
| | | | Dakota Quartzite | 1 | .50 |
| | | | Morrison Quartzite | 6 | 3.08 |
| | | | Morrison Chert/Siltstone | 1 | .050 |
| | | | Shale | 4 | 2.05 |
| | | | Slate | 4 | 2.05 |
| | | | Sandstone | 20 | 10.26 |
| | | | Unknown Stone[a] | 13 | 6.67 |
| Peckingstone | 28 | 14.36 | Dakota Quartzite | 17 | 8.72 |
| | | | Morrison Quartzite | 10 | 5.13 |
| | | | Morrison Chert/Siltstone | 1 | .50 |
| | | | Chert/Siltstone | 2 | 1.03 |
| Polishing/Hammerstone | 1 | .50 | Unknown Stone[a] | 1 | .50 |
| Totals | 195 | 100.00 | Totals | 195 | 100.00 |

[a] Assumed to be of nonlocal origin.

Hammerstones are differentiated from peckingstone by their morphology. Both, however, are employed in a hard-hammer fashion. One hammerstones are of local material, the other is of nonlocal material. Both are characterized by heavily battered margins, and overall roundedness. Peckingstones are all of local materials, and are functionally similar to hammerstones, but their morphology is characterized by battered margins and somewhat smaller size. Manos and metates are treated seperately in the section titled "Grinding Implements," below.

Other modified stone is a default category containing modified stone items which did not fit into established analytic categories used by Crow Canyon analysts (Schwab and Bradley 1987). A single flaked, ground and polished slate fragment, perhaps from a tchamahia, was also included in the "other modified stone" category. Tchamahias are sometimes viewed as possessing ritual rather than practical functions through analogy with modern Pueblo uses (Woodbury 1954 [cited in Cattanach 1980:285]). Neither whole nor fragmentary tchamahias were found in use-surface or fill contexts associated with structures at Green Lizard indicating that such items were either never common at Green Lizard, or that they were of sufficient value to have been removed when the site was abandoned. Axes were also absent in the midden assemblage. One small ax was found at or just above the roof fall zone in the pitstructure. The absence of axes, whole or fragmentary, in light of the comparatively large number found at Sand Canyon Pueblo, suggests that these were valued items and were removed when the site was abandoned.

## Ornaments

Probable ornaments from the primary midden deposit consisted complete and fragmentary pendants, a fragment of a ground and polished stone ring, bone tubes – presumably for use in necklaces (Rohn 1971; Bullock 1992), and a perforated rabbit tibia which fell into a class of artifact sometimes termed a "tinkler", but whose function as an ornament is ambiguous (Table 3.19). The "other modified mineral" category includes items – some with grinding facets – that were perhaps used to produce pigments. Thirteen mostly fragmentary pendants were recovered. Many had originally been incorporated into the "other modified stone" category above, but examination indicated that these were probably pendants or pendant blanks. One of the pendants was an unperforated Late B/W sherd with ground margins. Most are made of soft minerals such as slate, shale and gypsum/calcite.

Table 3.19: Nonstructure 1 Ornaments.

| Type | Count | Percent |
|---|---|---|
| Cylinder | 1 | 4.00 |
| Other Modified Mineral (Pigment) | 4 | 16.00 |
| Pendant | 13 | 52.00 |
| Ring | 1 | 4.00 |
| Bone Tubes | 5 | 20.00 |
| Perforated Tibia 'Tinkler' | 1 | 4.00 |
| Total | 25 | 100.00 |

The majority of the pendants are fragmentary and unfinished suggesting that they may have been broken in manufacture. The cylinder is a small ground stone object of unknown stone. Its classification as an ornament is tentative. The range of types of ornament, and their largely fragmentary nature, suggests that some if not all were probably manufactured by the inhabitants of Green Lizard from locally available materials.

## Grinding Implements

Grinding implements (manos and metates) were recovered from primary midden deposits, but their relative frequency is low. Twelve whole or fragmentary two-hand manos and a single one-hand mano were recovered. Recognizable metate fragments were completely lacking. Grinding implements are considered tools with relatively long use-lives – metates longer than manos (Schlanger 1990; Wright 1990). Comparison of numbers of grinding implements recovered from midden contexts at roughly contemporary sites on Mesa Verde suggests that incidence of grinding implements at Green Lizard may in fact be proportionally somewhat higher than at other sites. At Long House, a late Pueblo III site considerably larger the Green Lizard, nine metates and 29 manos were recovered from midden contexts (Cattanach 1980). At Site 875, a site with both Pueblo II and Pueblo III components, Lister (1965) reports one metate and 34 manos from midden contexts. At Site 499, roughly equivalent in size and age to Green Lizard, 22 manos and no metates were recovered (Lister 1964). In all of the Mesa Verde sites just discussed, far larger portions of the middens were excavated than was the case at Green Lizard. Thus, the low overall frequency of grinding implements and the absence of metates from the midden is relatively common and probably a result of curation and recycling.

## Faunal Remains

Faunal remains constitute the third largest class of object, by count, recovered from midden contexts. The majority of this bone appears to have resulted from domestic economic use. The remaining faunal material derives from animals that either lived in and around the midden during the site's period of occupation or inhabited the midden after the site had been abandoned. The species the latter category include are mice, gophers, voles, woodrats, small birds and reptiles. Although some larger rodents such as ground squirrels and prairie dogs have been documented ethnographically as having had an economic use, none of the recovered rodent bones in these taxa exhibited burning or other modification suggesting use as a food (Walker 1990a). It is probable that they were incorporated into midden deposits naturally. Disturbances caused by such burrowing rodents can significantly affect formation processes in midden strata (Schiffer 1987).

The list of identified economic species (Table 3.20) indicates clearly that domesticated turkey was the preferred or most easily exploited animal. On the basis of bone measurements, Walker (1990a) indicates that all the turkey remains are domestic rather than wild. Cottontail rabbits have the second highest frequency, followed by jackrabbits. Jackrabbits are poorly represented in the faunal collection. Large and medium mammals such as mule deer and big horn sheep are even more poorly represented. Likely explanations include that these taxa were only rarely exploited, that procurement resulted in processing at the procurement site to minimize transported weight, that bone fragmentation to extract marrow made specific identification difficult, or that conversion to bone tools made species identification difficult. However, as indicated in Table 3.20 below, inclusion of indeterminate mammal categories (medium artiodactyl and medium mammal) would not significantly alter the relative representation of large and medium game animals at Green Lizard, suggesting that one or both of the first two explanations are likely. Thus, the dominant meat protein sources based on the NISP at Green Lizard during Pueblo III appears to have been domesticated turkey and cottontail rabbit. However, meat weight calculations would probably alter this conclusion. Although definitive evidence of use as food is lacking for these taxa, their dominance in the faunal assemblage, in contrast to the relative paucity of traditional big game animals, suggests that they were the principal source of animal protein for the inhabitants of Green Lizard. Rare species such as Pine Marten (*Martes americanus*), and Western Screech Owl (*Otus kennicotii*) are also present. Faunal data are found in Walker (1990a).

Table 3.20: Nonstructure 1 Economic Bone.

| Taxon/Taxa | NISP | Percent |
|---|---|---|
| Turkey (*Meleagris gallopavo*) & turkey-sized bird | 541 | 58.7 |
| Cottontail (*Sylvilagus* sp) | 283 | 30.7 |
| Jackrabbit (*Lepus* sp) | 58 | 6.4 |
| Deer (*Odocoileus hemionus*) | 3 | 0.3 |
| Big Horn Sheep (*Ovis canadensis*) | 1 | 0.1 |
| Medium Artiodactyl | 16 | 1.7 |
| Medium Mammal | 19 | 2.1 |
| Total | 921 | 100.0 |

NISP = Number of Individual Specimens.

Most of the bone tools recovered from midden contexts are awls (Table 3.21). The "other modified bone" category consists of bones exhibiting cultural modifications ranging from cut marks to polish. It is interesting to note that other bone tool types such as fleshers (humerus scrapers), needles and bodkins were not recovered. It is likely that this is, in large part, the result of sampling error – only 3.5% of the midden area was excavated. A secondary consideration is that bone tools were discarded when broken or exhausted and bones in the "other" category may contain unrecognized fragments of these other tool types. The majority of the awls were made from turkey or turkey-sized bird bones. One of these was a double-pointed awl. Awl frequencies similar to those in Green Lizard (44.9%) midden contexts are present at other Mesa Verde region Pueblo III sites such as Long House (52.5%) and from all excavated proveniences at Mug House

(46.7%) (Cattanach 1980; Rohn 1971). The bone tubes and much of the modified bone is bird bone and may be turkey as well (Walker 1990a). The single tibia "tinkler" is from a cottontail rabbit or jackrabbit.

Table 3.21: Nonstructure 1 Modified Bone and Bone Tools.

| Bone Tool Type | NISP | Percent |
|---|---|---|
| Awls | 44 | 44.9 |
| Perforated Tibia 'Tinkler' | 1 | 1.0 |
| Tubes | 7 | 7.1 |
| Other Modified Bone | 46 | 47.0 |
| Total | 98 | 100.0 |

NISP = Number of Individual Specimens.

Most of the culturally modified bone is of turkey or turkey-sized bird, including the majority (77.3%) of awls found in midden contexts (Table 3.22). This figure is similar to that found in midden contexts at Long House (74.4%).

Table 3.22: Nonstructure 1 Bone Awls by Taxon.

| Taxon/Taxa | NISP | Percent |
|---|---|---|
| Turkey and turkey-sized bird | 44 | 77.3 |
| Artiodactyl | 2 | 4.5 |
| Large and Medium Mammal | 3 | 6.8 |
| *Sylvilagus sp.* | 3 | 6.8 |
| Small Mammal | 1 | 2.3 |
| Small Carnivore | 1 | 2.3 |
| Total | 44 | 100.0 |

NISP = Number of Individual Specimens.

In summary, the faunal assemblage recovered from primary midden deposits at Green Lizard indicates that large and medium-sized mammals were not heavily utilized. Turkey and cottontail rabbit apparently constituted the dominant source of animal protein, and were used as a source of other economically useful animal parts during most of Green Lizard's occupation.

However, the underrepresentation of big game animals in the midden faunal assemblage may also result from these animals were being butchered away from the site.

## Plant Remains

Analyzed plant remains from the midden show use of several woody and economic plants (K. Adams 1989). One flotation sample from level 5 (80-100 cm) in 1x1 124S/117E might be the remains of a single hearth cleaning event. This feature was visible as a discrete cluster of charred twigs, organic debris and ash. Analysis of a sample of this material revealed the presence of numerous corn (*Zea mays*) cupules and cobs, (many of them burned), Cheno-am seeds, a large quantity of juniper twigs (*Juniperus osteosperma*), yucca (*Yucca sp.*) leaf fragments, a prickly pear (*Opuntia sp.*) cactus seed, and an Indian rice grass (*Oryzopsis hymenoides*) floret. Wood charcoal from this sample also included *Artemisia* (sagebrush), *Atriplex* (saltbush), *Cercocarpus* (mountain mahogany), *Ephedra* (Mormon tea), *Juniperus* (juniper), *Pinus* (pine), *Populus* (cottonwood/willow), and *Quercus* (oak). These woods, as well as corn cobs, were probably used as fuel. The plant remains probably represent a selection of the range of food and nonfood plants exploited by the inhabitants of Green Lizard. Corn is the dominant economic plant type recovered from all midden units in the form of burned kernels, cupules, cobs and shank fragments. Analysis of 31 measurable cobs and cob fragments recovered from midden contexts indicates that the majority are a 10 - 12 row variety, but range from 8 to 14 rows. Mean cupule width of this sample was 5.5 mm and the average cob diameter was 1.1 cm (K. Adams 1989:11-13).

Additional fuelwood information was provided through the analysis of samples of charcoal routinely collected from midden deposits. Pinyon pine and juniper appear to have been the predominant fuel woods, appearing in 30 of 48 (62.5%) midden excavation levels in the 10 1 x 1 meter units sampled. Serviceberry, mountain mahogany, sagebrush, rabbitbrush, cliffrose-antelopebrush, and groundcherry/rose types are present as probable fuel woods as well, but appear in significantly lower frequencies. Charred plant remains recovered from the midden clearly indicate that the inhabitants of Green Lizard used both domesticated plants in addition to a wide variety of wild plant foods. The botanical record recovered from midden contexts at Green Lizard is consistent with that of other Pueblo III period sites in the region (K. Adams 1989).

## Midden Functional and Chronological Interpretations

The Pueblo II deposition in the midden is present, but appears to have been minor. It is possible that the sampling strategy employed failed to encounter significant Pueblo II deposits in the midden, but this is considered unlikely. Some measure of the duration or intensity of the Pueblo II occupation is gained through comparison of Pueblo III ceramics (Mesa Verde B/W, Mesa Verde Corrugated, McElmo B/W and P III White, Painted) to Pueblo II ceramics (Mancos B/W, Mancos Corrugated, Tin Cup Polychrome, P II White, Painted) in midden excavation levels (Figure 3.20). The proportion of Pueblo II sherds increases as midden depth increases, but the relative proportion of Pueblo III sherds is greater at all midden levels, including the lowest. Thus, the dominance of Pueblo III ceramics suggests that Pueblo II occupation of the site was relatively insubstantial or of short duration. The Pueblo III occupation was clearly greater in both duration and intensity and is considered the principal occupation during which the majority of the architectural portion of the site was constructed.

Several large pieces of wood charcoal from midden contexts were submitted to the Laboratory of Tree Ring Research at the University of Arizona, and eight samples were dated (Table 3.23). All of the dates were from pinyon or juniper and probably represent fuelwood rather than constructional wood.

Table 3.23: Nonstructure 1 Tree-ring Dates.

| Provenience | Species | Date |
|---|---|---|
| 129S/113E (60-80 cm) | Juniper | 959 vv |
| 126S/120E (40-60 cm) | Pinyon | 1128 vv |
| 124S/116E (40-60 cm) | Juniper | 1029 vv |
| 124S/117E (60-80 cm) | Juniper | 1036 vv |
| 124S/117E (60-80 cm) | Juniper | 1089 +vv |
| 124S/117E (60-80 cm) | Juniper | 1171 ++vv |
| 124S/117E (80-100 cm) | Juniper | 1096 +vv |
| 124S/117E (80-100 cm) | Juniper | 1142 +vv |

No cutting dates were obtained. The dates reflect erosion of outer rings during burning, as well as probable use of old and dead wood for fuel. The latest date of A.D. 1171 ++vv suggests that deposition of middle levels of the primary midden may have taken place in the latter half of the twelfth century or early part of the thirteenth.

A sample of small twigs from what had been interpreted as the discrete remains of a hearth cleanout located 80 cm below modern ground surface in midden unit 124S/117E was submitted for extended counting time, high precision C-14 dating at the University of Washington, Quaternary Research Center (Table 3.24). The midden sample (QL-4395) was submitted with the intention of achieving a date with a high precision, and low standard deviation. High precision dating has the potential of routinely yielding sample standard deviations of 20 years or less if sample requirements are met (Stuiver and Pearson 1986; Jope 1986). However, the sample was smaller than desired, resulting in lower than desired precision. Sample radiocarbon age and A.D./B.C. calibration are presented below. Calibration was performed using the program CALIB 3.0, developed by Stuiver and Reimer (1993). The assay was corrected for C-13 fractionation, but a laboratory error correction multiplier has been excluded.

Table 3.24: Nonstructure 1 High Precision Radiocarbon Date

| C-14 Age | Calibrated A.D. | Calibrated BP | Calibrated A.D./B.C. |
|---|---|---|---|
| 785±40 | 1258±40 | 692±40 | 1 sigma - 1215 (1258) 1277 |
| " | " | " | 2 sigma - 1162 (1258) 1281 |

Although not as precise a date as was hoped for, the two standard deviation age range clearly indicates Pueblo III period deposition in the midden at 80-100 cm below modern ground surface as was indicated by the tree-ring sample discussed above. The midpoint (in parentheses) and one standard deviation range are A.D. 1215 (1258) 1277. This date is virtually the same as the high-precision sample from the kiva. It may also be possible, though unlikely, that since both dates fall out so closely to one another, that significant postabandonment accumulation of midden deposits occurred, thereby implying an intense postabandonment reuse of the site that is not apparent from the archaeological remains in the rest of the site.

Probability distributions calculated by Stuiver and Reimer's program indicate that the area under the probability distribution at two standard deviations is .05 at cal. A.D. 1162-1178 (788-772 BP) and .95 at cal. A.D. 1187-1281 (763-669 BP). The probability distribution narrows the age range significantly, clearly indicating that hearth material was burned and discarded during Pueblo III after which a minimum of 80-100 cm of additional midden accumulated.

It is clear that the sediments, artifacts, ecofacts, ash and other detritus comprising the primary midden deposit at Green Lizard resulted from the deposition of culturally derived organic and inorganic remains as secondary refuse. Natural formation processes also acted upon the midden, both during deposition and after final abandonment. Rodent disturbance and erosion constituted the most significant disturbance processes. Rodent occupation of the midden resulted in a variable degree of vertical and lateral mixing, while water erosion transported fine particles causing deposits in some areas, especially the southernmost, to be conflated. It is clear that the vast majority of the secondary refuse accumulation forming the midden area originates in the Pueblo III occupation of Green Lizard, and register the range of trash-generating behaviors and activities at the site during its occupation, insofar as these survive in the archaeological record. These behaviors were largely domestic in nature, and appear to constitute a useful representation of the range of behaviors in small Pueblo III habitation sites in the Sand Canyon Locality and the Mesa Verde region.

## SITE SUMMARY AND CONCLUSION

Ceramic and architectural data indicate the presence of a Pueblo II component preceding the main Pueblo III occupation of the site. The extent, duration and intensity of the Pueblo II occupation is incompletely understood, but data which have been presented strongly suggest it was of limited duration and/or intensity. Excavation in the western portion of the architectural sampling stratum discovered a single relatively intact masonry room, Structure 12, below Structure 4, a

Pueblo III room. A second Pueblo II structure or use-surface was present below Structure 3, also a Pueblo III room. A Pueblo II temporal assignment for these structures is based on the presence of a Late Pueblo II ceramic assemblage and single-stone rather that double-stone masonry used in Structure 12.

An initial Pueblo II construction date for Structure 1 (pitstructure) while not impossible, is considered unlikely. It is inferred, therefore, that the Pueblo II occupation of Green Lizard may have been seasonal rather than year-round. However, additional Pueblo II structures could be present in unexcavated portions of the site.

Evidence of the Pueblo II use of the site is also found in the midden consisting of a small number of Pueblo II sherds (Table 3.15). Pueblo II period ceramics (n = 47) constitute less than 1 percent (0.88%) of all primary midden ceramics. Ceramics of Pueblo III origin on the other hand (n = 815) comprise 15.26% of the midden ceramic assemblage. These are the proportion of the total assemblage that could be assigned to clear-cut, temporally diagnostic ceramic types. These data also favor an interpretation of the Late Pueblo II use as having been limited and probably seasonal. After some period of abandonment, Green Lizard was reoccupied during the Pueblo III period and was unquestionably a year-round use lasting for a considerable period of time, perhaps exceeding a generation.

Evidence of the increasing intensity of site utilization at Green Lizard during Pueblo III was present in the accretional growth of the western roomblock from two masonry rooms to as many as nine masonry rooms, including two rooms in the unexcavated middle room block. Evidence of remodeling in Structure 3 (a blocked doorway), indicates that at some point in the occupational history of the site, the function or association of one or more of the surface structures may have been restricted or changed. It is unclear where in this sequence of occupation the nonmasonry structures (Structures 8, 10 and 13) fit. But, available evidence supports an inference of Pueblo III use for these structures. These nonmasonry structures were used as a Pueblo III refuse area after they were abandoned, at some time before the site as a whole was abandoned.

Additional evidence of the long duration and intensity of occupation is most clearly recorded in the substantial depth and density of the midden deposits, extensive remodeling of the pitstructure and the abandonment and of the entire western portion of the western kiva suite and subsequent accumulation of secondary refuse over the area.

It seems clear that the first abandoned structures were the nonmasonry structures and Structure 2. It is not clear however, whether the Pueblo III trash deposited in these structures originated from activities carried out by the inhabitants of the western kiva suite or by the occupants of the eastern kiva suite. In the latter case, the entire western kiva suite may already have been abandoned. However, this is considered unlikely as little evidence of trash deposition into the western pitstructure depression was noted. The western kiva and its suite of rooms appear to have been abandoned in the A.D. 1250s to 1260s after a long history. Since the roof of the kiva had been deliberately dismantled at or shortly after abandonment, it is assumed that the former occupants of Green Lizard may have removed still useful roof beams for use in another, not too distant, structure. Site abandonment clearly was planned; this was also evident in the depleted abandonment assemblages in both surface structures and the pitstructure.

## Surface and Fill Assemblage Formation

With the exception of the reuse of the nonmasonry structures and Structure 2 as loci of secondary refuse deposition, fill units in the excavated Pueblo III kiva and masonry roomblock area are of apparent post-abandonment origin. In the pitstructure, de facto primary refuse is to some extent intermixed with artifacts and sediments originating in the dismantling of the roof and subsequent postabandonment collapse. In the masonry surface rooms, clear evidence of a roof fall zone was lacking. Abandonment assemblages in these rooms have been interpreted as de facto refuse related to the final abandonment of at least the western kiva suite at Green Lizard.

The fill of the pitstructure (Structure 1) was of primarily postabandonment origin. Much of the artifact assemblage found in upper and near-floor fill units may have resulted from erosion of the trash deposits overlying nonmasonry structures west of the pitstructure. The majority of the postabandonment fill in the pitstructure derives from collapse of masonry rooms adjacent to the pitstructure, as well as continued erosion of courtyard surfaces after dismantling of the roof, which contributed whatever artifacts were associated with these areas.

The overall paucity of whole ceramic vessels and other easily portable or valued items indicates that the pitstructure and surface room assemblages had been depleted. The occupants of Green Lizard took with them to a new residence those items that they desired and deliberately left behind items easily replaced or no longer desired. The lack of rich abandonment assemblages such as those found at nearby Sand Canyon Pueblo, along with intentional dismantling of the pitstructure roof, strongly supports an interpretation of planned structural and site abandonment, perhaps to a nearby settlement locus such as Sand Canyon Pueblo. I have presented evidence suggesting that the occupation of Green Lizard may have overlapped the early occupation of Sand Canyon Pueblo The abandonment of Green Lizard probably occurred in the A.D. 1250s to 1260s. Since construction at Sand Canyon Pueblo was ongoing during this interval and continued into the A.D. 1270s, it seems likely that the inhabitants of Green Lizard relocated to Sand Canyon Pueblo. The inhabitants of Green Lizard were probably part of the long-term community that occupied the upper Sand Canyon Locality. Sand Canyon Pueblo became the residential locus of this community in the A.D. 1250s through 1270s (Adler 1990; Lipe 1992).

## Interpretations of Site Function

The dominant occupation of Green Lizard, a small year-round habitation occurred during the latter half of the Pueblo III period. Activities associated with daily living in one place occurred regularly at the site. The presence of check dams, accretional growth of rooms, depth of primary midden deposits and the dominance of domesticated subsistence items such as maize and turkey in the diet indicate locally high population density and probable intensification of resource production and procurement at Green Lizard.

Green Lizard is located in a favorable, south-facing inner canyon area allowing access to diverse canyon resources, and the vicinity of one of the most dependable springs in the upper Sand

Canyon drainage. Arable land is found on nearby intracanyon colluvial benches, and on the mesa above the site. From this location the inhabitants could exploit various wild resources in the canyon and employ a risk-reducing farming strategy by farming both mesa top and canyon benches.

# Chapter 4

# COMPARISONS OF SAND CANYON AND GREEN LIZARD ARCHITECTURE

## GOALS OF ARCHITECTURAL COMPARISON

In this chapter, I used architectural data to compare architectural units (individual structures and kiva suites) at Green Lizard with those at Sand Canyon Pueblo. I sought to determine what changes, if any, in community organization occurred with aggregation at Sand Canyon Pueblo. The questions that these comparisons attempt to answer are: 1) what differences, if any, exist in the amount of labor invested in the construction of surface rooms, and kivas at the two sites and, 2) what are their implications for inferences of social complexity, organization and site function.

The aim of these comparative analyses is to define architectural differences between Green Lizard and Sand Canyon Pueblo, and to determine whether these are indicative of functional (horizontal) differentiation or status and wealth differences (vertical differentiation) coincident with aggregation. If functional differentiation exists, or if elite households are present at Sand Canyon Pueblo, these organizational differences may have been expressed in the built environment. I expect, therefore, that differences in architectural labor investment, labor investment expressed in formality of construction, and kiva suite size, should differentiate between structures and kiva suites at Green Lizard and Sand Canyon Pueblo and among units within Sand Canyon Pueblo. Three models of potential social responses to aggregation were evaluated with different sets of architectural data in a two step comparison. In the first step, I used masonry construction data to generate indices of relative construction effort (Relative Labor Index), selection and uniformity of stone shapes used in construction (Selection and Uniformity Indices) and excess effort expended in pecking stone surfaces (Shape Index). I consider the Selection and Uniformity, and the Shape indices as general indices of formality. I used these values in comparisons of relative construction efforts and formality between and among similar structure types at two sites. In the second step, I used architectural data to compare kiva suites. The data used in this comparison consist of total kiva suite roofed area, structure type roofed areas within individual kiva suites – kivas and surface rooms (towers are included with surface room totals) – and kiva suite total construction labor estimates.

To interpret architectural differences among kiva suites at Green Lizard (KS 1) and Sand Canyon Pueblo (KS 102/108, KS 208, KS 501, KS 1004, KS 1206), I devised three models of potential organizational responses to aggregation (Chapter 1). In the first scenario, I expect that if no significant architectural differences exist among Green Lizard and Sand Canyon Pueblo kiva suites in the sample (that is, if the Sand Canyon Pueblo kiva suites are relatively similar, and Green Lizard falls within their range of variability), then a primarily egalitarian social order existed and that it differed little from that of the prior dispersed community, of which Green Lizard was a part.

My expectation in the second scenario is that if architectural differences occur among Sand Canyon Pueblo kiva suites, indicating that one or more units are distinct and perhaps nonresidential, whereas others are architecturally similar to each other and to Green Lizard, and therefore residential, then functional (horizontal) differentiation is present, and that it occurred within a primarily egalitarian social context.

In the third scenario, I expect that if one or more kiva suites at Sand Canyon Pueblo are elite residences, and consequently are architecturally distinct from nonelite residential kiva suites and to the Green Lizard kiva suite, then vertical differentiation is present.

## Architecture and Social Complexity

In this section I provide a brief overview of the ways in which social meaning is conveyed in architecture in the context of the built environment (Rapoport 1980, 1982). All architecture, whether prehistoric or modern, is characterized by two basic elements, the materials employed and the desired or required shape and size of the finished structure (McGuire and Schiffer 1983). Functional requirements, cultural norms and culturally mediated idiosyncratic choice furnishes the basic impetus of structural design and encompasses both utilitarian and social aspects of architecture. Architecture therefore serves two basic ends – functional and utilitarian on the one hand and symbolic on the other (Rapoport 1982). According to McGuire and Schiffer (1983:280-281), utilitarian functions "...(1) mediate between people ... and the natural environment and (2) ... delineate space for the performance of activities by various social units ..." while symbolic functions "... facilitate the workings of ideology and social structure ..." Architecture therefore conveys many forms of cultural meaning including information about structure function and status. The built environment embodies sets of cues that impart culturally determined contextual information about appropriate social behaviors associated with structure function and status on the one hand, and about public and private spaces on the other (Rapoport 1982).

Researchers in the Southwest and elsewhere have recently explored linkages between architecture and social organization (Ciolek-Torrello 1978; Netting 1982; Lekson 1984; Lightfoot 1984; Bradley 1988; Cliff 1988; Ringle and Andrews 1988; Kane 1989; Lipe and Hegmon 1989). They observed that elites or individuals of high status tend to possess greater access to and control of the productive potential of the social group (Fried 1967; Sahlins 1972; Wilson 1988). Elites tend to materially display their greater access to the means of production and labor in culturally determined ways, which may be blatantly overt, as in the case of royal palaces and monumental architecture in complex chiefdoms and state level societies, or subtly understated, as in the case of structures with rich internal appointments, but external similarity to less wealthy or nonelite households (Wilk 1983:112).

The linkage between larger household size and wealth and status differences at Sand Canyon Pueblo and Green Lizard kiva suites is explored in this chapter. In general, the degree to which status differences are expressed or suppressed is mediated through societal values and norms and enhanced with increasing wealth differential and sociopolitical complexity. A clear trend appears to exist; as sociopolitical complexity and wealth differences increase, elites assume ever-increasing control of the means of production. As this process continues, there appears to be a concomitant increase in overt architectural expressions of elite status and wealth.

Overbuilding beyond minimal functional requirements may be one way in which elite status is expressed architecturally (McGuire and Schiffer 1983). Differences in the size and complexity of structures, differences in per capita living and storage space, differences in investment in construction and the presence of "ostentatious" publicly visible external facades are seen as indicators of status differentiation and sociopolitical complexity (Kirch 1980; Cordy 1981; Lightfoot and Feinman 1982; Rathje and McGuire 1982; Lightfoot 1984a, 1984b; Ayers 1985; Kane 1986, 1989; Lightfoot and Feinman 1989b; Lipe and Hegmon 1989; Orcutt, Blinman and Kohler 1990). McGuire and Schiffer (1983:282), in summarizing the effects of social inequality on architecture, have suggested that elite-related structures should demonstrate a greater degree of investment in symbolic aspects of architecture, and the built environment in which elite and nonelite households coexist should demonstrate greater variability in construction labor. In preindustrial agrarian societies, elite status may be expressed in larger structures which are used to host larger social gatherings, to store agricultural surpluses, and to house larger households. In addition, there is likely to be greater investment in symbolic aspects of architecture, which convey social meaning and status. Larger household size is a key difference between elite and nonelite households in some ethnographic settings (Watson 1978; Netting 1982; Wilk 1983). These observations provide the focus for the following discussion and comparison of architectural labor investment.

Archaeologists investigating architectural manifestations of sociopolitical complexity have focused on comparative differences in the size of functional structure types as a proxy for size of the social group that used them. This is in addition to reconstruction of construction labor costs (Lekson 1984; Bradley 1988; Metzger et al. 1988). Research into the comparative scale of structures relies on floor area comparisons and functional differentiation of structure types derived from feature and assemblage data. Assessment of sociopolitical complexity or status differences from comparison of floor areas normally requires assigning a function to specific structures or groups of structures. In the Southwest the functional structure types commonly used are habitation, ritual/ceremonial, and storage; each of these is subject to interpretive difficulties and ambiguities (Ciolek-Torrello 1978, 1985; Kane 1989; Lipe and Hegmon 1989; Reid and Whittlesey 1990). Lowell (1991) for example, has identified a set of general activity rooms at Turkey Creek Pueblo that fall outside the traditional tripartite system of room function. Using room abandonment assemblages Ciolek-Torrello (1978) also identified additional room types at Grasshopper Pueblo.

Lekson (1984) generated labor investment figures for large, architecturally complex Pueblo II sites in Chaco Canyon. His reconstruction estimates of labor input values for Chacoan sites were derived from experimental wall constructions or stabilization/repair rates for prehistoric walls. Data of these sorts have been used to assess organizational aspects of large-scale construction efforts (Erasmus 1966; McGuire and Schiffer 1983; Lekson 1984; Bradley 1988). Estimates of the amount of person-hours or days involved, together with estimates of the time required for construction are used to generate estimates of the number of laborers required. If large labor groups are inferred, then the presence of some sort of administrative/managerial elite is also inferred. In summary, organizational complexity accompanying aggregation – horizontal or vertical differentiation – is expected to be expressed in the built environment in different ways. Functional differentiation may be expressed in greater labor investment, formality and nonresidential use at special function structures, whereas status and wealth differences are expected to be expressed in larger household size and, therefore, larger residential structures. It has also been argued that construction of large-scale communal architecture over short periods of time suggests the presence of elite managers to marshal and organize large labor groups (Lekson 1984; Upham 1982; Lightfoot 1984).

## Sand Canyon Pueblo Architecture and Social Complexity

Sand Canyon Pueblo is a large late 13th-century Anasazi site in the Mesa Verde region of southwestern Colorado. The site contains an estimated 420 rooms, 90 kivas, 14 towers, a great kiva and a large D-shaped structure (Bradley 1993). The most of the site is bounded by an enclosing wall that appears to have been constructed over a short period, perhaps as a single event (Figure 1.3).

