CHIMNEY ROCK, AN ELEVENTH CENTURY CHACOAN GREAT HOUSE: EXPORT, EMULATION, OR SOMETHNG ELSE?

by

BRENDA KAYE TODD

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M.A., University of Colorado, 2005

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written by Brenda Kaye Todd
has been approved for the Department of Anthropology

____
Stephen H. Lekson

____
Catherine M. Cameron

____
Douglas B. Bamforth

____
Arthur A. Joyce

____
Gregory B. Johnson

____
Timothy R. Pauketat

Date_______________

The final copy of this thesis has been examined by the signatories, and we
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Todd, Brenda Kaye (Ph.D. Department of Anthropology)

Chimney Rock, an Eleventh Century Chacoan Great House: Export, Emulation, or Something Else?

Thesis directed by Professor Stephen H. Lekson.

This dissertation asks the question: was Chimney Rock Great House an “export” or an “emulation” of Chaco Canyon? This question – a classic formulation in Chacoan studies, is addressed by a controlled comparison of specific variables of the architecture and ceramic assemblages from Chimney Rock Great House, Pueblo Alto in Chaco Canyon, and the Bluff Great House in Utah. Each Great House is compared to an associated, smaller community site (29SJ 627 in Chaco Canyon, the Ravine Site near Chimney Rock, and the Corral Canyon Site near Bluff) to determine if there are significant differences in architectural traits or ceramic assemblages warranting their designation as disparate site types (Great House vs. community site). Ceramics at the six sites are compared for ware category, vessel form, and temper type. Results of the ceramic analysis indicate that sites outside of Chaco Canyon obtained the bulk of ceramics locally, but that Great Houses had access to similar trade networks as sites located in Chaco, and to more exotic goods than smaller sites. Architecture at each of the six sites was investigated for a suite of Chacoan architectural characteristics (Great House; formality in layout and design of the Great House; Great Kiva and specific floor features associated with Great Kivas; Chacoan roads; earthen architecture; Chacoan round rooms; formal plaza), room sizes are compared, the scale of construction events are compared, and architectural histories explored. Results of the architectural analysis indicate that Chaco-era sites are variable, but that there is a distinct difference between Great House sites and small sites. The conventional methodology of

the “export vs. emulation” framework is critiqued and alternative approaches that may be better suited to explore the diversity documented in the Chacoan World are presented. These approaches include investigating the rare components of artifact assemblages, considering the architectural history of buildings, and looking at relationships between political capitals and provinces in other prehistoric civilizations as possible models for interaction in the Chaco World.

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Any mistakes or omissions are solely my own and are unintentional.

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CHAPTER I

INTRODUCTION

This investigation of the relationship between Chimney Rock and Chaco Canyon began with a widely used framework for studying Chacoan Great House "outliers:" export vs. emulation (Cameron 2008; Reed 2008; Van Dyke 1999). The research was inspired by a technological approach to style, and assumed a complex Chacoan System (Lekson 1999, 2009; Lekson et al. 2006). Through the course of research, it became clear that, while useful for establishing baseline site categories, the export vs. emulation framework may not encompass the range of behaviors and strategies deployed by Chacoan and non-Chacoan groups; and the technological approach to style may not be appropriate for understanding a Chacoan World that was likely multi-cultural, hierarchical, and dynamic over a period of several centuries.

Chapter I describes the problem investigated in this dissertation and situates it in its intellectual context. The difficulties of dealing with distance and interpretations of Chaco and its "outliers" are summarized and discussed. Chapter II recounts archaeological concepts of style and explores the confusing and sometimes contradictory relationship between material culture and personal and group identity. Chapter III provides an overview of the six sites – paired Great Houses and associated "normal" houses – included in this study, focusing on the Chimney Rock Great House in southern Colorado, 150 km from Chaco Canyon. Chapter IV uses an approach inspired by technological style to investigate the architecture of each site for a suite of Chacoan traits, and moves beyond the typical checklist or inventory approach to the problem with a comparison of room size and a comparison of the scale of construction events. Chapter V, also inspired by a technological approach to style, investigates ceramics by comparing ratios of ware, vessel form, and temper type at each site. Recognizing that coarse-grained investigations of entire assemblages may mask relationships between people and places, the more rare and unique components of the ceramic assemblages are identified and discussed. Chapter VI answers the question, “What was Chimney Rock?” and suggests some possible interpretations of the site, its origins, and relationship to Chaco Canyon and the local community. Chapter VII summarizes and concludes the dissertation, offering alternative approaches to the export vs. emulation dichotomy recognizing variation and nuanced conceptions of identity.

THE PROBLEM

Was Chimney Rock Great House (5AA83) in southwestern Colorado an export (colony) or a local emulation of Chaco Canyon? This question – a classic formulation in Chacoan studies (Cameron 2008; Reed 2008; Van Dyke 1999), is addressed by comparing specific variables of the architecture and ceramic assemblages from Chimney Rock Great House, Pueblo Alto in Chaco Canyon, and the Bluff Great House in Utah (Figure 1). Each Great House is also compared to an associated, smaller community site (29SJ 627 in Chaco Canyon, the Ravine Site near Chimney Rock, and the Corral Canyon Site near Bluff) to determine if there are significant differences in architectural traits or ceramic assemblages warranting their designation as disparate site types (Great House vs. community site). Pueblo Alto, as one of the accepted and the most recently excavated Chaco Canyon Great House, serves as a benchmark of Chacoan ceramic assemblages and architectural patterns. The Bluff Great House, also recently excavated and reported (Cameron 2008) provides a useful third Great House assemblage to assess the degree of similarity between the Chimney Rock and Pueblo Alto collections (See Chapter III for a description of each site and the rationale for its inclusion). This analysis operates under the assumption that sites that are exports of Chaco Canyon will share certain low visibility architectural and artifactual traits with the Canyon, while those that are simply local copies will appear "Chacoan" in obvious ways, but differ in low visibility traits.

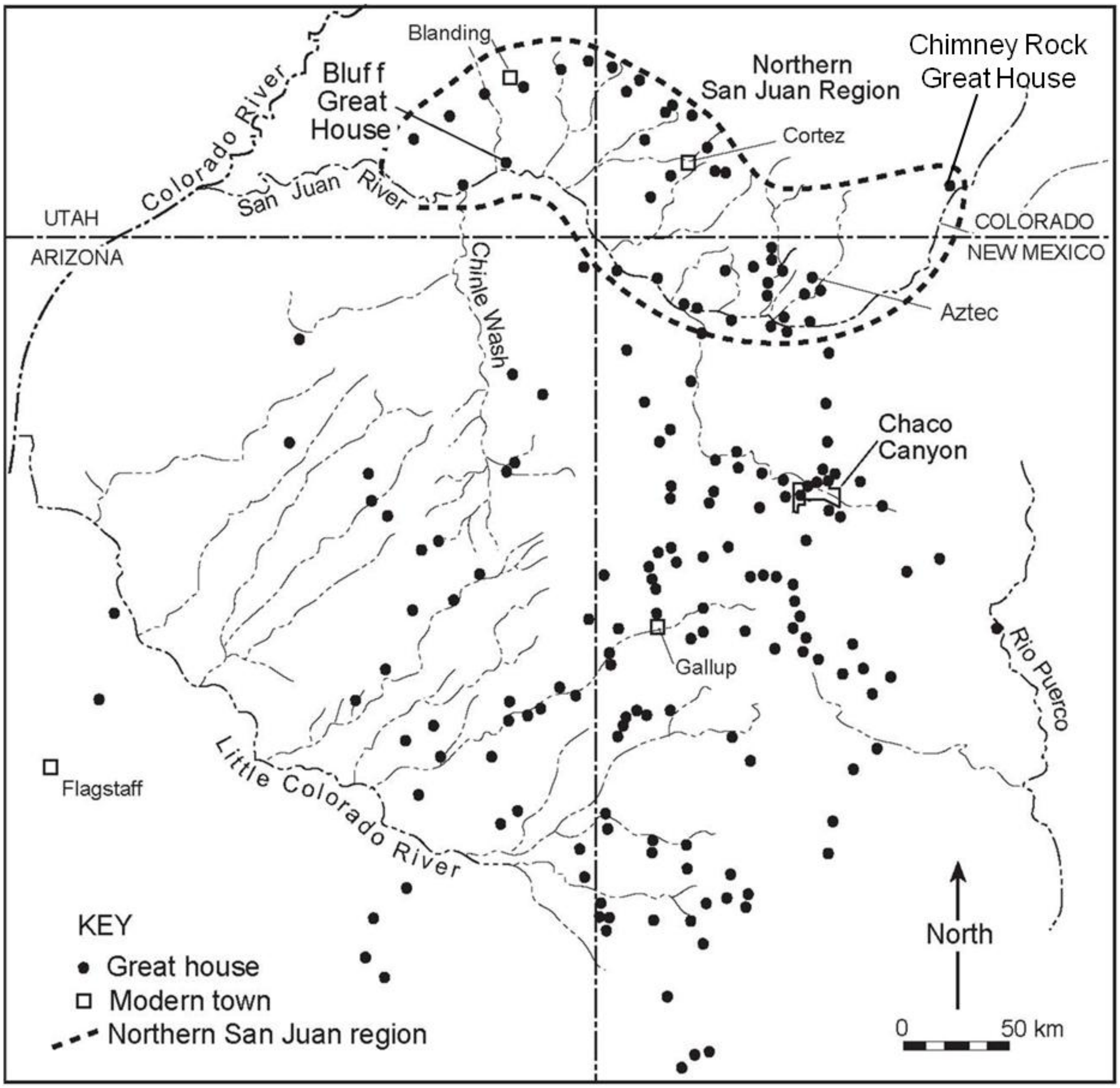


Figure 1. Regional map showing Chaco Canyon, Chimney Rock Great House and Bluff Great House. Small sites examined in this dissertation are located near each Great House. Adapted from Cameron (2008: Figure 1.1).

A related component of this dissertation examines the utility of the export vs. emulation dichotomy for understanding prehistoric political organization. Is export vs. emulation an appropriate framework with which to address the Chaco World? The identification of sites as exports (or colonies) of Chaco or as emulations (copies) of Chaco may be useful baseline categories for understanding variation in the connections between outlying sites and Chaco, but the ways that these types of sites are identified are potentially problematic, and categorization does not go far enough. Why was a Chacoan colony established in a particular location? Why did local leaders make the choice to emulate Chacoan architecture and artifacts? Were these reasons economic, political, religious, or a combination of these factors?

If Chaco were a hierarchically organized regional system, it is reasonable to expect ceramics and architecture at sites situated at different levels of power and influence to reflect functional differences. Specifically, in a hierarchically organized system, Pueblo Alto may be different from Chimney Rock and Bluff, but Bluff and Chimney Rock may be more similar to one another than either is to Pueblo Alto or to the small sites examined in this investigation. The Chaco System developed over a period of several centuries. Therefore, there is no quintessential moment represented by architecture and ceramics that defines Chaco and can be used as a standard that other candidate components of the Chaco System must reach.

Finally, it is important to carefully consider the types of evidence examined and the desired object of study. It is possible that the export vs. emulation framework as traditionally used by Southwest archaeologists tracks social or ethnic groups rather than political influence. In sum, the strict application of the export vs. emulation framework does not allow for the variability that would result from the factors described above. A post-structuralist approach that embraces more complex conceptions of identity, practice, and agency may prove a viable way to improve the basic export vs. emulation framework in the Chaco World. An examination of the rare and unique artifacts and architectural features may also provide an avenue to get at prehistoric connections that larger and coarser grained analyses do not. These and other issues are carefully considered through an examination of six sites, three Great Houses and three small sites, in this dissertation.

The relationship between outlying settlements and political capitals and between contemporary prehistoric cities and settlements in general has been an enduring question in archaeology. In the southwest, researchers have not reached a consensus on the intensity or structure of the relationships between outlying Great Houses and Chaco Canyon. This problem has been most often addressed by utilizing a dichotomous either/or model of relationship based on the concept of the export of people, technology, and ideas directly from Chaco Canyon; or an emulation of Chacoan technology and ideas by indigenous residents. This approach has yielded varying levels of success. The study of outliers and their relationships to Chaco Canyon remains in its early stages due to a lack of excavation data from outlying Great Houses and the fact that many outliers that have been examined had significant post-Chaco occupation that complicate solid analysis of Chaco-era activities. However, outliers have recently received increasing attention with the work of Reed, ed. (2006; 2008) to evaluate Aztec Ruins and Salmon Ruins in relation to Chaco, Cameron's (2008) study of the Bluff Great House in Utah; Duff and Lekson's (2006) examination of Chacoan communities located south of Chaco Canyon; Kintigh's (2003) examination of Great House architecture, communities, and function; and Van Dyke's assessment of architectural variation and relationship in Chacoan Great Houses (1999; 2003).

This dissertation contributes to this discourse with new excavation data from the Chimney Rock Great House (5AA83) in southwestern Colorado. Chimney Rock Great House has been called the “Ultimate Outlier” (Malville, ed. 2004) and is an ideal site for examining the relationship between outliers and Chaco Canyon because there is no Post-Chaco era use of the site.

The remainder of this chapter situates the current project within its intellectual context. First, the problem of distance and relationship, including a brief description of the development of the field of archaeology and the ways in which this history has impacted the scale and scope of archaeological inquiry in general are described. Next, the past century of work at Chaco Canyon is summarized to provide a background for the evaluation of Chimney Rock Great House. Then, outlying Great Houses, their function, and interpretations are discussed.

The Difficulty of Distance and the Challenge Of Complexity

Explaining the relationships and impacts of distance in prehistory has long been a challenge in the field of archaeology. How far is too far between settlements or civilizations for ideological or cosmological connections to exist? How far is too far for meaningful interaction? How far is too far for effective political governance? How far is too far for economic exchange? The list of questions goes on. There is no single answer that can be applied to each of these questions because each involves fundamentally different scales and components of human experience. For example, ideology may have roots deep in history and is often passed to future generations orally, through daily practice and observances, and further dispersed through intermarriage and migration. Both everyday and infrequent interactions between people may constitute meaningful relationships and identity formation, albeit at different scales. Direct oversight by a political entity may or may not be possible depending upon the development of technology and infrastructure. And, the scale of effective economic exchange is likely determined by which particular commodity is being exchanged. For example, there is a finite distance that foodstuffs can be traded in a tumpline economy (Lightfoot 1979, but see N. Malville 2001), but prestige goods like copper bells and macaws might travel much greater distances.

It is undeniable that explaining these differing scales and intensities of interaction in prehistory is challenging, but archaeologists in the United States have tended to limit the possibilities of ancient interaction and engagement with distant peoples, places, and ideas. Archaeologists, just like all human beings, in the past or present, construct understandings and knowledge of the world based upon cultural, intellectual and historical filters. Perhaps this tendency to take a limited perspective on the abilities and knowledge of prehistoric people is a reflection both of our own limited knowledge and understanding of the archaeological record and a result of the history of the development of the field of archaeology in general.

Lekson (2009) and Pauketat (2004; 2007) trace this tendency to "downsize" and limit the possible accomplishments and complexity of prehistoric Native people to the very inception of archaeology as a discipline. For Lekson (2009:34), Lewis Henry Morgan, sometimes considered to be the "Father of American Anthropology", played the most prominent role in establishing the precedent of understanding prehistoric societies as simplistic. Morgan believed that societies evolved through various stages, beginning with savagery, then barbarism, and then finally civilization with multiple intermediate levels associated with each stage. According to Morgan, societies in the New World never progressed far enough along this ladder of civilization to have states, empires, or otherwise complex political systems (Lekson 2009:34). Morgan was a very influential and formative thinker in Southwestern archaeology, and his ideas continue to underlie much research and interpretation today.

In the eastern United States, the “Moundbuilder Myth,” or the idea that the ancestors of the Native People who inhabited North America at the time of the arrival of Europeans could not have been capable of constructing the hundreds of earthen pyramids that dot the Mississippian landscape, continues to color the ways that archaeologists interpret prehistory. Pauketat (2004:3) notes that this ideology is racist, “But it lives wherever archaeologists understate the cultural achievements or de-emphasize the historical importance of First Nations peoples.” This downsizing of the past is evident in the language used to describe ancient Cahokia. For example, rather than rightly calling Cahokia a city, it has been called a ‘ceremonial center’, ‘chiefdom’, or a ‘town-and-mound’ complex (Pauketat 2004:3). These limited perspectives of the past continue to be propagated into future generations of archaeologists and American citizens, with Cahokia being mentioned in high school and college texts only since the 1980s. Not only has the colonial legacy of the marginalization and disenfranchisement of Native Peoples impacted archaeological interpretations, but it has also led to a practice of the complete destruction of archaeological and historical sites throughout the midcontinent and elsewhere (Pauketat 2004:174).

The “New Archaeology” of the 1960s and 1970s, while contributing tremendously to the methodology and practice of archaeology, also played an important and far-reaching role in the institutionalization of narrowly focused archaeological studies. The New Archaeology was developed in response to the previous decades of cultural-historical explanations dominated by descriptions of migrations and diffusions. The proponents of the New Archaeology movement, led by Lewis Binford, contended that these types of explanations were not sufficient and sought to transform archaeology into a science that could contribute to the field of Anthropology in a more concrete and scientific way (Binford 1962; 1964). To accomplish this transformation, hypotheses, typically concerning the ways in which humans adapt to their environments, were tested in “natural laboratories.” These “natural laboratories” were often only the size of a river drainage or valley; if a larger area was to be investigated, elaborate random sampling techniques were employed (Lekson 2009:110-111). This research was dominated by academic institutions and produced a generation of PhDs. Some of the most influential of these scientific studies include Hill’s (1970) study of Broken K. Pueblo, Longacre’s (1970) study of Carter Ranch Pueblo, and Plog’s (1974) The Study of Prehistoric Change.

While heavily shaped by ideals of the “New Archaeology” and the subsequent processual archaeology, Cultural Resource Management (CRM) has, by necessity, broadened the scope of research in the United States. CRM has also spurred a close examination of research design and the ways in which CRM archaeology augments the formerly academically dominated sphere of research (Goodyear et al. 1978). The passage of CRM laws in the 1960s and 1970s resulted in the completion of large projects and the influx of mountains of data. Despite the fact that these CRM projects were much larger in scope than the previous academically driven research, it soon became clear that these undertakings were still only small parts of the overall picture of southwestern archaeology. Partly in response to this realization, beginning in the 1980s, several large-scale syntheses of CRM data were completed in the southwest. A few of the most noteworthy of these included the Dolores Archaeological Program: Final Synthetic Report (Breternitz et al. 1986), A View from Black Mesa: The Changing Face of Archaeology (Gumerman 1984), and People of the Mesa: The Archaeology of Black Mesa, Arizona (Powell and Gumerman 1987). CRM firms continue to complete the majority of archaeological research in the southwest and have expanded and augmented our understanding of the prehistory of many areas of the United States (Green and Doershuk 1998).

It is indeed difficult to grasp the archaeology of a region, or of several regions, sufficiently to make connections between the ebbs and flows of prehistoric societies in different geographical areas. Modern state and international lines have played an important role in perpetuating this limited perspective on the past. With each state having its own university or two and its own historic preservation laws to comply with, researchers have understandably focused their efforts closer to home, thereby bounding the past within the confines of modern state and international borders and regulatory requirements. However, as more data is collected and archaeological theory continues to develop, this myopic view of the past is shifting. It is now very apparent that systems like Chaco cannot be understood without a broader perspective on prehistory.

A trend encouraging large scale studies and understandings of archaeological regions and connections between regions is beginning to emerge. At a recent Society for American Archaeology Symposium entitled “Whither Southwest Archaeology?” participants urged researchers toward meta-narratives, large scale histories, and more accessible ways of communicating with the public. In this vein, Lekson (2009:13) critiques the age old archaeological value of ‘sticking close to the data,’ and urges researchers to avoid parsimony, unless evaluating competing answers when all else is equal, and give ancient peoples and societies their due recognition. Lekson states, “… ‘the data’ represent a small sample of a site that represents a small sample of a society’s material remains that represent a tiny and indirect sample of its range of people, actions and events – what actually happened in the ancient Southwest.” Therefore, the simplest, the most parsimonious, interpretations based upon our necessarily very limited data sets almost certainly misrepresent the reality of the past. Indeed, the ideas upon which early simplistic interpretations of prehistory were originally based, the

Moundbuilder Myth, Natives as simple savages, etc, that linger in archaeological work in the present simply perpetuate “antique, racist notions about Native America” (Lekson 2009:14).

This dissertation is intended to contribute to this movement by working under the premise that the intellectual history of the field of archaeology has effectively served to limit our ability to understand prehistoric people. In an effort to move beyond this glass ceiling on prehistoric complexity, this research utilizes, critically evaluates, and provides alternative perspectives on the most frequently used framework for understanding distance, complexity, and connection in the Chaco System: export vs. emulation.

A Century of Interpretation at Chaco Canyon

To contextualize this study on the relationship of Chimney Rock to Chaco Canyon, the following paragraphs provide a brief overview of the chronology and past century of archaeological interpretations of Chaco Canyon. The development of these theories through time mirrors the brief discussion on distance and relationship in the preceding paragraphs by moving from canyon-centered perspectives to larger regional perspectives as the existence of an extensive system of outliers was recognized.

Chaco Canyon is located in the heart of the San Juan Basin in northwest New Mexico. Chaco’s putative region encompasses approximately 40,000 square km and extends into bordering parts of Colorado, Arizona and Utah. The canyon was the site of an unprecedented Puebloan cultural florescence between A.D. 850 and 1150. The nature and extent of this system are contentious and debated (see Lekson, ed. 2006 and Mills 2002 for examples and discussion of different perspectives on Chaco). The largest and archetypical Great Houses are located in a 2 km area of Chaco Canyon often referred to as “downtown” Chaco (Lekson 2006:9). A “Chaco

Halo" has been proposed for Great House communities within a radius of between 8.5 and 15 km from the canyon (Doyel et al.1984; Lekson 2006). Lekson (2009:132) extends the boundaries of the Chaco World, stating that there are "undeniable outliers" at about 140-150 km radius from Chaco; further, that sites including Owen's Site at the head of Grand Gulch and Aragon in the Mogollon Highlands, at 240-250 km radius from Chaco are indeed Great Houses and should be considered part of the Chaco System.

The chronology of developments within Chaco Canyon has been broken down into three phases accepted by most Southwesternists: the Early Bonito phase (850-1040 A.D.), the Classic Bonito phase (1040-1100 A.D.), and the Late Bonito phase (1100-1140 A.D) (Lekson 2006:6). In the mid-800s, or the Early Bonito phase, inhabitants of Chaco Canyon began to construct Great Houses, an architectural form never seen before in the region. These "Great Houses" were differentiated from other puebloan constructions based on their possession of one or more of the following features: larger relative building size, greater labor investment, multistoried construction, symmetry of layout, large-scale foundation units that indicate planning, core and veneer masonry, and banded masonry (Mills 2002:89-90; Judge 1991:27-28). Between A.D. 1040 and 1100, the Classic Bonito phase, isolated great kivas and formally constructed trash mounds became a component of the Chacoan architectural repertoire (Judge 1991:25). In the early A.D. 1100s, or the Late Bonito phase, Great House construction slowed considerably, and only very small-scale additions and remodeling projects were carried out on existing Great Houses. The architects of the canyon began to build a new kind of Great House, more compact and efficiently constructed, labeled "McElmo" by Vivian and Mathews (1965). Large building projects outside of Chaco Canyon proper were also underway during the Bonito phase. These communities are known as "Chacoan Outliers" and are typically made up of a Great House surrounded by smaller pueblo structures, and often have associated great kivas and roads (Marshall et al. 1979:331; Powers et al. 1983; Kantner and Mahoney 2003; Lekson 2006:14, Van Dyke 1999). Chimney Rock Great House appears to be one of these large building projects.

After about A.D. 1110, during the late Bonito Phase, almost all construction within Chaco Canyon ceased and quantities of finished goods filtering into the canyon decreased (Kantner 2004:127-128). Based on the fact that the last known cutting date is A.D. 1132, some argue that Chaco Canyon was largely depopulated by A.D. 1140 (Judge 1991:27). A.D. 1150 is often accepted as the end of the identifiable "Chaco Phenomenon." The canyon was devoid of inhabitants at the end of the 12th century, and then reoccupied during the A.D. 1200s. Then, like the rest of the Four-Corners region, Chaco was abandoned by the beginning of the 14th century (Cameron and Toll 2001:10).

Early interpretations of Chaco Canyon relied heavily upon ethnographic accounts of the present day Pueblo peoples of New Mexico and Arizona. Using ethnographic analogies, Chaco was understood as egalitarian and largely non-hierarchical. One of the quintessential examples of this type of explanation is that of Gwinn Vivian (1970, 1991). Vivian (1991:58) explains the Great House/small site dichotomy observed in the Canyon by arguing that Chaco was composed of "two essentially egalitarian sociopolitical systems with roots in two cultural traditions, the Cibola and the San Juan." Small house communities were representative of the Cibolan cultural group and were organized by lineage. Conversely, Great Houses represented the San Juan cultural tradition and were organized by a "specialized sequential hierarchy founded on the principle of dualism" (Vivian 1991:58). The origin of the idea of two cultural groups inhabiting Chaco Canyon can be traced to Clyde Kluckhohn in the first half of the twentieth century (1939). The concept of multiple cultural groups was further developed by Gordon Vivian (Vivian and

Matthews 1965) who interpreted the various types of architecture in the canyon (Bonito Style Great House, small sites or Hosta Butte, and McElmo or late Great House) to represent three distinct groups of people.

Up until the 1980s, some explanations of Chaco Canyon were based upon direct colonization by Mesoamericans (Di Peso 1968, 1974; Kelley and Kelley 1975; Hayes 1981). Specifically, in the 1960s and 1970s, some researchers argued that a class of long-distance traders, akin to the *pochteca* of Aztec society, had created Chaco. Frisbie (1978) and Reyman (1978) suggested that the elaborate burials at Pueblo Bonito were the physical remains of Mesoamericans who oversaw the Chacoan component of a long distance trade network. These arguments were primarily derived from the concentration of impressive architecture at Chaco and on the presence of macaws and copper bells of Mesoamerican origin found in the canyon (Sebastian 1992:82, Cordell 1997:324).

As awareness of the two hundred plus Chaco outliers grew (Powers et al. 1983; Marshall et al. 1979), understandings of Chaco expanded outside the canyon. To explain the increasingly recognized extent of the Chaco World, the canyon and its outliers were interpreted as a redistributive economy. Judge (1979) argued that the Great Houses in the canyon were located at the mouths of drainages to oversee agricultural activities in these relatively more productive locales. Large, featureless rooms in Great Houses would have been used for the storage of agricultural surplus. Outliers were located in areas that were advantageous in terms of resources in one way or another. In this scenario, Chaco was considered a place where goods, especially corn, were imported from locations experiencing better conditions and then distributed to those locations that were struggling. Roads were used to facilitate transport of goods into the canyon and ceremony functioned to regulate this redistribution. Judge (1989) later modified his argument to a “Pilgrimage Fair Model”, placing Chaco as a center for turquoise manufacture and distribution and as a central place for communal ritual. Malville and Malville (2001) develop this theory further, proposing that pilgrimages and festivals were major factors in Chaco’s spatial cohesion, rendering political power, administrative control and military coercion unnecessary.

Interpretations of Chaco Canyon in the 1980s were dominated by the utilization of Service’s (1962) typology of band, tribe, chiefdom, and state or Fried’s (1967) typology of egalitarian, ranked, stratified, and state societies. For example, Earle (2001:32) categorizes the Chaco World as “a staple-finance” (corporate) chiefdom based on control over intensive agriculture with a region marked symbolically by the extent of the road system and focused on the monumental Great Houses.” Sebastian (1992:40) remarks that most of these neo-evolutionary arguments are based on the premise that “The observed complexity of the Chaco system was an attempt to deal with the harsh, arid, and uncertain environment of the San Juan Basin through socio-cultural means.” Further, “the suggested mechanism in most of these models was a redistributive economy in which Chaco Canyon served as the administrative center” (Sebastian 1992:40).

A few archaeologists have argued that Chaco was a state. Wilcox (1993:84) proposes that Chaco was a simple state with its administrative headquarters located either at Pueblo Bonito or Chetro Ketl. Territorial chiefs stationed at the outliers would have paid Chacoan leaders tribute. LeBlanc (1999) sees Chaco as a complex, centralized society that was state-like in organization. Lekson (2009) claims not that Chaco was a primary state, but rather that it was a third or fourth generation "secondary" state, reflecting Mesoamerican and Northern Mexican states. Lekson claims that Chaco had kings, and was moving towards population growth, long distance exchange and militarism. Lekson’s, Le Blanc’s, and Wilcox’s reconstructions interpret Great

Houses as the homes/palaces of elites and see the Canyon exercising power over the region via economic and military means.

Other scholars don't believe that Chaco was a state, but do argue for hierarchical organization. For example, based upon the burials found at Pueblo Bonito, Akins (2003:94) states "the people who occupied Chaco Canyon a millennium ago were hierarchically organized – that is, their society was based on an ascribed status hierarchy." And, the people who lived at Pueblo Bonito were "hereditary leaders who controlled access to ritual knowledge and paraphernalia, and it was a place where both public and non-public ceremonies were performed" (Akins 2003:106). Mathien (2003:139) agrees with Akins' interpretation of a hierarchically organized society, stating "Chaco Canyon's prehispanic residents were ancestral to several historic Pueblo groups, but organizational complexity as evidenced by mortuary practices, was much greater among the prehispanic Chacoans than among any of their descendants."