Sand Canyon Pueblo has been excavated as part of the larger Sand Canyon Locality study sponsored by the Crow Canyon Archaeological Center. The purpose of the study is to investigate community organization during the Pueblo III period (A.D. 1150-1300), and subsequent abandonment of the Sand Canyon Locality and the Mesa Verde region shortly before A.D. 1300. Research foci at Sand Canyon Pueblo are chronology, planning and scale of construction, the presence or absence of intrasite functional differentiation, and the role of the site in the locality and the Mesa Verde region (Lipe 1992; Bradley 1993). Based on surface mapping, Sand Canyon Pueblo was divided into 14 more or less discrete clusters of contiguous architecture called architectural blocks; each contained a varied number of rooms and kivas. The architectural blocks were numbered in series from 100 through 1400. The rooms and kivas are largely arranged in distinct kiva suites roughly analogous to the "unit-type" pueblos first described by Prudden (1903, 1918).

## Sources of Sand Canyon Pueblo Architectural Data

The following provides a brief summary of architectural blocks and kiva suites at Sand Canyon Pueblo that contribute architectural and assemblage data used in this and subsequent analyses (Figure 1.4). The overview is largely abstracted from Bradley (1992, 1993) and Sand Canyon Pueblo annual reports of excavations (Bradley 1986, 1987, 1988, 1990, 1991; Kleidon and Bradley 1989).

### Architectural Block 100

Architectural Block 100 (AB 100) is estimated by Bradley (1993) to contain 24 surface rooms, 11 kivas and a single tower. I have designated the excavated portion of AB 100 as Kiva Suite 102/108 (KS 102/108). KS 102/108 consists of 3 kivas (STR 102, 107 and 108), 1 tower (STR 101) and 3 surface rooms (STR 104, 105 and 106) that have been excavated. Structure 107 is a rectangular surface room containing kiva features (hearth, deflector and vent system), and Structure 106 is a small (1 $m^2$ floor area) room adjacent to structures 105 and 107. Tree-ring samples from Structure 102 indicate that it was built in the early A.D. 1270s, shortly before the site was abandoned. The remaining structures were added as kiva suites some time thereafter. Thus, three kiva suites are, by definition, present in this excavated part of AB 100.

These kiva suites, do not, however, conform to the "unit-type" design found at other excavated Sand Canyon Pueblo kiva suites. Perhaps the most significant departures are the low kiva to room ratio (1:2), and unclear association of particular rooms with particular kivas. Bradley (1993:33) argues, from this and other evidence, that these are nonresidential, special-use structures. Although by definition, these should be considered as separate kiva suites, for analytic purposes, they have been lumped together as a "complex" kiva suite. This action finds some support in the fact that a single discrete refuse deposit, Nonstructure 103 (NST 103), was found in association with this complex of rooms and kivas. As no other refuse deposit was found, I have assumed that NST 103 contains a discard assemblage that represents the range of the behaviors occurring in all three of these kiva suites.

Though it is possible that other, undiscovered trash deposits were associated with these kiva suites, it seems unlikely as other kiva suites, presumably with their own refuse deposits, are immediately adjacent to the KS 102/108 complex. Trash deposits in abandoned rooms associated with this complex of kivas suites were also lacking. Finally, if this complex kiva suite was constructed in the A.D. 1270s and the site was abandoned by the 1280s, significant quantities of trash were probably not generated, especially if a nonresidential use is postulated. Architectural comparisons based on masonry data are possible only for Structures 102 and 108. However, roofed area and labor construction estimate comparisons are possible as these data were available from the entire kiva suite.

Architectural Block 200

Kiva suite 208 (KS 208) is in a kiva-dominated architectural block (AB 200), and contains a single kiva (STR 208) and 7 associated surface rooms (STR 202-207 and 211). Structure 208 began as a large, free-standing tower that was later converted to a kiva. Of the seven rooms, two (Structures 205 and 206) contain doorways that open into an adjacent, unexcavated kiva suite. Although Bradley (1993:34), does not consider these rooms as part of KS 208, it could be part of KS 208, and connect to unexcavated rooms that may themselves be associated with this kiva suite. These rooms are, therefore, included in KS 208 in subsequent analyses. Conversion of the tower into a kiva post-dates A.D. 1244 based on a single tree-ring date. Construction of the kiva and rooms probably occurred in the A.D. 1260s. According to Bradley (1993) surface structures in KS 208 lack floor features and other indications of domestic use. In addition, labor investment in comparison to other excavated kiva suites is relatively high. Bradley, therefore, suggests that architectural and feature data indicate that KS 208 was probably a special-use rather than a domestic structure. It is unclear, however, whether this implies a nonresidential special-use, as Bradley (1993) suggests was the case for KS 102/108. Suitable masonry data were not available for KS 208, but roofed area and labor investment rates were available and were used in subsequent analyses. A discrete refuse assemblage, Nonstructure 209, was in direct association.

<u>Architectural Block 300</u>

A series of 5 rooms (STR 303-305 and 307-308) and a kiva in a square room (STR 306) were excavated in this room-dominated architectural block (AB 300). The area that was excavated does not contain a "normal" kiva suite. It is not known what, if any, additional rooms might have been associated with the use of this kiva, nor is the association between the excavated rooms and kiva clear. Masonry data is not available for these structures, but (Bradley 1993) presents roofed area and labor estimates.

Because room and kiva associations are problematic these data were not used in subsequent architectural analyses. Bradley (1993:38) suggested that AB 300 might have served as a specialized storage building for nearby public areas and facilities such as the D-shaped structure, great kiva and adjacent plaza. It is difficult, however, to evaluate this with available data. An arbitrary 2 x 2 m excavation unit (ARB 15) located near AB 300 (Figure 1.3) contained refuse that may have been discarded from one or more unexcavated kiva suites in AB 300. Thus, although architectural data are not useful in the comparisons undertaken here, this refuse assemblage may, nonetheless contain evidence of behaviors that might be representative of activities at AB 300, so data from ARB 15 are used in subsequent assemblage comparisons (Chapter 5).

Architectural Block 500

Kiva suite 501 (KS 501) is in a kiva-dominated architectural block (AB 500). The suite contains a single kiva (STR 501), 9 surface rooms (STR 503-508, 510-512), and a small subterranean room (STR 514) that has been included with the surface rooms. Tree-ring dates suggest that the kiva suite was constructed in or about A.D. 1252, and grew over time by accretion. Two discrete refuse deposits, one underlying Structure 512, and a second to the southwest of the kiva, Other 515, appears to be associated with the use of KS 501. The suite follows the normative "unit-type" construction pattern and is considered by Bradley (1993:35) to have been a domestic residential kiva suite, even though it is in a kiva-dominated roomblock. He has suggested that the presence of a standard kiva suite in a kiva-dominated roomblock may indicates that the architectural block was more complexly organized than thought at first, or that some kiva suite functions changed over time. Masonry, roofed area and labor investment data were all available and used in comparisons.

Architectural Block 600

Architectural Block 600 is a kiva-dominated area in the western half of the site. Although no architectural excavations have been undertaken in AB 600, an arbitrary 2 x 2 m excavation unit (ARB 26) was excavated just to the south. According to Bradley (1993, personal communication) this refuse deposit is immediately south and below KS 601 in AB 600. KS 601 appears to be a "domestic" kiva suite. ARB 26 contained a large discard assemblage that probably resulted from activities at one or more of the unexcavated kiva suites at AB 600. If Bradley is correct, the assemblage from this excavation unit can be usefully compared to similar assemblage data from other excavated refuse deposits at Sand Canyon Pueblo and Green Lizard.

Architectural Block 800

Architectural Block 800 is in a probable kiva-dominated area of Sand Canyon Pueblo distinguished by the presence of a great kiva (STR 805). The great kiva was built and abandoned before the final abandonment of the site. Excavations in this architectural block have focused on the great kiva and surrounding structures, but these data are not yet available. An arbitrary 2 x 2 m excavation unit (ARB 27) was, however, excavated just to the east of the great kiva. This unit contained a large discard assemblage perhaps related to activities in AB 800 kiva suites or perhaps the great kiva itself. Although not directly associated with any particular kiva suite, this excavation unit may provide information about the kind of activities that occurred in one or more of the kiva suites in AB 800. Information from this unit also allows examination of assemblage composition differences with proximity to the Great Kiva.

Architectural Block 1000

Kiva suite 1004 consists of a kiva (STR 1004), 6 surface rooms (STR 1001-1003 and 1005-1006) and a tower (STR 1008) at the north end of a "standard" domestic residential roomblock (AB 1000). A small, unroofed courtyard area containing refuse (Other 1000) is also present. Tree-ring data indicate the kiva was constructed at or soon after A.D. 1265, and the remaining room and tower were added some time thereafter. Initial labor estimates for this kiva suite are high for the core unit of the kiva suite, mostly because of the massive kiva retaining wall, but subsequent construction labor investment was much more moderate (Bradley 1993). Bradley (1993:38) suggests that this kiva suite may, during its initial construction and occupation, have been a special-use structure, but in its final configuration was as a domestic residence. At some point in its occupation, refuse was deposited in the southern portion of the courtyard (OTH 1000), and later sealed and covered by the construction of Structures 1005-1007. After some period of time, Structures 1006 and 1007 were abandoned and additional refuse was deposited in and over them. Masonry, construction labor investment, roofed area and discard assemblage data were available from this kiva suite and are used in subsequent analyses.

Architectural Block 1200

Kiva suite 1206 contains a kiva (STR 1206), 9 surface rooms (STR 1201, 1202, 1204, 1205, 1207-1209 and 1212) and a tower (STR 1203), and is in the middle of a "standard" architectural block (AB 1200). Although Bradley (1987) argued that the tower (STR 1203) is not associated with KS 1206, its proximity suggests that it might be. Structure 1205 was two stories in height and may have been the first structure built in A.D. 1260. The kiva (STR 1206) was built soon thereafter, in A.D. 1262. Bradley (1993) concludes that KS 1206 was probably a domestic residential unit from its inception. A large room (STR 1204) was built and used for some time, and then subdivided into a mealing room (STR 1212) and the other half of Structure 1204 was abandoned and used as a trash dump. Finally, the mealing room was also abandoned and used as a refuse area. Masonry, construction labor, roofed area, and discard assemblage data were available from this kiva suite and were used in subsequent analyses.

## Interpretations of Complexity at Sand Canyon Pueblo

Excavations at Sand Canyon Pueblo revealed that architectural blocks can be segregated into three groups based on surface estimation of kiva to room ratios: kiva-dominated, containing fewer than 4 rooms per kiva; standard, containing from 5 to 16 rooms per kiva; and room-dominated, containing more than 20 rooms per kiva (Bradley 1993). Three kiva suites have been excavated in kiva-dominated roomblocks: KS 102/108, in Architectural Block 100, KS 208 in Architectural Block 200 and KS 501 in Architectural Block 500. Kiva suites 1004 and 1206 are in "standard" architectural blocks, while KS 300 is in the only identified room-dominated architectural block.

Bradley (1993) suggested that construction labor estimates can yield information relevant to the size of construction task groups and the way in which they were organized. Bradley also suggests that, "Architecture with higher labor investment per unit of space covered may represent intended functional differentiation from units constructed less intensively" (Bradley 1993:28). This connection has also been noted by cross-cultural studies indicating that symbolically important buildings tend to have greater labor investment than less important structures (Kramer 1978; Watson 1978; Rapoport 1982). On this basis, Bradley suggests that excavated kiva suites 102/108 and 208 are likely candidates for special function, nonresidential uses (1993, Table 3). This inference, based on construction labor estimates (in person hours) is of interest in my research, because functional differentiation is one of the potential responses to aggregation at Sand Canyon Pueblo that signals more complex community organization (see Chapter 1).

Table 4.1 describes basic architectural characteristics for the Sand Canyon Pueblo and Green Lizard kiva suites used in this analysis. The two variables of primary interest were total kiva suite roofed area and standardized mean labor scores per structure. Standardized mean scores per structure were calculated by dividing mean per structure labor estimates by total kiva suite roofed area. Figure 4.1, indicates that the excavated kiva suites are separable into 1) those with moderate total roofed area and high mean labor estimates per structure (Sand Canyon Pueblo - KS 102/108 and 208); 2) those with high total roofed areas and moderate mean labor estimates per structure (Sand Canyon Pueblo - KS 1004 and 1206); and 3) those with low total roofed area and low mean labor estimates per structure (Sand Canyon Pueblo - KS 501 and Green Lizard - KS 1). As discussed previously, functionally differentiated, nonresidential special use structures should be characterized by high labor investment. The highest labor investment values occur at KS 102/108 and KS 208. These are the same kiva suites identified by Bradley (1993) as most likely to have been nonresidential special function facilities on the basis of labor investment and kiva to room ratios. In this regard, Bradley's determinations and mine are similar, but the way in which labor values are calculated differ.

Two additional groups of kiva suites are evident. KS 501 at Sand Canyon Pueblo and KS 1 at Green Lizard are roughly similar - KS 501 has a slightly greater mean labor investment than Green Lizard, whereas Green Lizard has a slightly larger total roofed area. Similarity between these kiva suites on these measures appears to be a reflection of overall functional similarity. That is, KS 501 has been classified by Bradley as a standard domestic residential unit, and excavation at Green Lizard indicates the same (Chapter 3). It is interesting to note that KS 501 at Sand Canyon Pueblo is within an architectural block defined by Bradley (1993) as kiva-dominated, but falls within Bradley's definition of a standard kiva suite.

The final group, KS 1004 and KS 1206, are the largest excavated kiva suites at Sand Canyon Pueblo and contrast greatly with KS 501 and KS 1 at Green Lizard, described above. These kiva suites possess labor investment values only marginally greater per unit that at KS 501 and KS 1 at Green Lizard, yet they contain by far the largest roofed areas at Sand Canyon Pueblo. If these are residential domestic units, then household size was uncommonly large at these kiva suites. As discussed previously, larger household size is commonly associated with nonegalitarian leaders in cross-cultural studies (Lightfoot 1984; Johnson and Earle 1987). If this is valid for Sand Canyon Pueblo, then KS 1004 and 1206 could be the residences of nonegalitarian leaders.

Alternatively, this result may simply be a reflection of household size variability at Sand Canyon Pueblo. The former interpretation conforms to residential elite scenario of postaggregation community organization at Sand Canyon Pueblo, while the latter can be incorporated into the egalitarian undifferentiated scenarios (see Chapter 1). The latter is a likely outcome if architectural and discard assemblage data fail to support the development of vertical differentiation at Sand Canyon Pueblo following aggregation.

The data presented in Table 4.1 and in Figure 4.1 suggests that rather than two distinct groups of kiva suites (special-use nonresidential structures and residential structures) as suggested by Bradley (1993), three distinct kiva suite groupings may be present. These kiva suite groups are derived from comparison of total roofed area and mean per structure construction labor estimates at individual kiva suites (Figure 4.1). Room roofed area is the total surface room area in each kiva suite. Kiva roofed area is the total kiva area, including corner rooms, in a kiva suite. I have included corner rooms in the kiva roofed area values as they are accessed through kivas and may, therefore, be functionally related to activities in kivas. I consider corner rooms to be extensions of kiva space and are thus included with kiva areas where they are present. The kiva suite construction labor estimate is in person-hours and is derived from Bradley (1988; 1993) for Sand Canyon Pueblo kiva suites.

Table 4.1: Kiva Suite Roofed Area and Construction Labor Estimates.

| Provenience | No. of Kivas | No. of Rooms [a] | Room Roofed Area ($m^2$) | Kiva Roofed Area [c] ($m^2$) | Total Roofed Area ($m^2$) | Kiva Suite Construction Labor Estimate [b] | Mean Construction Labor Estimate per Structure [b] | Standardized Mean Construction Estimate per Structure [h] |
|---|---|---|---|---|---|---|---|---|
| SCP: KS 102/108 | 3 | 5 | 28.60 | 46.29 | 74.89 | 8417.7 | 1202.5 | 16.06 |
| SCP: KS 208 [e] | 1 | 7 | 30.60 | 33.90 | 64.50 | 6671.7 | 884.0 | 13.71 |
| SCP: KS 501 | 1 | 10 | 37.95 | 14.45 | 52.40 | 4510.1 | 410.0 | 7.82 |
| SCP: KS 1004 | 1 | 8 | 59.00 | 28.98 | 87.98 | 6285.2 | 785.7 | 8.93 |
| SCP: KS 1206 | 1 | 11 [d] | 57.59 | 24.71 | 82.30 | 7444.7 | 676.8 | 8.22 |
| GL: KS 1 [g] | 1 | 7 [f] | 36.79 | 20.42 | 57.20 [f] | 3087.9 | 384.9 | 6.73 |

[a] All towers are assumed to have been at least two stories, and are included with room counts. Rooms with a second story, where known or suspected, are also included. [b] Estimates in person-hours based on Bradley (1992, 1993). Average construction labor by structure type: surface rooms = 386.5; kivas = 1645.1; towers = 2321.1. These Sand Canyon Pueblo construction averages have also been applied to masonry Green Lizard surface structures as 1) mean surface room floor areas are roughly similar: Green Lizard [n=7] at $5.25m^2$ and Sand Canyon Pueblo [n=40] at 4.08 $m^2$ and, 2) mean surface room wall widths are also similar: Green Lizard [n=19] at 31.8 cm and Sand Canyon Pueblo [n=40] at 31.2 cm. [c] Kiva roofed area includes all benches, main chamber and corner rooms. [d] Includes one 2 story room, Structure 1205. [e] Kiva suite room number and roofed area include two surface rooms (Structure 205 and 207) that may or may not be associated with this kiva suite. [f] Excludes three jacal rooms totaling 10.3 $m^2$. [g] Green Lizard kiva construction effort adjusted for the proportion of masonry used in construction, $1.63m^3$ relative to the slightly smaller, fully masonry lined Sand Canyon Pueblo kiva (STR 501) at $7.2m^3$. [h] Mean per structure construction labor estimate standardized by dividing by total kiva suite roofed areas.

The averages of these figures for kivas and surface rooms has been applied to the Green Lizard kiva suite. The mean construction labor estimate per structure is the mean value for all structures in a kiva suite. The final measure is the standardized mean value derived by dividing the mean per structure construction value by total kiva suite roofed area.

These kiva suite groups indicate, from an architectural standpoint, that differential uses and activities might have occurred at Sand Canyon Pueblo. As I have discussed in Chapter 1 and above, architectural differentiation is expected to be the product of either 1) functional differentiation of kiva suites and/or architectural blocks, that is, the development nonresidential special-use structures or, 2) the presence of status differentiation and a nonegalitarian social

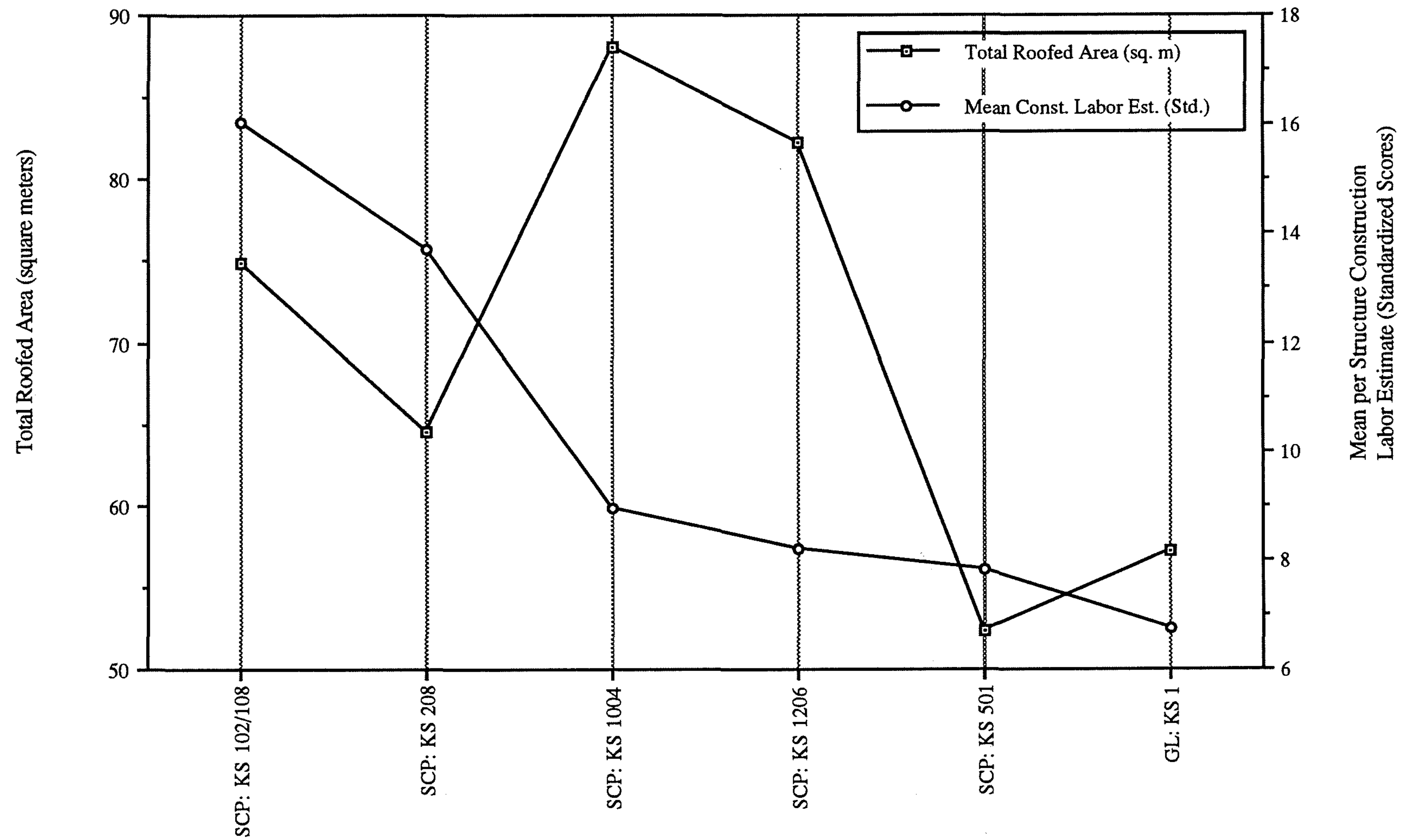



Figure 4.1: Kiva Suite Roofed Area and Standardized Mean per Structure Labor Estimates.
GL - Green Lizard; SCP - Sand Canyon Pueblo.

formation reflected in larger households and therefore larger kiva suites. Expectations of differential kiva suite use are tested against architectural data (this chapter) and against artifact assemblage associated with particular kiva suites or architectural blocks at Sand Canyon Pueblo and Green Lizard in Chapter 5, below.

In summary, five excavated kiva suites from Sand Canyon Pueblo and one kiva suite from Green Lizard were compared using total roofed area and standardized mean per structure labor estimates (Table 4.1, Figure 4.1). This initial architectural comparison indicates that three distinct kiva groups are present and that these can perhaps be related to the three scenarios of potential postaggregation community organization at Sand Canyon Pueblo. Masonry, roofed area and labor investment data were then compared in light of these three scenarios and are discussed at the end of this chapter.

## ARCHITECTURAL COMPARISONS: MASONRY DATA

The following section discusses the key architectural comparisons to be made in terms of their significance and meaning in relation to the relative investment of labor and potential social complexity. In this section I use additional architectural indices to test the kiva suite groupings obtained from total roofed area and labor estimates.

### Comparative Indices Description

Relative construction effort was assessed by using quantitative architectural data to derive 1) the Relative Labor Input index, i.e., relative amounts of labor investment in wall construction and 2) several formality indices which measure the relative degree of formality as expressed in manipulation of masonry and construction techniques not central to the structure's function or structural integrity. These indices are not grounded in actualistic studies, but provide proxy values for comparing structures at Green Lizard and Sand Canyon Pueblo. The indices enable quantitative comparison while avoiding many of the problems encountered in structure function inferences and labor rate studies.

Several assumptions provide the rationale for use of the Relative Labor Input and Formality Indices: 1) all wall construction materials (stone, suitable sediments and water) are locally available; 2) for masonry walls, the greater the amount of stone used in wall construction relative to mortar, the greater the relative amount of labor invested (Metzger et al. 1988); 3) for masonry walls, wide walls are assumed to have required greater relative amounts of labor than narrower walls of similar construction and; 4) certain forms of wall treatment such as stone selection and especially stone dressing are additional labor inputs not essential to the integrity or soundness of construction. The Formality Indices are based on this last assumption about the symbolic content of the built environment (McGuire and Schiffer 1983; Rapoport 1982). Thus, significant differences in the Relative Labor and Formality Indices may differentiate status or ability to organize greater construction and/or postconstruction labor investment. If aggregation at Sand Canyon Pueblo was accompanied by increased social complexity and wealth differences, these indices may differ between Sand Canyon Pueblo and Green Lizard.

The relative labor index (RLI) is used to compare relative amounts of labor invested from one masonry wall to another. The variables wall width, wall height, and summed height of stones in a measured vertical wall transect are used to derive the RLI. Selection and Uniformity indices are proxy indicators of formality, i.e., of pre- and postconstruction efforts in excess of labor inputs required to build a sound structure. The Selection and Uniformity indices are constructed with individual stone height and width measurements in the same measured wall transects used to construct the RLI. These data are used to assess size and shape of construction stones in walls at Green Lizard and Sand Canyon Pueblo. Standard errors of stone heights and widths provide a proxy measure of the uniformity of stone selection. These indices were compared between and among walls of structure types (pitstructures, towers and surface rooms) at Sand Canyon and Green Lizard.

Selection of particular sizes and shapes of stones provides evidence of constructional preferences and a gauge of the potential effort expended in selection. The Selection Index measures the relative tabularity or blockiness of stones. Tabularity and blockiness are expressed as slope and intercept values (Table 4.3). High intercept values and low slope values indicate tabular stones, while low intercept and high slope values indicate blockier stones. The Uniformity Index measures how uniform – in height and width – stones selected for construction were. Uniformity of stones is expressed as standard errors of the slope and intercept enables inspection of similarities and differences and evaluation of the presence or absence of excess constructional effort invested in intentional selection of similar sizes and shapes of stones.

The Shaping Index is a proxy measure monitoring the intentional shaping of masonry through pecking of exposed surfaces to remove projections and regularizing exposed masonry surfaces. I consider that pecking of masonry surfaces is labor investment in excess of that required for sound construction. The greater the amount of pecked stone present in a structure, the greater the amount of nonessential labor investment, and therefore, greater investment in formal, symbolic aspects of construction.

The Shaping Index employs the recorded estimates of the proportion of pecked masonry in entire walls. These proportions were averaged to derive the overall proportion of pecked stone in a structure. The data and indices constructed from them are presented in Table 4.1.

## Calculation of Comparative Architectural Indices

The architectural data used in compiling the comparative indices are from the initial Crow Canyon Architectural Recording Form first used in 1988. As in all such initial attempts, recording inconsistencies are present. Where such inconsistency affected calculation of the comparative indices, various work-arounds, as described below, were devised and applied.

Architectural indices are computed from wall height, wall width and stone sizes recorded at vertical transects of wall midlines for all exposed surface room and tower walls. In pitstructures (round rooms), architectural data were consistently recorded for lower lining wall segments below each pilaster. Although other architectural features of pitstructures, such as pilasters and upper lining walls, were recorded for some pitstructures, only lower lining wall data was recorded for all pitstructures. For comparative purposes, I treat pitstructure lower lining walls (LLW) as

| Provenience | Mean Stone Height | Height Standard Deviation | Mean Stone Width | Width Standard Deviation | Sum Stone Height x Width ($cm^2$) | Mean Stone Size ($cm^2$) | Mean Stone Size ($cm^2$) Stand. Dev. | Stone to Mortar Ratio | Mean RLI Score | Shape Score |
|---|---|---|---|---|---|---|---|---|---|---|
| SCP: STR 102 LLW | 9.20 | 2.974 | 25.29 | 8.636 | 12356 | 238.46 | 69.365 | .88 | 39.76 | 1.000 |
| SCP: STR 108 LLW | 7.19 | 1.640 | 18.96 | 5.035 | 6629 | 138.41 | 66.929 | .86 | 38.80 | .250 |
| SCP: STR 501 LLW | 6.46 | 1.989 | 15.00 | 2.981 | 5882 | 96.89 | 36.448 | .81 | 40.03 | 1.000 |
| SCP: STR 1004 LLW | 8.15 | 3.243 | 20.78 | 7.318 | 8052 | 173.67 | 90.191 | .86 | 38.59 | 1.000 |
| SCP: STR 505 | 8.75 | 3.887 | 18.33 | 7.535 | 2089 | 174.08 | 161.345 | - | - | - |
| SCP: STR 507 | 5.52 | 1.799 | 13.94 | 5.293 | 1924 | 81.28 | 49.242 | .69 | 23.13 | .567 |
| SCP: STR 508 [b] | 5.80 | 2.426 | 15.80 | 6.416 | 1423 | 94.87 | 62.310 | - | - | .133 |
| SCP: STR 510 | 7.35 | 2.880 | 18.66 | 6.795 | 3701 | 158.48 | 76.927 | .79 | 22.1 | .550 |
| SCP: STR 511 [b] | 5.53 | 1.795 | 14.50 | 1.924 | 2589 | 80.96 | 48.673 | - | - | .683 |
| SCP: STR 1001 | 10.04 | 2.353 | 17.32 | 4.633 | 3938 | 134.77 | 75.380 | .86 | 25.83 | .125 |
| SCP: STR 1002 | 8.40 | 2.613 | 17.33 | 2.895 | 2128 | 141.87 | 74.503 | .87 | 25.20 | .300 |
| SCP: STR 1003 | 8.00 | 4.251 | 17.61 | 6.657 | 7184 | 163.69 | 125.920 | .81 | 33.31 | .067 |
| SCP: STR 1007 | 7.40 | 2.880 | 43.40 | 11.589 | 1514 | 302.80 | 112.586 | .67 | 20.18 | 0.000 |
| SCP: STR 1008 | 9.75 | 3.808 | 23.08 | 5.662 | 12415 | 241.89 | 119.039 | .93 | 49.44 | .750 |
| GL: STR 1 LLW [c] | 9.16 | 3.034 | 25.69 | 16.646 | 3539 | 236.15 | 160.669 | .76 | 33.88 | .500 |
| GL: STR 3 | 5.96 | 2.577 | 19.04 | 7.758 | 1134 | 132.23 | 80.860 | .76 | 23.38 | .073 |
| GL: STR 4 | 8.42 | 2.923 | 21.80 | 9.368 | 4851 | 209.45 | 120.616 | .88 | 30.33 | .030 |
| GL: STR 5 | 8.05 | 3.050 | 19.68 | 7.680 | 4689 | 166.53 | 74.396 | .83 | 30.04 | .020 |
| GL: STR 6 | 6.25 | 3.420 | 19.07 | 10.16 | 2438 | 147.10 | 128.483 | .83 | 25.56 | .003 |

[a] LLW = pitstructure lower lining wall. [b] Only Shape Score used, insufficient data to Calculate RLI in these rooms. [c] Pitstructure has only partial masonry lining.

Table 4.2: Green Lizard and Sand Canyon Pueblo Masonry Data.

representative of the effort expended in building the entire structure. After comparative indices were calculated for each measured transect in each structure, mean structure indices were computed.

Relative Labor Index

Calculation of the Relative Labor Index involved the manipulation of the variables wall height, wall width and the sum of stone heights, all of which have been systematically recorded at single wall midline measurement transect points. Since I have assumed that the greater the amount of stone relative to mortar used in wall construction the greater the relative degree of labor invested, this index yields values that are high where the proportion of masonry relative to mortar is high, and low where greater amounts of mortar relative to stone is present.

The RLI is calculated by dividing the sum of the height of stones in the measured wall section by wall height. The resulting figure is the ratio of mortar to stone. Stone to mortar ratios were then multiplied by wall width, yielding the Relative Labor Index.

$$\text{Method: } \frac{\text{Summed Stone Ht.}}{\text{Wall Ht.}} \times \text{Wall Width} = \text{Relative Labor Index}$$

In some cases, actual wall height at the measurement transect was not recorded. Since actual wall height is a critical value in computing the index, a work-around convention was devised. Where wall height at point of measurement was missing, wall height was approximated by averaging maximum and minimum wall heights, which had been recorded for most walls. This procedure was useful in most cases. Occasionally however, the summed height of stones in a measured transect exceeded averaged wall heights. In such cases, the maximum wall height was used.