Since the 1980s, some archaeologists have grown increasingly uncomfortable with neo-evolutionary trajectories that attempt to place Chaco Canyon in a category of societal type and have sought alternative ways of exploring political complexity in non-state societies (Mills 2002:77; Nelson 1995). "Especially important is the decoupling of scale, centralization, and hierarchy, and the varying emphasis placed on the role of human agency in understanding how sociopolitical complexity arises" (Mills 2002:77). Some argue that "archaeological patterns corresponding to systems of ranked kin, hereditary leaders, and centralized redistribution are not recognized" at Chaco Canyon (Fish 1999:45). More recently, Sebastian (2006:411) urges that archaeologists move away from neo-evolutionary explanations and look instead to "the broad range of societies that exhibit institutional differences in social, political, and economic power, but bear little resemblance to the stereotypical chiefdom. Specifically, Sebastian suggests that archaeologists consider Sub-Saharan Africa as a potential analogue for the organization of Chaco Canyon because many mid-level societies exhibiting a wide range of organizational diversity have been documented in this region of the world (2006:412).

Along these lines, researchers have begun to seek alternative labels and explanations. For example, several non-Southwestern archaeologists argue that Chaco was a ritual center. Renfrew (2001:14-15) calls Chaco "a location of high devotional expression" where the "production and consumption of goods is to be understood in the context of the ideational/devotional significance of the Great Houses and great kivas of Chaco and of the periodic visits made to them for devotional purposes." Renfrew (2001:15) claims that analogies for this concept include the Ring of Brogar and Stones of Stennes in the Orkney Islands of Scotland, the *image ahu* of Easter Island, medieval pilgrimages to the Church or St. James of Compostella, other Roman Catholic pilgrimage centers, and the Olympic games. Finally, Yoffee (2001; 2005:170) calls Chaco a "rituality" wherein the "fundamental component of the existence of Chaco and of the Chacoan network was its elaborate ceremonial apparatus" Van Dyke (2004:413) agrees that Chaco was a "center for ritual and pilgrimage for communities in the San Juan Basin and perhaps beyond" during the eleventh century. Other less specific, although neo-evolutionary, labels for Chaco include "middle-range societies," "sedentary pre-state societies," "intermediate level societies," and "societies with moderately developed hierarchies" (Neitzel 2003a:143).

More recent archaeological work acknowledges connections on a continental scale, but does not attribute the Chaco Phenomenon to Mesoamerican origins. Nelson (2006:340) states, "synchronicities suggest that the growth of the Chaco Canyon center was indeed stimulated by a cycle originating in Mesoamerica." The cycle that Nelson is referring to is the expansion of the frontier of Mexico between 500 and 700 A.D. Nelson (2006:341) explicitly rejects the idea of domination by intruders, but argues that Chacoan elites used Mesoamerican objects to legitimize their power and status.

Archaeologists working together on the Chaco Capstone Conference In October 2002 were unable to come to an agreement on the level of hierarchy present at Chaco Canyon, but determined that if there ever was hierarchical organization, it would have been "in the Chaco/Aztec axis between A.D. 1040 and 1130" (Sebastian 2006:403). Leaders would have gained power through ritual knowledge, performance, and events. Coercion was probably not used as an avenue of power prior to A.D. 1080, but there was disagreement among participants as to its role after that time. There is unquestionable evidence of violence north of the San Juan River in the A.D. 1100s and 1200s (Sebastian 2006:403-404).

All of these attempts to understand Chaco Canyon have been valuable and have contributed to overall knowledge about the organization of the polity. However each is situated in the intellectual context of its time, does not adequately allow for diversity, and leaves room for improvement. Most of the preceding explanations are situated comfortably within Morgan's established paradigm of political simplicity in the Americas. The interpretation of Chaco Canyon as an egalitarian, peaceful society was couched in the ethnographic accounts of the modern day pueblos. This interpretation ignored evidence that the prehistoric puebloan society located in Chaco Canyon was much different, more hierarchical, and potentially more violent world than that of the modern day pueblo peoples. Explanations for Chaco that attributed the complexity present in the canyon to Mesoamerican interlopers played into the racist ideology that the ancestors of modern day Pueblos living in the Southwest could never have been advanced enough to create Chaco. The majority of other explanations for Chaco attempt to label and categorize the society as a "chiefdom," a "state," a rituality, etc. by basically utilizing a "checklist" approach. This dissertation is less concerned with labeling Chaco, or any other society for that matter, and more focused upon addressing and developing theoretical approaches for understanding the relationships between contemporary components of larger communities and political systems of varying scales.

Chaco and Communities outside the Canyon

Defining the traits that constitute a Chacoan community has proven to be difficult and, like much else concerning Chaco, has inspired much disagreement and debate. The variability among Chacoan outliers is the shared component of most of these debates on the essence of "outlierness."

The similarities between structures within Chaco Canyon and those scattered throughout the San Juan Basin were noted by explorers and archaeologists in the late part of the 19th and early 20th centuries. Lewis Henry Morgan observed similarities in the architecture and the sites of the San Juan Basin, specifically Aztec Ruins, and Chaco Canyon (Morgan 1881). T. Mitchell Prudden (1903) noted a connection between Chaco Canyon and Salmon Ruins. J.A. Jeancon, the first archaeologist to work at Chimney Rock Great House in southwestern Colorado, stated that the imposing nature of the site and fine masonry was quite similar to that observed in Chaco Canyon (Jeancon 1922: 14, 16).

While the similarities between sites scattered throughout the San Juan Basin and beyond and Chaco Canyon has been noted for over a century, determining precisely which sites should and should not be considered Chacoan outliers has proved to be no easy task. Archaeologists have worked on and debated this problem for decades, and continue to do so today. Surveys conducted by Marshall et al. (1979) and Powers et al. (1983) were the first concerted efforts towards teasing out the nature and extent of Chacoan outliers. *The Outlier Survey* (Powers et al. 1983) was undertaken both to survey actual communities on the ground and to review the literature in an attempt to identify other possible outliers. The study intensively surveyed three outliers and compiled data culled from the literature on 33 others, resulting in a greater recognition for the scope of the Chacoan World and the development of more concrete definitions of outlier communities. Powers et al. (1983) presented a somewhat conflicting methodology for identifying outliers. On one hand, since many potential outliers are unexcavated, Powers et al. (1983:308) did not advocate for a strict set of criteria for the identification of these sites as Chacoan structures. Instead, if a structure was significantly greater in size relative to structures in the local community, it could be categorized as an outlier. On the other hand, if a site was not drastically larger than contemporary structures in the local community, it could be considered to be an outlier based upon a "strong complex of morphological and architectural attributes known to be distinctive of Chacoan structures" – essentially, a checklist (Powers et al. 1983:308). Lekson (1991:36) more recently reiterated the relative approach to indentifying Great Houses by noting that a Great House is a "significantly bigger bump" than contemporary bumps in the area.

The goal for Marshall et al's (1979:11) survey of the San Juan Basin was to "generate a consistent set of criteria to characterize Chacoan Anasazi communities." They created a checklist for identifying Chacoan structures that included: evidence of planning, wide walls made of core-and-veneer masonry, blocked in kivas, occasionally tower kivas, great kivas, and roads (Marshall et al. 1979:15-16). Marshall et al. (1979:337) also provide a functional definition for Chacoan outliers – that they were public structures, including a Great House, Great

Kiva, and smaller domiciles; required communal effort to construct; and were used in ways that involved the larger community. Jeffrey Altschul (1978) also contributed to this early conversation of the nature of interaction in the Chaco World by identifying an "interaction sphere." In Altschul's interpretation, the Chacoan system is attributed to a standardized cultural response to stress, and not to diffusion from one or two cultural centers.

More recently, Kintigh (2003:97; also Kantner and Kintigh 2006:155) has defined an outlier as a 'Chacoan architectural complex' which is "an archaeological site, or portion thereof, that consists of a cluster of distinctive architectural features (including one or more Great Houses, great kivas, earthworks, and roads) that exhibit a strong affinity to those same features found in Chaco Canyon. Therefore, an outlier just must exhibit an "affinity" to the architectural features located in the canyon. While useful, this definition provides ample opportunity for debating the inclusion or exclusion of many different sites in the category of "outlier."

The Great House component of Kintigh's definition of a Chacoan architectural complex has been the most often privileged factor for the inclusion of a site in the category of Chacoan outlier. Great houses, at least within the canyon, are identified as being "unusually imposing pueblo structures, with fine, often banded, core and veneer masonry, multiple stories or exceptional single story height, and oversized rooms" (Kintigh 2003:98). Great houses are also often associated with great kivas, encircling berms, or roads (Kintigh 2003:98). This particular suite of architectural characteristics is termed Bonito-style architecture (Gladwin 1945; Van Dyke 2003a:118; Vivian and Matthews 1965).

Building on Kintigh (2003), Van Dyke (2003a:118) states that each outlier "must minimally contain a Bonito style Great House," and that often there are one or more great kivas, earthworks, roads, and a surrounding community. Further, while the prevalence of Bonito-style architecture makes it possible to identify Great Houses across the landscape, these Great Houses are characterized by diversity in their shape, size, and elevation (Van Dyke 2003:118). In accordance with Van Dyke's work, participants in the Chaco World conference agreed that if a site was to be considered an outlier it needed to have "a reasonably distinctive Great House contemporaneous with comparable features found in Chaco Canyon " (Kantner and Kintigh 2006:155). While some outliers are fairly obvious, others inspire much debate.

Outlier Communities

Outlying Great Houses do not typically exist in isolation, and are usually associated with a surrounding community of smaller residential structures. However, Powers et al. (1983:14) do note that some outliers do not appear to have a local community. Defining communities in prehistory is not without its difficulties, but Varien (1999:19) provides a reasonable definition of community as "many households that live close to one another, have regular face-to-face interaction, and share use of local social and natural resources." Adding the concept of reproductive stability to this definition Mahoney (2000:27) has argued that outlying Great Houses may serve to integrate different components of the local residential community within about a 7-8 km radius. In this scenario, the Great House functions as an integrative mechanism to maintain the 475 individual population level (derived from Wobst 1975) necessary for reproductive stability. Mahoney (2000:20) limits the integrative capacity of the Great House to a 7-8 km radius, based on the maximum distance that agriculturalists engaging in extensive farming typically travel to tend to their fields. At distances beyond 7-8 km, Mahoney contends that people would not be able to have the face-to-face interaction necessary to be considered a community under Varien's definition. Most Chacoan communities were apparently not reproductively stable (Mahoney 2000). Approaching the concept of community utilizing the 475 person benchmark described above is problematic. Kintigh (2003) notes that 475 individuals is the high end of the range of individuals, as defined by Wobst (1975), that is necessary for reproductive stability. By utilizing Wobst's (1975) lower range of seventy five to two hundred people necessary for reproductive stability, the number of Great House clusters that can be considered as communities increase significantly (Kintigh 2003). Further, even if there were not enough individuals for long term reproductive stability, the consequences of insufficient mating pools would not have been recognized in the span the several generations that most Great House communities were extant (Kintigh 2003; Kantner and Kintigh 2006:156). Wilcox expands Mahoney's 7-8 km range for effective community interaction to 18 km. Wilcox (1993:81, 1996:243-246) contends that communities, and their requisite face-to-face interaction, could be maintained if people were able to visit the Great House and return home within a single day. Extrapolating from Drennan (1984), Wilcox determines that 36 km is a reasonable distance for a person to travel round trip in one day.

Gilpin (2003) notes that Chaco-era settlement clusters were at least thirty times as densely packed as the surrounding area. While this aggregation may have been driven by availability of resources, people chose to aggregate where they did purposefully and membership of that particular group must have been meaningful (Kantner and Kintigh 2006). Van Dyke (2003b) presents a more expansive definition of community, stating that individuals may have imagined their communities to be larger than the immediate landscape. Public features (Great Houses) in the midst of residential structures would have focused attention and identity locally. Individuals would have interacted with those living closer to them more frequently, but would have maintained social relationships at other scales. Based upon the definitions and critiques of "community" above, Kantner and Kintigh (2006:157) state that "spatially distinct clusters of habitations, with public infrastructure including Chacoan architectural complexes, as the basic community unit."

The Chaco World

As noted by many researchers (Marshall et al. 1979; Powers et al. 1983; Van Dyke 2003a), the elements of the Chacoan architectural complex do not always occur in cohesive units. Rather, combinations of Great Houses, great kivas, core and veneer masonry, blocked in kivas, roads, and earthworks vary temporally and geographically in their distribution across the landscape. Kantner and Kintigh (2006:159) observe that elements of the Chacoan architectural complex occur most frequently within the San Juan Basin closer to Chaco Canyon. Sites exhibiting traits less similar and more variable than those defined as Chacoan above are observed further away from the Canyon. To further complicate defining the boundaries of the Chaco World, the elements that characterize the Chacoan architectural complex are variable through time and space, even within the canyon. In essence, there is no single snapshot or moment in time that is quintessentially "Chaco." The architecture associated with the Chaco System is variable because that system was dynamic and developing over hundreds of years.

Kantner and Kintigh (2006:159) note that further research needs to be done to better understand the relationship of communities without Chacoan Great Houses to Chaco Canyon. Were these communities purposefully excluded or did they choose to resist? And, what role did outlying Great Houses without surrounding communities fulfill in the Chaco World? Kantner (1997) postulates that small outlying Great Houses without communities may have served as boundary markers along roads, and not as central ceremonial complexes.

Outlier Function and Origins

As noted by Durand (2003:143), the great diversity in outlying Great House history, form and location may necessitate multiple explanatory models that fit within the confines of both the individual outlier and the larger Chaco system. Early interpretations of Great Houses primarily postulated that the buildings had been used as residential structures. In the first half of the 20th century, these interpretations were confined to the Great Houses located within Chaco Canyon because the scale and extent of the Chaco World were not yet apparent. For example, Gladwin (1945) believed that the Great Houses and small sites were representative of a progression through time, and not that they were contemporary structures. Judd (1954:1) proposed that Pueblo Bonito was a "communal dwelling, the home of perhaps 1,000 people." More recently, Lekson (2006, 2009) has argued that Great Houses are actually palaces, the residences of the elite.

The low incidence of hearths (Windes 1984) and mealing bins (Windes 1987a), has been used to refute the argument that the Great Houses functioned primarily as residences. A similar pattern has been noted outside of the canyon at a Great House called Guadalupe Ruin. Here, a hearth and a masonry bin were found in only one of the ten Chaco era rooms excavated (Pippin 1987). In complementary research, Bernardini (1999) used the identification of residential suites as a method of determining population levels at Pueblo Bonito. Bernardini (1999) determines that Pueblo Bonito probably never housed more than twelve households, or about 70 people, and that during its height, the structure had more about two hundred none residential rooms. The size of the Great House is not a reflection of residential use, but of social and public use.

Great houses have also been postulated to be centers for redistribution (as in Judge 1979). In this scenario, food could be redirected to areas of the basin that had experienced crop shortfalls, and the large, empty rooms that characterize the canyon Great Houses could have been used for storage (Lekson 1984:271). Critics have cited two problems with this scenario. First, is the issue of distance. Some have claimed that foot transport of goods from outliers to the canyon would be inefficient (Lightfoot 1979). Second, is the paucity of evidence for the transport of goods out of Chaco Canyon and back to outlying communities (Mathien 1993; Powers et al. 1983). However, it is very possible that whatever "goods" were being transported to the outliers were something of a more esoteric and intangible nature and may not have been comprised of the pots and stones that archaeologists typically seek. Exciting new research involving the sourcing of corn (Benson et al. 2003) may shed further light on the movement of goods and redistribution in the Chaco system.

Finally, some archaeologists have looked to ritual/ceremony as the primary function of Great Houses. Stein and Lekson (1992) have postulated that the middens, roads, berms, and striking topographical locations could have made up a ritual landscape. Raised middens and berms could have been constructed in symbolic opposition to subterranean kivas and graded roads (Stein and Lekson 1992:97). Fowler and Stein (1992) see formal Chacoan roads not as utilitarian in nature but as "time bridges" to connect ritual structures built and in use at different times. Stein et al. (2007) present an intriguing reconstruction of the Chacoan ritual landscape at approximately A.D. 1130 – when Great House construction in the canyon had ceased. The reconstruction includes caves, roads, earthen architecture, the Chetro Ketl field (more on this in Chapter IV), among other more esoteric features that are components of the Chaco landscape. The unusually large rooms and numerous kivas in Great Houses would have been useful for ceremonial purposes, allowing housing and storage for pilgrims attending ritual events (Judge 1989).

The highest density of ritual paraphernalia from the Chaco System and time period has been recovered from Great Houses, most especially Pueblo Bonito, within Chaco Canyon (Mathien 2003; Neitzel 2003b). There are many fewer ritual objects recovered from outlying Great Houses (Durand 2003:149). This could be due to post-Chaco occupation of these structures, or that the outliers were not the intense foci of ritual activity that the Great Houses in downtown Chaco were. Since birds are still of religious importance to contemporary pueblo groups, Durand (2003:160) uses the relatively high frequency of avifauna , including scarlet macaws and raptors, recovered from Canyon Great Houses to bolster her contention that Great Houses were locations of frequent and intense ritual activity.

Whether or not Great Houses inside and outside the canyon were residences, centers for redistribution, or the loci of intense ritual activity, the question of the relationship between Chaco Canyon and outliers remains unresolved. Durand (2003) proposes that Renfrew and Cherry's (1986) model of peer-polity interaction may be useful for explaining this relationship. Peer-polity interaction has been used to explain relationships in polities that do not have clear dominant/subordinate relationships. Relationships between polities may take the form of competitive emulation where aspiring leaders engage in increasingly elaborate displays of wealth to bolster their position or status, or as symbolic entrainment whereby the symbolic system of a more advanced polity is adopted by less advanced polities in the region to increase local prestige (Renfrew 1986:8). In this way, competitive emulation would have occurred at some outliers, and symbolic entrainment at others (Durand 2003:161).

Van Dyke (1999) conducted a comparative study designed to address the impetus for the construction of outlying Great Houses and the nature of the relationships between these outlying communities and Chaco Canyon. The study was based on the premise that similarity in outlying

Great House form should be indicative of a Chacoan origin, and diversity in outlying Great House form would be indicative of local development. Van Dyke (1999) found that the evidence and results were ambiguous, indicating the need for a range of explanatory models, rather than a single, all-encompassing model explaining the relationships between outliers and Chaco Canyon. Further, "Chacoan" architecture encompasses a diverse range of traits and that the presence of Bonito-style architecture probably was related to community ritual and power issues. In essence, the Chacoan architectural complex may have spread widely throughout the southwest without the need for direct supervision by Chacoans.

Kantner (2003:218) contends that despite the stylistic similarities, particularly architectural characteristics, evident across the San Juan Basin and beyond that Chaco was not a system defined as 'a regularly interacting or interdependent group of items forming a unified whole.' If the Chaco world was not a system, then what form did the interaction that resulted in this similarity take? Kantner (2003) states that the characteristics that archaeologists have called "Chacoan" (Great House form, landscape features, Dogoszhi style pottery) first developed in the canyon, and then spread south to others with historical connections to individuals living within Chaco. From there, the Chacoan tradition spread geographically. Since the Chacoan culture developed first within the canyon, inhabitants of the canyon were able to use these practices to their advantage, with the canyon ultimately gaining great importance as a religious center (Kantner 2003:219).

Aspiring leaders outside of the canyon would have adopted a ready-made Chacoan ideology and material culture repertoire as a means of building their own power and connecting themselves to the powerful individuals or institutions in the canyon (Kantner 2003:220). Kantner and Kintigh (2006:187) note that the appearance of outlying Great Houses corresponds with the movement of prestige goods, such as Narbona Pass chert. Visitors would have traveled to Chaco occasionally bearing gifts and providing labor. Roads were elaborated by participating communities to signal their ties with Chaco Canyon (Kantner 2003:220). Occasional large scale social events, larger social networks, and enhanced astronomical observations to augment farming schedules would have been among the benefits to those outlying communities who chose to participate (Kantner and Kintigh 2006:186). The level and nature of interaction between Chaco and outlying settlements would not have been monolithic. Communities within the San Juan Basin and the surrounding highlands were likely interacting with Chaco somewhat regularly, while those communities further away were probably not interacting with Chaco at the same intensity (Kantner and Kintigh 2006:187). This explanation allows for the widespread prevalence of Chacoan characteristics across the landscape, but does not require hegemonic Chacoan oversight.

Subsequent Chapters

The following chapter describes the theoretical background of the export vs. emulation construct that has been so frequently utilized to study the Chaco system. Next, research to date at the Chimney Rock Great House and a brief overview of the other five sites (Pueblo Alto, 29SJ 627, Ravine Site, Bluff Great House and Corral Canyon Site) is described. Subsequent chapters apply the export vs. emulation framework to architectural and ceramic data from Chimney Rock Great House and the other five study sites. The last two chapters offer interpretations of Chimney Rock Great House and dissertation conclusions. The ultimate goal of this exercise in comparison and contrast is to reveal insights that can be used across regions and to contribute to the development of theoretical approaches to understanding political complexity in prehistory.

Chapter II

Style in Archaeology

Stylistic similarities in architecture and artifacts have long been noted between Chaco Canyon and sites throughout the San Juan Basin (Chapter I). The relationship between these sites and Chaco Canyon has been much debated, and many archaeologists have attempted to develop an explanatory framework for all of the sites that "look" similar to Chaco. Most recently, these efforts fall into the category of attempts to determine if a site is an emulation (local copy) of Chaco, or an export (constructed by individuals from Chaco Canyon with detailed knowledge of Chacoan technology), for example Cameron (2008) and Reed (2008). Archaeologists have interpreted sites that are emulations as being constructed by locals, with no significant and certainly no political connection to Chaco Canyon. In this scenario, local community leaders associate themselves with Chaco in a superficial way and increase their own prestige and power by constructing buildings and using tools and pottery similar to those constructed and used in Chaco. Exports, on the other hand, have been conceptualized in a manner more akin to colonies. This interpretation posits that elites or priests from Chaco Canyon actually instigated and oversaw the construction of the outlying settlement. Chacoans may have chosen certain locations for their resource potential or for more esoteric reasons such as geological or astronomical significance. After the construction of the Great House, it would have likely been inhabited by Chacoan elites.

Export vs. Emulation: Theoretical Underpinnings

The use of the term “style” has been ubiquitous and pervasive in archaeology. From the inception of our science, the concept has been utilized to define artifact types, culture groups, and interactions between those groups. This term has been used in multiple ways, with some researchers defining their approach very specifically and others assuming a more general and seemingly intuitive understanding of just what style is and where in material culture it resides. In the 1960’s, Hans Georg Gadamer wrote, “the notion of style is one of the undiscussed, self-evident concepts upon which our historical consciousness is based” (Gadamer 1965: 466 as cited by Sauerlander 1983: 253).

In the subsequent decades, this “self-evident” concept has proven to be not quite so easily delineated. Much has been written regarding the utility of various definitions of the concept, but, there is little agreement upon what “style” exactly is. Regardless of how it has been defined, style, at its most basic, has most frequently been used in an attempt to get at the identities of the prehistoric people who are the object of archaeological study. Archaeologists have attempted to define style and which aspects of style are meaningful in an effort to tease apart ethnic groups, migrations, economics, state formation, and the boundaries of other types of social groups in prehistory.

A detailed discussion of the development, debate, and uses of style in attempts to define ethnicity in archaeology is particularly germane to the problem at hand. How exactly can we define just who was and who was not “Chacoan” in prehistory? What was “Bonito-style”? Was there a bounded entity of individuals who considered themselves to be a part of the Chaco World? Would this entity, if it existed, be equivalent to modern definitions of ethnicity? Style has often been used in efforts to identify ethnicity in archaeology and anthropology – this is discussed in upcoming sections of this chapter. If, as seems quite likely, Chaco was multi-ethnic and multi-lingual, can we even use the concept of style to define relationships between the canyon and the rest of the Chaco World? What kinds of material culture should be examined to elucidate these issues? What specific aspects of various material culture categories are relevant to the problem? Is there a certain quality or amount of similarity that can be defined when comparing a class of artifacts from different locations that is indicative of meaningful relationships between the two?

The emulation vs. export dichotomy is based upon the concept of "style" as related to the expression of individual and group identity in material culture and the assumption that there are real and meaningful answers to the questions above. The following pages include a discussion of ethnicity and archaeology, the development and changing use of the concept of style in efforts to investigate identity in archaeological contexts, a discussion of technological style (the basis for the emulation vs. export framework used in this dissertation) and finally, a critique of some of the ways that style has been applied and some alternative approaches to illuminating identity in the past. It is important to examine the intellectual development of the discipline of archaeology to better understand the resultant biases and limitations and to allow for the development of fresh perspectives on the past.

Ethnicity and Archaeology

Many scholars have described the concept of ethnicity, but perhaps the two most frequently cited definitions in the anthropological literature are those of Frederik Barth, a cultural anthropologist, and Siân Jones, an archaeologist. Barth (1969:10-11) defines 'ethnic group' in terms of four necessary components: First of all, an ethnic group "is largely biologically self-perpetuating;" it "shares fundamental cultural values, realized in overt unity in cultural forms;" it “makes up a field of communication and interaction;” and it “has a membership which identifies itself, and is identified by others, as constituting a category distinguishable from other categories of the same order.” As archaeologists, we should be able to determine the presence or absence, at least to a point, the first three components of Barth’s definition. However, the difficulty comes in the fourth stipulation. How can we determine if people in the past identified themselves as a distinguishable category?

Jones (1997:84) defines ethnicity in a similar way, saying, “Ethnic groups are culturally ascribed identity groups, which are based on the expression of real or assumed shared culture and common descent.” Jones draws upon Barth’s emphasis on self-ascription by her use of the terms “real or assumed shared culture and descent.” If an important component of ethnic identity hinges upon self-ascription, it begs the question of what archaeological methods are appropriate for the study of ethnicity in the past. Can archaeologists even “get at” ethnicity? Or, should we be setting our sights on identifying other types of group boundaries that are not defined by self-ascription? Although the study of style and identity is fraught by the issues raised above, judging from ongoing research utilizing style in an effort to define identity, archaeologists remain confident that the concept is useful and that much can be gained through its rigorous application.

Perhaps ethnicity is not the most appropriate focus of inquiry in Chaco World. Human identity is multi-faceted, situational, and complex. Based on the large areal extent of the Chaco System – encompassing the San Juan Basin and beyond – the diversity of architecture and material culture in this region, and the multiple language groups represented by modern Pueblos (descendants of the people who lived at Chaco), it is likely that Chaco, whatever Chaco was, was multi-ethnic and multi-lingual (see Kluckhohn 1939, Vivian and Mathews 1965; Vivian 1970, 1990; Windes et al. 2000 for some perspectives on this topic). Therefore, we should not expect to identify a homogenous ethnic signature in material culture from the San Juan Basin during the Chaco time period. And, this should not discount indications of complexity and connection between far flung outliers and the canyon proper. Rather, our inquiry should attempt to locate indications of other facets of peoples' identities, particularly their political and community affiliations.

Since archaeologists cannot ask those that we study about their ethnicities and identities, we must look to the material culture that these individuals leave behind. Throughout much of the history of archaeological inquiry, researchers have approached groups and boundaries in terms of style. While there have been many attempts to delineate style, Michelle Hegmon's (1992:517-518) definition of the concept as, "a way of doing things," and as something that involves a choice, conscious, or unconscious among alternatives has been widely adopted and provides a useful foundation for more detailed discussions and application of the concept in the following pages. Hegmon's definition of style as "a way of doing things," is akin to Bourdieu's (1977) concept of *habitus.* Bourdieu (1977:167) describes *habitus* as the subliminal generative schemes that humans reference unconsciously as they live their lives. These practices are shared by people from similar communities, families, ethnic groups, etc.

Studies of style can be divided into two broad categories. In North America, style is often approached as "formal variation as expressed in the goods of everyday life" (Stark 1998a: xvii). In Europe, approaches have been heavily influenced by French "*techniques et culture or technologie*" and focuses on the connection between cognition, technical choice, material culture patterning and identity (Stark 1998a: xvii). The two broad categories of stylistic studies are not mutually exclusive; the "formal variation expressed in the goods of everyday life" that is the focus in North America can be studied as part and parcel of cognition, technical, choice, material culture patterning and identity that is the focus of study in Europe. This dissertation is influenced by both approaches. First, the development and use of style in North America will be outlined, then that in Europe.

MATERIAL CULTURE STUDIES IN ARCHAEOLOGY

Quite logically, early archaeology was largely focused upon studies of material culture. Researchers attempted to make sense of the archaeological record by creating categories of like artifacts and building chronologies. Replicative studies of prehistoric technologies, such as lithics and ceramics, have their origins in the 18th century (Trigger 1989:61). These studies and efforts to organize the past proved to be the foundations for the delineation of bounded cultural entities later in the twentieth century.

During the era of archaeology commonly known as the "cultural-historical" period that dominated the field until approximately 1960, stylistic studies were aimed at identifying homologous similarities and at defining archaeological types. These types were created primarily in order to build chronologies (Conkey 1990:5), and to glean information about prehistoric social groups (Hegmon 1992:518). Decorative components (i.e. paint designs, ceramic shapes, etc.) of artifacts were most often used to create these categories. Approaching style from this perspective resulted in the artifacts and the patterns among and between them becoming the subjects of inquiry. Archaeologists began to label groups of people from the objects they left behind. The "Red on Buff Culture" in the Hohokam area of the American Southwest is an example of this practice (Conkey 1990:8). This approach results in intellectual and methodological confusion because style is then equated with social/historical entities, or takes on an autonomous role where the spread of artifacts is seen to cause cultural change. The practice of culture is equated with the production of cultural materials (Conkey 1990:8). In sum, this approach assumes that the temporal and geographical dispersal of an artifact type corresponds with the temporal and geographical extent of a society (MacEachern 1998:107).

A classic example of associating artifacts with groups of people is Emil Haury's "site-unit intrusion" at Point of Pines Pueblo in Arizona (Haury 1958, 1989). Haury identified evidence for a migration in traits of architectural features, ceramics, ritual practice and perishable artifacts. Haury describes the rigorous evidence he deems necessary to identify a migration in the pivotal *Evidence at Point of Pines for a Prehistoric Migration from Northern Arizona* (1958). Stone (2003:59) takes this a step further, postulating that the newcomers to Point of Pines were purposefully signaling their ethnic differences through ceramics and architecture. In this way, the sizable group of individuals who migrated to Point of Pines from elsewhere maintained pre-existing community structures and advertised their otherness to their newfound community through their architecture, ritual practices and use of distinct pottery and other perishable materials. This strategy of maintaining separateness from the pre-existing Point of Pines community ultimately resulted in a violent end for the immigrants (Stone 2003:62).

Style in the cultural-historical paradigm was also used in the creation of culture areas. Culture areas are defined as "geographic units characterized by similar languages, subsistence patterns, and material cultures" (Earle and Preucel 1987:503; Trigger 1989:299; also Willey and Sabloff 1993:87). Observed stylistic similarities within a culture area were used to define "traditions," that extend through time, and "horizons" that extend across space (Earle and Preucel 1987:503). Akin to the culture area concept is that of archaeological cultures – the concept that distinctive artifact assemblages were representative of ethnic groups (Trigger 1989:308).

Alfred L. Kroeber (1939:4) observed that culture areas were developed in the Americas when museums began to organize their material culture in terms of geographic region of origin rather than in terms of evolutionary sequences. According to Woods (1934:517), this approach was employed because the "comparatively uniform and undocumented mass of native New World culture almost necessitated a static, descriptive, approach such as the culture-area idea offered."

A.L. Kroeber published *Cultural and Natural Areas of Native North America* in 1939, noting that the most difficult component of mapping culture wholes is defining boundaries. He says:

> "Where the influences from two culture climaxes or foci meet in equal strength is where a line must be drawn, if boundaries are to be indicated at all. Yet it is just there that differences often are slight. To people classed as in separate areas yet adjoining each other along the inter-area boundary almost inevitably have much in common. It is probable that they normally have more traits in common with each other than with the focal points of their respective areas (1939:5)."

The American Southwest provides a prime example of early efforts to define culture areas. In the 1930s, Southwestern archaeologists attempted to assign order to the elements of material culture they were unearthing by grouping them into three cultural units: Mogollon, Anasazi, and Hohokam (Speth 1988:201). These culture units were further broken down into stages or time periods, known as the Pecos Classification or the alternative Gladwin Classification for the Hohokam region (Willey and Sabloff 1993:121-122). Both the Pecos and Gladwin classifications used skeletal characteristics, architecture, and ceramics to define various stages (Cordell 1997:166, 169). Also in the 1930's, Gladwin and Gladwin introduced a classification scheme meant to trace tribal histories through time. The scheme was built upon the foundation of various linguistic stocks. These linguistic stocks were then traced through time and space to increasingly specific roots, stems and branches (Gladwin and Gladwin 1934).

In the latter portion of the twentieth century, coming full circle with Kroeber's observations in 1939, some scholars began to question the utility of such cultural labels (Speth 1988, Wilcox 1988). Variations observed in material culture may be attributed to a number of things other than ethnicity – environment, available resources, local traditions, trade, gender etc. (Trigger 1989:309). In the Southwest, in particular, archaeologists discovered that there is no clear-cut way to define boundaries between different groups. Furthermore, boundaries defined by different criteria (i.e. architecture, pottery, etc.) do not coincide with one another (Neitzel 1994:213). According to Neitzel (1994:213), "These classificatory difficulties derive from the culture-area approach and its assumptions about discrete, homogenous cultures." Indeed, Neitzel (1994:209) notes a shift from the focus on culture areas to one on regional systems, or "the total social system at the level of interacting communities."

STYLE AND THE NEW ARCHAEOLOGY

The "New Archaeology" of the 1960s, among other things espoused a "general scientific approach that stressed explicitness of assumptions, problem-orientation and structures research strategies, hypothesis testing . . . , and a positivist philosophical position" (Willey and Phillips 1993:221). This revolutionary approach to the study of the past brought with it a critique of cultural historical efforts to classify material culture into culture areas (Binford 1965). Adherents of the New Archaeology viewed studies of ancient technologies as not valuable because they were not situated within an explanatory framework – changes in archaeological cultures needed to be examined in the framework of culture process (Trigger 1989:392).

The development of an explanatory framework for style was not a priority largely due to the influence of Lewis Binford, the pioneer of the New Archaeology. Following White (1949) Binford stated that technology was an "extrasomatic means of adaptation" (Binford 1965), and that societies had three subsystems that were reflected in material culture: technology, social organization, and ideology. Technomic aspects of material culture reflect how objects were used to cope with the environment, while sociotechnic aspects of objects reflect social context, and ideotechnic characteristics reflect ideology (Binford 1962, 1965). Style was residual after these three functional aspects of material culture have been identified (Binford 1972) and was effectively relegated to an unimportant, superfluous aspect of material culture.

As processual archaeologists turned their attention to explanation and to developing archaeology into a hard science, many material culture studies in the 1960s and 1970s were completed by scholars in other fields, such as art history and ethnology (e.g. Lechtman and Merrill 1977). The ethnoarchaeological studies completed by archaeologists (Hodder 1979; Longacre 1981) demonstrated that individuals frequently blurred boundaries between technology, function and style. The processual model that assumed that technical choices were governed by environmental factors was not observed among living groups.

Style as a Meaningful Component of Material Culture

Beginning in the 1970s, archaeologists became increasingly aware of and began to grapple with more complex and developed theories of ethnicity and identity. These theories were often rooted in ethnographic research.

Martin Wobst, adding style to each aspect of Binford's tripartite conception of material culture, posited that style was much more than simply a vehicle for the determination of typologies. Style was not merely an added on after thought; style had function, and this function was to transmit messages (Wobst 1977:317) concerning emotional state, personal identification, authorship and ownership, prescription and proscription, religion, and politics. Messages are discursively created in style (Wobst 1977:323). Stylistic messaging can lend to both social integration by summarizing an individual's economic, gender, class or other social situation, and to social differentiation, by allowing individuals to broadcast their uniqueness (Wobst 1977:327-328). There is no guarantee that the stylistic message of an item will vary from those in surrounding social groups. This possibility becomes less likely in cases of boundary maintenance and when an item carries a message that explicitly signals social group affiliation (Wobst 1977:329).

Wobst's work was important because it indicated that certain aspects of identity can be signaled through material culture and demonstrated that there was not a one to one relationship between such objects and personal or ethnic identity. Therefore, material culture can signal ethnicity differentially in various times and circumstances, so archaeologists must be wary when interpreting artifact assemblages as representative of bounded group entities.

Wobst evaluates his ideas with an ethnographic example from Eastern Europe. A few of his findings are detailed to further elucidate the previous discussion. In his study of Romanian folk-dress, Wobst found that area of residence was indicated by shirt cut or color. Village of residence could be discerned from the color and combination of motifs, and status, occupation, and family could be identified by quality and quantity of decoration and elaboration on other dress items (Wobst 1977: 337). These examples demonstrate that the most general message (area of residence) was expressed in the most simple and straightforward stylistic manner, through shirt cut or color. Through their clothing, individuals could signal the area of their home to strangers in a clear and unambiguous manner. As the messages become more directed, the stylistic signaling becomes increasingly subtle, as in the signaling of status through quantity and quality of decoration. These messages would have been directed to a target group that was encountered on a more frequent basis and in more intimate contexts.

In archaeological investigations like this dissertation, it may not be possible to investigate identity on the individual level like Wobst does in the example above, but it may be possible to identify stylistic aspects of artifacts and architecture that signal participation in the Chaco System. For example, a pattern (like architecture) that is identifiable throughout the San Juan Basin, may be a stylistic expression of political affiliation.

Polly Wiessner is well known for her research of style among hunter gatherer groups in South Africa. Much like Wobst (1977), Wiessner defines style as the "formal variation in material culture that transmits information about personal and social identity" (1983:256). Stylistic attributes are subject to selection and have the capability to confer adaptive advantages on its users (1983:256). Style is one of the means through which individuals can project aspects of their identities to others (Wiessner 1983:257).

According to Wiessner, two types of style need to be made explicit in archaeology: "emblemic," and "assertive." (Wiessner 1983:256-257). Emblemic style is "formal variation in material culture that has a distinct referent and transmits a clear message to a defined target population about conscious affiliation or identity" (Wiessner 1983:257). In contrast to Wobst (1977), Wiessner claims that emblemic style carries information about groups or boundaries but not about the degree of interaction within or between them. Through an examination of the distribution of elements of emblemic style, information about prescription and proscription can be identified. Since emblemic style carries a distinct message, it undergoes strong selection for both uniformity and for clarity. Because of its role in marking and maintaining boundaries, emblemic style can be distinguished archaeologically by the homogeneity within its realm of distribution. In sum, emblemic style should change gradually through time and undergo rapid change only when its referent changes or it is separated from that referent (Wiessner 1983:257).

Assertive style is defined as "formal variation in material culture which is personally based and carries information supporting individual identity" (Wiessner 1983:258). Assertive style can separate an individual from similar individuals by signaling membership in various groups. Assertive style has no distinct referent within the group and may be employed consciously or unconsciously by individuals in a society. Wiessner provides the example of San men wearing a variety of store-bought hats, and then giving them personal embellishments to concurrently signal connection to others who are "modern" and have access to cash, while maintaining their personal identities. This type of style should appear in the archaeological record with the origins of regular, delayed, and unbalanced reciprocal relationships (Wiessner 1983:258).

Since assertive style has no definite referent to the larger group and therefore possesses the potential to disseminate itself through the processes of enculturation and acculturation, it may provide an archaeological measure of interpersonal contact. Assertive style can complement emblemic style by giving a measure of contact between boundaries. For example, it may be very important for a group to identify itself in overtly emblemic ways, while individuals may employ assertive style to indicate connections that crosscut social groups at the same time. However, two key factors must be kept in mind when considering this role of assertive style. First of all, the researcher must consider the realm of function and suitability for carrying messages in an artifact, the ease of replication and complexity of design of an artifact, and density of artifacts containing style in a population (Wiessner 1983:258). Secondly, assertive style would be expected to have a different profile of change than emblemic style because it is not connected to a distinct referent. Observing this type of change in the archaeological record could provide information about socio-economic change (Wiessner 1983:259). Emblemic expressions of Chacoan identity are more relevant than assertive style in the context of this dissertation. It is likely to be difficult to untangle individual identities in the particular data sets examined here. Observed variation may be an expression of the agency of individuals to express themselves via assertive style as described by Wiessner (1983).

The dividing line between emblemic style and assertive style can often be unclear, and some items may display both types of style at once. Wiessner defines two approaches for deciding what items are appropriate to use for stylistic analyses. The first approach assumes that an item carries a stylistic message because it is one that is naturally important to social identity. The other approach involves defining the efficiency of an artifact for transmitting a certain type of message. Usually, the greater the number of transformative stages an artifact goes through, the greater its chances of bearing social information (Wiessner 1983:259). Additionally, the longer the lifetime of an item, the higher the probability that the artifact's message will reach others.

Wiessner operationalized her concepts of style in an ethnographic study of San projectile points. She found that projectile points were especially well suited for carrying messages pertaining to groups and boundaries because they are widespread and important socially, economically, politically, and symbolically. Projectile points also carried information about linguistic groupings (Wiessner 1983:272). Despite these positive results, Wiessner does note three difficulties. First of all, she found that style resided in a range of different characteristics of projectile points, including some that would be of functional importance. Second, it seemed that the choice of traits in which style was invested was more the result of historical events rather than any type of coherent principle. Third and finally, different projectile point traits often simultaneously carried multiple types of social information (Wiessner 1983:273).

Recent archaeological approaches to identity and boundaries through stylistic analyses have revealed inconsistencies in the relationship between material culture and identity. For example, John Wayne Janusek (2002) uses the concept of style to explore the nature of social boundaries and relations in multi-ethnic Tiwanaku. Janusek examines the 'style' of ceramic assemblages and compares it to many other elements of everyday residential life, including space, status, craft, diet, and mortuary ritual (2002:36). The term 'style,' is never concretely defined, but it appears Janusek uses style as an all-encompassing concept, describing both the form and the overall decoration of ceramic assemblages with the term.

Despite the fact that a considerable amount of research (Wobst 1977, Wiessner 1983) supports the claim that material style plays an active role in social interaction, Janusek (2002) advocates a cautious approach to style because there is rarely, if ever, a direct and obvious relation between style and identity. In other words, material culture is not a text to be read and is historically contingent. Researchers cannot simply assume that a category of material culture played a role in defining social identity. The categories of material culture that most likely would have been significant need to be identified, perhaps by determining those that would have been on display.

This concept is akin to Wobst's ideas of the information exchange capacities of material culture. Items that played key roles in noteworthy activities for the group should be included in this category of significance. Feasts and other social gatherings were important to ancient Andean peoples, so Janusek chose ceramic assemblages as the targets for an examination of style (Janusek 2002:37). Serving vessels were often traded and exchanged, therefore the relation between vessel style and social identity will most likely be indirect and constantly in a state of becoming. Thus, it is important to examine entire assemblages rather than isolated vessels (Janusek 2002:38)

Lightfoot and Martinez (1995) further demonstrate the complexity of elucidating boundaries and ethnic identity in archaeology through their work at Fort Ross, California. Fort Ross was a fur trading outpost that, like other fur-trading forts, was run by Russians or Euro-American men who oversaw "lower-class Scots, French-Canadians, eastern Europeans, Euro-Americans, Metis and other 'mixed-bloods,' eastern Native Americans, native Alaskans, Hawaiians, Filipinos, and even a few Africans" (Lightfoot and Martinez 1995:483-484). As would be expected, the contact among so many diverse ethnicities and cultures resulted in a dynamic and confusing archaeological record.

Lightfoot and Martinez criticize earlier approaches to the study of frontiers. The two say that the core-periphery theoretical framework has shaped most studies of frontier interactions and that this approach is inadequate because it sets up an expectation of sharp frontier boundaries in terms of material culture (Lightfoot and Martinez 1995:471).

> Rather than lamenting the 'noise' commonly found in the material culture at the margins of social units, we should take advantage of this ambiguity in considering the implications of cross-cutting social networks and the creolization of cultural constructs. Our approach suggests that research should be directed toward issues concerning how people establish and maintain interethnic ties in frontier contexts,

> how multiple kinds of interactions take place within and between groups that intersect both newcomers and native, and how frontier relationships can facilitate culture innovations (Lightfoot and Martinez 1995:488).

Through an examination of the spatial layout of residential space, the ordering of domestic tasks, and the structure of trash disposal, it is possible to evaluate the "nature and magnitude of culture change and persistence in contact settings" (Lightfoot et al. 1998:216-217). Research at Fort Ross demonstrated that the organizational principles of the dominant colonizers were materialized in the layout of 'ethnic' neighborhoods, while the identities of the lower classes were visible in household and community organization (Lightfoot et al. 1998:217).

Another ethnographic example that demonstrates the complexity of defining identity through material culture is Dietler and Herbich's (1989:148) examination of the 'operational sequence' of Luo pottery production. This study critiques several of Wobst's (1977) statements about the nature of style and the signaling of identity. For example, the two find that the decoration on Luo pottery rarely represents a deliberate attempt to transmit information, especially in the context of signaling group identity (Dietler and Herbich 1989:158). Additionally, the target group of a stylistic message often consisted of individuals quite close to the maker, in contrast to Wobst's claim that the target group would be significantly removed from the message emitter. The longevity of the message is completely irrelevant in this case. For example, one potter expended considerable energy to make a very elaborate jar to differentiate herself from her potter co-wife, of whom she was very jealous. Finally, beer-drinking pots are very visible and, in Wobst's framework, should be expected to play a significant role in stylistic messaging. However, this theory does not play out because in some villages the pots are elaborately decorated, and in others, hardly decorated at all (Dietler and Herbich 1989:159).

Dietler and Herbich (1989:159) sum up their findings saying, "[neither] a communication function, nor the meaning, target, or locus of any information which might be conveyed stylistically in these cases can be inferred from consideration of the material pattern of the objects, their social visibility, or the 'cost' of their stylistic elaboration." Additionally, to even begin to understand style among Luo potters, it is necessary to examine the processes of learning, interaction, and innovation (Dietler and Herbich 1989:160).

TECHNOLOGICAL STUDIES OF STYLE: THE FRENCH TRADITION

The merging of ethnology and archaeology in French archaeology resulted in a focus on the development of a methodology for the study of techniques (Stark 1998b:5). It is this approach to material culture – the contention that meaning and identity may be discernible in objects and traits that were not traditionally thought to be stylistic – that has been most directly influential in the export vs. emulation debate in the American Southwest. The work of Leroi-Gourhan (1993) was instrumental to the development of this methodological approach to technology. He posited that the belief systems and social structure of a society could be understood through an examination of technology. Technology is the key to understanding these facets of society because human behavior is structured by *chaines operatoires*, or, deeply embedded operational sequences. *Chaines operatoires* comprise the foundation of a society's technology and are therefore reflected in all material culture, ranging from tools to the organization of space (Leroi-Gourhan 1993: 305, 319).

Conceptualizing objects, even seemingly undecorated and undiagnostic ones, as the result of a complicated process of multiple technical choices made during the manufacturing sequence, allows for great potential for insight into behavior, social relationships and structures. Any technology, from architecture, to basketry, to cooking, requires a system of behaviors. Similar results in material culture can be achieved with a variety of different choices during the production sequence. Therefore, these choices in technological methods result in a technological style (Lechtman and Merrill, eds. 1977). People make choices based on what they have been taught, previous experience, and the perceived pros and cons of various options (Hitchcock and Bartram 1998:12). The combination of choices in the manufacturing process can be called a technological system. Particular combinations of choices are often passed on from one generation to the next and become mundane, thoroughly internalized processes (Sackett 1986: 268-269). In this way, everyday goods come to reflect "the way things are always done" (Wiessner 1984: 161, 195). Any element of material culture is therefore a result of conscious and unconscious decisions on the part of the manufacturer. Phrased in a different way, technical behaviors "constitute culturally grounded systems in which the choice of actors, raw materials, tools, and processing modes does not merely relate to natural pressures, but also to symbolic, religious, economic, and political ones" (Gosselain 1998:78). These patterns of behavior are not determined randomly; rather they are conditioned by a number of factors in the learning process and can be aptly labeled "socially acquired dispositions" (Dietler and Herbich 1994:465). In sum, style (and identity) resides in each step or choice in a technological process and each technical feature of an object (Gosselain 1998:82).

Building upon the French technological approach to style, James Sackett considers the identification of ethnic groups and boundaries through a more subtle reading of style than Weissner (1983) or Wobst (1977), with the concept of isochrestic variation. The term "isochrestic" comes from Greek and means "equivalent in use." Isochrestism indicates that there is more than one way to complete a given task or to manufacture a particular object. Artisans in a group are usually aware of a few isochrestic options, and typically choose only one of these possibilities. The choices made by artisans are usually conditioned by the technological traditions that the individual has been enculturated with. These choices are quite specific and are habitually chosen within a given group at a given time. Isochrestic style reflects an unconscious perpetuation of stylistic choices conditioned by enculturation within a given group. The likelihood that two disparate groups would make the exact same choices in the exact same combinations is quite unlikely (Sackett 1990:33).

Sackett does not discount the presence and role of decoration in material culture. According to Sackett, style may reside in both adjunct form and instrumental form. Adjunct form is variation in addition to the function and manufacture of an object. Conversely, instrumental form is those characteristics of an object necessary to its function and manufacture (Sackett 1990:33). In this way, the same characteristics of various classes of material culture can have both style and function simultaneously.

Ethnicity is reflected in the specific choices made to achieve a specific goal (Sackett 1990:33). An isochrestic model of material culture is particularly attractive for archaeologists since the bulk of the archaeological record consists of items of utilitarian form with little or no "decoration," An isochrestic model has the potential to allow archaeologists to understand much more than the very small portion of material culture characterized by diagnostic or otherwise unique decorative aspects (Sackett 1990:34). Moreover, isochrestic choice manifests itself in variation in material culture wherever culturally conditioned activity is materially presented. The isochrestic model is an etic perspective imposed upon the archaeological record by the researcher to organize observed patterns, not an emic perspective the researcher attempts to derive from material culture (Sackett 1990:35).

Sackett (1990:35) comments,

> That artisans tend to "choose" by conforming to and perpetuating the isochrestic options imposed upon them by the technological traditions within which they work is presumably no different from their conforming to and perpetuating the specific gestures, idioms of speech, ways of disciplining children, and magical practices appropriate to, and characteristic of, the social groupings within which such traditions are fostered.

Isochrestic patterning is necessary, for without it, living in human groups would be impossible and chaotic. Isochrestic variation creates a structured material environment and regulates the social fabric of a community (Sackett 1990:35). In this way, isochrestic variation promotes the self-identity and cohesiveness of a given cultural group (Sackett 1990:36).

While Sackett's perspective on material culture is primarily a passive one, it should be noted that not all researchers using a technological approach to material culture subscribe to this notion. Heather Lechtman (1977), one of the pioneers in the development of this approach, argues that technological style is bound up in symbolic structures and attitudes of the community and artisans. Additionally, manufacturers are not simply passive perpetrators of culture; they have the power to both pass on and to alter ideology. Lechtman (1977) studied Andean metallurgy and discovered that utilitarian models of the craft that focused on hardness, strength and the like were not applicable in this situation where the craftspeople focused more upon soft metals and a complex process for achieving a desired and specific color for final products. Conceptually similar techniques were used in the manufacture of cloth as well. These technical processes were interwoven in the cosmology and ideology of the society. Lechtman says "key technologies associated with cloth and metal production shared stylistic modes, perhaps because those modes are expressions of cultural ideals, incorporating ideological concerns of the society at large" (Lechtman 1993:273).

Pierre Lemmonier (1986) focuses upon the interplay between matter, objects, energy, gestures in sequences, and knowledge in his studies of the Anga in Papua New Guinea. To a much greater extent than Lechtman (1977), Lemmonier focuses upon the process and sequence of techniques to achieve a given end rather than on the final object itself. These choices along the way are the result of social learning, and may be indicative of social or group boundaries and distinctions. The differences in focus on process vs. final object of Lechtman and Lemmonier may be a result of the complexity of the societies and technologies the two study. Andean metallurgists are likely operating in completely different social milieu than are Anga individuals manufacturing everyday objects. For example, metallurgy in a more complex society may be less amenable to personal innovation or expressions of identity than the manufacture of objects in a tribal society (Hegmon 1998: 268-269). This point emphasizes the importance of a consideration of context when researching style.

STYLE AND ARCHAEOLOGY: A COMPLEX RELATIONSHIP

As detailed in the preceding pages, style is inherent in much of what archaeologists do and has been an important and central component of the field of study since its inception. Similarities between objects were used to group them into categories, or types. These types then came to signify the people who made them to such an extent that it was the objects, and not the people that were the subjects of our study. Style has been defined in a multitude of ways and found to reside in both the objects and the technological steps in the manufacture of those objects. Style has been considered active, passive, residual and superfluous through time. Style has been used in attempts to define culture areas, ethnicities, groups, learning networks, polities, and economic systems with varying levels of success.

Archaeologists have turned to ethnoarchaeological studies of living societies in an effort to define the relationships between material culture and the multi-layered identities of individuals. Ethnoarchaeological studies show that the links between people and things are complex, situationally dynamic, and highly context – dependent. Through these studies, researchers have discovered that attempts to define culture areas and identities through a simple correlation of people and categories of similar artifacts are exceptionally problematic. These studies have, however, provided the key insight that some aspects of identity may be accessible through an examination of the technological choices and patterns that people make during the process of manufacturing objects.

An approach inspired by concepts of technological style to define sites as emulations or as exports of Chaco Canyon is attractive and appears to be a logical methodology to adopt. Studies that have done so basically assume that there are a suite of technological characteristics in architecture, and artifacts that only Chacoan people would be aware of. Therefore, if an outlying site and its assemblage possess these low-visibility characteristics, it is a direct export of Chaco Canyon. If, on the other hand, the site does not display these traits, but displays more superficial and highly visible features such as a faux masonry veneer, it is determined to be an emulation of locals wanting to associate themselves with Chaco.

On the face of it, this approach seems straightforward. However, upon closer inspection, problems become apparent. First and foremost this use of technological style is the equivalent of a checklist. Basically, if a site is observed to have a suite of characteristics, it is thought to be an export, and if not, an emulation. As has become evident through other applications of the checklist approach, most notoriously in the realm of social evolutionary schemes, the past is much more complex, unique and messy than a trait list could possibly encompass.

Next, determining if a site is an export or if it is an emulation does not explain much about the history and structure of the past. It puts a site in a category, but does not move beyond that. For example, there are likely many different reasons and processes that lead to the establishment of an “export.” Were these reasons primarily economic? Were they political? Were they religious? Was the outpost established for a combination of these reasons? As for an “emulation,” there is a host of reasons that local people may have wanted to construct something that was similar to the grandeur of Chaco that are not addressed by this checklist approach to categorization.

Very similarly to the attempts of early archaeologists to categorize people into groups based upon the objects that they left behind, the export vs. emulation checklist approach makes objects the focus of study instead of social dynamics. Of course, objects are the primary way that archaeologists can get at identity in the past, but it is important to consider that archaeology studies the lives of past people who had relationships and identities that were likely much more complex and dynamic than the distribution of particular artifact types across the landscape.

Additionally, forcing outliers into definitional categories created by archaeologists in the 20th century repeats the classic mistake of forcing prehistoric societies into evolutionary categories defined by ethnologists in the 20th century. At worst, this approach seems destined to fail, and at best to not provide a very insightful understanding of the relationships between Chaco and the rest of the San Juan Basin. A closer consideration of the context of architecture and objects may allow researchers to illuminate these issues more successfully. For example, it is likely that Great House architecture, Chaco Black-on-white pottery, and Narbona Pass chert did not mean the same thing at all times and in all places across the San Juan Basin.

Finally, it is possible that utilizing a stylistic approach to address the relationships of outlying Great Houses to Chaco Canyon may be fundamentally flawed in that it addresses and seeks out ethnic and cultural relationships and identities, rather than political relationships and identities. The "hidden" traits used most often by southwestern archaeologists to trace relationships of groups of people across the landscape are more likely to have been the product of learning networks and cultural practice than they are to be representative of political relationships. Conversely, the pattern of Great House communities and unique artifact types distributed across the San Juan Basin and beyond may very well be representative of an over-arching political system – Chaco. It is likely that Chaco Canyon and the Chaco World were comprised of multiple ethnicities and language groups. Therefore, we should not expect outlying Great Houses to share a specific suite of traits with Chaco Canyon. In this realm, the literature on the complex societies termed "states" by the archaeological establishment could prove informative.

States and empires are often multi-ethnic and multi-lingual. Scholars who study states find it perfectly acceptable that outposts not be mirror images of the capital for this reason. A certain local character is even accepted, if not expected in administrative buildings in these outposts. For example, Janusek notes that some locations under the control of Tiwanaku had a mixture of both local and Tiwanaku style ceramics (Janusek 2004:238). Further, some temples were arranged in ways like temples in Tiwanaku, but also had features and ritual activities that were local in origin (Janusek 2004:240-241). The extent of control that Tiwanaku exercised over colonies was variable and not continuous. A similar combination of methods and investments in outlying settlements, dependent on the specific situation, distance, and time has been noted for the Inca and Aztec Empires (e.g. Frye 2005; Malpass and Alconini 2010; Berdan et al. 1996). The situation is complex, likely much like the Chacoan World. This dissertation does not attempt to place Chaco World anywhere along the social evolutionary ladder, but does urge awareness of preconceived assumptions that the prehistoric society centered on Chaco Canyon in the 11th century had to have been homogenous and monolithic to be considered politically integrated.