Occasionally, wall width was not recorded, as was the case in all pitstructure lower lining walls, or was recorded as a range of values. In the latter case, the maximum and minimum values in the range were averaged. In the former, a standard bench surface width of 40 cm was used in all cases. As lower lining walls are a veneer of masonry backed by constructional fill, and actual stone widths vary considerably, the use of a constant width probably underestimates reduced construction variability and may inflate some RLI values. Relative construction efforts were still expressed in the stone to mortar ratios used in computing the RLI, however.

Structure 1 (pitstructure) at Green Lizard, contained lower lining wall masonry only below the southern recess (see Chapter 3 for discussion). The remainder of the lower lining wall consisted of plastered native sediments. Thus, the architectural analyses discussed below utilize only data from this portion of Structure 1. If the proportion of masonry employed had been factored in, the RLI of the pitstructure at Green Lizard would have ranked well below the majority of surface rooms.

### Structure Scores

Only contemporaneous walls enclosing a space were used in calculating RLI and Shape scores. Existing walls incorporated in newly formed structures are excluded in computing the structure score, as they do not reflect labor expenditures specifically related to the creation of a new structure. That is, I count the walls for that structure, not walls already existing. Existing walls may be counted with another structure.

At both Green Lizard and Sand Canyon Pueblo exterior-facing walls of surface rooms and towers are characterized by larger stone sizes and the presence of more pecked stone. This contrasts with interior walls characterized by smaller stone sizes and less shaping of masonry. Larger stone sizes and greater degree of pecking on exterior walls may represent conscious efforts to reduce erosion by minimizing the number of mortar joints subject to erosion, may constitute a culturally determined design convention, may represent a subtle visual cue conveying an increased sense of regularity or "formality," or involve aspects of all of these.

## Analysis and Comparison of Stone Shape Selection and Uniformity Indices

A regression analysis was performed on architectural data recorded for 19 structures at Sand Canyon Pueblo and Green Lizard (Table 4.1): four pitstructures, one tower and 12 surface rooms at Sand Canyon, and one pitstructure and four surface rooms at Green Lizard. All structures from both sites for which appropriate data were available are included. Regression coefficients were plotted to compare stone widths and heights. Underlying this comparison is the hypothesis that selection of particular sizes of stones, as expressed in stone height and width, may vary with structure type. It has previously been argued that selection and uniformity in stone sizes are useful proxies for assessing intrasite functional differentiation, or potential wealth and status differences expressed in architecture at Sand Canyon Pueblo.

SAS least-squares regression (SAS Institute Inc. 1988) statistical software running on an IBM 3090 mainframe was used in the analysis. Prior to running the regression basic statistical summaries, scatter plots and box and whisker plots were generated and inspected for nonnormality. Since the intent of the regression was comparison of architectural data between the two sites rather than to accurately predict stone width when stone height was known, moderately skewed distributions present in a few cases were ignored. The dependent variable used in the regression was stone width and the independent variable was stone height.

Standard regression coefficients and standard slope and intercept parameter errors were generated. The parameter estimates and standard errors of the data are graphically presented by scatter plotting (Figure 4.2). Standard error estimates were overlaid as x and y error bars constituting one standard deviation (68.2%) about the intersection of slope and intercept values.

## Regression Plot Discussion

The resulting scatter plot (Figure 4.2) contains three visually distinct clusters referable to pitstructures (kivas), including most Sand Canyon kivas and the single kiva from Green Lizard, mostly Sand Canyon Pueblo surface rooms and mostly Green Lizard surface rooms. The plot of regression coefficients and error bars illustrates that stone width or tabularity differentiates structure types. The intercept (x-axis) is a proxy for stone width that best fits the deviations of actual stone widths. Thus, the larger the intercept value, the wider (more tabular) the stones in relation to height (or blockiness) of stones. The larger the absolute value of the slope the greater the change in stone width per unit change in some value of x. That is, low slope values indicate increased tabularity, while high slope values indicated increasing blockiness.

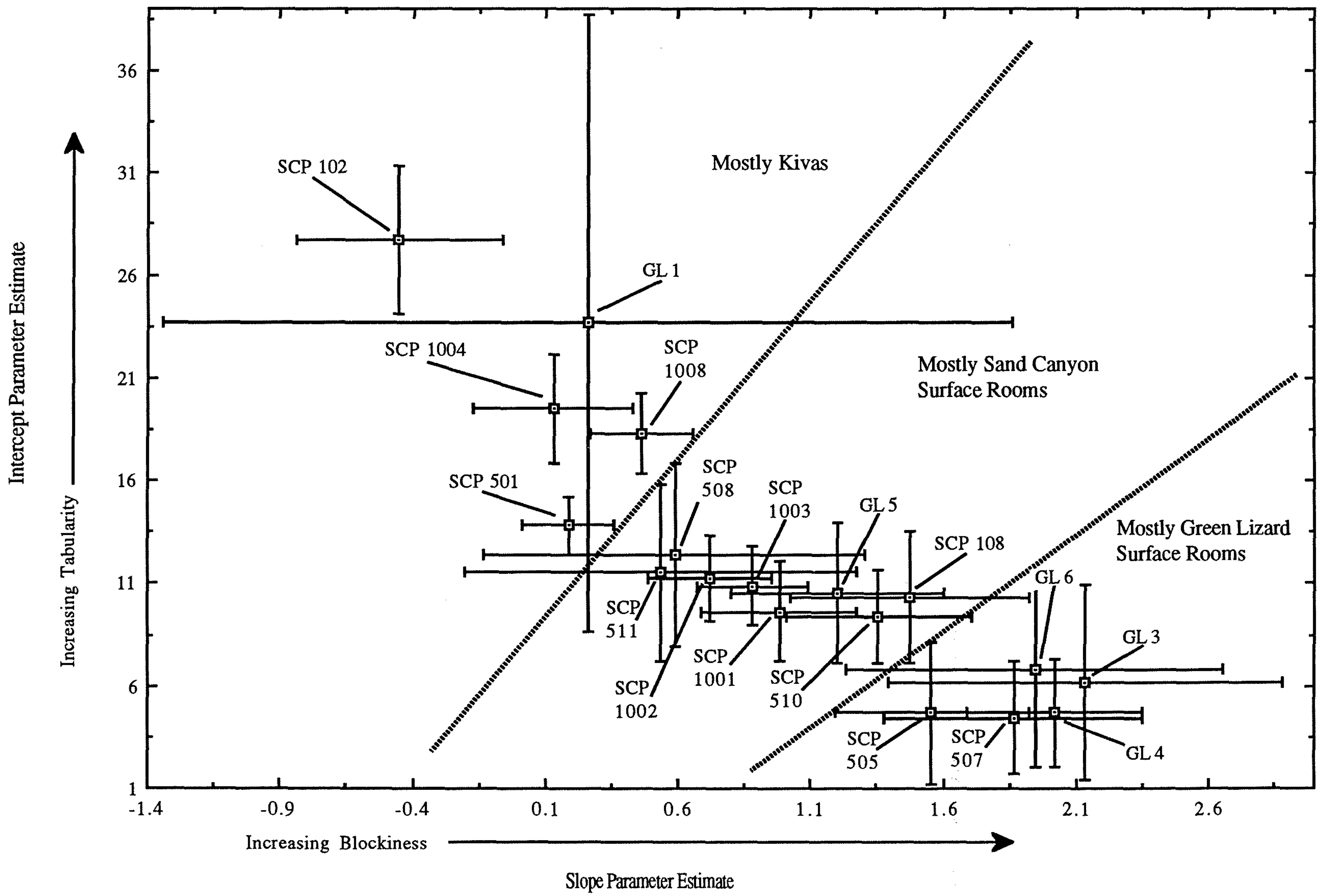
Structures in the upper left of the distribution contain stones that are consistently tabular while structures in the lower right corner of the distribution are consistently less wide and tend toward increasing squareness (Figure 4.2). This is borne out as well by the slope values. Cases in the upper left of the distribution have low slope values indicating a weak relationship between stone width and stone height. That is, stone height changes little as stone width increases. Slope values increase significantly as one moves toward the lower right of the plot indicating an increasingly positive relationship between stone width and stone height. Thus, tabularity decreases while blockiness increases from left to right and from top to bottom. Standard error overlaps are present between these groups indicating that distinctions are present but are not strongly expressed. However, with the exception of Structure 108 at Sand Canyon Pueblo, most of the kivas are very distinct from surface rooms, and Green Lizard rooms are generally distinct from Sand Canyon Surface rooms. The overlaps are interesting in themselves. Structure 1008 – a tower – is included in the kiva group. Structure 108, a kiva at Sand Canyon Pueblo, falls into the Sand Canyon surface room group as does Structure 5, a surface room at Green Lizard – two Sand Canyon surface rooms fall into the Green Lizard surface room group.

In the case of Structure 1008, its inclusion in the overall kiva group is clearly based on the similarity of intercept and slope, that is, similarity in stone size and shape used in construction (similar slope and intercept values). Structure 1008, multi-story D-shaped room, and Structure 1004, the pitstructure in the kiva suite that includes Structure 1008, lie in proximity to one another, indicating similarity in the shape of stones used in construction. It is unclear, however, whether this has any direct social meaning. It may be related to functional and formal similarities between the two structures that resulted in intentional selection of similar stone shapes and sizes by the construction group, may simply be the result of closely spaced construction events that utilized the same stone cache for both structures, or were the result of construction by the same mason.

Structure 108 (pitstructure) is also interesting in that the adjacent pitstructure, Structure 102, part of a distinct kiva-suite, has a very different intercept and slope. These two pitstructures, although within the same architectural Block and same complex kiva suite (KS 102/108) at Sand Canyon Pueblo, were constructed with significantly different stone shapes. A suggestion by the recorder that some reused masonry, perhaps from surface rooms, may be present in the lower lining wall of Structure 108 finds some support in this structure's inclusion in the Sand Canyon surface room group. The presence of Green Lizard Structure 5 in the Sand Canyon surface room group, and the placement of Structures 505 and 507 at Sand Canyon Pueblo within the group dominated by Green Lizard surface rooms indicates overlapping availability of construction material or similar stone selection preferences. The degree of tabularity of stones in Structure 5 is more similar to that found in Sand Canyon Pueblo surface rooms, while masonry stones used in Structure 505 and 507 at Sand Canyon Pueblo tend toward increased blockiness resulting in their inclusion with Green Lizard surface rooms.

The primary distinctions, therefore, between pitstructures and surface rooms at both sites are present in the degree to which masonry is more or less tabular. I should clarify at this point what I mean by "tabular" masonry. As I use tabular here, it means that the stone is wider than it is high. Even the most "tabular" masonry at Sand Canyon Pueblo is of loaf-shaped blocks rather than the fine, tabular stone used in Chacoan masonry as described by Lekson (1984). Figure 4.2 indicates that slightly more tabular stone was preferred for the construction of surface rooms at Sand Canyon Pueblo than at Green Lizard surface rooms. Masonry used in pitstructure construction at both Green Lizard and Sand Canyon Pueblo, as well as the single tower in the sample (Structure 1008 at Sand Canyon), is considerably more tabular than in surface rooms at either site (Table 4.3, Figure 4.2). In terms of formality of construction, the distinction between tabular vs. blocky masonry used in construction of pitstructures and surface rooms suggest that if formal ritual events occurred primarily in pitstructures, then tabular masonry may have been considered more formal than blocky masonry. Following this line of reasoning, Structure 102

Figure 4.2: Stone Selection and Uniformity Regression Plot. Green Lizard – Structure 1 (kiva), Structures 3, 4, 5, 6 (surface masonry rooms). Sand Canyon Pueblo – Structures 102, 108, 501, 1004 (kivas), Structure 1008 (tower), Structures 505, 508, 510, 511, 1001, 1002, 1003 (masonry surface rooms).


Mostly Kivas
Mostly Sand Canyon Surface Rooms
Mostly Green Lizard Surface Rooms
SCP 102
GL 1
SCP 1004
SCP 1008
SCP 501
SCP 508
SCP 1003
GL 5
SCP 108
GL 6
GL 3
SCP 511
SCP 1002
SCP 1001
SCP 510
SCP 505
SCP 507
GL 4
36
31
26
21
16
11
6
1
-1.4
-0.9
-0.4
0.1
0.6
1.1
1.6
2.1
2.6
Intercept Parameter Estimate
Increasing Tabularity
Increasing Blockiness
Slope Parameter Estimate

contains the most tabular masonry and, therefore, is the most formal of the pitstructures, whereas the surface rooms at Green Lizard are the least formal in construction.

## Evaluation of Selection

Stone width as a proxy for stone shape/size preference is one vector separating structure types and surface rooms between Green Lizard and Sand Canyon Pueblo. Recast in terms of this architectural study, the selection of tabular and blocky stones differentiates between structure types, and to a lesser degree, between structures. Of interest is whether these differences result from intentional selection or differential availability. Blockier masonry in Green Lizard surface rooms might suggest that such material was more readily available at Green Lizard than at Sand Canyon Pueblo. However, tabular stone was used in Structure 1 (pitstructure), suggesting that tabular stone was available at both sites. The presence of overall blockier building material at Green Lizard, relative to that used in construction at Sand Canyon Pueblo, suggests, therefore, that less effort may have been expended in selection of building materials at Green Lizard.

Thus, intentional selection of tabular stone is evident for kivas and towers at both Green Lizard and Sand Canyon Pueblo. Surface room construction at the two sites differs: tabular stone was used more frequently in surface rooms at Sand Canyon Pueblo than was the case at Green Lizard. If this difference is due to selective preference, as it appears to be, then greater selection effort, and therefore greater intentional formality is indicated at Sand Canyon Pueblo surface structures. This notion is further evaluated below.

## Evaluation of Uniformity

Uniformity, as previously discussed, may be construed as a measure of additional nonessential labor input. Thus, if stone sizes are carefully selected and/or shaped to be of uniform shape and size, then the greater the amount of uniformity expressed as similarity of stone size in a structure, the greater the amount of effort invested. Uniformity is expressed in Figure 4.2 through the size of the standard error bars. The larger the error on the y-axis, the greater the variability (less uniformity) in width of stones relative to height. The larger the error on the x-axis, the greater the variability in the dimension of stone blockiness (Table 4.3).

Table 4.3: Sand Canyon Pueblo and Green Lizard Stone Regression Parameter and Error Data Ranked from Most to Least Uniform.

| Description | Intercept Estimate | Slope Estimate | Intercept Error | Slope Error |
|---|---|---|---|---|
| Sand Canyon Pueblo - Structure 501 - Kiva | 13.81 | .19 | 1.40 | .17 |
| Sand Canyon Pueblo - Structure 1003 - Surface Room | 10.87 | .88 | 1.93 | .21 |
| Sand Canyon Pueblo - Structure 1008 - Tower | 18.29 | .47 | 2.01 | .19 |
| Sand Canyon Pueblo - Structure 1002 - Surface Room | 11.27 | .72 | 2.04 | .23 |
| Sand Canyon Pueblo - Structure 510 - Surface Room | 9.41 | 1.36 | 2.25 | .35 |
| Sand Canyon Pueblo - Structure 1001 - Surface Room | 9.61 | .98 | 2.43 | .29 |
| Sand Canyon Pueblo - Structure 1004 - Kiva | 19.49 | .13 | 2.67 | .30 |
| Green Lizard - Structure 4 - Surface Room | 4.70 | 2.02 | 2.65 | .33 |
| Sand Canyon Pueblo - Structure 507 - Surface Room | 4.46 | 1.86 | 2.75 | .49 |
| Sand Canyon Pueblo - Structure 108 - Kiva | 10.29 | 1.47 | 3.19 | .45 |
| Green Lizard - Structure 5 - Surface Room | 10.50 | 1.20 | 3.43 | .40 |
| Sand Canyon Pueblo - Structure 505 - Surface Room | 4.70 | 1.56 | 3.47 | .36 |
| Sand Canyon Pueblo - Structure 102 - Kiva | 27.72 | - .45 | 3.60 | .39 |
| Sand Canyon Pueblo - Structure 511 - Surface Room | 11.54 | .53 | 4.31 | .74 |
| Sand Canyon Pueblo - Structure 508 - Surface Room | 12.39 | .59 | 4.47 | .72 |
| Green Lizard - Structure 6 - Surface Room | 6.80 | 1.95 | 4.77 | .71 |
| Green Lizard - Structure 3 - Surface Room | 6.16 | 2.14 | 4.79 | .74 |
| Green Lizard - Structure 1 - Kiva | 23.67 | .26 | 14.99 | 1.60 |

Inspection of Figure 4.2 indicates that in most cases, pitstructure and tower stone shape tends to be more uniform than that of surface rooms at Sand Canyon Pueblo. The pitstructure at Green Lizard has large errors on both axes, indicating that although primarily tabular stones were used, there was greater variability than in Sand Canyon Pueblo pitstructures.

This may in part be a function of the smaller number of measurements. The smallest standard errors in both intercept and slope are found in Structure 501, a kiva at Sand Canyon Pueblo, followed by Structure 1003 – a surface room – and Structure 1008 – a tower. Uniformity expressed in standard errors differ little between and among structures types at both Sand Canyon and Green Lizard. It is possible that this outcome reflects lesser emphasis on uniformity in stone size, except at Structure 501 (pitstructure), and greater emphasis on selection of stone sizes and shapes for use in different structure types at both sites.

Sample sizes in this architectural comparison are dependent on standing wall height. Green Lizard's location on a colluvial slope in most cases results in lower average wall heights than the sample of structures available at Sand Canyon Pueblo which are not subject to similar erosive processes. In order to assess the validity of structure and site type divisions inferred in Figure 4.2, potential sample size effects on plot locations were assessed by regressing slope estimates against number of observations. This regression analysis indicates no significant relationship between the number of observations and slope parameter estimates ($F_{1,19} = 2.79$, $p > .05$). The high proportion of unexplained variation in this regression ($r^2 = 0.13$) further indicates that little of the observed variation is explained by differences in number of observations. For the purposes of this comparison such sample size effects are unavoidable and the marginal strength of the relationship is assumed to have no significant effect on the generation of the comparative standard error plot

## Summary of Stone Selection and Uniformity

The clustering of distributions discussed above and illustrated in Figure 4.2, indicates that stone shapes differ between Green Lizard and Sand Canyon Pueblo surface rooms. Green Lizard surface rooms employ blockier stones than Sand Canyon Pueblo surface rooms, while the small amount of masonry in the Green Lizard pitstructure is tabular and similar fully masonry-lined pitstructures at Sand Canyon Pueblo. However, surface rooms at both sites tend to possess less tabular (i.e., blockier) masonry than was present in pitstructure lower lining walls.

There is a tendency for all pitstructures, and the single tower at Sand Canyon Pueblo (Str. 1008), to exhibit greater uniformity (smaller standard errors) in stone shapes, while the Green Lizard pitstructure and surface rooms exhibit greater variability in stone shape. A relatively high degree of variability present in all but a few of the Sand Canyon Pueblo units, i.e., Structure 501 (kiva) 1008 (tower), and 1002 and 1003 (surface rooms attached to a pitstructure). The high degree of variability suggests that although differences in stone shape preference exist between the two sites, uniformity within these preferences was not greatly emphasized.

The greater overall use of tabular masonry at Sand Canyon Pueblo indicates more selection effort went into construction than at Green Lizard. This may be linked to increasing social formality associated with aggregation. As the number of structures sampled is small, especially at Green Lizard, sweeping statements about greater formality or construction labor effort at Sand Canyon are unwarranted. Given these constraints, however, differences in stone selection and uniformity between Sand Canyon Pueblo and Green Lizard are clearly present suggesting the presence of greater "formality" of construction at Sand Canyon Pueblo. Assessment of variability among Sand Canyon Pueblo kiva suites illustrates no striking differences, suggesting little internal differentiation, at least in the sample used in this analysis. It should be noted, however, that Structure 102 at Sand Canyon Pueblo, which has the most tabular masonry, is in a kiva suite identified in roofed area and construction labor analysis (Figure 4.1) as possibly being a special function structure in a special use kiva suite (KS 102/108). However, there is no clear pattern between special function kiva suites and increased formality of construction. Nor is there clear evidence to support the suggestion, as indicated in the same analysis that KS 1004 was an elite residence although all the structures in this kiva suite (KS 1004) have the most uniform masonry in the sample (Table 4.3), stone selection – tabular or blocky – is less even.

## <u>Analysis and Comparison of Relative Labor and Shape Indices</u>

Relative Labor Input (RLI) scores were calculated for contemporaneously built walls comprising a structure (Table 4.2). The mean of individual wall scores comprises the structure RLI score. Structure RLI scores were grouped according to site, Green Lizard or Sand Canyon Pueblo, and general structure type: pitstructures and surface rooms, including Str. 1008, a tower (Figure 4.3).

A Wald-Wolfowitz runs test (Blalock 1979) was performed on ranked structure scores to test whether samples were drawn from the same population. Comparisons of Green Lizard and Sand Canyon Pueblo pitstructures and surface rooms, and between Green Lizard and Sand Canyon Pueblo surface rooms were performed.

The first analysis of pitstructure and surface room RLI scores at both sites confirmed the distinctive pattern of RLI scores between these structure types; the null hypothesis of identical populations was rejected ($z = -6.606$, $p < .01$). Significant differences in relative labor investment appear to exist between kivas and surface rooms. In the test of Green Lizard and Sand Canyon surface room RLI scores, the null hypothesis was not rejected ($z = 0.843$, $p > .05$) indicating that surface rooms at Sand Canyon Pueblo are not significantly different from those at Green Lizard in construction labor investment.

Shape Scores, consisting of the average proportion of pecked stone in individual structure walls, were compiled to yield mean Shape Scores for structures (Table 4.2). These were grouped according to site and structure type (pitstructures and surface rooms) as in the RLI analysis (Figure 4.4).

A Mann-Whitney U-test was performed on ranked structure Shape Scores to test whether samples were drawn from the same population (Siegel 1956:116-127). Tests of Green Lizard and Sand Canyon Pueblo pitstructures against Green Lizard and Sand Canyon Pueblo surface rooms, and between Green Lizard and Sand Canyon Pueblo surface rooms were performed.

The analysis of kivas and surface rooms at both sites resulted in rejection of the null hypothesis that samples were drawn from the same population ($U \leq 5$, $p < .05$). Significantly more pecked stone is present in pitstructure lower lining walls than in surface rooms at both Green Lizard and Sand Canyon Pueblo. Inspection of Shape Score data also indicates that the four Sand Canyon pitstructures possess more pecked masonry than was observed in the limited amount of masonry present in the Green Lizard pitstructure. A second Mann-Whitney U-test of Green Lizard and Sand Canyon Pueblo surface rooms also rejected the null hypothesis of samples drawn from the same population ($U \leq 9$, $p < .05$). The amount of pecked masonry in Sand Canyon Pueblo surface rooms is significantly greater than in Green Lizard surface rooms. Thus, pitstructures have more pecked stone than surface rooms at both sites, while Sand Canyon Pueblo surface rooms

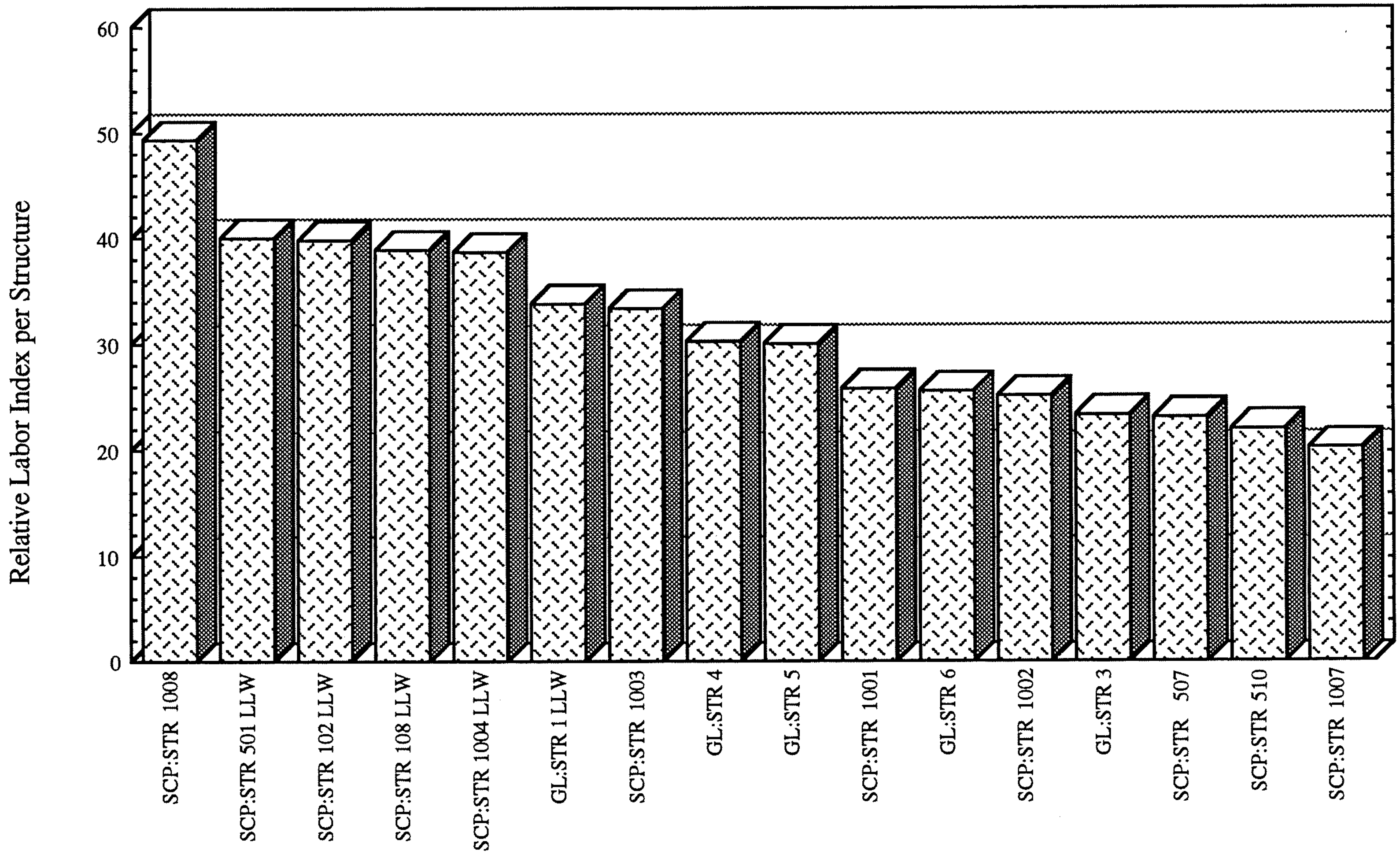



Figure 4.3: Ranked Sand Canyon Pueblo and Green Lizard RLI Scores. LLW Stands for Lower Lining Wall in Kivas

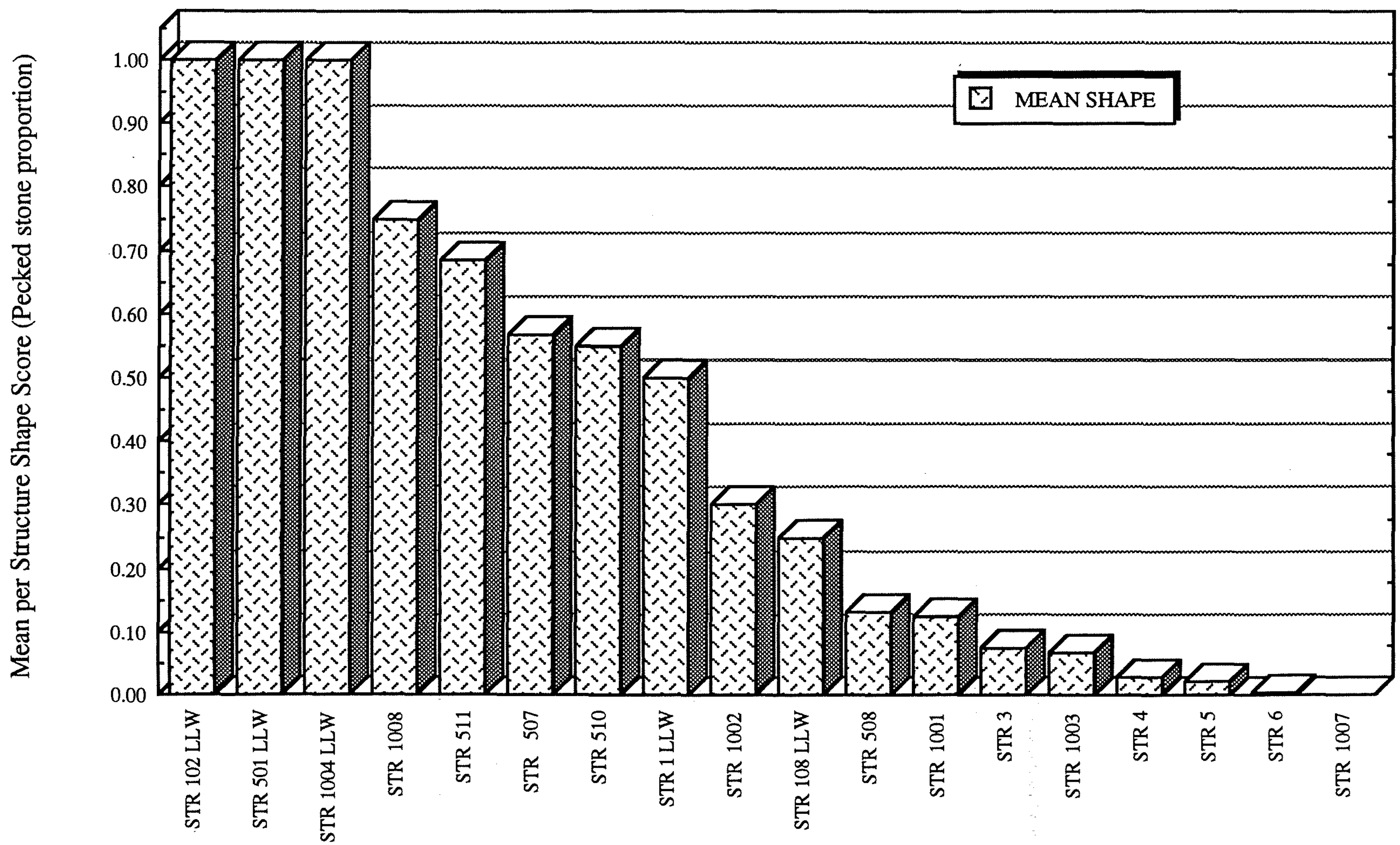



Figure 4.4: Ranked Green Lizard and Sand Canyon Pueblo Structure Shape Scores. LLW Stands for Lower Lining Wall in Kivas.

have more pecked stone than was observed in Green Lizard surface rooms. The presence of significantly higher Shape Scores and more tabular stones used in Sand Canyon surface rooms indicates greater overall masonry formality at the larger site.

### Summary and Conclusion of Masonry Data Analysis

Architectural comparisons of Green Lizard and Sand Canyon structures indicate that the subtle similarities and differences between the two sites exist – more tabular masonry was used in pitstructure lower lining walls at both Green Lizard and Sand Canyon Pueblo (and in Structure 1008, tower), while less tabular stones were used in surface rooms at both sites, more so at Green Lizard than Sand Canyon Pueblo (Table 4.3 and Figure 4.2).

If tabular and blocky stone sizes are equally represented in locally available construction material at both sites, then somewhat more effort may have been expended in the intentional selection of tabular stone at Sand Canyon Pueblo. Uniformity of stone selection expressed as standard errors indicates that, with the exception of Structure 1 (pitstructure) at Green Lizard with very large standard errors and Structure 501 (pitstructure) at Sand Canyon with extremely small standard errors, little apparent difference in uniformity of stone size selection exists between the two sites, and that differences between kiva suites at Sand Canyon Pueblo were not great. However, as a group, Green Lizard surface rooms tend to exhibit somewhat greater variability (larger standard errors) than Sand Canyon surface rooms.

Tests of RLI data indicated more labor was invested in the construction of pitstructures than surface rooms at both sites, while surface room construction inputs at both sites were comparable. Tests on structure Shape Scores indicate that pitstructures possess significantly more pecked stones than surface rooms at both sites, and surface rooms at Sand Canyon have significantly more pecked stone than Green Lizard surface rooms.

Thus, generally similar efforts where expended in kiva lower lining wall construction at both Sand Canyon Pueblo and Green Lizard. It appears that while similar levels of effort were expended in construction of Green Lizard and Sand Canyon surface rooms, somewhat greater effort was expended at Sand Canyon in shaping of stone. Selection, uniformity and shaping of masonry at Sand Canyon indicates more effort was expended, implying more investment in the formal or symbolic aspects of architecture at Sand Canyon Pueblo than at Green Lizard.

If wealth and status differences existed at Sand Canyon Pueblo, allowing some social units to control larger labor pools than others, then differences between Green Lizard and Sand Canyon Pueblo should exist, and should also exist between architectural units within Sand Canyon Pueblo. The differences between Sand Canyon and Green Lizard units are not highly expressed, that is, large differences do not appear to be present.

Bradley (1992, 1993) has suggested that some of the western units at Sand Canyon Pueblo with low kiva to room ratios including kiva suites 102, 108 used in this comparison, may have had greater ceremonial and ritual functions than other kiva suites at Sand Canyon Pueblo especially those on the western side of the site (Figure 1.3). In terms of the architectural variables measured here, western units (KS 102/108 and 501) do not appear to have been substantially different from each other, or from the eastern unit (KS 1004). This is not to say that functional differences may not have been present between these units, but this functional difference, if present, was not expressed in differential relative construction labor investment. Since larger household size is often an indicator of larger and perhaps wealthier households, one might expect larger kiva suites to have been more influential than smaller kiva suites.

In summary , similarities and differences in the relative expenditure of construction effort at Sand Canyon and Green Lizard suggest that existing differences might be due to larger cooperative labor groups at Sand Canyon Pueblo relative to those at Green Lizard, perhaps related to aggregation. If this is a correct, then overall similarities between and among architectural units within Sand Canyon Pueblo suggest task units were roughly similar in size, organization and status insofar as these are indicated in the architectural dimensions discussed above.

## ARCHITECTURAL COMPARISONS: ROOFED AREA DATA

The following architectural comparisons explore the interrelations between kiva and surface room roofed areas and vessel size classes from discard assemblages and their implications of household size and status and functional differentiation at Sand Canyon Pueblo. Assemblage data is included in this section as it is an important variable in assessing household size and activities. Larger vessel sizes, especially whiteware serving bowls, are an indicator of relative food-sharing group size. Thus, vessel size data, along with roofed area data are useful measures of relative household size and potential function when used together.

### Household Size and Status

Larger household size has often been regarded as a precursor of emerging elite households (Service 1962; Upham 1982; Lightfoot 1984; Wilson 1988; Lightfoot and Upham 1989). Larger household size is one way in which an emerging leader can begin to control more productive resources with which to acquire, promote and validate status. Success in augmenting productive output enables leaders to manipulate larger amounts of resources. Thus, I would expect considerable variability in Sand Canyon Pueblo kiva suite area. Household sizes at Green Lizard and Sand Canyon Pueblo are explored directly through comparisons of roofed areas in pitstructures and surface rooms, and indirectly through comparison of whiteware bowl and grayware jar size class frequencies. If Sand Canyon Pueblo had larger residential households as indicated by the presence of large roofed kiva-suite areas, as suggested earlier, then it should also have larger grayware jars for cooking and storage and larger whiteware bowls for serving. Comparison of vessel orifice radii by ware and type provides indirect evidence of relative commensal group size, but the relationship is complex, and discussed more fully later in this section (Turner and Lofgren 1966; Nelson 1981; Blinman 1988).

### Functionally Specialized Structures

If functional differentiation of structures is present at Sand Canyon Pueblo, as has been suggested by Bradley (1992, 1993), that is, nonresidential special-use structures, then these should be indicated by proportionally larger kiva roofed area relative to associated surface room roofed area. Thus, this hypothesis suggests that special function facilities functioned as sodality kivas. Nonresidential use may in turn be indicated by low frequency of grayware jars and perhaps overall smaller size than expected at residential domestic structures. The low frequency of grayware jars at sodality kivas indicates that cooking and storage activities were not important at these facilities. If these specialized functions at such structures or kiva suites entailed ritual and ceremonial activities involving feasting by ritual groups, then it is reasonable to expect that larger whiteware bowls used to serve ritual and ceremonial groups might also be present.

## Kiva Suite Roofed Area

Total roofed area is a proxy for relative residential group size and is used as a measure of total group size at Green Lizard and Sand Canyon Pueblo kiva suites. The proportion of roofed kiva to roofed surface room area is also expected to differentiate between nonresidential special uses and domestic residential kiva suites. The former should have relatively small total kiva suite size, and larger kiva areas relative to room areas, while the latter should have the opposite. Elite and nonelite residential households are distinguished by total kiva suite roofed area with the former being larger than the latter. Normal intrasite variation in household size is an unknown, but potentially significant factor in assessing kiva suite size. As indicated in Figure 4.1 and Table 4.3, I have related three distinct groups of kiva suites to three scenarios of potential postaggregation community organization at Sand Canyon Pueblo. Table 4.4 presents summary data used in this comparison. Total roofed area is used in this comparison rather than floor area as kivas at Sand Canyon Pueblo frequently possess small corner rooms. Pitstructure roofed area, therefore, is the summed area of corner rooms, benches and main chamber(s). Comparison enables determination of relative residential group size between and among kiva suites. The relationship between larger kiva suite roofed area and commensal (food-sharing) group size, is explored through comparison of pitstructure to room roofed area ratios, and the ratio of mean whiteware bowl and grayware jar vessel size. It is expected that larger residential groups will be indicated by larger kiva-suite roofed area relative to special function nonresidential kiva suites, or common domestic residential kiva suites with smaller households. Larger residential groups should also use and discard commensurately larger grayware jars and whiteware bowls than is expected at smaller residential kiva suites, while nonresidential special use kiva suites should contain larger whiteware bowls, but few and/or small grayware jars.

## Roofed Area Analysis and Results

Comparison of kiva-suite roofed area between Sand Canyon Pueblo and Green Lizard kiva suites indicates that significant variation exists among kiva suites (Table 4.4). Kiva-suite 102 (KS 102) and KS 208 at Sand Canyon Pueblo possess more roofed kiva area, 46.29 and 33.90 $m^2$ respectively than associated roofed room area, 28.60 and 30.60 $m^2$ respectively. Other Sand Canyon Pueblo kiva suites are more similar to Green Lizard in the proportion of pitstructure to room roofed area. KS 102/108 is comprised of three kivas; Str. 102 (22.18 $m^2$ including 3.07 $m^2$ in corner rooms); Str. 108 (16.61 $m^2$ including 1.35 $m^2$ in corner rooms); and Str. 107 (a surface room converted to a kiva at 7.50 $m^2$). A single refuse deposit was excavated in association with these three kivas. As a result I have combined them as a single architectural unit to facilitate assemblage-based comparison in this section and in Chapter 5.

Table 4.4: Green Lizard and Sand Canyon Pueblo Kiva Suite Roofed Area and Mean Grayware Jar and Whiteware Bowl Size.

| Provenience | Kiva Roofed Area [a] | Room Roofed Area [b] | Total Roofed Area | Kiva : Room Area Ratio | No. of GWJ Cases | Mean GWJ Size | No. of WWB Cases | Mean WWB Size | WWB : GWJ Size Ratio |
|---|---|---|---|---|---|---|---|---|---|
| SCP KS 102/108 | 46.29 | 28.60 | 74.89 | 1.62 | 4 | 5.0 | 39 | 11.56 | 2.31 |
| SCP KS 208 | 33.90 | 30.60 | 64.50 | 1.11 | 2 | 8.0 | 95 | 11.66 | 1.46 |
| SCP KS 501 | 14.45 | 37.95 | 52.40 | 0.38 | 9 | 8.33 | 80 | 10.91 | 1.31 |
| SCP KS 1004 | 28.98 | 59.00 | 87.98 | 0.49 | 39 | 8.87 | 268 | 8.57 | 1.12 |
| SCP KS 1206 | 24.71 | 57.59 | 82.30 | 0.43 | 53 | 8.81 | 188 | 9.45 | 1.07 |
| GL KS 1 | 20.42 | 36.79 | 57.20 | 0.56 | 46 | 7.51 | 352 | 10.77 | 1.43 |

[a] Total kiva corner retaining room areas are: Str. 102 – 3.07 $m^2$; Str. 108 – 1.35 $m^2$; Str. 1004 – 5.80$m^2$; and Str. 1206 – 2.35 $m^2$. [b] All towers are assumed to have been at least two stories, and are included with room counts. Rooms with a second story, where known or suspected, are also included.

Room roofed area at Sand Canyon Pueblo kiva suites ranges from a low of 28.60 $m^2$ at KS 102/108 to a high of 59.00 $m^2$ at KS 1004 (Table 4.4). The Green Lizard room roofed area is similar to that of KS 1206 at Sand Canyon Pueblo and falls at the upper end of the Sand Canyon Pueblo range. Green Lizard pitstructure roofed area is at the lower end of the Sand Canyon Pueblo range. The Green Lizard kiva is larger only than the kiva in KS 501 – the smallest pitstructure at Sand Canyon Pueblo – and Str. 107 – a rectangular kiva at KS 102/108. The largest single pitstructure at Sand Canyon Pueblo is at KS 208 followed by KS 1004. KS 102 at Sand Canyon Pueblo has the greatest total of roofed pitstructure area at 46.29 $m^2$, but three kivas comprise this sum.

Structure 102 has 22.18 $m^2$ of roofed area, Structure 108 has 16.61 $m^2$ of roofed area and Structure 107 built into a surface room possesses 7.50 $m^2$ of roofed area. Individually, the nonintramural kivas (STR 102 and 108) comprising KS 102 fall at the lower range of pitstructure roofed area at Sand Canyon Pueblo. However, KS 102 combines individual roofed areas since it comprises a single suite of adjacent, and perhaps integrated, kivas and rooms. Comparison of total roofed kiva suite area between Green Lizard and Sand Canyon Pueblo suggests that little difference exits between them overall. The smallest total roofed area occurs at KS 501 at 52.40 $m^2$ and the largest at KS 1004 at 87.98 $m^2$. Green Lizard at 67.49 $m^2$ falls in the middle of the Sand Canyon Pueblo range (Table 4.4).

Comparison of kiva suite roofed area to derive residential group size is a relative rather than an exact comparison operating under the assumption that larger residential group size is correlated with larger kiva suite roofed area. This comparison therefore is a general one intended to explore whether larger residential group size is an indicator of the presence of leaders and potential status differences as has been suggested elsewhere in the Southwest (Lightfoot 1984; Upham 1982; Upham et al. 1989). That is, habitation occurred predominantly in surface rooms, and kivas were used largely for ritual and ceremonial purposes. Whether kivas were used as habitations or for ritual purposes is an issue when attempting to infer social complexity. If kivas were used for ritual rather than domiciliary purposes, then room roofed area is the best gauge of residential group size.

If, on the other hand, kivas were primarily habitation structures, then total roofed area should be the basis of comparison (Lekson 1988, 1989; Cater and Chenault 1988; Lipe 1989; Wilshusen 1989; Varien and Lightfoot 1989).

If kivas were not used as domiciles, then the largest residential group size existed at KS 1004 at Sand Canyon Pueblo based on larger roofed room area, followed by KS 1 at Green Lizard, and KS 1206, KS 501, KS 208 and KS 102 at Sand Canyon Pueblo (Table 4.4). If, on the other hand, kivas were used as domiciles in addition to surface rooms, then KS 1004 still housed the largest residential group followed in order by KS 102 and KS 1206, KS 1 at Green Lizard and KS 208 and 501. Kiva Suite 1004 with the largest residential group size should, therefore, have the largest whiteware bowl and grayware jar sizes. As Table 4.4, illustrates however, this is not the case, indicating that the relationship between total roofed area and residential group size is a complex one.

If pitstructures functioned primarily as habitations they should be included in total roofed area for each kiva suite. Larger total roofed area should be associated with larger residential group size. Variation in household size is expected to be associated with the potential for developing nonegalitarian leadership (Lightfoot 1984; Upham et al. 1989; Hayden and Gargett 1992). If variability in residential group size exists, then larger vessel sizes should be found in association with larger households headed by emerging leaders. Larger households may have been headed elite leaders, who promoted their status in a context of ritual and ceremonial hosting and feasting.

If, on the other hand, pitstructures functioned principally for ritual and ceremonial purposes, leadership activities involving hosting and feasting might have occurred in kiva suites with the largest kiva area. For the domestic function model, evidence of leadership activities in the form of larger whiteware vessel sizes should be found in association with kiva suites with the largest total roofed areas. For the ceremonial model, larger whiteware vessel sizes should be found at kiva suites with large roofed kiva areas irrespective total kiva suite area.

Regressions of total roofed area against mean grayware, mean whiteware orifice radius, and the ratio of whiteware bowl to grayware jar mean orifice ratio, revealed little or no relationship

(Figure 4.5). A moderate relationship is present between total roofed area and mean whiteware bowl size, but is not significant, $r^2 = 0.468$, $F_{1,4} = 4.44$, $p > .05$.

Regression of whiteware bowl to grayware jar mean orifice ratio against the ratio of pitstructure to room roofed area revealed a strong positive relationship, $r^2 = .828$, $F_{1,4} = 19.48$ $p < .05$ (Figure 4.6). As the ratio of pitstructure roofed area increases, the ratio of whiteware bowl size also increases. This outcome supports the expectation of functionally specialized kiva suites at which ritual and ceremonial feasting occurred.

KS 102/108 at Sand Canyon Pueblo with the largest roofed kiva area (Structures 102, 107, 108 combined) has the largest mean whiteware bowl size. This outcome may however, have been affected by the small number of measurable grayware jar rim sherds from the associated refuse deposit (NST 103) as well as combining roofed area of three kivas. A second regression excluding KS 102/108 greatly weakens the relationship between kiva roofed area and whiteware bowl size, $r^2 = 0.184$. However, KS 102/108, although anomalous, is of interest because it is an outlier and differs from kiva suites at Green Lizard and others at Sand Canyon Pueblo included in the regression. Although a clear relationship between large kiva roofed area and large whiteware bowl size is not supported, the addition of more kiva-suite and vessel size data may strengthen the relationship. When KS 102/108 is retained in the analysis, a suggestion that functional distinctions related to greater ceremonial activities involving larger commensal groups size is indicated. Thus, it is likely that some kivas at Sand Canyon Pueblo were nonresidential and served primarily ritual and ceremonial functions as argued for the Anasazi area in general by Wilshusen (1989) and specifically for Sand Canyon Pueblo by Bradley (1992, 1993).

An additional regression of surface room roofed area against mean whiteware bowl size reveals a strong, highly significant negative relationship between the variables, $r^2 = 0.952$, $F_{1,4} = 79.33$, $p < .001$ (Figure 4.6). As surface room area decreases, whiteware bowl size increases, suggesting that kiva suites with few, small surface rooms had larger commensal group sizes, further supporting the implication of functional differentiation of kiva suites at Sand Canyon

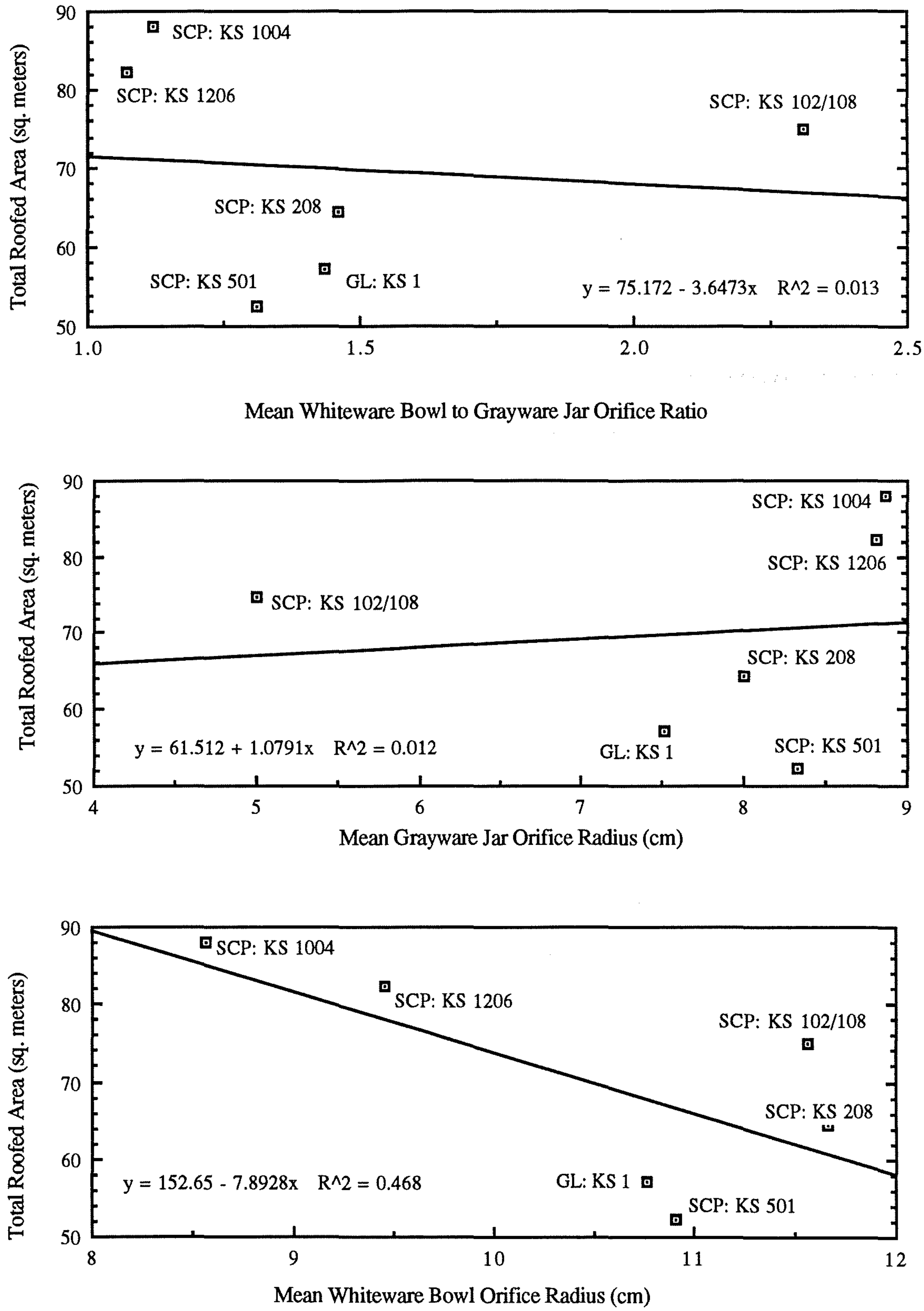



Figure 4.5: Green Lizard and Sand Canyon Pueblo Total Roofed Area Regressions.

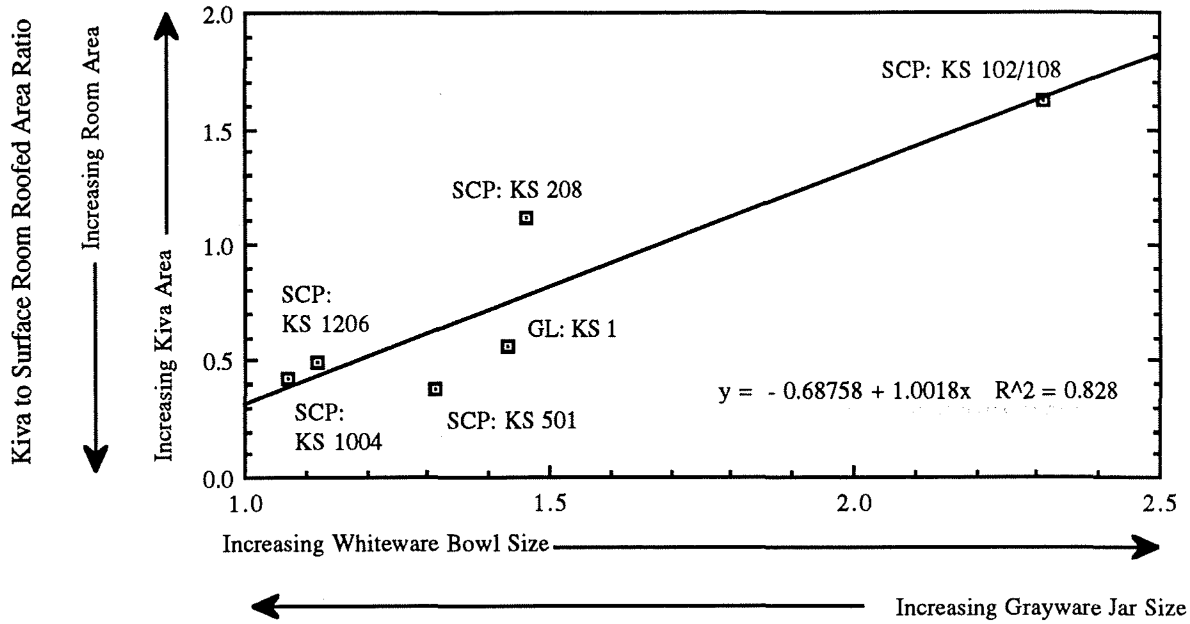
Pueblo. KS 102/108 and KS 208 had significantly larger whiteware bowl sizes than any other kiva-suite in the analysis, $t = 3.083$, $p < .05$. These two kiva suites also had the smallest total roofed room areas in the sample. Thus a relationship between consumption group sizes and larger kiva roofed area appears to exist, this relationship, however, is complexly expressed.

Regression of total roofed area against the ratio of whiteware bowl to grayware jar size failed to reveal a strong relationship, leading to the conclusion that larger residential group size expressed in total roofed area was not a factor in increased hosting and feasting activities associated with larger commensal group size. Instead, it appears that such activities may have occurred at kiva suites with larger kiva roofed areas relative to surface room roofed areas.

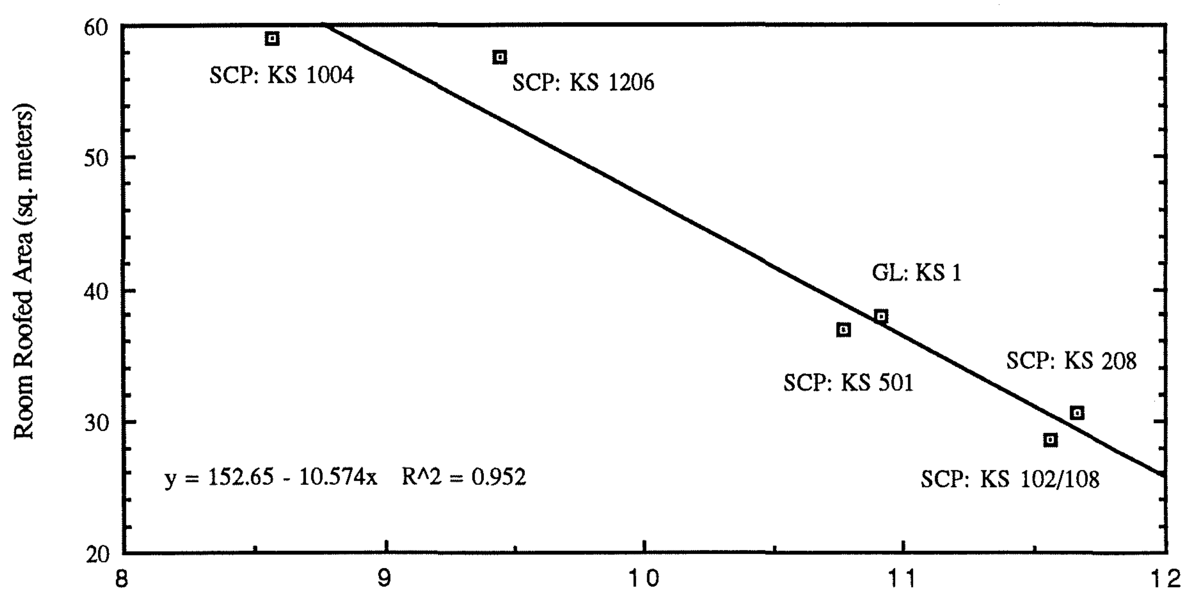
Development of nonegalitarian leadership is strongly linked in cross-cultural studies to larger household size, so the absence of a strong relationship between household size and evidence of increased commensal group size, suggests that ceremonialism – hosting and feasting activities – at Sand Canyon Pueblo took place at specially designated kiva suites. If these kiva suites with large roofed kiva areas were residential, then they had much smaller residential groups, and at the same time hosted larger commensal groups than larger Sand Canyon Pueblo kiva suites.

Of the three scenarios of postaggregation community organization at Sand Canyon Pueblo discussed in Chapter 1, and above, these results best fit the model of functional or horizontal differentiation. Social organization at Sand Canyon Pueblo is, therefore, still largely egalitarian, but complexly organized. If kiva suites such as KS 102/108 and KS 208 served as places of nonresidential ritual use, it is possible that such groups were probably organized at levels above that of the household. It is possible, therefore, though unproved by these data, that pancommunity integrating organizations, similar to sodalities or other cross-cutting associations, may have existed at Sand Canyon Pueblo.

In summary, these data hint at food preparation and consumption differences between and among kiva suites at the two sites, and among kiva suites at Sand Canyon Pueblo. At Sand Canyon Pueblo, KS 102/108 and KS 208 with large pitstructure roofed areas possess the largest whiteware bowls, while KS 1004 and 1206 with larger roofed room areas contain smaller




Mean Vessel Orifice Radius - Whiteware Bowl to Grayware Jar Ratio




Mean Whiteware Bowl Orifice Ratio (cm)

Figure 4.6: Regression Plot of Roofed Room Area Against Whiteware Bowl Size

whiteware bowls and larger grayware jars. KS 501 and Green Lizard KS 1, have whiteware bowl and grayware jar sizes that are intermediate to those at KS 102/108 and KS 208, and KS 1004 and KS 1206.

Organization and scale of food preparation (grayware jar size) and consumption (whiteware bowl size) at KS 501 and KS 1 were similar to each other. Medium grayware jar sizes and relatively large whiteware bowl sizes at KS 501, suggests that food preparation could have occurred at the household level and consumption at the interhousehold level. The pattern at KS 102 and 208 and KS 1004 and 1206 suggests that functional differences in the pattern of food preparation and consumption can be inferred at Sand Canyon Pueblo. Consumption involving larger groups may have occurred at KS 102 and 208 at which little evidence of food preparation targeted at meeting the needs of large food-sharing groups was found. Food preparation activities may have occurred at other kiva suites at Sand Canyon Pueblo and would, therefore, imply an egalitarian "potluck" model of feasting and hosting in which food is prepared at kiva suites different from that one at which it is finally consumed (Blinman 1988). However, the small sample of measurable grayware jar rim sherds at KS 102/108 and KS 208 compromises this interpretation. The presence of larger whiteware bowl sizes suggests that consumption activities occurred at the interhousehold level or above. At KS 1004 and 1206 on the other hand, food preparation appears to have been targeted at household level groups as observed at KS 501 and Green Lizard KS 1, but differing in that consumption may also have been at the household, rather than the interhousehold level.

Thus, an interesting, and complex pattern of feasting activity, food preparation and commensal group size appears to exist at Sand Canyon Pueblo that appears to be related to the presence of special function facilities on the one hand, and residential facilities of varied size, on the other.

### Sand Canyon and Green Lizard Architecture: Summary and Conclusions

This analysis of architectural data has resulted in the tentative identification of three groups of kiva suites that seem to fit the three postaggregation models discussed in Chapter 1: egalitarian and undifferentiated; horizontal differentiation and; vertical differentiation. Architectural data were then evaluated in light of expectations linked to these models.

Masonry data analyses revealed that, while architecture at Sand Canyon Pueblo is more formal than that at Green Lizard, intrasite differences in formality at Sand Canyon Pueblo were not strongly expressed, as might have been expected if architecture was used to convey differential status. I have suggested that increased formality in architecture may reflect increased formality in social interactions, and that this may have been a response to aggregation at Sand Canyon Pueblo.

Comparison of relative construction labor inputs did not reveal significant differences between structures at Green Lizard and Sand Canyon Pueblo, indicating overall similarity in construction efforts. Absolute construction labor estimates in person hours indicate that there are appreciable differences between Green Lizard and Sand Canyon Pueblo construction efforts. The kiva suite at Green Lizard has lower per structure values than kiva suites at Sand Canyon Pueblo. There are also intrasite differences in per structure labor values at Sand Canyon Pueblo. KS 102/108 and KS 208 possess the greatest mean per structure values, followed by KS 1004 and KS 1206. KS 501 is at the low end of the Sand Canyon Pueblo labor values, and is little different from KS 1 at Green Lizard.

When absolute labor estimates were plotted against kiva suite roofed area, three groups of kiva suites were evident. I have argued that these groups conform to expectations of functional differentiation (KS 102/108 and KS 208), vertical differentiation (KS 1004 and KS 1206) and undifferentiated egalitarianism. These expectations are partially supported by roofed area analyses that suggest the presence of special use ritual/ceremonial structures at Sand Canyon Pueblo. This analysis which does not, however, support the presence of elite residential structures. In summary, the analyses in this chapter indicate the development increased formality in architecture and the presence of functionally differentiated special-use kiva suites at Sand Canyon Pueblo. It is assumed that these architectural changes are linked to changes in community organization at Sand Canyon Pueblo and reflect increased complexity, in an egalitarian context, in response to aggregation. These results are further evaluated with assemblage data in Chapter 5.

# CHAPTER 5

# COMPARING GREEN LIZARD AND SAND CANYON PUEBLO MIDDEN ASSEMBLAGES

Three models or scenarios of probable responses to aggregation were developed in Chapter 1. These are the egalitarian undifferentiated, special function and elite residential models. In this chapter I compare discarded artifact assemblages recovered from discrete secondary refuse deposits at Green Lizard and Sand Canyon Pueblo associated with specific kiva suites or architectural blocks. I also describe the data, the methods of comparison and the rationale employed in making these comparisons. I further develop the implications for assemblage characteristics of increased social complexity in the context of aggregation at Sand Canyon Pueblo. The results of these comparisons are evaluated with regard to evidence of behavioral similarities and differences between Green Lizard and Sand Canyon Pueblo, and among structure-related secondary refuse deposits within Sand Canyon Pueblo. The basic unit of analysis used throughout this chapter, to the extent possible, is the kiva suite. Where this was not possible, results were referred to associated architectural blocks. In the last section, I summarize the results and discuss their implications for the presence or absence of increased social complexity and leadership development attending aggregation at Sand Canyon Pueblo.

## Comparative Methods

Assemblages used in the following comparisons were recovered from discrete secondary refuse deposits at Green Lizard and Sand Canyon Pueblo. These contexts were broadly similar in use and depositional history. I have assumed that these discard assemblages reflect the range of behaviors that occurred in associated kiva suites or architectural blocks. Abandonment assemblages at Green Lizard generally lack whole, still-useful artifacts that would indicate that the abandonment was planned. Sand Canyon Pueblo, on the other hand, possesses comparatively rich abandonment floor assemblages (Bradley 1987, 1988, 1990, 1992, 1993; Kleidon and Bradley 1989) that probably represent a more hurried, long-distance move in which bulky or difficult to transport items were abandoned in place (Stevenson 1982; Deal 1985). Floor assemblages from contexts with different abandonment modes are not comparable. Thus, floor assemblages only inform about abandonment patterns and abandonment-related activities rather than long-term activities. As a result, floor assemblage comparisons between Green Lizard and Sand Canyon Pueblo were not considered informative for comparison of daily activities. Comparable assemblages were, therefore, selected from secondary refuse deposits at Sand Canyon Pueblo and Green Lizard. These deposits were characterized by high densities of discarded artifacts and other refuse, and were selected with the expectation that such deposits incorporate evidence about the diversity and frequency of artifact-generating activities occurring over a period of time.