Also important is a consideration of peoples' lived experience. Comparing static categories of material culture likely does not capture the ways in which people moved through the world constantly constructing relationships and identities. A post-structural approach posits that resources (human and non-human) are not separate, but are mutually constitutive (Joyce 2010:22). For example, the stone pillars adjacent to Chimney Rock Great House were important to prehistoric peoples due to a combination of material factors likely including their towering height and association with lunar phenomena, but also because of the cultural meanings attached to these geologic features by the people who chose to live in their vicinity. The combination of human and non-human resources and the relations between the social and material world is referred to as materiality (Miller 2005).

As noted by Timothy Pauketat, the reality of the past is what people did and how they did it; as archaeologists, we have access to this information when we use theoretical approaches that grapple with practice, agency, memory and landscape (Pauketat 2007:2). Pauketat advocates a historical approach that examines the trajectories of change of societies, and not the development of particular institutions (Pauketat 2007:15). Working from the theoretical perspective that identities, communities and polities are always in a state of becoming, it may be possible to gain insight into this process through an historical examination of those societies. For example, constructed environments compel individuals to move through these spaces in specific ways

(Pauketat 2007: 70). Both the act of constructing the environment and moving through the environment are mutually constitutive of the individual and the larger community or polity.

Anthony Giddens (1979:7) notes that "social systems have no purpose, reasons or needs whatsoever; only human individuals do so." Societies must be created, recreated, destroyed, and reproduced through social relations and activity (Janusek 2004:5). Giddens contributes a more active facet to Bourdieu's (1977) passive concept of *habitus*. For Giddens, humans are knowledgeable beings who draw on "tacit stocks of knowledge" (*habitus*), but also have agency – or the ability to reproduce OR change existing structures (Giddens 1979:5). Structure is both the medium and the outcome of the reproduction of practices (Giddens 1979:5). The change effected by the agency of individuals may be unintentional and unexpected (Giddens (1979). The knowledge of individuals is always situated and incomplete – "a product of the particular social position and experiences of a subject" (Joyce 2010:23). Practice theory addresses this very issue – the ways in which people are constructed as cultural subjects via cultural principles and material and non-material resources, and the ways in which the actions of individuals change or reproduce structure (Joyce 2010:21).

In post-structuralist thought, identity can be conceptualized as affiliations with multiple, sometimes contradictory, overlapping collectivities (Joyce 2010:24). This can be contrasted with the pots = people perspective on identity that dominated archaeology of previous decades discussed earlier in this chapter. These affiliations with different groups may be based upon a variety of factors, including "shared memory, place, ancestry, gender, age, occupation, religion, or other cultural practices" (Joyce 2010:24). Different aspects of identity may be suppressed or displayed depending on the situation and in this way, identity if never expressed as a unified and consistent whole (Joyce 2010:24).

The following chapters primarily use the technological approach to style described in this chapter in an effort to determine if Chimney Rock Great House in southwestern Colorado was an export or an emulation of Chaco Canyon. In light of the potential problems associated with this approach detailed above, the context of Chimney Rock, the people who built, lived in and around the Great House and the materials they left beyond are considered in an effort to go a step beyond the checklist. The theoretical perspectives described in this chapter underlie all subsequent discussions of ethnicity, identity, and relationship in the Chaco World. This study is not meant to provide a baseline or to define rules for relationships of outliers to Chaco Canyon. Rather, it is meant to demonstrate the utility of considering such settlements in their own time, space, and context.

CHAPTER III

THE SITES

As described in Chapter I, this project uses ceramic assemblages and architectural information from six sites, Pueblo Alto and 29SJ 627 in Chaco Canyon, Bluff Great House and Corral Canyon Site, Ravine Site and Chimney Rock, as components in an evaluation of the relationship between Chimney Rock Great House and Chaco Canyon (Figure 1). This dissertation focuses on the late Pueblo II time period (A.D. 1000-1150) because this is when both Pueblo Alto and Chimney Rock Great House were constructed and occupied. The Ravine Site and Corral Canyon Site also date to this time period.

While defining the relationship of Chimney Rock to Chaco Canyon is the ultimate goal of this analysis, the inclusion of additional sites adds further dimension for understanding the socio-political structure of the Chaco-era San Juan Basin. A comparison of only Chimney Rock Great House to Chaco Canyon would not be as informative because it would provide no sense of the variability in the ceramic assemblages and architecture in the San Juan Basin during the Pueblo II time period, and thus no way of determining if the Chimney Rock assemblage is similar in a significant way to those observed in Chaco Canyon. The inclusion of three Great Houses and three small sites in this analysis informs on similarities and differences between the architecture and ceramics of sites in disparate locations and of different size classes, as well as informing on the general level of interaction between small sites, Great Houses, and Chaco Canyon.

Pueblo Alto, an undisputed Chaco Canyon Great House, serves as a standard sample for the material associated with the canyon. Pueblo Alto was chosen as the sample to represent

Chaco Canyon because, unlike other Great Houses in the canyon, it was excavated relatively recently, utilizing modern archaeological methods, and reported on in great detail (Windes 1987a and 1987b). The Bluff Great House in southeastern Utah, also recently excavated and reported (Cameron 2008), is included in the analysis to examine the variability of Chaco-style Great Houses located outside the canyon. Bluff is near the northwestern edge of the Chaco Region; Chimney Rock is the northeasternmost Great House. Three contemporary small sites, each a component of the community of one of the three Great Houses, are also included in the analysis. The small sites are 29SJ 627 in Chaco Canyon, the Ravine Site immediately below Chimney Rock Great House, and the Corral Canyon Site near the Bluff Great House. This component of the analysis explores cultural similarities and differences at the community level for contemporaneous Great Houses and small sites. The three pairs of sites were chosen to explore – on an initial, experimental level – the multiple levels of interaction, ranging from relationships between Great Houses throughout the San Juan Basin and with Chaco Canyon, to interaction with the local community.

This chapter provides a brief contextual background for Pueblo Alto, 29SJ 627, the Bluff Great House, the Corral Canyon Site and the Ravine Site. The 2009 University of Colorado research at the Chimney Rock Great House and the background of that site are described in the greatest detail here since the Great House is the primary focus of this dissertation. Complete maps and descriptions of architecture and ceramics from each of the six sites can be found in Chapters IV and V.

PUEBLO ALTO

Pueblo Alto, located atop the north mesa overlooking Chaco Canyon, was the culmination of Chaco Center investigations in the canyon. See Figure 2. Between 1975 and

1979, about 10% of the site was excavated (Windes 1987a:6). The location of Pueblo Alto is remarkable, not due to its relationship to any particular resource, but for its incredible view. Indeed, individuals at Pueblo Alto could see most of the San Juan Basin (Windes 1987a:1). Pueblo Alto is also the nexus of many roads, linking the Great House to the canyon and to locations in throughout the San Juan Basin (Windes 1987a:6). Chaco project personnel chose to excavate Pueblo Alto over other candidate Great Houses in the canyon largely due to its association with numerous prehistoric roads and a growing awareness of the existence of a Chaco Region (Windes 1987a:10).

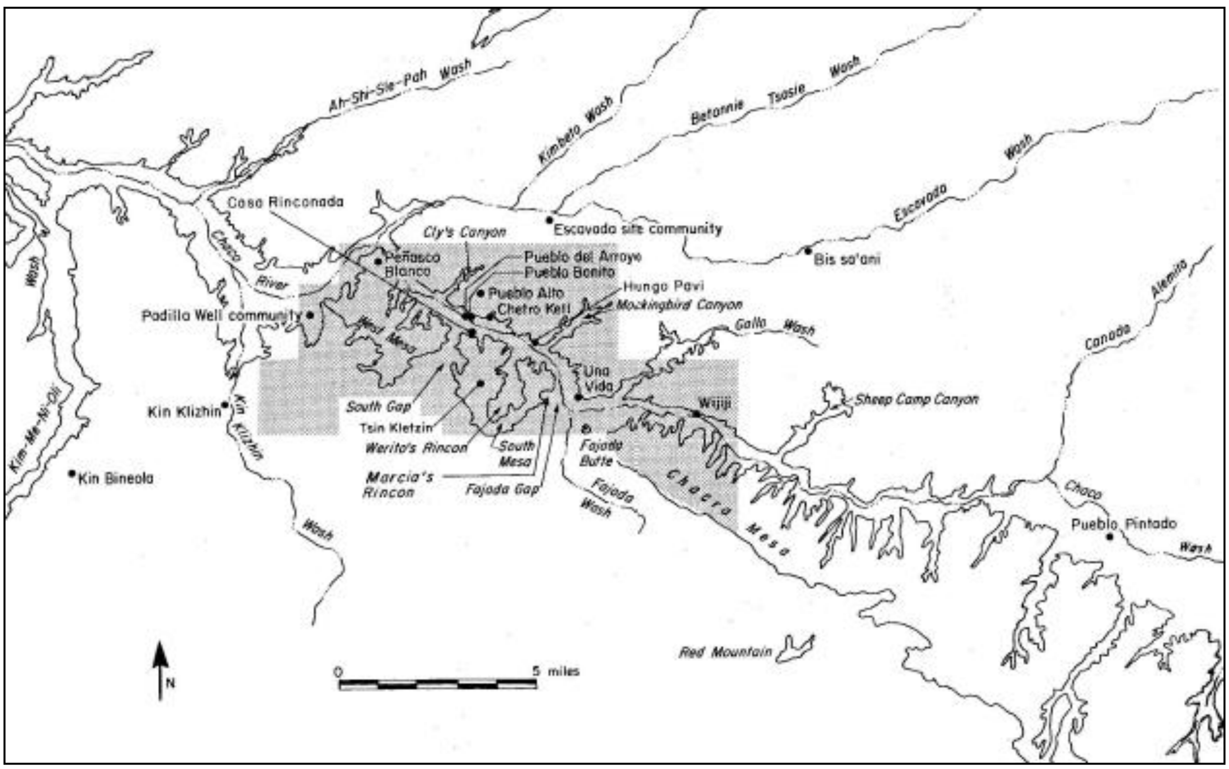


Figure 2. Chaco Canyon, New Mexico. Pueblo Alto is located on the north rim of the canyon and Marcia's Rincon (Location of 29SJ 627) is on the north side of the canyon. Chaco Culture National Historical Park denoted by stippling. Adapted from Truell (1992: Figure 1.2).

Pueblo Alto is a single story Great House comprised of 133 rooms, 3-5 kivas, and one enclosed and two exterior plazas covering approximately 16.9 hectares (Windes 1987a:12). A very large and unusual trash mound is associated with the site (Windes 1987a:12). Pueblo Alto is one of 13 or 14 Great Houses in Chaco Canyon. Alto is considered a Chacoan Great House because it demonstrates large site size, large rooms, high ceilings, and massive masonry core-and-veneer walls (Windes 1987a:9).

Research methodology at Pueblo Alto was designed to identify relationships between contemporary Great House sites and small sites, relationships between Alto and other Great Houses in the Canyon, and Alto and outlying Great Houses (Windes 1987a:54). To this end, wall tops were first cleared to obtain a solid plan map of the site. After this, wall abutments, masonry styles, vents, doors, etc. were examined to define the architectural history of the site (Windes 1987a:61). During the course of field work between 1976 and 1978, room suites in the central and western room blocks were investigated. No excavation was completed in the eastern room block (Windes 1987a:65-67). The large trash mound associated with Pueblo Alto was trenched and one and one half "telephone booth" units excavated (Windes 1987a:68). Kiva 10 was partially excavated prior to being deemed unsafe by the National Park Service, and Kiva 15 was excavated as part of the west wing sample (Windes 1987a:68).

29SJ 627

29SJ 627 is located on the west side of Chaco Canyon, north of the Chaco and Fajada Wash Confluences (See Figure 2 and Figure 3). The site was excavated in 1974 and 1975 as part of the Chaco Project investigations in the canyon. Excavations revealed 25 rooms, parts of seven pit structures, plaza areas, and trash accumulations. The site was used with varying levels of consistency between the A.D. 700s and middle A.D. 1100s (Truell 1992:1). Research at 29SJ 627 was designed to evaluate the relationships between small sites and the contemporaneous Great Houses in the canyon and to explain the utilization of the harsh canyon environment for the duration of human occupation in the area (Truell 1992:1). 29SJ 627 was the largest and longest occupied small site investigated during the course of the Chaco Project (Truell 1992:6). Most of the site, with the exception of one and possibly two lower room floors, a considerable amount of the trash mound and the floor and walls of one pit structure underlying a kiva, were excavated (Truell 1992:8).

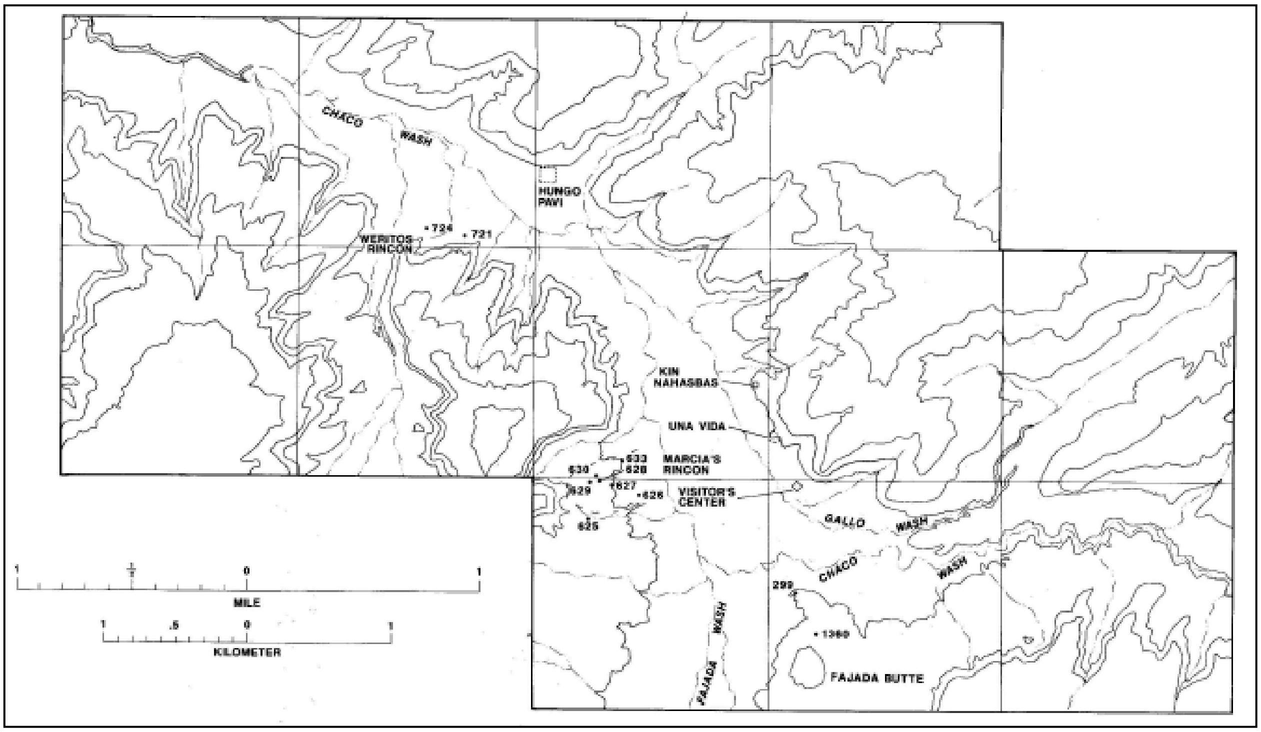


Figure 3. Marcia's Rincon and location of 29SJ 627 within Chaco Canyon. Adapted from Truell (1992: Figure 1.3).

RAVINE SITE

The Ravine Site (5AA88) is located on the mesa immediately below the Chimney Rock Great House (Figure 4). The site is made up of 19 masonry buildings and is included in the High Mesa Site Group defined by Eddy (1977:52). Excavations of Building 16 and Mound 17 were directed by Marcia Truell in the summer of 1972. Excavations at the Ravine Site were designed to investigate the oversized “crater mound” (Mound 17), to examine domestic structures (Mound

16) and to prepare the site for stabilization and display to the public (Eddy 1977:52-53). Crater mounds are essentially above-ground circular stone structures. Upon excavation, Mound 17 was determined to be an oversized community structure, akin to a Great Kiva and Mound 16 a domestic structure consisting of one large circular room backed by three smaller storage rooms. Dendrochronological information, including ten cutting dates of A.D. 1077r from Building 16, situate the site towards the later end of the date range. Although no cutting dates were recovered from Mound 17, Eddy postulates that the structure was not built much later than A.D. 1084 (Eddy 1977:58).

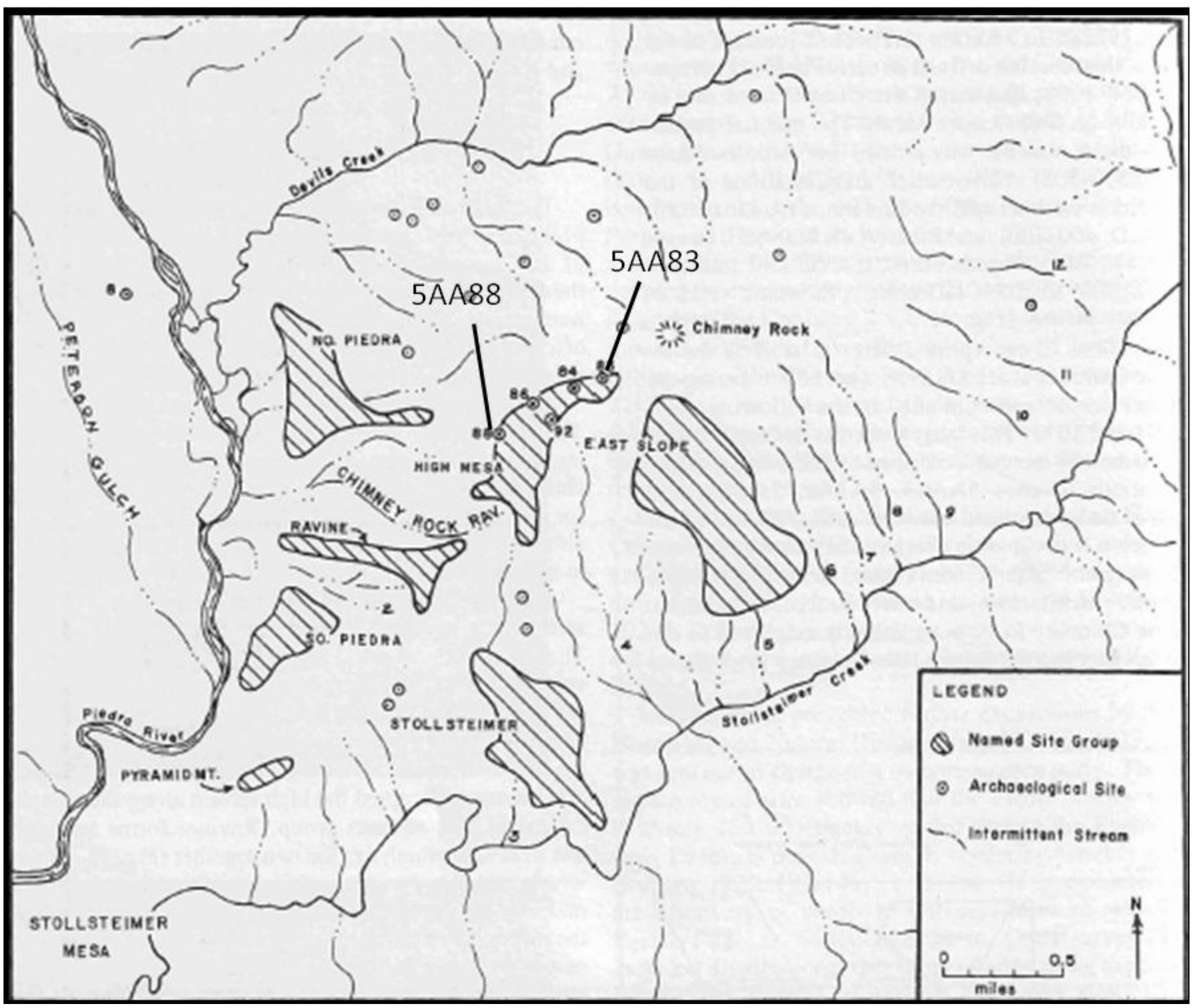


Figure 4. Seven site groups defined by Eddy (1977) at the Chimney Rock Archaeological Area. The Great House is 5AA83 and the Ravine Site is 5AA88. Adapted from Eddy (1977: Figure 4).

Bluff Great House

The Bluff Great House, built in the late A.D. 1000s or early 1100s, is located in southeast Utah (Figure 1), the northern frontier of the Chaco System (Cameron 2008:1). The Great House today appears as a large mound, about 50 m long x 28 m wide and is almost 4 m in height. The site is rectangular, was at least two stories tall, but may have been up to four stories tall (Cameron 2008:81). The Great House, Great Kiva, and earthen berm partially surrounding the Great House were investigated during the course of University of Colorado Field Schools between 1996-1998 and 2002-2004 (Cameron 2008:6-7). Portions of three rear rooms were exposed below floor level, tests were placed in each of the four intramural kivas, and walls were cleared along the northern and western and southeastern portion of the Great House (Cameron 2008:103). Excavations of the Great Kiva revealed portions of the interior wall of the main chamber, portions of a cobble bench, and peripheral rooms on the northern, eastern, and western sides of the structure (Cameron 2008:197). Six test units were placed in the earthen berm. These units included one large mechanically excavated trench (70 cm x 19 m in size), and six smaller 1 x 1 m hand excavated units (Cameron 2008:270-271).

Investigators defined two sets of goals for research at the Bluff Great House. The first set (for years 1996-1998) was concerned with determining whether or not Bluff was a Chacoan Great House, and if so, how it functioned in the northern frontier of the Chaco System and the role the site played in the local community (Cameron 2008: 10). The second set of research objectives (for years 2002-2004) were concerned with the post-Chaco era. Specifically, how did the use of Great Houses change after the collapse of the Chaco System, and did residents of Bluff trade with communities in the Northern San Juan or other regions? (Cameron 2008: 10-11). For a discussion of these particular questions, see Cameron 2008.

Corral Canyon Site

The Corral Canyon Site is located in southeastern Utah, east of Highway 191, 9 km south of Blanding and approximately 32 km north of the Bluff Great House (Figure 5). The site is made up of two pit structures, one additional structure that may be a kiva, a semi-subterranean mealing room, and one small surface room. No intact midden was found in association with the site, but this may be due to the significant amount of trampling by cattle that has occurred there (Firor 1998:51-52). The construction of the highway may have destroyed some habitation structures (Firor 1998:156).

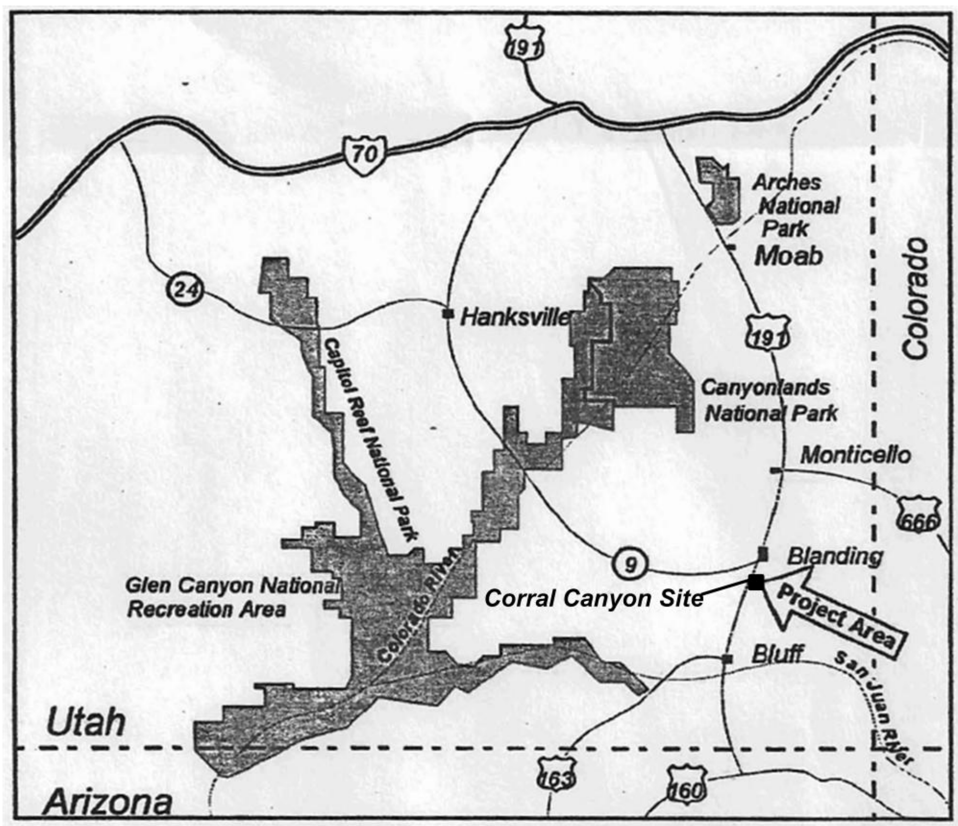


Figure 5. Corral Canyon Site. Adapted from Firor (1998: Figure 1-1).

The site has been tested three times: twice by Abajo Archaeology in 1991 and1994 and then by Alpine Archaeology, Inc. in 1995 in response to proposed road work on Highway 191

(Firor 1998:51-52). Tree ring dates from the site indicate that it was occupied at approximately A.D. 1050 (Firor et al. 1998: ii). Based on the floor space of the three pit houses, estimated at 57 m^2, The Corral Canyon Site was probably the home of two families, about six to nine people (Firor 1998:156). The data used in this dissertation is primarily from the work completed in 1995 by Alpine Archaeological Consultants, Inc. Alpine completely excavated four features at the site: Feature 5, an insubstantial surface structure; Feature 6, a pithouse; Feature 10, a kiva or pithouse; and Feature 11, a semisubterranean mealing room (Firor 1998).

CHIMNEY ROCK GREAT HOUSE

Chimney Rock Great House is located on the upper mesa of a northeast to southwest trending flat-topped ridge or mesa (Figure 1 and Figure 4). The upper mesa, at an elevation of 7,600 feet, is connected to the lower mesa, at an elevation of 7,000 feet, by a narrow causeway. The name "Chimney Rock" is derived from the two dramatic pinnacles of rock at the northeast end of the mesa. The main pinnacle holds the name "Chimney Rock," while the shorter one is known as "Companion Rock." Jean Allard Jeancon (1922) – the first archaeologist to work at the site, estimated that the L-shaped pueblo consisted of 35 ground floor rooms, with some indications of a second story, and two kivas. Recent mapping in 2009 by the University of Colorado at Boulder (the research reported here) and Woods Canyon Archaeological Consultants, Inc., has shown that the site consists of approximately 30 ground floor rooms, 2 kivas, 15 ancillary or buttress rooms surrounding the east kiva, and potentially several second story rooms north of the east kiva (Figure 6).

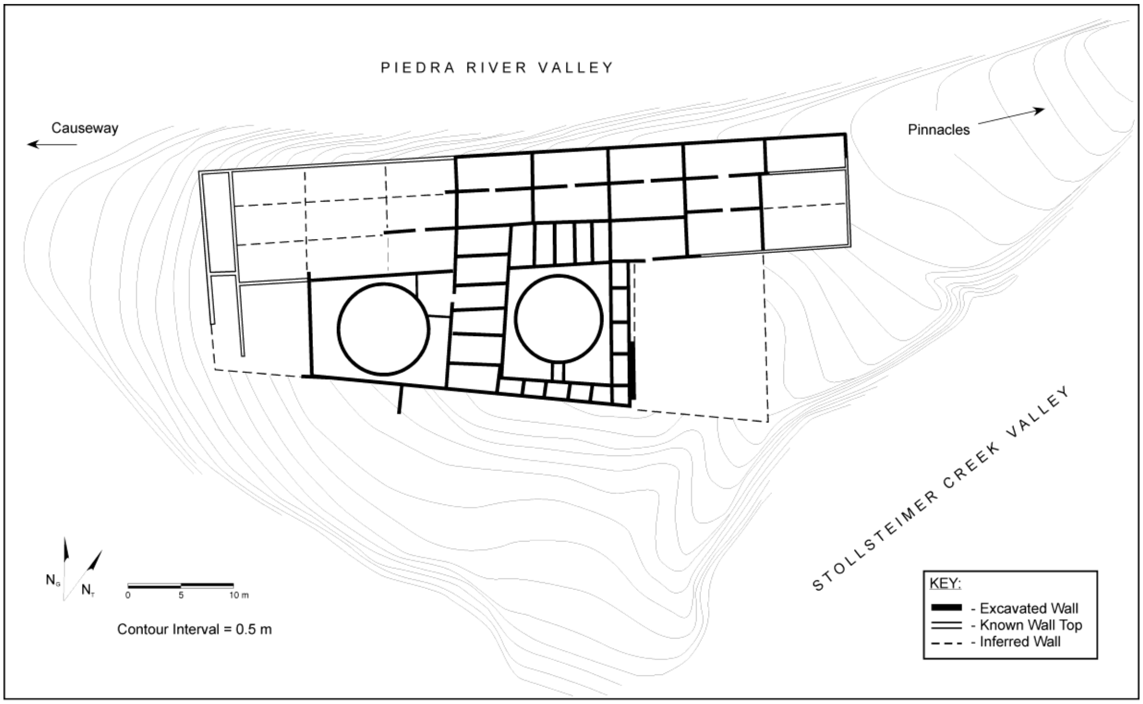


Figure 6. Topographic setting of Chimney Rock Pueblo (5AA83). Topography digitized from Eddy (1977: Figure 12) and map of Pueblo based in part on data generated by CU and the Colorado School of Mines. Revised by Woods Canyon Archaeological Consultants, Inc. 2009. Drafted by Jason Chuipka.