## Discard Assemblage Descriptions

Two trash deposits are present at Green Lizard. The primary refuse deposit was the midden, Nonstructure 1 (NST 1), that was used throughout the Pueblo III occupation of the site. A later deposit west of Structure 1 (pitstructure) overlay abandoned Pueblo III surface structures. Ceramic and tree-ring data suggest that this later trash deposit (Late Trash) was probably deposited from some time in the early A.D. 1200s until the site was abandoned as a habitation. Abandonment at Green Lizard is estimated to have occurred between the A.D. 1240s-1260s, based on ceramic assemblage data and high precision radiocarbon dating of postabandonment material deposited in the pitstructure depression (see Chapter 3).

At Sand Canyon Pueblo, each of the discrete midden deposits vary in age, but all accumulated in the A.D. 1250s to 1280s based on tree-ring dates from associated structures (Figure 5.1, 5.2). Arbitrary Unit 15 (ARB 15), a 2 x 2 m excavation unit, is adjacent to Architectural Block 300 (AB 300). Secondary refuse in this square is believed to derive from activities carried out in AB 300 rooms and pitstructures. Arbitrary Unit 26 (ARB 26) is below KS

601, an unexcavated standard kiva suite in AB 600 (Bradley, 1993, personal communication). Refuse recovered from the 2 x 2 m test pit probably was deposited as a result of activities carried out in some of the pitstructures and surface rooms of this Block. Arbitrary Unit 27 (ARB 27) was near AB 800. Refuse recovered in this test unit also is believed to result from activities at one or more of the kiva suites or even activities associated with use of the Great Kiva in AB 800.

Table 5.1: Location of Sampled Trash Deposits by Provenience and Architectural Block Status.

| Site and Architectural Block | Architectural Block Status | Kiva Suite Designation | Sampled Trash Unit |
|---|---|---|---|
| SCP - AB 100 | Kiva-dominated | 102/108 | NST 103 |
| SCP - AB 200 | Kiva-dominated | 208 | NST 209 |
| SCP - AB 300 | Room-dominated | KS 306 – Not a complete kiva suite | ARB 15 located nearby |
| SCP - AB 500 | Kiva-dominated | KS 501 | STR 512, OTH 515 |
| SCP - AB 600 | Kiva-dominated | KS 601 – unexcavated standard kiva suite | ARB 26 located nearby |
| SCP - AB 800 | Kiva-dominated | None excavated in direct association | ARB 27 located nearby |
| SCP - AB 1000 | Standard | KS 1004 | OTH 1000 |
| SCP - AB 1200 | Standard | KS 1206 | STR 1204 |
| Green Lizard | Standard | KS 1 | NST 1, Late Trash |

Nonstructure 103 (NST 103) was located adjacent to the southern enclosing wall of Structure 102 (KS 102/108). This refuse deposit appears to result from activities carried out in STR 102/108 and associated rooms, and possibly and unexcavated kiva nearby. Nonstructure 209 (NST 209) was located adjacent to the eastern enclosing wall of Structure 208 (KS 208). This refuse probably resulted from activities carried out in STR 208 and associated rooms. Other 515 (OTH 515) was located adjacent to the southern courtyard enclosing wall of Structure 501, a kiva. The origin of the refuse deposit within Structure 512, a surface room associated with Structure 501 is problematic. This trash deposit may derive from activities in adjacent surface rooms and the associated kiva (STR 501), or it may derive from activities at an unexcavated kiva suite to the north. This refuse deposit, however, appears to postdate construction of Structures 511 and 507 and may predate construction of Structures 505 and 506 (Figure 5.1). It is likely, therefore, that this refuse deposit is associated with KS 501.

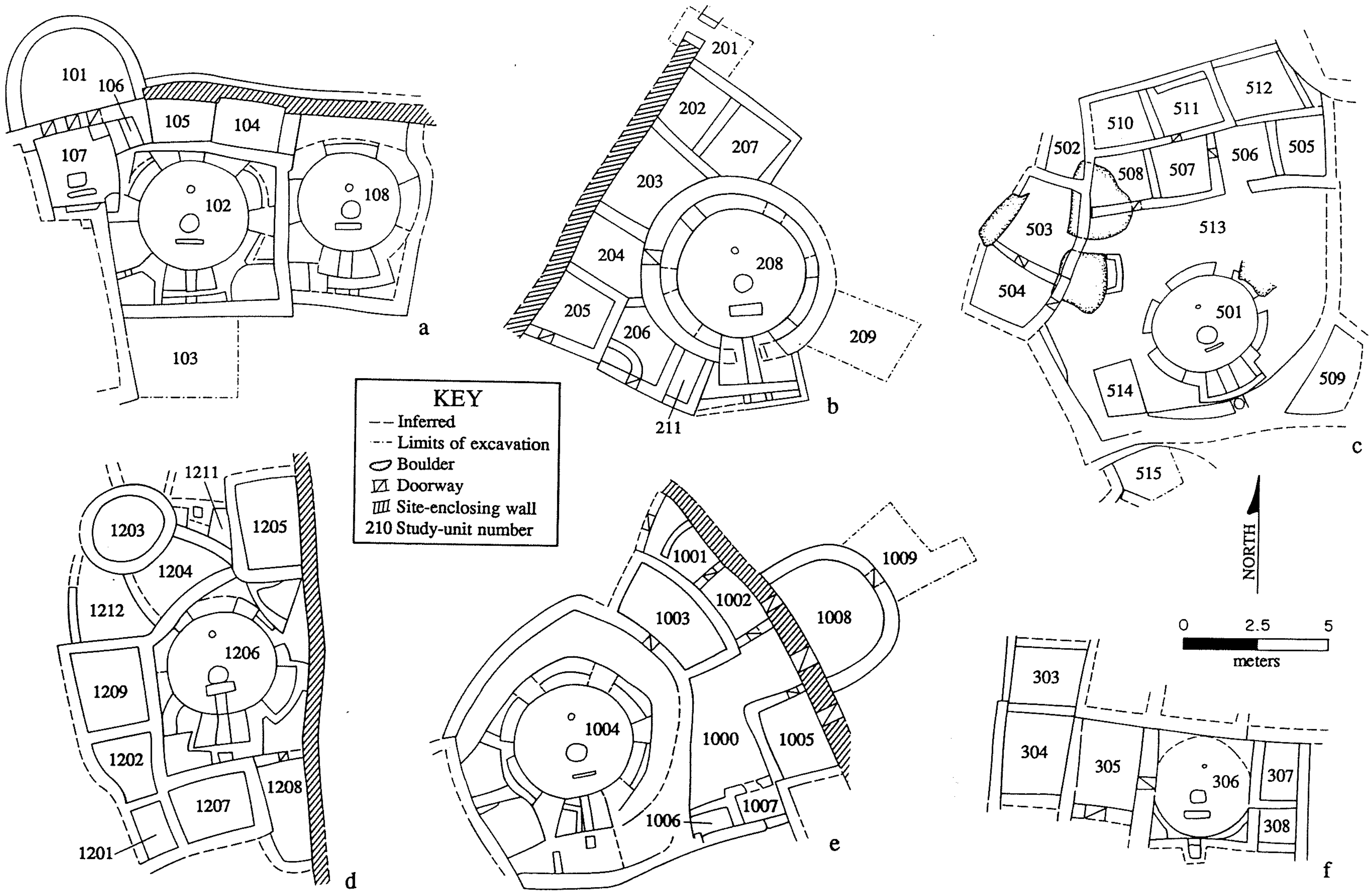



Figure 5.1: Sand Canyon Pueblo Excavated Study Unit Plans.

In making this judgment, I assume that secondary refuse abutting an existing wall and underlying later walls would not have been deposited from a neighboring kiva suite while KS 501 was still occupied and growing. Other 1000 (OTH 1000) is a refuse deposit in an enclosed courtyard area associated with the kiva and surface rooms comprising KS 1004 centered on Structure 1004 (kiva). This refuse deposit accumulated during the occupation of the kiva suite and was capped with constructional debris after some time, creating a new courtyard surface. Additional refuse was deposited on the new surface and filled Structures 1006 and 1007, with deposition continuing until KS 1004 was abandoned (Bradley 1990). Structure 1204 was a refuse-filled room associated with KS 1206. This structure is believed to have originally served as a corn-crib that was subsequently used as a trash dump until the kiva suite was abandoned (Bradley 1988).

## Usefulness of Secondary Refuse Assemblage Comparison

The use of secondary refuse deposits in comparative analyses has both advantages and disadvantages. Advantages are: 1) that assemblages from secondary refuse deposits represent a diachronic accumulation that may provide evidence of common artifact-generating behaviors at a site; 2) midden deposits are less subject to problems of interpretation caused by differential abandonment behaviors and differential formation processes (Schiffer 1983, 1987) and; 3) they tend to provide a generous sample size.

The disadvantages of employing midden deposits include the possibility that biases were differentially introduced by lateral cycling prior to incorporation of artifacts into secondary refuse deposits, and by differential recycling and secondary reuse of items after they have been incorporated into a secondary refuse deposit (Schiffer 1987). A secondary refuse deposit represents an immediately available stockpile of useful recyclable materials. Variation in the kind or frequency of recycling activities among units might result in differing assemblage characteristics. It is likely, however, that similar formation biases existed in any relatively long-term secondary refuse deposit, thereby mitigating to an extent potential variability introduced by the effects of recycling midden materials.

Natural formation processes and depositional context are expected to have affected refuse deposit characteristics at both sites. At Green Lizard, both refuse deposits were subject to erosion, as were some deposits at Sand Canyon Pueblo. Other Sand Canyon Pueblo deposits, however, were in abandoned rooms, reducing erosional effects. Thus, refuse deposits in open, unrestricted locations may have eroded, resulting in conflation of artifacts, while confined deposits were less subject to this process. Deposits in eroded contexts may therefore yield higher densities of artifacts per unit of volume than in confined deposits, if overall deposition rates and refuse composition are similar.

Another potential disadvantage lies in the possibility that variability in midden assemblages reflects differences in activities and depositional processes within kiva suites or architectural blocks. That is, discrete secondary refuse deposits within abandoned structures or immediately associated with specific structures might possess assemblages that reflect activities specific to a particular portion of a kiva suite or architectural unit. Despite all this, the advantages of making inter- and intrasite comparisons of secondary refuse deposits are considered to outweigh the disadvantages as a means of investigating social effects of aggregation and/or leadership development.

## Aggregation and Differentiation: Discard Assemblage Expectations

The transition from dispersed hamlets to aggregated villages may have entailed rearrangements or realignments in social roles, lines of authority and perhaps decision-making structures (see Chapter 1 for a more detailed discussion). In the following sections, I formulate and test expectations of assemblage characteristics expected to have accompanied increases in social complexity and development of more formal leadership in the context of aggregation into large villages during the Late Pueblo III period in the Sand Canyon Locality.

Discard assemblages from selected Green Lizard and Sand Canyon Pueblo refuse deposits were compared to assess whether social, political and economic complexity increased with aggregation. As I have discussed in Chapter 1, evidence for the presence of elites and nonegalitarian social formations include differential access and accumulation of wealth, agricultural intensification, production and storage of agricultural surpluses, the presence of exotic prestige items, differential mortuary accompaniments, the existence of regional exchange systems, differentially increasing population, differentially larger household size, settlement hierarchies, craft specialization and access to and control of a group's labor efforts (Upham and Plog 1986; F. Plog 1989; Plog and Upham 1983; Lightfoot 1984; Upham et al. 1989; Peebles and Kus 1977; Olszewski 1991). The general social variables selected for the discard assemblage comparisons at Green Lizard and Sand Canyon Pueblo are: 1) specialized production, 2) household wealth and, 3) resource intensification. Each of these subsumes two or more specific measures that are discussed below.

Specialized craft production has been linked to the presence of elites in cross-cultural settings (Sahlins 1972; Costin 1991; Peregrine 1991). Evidence of craft specialization, if strongly expressed, should be visible in the differential distribution of the byproducts of specialized item production. In Middle Range (tribal) societies, I expect that elite households might preferentially engage in production of items for exchange and elite use. In Middle Range societies, specialized production does not imply full-time craft-specialization, as found in complex chiefdoms and archaic states. In these societies, therefore, elites might encourage household members to produce craft items beyond what was required for daily household use. This surplus might have been used for exchange and other elite uses. I define craft specialization, therefore, to include small-scale production of exchangeable items at the household or kiva suite level. Thus, if production of craft items beyond what was required for daily activities occurred at elite residences, there should be more evidence of the production of such items at these residential facilities. To explore this, I compared evidence of ceramic manufacturing (ceramic manufacturing index) and stone tool production (stone tool production index) in Sand Canyon Pueblo and Green Lizard refuse deposits.

Emergent elites tend to control access or distribution of exotic or nonlocal resources and make greater use of status-marking items. Control and use of such resources may have served both as status markers and as impetus for the enhancement of status-validating activities (Upham et al. 1981; Lightfoot and Feinman 1982; Feinman and Neitzel 1984; Lightfoot 1984; Upham and Plog 1986; Lightfoot and Upham 1989a; Olszewski 1991). Cross-culturally elites are accumulators of wealth items, even though they often maintain an external facade little different from that of nonelites (Wilk 1983; Hayden and Gargett 1992). Elites are therefore expected to use and discard wealth and status items at a greater rate than nonelite households. The measures of household wealth I have used include the relative frequency of nonlocal stone material (nonlocal stone index), nonlocal ceramics (nonlocal ceramic index) and items of personal decoration (ornament index). These artifact groups are considered indicators of relative household wealth.

Intensification of food production and procurement seen in changes in the proportion of domestic to wild plants used and intensification of domestic protein sources and increased wild game procurement have, in whole or in part, been viewed as a concomitants or adjuncts of resource depletion, aggregation, increased social complexity and or leadership development (Lightfoot 1984; Upham 1982; Speth and Scott 1989; Kohler 1989; Orcutt et al. 1990). As populations aggregate and mobility is reduced, local wild resources are subject to more rapid depletion. Responses caused by shortfalls in wild resource procurement may include intensification of both plant and animal domestic resources and intensified procurement of wild plant and animal foods. Intensified production of domestic resources and intensified procurement of wild food resources may require more efficient labor organization. Aggregation, as argued by Kohler (1989), facilitates the intensification process by enabling the formation larger labor pools. Control of larger labor pools may, therefore, allow some individuals to assume control of the production and procurement of resources. Such control might enable these individuals to assume positions of status and prestige, i.e., become an elite. The measures of resource intensification include the relative ubiquity of wild and domestic plants, total faunal material indexed to grayware jars, the ratio of wild to domestic protein in the diet, the proportion of cottontails to jackrabbits as an index of both environmental degradation and organized small-game drives, and the proportion of artiodactyl remains as an indicator of cooperative long-distance big-game hunting. All of these measures in conjunction are indicators of the relative degree of intensification. In any case, I expect that greater amounts of domestic plants and animals and large game animals should be present at elite residential facilities than at either special use or nonelite domestic facilities.

## Household Production Specialization

The basic unit of production, especially in tribal societies, is the household engaged in what Sahlins (1972) called the domestic mode of production. Thus, the household (or extended household) residing in a kiva suite was probably the basic unit of production in Pueblo III Anasazi communities in southwestern Colorado. The focus is, therefore, on how production was organized at Sand Canyon Pueblo with aggregation. According to Costin (1991), specialization is one way that the organization of production can be structured. Craft specialization has been linked to the emergence of elites (Service 1962; Peregrine 1991). Encouraging and promoting specialized production of craft items, especially in a context of aggregation, may be a strategy to maintain and increase elite influence and authority (Peregrine 1991; Blinman 1988, 1989). Thus, it is reasonable to argue that elites encourage and promote craft production for their own consumption, for exchange, and as visual referents of status. With late Pueblo III period aggregation, increases in social and economic complexity may have resulted from the need to organize and regulate larger resident populations. Status and wealth differentiation may have accompanied aggregation. In a context of village aggregation and increasing social complexity some households with skilled potters or knappers may, therefore, have begun producing craft items beyond the immediate needs of their own household to meet the needs of nonproducing households. Specialized, household level production may have provided a path for wealth and status accumulation through exchange of craft items to nonproducing households.

If elites emerged with aggregation at Sand Canyon Pueblo, then larger elite households might have engaged in specialized production. If some form of egalitarian organization was maintained after aggregation, then I expect that little difference should exist between and among units at Sand Canyon Pueblo. In the former case, those kiva suites engaged in specialized production should have high ratios of the byproducts of manufacturing, while the consumer residences should have low ratios of these artifacts.

In terms of the ratio of producing to nonproducing households, all or most households should be producing in the absence of specialization. In this case specialization, and hence the presence of elites, as I have argued, is unlikely. Thus, where high numbers of producers are present, the degree of specialization is low or nonexistent, whereas few producers relative to the number of consumers indicates a high degree of specialization. I expect that if elite households fostered specialized production by members of their households for exchange with nonproducer households, then KS 1004 and KS 1206, identified by architectural evidence in Chapter 4 as potential elite residences, should have the highest values. Nonelite domestic residences (KS 501 at Sand Canyon Pueblo and KS 1 at Green Lizard) should have lower values, while special function facilities KS 102/108 and KS 208 should the lowest values. ARB 15 is associated with a room-dominated architectural block, and is considered on that basis a potential special function facility as is ARB 27, associated with a kiva-dominated Block. Thus, both units should have low values. ARB 26 is just to the south of KS 601, an unexcavated standard kiva suite; it should, therefore, have values similar to KS 501 and Green Lizard KS 1. I compared evidence of stone tool production and ceramic manufacturing to examine whether producer and nonproducer facilities are present at Sand Canyon Pueblo.

## Ceramic Manufacture

The ceramic manufacturing index is aimed at detecting the presence of ceramic manufacturing activities through recovery of manufacturing evidence in the form of polishing stones and unfired clay recovered from screened secondary refuse deposits at Sand Canyon Pueblo and Green Lizard. The ceramic manufacturing index is the ratio of unfired clay and polishing stones to total sherds within respective refuse deposits.

Blinman (1988) in a study of whiteware production in the Dolores Archaeological Program area found that in general the ratio of ceramic-producing to nonproducing households was relatively high – on the order of 1:1 to 1:2. These household production ratios suggest that some Pueblo I households at the Dolores Archaeological Project did not produce whitewares. However, as Blinman (1988) pointed out, evidence was rare and may not have been preserved in all cases. Hence, the number of producing households was probably greater than actually observed.

The ceramic manufacturing index is expected to differentiate producing and nonproducing households at Sand Canyon Pueblo and Green Lizard. Comparison of the index between Sand Canyon Pueblo and Green Lizard suggests that relatively more evidence for ceramic manufacture is present at Green Lizard secondary refuse deposits than at all Sand Canyon Pueblo secondary refuse deposits (Table 5.2). Although ceramic production occurred at households at both sites, more evidence of it is present at Green Lizard refuse collections, but the difference is not significant ($t = -2.714$, $df = 1$, $p = .225$).

Comparison among discrete Sand Canyon Pueblo deposits reveals that some refuse deposits, KS 102/108, KS 208 and AB 600, lack ceramic production evidence, whereas others have evidence suggesting that both producer and nonproducer groups might have existed at Sand Canyon Pueblo. Based on this evidence, it appears that ceramic manufacture at Sand Canyon Pueblo is common, though not ubiquitous. The amount of ceramic manufacturing evidence at Sand Canyon Pueblo is very low. Its absence at some of the units may be due to sampling error, formation processes and methods of data recovery, rather than to ceramic manufacturing activities. However, the refuse deposits associated with KS 102/108 and KS 208 were completely excavated, suggesting that these kiva suites might indeed have been nonproducer units. Thus, no linkage between evidence of ceramic manufacturing activities and inferred facility function is apparent.

Table 5.2: Ceramic Manufacturing Evidence at Sand Canyon Pueblo and Green Lizard.

Sand Canyon Pueblo

| Study Unit | Architectural Unit | Total Ceramic No. | Ceramic Manufacture Count | Ceramic Manufacture Index | Ceramic Manufacture Count/m$^3$ |
|---|---|---|---|---|---|
| ARB 15 | AB 300 | 1750 | 2 | .00114 | 0.9 |
| ARB 26 | AB 600 | 417 | 0 | - | - |
| ARB 27 | AB 800 | 1626 | 1 | .00062 | 0.5 |
| NST 103 | KS 102/108 | 838 | 0 | - | - |
| NST 209 | KS 208 | 3091 | 0 | - | - |
| OTH 515 | KS 501 | 550 | 1 | .00182 | 1.1 |
| STR 512 | KS 501 | 1707 | 2 | .00117 | 0.7 |
| OTH 1000 | KS 1004 | 5163 | 1 | .00019 | 0.2 |
| STR 1204 | KS 1206 | 3141 | 2 | .00064 | 0.3 |
| Sum | | 18283 | 9 | .00049 | 0.4 |

Green Lizard

| Study Unit | Architectural Unit | Total Ceramic No. | Ceramic Manufacture Count | Ceramic Manufacture Index | Ceramic Manufacture Count/m$^3$ |
|---|---|---|---|---|---|
| NST 1 | KS 1 | 4960 | 8 | .00161 | 0.8 |
| Late Trash | KS 1 | 4102 | 13 | .00317 | 1.2 |
| Sum | | 9062 | 23 | .00254 | 1.1 |

KS 1004 and 1206 were expected to have the highest values, but KS 1206 had only moderate values, whereas KS 1004 had low values. KS 501 and Green Lizard KS 1 were expected to have moderate values, but both of KS 501 refuse deposits and Green Lizard had the highest values. ARB 26 expected to be similar to KS 501 and KS 1 had no ceramic manufacturing evidence at all. Neither of the potential special function facilities, KS 102/108 and KS 208 had any ceramic manufacturing evidence, as was expected. ARB units 15 and 27, potentially associated with Blocks containing special function facilities, both had higher than expected values suggesting that their association with special function facilities, at least in this regard, may be incorrect. In any case, no clear evidence of ceramic production differentiation at Sand Canyon Pueblo is present.

## Stone Tool Production Index

The stone tool production index computes the ratio of debitage plus cores to the number of flaked stone tools (utilized flakes, other chipped stone tools, modified flakes, bifaces, drills and projectile points). This provides an index of knapping activities and stone tool production relative to flaked stone tool use (Clark 1989). I have assumed that the tools and manufacturing byproducts that were made or used at a locale were discarded in associated archaeological deposits. Variations in frequency of tools relative to manufacturing debris may reveal places where tools were manufactured but not used and vice versa. That is, an excess of manufacturing debris in a kiva suite refuse deposit suggests tools were produced there, but deposited elsewhere. The inferred movement of stone tools from a producer kiva suite to nonproducing, consumer kiva suite implies specialization in stone tools production.

The presence of more knapping byproducts indicated by high production index values suggests therefore that flaked stone tool production, use and discard all occurred. Disparities in the frequency of stone tool production byproducts and frequency of discarded flaked stone tools are indicated by low values of the production index. Low stone tool production index values are expected where there was use and discard of greater quantities of flaked stone tools relative to the quantity of stone tool production byproducts. Thus secondary refuse deposits with high index values suggest greater tool production than use, while low index values suggest greater tool use than production.

The comparison of Green Lizard and Sand Canyon Pueblo summary data indicates that Green Lizard has a moderately higher average index (23.67) than Sand Canyon Pueblo (17.54), but the difference is not significant ($t = 1.331$, $df = 1$, $p \geq .410$). Thus overall stone tool production at Green Lizard and Sand Canyon Pueblo were similar (Table 5.3). Lithic assemblages from selected refuse deposits at Sand Canyon Pueblo indicate that significant variation in production exists between units ($D_{max} = .532$, $p = .007$).

High production index values are present at several Sand Canyon Pueblo refuse deposits – AB 600, AB 700, KS 208, KS 1004 and KS 1206 (Table 5.3). This result suggests that while some units were producing, using and discarding flaked stone tools at rates similar to that at Green Lizard, other deposits – especially those at KS 102/108, KS 501 and ARB 15 (AB 300) – appear to have used and discarded more flaked stone tools than they produced.

Table 5.3: Stone Tool Production Indices at Sand Canyon Pueblo and Green Lizard

Sand Canyon Pueblo

| Study Unit | Architectural Unit | Debitage No.[a] | Flaked Stone Tool No. | Core No. | Debitage + Core/m$^3$ | Flaked Stone Tool/m$^3$ | Production Index Value |
|---|---|---|---|---|---|---|---|
| ARB 15 | AB 300 | 415 | 48 | 5 | 199.1 | 22.8 | 8.75 |
| ARB 26 | AB 600 | 467 | 23 | 2 | 418.8 | 20.5 | 20.39 |
| ARB 27 | AB 800 | 635 | 36 | 2 | 337.0 | 19.0 | 17.69 |
| NST 103 | KS 102 | 215 | 33 | 7 | 138.8 | 10.6 | 6.73 |
| NST 209 | KS 208 | 1543 | 70 | 21 | 416.0 | 18.6 | 22.34 |
| OTH 515 | KS 501 | 158 | 18 | 4 | 184.1 | 20.5 | 9.00 |
| STR 512 | KS 501 | 257 | 38 | 5 | 93.2 | 13.5 | 6.89 |
| OTH 1000 | KS 1004 | 1132 | 62 | 25 | 221.6 | 11.9 | 18.66 |
| STR 1204 | KS 1206 | 2070 | 73 | 69 | 361.9 | 12.4 | 29.30 |
| Sum | | 6892 | 401 | 140 | 277.9 | 15.8 | 17.54 |

Green Lizard

| Study Unit | Architectural Unit | Debitage No. [a] | Flaked Stone Tool No. | Core No. | Debitage + Core/m$^3$ | Flaked Stone Tool/m$^3$ | Production Index Value |
|---|---|---|---|---|---|---|---|
| NST 1 | KS 1 | 3402 | 137 | 44 | 332.9 | 13.2 | 25.15 |
| Late Trash | KS 1 | 1387 | 69 | 43 | 131.3 | 6.3 | 22.72 |
| Sum | | 4789 | 206 | 87 | 229.6 | 9.7 | 23.67 |

[a] Excludes utilized flakes.

There is no clear relationship between production differentiation and inferred facility function. Inferred special function facility KS 102/108 has low values as anticipated, whereas KS 208 – also considered a special function facility – has unexpectedly high values. Inferred domestic unit KS 501 has relatively low values suggesting that it may have been a nonproducer facility. KS 1004 and 1206, inferred to have been elite residences, have high production values as anticipated. However, the index values for all of these potential "producer units" are similar to those at Green Lizard, suggesting that production specialization was absent. The producer to nonproducer ratio of 5:3 at Sand Canyon Pueblo (combining both KS 501 refuse deposits) also indicates that stone tool production was a generalized, widespread activity rather than a specialized one. Nevertheless, differences are clearly present and suggest – at least in the case of KS 501 – that some households were consuming more flaked stone tools than they were making.

The presence of nonproducer households at Sand Canyon Pueblo suggests that, while specialized production was not present as such, some form of economic differentiation may have accompanied aggregation. It is also possible that variation in production index values at Sand Canyon Pueblo may result from uncontrolled complex interactions between seasonality, longevity, and formation processes. However, the differences in production index values that exist at Sand Canyon Pueblo suggest another possibility – that economic differentiation accompanied aggregation, where some households produced stone tools for use by others. The degree of craft production specialization implied by this is very low, and would not in Costin's (1991) terms constitute specialization. However, some form of producer/nonproducer relationship, nonetheless, appears to exist at Sand Canyon Pueblo.

## Household Production: Summary and Conclusions

The ceramic and stone tool production evidence, clearly indicates that no strong pattern of production specialization differentiated inferred elite facilities (KS 1004 and 1206) and other kiva suites at Sand Canyon Pueblo and Green Lizard. However, as Table 5.4 and Figure 5.3 indicate, an interesting dichotomy between high and low evidence of ceramic production and evidence of flaked stone tool production values is present. Generally, if a kiva suite has high ceramic manufacturing evidence, it tends to have low values for flaked stone tool production and vice versa. This correlation is not, however, strongly expressed ($r_s = -.267$). Most of the negative $r_s$ is caused by two observations, KS 102/108 and KS 1206. Even if weak, the correlation is an interesting one in terms of its implications for changing economic organization at Sand Canyon Pueblo after aggregation. By comparison, Green Lizard is high on both values suggesting that production complementation might have occurred with aggregation.

Clear evidence supporting elite-driven craft specialization is absent. Evidence presented in Tables 5.2 – 5.4 suggests that different households might have been producing either ceramics or stone tools, but generally not both. The evidence from Green Lizard also suggests that a change in production organization from dispersed to aggregated communities. Thus, production

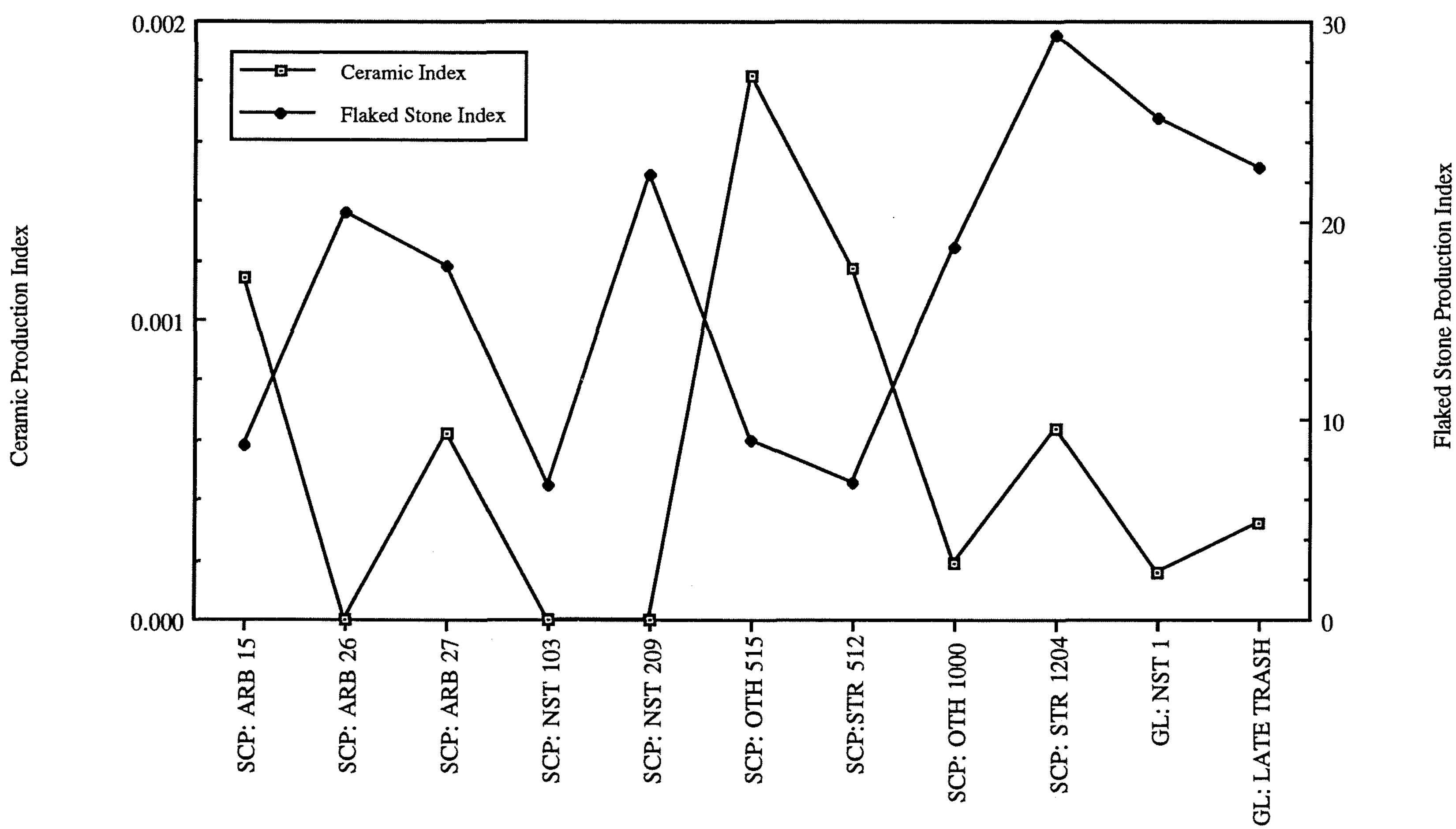



Figure 5.2: Double y-axis Line Plot of Ceramic and Flaked Stone Production Indices.

complementation between producer/nonproducer households indicates that organizational change and economic restructuring, and hence increased complexity, accompanied aggregation at Sand Canyon Pueblo. Such change is functional and complementary, perhaps growing out of the recognition of skilled and unskilled households.