The Chimney Rock Pueblo is constructed of regularly coursed sandstone masonry. Similarities between architecture at Chimney Rock and Chaco Canyon 93 miles to the southwest have been noted since the site was first investigated (Jeancon 1922; Eddy 1977; Bradley 2004; Kane 1993, 2004; Lekson 2004, 2009; Malville 2004; Wilcox 1993, 2004 for a few examples). Chaco Canyon was the 11th and 12th century center of what is most frequently referred to as the Chacoan Regional System (Crown and Judge 1991). The extent of the Chaco Region is principally determined by the distribution of Great Houses. Also included in the suite of traits associated with the Chaco System are prehistoric roads, great kivas or combinations of those structures (Mills 2002:67-68; Kantner and Kintigh 2006:155). Estimates for the ultimate size of the Chaco Region vary, but range from the entire San Juan Basin and surrounding uplands, or approximately 65,000 square kilometers (Cordell 1997:305-306) to an area of about 120,000 square kilometers including the San Juan Basin, the surrounding uplands in northwestern New Mexico, northeastern Arizona, southeastern Utah, and southwestern Colorado (Lekson 1996:82; Lekson 2006:9). See Chapter I for more information on Chaco Canyon.

Approximately two hundred outlying Great Houses have been identified, located in southwestern Colorado, New Mexico, Utah and Arizona (Kantner 2004:102, Lekson 2006:14). Chimney Rock is the northeastern-most of these outlying Great Houses and was connected to Chaco Canyon by the line-of-site passing through Huerfano Mesa (discovered by Katy Freeman and reported by Freeman et al. 1996; described by Lekson 2004:vii, ix). Chimney Rock is also archaeologically unique compared to many other prominent outliers, including Aztec Ruins, in that it was abandoned in the mid to late 12th century and does not have later 13th century components that complicate chronology and other research questions.

PREVIOUS RESEARCH AT CHIMNEY ROCK GREAT HOUSE

The first major research at Chimney Rock was undertaken in 1921. This project was sponsored by the State Historical and Natural History Society of Colorado (now the Colorado Historical Society) in partnership with the University of Denver (Lister 1993:9-26). Jean Allard Jeancon directed the project. Excavations took place at the Chimney Rock Pueblo (5AA83), the Guardhouse (5AA84) just west of the Great House on the neck of the mesa accessing the main pueblo, the Causeway Site (5AA85), and sites near the Pargin and Harlan Ranches located on the benches on the east side of the Piedra River (Jeancon 1922). During this field season at the Chimney Rock Pueblo, five living rooms (6, 9, 10, 11, and 12) were completely excavated and two other rooms (3 and 34) were partially excavated. The East Kiva was 80% excavated and the corner spaces in the rectangle surrounding the kiva were cleared. Six small rooms interpreted as storage areas (38, 39, 40, 42, 42, and 43 in Eddy's 1977 report) just outside of the East Kiva were excavated (Jeancon 1922; Eddy 1977:32-33).

Further excavations were carried out in 1922, this time under the direction of Frank H.H. Roberts, a student during the previous field season of 1921. During this field season, rooms 31-35, the West Kiva, and the dead spaces around the kiva (called 1-A and 2-A) were fully excavated (Jeancon and Roberts 1924). East of the Great House, Jeancon (1922:14) also describes "a small mound of rooms without wall definition at present and forming a low mound. Next to them is a large depression in the cap-rock in which great fires have burned as is indicated by the red fire stains in the sandstone." It was thought for several decades that fire watch tower constructed by the USFS east of the Great House had obliterated all traces of this fire pit. The removal of the fire tower in 2010 and subsequent examination of the area revealed that the fire pit was never covered at all. The prehistoric fire pit is located just east of where the fire tower was constructed on the very edge of the mesa (Wendy Sutton, personal communication 2011). No backfilling was completed after these early excavations, leaving the site open to the ravages of weather, looting, and vandalism for the next 50 years (Eddy 1977:33; Lister 1993:27).

In 1970, 1971, and 1972, a University of Colorado team lead by Dr. Frank Eddy completed a project composed of both excavations at the Great House and survey around Chimney Rock Pueblo under a contract with the U.S. Forest Service (Eddy 1977, Eddy 2004). This work identified 91 sites, interpreted by Eddy (1977) to be equivalent to the 108 sites recorded by Jeancon (1922), and completed further excavations in sites 5AA83, 5AA86, 5AA88, and 5AA92 (Eddy 1977). Based on the distinctive architecture, unusual settlement pattern, and ceramic industry, Eddy identified a new and distinct archaeological culture that he named the

“Chimney Rock Phase” that existed between A.D. 925 and 1125 (Eddy 1977:3). Eddy (2004:26) later slightly revised the dates of the Chimney Rock Phase to fall between A.D. 1000 and 1125.

The goals of Eddy’s excavations were to “clear a room and test a kiva in preparation for wall stabilization and eventual ruins display” (Eddy 2004:26). Eddy also wanted to obtain samples for dendrochronological dating, a technology not yet in existence during the 1920s excavations, and to create a chronological sequence from ceramics (2004:27). He excavated Room 8, a small area of unexcavated fill on the north side of the East Kiva, tested outside of the building to the south and east of the East Kiva, and did cursory testing of a trash deposit (Eddy 1977; Eddy 2004:28).

Eddy was successful in his goal of obtaining samples for dendrochronological dating. Ninety wood specimens were collected during the course of excavations. Fourteen of these were duplicates, and of the 76 remaining specimens, 47 were dateable. Forty-one of the specimens were from Room 8. Of these, 26 dated to A.D. 1093, with the remaining dates coming in between A.D. 1066 and 1092 (Eddy 1977:43). Thirteen of these have an “r” suffix (possible cutting date), one is rB (definite cutting date), two have a “c” suffix (probable cutting date) and one is “cB” (definite cutting date). These seventeen dates provide good evidence for a work crew harvesting timber for the Great House during the summer of A.D. 1093 (Eddy 1977:44). The remaining six samples were from the East Kiva. A single date of A.D. 1076r from a ponderosa pine pole taken from the horizontal ventilator tunnel next to the vertical ventilator shaft has been interpreted as dating the construction of the lower kiva (Eddy 1977:44). The other five dates from the kiva were recovered from the roof. Only one of these samples had a continuous outer ring. This sample indicates a cutting date of A.D. 1093r (Eddy 1977:46).

Eddy also did some work outside of the pueblo in 1971 in an attempt to identify plaza and midden locations. This work resulted in the definition of the East Court, an elevated surface located between the two arms of the L-shaped Great House Eddy (1977:39). A bench or banquette, interpreted by Eddy as a location to sit during ceremonial activities or for resting during the day was defined along the exposed east wall of the pueblo. The South Plaza, consisting of a mud plaster paving of an unknown extent outside the south wall of the building was identified as well. This plaza appears to have been constructed directly on top of the bedrock surface (Eddy 1977: 40). A trash deposit along cliff on the north side of the Great House was examined. The deposit was found to consist of a "charcoal-stained soil mixed with pottery, stone and bone artifacts" (Eddy 1977:41). Eddy found no evidence of the calcined human remains reported by Jeancon (1922) (Eddy 1977:41).

The Guard House (5AA84) has been examined on three different occasions. First, in 1921, J.A. Jeancon outlined the building, consisting of a square structure with a circular structure inside of it, and gave it its name. Jeancon interpreted the structure as serving to control access across the causeway to the Great House above (1922). In 1970, Eddy again examined the site to evaluate the possibilities for ruin display. Due to the sparse remnants of the guardhouse, Eddy recommended against displaying the site to the public (Eddy 1977). In 1988, Fort Lewis College conducted a summer field school at 5AA84. These excavations examined the ventilator, and the northeast curve of the wall and identified a hard-packed clay floor and some intact portion of the original wall (Eddy 2004: 50-51).

After the completion of the final University of Colorado at Boulder field season, the Chimney Rock Archaeological Area was closed for a period of 12 years between 1973 and 1985 in an effort to avoid disturbing nesting peregrine falcons (Eddy 2004:47). The site was reopened in 1985 and very limited research was conducted in 1988 (Eddy 2004:48). In 2009, the University of Colorado returned to the site (described below).

Interpretations of Chimney Rock Great House

Throughout the nearly one hundred years that archaeologists have been aware of Chimney Rock, there have been a diversity of interpretations of the site. However, there is one common theme present in most, if not all, of these interpretations. This common theme is a clear connection to Chaco Canyon to the south. The following paragraphs briefly summarize the main theories proposed for the Great House.

Jean A. Jeancon, the first archaeologist to work at the site, interpreted Chimney Rock as defensive, noting that the trail, "would constitute a fairly good defense, as the enemy in attacking would have to surmount this rise and would suffer from precarious footing in the climb which would necessarily retard his progress" (1922:13). He also saw the guardhouse, which literally blocks the only entrance from the lower mesa to the main pueblo of Chimney Rock above as a defensive structure (Jeancon 1922). Jeancon was impressed with the imposing structure of the two story Chimney Rock Pueblo and by the beauty and craftsmanship of the masonry; he saw similarities to Chaco Canyon (Jeancon 1922:14, 16).

Based on the exceptional parallels in architectural planning, masonry styles, and kiva construction at Chimney Rock and at Chaco, Frank Eddy (1977) suggested that Chimney Rock was built by male priests from Chaco who possessed detailed cultural and religious knowledge. Based on the relative lack of Chacoan pottery at Chimney Rock, Eddy posited that women from Chaco had not been a part of this colonization. Parker (2004) adds an interesting facet into this interpretation. Based on petrographic analyses, Parker (2004) found that while Gallup Black-on-white (associated with Chaco) made up only 9.5% of the ceramics found at the site, the local imitation of Chacoan pottery that used Chacoan sherds as temper, made up 56% of the total pottery at the site. This evidence provides a strong indication of a Chacoan presence on the high mesa.

Building on the defensive nature of Chimney Rock David Wilcox (1993; 2004) posited that the pueblo functioned as a fortress where warrior-priests could collect tribute from local populations and provide protection from any threats to Chaco coming from the northeast. Tucker (2004) sees a much less significant connection to Chaco Canyon than do many other researchers. In his estimation, Chimney Rock developed over a period of two centuries due to reactions to natural and cultural forces and was constructed by a local elite population and not a Chacoan elite population (contra Eddy 1977; 2004). In this scenario, Chimney Rock develops trading relationships and ritual connections to Chaco Canyon only very late in its history, ultimately becoming a northeastern port of trade. In a similar vein, Al Kane (2004) interpreted Chimney Rock as a "lumber-camp" where trees would have been floated down the Piedra River to the San Juan River and then carried to Chaco. Chimney Rock may have also supplied dried meat of large game animals to Chaco (Kane 2004).

Bruce Bradley (2004) used Spanish missions as an analog to explain Chimney Rock and other outliers. In this framework, Chaco was a theocracy that dispatched missionaries to indigenous populations. "Missionaries" would have lived in the outlying Great Houses and gained greater prestige due to similarities with the Great Houses of Chaco Canyon. John Roney (2004) saw Chimney Rock as an outlier participating in the Chaco Regional System in the same ways as other Chacoan outliers and as a direct product of Chacoan people. In Roney's (2004) estimation, Chimney Rock may have participated in the Chaco system due to the ritual significance of the double chimneys and the economic importance of timber and other resources.

J. McKim Malville's (Malville et al. 1991, Malville 2004) interpretation of Chimney Rock has been the most influential and most substantiated explanation for the site in both the public and professional arenas. Malville concludes that Chimney Rock is an astronomical observatory, largely based on tree ring dates provided by Eddy (1977) which may correspond to a cycle of dramatic moon rises between the two stone spires during the lunar standstill each 18.6 years. Malville (2004) argues that much of the power of ritual specialists within Chaco was esoteric in nature and may have included astronomical observations from Chimney Rock. The A.D. 1076 and 1093 dates derived from Eddy's excavations (described in more detail above) fall on years in which lunar standstills occurred. Malville has inferred that this coincidence in cutting dates and lunar standstills demonstrates a significant ceremonial nature to the site (2004). The University of Colorado sought to evaluate Malville's influential and compelling theory during work completed in 2009 (described below).

PREVIOUS WORK IN THE CHIMNEY ROCK ARCHAEOLOGICAL AREA

The Chimney Rock Great House does not exist in isolation, but is in fact situated in the center of a dense community. This section briefly details work to date in the Chimney Rock Archaeological Area and in the surrounding area.

Two major rounds of study have been undertaken in what is now the Chimney Rock Archaeological Area, 4,100 acres managed by the USDA Forest Service and designated as a National Historic Landmark in the 1970s (http://www.chimneyrockco.org/mainnew.htm). The first research took place in the 1920s, and the second in the 1970s.

The first research project, directed by J.A. Jeancon in 1921 and discussed above, completed work at the Guardhouse (5AA84) located on the neck of the mesa accessing the main pueblo, the Causeway Site (5AA85), and other sites on the benches below Chimney Rock along the Piedra River, in addition to work at the Great House (Jeancon 1922).

The next major round of research was conducted at a number of sites within the Chimney Rock Area by Frank Eddy in 1970s. This work identified 91 sites (interpreted by Eddy [1977] to be equivalent to the 108 sites reported by Jeancon [1922]), and completed excavations in sites 5AA83, 5AA86, 5AA88, and 5AA92 (Eddy 1977). In 1970 and 1971, Eddy completely excavated Mound 3 of the Parking Lot Site (5AA86). The Parking Lot Site consists of three linked circular masonry rooms (Rooms 2, 3 and 4) backed by two rectangular masonry rooms (Rooms 1 and 6) (Eddy 1977:50). Eddy (1977; 2004) determined that the site was contemporary with the Great House above, but that the architecture was substantially different. Eddy also examined a series of what he termed “crater-shaped mounds” at sites 5AA86, 5AA88, and 5AA92 (Eddy 1977:4). The mounds ranged from .45 to 1.8 meters in height, are circular in plan, with a .45 to .9 meter central depression. Eddy interpreted the rooms to be the remains of circular, thick-walled masonry domestic rooms, with central fireplaces, ventilator systems and flat roofs constructed from logs and mud. One particularly large crater mound, with a diameter of 30-40’ at 5AA88 was determined to be analogous to great kivas associated with the Chacoan system (Eddy 1977:4).

Eddy, through extensive surveys, also defined seven groups of sites within the Chimney Rock Archaeological Area (Figure 4). The first is the “High Mesa Site Group” consisting of 16 sites, including Chimney Rock Pueblo (5AA83), the Guard House (5AA84), the Parking Lot Site (5AA86), and (5AA88), and Mound 3 of 5AA92 that was destroyed during the construction of the parking lot (Eddy 1977:7). The "East Slope Group" is located on the east slope of the Chimney Rock Mesa and consists of five residential sites and 7 non-architectural sites (Eddy 1977:10). The "Stollsteimer Group" is located on the southeastern tip of the Chimney Rock Mesa and consists of nine permanent residences and 6 other non-architectural sites that may have been camps or workshops (Eddy 1977:12). The "Chimney Rock Ravine Group" is located along the southern rim of the Chimney Rock Ravine and consists of five architectural habitation sites and three non-architectural temporary camps (Eddy 1977:13). The "Pyramid Mountain Group" is located on the extreme southwestern corner of the Chimney Rock Mesa and consists of two large sites: the Village site (5AA129) and 5AA130 (Eddy 1977:15). The "Southern Piedra Group" consists of six architectural sites and one workshop on the Piedra River along the southwestern edge of the Chimney Rock Mesa (Eddy 1977:16). The "Northern Piedra Group" is a group of 14 sites comprised of 70 buildings located at the confluence of the Piedra River and Devil's Creek. This group of sites is one of the two largest site groups, the other being the High Mesa Site Group, and may have actually housed more people than the High Mesa Site Group (Eddy 1977:17). Eddy interprets all of these sites to be representative of the 11th century community and components of the Chimney Rock Phase (1977:22).

Previous Research in the Chimney Rock Region

In the immediate region surrounding Chimney Rock, after the initial work completed by State Historical and Natural History Society of Colorado (now the Colorado Historical Society) in partnership with the University of Denver in 1921 and 1922, no further excavation was carried out in 1923 due to lack of funding. Refer to Figure 7 for the locations of archaeological investigations described in this section. Instead, Frank H. H. Roberts, a student who had worked with Jeancon in 1921 and directed field operations in 1922, was charged with completing a survey of the Piedra and Pine River Valleys south of Highway 160. Roberts' survey revealed that the benches and hills surrounding Chimney Rock and south of Highway 160 had been thickly populated during the Pueblo I and early Pueblo II time periods. Indeed, thirty villages were recorded on Stollsteimer Mesa. (Roberts 1925; Eddy 1977; Eddy 2004). The survey activities were continued in 1924, and again, were lead by Roberts. This survey included locations along the San Juan River south to Rosa, New Mexico. Roberts also carried out three weeks of test excavations on Stollsteimer Mesa during 1924 (Roberts 1929).

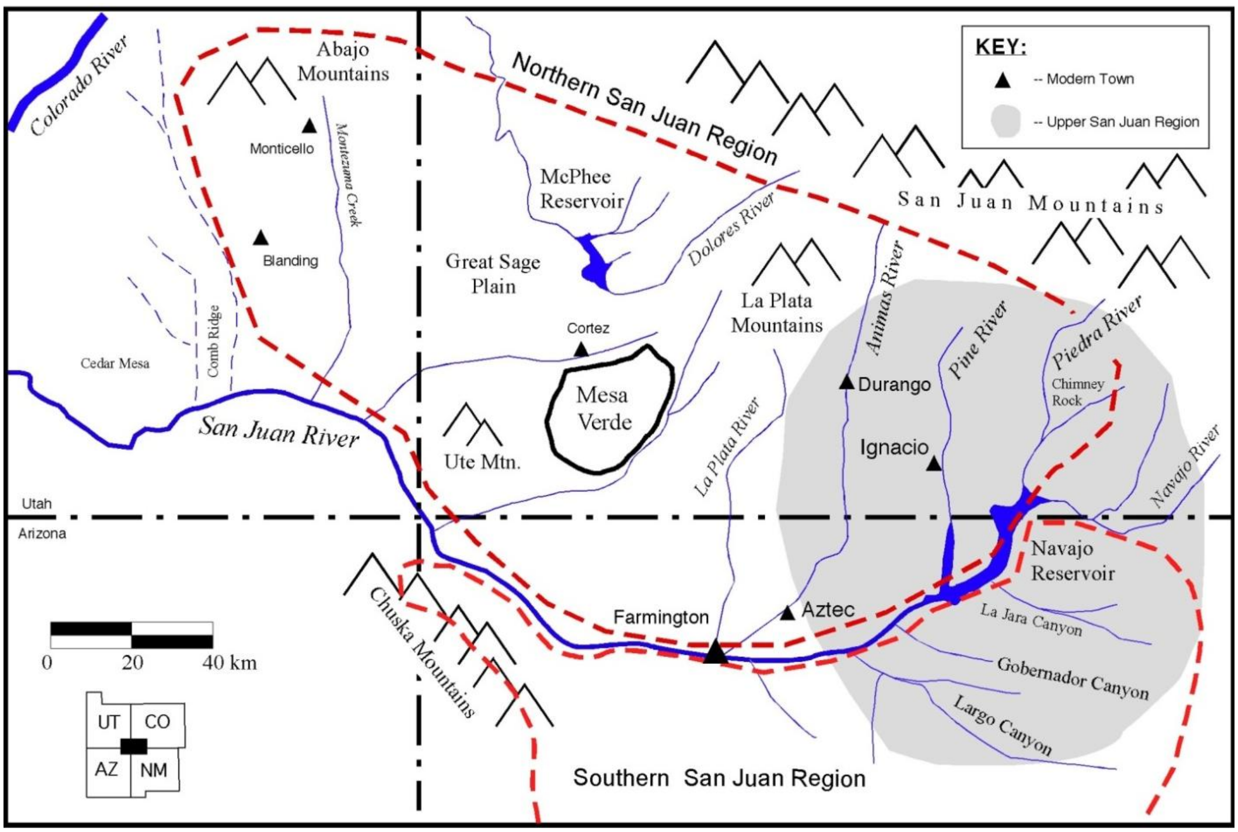


Figure 7. Chimney Rock Region and locations of surveys and work summarized in this section. Map from Chuipka et al. (2009: Figure 4).

In 1925, Jeancon returned for one final field season in the area, conducting excavations at the Harlan Ranch near the Piedra River (Roberts 1930:17). No research was completed in the area during 1926 and 1927. In 1928, Roberts, now at the Smithsonian Institution, returned and completed excavations of Pueblo I and early Pueblo II sites on Stollsteimer Mesa (Roberts 1930). These excavations resulted in the definition of the Piedra Phase Unit between A.D. 850 and 950 (Eddy 1966: 492-499).

About 40 km south of Chimney Rock, the Museum of New Mexico completed an important series of site surveys and excavations along the San Juan River, now Navajo Reservoir, between 1958 and 1963 (Dittert, Hester, and Eddy 1961). Many Pueblo I and Pueblo II sites were recorded during this research, along with sites representing time periods spanning A.D. 1-850. The Ancestral Puebloan cultural patterns identified through this work were labeled: Los Pinos (A.D. 1-400), Sambrito (A.D. 400-700), Rosa (A.D. 700-850), and Arboles (A.D. 950-1000) (Eddy 1966: 472-484).

In 1969, 1970, and 1973 under a contract with the Southern Ute Tribe, the University of Colorado surveyed approximately 45,000 acres on the Southern Ute Reservation, to the east of the Navajo Reservoir District, along the San Juan River and towards Pagosa Springs. The survey recorded 226 sites of the Rosa, Piedra, and Arboles Phase, representing the time periods between A.D. 700 and 1050 (Adams 1975; Eddy 2004:25-26).

In 2008 and 2009, Woods Canyon Archaeological Consultants, Inc. completed the Northern San Juan Settlement Survey and testing project in La Plata and Archuleta counties in southwestern Colorado. The project area included 148,000 acres between Durango, CO and Chimney Rock (Figure 8). The goals of the project were to 1) Clarify the archaeological record for this area from the Paleoindian through Protohistoric periods, and 2) to develop a cultural resource management plan to better evaluate, manage, and protect these resources (Chuipka et al.

2009:1). This work was organized around three major river drainages: the Animas River; the Piedra River; and the Pine River (Chuipka et al. 2009:1).

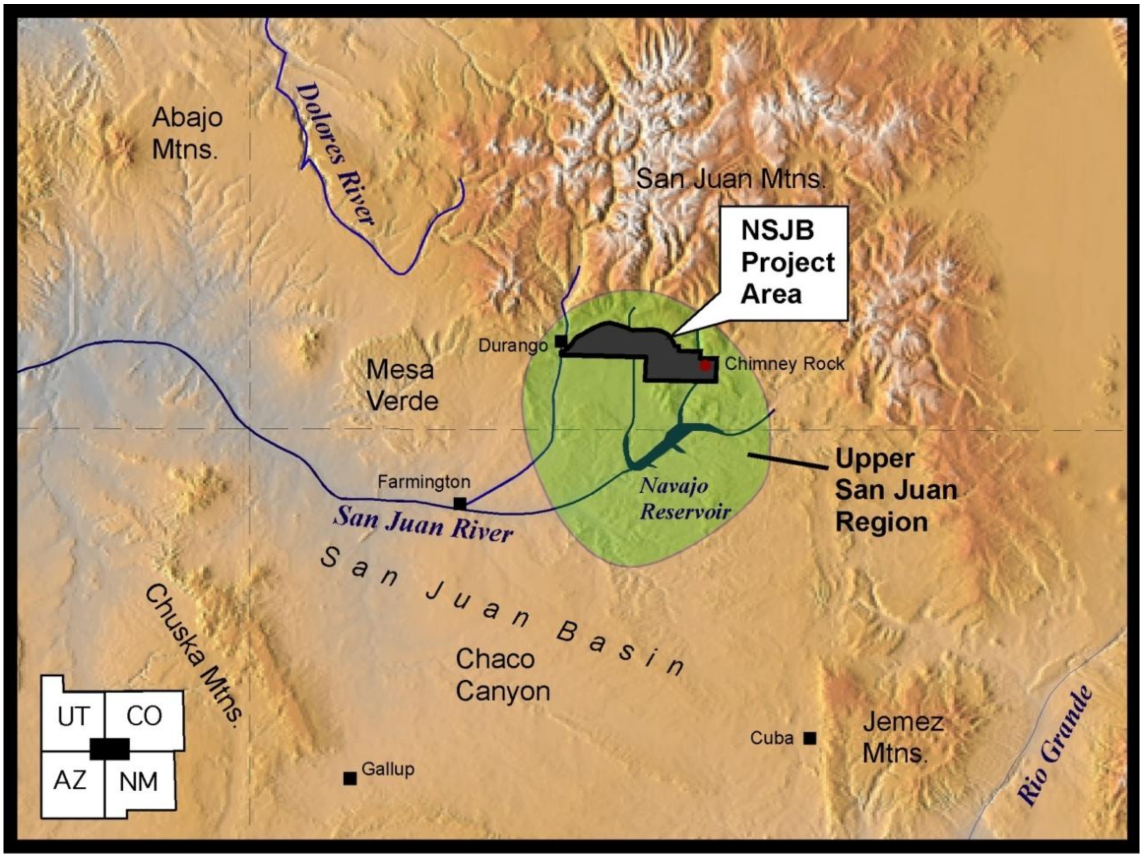


Figure 8. Northern San Juan Basin Project Area. Map courtesy of Jason Chuipka, Woods Canyon Archaeological Consultants, Inc.

Survey and testing of the Animas River drainage completed by Woods Canyon Archaeological Consultants, Inc. (Chuipka et al. 2009) revealed sparse evidence for Paleoindian, Archaic, and Basketmaker II presence on the landscape; no evidence for Basketmaker III, strong evidence for Pueblo I; no evidence for Pueblo II, Pueblo III, and Navajo; and sparse evidence for Ute occupation. Survey and testing along the Pine River drainage revealed sparse evidence for Paleoindian, Archaic, and Basketmaker II occupation; no Basketmaker III; widely spaced, single unit Pueblo I habitations pre A.D. 850 and two villages post-A.D. 850; no Pueblo II sites; Pueblo III hunting camps; two Navajo settlements, and no Ute presence. Survey and testing of the Piedra

River Drainage revealed sparse evidence for Paleoindian, Archaic, and Basketmaker II; no Basketmaker III sites; a few small Pueblo I sites; Pueblo II occupation centered around Chimney Rock; and no Pueblo III sites; numerous Navajo sites; and no Ute sites (Chuipka et al. 2010).

2009 University of Colorado Research

In 2009 the author directed excavations and fill reduction related to stabilization purposes at the Chimney Rock Great House (5AA83) in southwestern Colorado. This research is summarized in the remainder of this chapter. For a full report, see Appendix A. The research is presented in sections summarizing "Objectives and Research Design," "Field Methods," "Analytical Methods," and "Results."

Objectives and Research Design

Excavations completed by the University of Colorado in 2009 at Chimney Rock Great House (5AA83) excavated one quarter of two rooms (5 and 7) below floor and to the bedrock underlying the Great House. The opportunity to complete the research was provided by the need for fill reduction for stabilization purposes at the site. To this end, fill was first reduced in Rooms 5 and 7 by at least 50 cm from modern ground surface to equalize load differentials on prehistoric wall fabric (as specified by Hovezak 2007).

Excavations at the Great House addressed three major research questions. First, was the Chimney Rock Pueblo built in a single planned construction effort in A.D. 1076 and then re-roofed in A.D. 1093 in correspondence with major lunar standstills? Next, how does Chimney Rock Great House relate to the surrounding community? Lastly, how does Chimney Rock Great House relate to the larger Chacoan World?

Much of the existing understanding of Chimney Rock Great House hinges on a possible connection to major lunar standstills (Table 1). Both the construction and role of Chimney Rock Pueblo in the larger Chaco Region have been interpreted based upon a single cutting date of A.D. 1076 from the East Kiva ventilator, and thirteen cutting dates of A.D. 1093 from Room 8. Both A.D. 1076 and A.D. 1093 correspond with major lunar standstills, when the moon rises between the massive pillars of Chimney Rock and Companion Rock, just east of the pueblo. For approximately 2 ½ years surrounding the time of the major lunar standstill, the moon rises between the chimneys from the perspective of the Great House at least one or two times each month (Malville et al. 1991). Eddy (1977:46) contends that the pueblo was constructed in a single, planned event in A.D. 1076 by Chacoan priest-colonists, and then re-roofed in A.D. 1093 in connection to the astronomical lunar cycle. Malville (2004) argues that Chimney Rock was an astronomical observatory, built and sited to purposefully correspond to major lunar standstills to bolster the esoteric knowledge and power of the priests of Chaco Canyon.