Table 5.4: Ceramic Manufacturing and Stone Tool Production Reverse Rank Correlation.

| Study Unit | Architectural Unit | Ceramic Manufacturing Index Rank (1 = Low) | Stone Tool Production Index Rank (1 = High) |
|---|---|---|---|
| ARB 15 | AB 300 | 7 | 7 |
| ARB 26 | AB 600 | 2 | 3 |
| ARB 27 | AB 800 | 5 | 5 |
| NST 103 | KS 102 | 2 | 9 |
| NST 209 | KS 208 | 2 | 2 |
| OTH 515 | KS 501 | 9 | 6 |
| STR 512 | KS 501 | 8 | 8 |
| OTH 1000 | KS 1004 | 4 | 4 |
| STR 1204 | KS 1206 | 6 | 1 |

It may also have functioned as a way of forging and maintaining interhousehold alliances in an egalitarian social context, and may accompany strong reciprocal economic ties. It is possible that production complementation existed prior to aggregation, but data to address this issue is not available.

## Household Wealth and Status

Differential wealth accumulation and possession of larger numbers of status-conveying objects are linked to the presence of status differences and elites (Feinman and Neitzel 1984). If aggregation-caused organizational changes resulted in vertical differentiation and the emergence of elites, then evidence of status items and greater access to nonlocal items should be evident. If functional differentiation occurred, then wealth items should be rare at special function facilities unless they were involved in ritual and ceremonial displays. If no organizational change occurred with aggregation, then there should be no significant differences in wealth item frequencies between Green Lizard and sample units at Sand Canyon Pueblo. Wealth and status differences may therefore have been expressed in differential frequencies of nonlocal flaked stone, nonlocal ceramics and ornaments.

Table 5.5: Sand Canyon Pueblo and Green Lizard Wealth Item Frequencies and Proportions.

Sand Canyon Pueblo

| Study Unit | Architectural Unit | Nonlocal Ceramic Frequency | Nonlocal Cers as % of Total Ceramics | Nonlocal Stone Frequency | Nonlocal Stone as % of Total Debitage | Ornament Frequency | Ornaments as % of Ceramics + Debitage |
|---|---|---|---|---|---|---|---|
| ARB 15 | AB 300 | 1 | .06 | 7 | 1.57 | 5 | .23 |
| ARB 26 | AB 600 | 0 | 0.00 | 3 | 1.39 | 6 | .95 |
| ARB 27 | AB 800 | 0 | 0.00 | 10 | 1.52 | 10 | .44 |
| NST 103 | KS 102/108 | 2 | .24 | 2 | .86 | 5 | .47 |
| NST 209 | KS 208 | 4 | .13 | 27 | 1.71 | 9 | .19 |
| OTH 515 | KS 501 | 0 | 0.00 | 1 | .58 | 3 | .42 |
| STR 512 | KS 501 | 4 | .24 | 2 | .74 | 2 | .10 |
| OTH 1000 | KS 1004 | 4 | .08 | 22 | 1.90 | 12 | .19 |
| STR 1204 | KS 1206 | 2 | .06 | 15 | .71 | 11 | .21 |
| Sum | | 17 | .09 | 89 | 1.30 | 63 | .25 |

Green Lizard

| Study Unit | Architectural Unit | Nonlocal Ceramic Frequency | Nonlocal Cers as % of Total Ceramics | Nonlocal Stone Frequency | Nonlocal Stone as % of Total Debitage | Ornament Frequency | Ornaments as % of Ceramics + Debitage |
|---|---|---|---|---|---|---|---|
| NST 1 | KS 1 | 22 | .44 | 141 | 4.99 | 33 | .38 |
| Late Trash | KS 1 | 20 | .49 | 43 | 2.63 | 19 | .33 |
| Sum | | 42 | .46 | 184 | 3.67 | 52 | .36 |

Differential access to nonlocal stone and ceramics is expected to indicate the extent to which household or interhousehold groups (kiva suites) were able to obtain such items. The frequency of items of personal adornment is expected to differentiate high status from low status households. I consider, therefore, that three artifacts classes constitute a measure of relative household wealth. I expect that if elite households were present, then KS 1004 and KS 1206, identified by architectural evidence in Chapter 4 as potential elite residences, should have the highest values. Nonelite domestic residences (KS 501 at Sand Canyon Pueblo and KS 1 at Green Lizard) should have significantly lower values, while special function facilities KS 102/108 and KS 208 should have the lowest values. ARB 15 is associated with a room-dominated Block and is considered on that basis a potential special function facility as is ARB 27, associated with a kiva-dominated Block. Thus, both units should have very low values. ARB 26 is just to the south of KS 601, an unexcavated standard kiva suite (Bradley, 1993, personal communication); it should, therefore, have values similar to KS 501 and Green Lizard KS 1. I compared evidence of differential access by examining nonlocal ceramic, nonlocal flaked stone and ornament frequencies to examine whether elite residential facilities are present at Sand Canyon Pueblo. Table 5.5 lists the frequencies of these items by study unit.

## Nonlocal Ceramics

A comparison of nonlocal ceramic frequencies indicates that Green Lizard has a higher frequency of nonlocal ceramics than Sand Canyon Pueblo, but the difference is not significant ($t = -.994$, $df = 1$, $p = .502$). Intrasite comparison at Sand Canyon Pueblo indicates that slight differences in frequencies occur between units. A cross-tabulation of Sand Canyon study units against a local versus nonlocal determination for all ceramics failed to reject the null hypothesis ($X^2 = 7.887$, $df = 8$, $p > .25$); the frequency of nonlocal ceramics is not significantly different among kiva suites. Thus, differential access to nonlocal ceramics is not indicated between kiva suites at Sand Canyon Pueblo

## Nonlocal Flaked Lithic Material

Inspection of Table 5.5 indicates that higher frequencies of nonlocal stone are present at Green Lizard than at Sand Canyon Pueblo. However, the differences between the two sites are not significant ($t = 7.395$, $df = 1$, $p = .084$). I should note, however, that the difference is significant at the .10 level, indicating that relatively more nonlocal flaked stone is present at Green Lizard. Examination of intrasite differences in nonlocal material frequency at Sand Canyon Pueblo indicates that the refuse deposits associated with KS 1004 and KS 208 have higher frequencies of nonlocal stone than other kiva suites. However, a cross-tabulation of Sand Canyon study units against a local versus nonlocal determination for all stone material failed to reject the null hypothesis, $X^2 = 11.911$, df = 8, $p > .10$. There are no significant differences in the distribution of nonlocal flaked stone among sampled Sand Canyon Pueblo assemblages. In summary, access to nonlocal flaked stone material was equivalent among units at Sand Canyon Pueblo. There is no patterned association between nonlocal stone frequency and facility function inferred from architectural evidence.

Ornament Index

The ornament index combines pendants, pendant blanks, rings, tubes, beads, tinklers, other modified mineral, and pigment artifact categories and is standardized by dividing study unit ornament totals into the sum of debitage and ceramics within respective discard assemblages.

It is expected that if ornaments constitute wealth objects or objects used in ritual and ceremony associated with elite households, then refuse assemblages associated with elite facilities should contain greater ornament frequencies than discard assemblages at nonelite facilities. If ornaments were used in ceremonial/ritual observances at special function facilities, this might be reflected in associated refuse deposits.

Ornament frequencies in Table 5.5 suggest that more ornaments are present at Green Lizard than in any assemblage at Sand Canyon Pueblo. Green Lizard has a higher overall ornament index (.36) than at Sand Canyon Pueblo (.25). Analysis reveals that the differences are significant, $t = -5.145$, df = 8, $p < .001$. Greater ornament use and discard occurred at Green Lizard than at Sand Canyon. Within Sand Canyon Pueblo, four refuse deposits (ARB 26, ARB 27, NST 103 and OTH 515) have higher ornament index values than Green Lizard. ARB 26 is apparently associated with an unexcavated standard kiva suite (Bradley, 1993, personal communication). ARB 27 cannot be associated with a particular kiva suite but is in a kiva-dominated architectural Block containing a great kiva. NST 103 is associated with KS 102/108, and is inferred to have been a special function kiva suite (Chapter 4). OTH 515 is associated with KS 501, inferred to have been a standard domestic residential facility. The spread of high index values across varied inferred facility types indicates there are no patterned associations between ornament indices and inferred facility function.

## Household Wealth: Summary and Conclusions

Differential wealth accumulation and access to nonlocal resources expected to have been associated with the development of nonegalitarian leadership roles accompanying aggregation are not indicated at Sand Canyon Pueblo. Nonlocal ceramics and nonlocal flaked lithic material frequencies and ornament indices are greater at Green Lizard than at Sand Canyon Pueblo.

KS 1004 and 1206 were expected to have the highest values for each measure, but KS 1206 had only moderate values, whereas KS 1004 had low values. KS 501 and Green Lizard KS 1 were expected to have moderate values, but both KS 501 refuse deposits and Green Lizard had the highest values. ARB 26, expected to be similar to KS 501 and KS 1, had no ceramic manufacturing evidence at all. Neither of the potential special function facilities, KS 102/108 and KS 208 had any ceramic manufacturing evidence, as was expected. ARB units 15 and 27, potentially associated with architectural blocks containing special function facilities, both had higher than expected values suggesting that their association with special function facilities, at least in this regard, may be incorrect. In any case, no clear evidence production differentiation at Sand Canyon Pueblo is present.

Higher frequencies of nonlocal stone and ceramics at Green Lizard may be due to the presence of slightly more extensive exchange and procurement networks during the occupation of Green Lizard. As Neily's (1983) study points out, access to nonlocal resources declines through time, a trend that appears to continue through the late Pueblo III period. Given the overall low frequency of nonlocal manufactured and raw materials it is evident that neither the occupants at Green Lizard or Sand Canyon Pueblo participated in large-scale regional exchange networks. If an emerging elite was present at Sand Canyon Pueblo, it does not appear to have had differential access to nonlocal ceramics, lithics or an excess of ornaments used to display elevated status. If nonegalitarian leadership emerged at Sand Canyon Pueblo in the context of aggregation, it does not appear to have affected the frequency or distribution of these artifact types.

## Resource Intensification

Intensified procurement of wild foods and intensified production of domestic foods is linked in cross-cultural studies to the development of nonegalitarian leadership. Elite leaders are expected to have encouraged production of surpluses through intensification within their own and allied households. Surplus resources may have been necessary to "finance" elite activities (Lightfoot 1984); perhaps by hosting feasts or ceremonies that increased their status and, hence, their ability to make and carry out decisions. I used the ratio of domestic to wild plants, the ratio of total bone to grayware jar sherds, the ratio of domestic to wild animal food, the ratio of cottontail rabbits to jackrabbits and the proportion of artiodactyl remains to monitor differences in resource intensification and explore this linkage in the context of aggregation into large villages. It is also possible that some degree of increased intensification may be related to 1) higher local population densities that may have resulted in local resource depletion and, hence, intensification ; and 2) higher regional population densities. The first – a function of aggregation – may be a mechanism that can increase intensification in the absence of organizational change.

Elite households should, therefore, have evidence of greater overall plant and animal resource use, that is, higher indices of intensification than is expected at either special use facilities or nonelite domestic facilities. Inferred elite residential facilities at KS 1004 and 1206 should also have higher frequencies of food items that were the most expensive to produce or procure. If food preference hierarchies were present at in a farming-based economy such as that at Sand Canyon Pueblo, then I expect that the most valued food item might have been large game animals.

### Domestic and Wild Plant Ratio

If agricultural intensification accompanied aggregation and was spurred on by the development of elite leadership at Sand Canyon Pueblo, then elite residences are expected to have greater domestic to wild plant ratios than at special function or nonelite domestic facilities. Greater evidence or domesticated plants should be found at elite facilities as elites are expected to have larger available labor pools and perhaps differential access to more productive land than commoner households.

Macrobotanical plant food data were available from only one refuse deposit at Sand Canyon Pueblo (STR 1204) and from NST 1 at Green Lizard. Botanical data were available from eight fire features in 5 different kiva suites at Sand Canyon Pueblo, and from two fire features in two different structures at Green Lizard (Table 5.6). Domestic plants consist of corn and beans. Ruderal or pioneer plants species were lumped with wild plants remains to facilitate analysis. All fuel wood and other nonfood plant remains were excluded from the analysis.

Table 5.6: Sand Canyon Pueblo and Green Lizard Botanical Data from Middens and Fire Features.

Sand Canyon Pueblo and Green Lizard Domestic to Wild Plant Ratios from Middens

| Study Unit | Domesticates | Wild | Domestic / Domestic + Wild |
|---|---|---|---|
| SCP: STR 1204 | 365 | 73 | 0.833 |
| GL: NST 1 | 126 | 58 | 0.649 |

Sand Canyon Pueblo and Green Lizard Domestic to Wild Plant Ratios from Fire Features

| Study Unit | Domesticates | Wild | Domestic / Domestic + Wild |
|---|---|---|---|
| Sand Canyon Pueblo | 681 | 36 | 0.950 |
| Green Lizard | 93 | 52 | 0.641 |

Based on the limited midden sample, domestic plant use appears to have been greater at Sand Canyon Pueblo (0.833) than at Green Lizard (0.649). Domestic plant foods comprised a relatively greater proportion of recovered plant parts at Sand Canyon Pueblo than at Green Lizard. However, the limited sample size precludes valid inferences. A larger data set was available for fire features. These data also suggest that domestic plant use was higher at Sand Canyon Pueblo (0.950) than at Green Lizard (0.641). However, intrasite comparisons among Sand Canyon

Pueblo kiva suites were hampered by extreme differences in frequencies between samples. Although all were from standard one liter samples, some contained a single identifiable plant part, whereas other contained several hundred. As a result, correspondence between inferred facility function and relative frequency of domestic plant use could not be assessed.

In summary, the evidence presented, although not as complete as desired, suggests that reliance on domestic plant foods was greater at Sand Canyon Pueblo than at Green Lizard. Aggregation may have led to greater labor intensification and, therefore, to greater, increased production of domesticated plants. Increased intensification could have been elite-driven or it could have occurred as a result of aggregation in an egalitarian social context. Aggregation might have caused local resource depletion and, therefore, necessitated intensification. Kohler (1989) has argued that aggregation may have been caused by local resource depletion leading people to aggregate in order to more efficiently exploit available wild food resources and intensify agricultural production.

Total Bone Comparison

Comparison of faunal material to grayware jar frequency at Green Lizard and Sand Canyon Pueblo provides a further measure of the intensity of agricultural production (Blinman 1988:56). I assumed that grayware jars were used primarily for cooking and storage of subsistence items, hence, increases in the frequency of grayware jars – relative to the frequency of faunal remains – may be a result of greater reliance on agricultural products. This measure, therefore, monitors intensity of faunal procurement relative to agricultural production.

Bones from both sites contain domesticated turkey as a component of total faunal elements, that is, the number of individual specimens (NISP). A second faunal-based comparison with similar expectations was conducted with a subsistence-related subset of the faunal data termed "economic bone" consisting of artiodactyls, large and medium mammals, lagomorphs, turkey-sized birds and turkeys. This was done to remove species that were not clearly used as food items. At the time of this analysis, only these data were available from Sand Canyon Pueblo kiva suites.

I expected that low faunal index frequencies for both ratios indicate relatively greater reliance on agricultural products and vice versa. Larger elite households should, therefore, have low values as elites are expected to have greater access to higher quality foods and should have more of them, whereas special function and nonelite domestic units should have higher values.

The Green Lizard ratio is marginally greater than at Sand Canyon Pueblo, but the difference is not significant (t = - .131, df = 1, p = .917). Green Lizard also has a larger proportion of economic bone overall than at Sand Canyon Pueblo, but this too is not significant, t = -.205, df =1, p = .871. These differences increase greatly, however, when the bone-poor Late Trash deposit is excluded (Table 5.7). The primary long-term refuse deposit at Green Lizard (NST 1) has a higher ratio than any Sand Canyon Pueblo sample suggesting greater dependency on domestic plants accompanied aggregation at Sand Canyon Pueblo as was expected.

Table 5.7: Sand Canyon Pueblo and Green Lizard – NISP and Economic Bone Ratios.

Sand Canyon Pueblo

| Study Unit | NISP | Economic Bone No. | NISP:Grayware Jar | Economic Bone:Grayware Jar |
|---|---|---|---|---|
| NST 103 (KS 102/108) | 155 | 56 | .363 | .131 |
| NST 209 (KS 208) | 711 | 218 | .567 | .174 |
| STR 1204 (KS 1206) | 1142 | 319 | .548 | .153 |
| Sum | 2008 | 593 | .534 | .157 |

Green Lizard

| Study Unit | NISP | Economic Bone No. | NISP:Grayware Jar | Economic Bone:Grayware Jar |
|---|---|---|---|---|
| NST 1 (KS 1) | 2825 | 921 | 1.015 | .331 |
| Late Trash (KS 1) | 136 | 87 | .066 | .042 |
| Sum | 2961 | 1008 | .610 | .208 |

Intrasite comparisons at Sand Canyon Pueblo reveal no patterned associations between either of the ratios and inferred facility function (Figure 5.3). KS 102/108 and KS 208, both expected to have been special use facilities, have contrasting values, whereas KS 1206, a suspected elite facility, has high values, also contrary to expectations. Thus, little no substantive evidence of elite-driven intensification is present at Sand Canyon Pueblo. This suggests that the

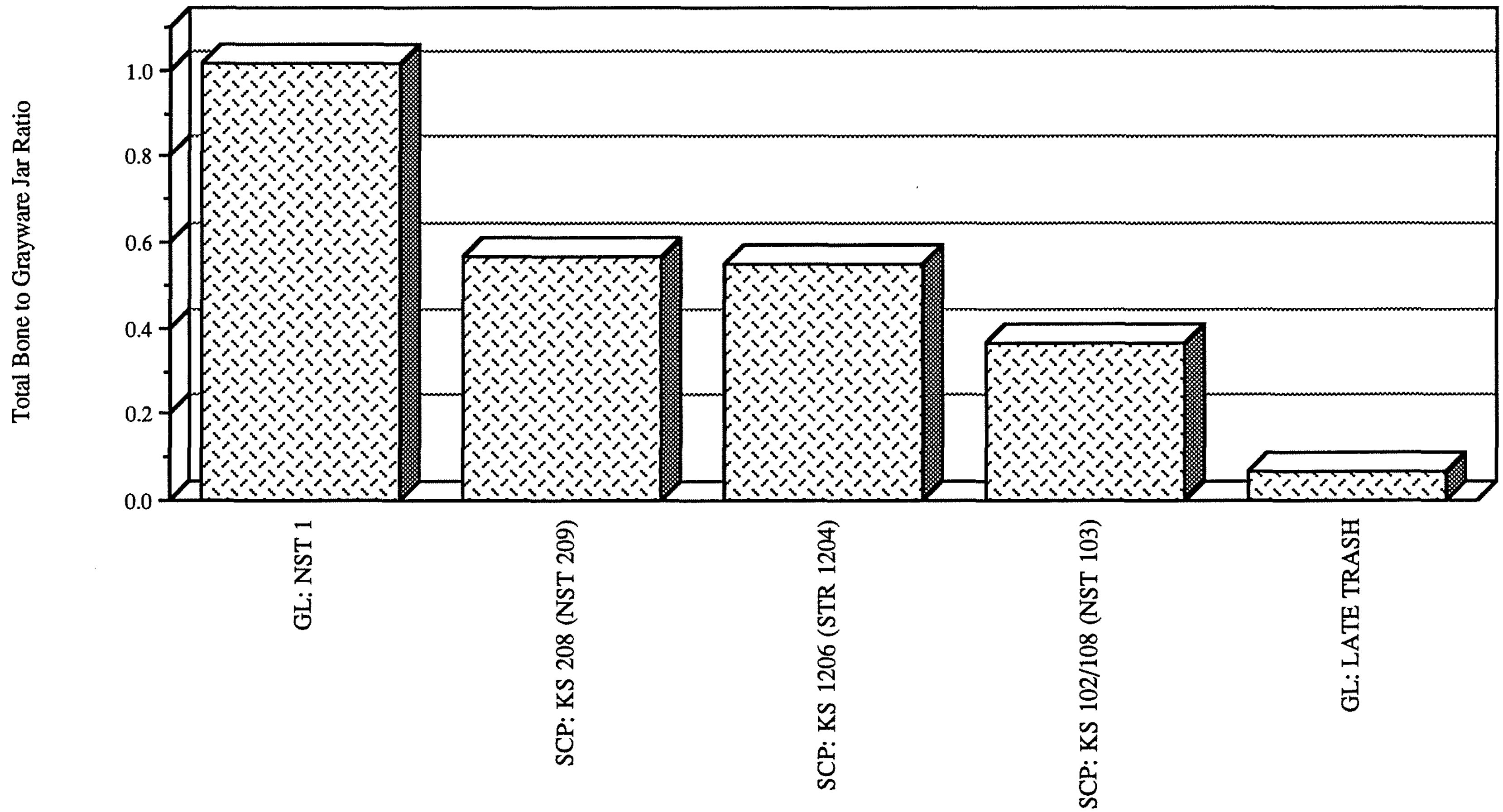



Figure 5.3: Ranked Total Bone to Grayware Jar Bar Chart

increase in intensification seen from Green Lizard to Sand Canyon Pueblo may be a result of intensification caused by aggregation.

Domestic and Wild Animal Protein Comparison

The ratio of domestic to wild animal protein is an index measuring dietary dependence on domestic versus wild animals. Wild fauna were defined as artiodactyls, large and medium mammals and lagomorphs, while domestic fauna were defined as turkeys and turkey-sized birds. The domestic to wild protein ratio is derived through the following calculation:

$$\frac{\text{Domestic NISP}}{\text{Wild NISP} + \text{Domestic NISP}}$$

The relative domestic protein contribution is provided by percent of domestic faunal elements to total NISP and the ratio of domestic faunal remains to grayware jar sherds within each study unit and summed by site (Table 5.8).

I assumed that by the Pueblo III period, turkeys contribute to Anasazi dietary needs as discussed by Breitburg (1988) and evidenced by dismemberment marks on turkey remains at both Green Lizard and Sand Canyon Pueblo (Walker 1990a, 1990b). The wild to domestic protein ratio is expected to vary with the degree of procurement of wild animal food sources relative to the utilization of domestic protein resources. It is expected that if protein needs were constant over time, a decrease in the ratio of wild protein use indicates increasing reliance on domestic animal protein sources. Increasing reliance on domesticated turkeys as a food source is expected to indicate intensification of domestic food resource production. Intensification may be tied to increased population size, and/or increases in elite ceremonial and ritual hosting events that involved the consumption of turkeys.

Breitburg (1988:100) has suggested that domestic turkey populations, similar to those of pigs among the Tsembaga Maring (Rappaport 1968) required regulatory controls to check overpopulation relative to available food supply. That is, increases in turkey populations may have triggered increases in turkey consumption through ritual or ceremonial feasting cycles. It is expected therefore that if an emergent elite is present at Sand Canyon Pueblo, greater turkey consumption for daily food and feasting purposes should show an increase relative to evidence of wild game procurement and consumption.

Larger elite households with access to greater resources may have been able to intensify turkey production for household use and in elite sociopolitical activities that may have involved hosting. Larger elite households should, therefore, have been able to both produce and consume greater quantities of turkeys than smaller, nonelite households, and have the highest values. Thus nonelite domestic facilities should have lower frequencies of turkeys and lower , while nonresidential special function facilities should have the lowest values.

Table 5.8: Domestic Protein Indices at Sand Canyon Pueblo and Green Lizard.

Sand Canyon Pueblo

| Study Unit | NISP | Wild No. | Domestic No. | Domestic. Protein Index |
|---|---|---|---|---|
| NST 103 (KS 102/108) | 155 | 22 | 34 | 0.607 |
| NST 209 (KS 208) | 711 | 77 | 141 | 0.647 |
| STR 1204 (KS 1206) | 1142 | 43 | 176 | 0.804 |
| Sum | 2008 | 142 | 451 | 0.761 |

Green Lizard

| Study Unit | NISP | Wild No. | Domestic No. | Domestic. Protein Index |
|---|---|---|---|---|
| NST 1 (KS 1) | 2825 | 380 | 541 | 0.587 |
| Late Trash (KS 1) | 136 | 23 | 64 | 0.734 |
| Sum | 2961 | 403 | 605 | 0.600 |

Discard assemblages associated from inferred special function facilities KS 102/108 and KS 208 have relatively high domestic protein indices, contrary to expectation. These values are higher than those in NST 1 at Green Lizard, indicating that turkeys were consumed at special function facilities at a relatively similar rate. KS 1206 possesses a the highest value consistent with an inference of elite residential use. The long-term midden deposit at Green Lizard (NST 1) falls at the lower end of the Sand Canyon Pueblo samples indicating that more domestic animals were used at Sand Canyon Pueblo, the differences, however, are not significant, $t = -.626$, $df = 1$, $p \geq .644$.

One possible interpretation of the high values at KS 102/108 and KS 208 suggests that ritual and ceremonial activities at these facilities resulted in the use and discard of turkey bones, perhaps as a result of feasting activities or other consumption. However, the limited sample size compromises this inference. Thus, intensification of domestic animal use might be tied to increased population size, and/or increases in ceremonial and ritual hosting and feasting involving consumption of turkeys, but may also be a function of reduced accessibility to wild animal foods through social restrictions or local depletion with aggregation.

Lagomorph Index

The lagomorph index is similar to that used by Szuter and Bayham (1989) as an indicator of habitat degradation in Hohokam sites in southern Arizona. Reduction of brushy vegetation and agricultural intensification created by increased population and aggregation tends to result in habitats more favorable to jackrabbits (*Lepus sp.*) than to cottontails (*Sylvilagus sp.*). Szuter and Bayham (1989) indicate that Hohokam sites occupied for longer periods of time demonstrate a decline in the ratio of cottontails to jackrabbits. When occupation density is low or seasonal, more cottontail remains tend to be recovered. Thus, aggregation may result in habitat degradation evidenced by a decline in the ratio of cottontails to jackrabbits. Habitat degradation in the Sand Canyon Locality, if present, assumed to be an indicator tree and shrubby vegetation depletion such as cutting of trees for construction and fuel wood and field clearing concomitant with agricultural intensification and village aggregation.

Rabbits are also a prominent source of protein in most Anasazi sites – they are the second most numerous fauna at Mug House at Mesa Verde (Rohn 1971). However, communal hunting of rabbits is a relatively high-cost procurement strategy. Studies at the Dolores Archaeological Program suggest that lagomorph procurement may become more cost effective during periods of aggregation and population growth (Neusius and Gould 1988). Communal rabbit hunts normally result in capturing jackrabbits rather than cottontails. Cottontails cannot be successfully driven as the hide in their burrows. Thus, increases in rabbit drives should show proportional increases in *Lepus* relative to *Sylvilagus* Jackrabbits are not expected to be a preferred elite food item. I expect ,therefore, that elite residences should have lower ratios of jackrabbits than nonelite facilities. The ratio of jackrabbits (*Lepus*) to all rabbits (Lagomorphs) monitors the contribution of each.

Table 5.9: Lagomorph Ratios at Sand Canyon Pueblo, Green Lizard and Tested Sites.

Sand Canyon Pueblo

| Study Unit | Sylvilagus | Lepus | Lepus:Lagomorph | Sylvilagus:Lepus |
|---|---|---|---|---|
| NST 103 (KS 102/108) | 22 | 0 | 0 | 0.000 |
| NST 209 (KS 208) | 45 | 26 | .366 | 1.731 |
| STR 1204 (KS 1206) | 12 | 16 | .571 | 0.750 |
| Sum | 79 | 42 | .347 | 1.881 |

Green Lizard

| Study Unit | Sylvilagus | Lepus | Lepus:Lagomorph | Sylvilagus:Lepus |
|---|---|---|---|---|
| NST 1 (KS 1) | 283 | 58 | .170 | 4.879 |
| Late Trash (KS 1) | 9 | 8 | .471 | 1.125 |
| Sum | 292 | 66 | .184 | 4.424 |

Sand Canyon Tested Sites

| Site Designation | Sylvilagus | Lepus | Sylvilagus:Lepus |
|---|---|---|---|
| 5MT 3918 | 39 | 9 | 4.33 |
| 5MT 3930 | 19 | 1 | 19.00 |
| 5MT 3936 | 70 | 0 | 0.00 |
| 5MT 3951 | 15 | 0 | 0.00 |
| Sum | 143 | 10 | 14.30 |

Summary lagomorph indices for Sand Canyon Pueblo (1.881) and Green Lizard (4.424) appear to be consistent with an inference of habitat degradation through intensification favoring greater availability and greater procurement of jackrabbits (Table 5.9, Figure 5.4). Four times as many cottontails relative to jackrabbits are present in the Green Lizard sample. At Sand Canyon Pueblo, cottontails still outnumber jackrabbits by nearly 2 to 1, but this ratio represents a greater than 50 percent decline from the Green Lizard figure.

Lagomorph data presented in Brand (1991) from four small mesa top Pueblo III habitations tested as part of the Sand Canyon Project and whose primary occupation estimates range from A.D. 1100 to A.D. 1300 (Varian 1990) were compared to Green Lizard and Sand Canyon Pueblo faunal data. The overall lagomorph ratio of 14.30 at small mesa-top sites is considerably higher than either Green Lizard or Sand Canyon Pueblo. Two of the sites lacked jackrabbit remains entirely. These data must be treated with caution however, as faunal remains were recovered from both midden and nonmidden sampling units.

It appears that the lower frequency of cottontail rabbit remains at Sand Canyon Pueblo may signal habitat degradation, perhaps resulting from long-term use, or intensification with aggregation. However, the presence of still significant quantities of cottontails suggests that enough local cottontail habitat was available so that cottontails are better represented than jackrabbit overall, implying, therefore, that if habitat degradation occurred, it was not extensive enough to have seriously affected cottontail habitat.

The overall ratio of jackrabbits to all rabbits is higher at Sand Canyon Pueblo than at Green Lizard, and, contrary to expectation, the highest ratio of jackrabbit use is at the inferred elite residential facility, KS 1206. It is possible that protein from any source may have been in high demand at Sand Canyon Pueblo, hence, the highest ratio at an inferred elite facility. Alternatively, if KS 1206 is not an elite residence, then the higher ratio may simply be a function of more people available for rabbit drives at this large residential unit and, therefore, greater success relative to smaller residential units with fewer people.

The jackrabbit ratio is much higher at both Sand Canyon Pueblo kiva suites than at the long term midden deposit (NST 1) at Green Lizard. This indicates that communal rabbit hunting may have increased with aggregation at Sand Canyon Pueblo, but the increase was not significantly greater than at Green Lizard, $t = 4.231$, $df = 1$, $p = .148$. The exclusion of the bone poor Late Trash deposit at Green Lizard may, however, make the increase significant. This must, however, be treated with caution, as the apparent increase in communal rabbit hunting may also be the result of habitat destruction with aggregation.

Artiodactyl Index

The artiodactyl index is a NISP based index that includes artiodactyls and large and medium mammals, and is contrasted to lagomorph remains. The index is calculated by dividing the frequency of artiodactyls defined above, by the total artiodactyls plus lagomorphs (jackrabbits and cottontails). The index monitors the intensity of large game procurement relative to that of small game. Two additional measures, the ratio of artiodactyls to grayware jars and artiodactyls as percent of NISP, monitor the relative proportion of artiodactyls in individual faunal assemblages. I have assumed that discard rate of grayware jar sherds per household was constant. Grayware jars, therefore, are used to standardize this ratio.

I expected that more large game animals should exist in Sand Canyon Pueblo discard assemblages overall, than at Green Lizard. Speth and Scott (1989) have argued that there is an increase in the number of artiodactyl remains as communities grow and become increasingly sedentary. The increase is not thought to be related to environmental change, but to increased efficiency of cooperative large game hunting associated with increasing effectiveness of labor organization at aggregated sites. Brand (1991) in an analysis of faunal remains from Sand Canyon Pueblo and small Pueblo III mesa-top habitation sites tested by Crow Canyon researchers as part of the larger Sand Canyon Project (Kuckelman et al. 1991; Varian et al. 1992) indicates an increase in the amount of artiodactyl remains is evident at Sand Canyon Pueblo relative to the frequency of artiodactyls recovered at the earlier small habitation sites. If elites were present at Sand Canyon Pueblo as inferred at KS 1206, it is possible that elite households may have had greater access to large game animals than nonelite households. Large game may have been a status item. I expect, therefore that discard assemblages associated with elite facilities should have higher artiodactyl index values than either nonelite domestic residences or special function facilities.