Table 1. Major lunar standstills between A.D. 1000 and 1125 and corresponding tree ring dates from the Great House. Dates courtesy of Kim Malville, personal communication 2011.

Major Lunar Standstills between A.D. 1000 and 1125	**Corresponding Cutting Dates from the Chimney Rock Great House**
A.D. 1002	
A.D. 1020	A.D. 1018 (near cutting date – could have been cut anytime in A.D. 1018-1021).
A.D. 1039	
A.D. 1057	
A.D. 1076	A.D. 1076
A.D. 1094	A.D. 1093
A.D. 1112	

Currently, archaeologists focus heavily upon defining the relationships between Chaco Canyon and the outlying Great Houses, and the relationships between outlying Great Houses and their respective local communities (Reed 2008; Cameron 2008, Kantner 2003, Van Dyke 1999). Excavations at Chimney Rock were designed to inform on these questions by examining concepts of "emulation" vs. "export." Eddy (1977) determined that Chimney Rock was an export built by Chacoan priests. More recently, archaeologists have postulated that perhaps outliers like Chimney Rock were more akin to emulations of Chaco Canyon, rather than actual exports (Reed 2006, Cameron 2008). A careful examination of wall construction and other artifact classes such as pottery informs on this debate. For example, "hidden" construction characteristics found to be similar or identical to those at Chaco would be an indication of export, while more superficial similarities would be indicative of emulation. This excavation was designed to establish firm dates for Chimney Rock, thereby helping to place the site in time and space in reference to Chaco and to the surrounding community.

Of course, there is always the possibility that Chimney Rock Great House is neither an export or an emulation of Chaco Canyon. Given the spectacular and striking location of the site and its apparent connection to the major lunar standstill, the Chimney Rock Great House could represent a heretofore unidentified class of Chacoan Great House. The Great House may have been constructed solely as an astronomical observatory and pilgrimage location, meant to co-opt the power of the chimneys and the moon for Chaco Canyon. This possibility is explored in greater detail throughout this dissertation.

FIELD METHODS

The University of Colorado completed fill reduction and testing in two adjacent rooms, 5 and 7. Room 5 is east and Room 7 is south of Room 8 excavated by Dr. Frank Eddy in the early 1970s (Eddy 1977). These rooms were previously unexcavated. Partial excavation was needed in Rooms 5 and 7 because they share walls with rooms that had been excavated and now stand open, resulting in uneven loads on and moisture movement through the exposed prehistoric walls (Figure 9 and Figure 10). Initial excavation methodology reflected stabilization plans (Hovezak 2007), but after this task was completed, methodology was designed to address the research questions (above) through the recovery of wood samples for dating, pottery for analysis and original architecture for comparison to other Chacoan structures and to the surrounding community.

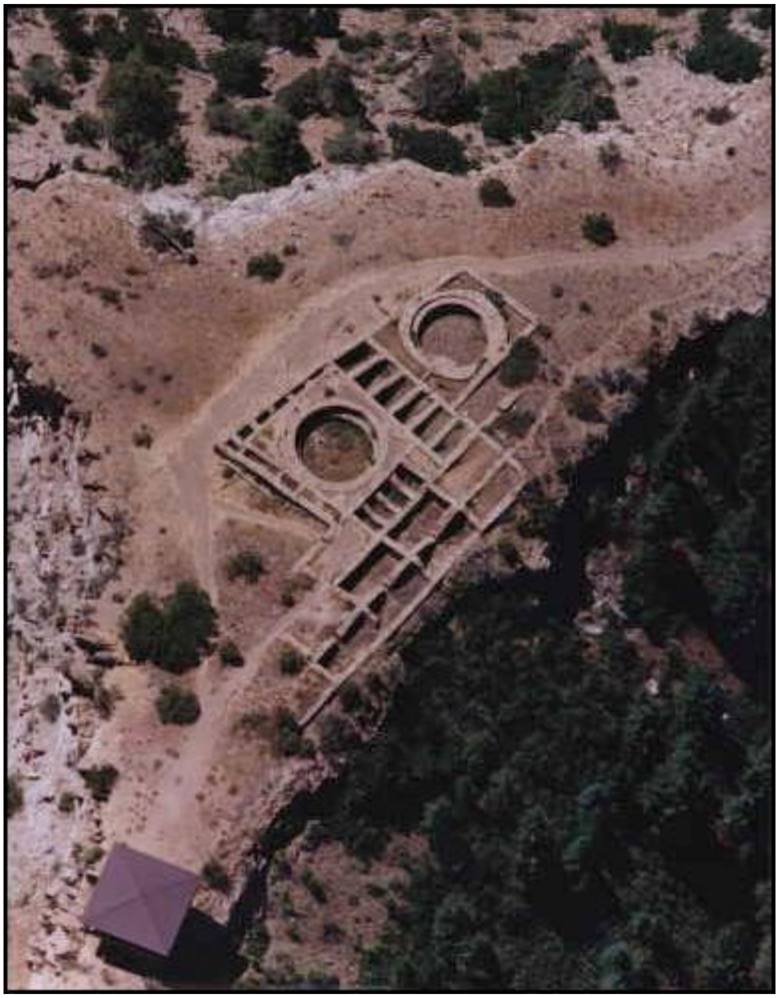
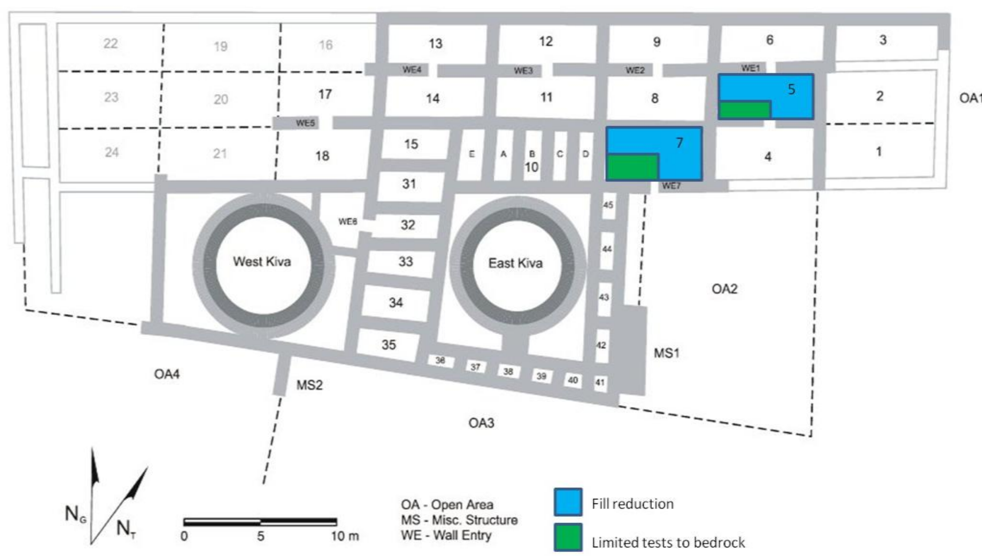


Figure 9. Aerial view of Chimney Rock Great House showing excavated and unexcavated rooms. Courtesy of Frank Eddy.



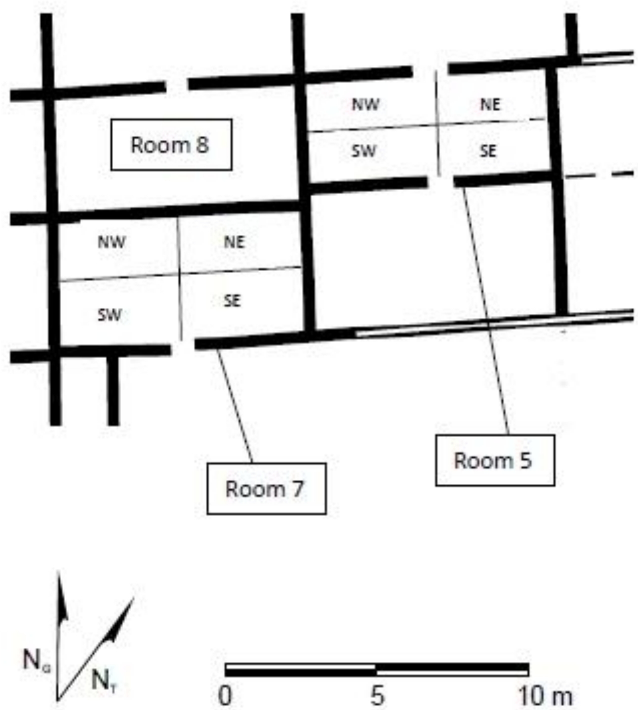


Figure 10. Location of excavations (top) and detail of location of excavations (bottom). Top map adapted from in progress base map derived from Frank Eddy's 1972 map as annotated by Steve Lekson in 2009. Drafted by Jason Chuipka, Woods Canyon Archaeological Consultants, Inc. Chimney Rock Interpretive Association's Preservation and Reconstruction Project (#2009-01-039). Bottom map adapted by Brenda K. Todd from map digitized and drafted by Jason

Chuipka, from Eddy (1977: Figure 12) and maps of pueblo revised by Woods Canyon Archaeological Consultants, Inc.

First, fill reduction was addressed. The draft stabilization plan (Hovezak 2007) indicated that the fill in Rooms 5 and 7 needed to be reduced by at least 50 cm. Each room was subdivided into quadrants (Figure 10). Work commenced in the NE quadrant of Room 5 and in the NW quadrant of Room 7. Fill reduction was undertaken in these initial quadrants with the removal of three 20 cm arbitrary levels that were completely screened. Virtually no artifacts were recovered, and it became clear that a significant portion of the upper fill in each room consisted exclusively of wall fall and sparse, re-deposited cultural material. Therefore, fill to 60 cm below modern ground surface was removed from the three remaining quadrants in each room and every third wheelbarrow was screened. Rocks from the first quadrant excavated to 60 cm below modern ground surface in each room were cairned for volume measurement, but rocks from the other three quadrants were not because they would not represent a controlled sample.

Fill reduction was completed in week 2. As detailed in the CRIA-CU contract and USDA Forest Service ARPA permit, tests were then placed in one quadrant of each room to bedrock. The author, in consultation with the USDA Forest Service chose the southwest quadrant of each room for complete excavation. One of the primary reasons that the SW quadrants were chosen in both rooms was the hope that potential doors could be further defined in the south walls of each room. These quadrants were excavated using a combination of arbitrary levels and natural stratigraphic levels.

One floor surface was identified in Room 5 (Figure 11) and two floors were identified in Room 7 (Figure 12 and Figure 13). The lower floor surface in Room 7 was approximately 3 cm below the upper floor surface. Burned roof debris was located on and above room floors, below wall rubble. Numerous charred wood samples for dendrochronological dating were recovered from both rooms. In Room 7, the ceiling appears to have been heavily burned before collapsing directly onto the floor of the room. In Room 5, burned roof materials occurred in lenses. These lenses were thick, possibly aeolian strata. Room 5 was nearly devoid of artifacts above the floor surface, with the exception of a grizzly bear jaw. The Room 7 floor yielded approximately 150 ears of burned corn, several potentially reconstructible partial pots, an elk antler, and a complete pot built into the floor (Figure 14, Figure 15, and Figure 16). Subfloor excavations in Room 5 yielded a significantly higher density of artifacts than work above the floor. A large lithic biface, animal bone, and a small amount of pottery were recovered from subfloor contexts. Room 7 also yielded a considerable amount of animal bone from subfloor fill. Both rooms were excavated to bedrock, which was approximately 15-20 cm below room floor. The exact depth of fill between floor and bedrock is variable due to the natural slope of the bedrock on the Chimney Rock Mesa. There were two features in the bedrock of Room 5: a hearth hollowed out of the bedrock; and an unburned basin. The bedrock beneath Room 7 was featureless.

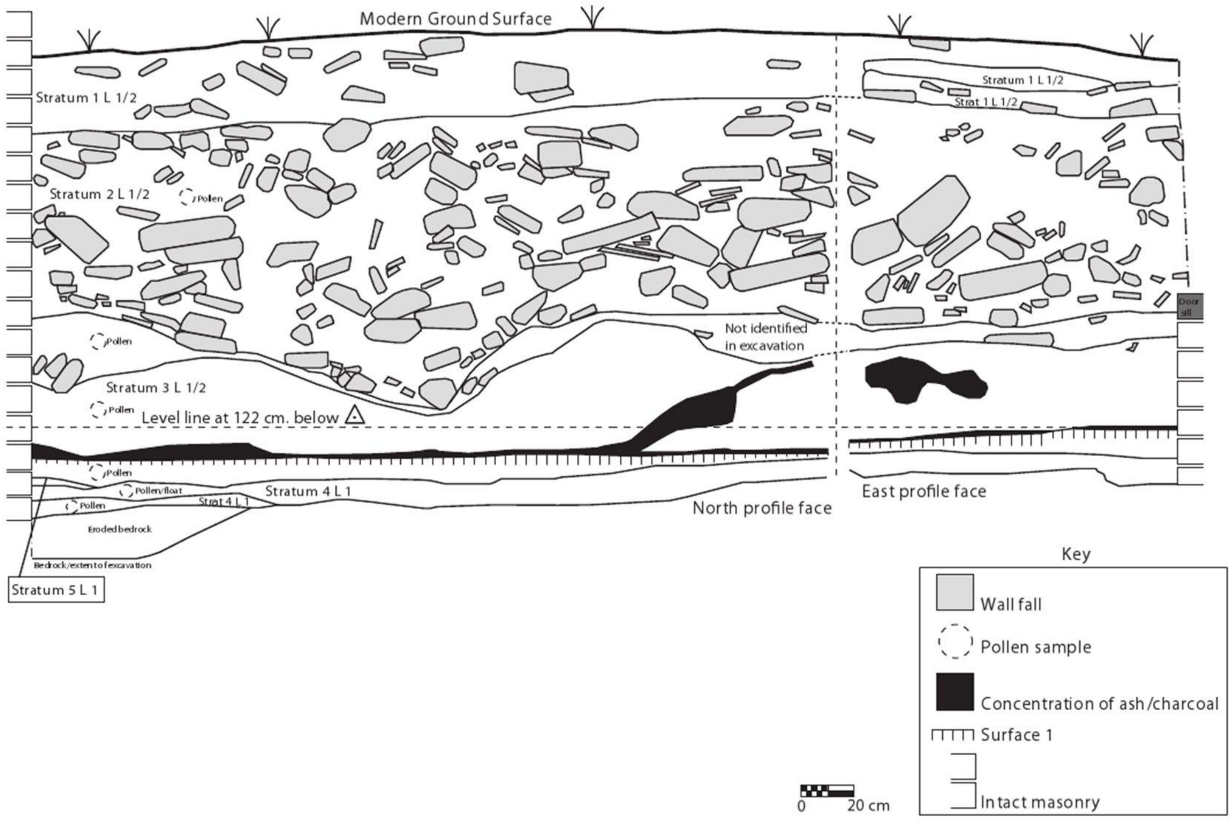


Figure 11. Room 5, composite profile of north and east faces of the Southwest Quadrant. Note Surface 1, and concentration of ash and charcoal.

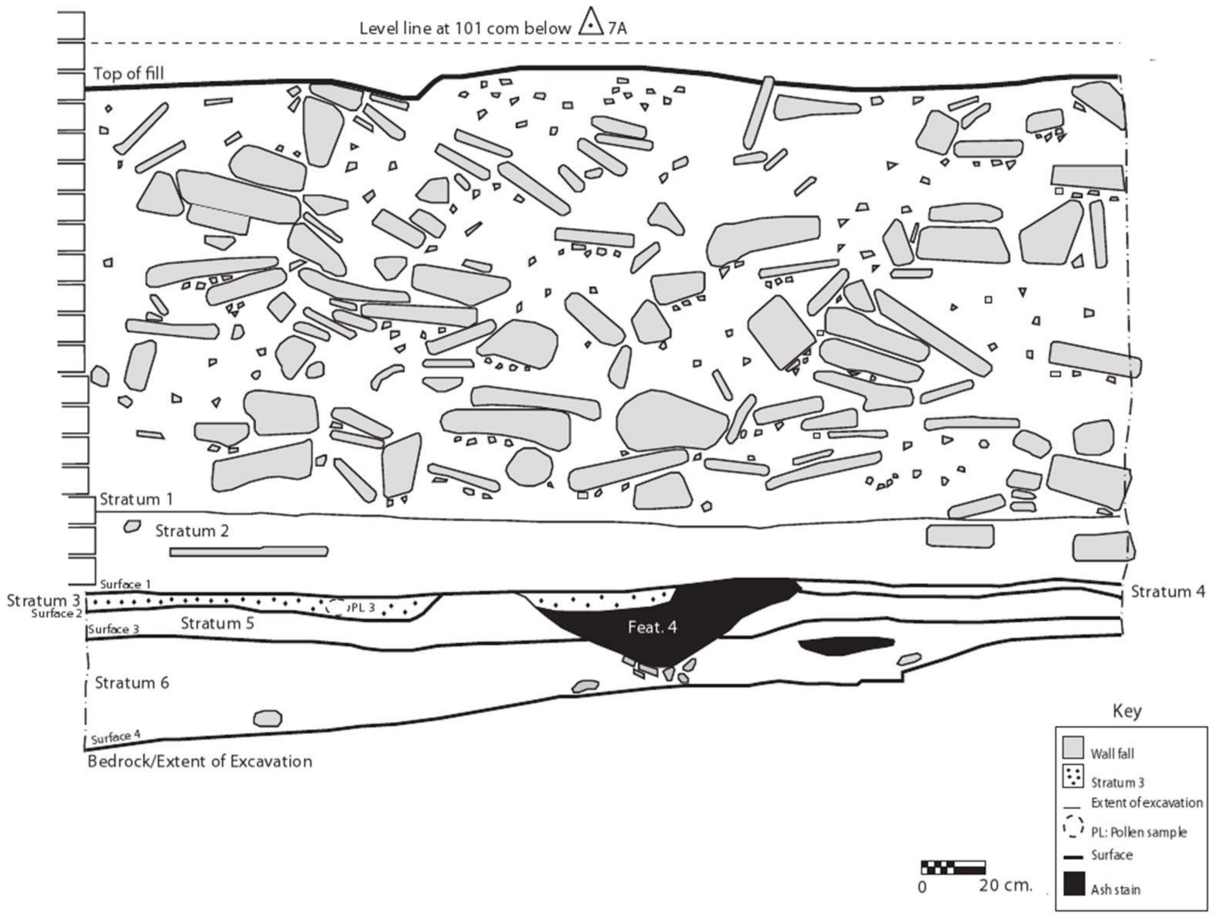


Figure 12. Room 7, Profile of north face of Southwest Quadrant.

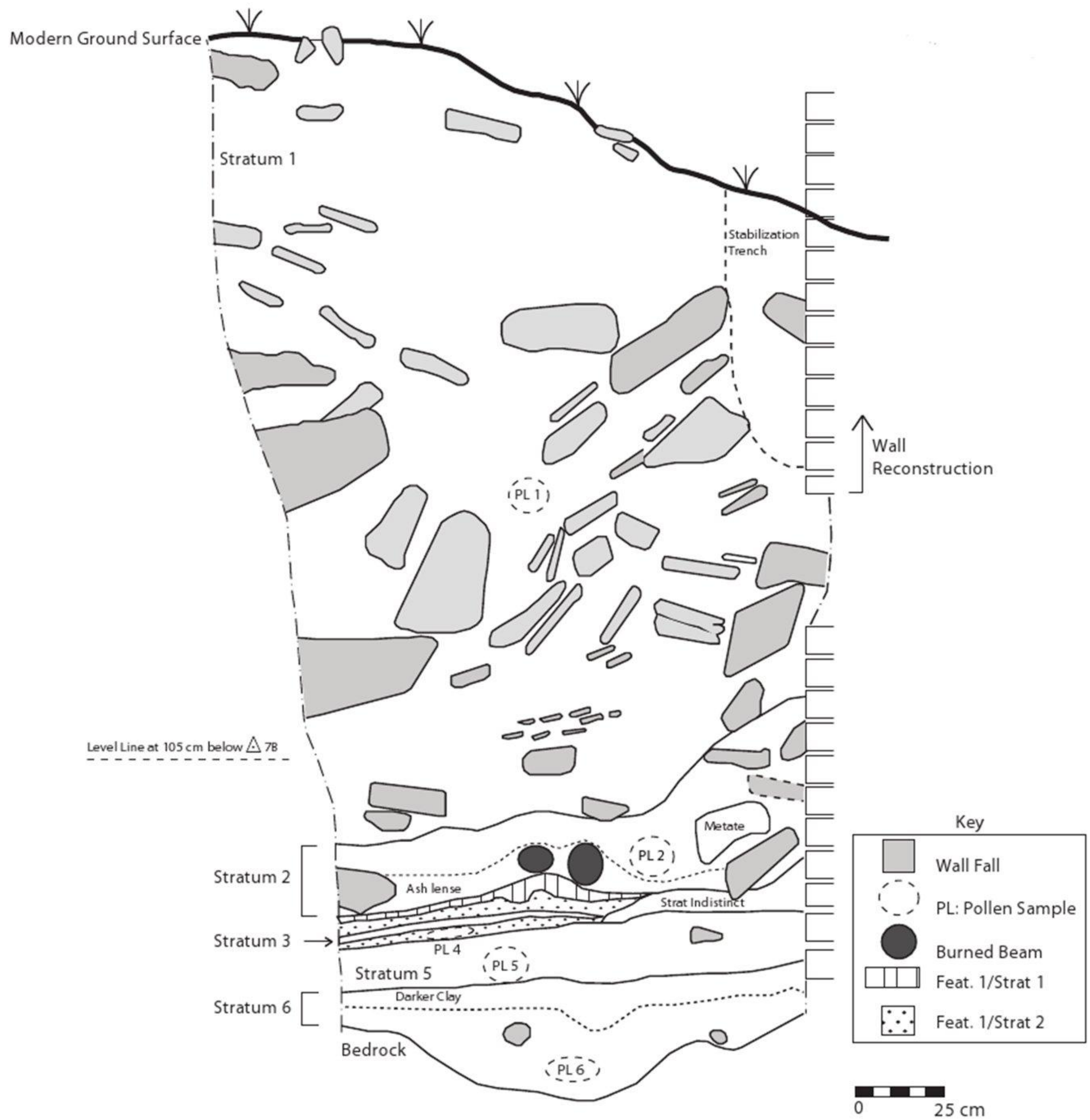


Figure 13. Room 7, east face profile of Southwest Quadrant. Feature 1 is a refuse deposit.

Figure 14. Pot installed concurrently with Surface 1. Note that the orifice of the pot is flush with Surface 1

Figure 15. Pot installed concurrently with floor, nearly completely excavated.

Figure 16. Close-up of burned corn and botanical material on floor of Room 7.

ANALYTICAL METHODS

Materials recovered from Chimney Rock Great House were analyzed by the most appropriate individual or institution for each artifact category, working in close coordination with the author (Table 2).

Table 2. Artifact analysts and institutional affiliations.

Artifact Class	Analyst	Institution
Ethnobotanical Materials	Dr. Karen Adams	Crow Canyon Archaeological Center
Wood Samples for Dendrochronological Dating	Laboratory Staff	Laboratory of Tree Ring Research

Ceramics	C. Dean Wilson	Laboratory of New Mexico Office of Archaeological Studies
Faunal Material	Brigit Burbank under the supervision of Dr. Robert Muir	Simon Fraser University, British Columbia, Canada
Lithic Material	Jakob Sedig	University of Colorado
Corn Sourcing	Dr. Larry Benson (USGS) and Kellam Throgmorton (CU)	United States Geological Survey (USGS) and University of Colorado (CU)
Groundstone	Brenda K. Todd	University of Colorado

SUMMARY OF RESULTS

The following pages summarize the results of the analyses of individual classes of artifacts. For complete analysis reports, see Appendix A.

CHIPPED STONE

Analysis of chipped stone from Chimney Rock Great House was completed during the fall of 2009 by Jakob Sedig, project crew member and University of Colorado graduate student. Fifty-four pieces of chipped stone were recovered from Rooms 5 and 7 during fill reduction activities and limited testing. Each piece of chipped stone was classified into one of the following three categories: debitage, flake tool, or formal tool. Only four formal tools, including three projectile points and one biface, were identified in this assemblage. Material types were also identified, using the Warren Code System (Warren 1967).

Twenty-three pieces of chipped stone were recovered from Room 5. Ten were classified as debris/shatter, 3 as broken flakes, 5 as flake fragments, 2 as utilized flakes, and 1 piece as a modified flake. The two formal tools identified include a broken orthoquartzite projectile point and a finely made biface (Figure 17 and Figure 18). Fifteen distinct types of raw material were identified in the assemblage, with the most common raw material type being local cherts and siltstones. The 15 distinct types of raw material can be consolidated into 8 broad categories that include local cherts, siltstones, basalts, quartzites, Burro Canyon Orthoquartzites, Narbona Pass chert, and unidentifiable material. The majority of flake fragments, broken flakes, and utilized and modified flakes were recovered from contexts on or above the floor, indicating that most lithic reduction activities associated with the room happened after the construction of Room 5. The biface was recovered from sub-floor contexts and was manufactured from an exotic stone type, Alibates chert from Texas. Since no debitage of Alibates chert was found at Chimney Rock, it is likely that the tool was manufactured elsewhere and transported to the site as a finished piece. Interestingly, the only other tool from this room, a projectile point, was also found in subfloor contexts.

Figure 17. Orthoquartzite projectile point fragment recovered from Room 5.

Figure 18. Biface (possible Alibates chert) recovered from Room 5.

Thirty one pieces of chipped stone were recovered from Room 7. Eleven of these were categorized as debris/shatter, 1 as a broken flake, 3 were flake fragments, 4 were complete flakes, 9 were utilized flakes, 2 were formal tools (chalcedony projectile points, Figure 19 and Figure 20) and 1 was a spent core. Thirteen types of raw material were present in the room and these can be grouped into 8 broad categories: local cherts, siltstones, undifferentiated clays, basalts, quartzites, red jasper, Narbona Pass chert, and unidentifiable material.

Figure 19. Chalcedony projectile point recovered from Room 7.

Figure 20. Chalcedony projectile point recovered from Room 7.

While the sample size is too small to infer a great deal about chipped stone at Chimney Rock Great House, a few patterns can be noted. No correlation between chipped stone material type and chipped stone type (debitage, flake tool, formal tool) or chipped stone type and provenience was noted in either Room 5 or Room 7. Most of the chipped stone in both rooms was classified as debris/shatter. Like Room 5, material types in Room 7 were dominated by local cherts and siltstones. Unlike Room 5, complete flakes and flakes with cortex present were found in Room 7. This is suggestive of different stages of lithic reduction being completed in each of the two rooms: earlier, hard hammer reduction in Room 7 and later, soft-hammer reduction in Room 5. The biface and two of the projectile points were likely manufactured elsewhere and transported to the site based upon the lack of debitage of the same material type as these particular tools. Other expedient tools (not recovered), were likely made and used on the site. Three pieces of Narbona Pass chert, a non-local material type originating in the Chuska Mountains, were recovered from the rooms. Narbona Pass chert is found more frequently in Chaco Canyon between A.D. 1050 and 1100, so it is not surprising that it be recovered at Chimney Rock, an outlying Chacoan Great House. Cameron (2001:85) notes that Narbona Pass

Chert "may have had value beyond the utilitarian," possibly valued as a gift, or as a minor tribute. No evidence for specialized tool manufacture was noted.

GROUNDSTONE

Basic groundstone identification and analysis was completed by the author. Fifteen groundstone specimens were recovered from Rooms 5 and 7. Much of the recovered groundstone appears to be from secondary depositional contexts, with a very few exceptions.

Nine groundstone artifacts were recovered from Room 7. Two small, unidentifiable pieces of groundstone were found in the upper fill of the room. Pieces of a fairly large metate (41x22x8 cm) were removed from Stratum 2 Level 2 of Room 7, the heart of the burned roof material. The metate may have been stored in or on top of the roof. Two pieces of groundstone were point located to floor Surface 1. These include a broken piece of a smooth, shaped slab and a portion of a large two-handed mano (16x11x4 cm). There was some burning on the broken end of the mano. One indeterminate piece of groundstone was recovered from the three centimeters of yellow sand found on top of Surface 3 in places. One shaped disc, likely a pot lid was recovered from Stratum 5, the construction fill laid on top of Surface 3 to create a flat floor surface for the room. This fill was mottled, and likely from a variety of different sources. Two pieces of groundstone were recovered from Stratum 6, the natural sediments atop Chimney Rock Mesa. These pieces include a one-handed mano and a circular shaped stone, likely a pot lid.

Six groundstone artifacts were recovered from Room 5. A hammerstone, two incomplete pieces of a heavily used mano, and a one handed mano were found in upper room fill dominated by wall fall and Aeolian deposits. A piece of a broken one-handed mano and a smooth shaped stone slab were recovered from Stratum 3 Level 1, approximately 30 cm above the only floor surface in the room. One hammerstone was recovered from Stratum 4, the cultural fill immediately below Surface 1.