The artiodactyl index comparison for study units at both sites indicates somewhat greater artiodactyl use at Sand Canyon Pueblo (0.148) than at Green Lizard (0.114), as anticipated, but the difference is not significant, $t = -2.856$, $df = 1$, $p = .214$. Comparison of discrete midden deposits at Sand Canyon Pueblo and Green Lizard reveals that KS 102/108 lacks artiodactyl remains. As the entire refuse deposit was excavated, it is unlikely that the absence of artiodactyl remains is a result of sampling error.

Table 5.10: Artiodactyl Indices at Sand Canyon Pueblo and Green Lizard.

Sand Canyon Pueblo

| Study Unit | NISP | Artiodactyl | Lagomorph | Artiodactyl Index | Artiodactyl: GWJ | Artiodactyl % of NISP |
|---|---|---|---|---|---|---|
| NST 103 (KS 102/108) | 155 | 0 | 22 | 0.000 | 0.000 | 0.00 |
| NST 209 (KS 208) | 711 | 6 | 71 | 0.078 | 0.005 | 0.84 |
| STR 1204 (KS 1206) | 1142 | 15 | 28 | 0.349 | 0.007 | 1.31 |
| Sum | 2008 | 21 | 121 | 0.148 | 0.006 | 1.05 |

Green Lizard

| Study Unit | NISP | Artiodactyl | Lagomorph | Artiodactyl Index | Artiodactyl: GWJ | Artiodactyl % of NISP |
|---|---|---|---|---|---|---|
| NST 1 (KS 1) | 2825 | 39 | 341 | 0.103 | 0.015 | 1.38 |
| Late Trash (KS 1) | 126 | 7 | 17 | 0.292 | 0.003 | 5.56 |
| Sum | 2951 | 46 | 358 | 0.114 | 0.010 | 1.56 |

Kiva Suite 208 has a low index value, as expected. Kiva Suite 1206 has the highest value of any kiva suite in the sample as was expected for an elite facility. Thus, the residents of KS 1206 appear to have used and discarded more artiodactyls relative to rabbits than other units at Sand Canyon Pueblo. This suggests either differential access or differential success in artiodactyl procurement.

The artiodactyl percent and artiodactyl to grayware jar ratio contradict the artiodactyl index discussed above. These index values suggest that, overall, artiodactyl use was greater at Green Lizard than at Sand Canyon Pueblo. These differences are not, however, significant; $t = -.765$, $df = 1$, $p = .584$, and $t = -1.83$, $df = 1$, $p = .319$. Within Sand Canyon Pueblo, KS 1206 still has the highest percent and grayware jar index values. This also supports the inference of KS 1206 as an elite facility. However, the artiodactyl percent value at KS 1206 is little different from the one at Green Lizard's primary refuse deposit, NST 1, whereas the artiodactyl to grayware jar ratio at KS 1206 is lower than at Green Lizard's primary refuse deposit. These results suggest that although

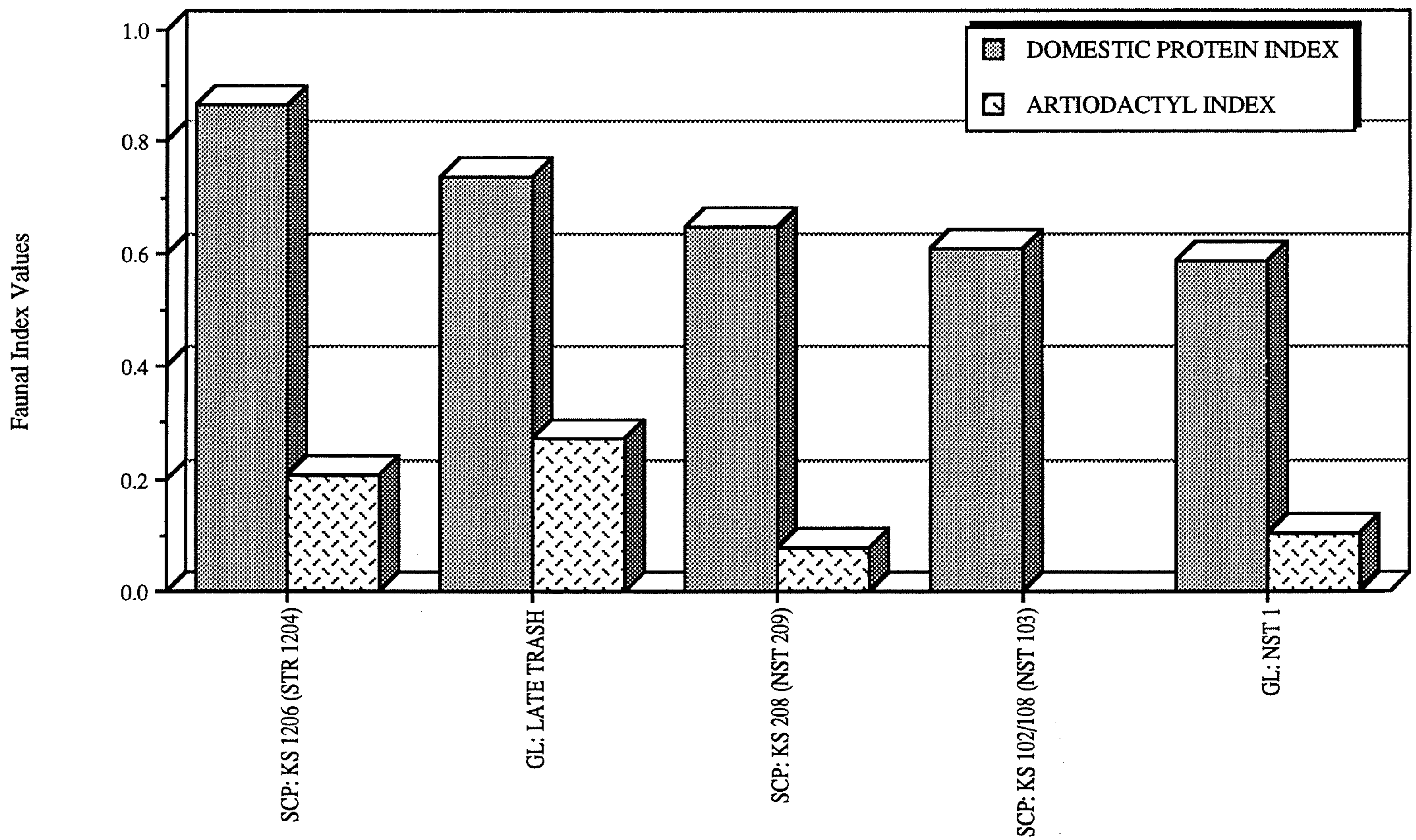



Figure 5.4: Domestic Protein and Artiodactyl Indices. Ranked by Highest Domestic Protein Value.

KS 1206 may have had greater access to big game animals than other kiva suites at Sand Canyon Pueblo, the intensity of procurement was similar to that at Green Lizard, a domestic residential facility.

If the largest residential facilities such as KS 1206 were not elite residences as I have just suggested, then the high artiodactyl values at this kiva suite might be the result of larger hunting group size and, therefore, greater success relative to smaller domestic facilities with fewer hunters. Larger, better organized hunting groups existed at large residential units and were, therefore, more successful in the long run than smaller units with fewer available hunters.

The artiodactyl index values at Sand Canyon and Green Lizard that cooperative long-distance big-game procurement, or artiodactyl hunting of any sort for that matter, was not greatly different from that at Green Lizard. Intersite differences at Sand Canyon Pueblo may be attributable to differential group size rather than differential access and status. The artiodactyl percent and artiodactyl to grayware jar ratio supports this inference and contradicts the Speth and Scott (1989) model of cooperative big game hunting at aggregated sites. This suggests that big game hunting at Sand Canyon Pueblo was not organized as a site wide activity. Rather, household and interhousehold groups (kiva suites) may have formed individual hunting parties.

### Resource Intensification Summary and Conclusions

Comparison of data related to domestic and wild resource intensification and procurement clearly suggest that both plant and animal domestic resource use was more intense at Sand Canyon Pueblo. This agrees with the expectation that resource intensification occurs with aggregation. However, domestic resource intensification does not demonstrate the presence or development of elite leadership at Sand Canyon Pueblo in the context of village aggregation.

## Assemblage Comparison Summary and Conclusions

Summarizing the conclusions of such a disparate group of assemblage-based comparisons is a daunting task and is ideally suited to multivariate statistical procedures. Such analyses are, however, beyond the scope of the comparisons originally devised. The overall trends of the measures track complex cultural phenomena that are highly interrelated, so statistical tests on each of these measures were not always revealing. The overall trend of the all of the measures, however, was revealing.

Comparison of potential household wealth differences indicated that no significant differences between Green Lizard and Sand Canyon Pueblo exist. Thus, access to nonlocal materials and use and discard of ornaments which might signal the presence of an emerging elite are lacking. If emerging leaders were present at Sand Canyon Pueblo, they did not express their status through possession of greater amounts of such items.

On the basis of the comparisons undertaken here, there is no evidence to suggest the presence of production specialization. There is, however, some evidence to suggest that some units at Sand Canyon Pueblo produced stone tools while others used, but produced few stone tools. Some units might have been engaged in part-time, household level production, supplying flaked stone tools to other households at Sand Canyon Pueblo. Rather than equating this with specialized production, however, it is likely that production complementation and subtle economic differentiation in an egalitarian context may have occurred with aggregation at Sand Canyon Pueblo.

Finally, resource use was compared between Green Lizard and Sand Canyon Pueblo. More domestic plant and animal resources appear to have exploited at Sand Canyon Pueblo relative to Green Lizard. Intensification of domestic protein sources (turkeys) appears to have occurred at Sand Canyon Pueblo as a substitute or complement to wild animal protein. Increased intensification of domestic turkey may have been supported in part by an increase in agricultural surplus brought about by increased efficiency of labor organization with aggregation in an aggregated setting. The lagomorph indices suggest that while habitat destruction occurred with aggregation, it does not appear to have been of sufficient scale to severely affect cottontail habitat. Communal rabbit hunting also appears to have increased with aggregation at Sand Canyon Pueblo, but not significantly so. The artiodactyl index also indicates that artiodactyl procurement increased with aggregation at Sand Canyon Pueblo, thereby supporting the Speth and Scott (1989) model. However, the artiodactyl percent and artiodactyl to grayware jar ratio measures contradict this, and indicate that artiodactyl procurement may not have increased with aggregation. This contradicts the Speth and Scott model.

All of the resource-based variables indicate that resource production and procurement may have intensified with aggregation. None of these measures provided clear evidence indicating that intensification was a result of organizational change (i.e., elite-driven), rather than a byproduct of the effects of aggregation. The small sample of kiva suites for which faunal data were available compromises the strength of the inferences to some extent. Thus, the conclusions I have drawn need to be further evaluated with a larger data base.

## Conclusions

This comparative assemblage analysis suggests that Late Pueblo III aggregation in the Mesa Verde region may have resulted in some differentiation in activities between resident populations at the interhousehold level of integration. Thus, community organization at Sand Canyon Pueblo seems to have been horizontally rather than vertically differentiated. Community organization was basically egalitarian, but functional and economic differentiation is indicated by architectural and assemblage evidence. Functionally specialized ritual and ceremonial facilities that appear to have served community integrative purposes may have been present at Sand Canyon Pueblo, while among domestic residential facilities there is evidence of limited economic and productive differentiation and complementation.

Analysis failed to discover overt evidence of nonegalitarian leaders at Sand Canyon Pueblo. I should stress, however, that ways in which leadership are manifested vary. Not all leadership roles are accompanied by clear, overt status markers, as pointed out by Feinman and Neitzel's (1984) cross-cultural study. However, none of the social variables used in this study indicated the presence of elite leaders. Thus, elite leadership was either minimal, not present, or the sample of architectural units did not include an elite facility. Functional differentiation may signal the initiation of activities and behaviors that could have led to the development of an elite leadership at Sand Canyon Pueblo, but the site and the Mesa Verde region were abandoned before this process had been well developed.

Thus, the picture of community organization that emerges is one of a society that is more complexly organized than the earlier dispersed community, but that is still basically egalitarian. The organizational complexity encountered at Sand Canyon Pueblo in what was an egalitarian tribal society indicates that traditional typologies of tribal organization insufficiently complex. I must note I have been dealing with a relatively small sample. Green Lizard is the only example of the earlier dispersed community in the sample. Had a larger sample of kiva suites from the dispersed community been available, there might have been as much variability between them as I observed at in the sample of kiva suites from Sand Canyon Pueblo.

# Chapter 6

# SUMMARY AND CONCLUSION

## INTRODUCTION

I investigated Pueblo III social complexity and changing community organization that accompanied the shift from dispersed to aggregated communities in the Sand Canyon Locality of the Mesa Verde Region. This study indicated that comparative analyses of comparable excavation data and multiple lines of evidence can reveal information about the organization of prehistoric Puebloan communities. In this final chapter, I briefly summarize the results of this study and discuss its implications for understanding how thirteenth century communities may have been organized and the role of aggregation in organizational change.

### Green Lizard

Excavation of the western kiva suite at the Green Lizard site provided assemblage and feature data from this small habitation that is representative of the dispersed community in the upper Sand Canyon area. Green Lizard's artifact assemblage and architectural characteristics were compared to similar data from nearby Sand Canyon Pueblo, a large, aggregated village. The Pueblo III occupation of Green Lizard is believed to have spanned the early A.D. 1200s to ca. 1250 or 1260. The last few years of occupation of Green Lizard and the initial construction and occupation of Sand Canyon Pueblo, probably overlapped in time. Residents of the two sites may, therefore, have been part of the same community when the occupations overlapped and may have been later as well if residents of Green Lizard relocated to Sand Canyon Pueblo.

Architectural analysis from the excavated kiva suite at Green Lizard (KS 1) show that the number of surface rooms grew through time, some were modified, and some were abandoned and reused as refuse areas. The associated pitstructure (Structure 1) also underwent modifications during its use. This pattern of structural accretion, modification and reuse, along with chronological evidence, high estimated artifact population, and volume of secondary refuse deposits suggest an occupation span of at least one generation, and perhaps longer. Growth of the Pueblo III roomblock over time indicates that the number of site residents also grew.

Abandonment of Green Lizard occurred about A.D. 1250 - 1260. The abandonment was planned and the site was depleted of useful artifacts such as ceramic vessels, ground stone axes, matting and basketry, and the pitstructure roofing beams which were salvaged prior to abandonment.

Assemblage data from Green Lizard indicate a wide variety of activities associated with domestic habitation activities. Evidence for the occupants of Green Lizard having engaged in the regional exchange of nonlocal ceramics and flaked stone, while somewhat greater than that found at Sand Canyon Pueblo, still comprised an insignificant proportion of the total ceramic and lithic assemblages recovered; procurement of locally available resources was preferred. The presence of check dams, accretional growth of rooms, depth of primary midden deposits, and dominance of cultivated and domesticated items such as maize and turkey in the diet indicate locally large populations and probable intensified resource production Green Lizard compared to earlier periods.

## Architectural Comparison

Architectural comparisons between the kiva suite at Green Lizard and similar kiva suites at Sand Canyon Pueblo were based on the presumption that if increased social complexity accompanied aggregation at Sand Canyon Pueblo. Social complexity would, therefore, be expressed in differential building efforts and formality of construction among kiva suites.

The results of the architectural comparisons indicated that relative construction effort of kivas and surface rooms did not differ significantly between Green Lizard and Sand Canyon Pueblo. At both sites, relative construction effort was somewhat but not significantly greater in kivas (and the sole tower in the Sand Canyon Pueblo sample) than in surface rooms.

Comparison of formality indices at Green Lizard and Sand Canyon Pueblo surface rooms indicate that at Sand Canyon Pueblo, considerably more effort was expended in the selection of more tabular stone shapes, greater overall uniformity in stone size, and more stone shaping and smoothing than at Green Lizard. Architectural expressions of formality were generally greater at Sand Canyon Pueblo than at Green Lizard, suggesting that if architecture at Green Lizard is representative of small habitations of the time, an overall increase in labor investment in the formal and symbolic aspects of architecture was one result of aggregation at Sand Canyon Pueblo. Though architecture at Sand Canyon Pueblo is more formal than at Green Lizard, intrasite differences in formality at Sand Canyon Pueblo were not strongly expressed, as might have been expected if architecture was used to convey differential status within this settlement. I suggest that increased architectural formality at Sand Canyon Pueblo may reflect an overall higher level of formal social interaction there in response to aggregation.

Comparison of relative construction labor inputs (RLI) did not reveal significant differences between kivas and surface rooms at Green Lizard and Sand Canyon Pueblo, thus indicating overall similarity in construction efforts for these structure types. Absolute construction labor estimates in person hours, on the other hand, indicate that there are appreciable differences between Green Lizard and Sand Canyon Pueblo construction efforts. The kiva suite at Green Lizard has smaller per structure values than kiva suites at Sand Canyon Pueblo. There are also intrasite differences in per structure labor values at Sand Canyon Pueblo.

When absolute labor estimates were plotted against kiva suite roofed area, three groups of kiva suites were evident at Sand Canyon Pueblo. I have argued that these groups conform to expectations of functional differentiation (KS 102/108 and KS 208), vertical differentiation (KS 1004 and KS 1206) and undifferentiated egalitarian domestic facilities (KS 501 and KS 1 at Green Lizard). These expectations were partially supported by roofed area and vessel size analyses. Altogether, these data suggest that KS 102/108 and KS 208 may have been specialized for ritual/ceremonial use. These analyses did not, however, support the presence of elite residential structures. In summary, architectural analyses indicated the development of increased formality in architecture and the presence of functionally differentiated special-use kiva suites at Sand Canyon

Pueblo. These architectural changes may have been caused by changes in community organization at Sand Canyon Pueblo, and demonstrate increased functional complexity with aggregation.

## Assemblage Comparison

Comparison of artifact assemblages recovered from similar discrete secondary refuse deposits at Green Lizard and Sand Canyon Pueblo were undertaken to assess whether the initial identification of three kiva suite groupings derived from architectural analyses remained plausible when tested against assemblage data.

Comparative analysis of specialized production variables indicated that elite-driven craft specialization was absent at Sand Canyon Pueblo. However, there was evidence of possible functional complementarity at Sand Canyon Pueblo between kiva suites engaged in ceramic production and in stone tool production. Complementation may have been a social response to aggregation as a way of strengthening intracommunity social and economic ties and alliances. Interdependence and cooperation between allied households signified by complementation of production may, therefore, have promoted by aggregation at Sand Canyon Pueblo.

Analysis of household wealth data indicate no significant differences in proxy variables of wealth between kiva suites at Sand Canyon Pueblo and Green Lizard. This result is in part a reflection of the near lack of participation by the occupants of both sites in regional exchange networks.

Cross-culturally, intensification of resources provides one avenue for emerging leaders to stage status validation and enhancement rituals, often involving feasting. Leaders may therefore have actively promoted intensification and surplus production to enhance status and prestige. Results indicate that domestic food plants and animals were somewhat more intensively used than wild ones at Sand Canyon Pueblo. That is, with intensification, domestic plants and animals, as a percent of the total increased. Driver (1993), using a larger faunal data set from Sand Canyon project sites, argues that the use of deer, but not turkey, increased with aggregation at Sand

Canyon Pueblo. The use of turkey increased at contemporary small canyon bench and talus sites, and deer procurement was very rare at these sites during the period of aggregation.

It is possible that the larger small habitation data set used by Driver (1993) provides a more accurate picture of faunal use at these sites than does the Green Lizard data by themselves. Evidence of intensification in the form of communal rabbit drives and differential access to big game animals indicates small differences are present between kiva suites. The differences that are present, at least in big game procurement, may result from differential group size rather than differential access and elite status.

## Evaluation of Community Organization at Sand Canyon Pueblo

I presented three scenarios of post-aggregation organization to examine the possible trajectory or directionality of social changes, if any, accompanying aggregation at Sand Canyon Pueblo. The first scenario – the egalitarian undifferentiated model – presumed no change in community organization at Sand Canyon Pueblo from that of the dispersed community of small domestic habitations. The second scenario – the specialized function model – suggested that functional differentiation developed with aggregation at Sand Canyon Pueblo. I expected distinct differences between domestic kiva suites at Green Lizard and Sand Canyon Pueblo and nonresidential special function facilities at Sand Canyon Pueblo. Construction labor estimates, ratios of kiva to room area, and presence or absence of domestic refuse were used to investigate this model. The third scenario – the elite residential model – suggested that aggregation involved the development of elites at Sand Canyon Pueblo. Differences that would distinguish elite residences from both commoner households and specialized function kiva suites were expected. These included larger overall surface room area, significant quantities of domestic trash containing discarded status items, and differences in construction labor investment compared to special use facilities or commoner facilities.

Architectural and assemblage analyses indicate that a specialized function interpretation seems to hold up for KS 102/108, but not for KS 208. KS 208 was expected to have been a special function facility based on its large roofed kiva area, high labor investment, and large serving vessels. However, the associated refuse assemblage is more like that of a residential domestic facility than to the refuse assemblage associated with KS 102/108.

KS 1004 and 1206 were expected to have been elite residential facilities on the basis of roofed area, labor investment, and serving vessel size. The discard assemblage associated with these facilities indicates, however, that these were probably not elite facilities. Rather, they appear to be larger-than-average domestic facilities similar in all but size to smaller domestic facilities such as KS 501 at Sand Canyon Pueblo and KS 1 at Green Lizard.

KS 501 at Sand Canyon Pueblo and KS 1 at Green Lizard were expected to have been nonelite domestic residential facilities. Analysis of artifact assemblage and architectural data revealed many similarities between the two kiva suites. Thus, the inference of nonelite residential use is probably correct.

In summary, these analyses indicate that Late Pueblo III aggregation at Sand Canyon Pueblo may have resulted in some level of differentiation in activities and in the overall function of kiva suite architectural complexes. Community organization after aggregation remained basically egalitarian, but some degree of functional and economic differentiation accompanied aggregation. Functionally specialized ritual and ceremonial kiva suites that appear to have served community integrative purposes may have been present at Sand Canyon Pueblo, in addition to the more obvious integrative structures, the great kiva and D-shaped building. Among domestic residential facilities there is evidence of limited economic and productive differentiation and complementation. Analysis failed to discover overt evidence of nonegalitarian leaders at Sand Canyon Pueblo. Thus, elite leadership was either minimal, not present, or the sample of architectural units did not include an elite facility.

Thus, community organization at Sand Canyon Pueblo seems to have been horizontally rather than vertically differentiated. The picture of community organization that emerges is one of a society that is more complexly organized than the earlier dispersed community, but one that was still basically egalitarian. However, only one sample from the dispersed community was available for study. As a result, I am limited in what I can say about differentiation in the dispersed community.

Functional differentiation and economic complementation may be precursors of wealth accumulation and the eventual emergence of nonegalitarian leaders. In the case of Sand Canyon Pueblo, however, the site was abandoned before this sort of social differentiation developed. Aggregation may have put into motion the kinds of social changes that lead to greater social complexity. But the degree of complexity and differentiation observed suggest that the checks and balances that maintained an egalitarian leadership and relative social equality may have been more powerful than the forces pushing community organization towards inequality.

If other contemporary aggregations resulted in similar complexity as inferred here for Sand Canyon Pueblo, then elite leadership was not present in the Mesa Verde area during the latter half of the thirteenth century. The abandonment of the Mesa Verde area by about A.D. 1300 resulted in larger and more substantial aggregations elsewhere in the Southwest. Some of these Pueblo IV aggregated sites were occupied longer than the 30 to 40 years at Sand Canyon Pueblo. It is possible that, with the advent of larger and longer-term Pueblo IV aggregations, social and environmental conditions could have developed that pushed these large communities to develop increasingly complex organization and allowed nonegalitarian leadership to arise (Upham 1982; Lightfoot 1984; Upham et al. 1989). On the other hand, Eggan (1950), E. C. Adams (1989, 1991) and Kintigh (1985) have argued that the development of the katchina cult helped to stabilize large aggregates on a more or less egalitarian basis. Kintigh (1985) suggests the rapid aggregation observed in the Zuni area in mid to late 1200s was not sustainable. The social mechanisms necessary to successfully integrate such large aggregates were not developed until the protohistoric period. The arrival of the katchina cult by the early A.D. 1300s from the Casas Grandes area may have provided the necessary integrating mechanism (Kintigh 1985; E. C. Adams 1991).

## Aggregation and the Development of Social Complexity

Aggregation is considered by many as a primary factor in the development of social differentiation and nonegalitarian leadership roles (Upham 1982; Lightfoot 1984; Upham et al. 1989; Orcutt et al. 1990; E. C. Adams 1991). Thus, aggregation into large villages has been considered as a central factor leading to the development of social inequality and hierarchical organization.

Increased complexity certainly seems to be related in some way to aggregation into large settlements, but small-scale aggregation, by itself, is probably not enough to have caused the development of social inequality and status hierarchies. Based on the research I have presented, aggregation, in the short term, cannot simply be viewed as the all-important prime mover in the development of social hierarchies. Increased economic differentiation may be an expectable result when communities move from dispersed to aggregated settlement systems, but the formation of a nonegalitarian form of community organization should not be considered an inevitable adjunct of aggregation. Continued occupation of large villages over several generations could eventually lead to the development of social inequalities of the sort claimed to have occurred in some areas of the northern Southwest (Upham 1982; Lightfoot 1984; Sebastian 1988; Wilcox 1991). But even in these cases, factors other than simple long-term aggregation must have been at work for social inequalities to have become embedded in a society's social fabric. Aggregation probably causes increased social instability in a community. Increased local population densities attending aggregation can heighten the potential for disruptive social conflict, can deplete local resources of all kinds, and can alter or modify access to other important resources such as arable land and water. In such situations, increased intracommunity – and perhaps intercommunity – social interdependence and cooperation may have been emphasized.

Thus, changes and adjustments in community organization appear to be necessary in shifting from dispersed to aggregated settlement systems. However, whether and to what degree community organization changed may have been dependent on factors such as population density relative to critical limiting resources – water, arable land, wild plant and animal foods, the potential for intensification of food resources, the degree to which mobility may have been constrained and the potential for intergroup conflict. Some or all of these, play a role in determining the direction and degree of organizational readjustments faced by Pueblo III Anasazi communities that chose to aggregate, or were forced to do so.

## Implications and Directions for Future Research

The research I have presented has explored whether complexity in community organization increased with large-scale aggregation and if so, how this complexity was expressed. This research has raised some interesting questions about aggregation and complexity. It may even have some application to understanding the social ramifications of aggregation at other aggregated Pueblo III sites in the Mesa Verde area, and perhaps in other parts of the Southwest as well. I have demonstrated several ways in which detailed architectural and assemblage data can be used to understand community organization.

This research has implications for the study of social complexity at aggregated sites in the northern Southwest Research into social complexity in middle range societies in the Southwest – and elsewhere – is a process that requires well-controlled, comparable data sets and good chronological control. Without detailed site-level comparative data and an understanding of the effects of natural and cultural formation processes, research into social complexity can only result in unwarranted inferences and weak interpretations. In order to fully assess organizational change at Sand Canyon Pueblo and similar aggregated communities, we need to better understand how the preceding community of dispersed sites was organized. The measures I have developed could be applied to tested sites dating to the early A.D. 1200s.

Aggregation may have caused social change and horizontal differentiation at Sand Canyon Pueblo, but more research into contemporary large sites is necessary to evaluate whether aggregation at these communities resulted in similar community organization or whether these varied from community to community. This study strongly suggests that functional differentiation can occur in an egalitarian social order. It is possible that the kind of complexity inferred at Sand

Canyon Pueblo indicates that a process of complex tribal formation was occurring in late thirteenth century southwestern Colorado. However, additional studies of the linkages and level of integration, if any, between these communities must first be done to assess this issue.

If such a complex tribal formation was developing, then intercommunity contacts and alliances may have been stronger than in preceding periods. Finally, more detailed research into the causes of aggregation are necessary. Recent research has suggested several causes for aggregation in the area, but none of them seem to directly address why so many communities in the Mesa Verde area chose or were forced to aggregate at approximately the same time. This dissertation, therefore, has pointed out significant developments in thirteenth century Anasazi community organization in southwestern Colorado. Of particular interest is the development of functional and economic differentiation with aggregation. These developments and their implications deserve further exploration with larger data bases.