FAUNA

Faunal analysis was completed by Brigit Burbank, a student at Simon Fraser University, under the supervision of Dr. Robert Muir during the Fall of 2009. Five hundred and ninety-four fragments of bone, teeth, antler, and ossified cartilage were recovered from Rooms 5 and 7. Three hundred and sixty-one fragments could be confidently identified as belonging to 19 different taxonomic categories. The categories range from the general (i.e. small mammals) to the more specific (i.e. porcupine, vole, wood rat). The assemblage is dominated by the medium mammal category, but it is possible that some larger mammals are simply so fragmentary that they appear to be medium mammals. Larger mammals, including artiodactyls and grizzly bear, and birds were also identified in the assemblage.

Two hundred and twenty two of the 594 fragments were assigned to the medium mammal category, 71 of the fragments were assigned to the artiodactyls taxon, and 38 were assigned to the cervid taxon. The cervid taxon is likely overrepresented because it consists of 38 antler fragments that probably originate from a single set of antlers. A grizzly bear mandible with teeth was identified. The remaining 15 taxonomic categories, all represented by 6 fragments or fewer, include various small, medium, and large birds, rodents, canis sp., elk, and deer.

Some comparisons can be made between faunal remains recovered from Eddy's excavations (analyzed by Harris 1977), and those recovered in 2009. Both assemblages are dominated by artiodactyls, contain immature artiodactyls, porcupine, and all of the taxa identified in the 2009 assemblage were also identified in Eddy's assemblage. Neither assemblage has many bird bones. Eddy's assemblage included some taxa not identified in the

2009 assemblage: these include grouse, bobcat, mountain lion, beaver, muskrat, and otter. Rodents and lagomorphs are more abundant in the earlier assemblage as well. These disparities are likely due to differences in sample size and the fact that Eddy's collection included a considerable amount of surface material.

While the faunal assemblage recovered in 2009 is too small to draw conclusions about diet, seasonality or function of the structures, some broad trends were defined. Like the inhabitants of other Chacoan Great Houses, the inhabitants of Chimney Rock consumed mostly deer and antelope (Plog 1997: 109). The lack of bird remains is likely indicative of an active choice to not consume birds. It is also unlikely that birds such as turkeys and macaws were being raised or traded at Chimney Rock. The most surprising find in the faunal collection was the mandible of a grizzly bear. The mandible was almost completely intact and nearly all the teeth could be refitted. Bears may have been of ritual importance at Chimney Rock, as indicated by a small bear effigy recovered from the guardhouse and a bear paw petroglyph recovered in the vicinity of the Great House (Malville 2004:7).

Strontium Analysis of Corn

Corn recovered from Room 7 was subjected to strontium (SR) analysis (Appendix D) by Dr. Larry Benson of the United States Geological Survey with the assistance of Kellam Throgmorton, project crew member and University of Colorado graduate student. Strontium analysis is used to determine the ultimate source of organic materials. Strontium isotopes occur naturally in surface sediments and in soil water. Plants that are grown in an area with a given 87SR/86Sr isotope ratio will acquire that isotope signature through the intake of water (Benson 2010: 622).

Burned corn suitable for strontium analysis was recovered from the floor of Room 7. Dr. Karen Adams analyzed ethnobotanical materials from Chimney Rock and determined that the corn from Room 7 was representative of two land races. Samples from both land races were tested for their strontium signatures. Rabbitbrush growing in three separate locations surrounding the Great House were collected to determine the strontium isotope signature of the local area. Rabbitbrush is a good indicator species for locales where corn could have been grown because it has similar growing requirements.

All but one of the cobs analyzed had elevated aluminum (Al) values, suggesting some level of mineral contamination. The cobs were not cleaned prior to analysis because they appeared to be free of mineral material and the cleaning process can sometimes be detrimental to strontium analysis. The rabbitbrush samples also had elevated Al values despite appearing clean.

Despite the minor mineral contamination issues, the 87Sr/86Sr results cluster and correlate best with themselves and not with the Al values. The maize samples tested are also within the range exhibited by the rabbitbrush collected in the immediate area. The 87Sr/86Sr values of the archaeological cobs range from 0.710014 to 0.710170 (with an average error of 0.0000115), while the rabbitbrush values range from 0.710082 to 0.711259 (with an average error of 0.0000093). This suggests that the corn recovered at Chimney Rock Pueblo was grown locally in the valley below the site. There is no significant difference in the strontium ratios of the two distinct types of corn analyzed. While there are a number of other potential sources for the maize based on previously published strontium data, the presence of delicate and easily destroyed parts of the maize plant lend credence to our interpretation that the Chimney Rock maize was grown locally.

ARCHAEOBOTANICAL ANALYSIS

Dr. Karen Adams completed an analysis of archaeobotanical materials recovered from Chimney Rock during the summer and fall of 2009. Thirty-seven macrobotanical samples and 11 flotation samples were analyzed.

At least fourteen different taxa/parts were identified in the flotation samples from Rooms 5 and 7. These include: sagebrush, mountain mahogany, cheno-am, conifer, juniper, pine, pinyon, ponderosa, cottonwood, chokecherry, Douglas fir, bitterbrush, oak, rose family, and maize. All of these were charred and are assumed to have been burned by the prehispanic inhabitants of Chimney Rock Great House.

Of the thirty-seven macrobotanical samples analyzed, domesticated maize (Zea mays) was the most ubiquitous, and therefore likely of great importance to the prehistoric residents of Chimney Rock Great House. Further, the diversity of maize parts present in the sample indicates that the food source was being grown near the pueblo. The density of maize was most notable in Room 7 where a pile of ear segments/fragments, some with kernels attached, and left over maize cob segments/fragments and shanks were stored or discarded within the pueblo (Figure 21). The majority of the remaining macrobotanical samples are most probably remains of roofing material in Room 7. Charred fragments of juniper, Douglas fir, ponderosa pine, and pinyon were present and were likely roof construction elements. Mountain mahogany, bitterbrush, and sagebrush may have been used as closing materials above the primary and secondary beam layers of the roof. In Room 7, short cigar-shaped maize cob segments with 10 rows of kernels were found in association with the latest floor surface (Surface 1). Fragments of Douglas fir, likely used as fuel, were found associated with a hearth (Feature 4) associated with an earlier floor. Most of the macrobotanical material from Room 5 was from a mixture of Aeolian, natural, and wall fall/roof fall deposits. Two samples from roof fall above the floor contain some of the same woody plant taxa/parts thought to be part of the Structure 7 roof, indicative of consistent choices in construction materials. Three charred maize kernels with pop/flint endosperm were preserved on the thick adobe floor of Room 5.

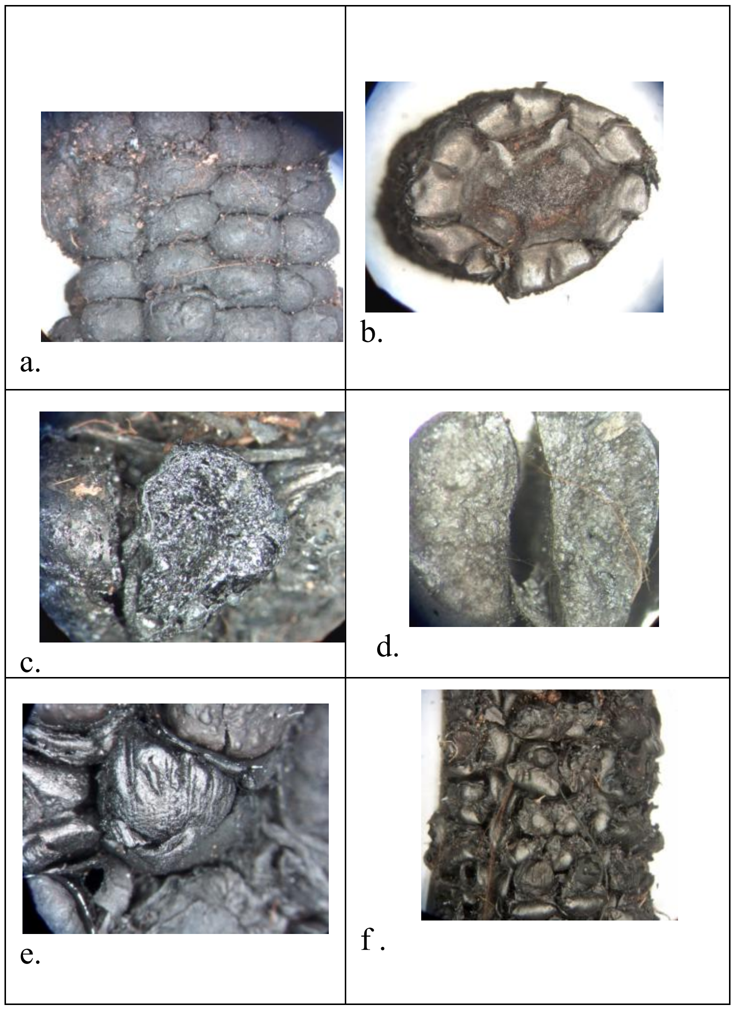


Figure 21. (Above) Charred maize (Zea mays) parts, all from the burned roof fall layer within Room 7. (a) Ear with mature kernels still attached, photographed through a macro lens; (b) cross-section (transverse) view of a 12-rowed maize cob segment, at 8x magnification; (c) interior view of a maize kernel (center of photo) with possible flour endosperm characterized by a porous and light-reflective surface, at 32x magnification; (d) interior view of two halves of a maize kernel with pop endosperm characterized by a very fine-grained non-porous and non light reflective surface, at 50x magnification; (e) kernel with striations across the top, at 50x magnification; (f) ear with sunken-in and hollow immature kernels, at 8x magnification. Figure from Adams analysis of Chimney Rock Archaeobotanical material, Todd (2011) Appendix E.

Flotation samples yielded evidence of the use of other wild plant resources as food by the residents of the pueblo. Cheno-am seeds could have been harvested from goosefoot or pigweed plants that came up as weeds within maize fields. Chokecherry seeds indicate the harvest of chokecherries from trees in riparian areas. Pinyon pine cones present in the flotation samples may indicate the use of pinyon nuts as occasional food resources, or may simply be the result of inadvertent entry on wood.

Observations of maize ears, cobs, kernels, and shanks suggest the presence of two landraces grown by prehistoric farmers. Cigar-shaped ear/cob specimens, kernels with husk striations, and an average kernel row number of 12 along with the presence of pop and flint kernels within the assemblage are indicative of maize similar to Chapalote or Basketmaker. Maize with gradual ear/cob taper, possible flour kernels, relatively large shanks, and 14 or 16 rows of kernels are similar to historic Rio Grande Pueblos large-eared flour maize land races. However, the Chimney Rock maize is not nearly as large as the Rio Grande maize.

Some inferences about seasonality can be made. Chokecherries are harvested in the early summer, and Cheno-ams can be gathered in the mid-summer through early fall. Maize is harvested in the late summer or early fall. Agricultural activities, such as field preparation, planting, and husking and drying corn can take place over much of the year. The plant record offers no indication for or against year round occupation of Chimney Rock.

DENDROCHRONOLOGY

Fifty-six wood samples were collected for dendrochronological analysis. Twelve total dates were returned, seven from Room 7 and five from Room 5. A short explanation of the symbols used in the following tables is provided here and in Appendix F. This information is taken directly from the Laboratory of Tree Ring Research website:

http://www.ltrr.arizona.edu/archaeology/explsymbols.pdf. The symbols associated with inside dates are: p, no pith ring present; and +/-, the innermost ring is not the pith ring and an absolute date cannot be assigned to it. A ring count is involved.

The symbols associated with the outside dates are: B, bark present; L, a characteristic surface patination and smoothness, which develops on beams stripped of bark, is present; vv, there is no way of estimating how far the last ring is from the true outside; +, one or more rings may be missing near the end of the ring series whose presence or absence cannot be determined because the specimen does not extend far enough to provide an adequate check; ++ a ring count is necessary due to the fact that beyond a certain point the specimen could not be dated. The symbols B, G, L indicate cutting dates in order of decreasing confidence unless + or ++ is also present.

In Room 5, all wood samples were recovered from the 30 cm directly on top of the floor (Table 3). The A.D. 1018+LB comp near cutting date (harvested anytime between A.D. 1018 and 1021) and the A.D. 1011 L comp cutting date are surprising because they are much earlier than any other dates yet recovered from the Great House. Interestingly, A.D. 1018 is a year in which a major lunar standstill occurred and A.D. 1011 is a year in which a minor lunar standstill occurred. These early dates may be indicative of a few different possibilities. First, the Great House may have been built much earlier than originally thought. The fact that the early wood samples have been stripped of their bark indicates that the wood was not old wood collected from the ground surface and integrated into the Great House. The structure may have been constructed early in the 11th century and ritually renewed during the major lunar standstill event, thus explaining the A.D. 1076 and 1093 tree ring dates. Or, the architects who built the Great House may have salvaged wood from an earlier structure atop Chimney Rock Mesa that was built at the same time as major and minor lunar standstill events. Either way, it would seem that the choice of wood was not random. And, these dates indicate human activity on Chimney Rock Mesa earlier than previously thought.

Table 3. Dendrochronological information for Room 5.

Laboratory of Tree Ring Research Specimen Number	**Chimney Rock Field Number (PD-PL)**	**Species Identification**	**Inside Date/Outside Date**
CRE-259	32-26	Ponderosa Pine	957/1024vv
CRE-260	32-27	Ponderosa Pine	931+/1018+LB comp
CRE-261	28-14	Douglas Fir	1038p /1082vv
CRE-262	28-19	Douglas Fir	1051 /1079vv
CRE-265	28-8	Juniper	964 /1011L comp

In Room 7, all wood samples came from the heart of the burned material within the room. See Table 4. The single A.D. 1070+LB comp and two A.D. 1093+LB comp dates are near cutting dates, meaning they could have been cut anytime between A.D. 1070 and 1073 or A.D 1093 and 1096, respectively. The A.D. 1093 dates are consistent with Eddy's dating of Room 8 and postulation that a work group was out cutting beams for the final roofing episode of the pueblo. Unlike Eddy's dating of Room 8, there are pre-1093 cutting dates from Room 7 indicating that some roofing material from previous construction events may have been retained during the activities circa A.D. 1093. Also of note is the fact that A.D. 1093 is a year in which a major lunar standstill occurred, and that the major lunar standstill phenomena is observable at Chimney Rock for a period of several years each cycle.

Table 4. Dendrochronological information for Room 7.

Laboratory of Tree Ring Research Specimen Number	**Chimney Rock Field Number (PD-PL)**	**Species Identification**	**Inside Date/Outside Date**
CRE-252	29-44	Douglas Fir	1025p /1070+LB comp
CRE253	29-18	Douglas Fir	1062 /1091 +vv
CRE-254	29-17	Ponderosa Pine	1008p /1055+vv
CRE-255	29-10	Douglas Fir	1047 /1080+vv
CRE-256	29-4	Douglas Fir	1006 / 1053vv
CRE-257	29-21	Douglas Fir	1054/ 1093+LB comp
CRE-258	29-22	Douglas Fir	1067 / 1093+LB comp

RADIOCARBON DATING

Four radiocarbon dates were processed as a component of our research. Two of these were from the corn on the floor of Room 7, and two were from the hearth (Feature 1) in the bedrock below Room 5.

The two dates from Room 5 are 930 +/- 40 B.P. and 970 +/- 40 B.P (Figure 22 and Figure 23). At one sigma confidence level (68% probability) these dates are A.D. 1030-1160 and A.D. 1020-1140. At two sigma confidence level (95% probability) these dates are A.D. 1020-1210 and A.D. 1000-1160.

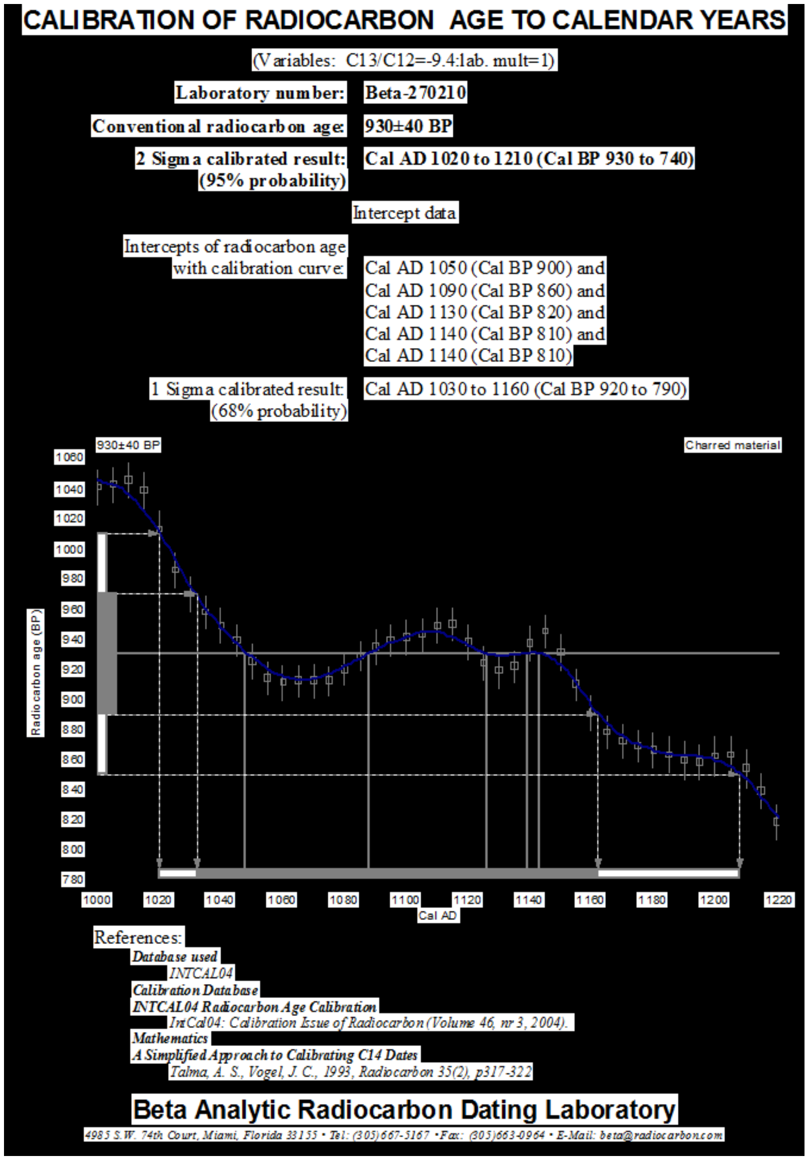


Figure 22. Calibration curve for radiocarbon sample from Room 5 (Feature 1, hearth in bedrock below the room). Processed by the Beta Analytic Radiocarbon Dating Laboratory.

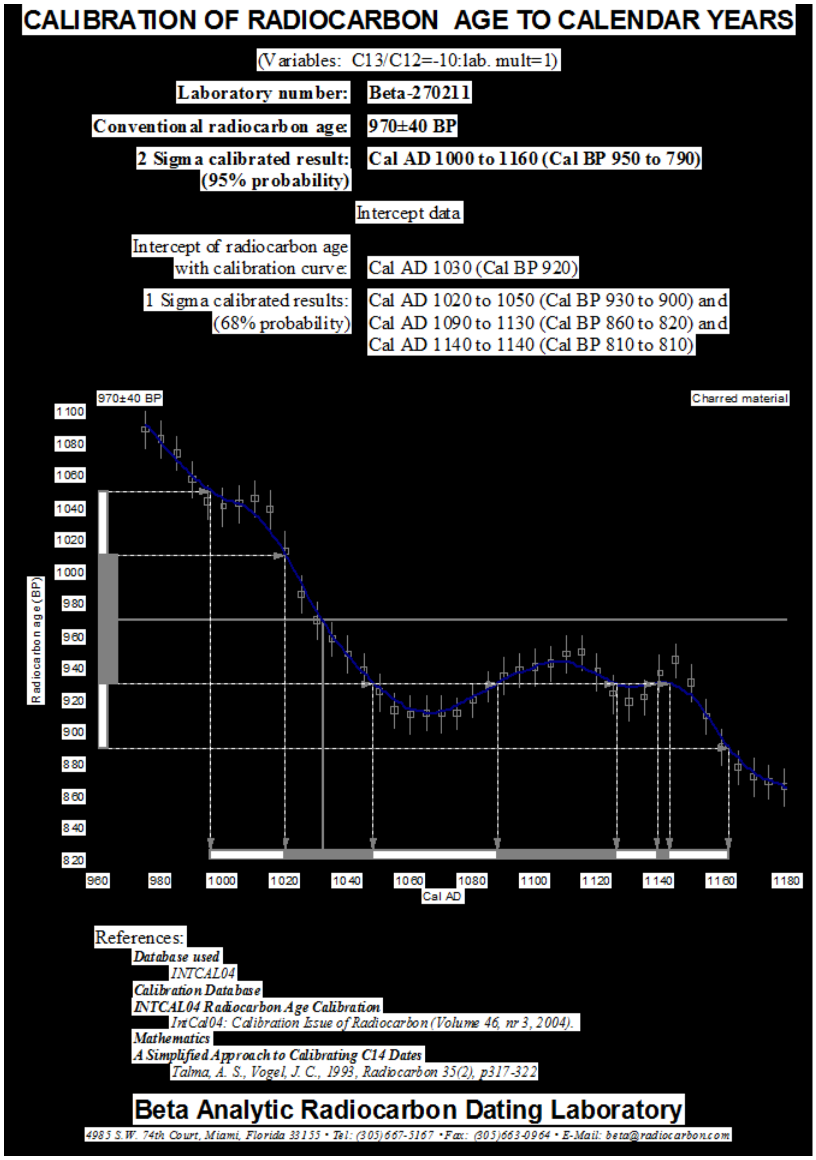


Figure 23. Calibration curve for radiocarbon sample from Room 5 (Feature 1, hearth in bedrock below the room). Processed by the Beta Analytic Radiocarbon Dating Laboratory.

The two dates from Room 7 are 955 +/- 20 B.P. and 960 +/- 20 B.P (Figure 24 and Figure 25). At one sigma confidence level (68% probability) these dates are A.D. 1028-1149 and A.D. 1026-1148. At a two sigma confidence level (95% probability) these dates are A.D. 1023-1154 and A.D. 1021-1154.

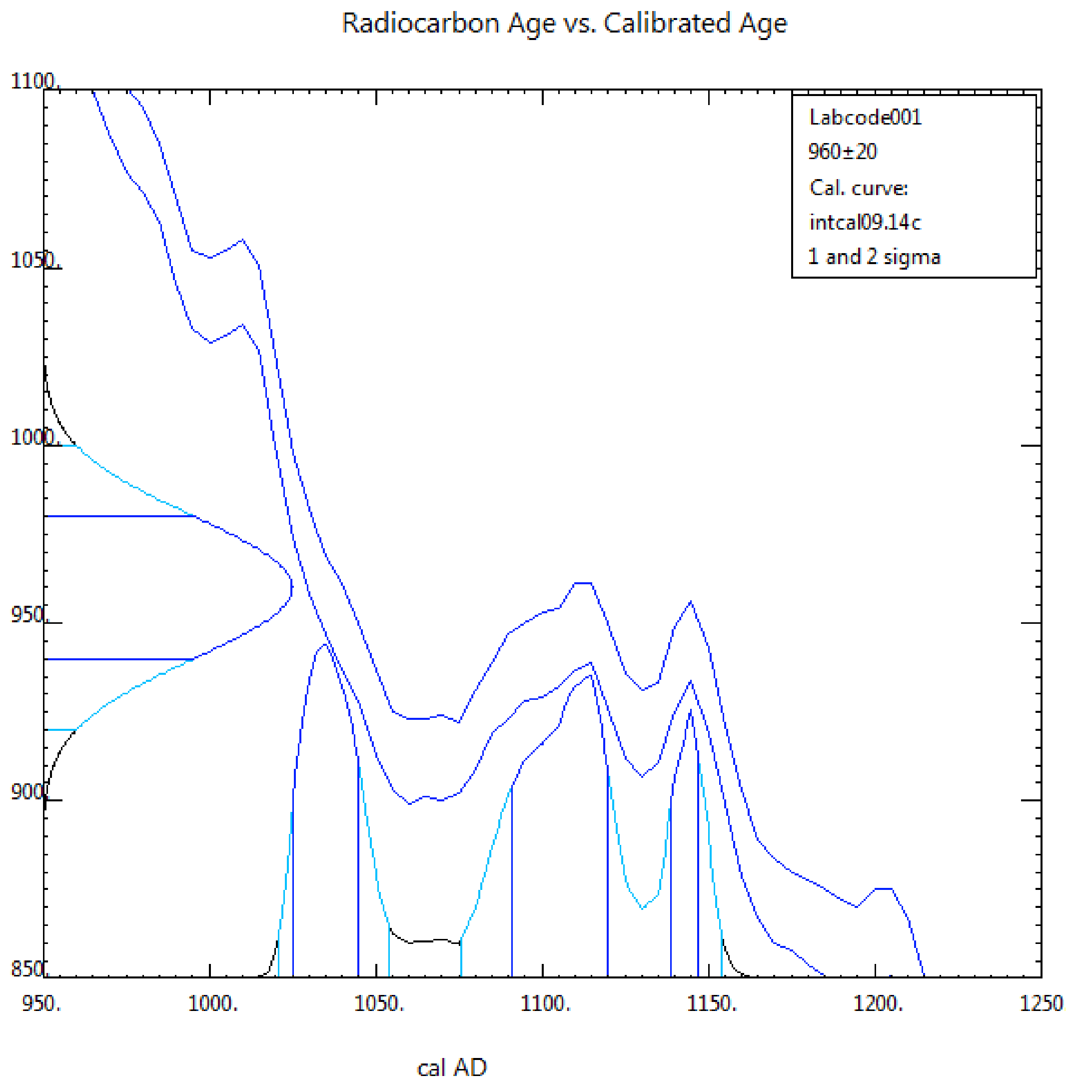


Figure 24. Calibration curve for radiocarbon sample from Room 7 (Corn lying atop Surface 1). Processed by the Keck Carbon Cycle AMS Facility, Earth System Science Department, University of California, Irvine.

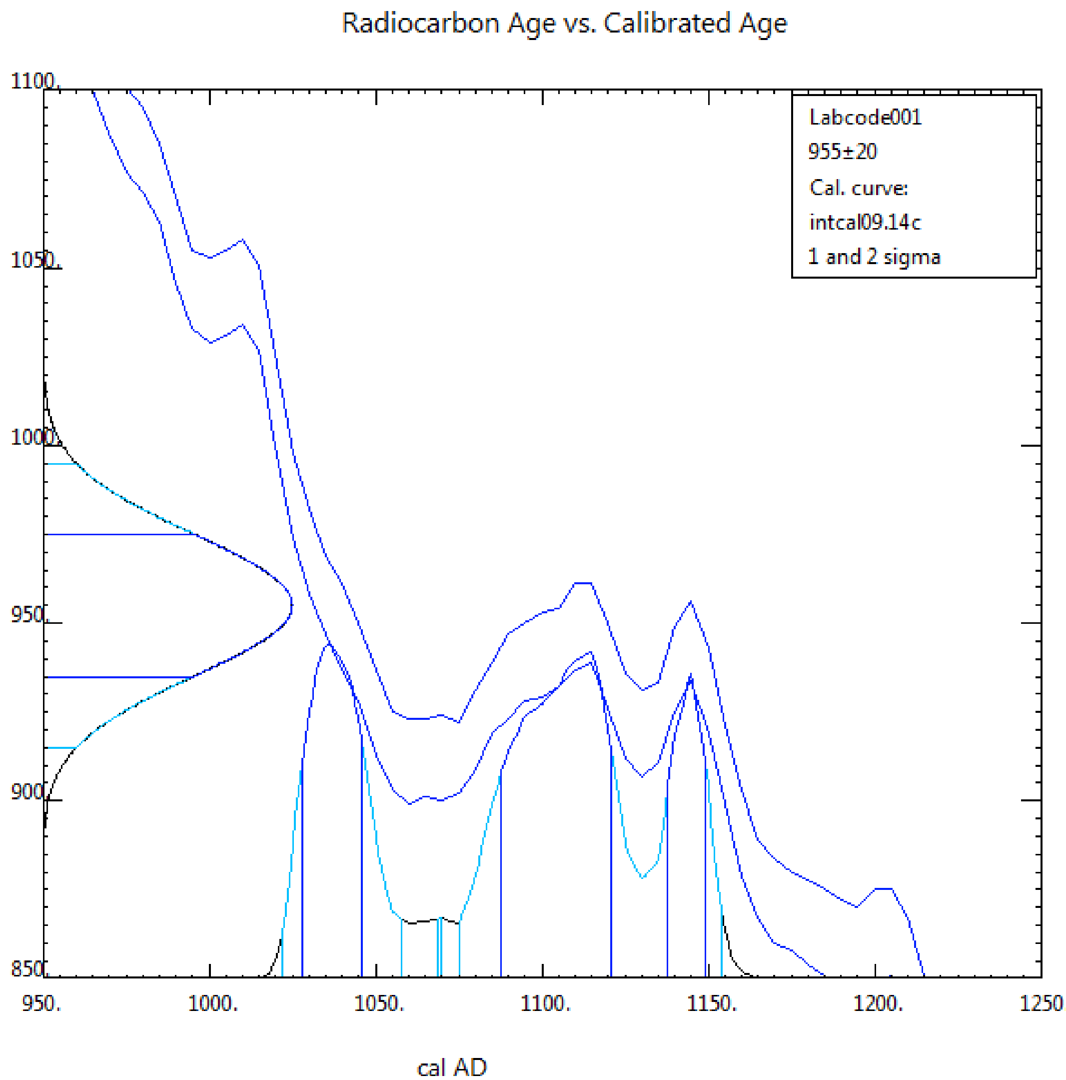


Figure 25. Calibration curve for radiocarbon sample from Room 7 (Corn lying atop Surface 1). Processed by the Keck Carbon Cycle AMS Facility, Earth System Science Department, University of California, Irvine.