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# APPENDIX

Appendix A: Green Lizard Point-Located Artifact Tables – Structure 1 (Kiva).

| PL # | Description | Elevation |
|---|---|---|
| 1 | Other Modified Artifact – possible one-hand mano? (OMA) | 94.93 |
| 2 | Whiteware, ladle handle fragment (LWU) | 94.84 |
| 3 | Two-hand mano fragment (TMA) | 94.89 |
| 4 | *Meleagris gallopavo* left femur shaft (NHB) | 94.90 |
| 5 | *Meleagris gallopavo* right humerus (NHB) | 94.87 |
| 6 | *Meleagris gallopavo* left tarso-metatarsus (NHB) | 94.96 |
| 7 | Small sandstone abrader (ABR) | 94.88 |
| 8 | Flake (BCS) | 94.94 |
| 9 | Flake (BCS) | 94.94 |
| 10 | *Meleagris gallopavo* bone awl (NHB) | 94.94 |
| 11 | Seven corrugated jar sherd (CRG) | 94.94 |
| 12 | Sandstone abrader or lapstone (ABR) | 94.88 |
| 13 | Sandstone abrader (ABR) | 94.91 |
| 14 | Sandstone abrader (ABR) | 94.86 |
| 15 | Flake (BCS) | 94.85 |
| 16 | Bird bone awl (NHB) | 94.86 |
| 17 | Six sherd cluster (4 CRG, 2 LWU) | 94.85 |
| 18 | Flake (BCS) | 94.87 |
| 19 | Other – possible core (OTH) | 95.04 |
| 20 | Two-handed mano fragment (TMA) | 94.05 |
| 21 | Flake (BCS) | 94.05 |
| 22 | Flake (BCS) | 95.02 |
| 23 | Flake (BCS) | 95.03 |
| 24 | Large chalcedony biface (BIF) | 95.04 |
| 25 | Sandstone abrader (ABR) | 95.03 |
| 26 | Flake (BCS) | 95.03 |
| 27 | Cluster of two corrugated jar sherds (CRG) | 95.04 |
| 28 | Flake (BCS) | 95.05 |
| 29 | Deteriorated *Zea mays* cob fragment (VEG) | 95.06 |
| 30 | Deteriorated *Zea mays* cob fragment (VEG) | 95.03 |
| 31 | Cluster of five Mesa Verde B/W rim sherds (VBW) | 95.03 |
| 32 | Botanical sample – disintegrated wood (VEG) | 95.04 |
| 34 | Flake (BCS) | 95.08 |
| 35 | Mesa Verde B/W jar – modified sherd disk (SHS) | 95.15 |
| 36 | Flake (BCS) | 95.14 |
| 37 | Flake (BCS) | 95.13 |
| 38 | Two-hand mano (TMA) | 95.10 |
| 39 | Flake (BCS) | 95.16 |
| 40 | Flake (BCS) | 95.11 |
| 41 | McElmo B/W sherd (EBW) | 94.10 |
| 42 | Sandstone slab metate (SME) | 94.24 |
| 43 | Turkey bone awl (NHB) | 93.99 |
| 44 | Mesa Verde B/W bowl sherd (VBW) | 93.98 |
| 45 | Late B/W bowl sherd (LBW) | 94.02 |
| 46 | Polished rabbit bone fragment (NHB) | 94.05 |
| 47 | Flake (BCS) | 93.99 |
| 48 | Flake (BCS) | 93.98 |
| 49 | Late B/W jar sherd (LBW) | 93.98 |
| 50 | Flake (BCS) | 94.00 |
| 51 | Late B/W bowl sherd (LBW) | 93.99 |
| 52 | Flake (BCS) | 95.00 |
| 53 | Canid bone awl (NHB) | 95.03 |
| 54 | Late B/W bowl sherd (LBW) | 94.96 |
| 55 | Turkey bone awl (NHB) | 95.00 |

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|---|---|---|
| 56 | Flake (BCS) | 94.95 |
| 57 | Flake (BCS) | 94.94 |
| 58 | Flake (BCS) | 94.94 |
| 59 | Burned medium artiodactyl bone (NHB) | 94.99 |
| 60 | Beam-impressed daub (ADO) | 94.94 |
| 61 | Beam-impressed daub (ADO) | 95.01 |
| 62 | Beam-impressed daub (ADO) | 94.93 |
| 63 | Beam-impressed daub (ADO) | 94.96 |
| 64 | Beam-impressed daub (ADO) | 95.02 |
| 65 | Beam-impressed daub (ADO) | 95.00 |
| 66 | Beam-impressed daub (ADO) | 94.97 |
| 67 | Beam-impressed daub (ADO) | 95.04 |
| 68 | Turkey bone (NHB) | 95.08 |
| 69 | Animal bone (NHB) | 95.06 |
| 70 | Turkey bone awl (NHB) | 95.05 |
| 71 | Turkey bone awl (NHB) | 95.05 |
| 72 | Polishing stone (POS) | 94.87 |
| 73 | Corrugated jar sherd (CRG) | 94.85 |
| 74 | Flake (BCS) | 94.84 |
| 75 | Flake (BCS) | 94.84 |
| 76 | Polishing stone (POS) | 94.89 |
| 77 | Flake (BCS) | 94.88 |
| 78 | Flake (BCS) | 94.88 |
| 79 | Flake (BCS) | 94.88 |
| 80 | Flake (BCS) | 94.86 |
| 81 | Flake (BCS) | 94.87 |
| 82 | Flake (BCS) | 94.88 |
| 83 | Flake (BCS) | 94.83 |
| 84 | Flake (BCS) | 94.91 |
| 85 | Turkey bone awl (NHB) | 94.88 |
| 86 | Polishing/hammerstone (PHS) | 94.89 |
| 87 | Turkey bone awl (NHB) | 94.89 |
| 88 | Flake (BCS) | 94.82 |
| 89 | Polishing/hammerstone stone (PHS) | 94.92 |
| 90 | Modified sandstone (OMS) | 94.94 |
| 91 | Flake (BCS) | 94.95 |
| 92 | Partial Mesa Verde B/W Bowl (VBW) | 94.93 |
| 93 | Medium artiodactyl bone (NHB) | 94.95 |
| 94 | Turkey bone awl (NHB) | 94.89 |
| 95 | Rabbit bone – *Sylvilagus* (NHB) | 94.89 |
| 96 | Late B/W jar sherd (LBW) | 94.89 |
| 97 | Flake (BCS) | 94.90 |
| 98 | Modified flake (MOF) | 94.87 |
| 99 | Turkey bone (NHB) | 94.92 |
| 100 | Late white unpainted bowl sherd (LWU) | 94.91 |
| 101 | Sandstone abrader (ABR) | 94.95 |
| 102 | Flake (BCS) | 94.93 |
| 103 | Flake (BCS) | 94.94 |
| 104 | Flake (BCS) | 94.91 |
| 105 | Flake (BCS) | 94.91 |
| 106 | Polishing/hammerstone (PHS) | 94.98 |
| 107 | Flake (BCS) | 94.92 |
| 108 | Rabbit bone – *Sylvilagus* (NHB) | 94.88 |
| 109 | Late B/W jar sherd (LBW) | 94.94 |
| 110 | Bird bone (NHB) | 94.92 |
| 111 | Mesa Verde B/W bowl sherd (VBW) | 94.98 |
| 112 | Tree-ring sample (TRE) | 94.92 |
| 113 | Vegetation sample (VEG) | 94.91 |
| 114 | Cluster of five sherds (LBW and LWU) | 94.97 |

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|---|---|---|
| 115 | Hematite – ground and faceted (OMS) | 94.98 |
| 116 | Flake (BCS) | 94.95 |
| 117 | Flake (BCS) | 94.95 |
| 118 | Two flakes (BCS) | 94.95 |
| 119 | Pueblo III B/W bowl rim sherd HBW) | 94.90 |
| 120 | Flake (BCS) | 94.93 |
| 121 | Turkey bone awl (NHB) | 94.95 |
| 122 | Flake (BCS) | 94.93 |
| 123 | Late B/W bowl sherd (LBW) | 94.93 |
| 124 | Four flakes (BCS) | 94.93 |
| 125 | Flake (BCS) | 94.95 |
| 126 | Sandstone abrader (ABR) | 94.94 |
| 127 | Modified sandstone (OMS) | 94.94 |
| 128 | Flake (BCS) | 94.94 |
| 129 | Hematite fragment (OTH) | 94.93 |
| 130 | Flake (BCS) | 94.95 |
| 131 | Bone awl (NHB) | 94.95 |
| 132 | Modified hematite (OMM) | 94.94 |
| 133 | Sandstone abrader (ABR) | 94.96 |
| 134 | Two late white unpainted jar sherds (LWU) | 94.94 |
| 135 | Flake (BCS) | 94.94 |
| 136 | Modified red ochre (UST) | 94.93 |
| 137 | Possible pendant blank (OMS) | 94.92 |
| 138 | Flake (BCS) | 94.91 |
| 139 | Bird bone (NHB) | 94.90 |
| 140 | Bird bone (NHB) | 94.88 |
| 141 | Mammal bone (NHB) | 94.88 |
| 142 | Animal bone (NHB) | 94.88 |
| 143 | Bird bone (NHB) | 94.88 |
| 144 | Bird bone (NHB) | 94.92 |
| 145 | Flake (BCS) | 94.89 |
| 146 | Bird bone awl (NHB) | 94.92 |
| 147 | Flake (BCS) | 94.88 |
| 148 | Mesa Verde B/W bowl sherd (VBW) | 94.89 |
| 149 | Flake (BCS) | 94.88 |
| 150 | Late white unpainted bowl sherd (LWU) | 94.87 |
| 151 | Late white unpainted bowl sherd (LWU) | 94.90 |
| 152 | Modified bird bone (OMB) | 94.93 |
| 153 | Turkey bone awl (NHB) | 94.96 |
| 154 | Flake (BCS) | 94.94 |
| 155 | Pueblo III B/W bowl sherd (HBW) | 94.86 |
| 156 | Cluster of five corrugated jar sherds (CRG) | 94.94 |
| 157 | Wood charcoal sample (VEG) | 94.92 |
| 158 | Turkey bone awl (NHB) | 94.23 |
| 159 | Turkey bone awl (NHB) | 94.26 |
| 160 | Medium artiodactyl bone awl (NHB) | 94.16 |
| 161 | Medium artiodactyl bone awl (NHB) | 94.12 |
| 162 | Medium artiodactyl bone awl (NHB) | 94.11 |
| 163 | Flotation sample of decayed vegetal material (FLOT) | 94.26 |
| 164 | Medium artiodactyl bone awl (NHB) | 94.16 |
| 165 | Flake (BCS) | 94.08 |
| 166 | Flake (BCS) | 94.18 |
| 167 | Flake (BCS) | 94.05 |
| 168 | Flake (BCS) | 94.06 |
| 169 | Flake (BCS) | 94.08 |
| 170 | Flake (BCS) | 94.10 |
| 171 | Flake (BCS) | 94.10 |
| 172 | Flake (BCS) | 94.06 |
| 173 | Flake (BCS) | 94.10 |

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|---|---|---|
| 174 | Turkey bone (NHB) | 94.08 |
| 175 | Partial Mesa Verde B/W bowl (VBW) | 94.07 |
| 176 | Slab metate fragment (SME) | 94.11 |
| 177 | Animal bone (NHB) | 94.14 |
| 178 | Sandstone abrader (ABR) | 94.14 |
| 179 | Late white unpainted jar sherd (LWU) | 94.10 |
| 180 | Flake (BCS) | 94.09 |
| 181 | Turkey bone (NHB) | 94.12 |
| 182 | Turkey bone (NHB) | 94.10 |
| 183 | Core (COR) | 93.96 |
| 184 | Late white unpainted jar sherd (LWU) | 93.95 |
| 185 | Cluster of three corrugated jar sherds (CRG) | 93.98 |
| 186 | Cluster of two corrugated jar sherds (CRG) | 94.00 |
| 187 | Corrugated jar sherd (CRG) | 94.01 |
| 188 | Flake (BCS) | 93.98 |
| 189 | Late B/W jar sherd (LBW) | 93.99 |
| 190 | Corrugated jar sherd (CRG) | 93.98 |
| 191 | Late B/W jar sherd (LBW) | 93.98 |
| 192 | Sandstone abrader (ABR) | 94.00 |
| 193 | Shaped sherd – corrugated jar sherd disk (SHS) | 94.03 |
| 194 | Flake (BCS) | 94.01 |
| 195 | Flake (BCS) | 94.00 |
| 196 | Corrugated jar sherd (CRG) | 93.97 |
| 197 | Late B/W bowl sherd (LBW) | 93.97 |
| 198 | Pueblo III B/W jar sherd (HBW) | 93.98 |
| 199 | Slate pendant (OMS) | 94.03 |
| 200 | Mancos Black/W seed jar rim (MBW) | 94.01 |
| 201 | Botanical sample – decayed closing material (FLOT) | 94.08 |
| 202 | Tree-ring sample – part of PL # 203 (TRE) | 93.90 |
| 203 | Tree-ring sample – 10cm diameter (TRE) | 93.90 |
| 204 | Flake (BCS) | 94.00 |
| 205 | Grayware jar sherd (ING) | 94.04 |
| 206 | Possible ground stone fragment (OMS) | 93.97 |
| 207 | Flake (BCS) | 94.07 |
| 208 | Bone awl (large medium artiodactyl rib) (NHB) | 94.06 |
| 209 | Flake (BCS) | 93.91 |
| 210 | Two flakes (BCS) | 94.03 |
| 211 | Ceramic object (OCA) | 94.02 |
| 212 | Two flakes (BCS) | 94.01 |
| 213 | Four flakes (BCS) | 94.00 |
| 214 | Mesa Verde B/W bowl sherd) | 94.00 |
| 215 | Flake (BCS) | 94.00 |
| 216 | Late B/W jar sherd (LBW) | 94.01 |
| 217 | Late B/W jar sherd (LBW) | 93.99 |
| 218 | Turkey bone awl (NHB) | 93.94 |
| 219 | Turkey bone (NHB) | 93.93 |
| 220 | Rabbit bone cluster – *Sylvilagus* (NHB) | 93.93 |
| 221 | Conglomerate slab metate (SME) | 94.01 |
| 222 | Tree-ring sample (TRE) | 93.97 |
| 223 | Tree-ring sample (TRE) | 93.98 |
| 224 | Flake (BCS) | 93.97 |
| 225 | Late white unpainted sherd (LWU) | 93.94 |
| 226 | Late white unpainted jar sherd (LWU) | 93.96 |
| 227 | Flake (BCS) | 93.94 |
| 228 | Core (COR) | 94.02 |
| 229 | Small modified sandstone fragment (OMS) | 93.95 |
| 230 | Turkey bone awl (NHB) | 94.02 |
| 231 | Late B/W bowl sherd (LBW) | 93.99 |
| 232 | Late B/W jar sherd (LBW) | 93.97 |

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|---|---|---|
| 233 | Mancos B/W jar sherd (MBW) | 93.97 |
| 234 | Late B/W bowl sherd (LBW) | 93.96 |
| 235 | Modified stone – floor polisher? (OMS) | 93.95 |
| 236 | Late white unpainted jar sherd (LWU) | 94.05 |
| 237 | Animal bone (NHB) | 94.05 |
| 238 | Small slab metate – lapstone? (SME) | 93.92 |
| 239 | Sandstone abrader (ABR) | 94.00 |
| 240 | Late white unpainted jar sherd (LWU) | 94.05 |
| 241 | Cluster of two corrugated jar sherds (2CRG | 94.04 |
| 242 | Modified turkey bone (OMB) | 94.08 |
| 243 | Flake (BCS) | 94.05 |
| 244 | Late white unpainted bowl sherd (LWU) | 94.05 |
| 245 | Flake (BCS) | 94.06 |
| 246 | Late white unpainted jar sherd (LWU) | 94.08 |
| 247 | Sandstone abrader (ABR) | 94.09 |
| 248 | Pueblo III B/W bowl sherd (HBW) | 93.98 |
| 249 | Late white unpainted sherd (LWU) | 94.00 |
| 250 | Flake (BCS) | 93.98 |
| 251 | Corrugated jar sherd (CRG) | 93.98 |
| 252 | Cluster of two corrugated jar sherds (CRG) | 93.98 |
| 253 | Corrugated jar sherd (CRG) | 93.93 |
| 254 | Flake (BCS) | 93.95 |
| 255 | Flake (BCS) | 93.92 |
| 256 | Core (COR) | 93.98 |
| 257 | Pueblo III B/W bowl sherd (HBW) | 93.92 |
| 258 | Utilized chert (UST) | 93.95 |
| 259 | Cluster of two rabbit bones – *Lepus* (NHB) | 93.99 |
| 260 | Sandstone abrader (ABR) | 94.04 |
| 261 | Modified sandstone fragment (OMS) | 93.98 |
| 262 | Modified sandstone fragment (OMS) | 93.95 |
| 263 | Two-and mano (TMA) | 93.96 |
| 264 | Two-and mano – conjoins with PL 265 (TMA) | 93.93 |
| 265 | Two-and mano – conjoins with PL 264 (TMA) | 93.92 |
| 266 | Polishing stone (POS) | 93.92 |
| 267 | Bird bone awl tip (NHB) | 93.93 |
| 268 | Small ceramic disk (OCA) | 93.91 |
| 269 | Flake (BCS) | 93.97 |
| 270 | Mesa Verde B/W bowl sherd (VBW) | 93.94 |
| 271 | Sandstone disk (STD) | 94.01 |
| 272 | Medium artiodactyl bone awl (NHB) | 94.07 |
| 273 | Pueblo III B/W bowl sherd (HBW) | 93.95 |
| 274 | Slab metate – 2 conjoinable pieces (SME) | 93.95 |
| 275 | Pueblo III B/W bowl sherd (HBW) | 93.99 |
| 276 | Flake (BCS) | 93.88 |
| 277 | Side-notched nonlocal chert projectile point – Surface 2 (POP) | 94.00 |
| 278 | Flake (BCS) | 94.89 |
| 279 | Turkey bone awl (NHB) | 93.91 |
| 280 | Sandstone rock with ground depression inset into Surface 1 (OMS) | 93.98 |
| 281 | Pueblo III B/W jar sherd rim – part of sipapu (HBW) | 93.99 |
| 282 | Flotation sample from sipapu fill (FLOT) | 93.99 |
| 283 | Plant sample (VEG) | N/A |
| 284 | Tree-ring sample (TRE) | N/A |
| 285 | Two-hand mano (TMA) | N/A |
| 286 | Human bone fragment(HUB) | N/A |
| 287 | Human bone fragment (HUB) | N/A |

Appendix A: Green Lizard Point-Located Artifact Tables – Structure 3.

| PL # | Description | Elevation |
|---|---|---|
| 1 | Late B/W ladle fragment (LBW) | 97.59 |
| 2 | Cluster of 23 corrugated jar sherds (CRG) | 97.56 |
| 3 | Cluster of 6 corrugated jar sherds (CRG) | 97.53 |
| 4 | Cluster of 2 corrugated jar sherds (CRG) | 97.53 |
| 5 | Modified conglomerate fragment (OMS) | 97.49 |
| 6 | Flake (BCS) | 97.52 |
| 7 | Modified sandstone (OMS) | 97.49 |
| 8 | Sandstone abrader (ABR) | 97.51 |
| 9 | Modified sandstone cluster (OMS) | 97.50 |
| 10 | Modified sandstone (OMS) | 97.50 |
| 11 | Cluster of 5 corrugated jar sherds (CRG) | 97.47 |
| 12 | Corrugated jar sherd (CRG) | 97.47 |
| 13 | Corrugated jar rim sherd (CRG) | 97.48 |
| 14 | Cluster of 9 corrugated jar sherds (CRG) | 97.50 |
| 15 | Utilized sandstone (UST) | 97.49 |
| 16 | Corrugated jar sherd (CRG) | 97.51 |
| 17 | Cluster of 2 corrugated jar sherds (CRG) | 97.52 |
| 18 | Cluster of 4 corrugated jar sherds (CRG) | 97.47 |
| 19 | Cluster of 2 corrugated jar sherds (CRG) | 97.49 |
| 20 | Sandstone abrader (ABR) | 97.51 |
| 21 | Cluster of 6 corrugated jar sherds (CRG) | 97.53 |
| 22 | Corrugated jar sherd (CRG) | 97.52 |
| 23 | Corrugated jar sherd (CRG) | 97.51 |
| 24 | Corrugated jar sherd (CRG) | 97.52 |
| 25 | Late B/W jar sherd (LBW) | 97.52 |
| 26 | Cluster of 2 corrugated jar sherds (CRG) | 97.51 |
| 27 | Cluster of 6 corrugated jar sherds (CRG) | 97.54 |
| 28 | Untempered clay (MIN) | 97.49 |
| 29 | Untempered clay (MIN) | 97.51 |
| 30 | Micro-archaeological sample | — |
| 31 | Microarchaeological sample (upper control) | — |
| 32 | Corrugated jar sherd (CRG) | 97.60 |

Appendix A: Green Lizard Point-Located Artifact Tables – Structure 4.

| PL # | Description | Elevation |
|---|---|---|
| 1 | Cluster of 13 corrugated jar sherds (CRG) | 97.54 |
| 2 | Corrugated jar sherd (CRG) | 97.56 |
| 3 | Corrugated jar sherd (CRG) | 94.55 |
| 4 | Corrugated jar sherd (CRG) | 97.56 |
| 5 | Cluster of 2 corrugated jar sherds (CRG) | 97.56 |
| 6 | Corrugated jar sherd (CRG) | 97.55 |
| 7 | Corrugated jar sherd (CRG) | 97.54 |
| 8 | Corrugated jar sherd (CRG) | 97.54 |
| 9 | Late white unpainted bowl sherd (LWU) | 97.54 |
| 10 | Corrugated jar sherd (CRG) | 97.54 |
| 11 | Flake fragment (BCS) | — |
| 12 | Modified Flake (MOF) | 97.57 |
| 13 | Late white unpainted bowl sherd (LWU) | 97.57 |
| 14 | Corrugated jar sherd (CRG) | 97.53 |
| 15 | Corrugated jar sherd (CRG) | 97.53 |
| 16 | Complete core (COR) | 97.53 |
| 17 | Late white unpainted bowl rim sherd (LWU) | 97.53 |
| 18 | Corrugated jar sherd (CRG) | 97.53 |
| 19 | Corrugated jar sherd (CRG) | 97.53 |
| 20 | Corrugated jar sherd (CRG) | 97.56 |
| 21 | Corrugated jar sherd (CRG) | 97.53 |
| 22 | Cluster of 6 corrugated jar sherds (CRG) | 97.56 |
| 23 | Flake (BCS) | 97.55 |
| 24 | Cluster of sherds – 3 CRG jar sherds; 1 LWU rim sherd | 97.55 |
| 25 | Mineral sample (MIN) | 97.55 |
| 26 | Cluster of 26 sherds – 25 CRG jar sherds; 1 LWU rim sherd | 97.52 |
| 27 | Flake (BCS) | 97.54 |
| 28 | Utilized flake (EDGD) | 97.54 |
| 29 | Mesa Verde B/W bowl sherd (VBW) | 97.52 |
| 30 | Flake cluster – 1 flake (BCS) and 1 utilized flake (EDGD) | 97.52 |
| 31 | Flake (BCS) | 97.52 |
| 32 | Cluster of 3 corrugated jar sherds (CRG) | 97.58 |
| 33 | Flake (BCS) | 97.53 |
| 34 | Cluster of 4 corrugated jar sherds (CRG) | 97.53 |
| 35 | Utilized flake (EDGD) | 97.55 |
| 36 | Untempered clay (CER) | 97.52 |
| 37 | Modified sandstone (OMS) | 97.52 |
| 38 | Modified sandstone (OMS) | 97.54 |
| 39 | Utilized sandstone (UST) | 97.54 |
| 40 | Sandstone abrader (ABR) | 97.55 |
| 41 | Sandstone abrader (ABR) | 97.56 |
| 42 | Peckingstone (PEK) | 97.52 |
| 43 | Utilized sandstone (UST) | 97.56 |
| 44 | Two-hand mano fragment – conjoins with PL #45 (TMA) | 97.53 |
| 45 | Two-hand mano fragment – conjoins with PL #44 (TMA) | 97.53 |
| 46 | Two hand mano (TMA) | 97.52 |

Appendix A: Green Lizard Point-Located Artifact Tables – Structure 6.

| PL # | Description | Elevation |
|---|---|---|
| 1 | Sandstone door slab – not shown on PL map (OMS) | 97.96 |
| 2 | 54 flakes – 53 of Dakota quartzite; 1 of unknown stone (BCS) | 97.78 |
| 3 | Flake – Dakota quartzite (BCS) | 97.75 |
| 4 | Flake – Dakota quartzite (BCS) | 97.74 |
| 5 | Flake – Dakota quartzite (BCS) | 97.75 |
| 6 | 3 flakes – 1 Morrison quartzite; 2 Dakota quartzite (BCS) | 97.70 |
| 7 | Flake – Dakota quartzite (BCS) | 97.70 |
| 8 | Flake fragment – Dakota quartzite (BCS) | 97.71 |
| 9 | Flake fragment – Dakota quartzite (BCS) | 97.72 |
| 10 | Flake fragment – Dakota quartzite (BCS) | 97.74 |

Structure 7.

| PL # | Description | Elevation |
|---|---|---|
| 1 | Turkey bone (NHB) | 97.43 |
| 2 | Cluster of 2 corrugated jar sherds (CRG) | 97.45 |

Structure12.

| PL # | Description | Elevation |
|---|---|---|
| 1 | Corrugated jar rim sherd (CRG) | 97.27 |
| 2 | Tree-ring sample (TRE) | 97.29 |
| 3 | Corrugated jar rim sherd (CRG) | 97.30 |
| 4 | Cluster of two B/W bowl sherds – one is Mancos B/W, one is LBW | 97.30 |
| 5 | Late Black/W bowl sherd (LBW) | 97.27 |
| 6 | Corrugated jar sherd (CRG) | 97.26 |
| 7 | 21 B/W sherds refit to Vessel 3, Mancos B/W bowl (MBW) | 97.27 |
| 8 | Other modified stone with shaped margins — mano? (OMS) | 97.27 |
| 9 | Late B/W bowl sherd (LBW) | 97.27 |
| 10 | Corrugated jar sherd (CRG) | 97.23 |
| 11 | Late B/W bowl sherd – refit to Vessel 3 (LBW) | 97.28 |

Appendix B: Green Lizard Artifact Tables by Study Unit.

| ARTIFACT TYPE | ARB 1 | ARB 2 | ARB 3 | ARB 4 | ARB 5 | ARB 6 | ARB 7 | ARB 8 | ARB 9 | GEN 0 |
|---|---|---|---|---|---|---|---|---|---|---|
| Abrader | 1 | 11 | | | | | | | | 3 |
| Adobe | | 1 | | | | | | | | |
| Awl | | | | | | | | | | |
| Chipped Stone (Debitage) | 158 | 366 | 13 | 33 | 23 | 39 | 4 | 4 | 2 | 278 |
| Bead | | | | | | | | | | |
| Biface | 1 | 2 | | | 1 | | | | | |
| Ceramics | 106 | 1229 | | 90 | 8 | | 16 | 1 | 6 | 166 |
| Core | 3 | 7 | | 2 | | | | | | 1 |
| Chip Stone Tool (Other) | | 3 | | | | | | | | |
| Cylinder | | | | | | | | | | |
| Drill | | | | | | | | | | |
| Eggshell | | | | | | | | | | |
| Gizzard Stone | | 1 | | | 1 | | | | | |
| Hammerstone | | 1 | | | | | | | | |
| Human Bone | | | | | | | | | | |
| Maul | | | | | | | | | | |
| Mano | | | | | | | | | | |
| Modified Cobble | | | | | | | | | | |
| Metate | | | | | | | | | | |
| Mineral Sample | 1 | 4 | | | | | | | 1 | 1 |
| Modified Core | | | | | | | | | | |
| Modified Flake | 2 | 4 | | 1 | 2 | | | | 1 | 1 |
| Modified Sherd | 2 | 10 | | 4 | | | | | | 2 |
| Nonhuman Bone | | | | | | | | | | |
| Other Ceramic Artifact | | | | | | | | | | |
| One-hand Mano | | | | | | | | | | |
| Other Modified Bone | | 2 | | | | | | | | |
| Other Modified Mineral | | 1 | | | | | | | | |
| Other Modified Stone | 1 | 17 | | | | | | | | 2 |
| Other Modified Vegetal | | | | | | | | | | |
| Peckingstone | 3 | 16 | | | | | | | 1 | 1 |
| Pendant | | | | | | | | | | |
| Polishing/Hammerstone | | | | | | | | | | |
| Projectile Point | 1 | 1 | | 1 | | | | | | |
| Polishing Stone | | | | | | | | | | |
| Petroglyph | | | | | | | | | | |
| Ring | | | | | | | | | | |
| Single-bitted Axe | | | | | | | | | | |
| Scraper | | | | | | | | | | |
| Shell | | | | | | | | | | |
| Shaped Sherd | | | | | | | | | | |
| Slab Metate | | 1 | | | | | | | | |
| Stone Disk | | | | | | | | | | |
| Two-hand Mano | 1 | 2 | | | | | | | | |
| Tube | | | | | | | | | | |
| Unmodified Cobble | | | | | | | | | | |
| Vegetal Sample | 3 | 4 | | | | | | | | 5 |

Appendix B: Green Lizard Artifact Tables by Study Unit (continued).

| ARTIFACT TYPE | GEN 1 | NST 1 | NST 2 | STR 1 | STR 2 | STR 3 | STR 4 | STR 5 | STR 6 | STR 7 |
|---|---|---|---|---|---|---|---|---|---|---|
| Abrader | 2 | 48 | | 37 | | 3 | 6 | | | |
| Adobe | | 3 | | 34 | | | 1 | | | |
| Awl | | 48 | | 63 | | 1 | | | | |
| Chipped Stone (Debitage) | 1 | 3585 | 4 | 1395 | 111 | 57 | 72 | 42 | 186 | 37 |
| Bead | | | | 1 | | | | | | |
| Biface | | 11 | | 4 | | 1 | | | | |
| Ceramics | 2 | 5344 | 1 | 2396 | 371 | 198 | 172 | 38 | 12 | 24 |
| Core | 1 | 41 | | 10 | 1 | | 2 | | | |
| Chip Stone Tool (Other) | | 9 | | 1 | | | | | | |
| Cylinder | | 1 | | | | | | | | |
| Drill | | 2 | | 3 | | | | | | 1 |
| Eggshell | | 15 | | | | | | | | |
| Gizzard Stone | | 5 | | 5 | | | | | | 1 |
| Hammerstone | | 2 | | 1 | | | | | | |
| Human Bone | | | | 11 | | | | | | |
| Maul | | 1 | | | | | | | | |
| Mano | | 1 | | | | | | | | |
| Modified Cobble | | 1 | | | | | | | | |
| Metate | | | | 1 | | | | | | |
| Mineral Sample | | 31 | | 19 | 1 | 4 | 6 | 1 | 2 | |
| Modified Core | | 1 | | | | | | | | |
| Modified Flake | | 53 | | 12 | 2 | 1 | 2 | | | 2 |
| Modified Sherd | | 52 | | 12 | 6 | 1 | 1 | | | 1 |
| Nonhuman Bone | | 2825 | | 837 | 13 | 6 | 6 | | 1 | 1 |
| Other Ceramic Artifact | | 2 | | 2 | | | | | | |
| One-hand Mano | | | | 1 | | | | | | |
| Other Modified Bone | | 61 | | 24 | | | | | | |
| Other Modified Mineral | | 7 | | 3 | | | | | | |
| Other Modified Stone | 4 | 70 | | 27 | | 6 | 2 | 1 | | 2 |
| Other Modified Vegetal | | | | 1 | | | | | | |
| Peckingstone | 3 | 28 | | 9 | 1 | 1 | 1 | | | |
| Pendant | | 4 | | 2 | | 1 | | | | |
| Polishing/Hammerstone | | 1 | | 3 | | | | | | |
| Projectile Point | 1 | 6 | | 4 | 1 | | 1 | 1 | | |
| Polishing Stone | | 1 | | 5 | | | | | | |
| Petroglyph | | | | 1 | | | | | | |
| Ring | | 1 | | | | | | | | |
| Single-bitted Axe | | | | 1 | | | | | | |
| Scraper | | 1 | | | | | | | | |
| Shell | | 3 | | 4 | | | | | | |
| Shaped Sherd | | 1 | | 2 | | | | | | |
| Slab Metate | | | | 9 | | | | | | |
| Stone Disk | | | | 1 | | | | | | |
| Two-hand Mano | 1 | 12 | | 18 | | | 1 | | 1 | |
| Tube | | 1 | | | | | | | | |
| Unmodified Cobble | | | | | | | | | | |
| Vegetal Sample | 1 | 95 | | 75 | 1 | 7 | 6 | | | 2 |

Appendix B: Green Lizard Artifact Tables by Study Unit (continued).

| ARTIFACT TYPE | STR 8 | STR 9 | STR 10 | STR 11 | STR 12 | STR 13 | SITE TOTAL |
|---|---|---|---|---|---|---|---|
| Abrader | 26 | 4 | 7 | | | 15 | 163 |
| Adobe | | | | | | 3 | 42 |
| Awl | 5 | | | | | 3 | 120 |
| Chipped Stone (Debitage) | 549 | 30 | 135 | 22 | 24 | 318 | 7488 |
| Bead | | | | | | | 1 |
| Biface | 4 | | 1 | | | | 25 |
| Ceramics | 1442 | 54 | 307 | 22 | 56 | 647 | 12738 |
| Core | 19 | | 3 | | | 14 | 104 |
| Chip Stone Tool (Other) | 1 | | 2 | | | | 16 |
| Cylinder | | | | | | | 1 |
| Drill | | | | | | | 6 |
| Eggshell | | | | | | | 15 |
| Gizzard Stone | | | | | | | 13 |
| Hammerstone | | | | | | | 4 |
| Human Bone | | | 3 | | | | 14 |
| Maul | | | | | | | 1 |
| Mano | | | | | | | 1 |
| Modified Cobble | 2 | | | | | 1 | 4 |
| Metate | | | | | | | 1 |
| Mineral Sample | 5 | 2 | | | 1 | 9 | 88 |
| Modified Core | | | | | | | 1 |
| Modified Flake | 14 | | 2 | | | 10 | 109 |
| Modified Sherd | 18 | 2 | 6 | | | 15 | 132 |
| Nonhuman Bone | 72 | 3 | 28 | | | 23 | 3815 |
| Other Ceramic Artifact | | | | | | | 4 |
| One-hand Mano | | | | | | | 1 |
| Other Modified Bone | 7 | | 2 | | | 2 | 98 |
| Other Modified Mineral | 1 | | | | 1 | | 13 |
| Other Modified Stone | 9 | 1 | 4 | | 1 | 11 | 158 |
| Other Modified Vegetal | | | | | | | 1 |
| Peckingstone | 18 | 1 | 8 | | | 20 | 111 |
| Pendant | 1 | | 1 | | | 1 | 10 |
| Polishing/Hammerstone | 1 | | 1 | | | 2 | 8 |
| Projectile Point | 1 | | | | 1 | 7 | 26 |
| Polishing Stone | 2 | | 1 | | | 2 | 11 |
| Petroglyph | | | | | | | 1 |
| Ring | | | | | | | 1 |
| Single-bitted Axe | | | 1 | | | | 2 |
| Scraper (Bone) | | | | | | | 1 |
| Shell | | | | | | | 7 |
| Shaped Sherd | 1 | | 1 | | | 1 | 6 |
| Slab Metate | 3 | | | | | 1 | 14 |
| Stone Disk | | | | | | | 1 |
| Two-hand Mano | 4 | | 1 | | | 3 | 44 |
| Tube | | | | | | | 1 |
| Unmodified Cobble | | | 1 | | | | 1 |
| Vegetal | 11 | 3 | 8 | | 2 | 12 | 235 |