The dates in the two rooms are not significantly different from one another, and unfortunately do not add a great deal of specificity to our understanding of Chimney Rock Great House. The dates do indicate that the Great House was constructed and in use during the Chaco era. They also indicate that the Chacoan inhabitants of the pueblo were likely the first and last to use the structure.

Ceramic Analysis

Ceramics from Chimney Rock Great House were analyzed by C. Dean Wilson. One thousand twenty-nine sherds were recovered, 999 from Room 7 and 30 from Room 5. The majority of the gray and white ware sherds examined from Rooms 5 and 7 had andesite/diorite temper, and are similar to that occurring in sites across much of the San Juan region. Pottery with quartz sand, trachyte, or sherd temper was also identified. Most sherds recovered from Chimney Rock Pueblo exhibit coiled or corrugated treatments over the entire surface underlying the fillet along the rim. This is typical of the majority of gray ware pottery produced in Anasazi country between A.D. 1000 and 1300. Seventy-seven percent of the pottery examined from Rooms 5 and 7 was assigned to San Juan gray ware types. The majority of sherds (79.5%) from this site are gray utility ware, with 20.4% being white wares. While most (64.3%) of the white ware sherds appear to have derived from bowls, a significant frequency (33%) are from jars. Other white ware vessel forms noted include a handed dipper. This assemblage appears to be functionally similar to those noted at other Late Pueblo II sites in areas to the south and west, with the possible exception of a higher frequency of gray ware cooking jars

A few sherds were assigned to Rosa Gray and Payan Corrugated, both types defined for the Upper San Juan tradition. A small number of sherds from a few vessels were assigned to Arboles Black-on-white, but in general assignments to this type were limited to the most distinct sherds. A very small number of sherds decorated with a diffuse organic paint were assigned to Indeterminate Organic Paint. Cibola gray wares are very difficult to distinguish from sand tempered gray wares produced in other areas of the Southwest, and were seldom recognized during the present study. A single Unpainted White Mountain Red Ware sherd was identified.

The distribution of both gray and white ware types from both Rooms 5 and 7 are indicative of an occupation during the very late part of the Pueblo II period. The overall distribution of types noted in the current study is similar, if not identical to those documented by Eddy (1977). Some of the most notable similarities include Mancos Black-on-white as the dominant white ware, and overall dominance of corrugated gray ware. Further, most of the decorated white and utility gray ware pottery from Chimney Rock Pueblo was assigned to Northern San Juan types, and a low frequency of pottery assigned to types defined for the Chaco tradition was identified in both studies.

Ceramic distributions noted at Chimney Rock support both a time of occupation and level of interaction consistent with a Chaco outlier. As is the case for other northern Chaco outliers, these assemblages contain a combination of types reflecting local production of San Juan types and types produced in the Chaco and Chuska regions to the south.

The following chapter utilizes the results of some of the above artifact analyses from Chimney Rock Great House to explore the relationship between Chimney Rock in Chaco in the export vs. emulation framework. See Appendix A for the complete Chimney Rock Technical Report.

Chapter IV

Chacoan Architecture

This chapter provides a general background of Chacoan architectural features, then describes Great Houses, plazas, kivas and round rooms, mounds and earthen architecture, and roads in greater detail to set the stage for a comparison of architectural features and history recorded at Pueblo Alto, 29SJ 627, Chimney Rock Great House, the Ravine Site, the Bluff Great House, and the Corral Canyon Site. The last section of this chapter examines and compares room size data at each of the sites.

Chaco Canyon, and by extension the Chaco region, is defined by its architecture. The pinnacle of these architectural achievements in Chaco date to the Bonito Phase (A.D. 1020-1100) and during this time the Canyon was the "center of the Ancestral Puebloan world" (Van Dyke 2008:105). The multiple storied Great Houses that characterize the canyon have captured the imaginations of explorers, archaeologists, and visitors to Chaco Culture National Historical Park for over one hundred years. The Great Houses of Chaco were laborious undertakings characterized by site preparation, foundations, coursed masonry walls, elaborately timbered roofs and ceilings, and skillful carpentry (Lekson 1984, 2006:12). The buildings were based on the "precepts of order, formality, standardization, and symmetry" (Vivian 1990:268). As noted by Lekson (2006:17), without Bonito phase Great House ruins, there would be no National Park.

Great Houses are not the only large scale constructions in the canyon. Roads were first discovered in the early twentieth century (Holsinger 1901) and were later redefined and investigated within the canyon in combination with water control studies (Vivian 1972) and in a series of surveys and remote sensing projects (Kincaid, ed. 1983; Lyons and Hitchcock 1977; Nials 1983; Nials et al. 1987; Roney 1992, Windes 1991). The existence of the road system extending to the south, west, and north of the canyon was then suggested through the use of remote sensing techniques by Lyons during the course of the Chaco Project (Lyons and Hitchcock 1977). Since the clearest and most abundant evidence for roads in found within Chaco Canyon, the definition of the morphology of Chacoan roads is based upon examples in the canyon proper (Vivian 1990:73). Long, straight, wide roads link sites and places to one another. Ramps or stairways were carved where roads met cliffs. Roads are often most formal where they are nearest to a Great House (Roney 1992). In some cases, roads point not to Great Houses, but to symbolically important locations. Kantner and Kintigh (2006:162) note that roads are "extensions of Chacoan architectural complexes, further directing attention towards these centers by physically tying them to the landscape." A series of line-of-sight signaling stations parallels the road system, extending to even distant Great Houses (Hayes and Windes 1975; Lekson 2006:15).

Great Houses and roads are associated with mounds, berms, or other forms of earthen architecture. The two large, formal platforms in front of Pueblo Bonito are notable examples of this type of architecture (Judd 1964, Wills 2001). The Bonito platforms are masonry faced, have adobe plastered surfaces, stairways to their uppermost prepared surfaces, and prehistorically, stood nearly 2 meters tall (Lekson, Windes, and McKenna 2006:105). There are also less formal mounds at Pueblo Alto, Chetro Ketl, and Penasco Blanco (Cameron 2002; Stein, Ford and Friedman 2003; Wills 2001; Windes 1987b). The mounds are typically composed of trash, earth, and construction debris (Lekson 2006:13).

Great Kivas, while not exclusive to the Chaco era, attained a new level of formality and design during this time. Great Kivas are typically large (up to 20 meters or more in diameter), round subterranean chambers, with a bench around the room perimeter, and other distinctive floor features (Marshall et al. 1979; Vivian and Reiter 1960). Chacoan Great Kivas can be linked to antecedent Basketmaker III and Pueblo I Great Kivas. Van Dyke (2007:94) notes that "Chacoan architects appropriated and transformed the Great Kiva into a formalized and iconic symbol."

Hundreds of small sites were a component of Chaco Canyon. The National Park Service has documented at least three hundred small sites that are contemporaneous with Great Houses (Hayes 1981; McKenna and Truell 1986). Great variability in kiva construction and form at the small sites in Chaco canyon are suggestive of multi-ethnic traditions (Lekson, Windes, and McKenna 2006:94). The differences between small sites and Great Houses have also been explained as being the result of different ethnic traditions (Kluckhohn 1939; Vivian and Matthews 1965; Vivian 1990). To complicate matters further, some "small" sites began to take on the appearance of Great Houses late in the 11th century (Lekson, Windes, and McKenna 2006: 96). Marcia Truell documented over forty "small" sites with core and veneer architecture and some with multiple stories (Truell 1986: Figure 2.16 and Appendix B).

The built environment at Chaco Canyon, despite its desert setting, was characterized by complex waterworks (Vivian 1990). The spaces in between Great Houses, small sites, mounds, roads, and Great Kivas were peppered with canals, gardens and ponds (Vivian 1974; Vivian et al. 2006). A large, man-made pond may have filled the lower canyon (Force et al. 2002). The water came from rainfall and was controlled for both pragmatic (farming and construction) and perhaps for more esoteric purposes. Hays-Gilpin and Hill (2000) have documented the importance of flowers in Puebloan, including Chacoan cosmology, and it is possible that some water was devoted to growing flowers. Intriguingly, a ponderosa pine planted in the Pueblo Bonito plaza would have required watering and maintenance (Stein, Suiter, and Ford 1997). Waterworks within the canyon may have been an important aspect of the overall design and ritual magnetism of Chaco (Lekson, Windes, and McKenna 2006:110).

Perhaps the most interesting characteristic of Chacoan architecture is not the components themselves, but the more esoteric concepts of design employed in the canyon. Great Houses, roads, Great Kivas, mounds, carpentry, etc. are components of the Chacoan city-scape. Much of the work to define the underlying precepts of the Chacoan cityscape has been completed by the Chaco Sites Protection Group (Stein, Ford, and Friedman 2003) and the Solstice Project (Sofaer 1997, 1999, 2007). Architecture in the canyon very likely transcended pragmatic concerns such as hydrology or solar energy (Fritz 1978; Lekson 1984; Lekson, Windes, and McKenna 2006; Marshall and Doyel 1981; Sofaer 2007; Stein, Ford, and Friedman 2003). The Chacoan cityscape was designed according to "cosmological, geomantic, aesthetic, and symbolic principles" (Lekson, Windes, and McKenna 2006:104).

While Chacoan architecture, and specifically Great House form, has been identified by archaeologists and explorers across the San Juan Basin for approximately one hundred years, much is made of variability observed within this category of architecture. This variability, when observed in Great Houses outside of the canyon has often been used as an argument for simplicity, lack of hierarchy, and lack of connection (Mills 2002; Kantner 1996; Neitzel 1989). Lekson, Windes, and McKenna (2006:69-70) note that there is also great variability within and between Great Houses in Chaco Canyon, and within individual buildings. Further, the architectural variability within the canyon is on level with that outside the canyon and shouldn't be used as evidence for arguments against regional integration. The Chaco System was not static; it was dynamic and always coming into being. Therefore, there is no “snapshot” in time that equals Chaco. Our investigations of Chaco Canyon and the Chaco World need to acknowledge and to expect a certain level of variability. What is the best way to make sense of this clearly identifiable pattern (Chacoan architecture), and variability within that pattern?

This dissertation explores the export vs. emulation framework in an attempt to understand architectural diversity in the Chaco-era southwest. Using a technological approach to style described in Chapter II, sites that are exports of Chaco Canyon, defined as being built by individuals with intimate knowledge of canyon architecture, would be expected to display a suite of specific traits, such as core and veneer masonry, formal layout, large room size, Chaco-style Great Kiva, Chacoan round rooms, earthen architecture and roads. Sites that are copies of Chaco, or emulations of canyon architecture, would be expected to appear superficially similar to Bonito phase canyon architecture, but differ in subtle ways. An example of this might be an unusually large structure with a veneer added to the exterior wall after the construction of the rest of the building. Sites that are completely unrelated to Chaco would be expected to not share similarities with architecture found in the canyon. In light of the variability in Chacoan architecture noted above, it is likely that the architecture of the sites considered in this dissertation will vary through space and time, will vary between different classes of building (Great Houses in the Canyon, Great Houses outside of the Canyon, and small sites), and reflect functional considerations. The complex and variable relationship between identity and style expressed in material culture described in Chapter II is in accord with this prediction (See Dietler and Herbich 1989, Wiessner 1983, Lightfoot and Martinez 1995). These issues are considered and explored in combination with and in addition to the export vs. emulation framework.

The canon of Chacoan architectural traits examined here include: Great House; formality in layout and design of the Great House; Great Kiva and specific floor features associated with Great Kivas; Chacoan roads; earthen architecture; Chacoan round rooms; formal plaza; and a discussion of other unusual Chacoan architectural forms. The presence or absence of these architectural features has been used to include or exclude sites as part of the Chaco World in previous studies (Cameron 2008; Reed 2008; Van Dyke 1999). The presence of any of the traits listed above is considered to be indicative of more direct (export) relationship to Chaco, and the absence is considered to indicate an emulative or negative relationship to Chaco. Inherent in each of these architectural features is a suite of both high and low visibility traits. Architecture shapes and is shaped by human perceptions and choices (Bourdieu 1971; Rapoport 1982). Choices that are a component of the process of construction are reflective of cultural and learning frameworks (Carr 1995; Clark 2001). Thus, the presence of low visibility traits at outlying sites that are also found at Chaco would be indicative of a closer relationship to the canyon proper and vice versa.

In the analysis, a site is considered to have a certain architectural feature only if both the high and low visibility components are present. For example, a Chacoan Great Kiva is not simply an overly large, subterranean structure; a Great Kiva usually has a suite of specific floor features (described in more detail below). This analysis also goes a step beyond previous work (Van Dyke 1999) by considering Chacoan architectural characteristics beyond Great Houses and Great Kivas.

The following pages describe the traits of Great Houses, Great Kivas, roads, earthen architecture, Chacoan round rooms, and formal plazas. This is be followed by an analysis of these traits at Pueblo Alto, Chimney Rock, Bluff, 29SJ 627, the Ravine Site and the Corral Canyon Site. Unfortunately, the quantity and quality of excavation data does not allow for a full accounting of all of the traits that are described for each architectural component at each site. As with any archaeological analysis, the detail of this architectural inventory is limited by the extent and intensity of excavation at each site, resulting in a coarser grained analysis than is ideal in studies of technological style. Nonetheless, the following discussion is commensurate with similar studies of the relationships between Chaco Canyon and outlying sites.

GREAT HOUSES

Lekson (1991:36) notes that a Great House is a "significantly bigger bump" than contemporary "bumps" or sites in the area. This statement is drawn from observations completed for the *The Outlier Survey: A Regional View of Settlement in the San Juan Basin* (Powers et al. 1983). Powers et al. (1983:308) state that "generally, if the layout and architectural features of a site are unclear or unknown, its recognition as a Chacoan structure is based on its greater size relative to contemporary sites." In this way, the identification of a Chacoan structure is not based upon specific traits but based on the relative context of individual buildings and communities (Lekson 1991:36). The concept of relative size is valuable in locations where little excavation has been completed. It is problematic with sites that do not have much exposed architecture and are only slightly larger than nearby sites and sites that are relatively isolated (Powers et al. 1983:308). Fortunately, in the case of the six sites examined in this analysis, a significant amount of excavation has occurred and the problem can be addressed with a greater degree of detail.

First, Great Houses are formally planned. Lekson (1981; 2007:7) explains this concept nicely by breaking down architecture into three roles: the designer, builder, and user. In small sites, all three roles may have been the same person or group of people. In Great Houses, complex walls and foundations determining wall widths and stories were laid out prior to construction, so the ultimate form did not develop during the course of building. Great Houses are clearly not single dwelling structures, so whoever was doing this planning became the designer for builders and users, each disparate but possibly overlapping groups of individuals. It is also extremely likely that Great Houses didn't function only as habitations (See Chapter I for a discussion of Great House function). This is an important shift because most structures prior to the Chaco era served solely as habitations for a few families, being remodeled and growing haphazardly as needed. Great Houses were likely habitations to a certain extent, but also served as administrative, public, and warehouse structures. This added dimension of division of labor and interaction is what makes the planning of a Great House different than planning a small, single family dwelling. One consequence of planning and the large scale of Great Houses is permanence. Smalls sites can be much more easily remodeled than can Great Houses (Lekson 2007:9).

Several categories of room types have been defined at Chacoan Great Houses. Storage rooms are identified by the lack of "fixed features or furniture" (Lekson 2007:13). In Chaco, these rooms have been documented to have been used to store food, religious paraphernalia, craft goods, and building materials (Judd 1959, 1964; Neitzel, ed. 2003). Rooms with room-wide platforms are characterized by platforms that extend across their short axes midway between the floor and ceiling. These rooms are uncommon, and have been interpreted as shelves (Judd 1954:45) or sleeping platforms (Di Peso 1974:238). Some of platforms may have been parrot perches; in Room 249 at Pueblo Bonito, the remains of five macaws were found (Judd 1964:107).

Rooms with large, formal fire pits are thought to have been used for domestic activities such as cooking and heating (Lekson 2007:16). The number of fire pits has often been used as a means of estimating population (Bernardini 1999). Unfortunately, it is likely that second story rooms with access to the outside also had fire pits, and the majority of second story floors were not preserved (Judd 1964; Morris 1928; Windes 1984). Rooms with mealing bins are rare, with only eight known from excavations at Great Houses in Chaco (Lekson 2007:18). Square rooms with firepits, ventilators and reflectors have been interpreted by some to be ceremonial in nature (Judd 1964). Lekson (2007:18) disagrees, seeing the rooms as functionally equivalent to other rectangular rooms with firepits. Incidental rooms typically refer to the spaces between round rooms and square enclosures or are the result of more formal construction projects built on different axes (Lekson 2007:28). Holsinger (1901) described the shapes of these incidental rooms as including diamonds, crescents, and compound forms with multiple corners, incurving arcs, and reentrants.

Balconies on the exterior walls of multi-story Great Houses would have allowed access to rear storage rooms. The balconies were constructed like the roofs/floors of rooms, with cantilever beams supporting secondary beams and other closing materials. Based upon photos of from Pueblo del Arroyo, balconies were likely narrow walkways constructed along the exterior of the Great House structure (Lekson 2007:28). Terraces, when referring to Great House architecture, are defined as “the roofs of lower story rooms located in front of upper story rooms” (Lekson 2007:28).

PLAZAS

Plazas are typically associated with Great Houses; it appears that the first “formal enclosed plazas in pueblo buildings” were constructed at Chaco in the early 11th century (Lekson 2007:31). Great House plazas in Chaco were leveled and usually formally surfaced. Not all Great Houses had plazas, and the exact function of these bounded spaces is unknown. The plazas at Great Houses are different from those at small sites in that they are "bounded area beyond the pitstructure or round room." Conversely, plazas at small sites are the frequently used spaces between roomblocks and pit structures. (Lekson 2007:32). It seems likely that the plaza spaces associated with Great Houses would have been used for communal gatherings or displays of some nature.

KIVAS AND ROUND ROOMS

Chacoan Great Kivas were most numerous and complex around A.D. 1120 (Lekson 2007:20). The interior features and furniture associated with Great Kivas are highly formalized and specific. The features and furniture include a low masonry bench around the base of the wall, four wooden posts or masonry piers to support a square room frame and roof, raised floor vaults running north-south between the roof supports, a raised firebox and deflector, an antechamber on the plaza level north of the below surface structure, and sometimes plaza level rooms around the periphery of the subterranean chamber (Marshall et al. 1979; Vivian and Reiter 1960). The diameter of Great Kivas ranges from 10-20 meters, with the majority measuring between 15-17 meters across (Van Dyke 2002). Great Kivas are typically oriented either on a cardinal or northeast/southeast axis, with an antechamber for entry on the north. Roofing was accomplished with four wooden pillars that supported a four-log framework with radial beams, all covered with smaller logs, bark and dirt. The four roof posts are typically supported by a stack of four stone discs (the number of discs sometimes varies) placed inside of four masonry lined pits (Van Dyke 2007).

In Chaco Canyon, at least twelve Great Kivas were associated with Great Houses, and there are a number of isolated Great Kivas (that is, not physically associated with a Great House) in the canyon as well (Van Dyke 2007). Great Kivas required a large labor investment for their construction. In some cases additional wealth was invested in the structures in the form of large deposits of beads, turquoise and other items sealed in wall niches or crypts (Hewett 1936). These structures are the materialization of increasingly formalized integrative mechanisms and practices during the Chaco era.

Tower Kivas are “two or three-story round rooms within rectangular enclosures” (Lekson 2007:21). Tower kivas are found outside the canyon at Kin Klizhin, Kin Ya’a (Marshall et al. 1979; Powers et al. 1983) and Kin Kletso and Chetro Ketl in the Canyon (Lekson 2007:21). Tower Kivas were built fairly late in the Chaco era, likely after A.D. 1110 (Lekson 2007:21).

Chacoan round rooms (sometimes called “clan kivas”) are uniquely Chacoan (Lekson 2007:21). These round rooms are distinctive enough to warrant the term “type,” but they are not restricted only to the canyon. This form of kiva is found in small numbers at Mesa Verde (McClellan 1969) and as far to the south as Zuni (Hodge 1923). Judd (1964:177) describes them as having “a central fireplace, and underfloor ventilating system, a subfloor vault to the west of the fireplace, and an enclosing bench having 6 to 10 low pilasters and a shallow recess to the south.” Lekson adds that Chacoan round rooms are often but not always elevated in a square, aboveground enclosure, and they have wattlework or board wainscoting along the interior of the circular room, above the bench (2007:21). Based on the wainscoting, it appears that Chacoan round rooms were roofed with a sort of inverted “basket” of jacal with plaster on the interior surface. The wainscoting is likely the lower preserved portion of the dome shaped basket (Lekson 2007:25).

Non-Chacoan round rooms are round rooms that do not display the features of Great Kivas or tower kivas. They are smaller than Great Kivas and tower kivas and have been recorded at Pueblo Bonito, Pueblo del Arroyo, Chetro Ketl, Kin Kletso and Pueblo Alto (Lekson 2007:27). These structures appear to be more variable than Chacoan round rooms with some being round and other keyhole in shape, some with a bench recess and others without, and some with subfloor ventilators and others without. Some round rooms have been included in this category based on size alone due to lack of excavation data (Lekson 2007:27).

Tri- and bi- wall structures are an unusual form, with only one tri-wall found in Chaco. They "are circular rooms surrounded by one or two concentric rows of rooms" (Lekson 2007:39). Within Chaco Canyon, there is a single tri-wall structure at Pueblo Del Arroyo that was built contemporaneously with the shift in power north and away from Chaco (Lekson 2007:40). The single tri-wall at Pueblo del Arroyo was investigated by Karl Ruppert (Judd 1959) and Gordon Vivian (Vivian 1959). The majority of these structures are found north of the San Juan River and according to Lekson (2007:40) "as a class of building, they [tri-and bi-wall structures] are of only limited interest in the great pueblo architecture of Chaco Canyon." These structures appear to gain importance in the Aztec area in the twelfth century.

MOUNDS AND EARTHEN ARCHITECTURE

A wide variety of earthen architecture, including mounds, platform mounds, berms and earthen terraces constructed to create a flat surface from a slope or to create an elevated surface for Great House construction are found in Chaco Canyon (Cameron 2008:266, 270).

Mounds are typically located to the southeast of Great Houses and are made up of sediment, household (and other) trash, and construction debris. The two mounds with prepared surfaces in front of Pueblo Bonito are the only platform mounds known in the Chaco World

(Cameron 2008:266, Wills 2001). Mounds at Penasco Blanco, Pueblo Alto, Pueblo Bonito and Chetro Ketl stood up to 6 meters tall and 60 meters by 40 meters on the ground.

Like much else concerning Chaco, not everyone agrees on the nature of these mounds. Archaeologists debate if these mounds are simply overlarge middens or if they are, indeed, forms of architecture (Wills 2001). Van Dyke (2008:130) hypothesizes that mounds could have been fabricated middens, their over large size indicative of deep time depth and historical connection to the location. The mounds would have represented "artificially constructed histories or imagined social memories" lending "legitimacy to existing social configurations" (Van Dyke 2008:130). Others have postulated that the mounds, especially the platform mounds in front of Pueblo Bonito, would have been perfect staging areas for public events. Ritual and other activities carried out on top of the mounds would have been visible and impressive to attendant pilgrims (Stein and Lekson 1992; Stein, Ford, and Friedman 2003).

Berms are typically associated with Great Houses and roads outside of Chaco Canyon (Stein and Lekson 1992:95).The term "berm" has most often been conceptualized as the linear mounding that occurs along the edge of a Chacoan road as a result or goal of surface clearing for road construction (Nials 1983). Cameron (2008) has also used the term to refer to the earthen mound surrounding the Bluff Great House in UT. See discussion of architecture or the Bluff Great House for more information on that particular berm.

A few examples of unusual earthen architecture in Chaco Canyon include the Chetro Ketl Field, Wetherill's dam, and large mounds on the south side of the canyon. The Chetro Ketl field was first noted by Gordon Vivian and Charlie Steen while flying over the canyon (Vivian and Matthews 1955:12). The "field" is a rectangular feature near Chetro Ketl, demarcated by adobe berms on its north and west sides. Smaller berms within the rectangular area create a gridded space with approximately 30 cells. The most popular interpretation of this space is that it served as an agricultural field (Loose and Lyons 1976; Vivian 1990). Stein et al. (2007:210) think that the Chetro Ketl field was more likely a playing field of some type. This argument is based upon the contention that the gridded form of the Chetro Ketl Field is different from other features in the Canyon identified as fields, the unsuitability of Chaco Canyon soils for agriculture, and Navajo stories that describe the area in which the field is located as a "playing field where The Gambler would engage challengers in a golf-like game focused on the cave on the east side of Lizard House Wash (Stein et al. 2001:211). The Gambler, a component of Navajo oral tradition, is described as a sorcerer who originated in the south, enslaved people in the region and settled in Chaco Canyon. Navajo stories about Chaco "respect it as a place of dark power and spiritual danger" (Stein et al. 2007:201).

Wetherill's dam is an earthen berm that is approximately 9 meters wide and 1.6 meters in height. It begins at the southeast corner of the eastern mound in front of Pueblo Bonito and continues for approximately 125 meters. It is likely that Wetherills' dam represents a pre-Columbian earthen construction that was subsequently modified in the early 1900's by Richard Wetherill in an effort to better catch runoff from the Chetro Ketl Rincon (Stein et al. 2007:213-214). It has been noted that Wetherill developed an intricate system of water control in an effort to increase agricultural productivity (Vivian 1990:49). Alternatively, or additionally, the berm may have served the dual purpose of elevated roadway and water control feature (Stein et al. 2007:213-214).

Some unusual mounds (29SJ 834 and 29SJ 835) on the south side of the canyon could perhaps be "natural hills that have been purposefully shaped and embellished to create elevated, leveled surfaces on pyramid-shaped mounds" (Stein et al. 2007:214). The mounds, when first recorded, were covered in a layer of "high quality ceramic pieces; shell, shale, and turquoise beads; shell ornaments; and well-crafted miniature ornaments" (Stein et al. 2007:214). For an intriguing reconstruction of these mounds, see Stein et al. 2007: Plates 8.8A – 8.8G; 8.9A – 8.9C.

Roads

Prehistoric roads have been noted throughout the San Juan Basin, and many Great Houses outside of Chaco are associated with roads (Marshall et al. 1979; Kincaid 1983; Nials et al. 1983; Roney 1992; Vivian 1972). Most of the roads found in association with Great Houses outside the canyon are either linked to roads in the canyon or converge there (Vivian 1990:318). Great Houses within the canyon are linked by prehistoric roadways (Vivian 1983). Roads within Chaco Canyon were well constructed, and "often included formal, even monumental, ramps, stairs, curb walls, and berms" (Lekson 2007:40). Despite their formality, the true extent of the roads is difficult to determine due to ranching, commercial activities, archaeology, and National Park Service activities (Lekson 2007: 40-41).

Chacoan roads, especially the Great North Road, and the roads that converge on Pueblo Alto, tend to display a uniform width of 9 meters. Smaller roads in the canyon average about 4.5 m in width (Nials 1983). Other roads outside the canyon range from about 3-6 meters in width (Stein et al. 2007:203). Chacoan roads follow straight routes, with minor shifts in angle to correct the course, incorporate Great Houses, or avoid topographic obstacles (Vivian 1990:322). Over 200 kilometers of Chacoan roads have been documented, some portions extending over 50 kilometers (Kincaid 1983). The roads were engineered; Nials (1983:6-26) defined engineering as "conception and planning of a route of travel to a known destination, involving survey and demarcation of that route prior to construction," and cited "the unusual width, consistency of road characteristics over widely separated areas, relationship of the roads to the terrain, characteristics of the road course, and the possible remains of a surveying and/or delineation system" as evidence of this engineering.

THE ANALYSIS

PUEBLO ALTO

Pueblo Alto is a large, single story Great House located on the north mesa overlooking Chaco Canyon (Windes 1987a:1; see Figure 2 and Figure 26). The Great House is not located on the mesa top in isolation, but is associated with several other sites. New Alto and East Ruin are effectively connected to Pueblo Alto via two, long low masonry walls that extend from the back wall of the Great House to the west and the east. A masonry wall also connects a large, 4 meter high mound to Pueblo Alto. The Parking Lot Ruin is a few meters from the west wing of the Great House, and the Rabbit Ruin and 29SJ 2401 are also included in the Pueblo Alto Complex (Windes 1987a:77). Other sites, less than eight rooms in size, are located in the vicinity of the Great House to the east. The relationship between the small sites and the Great House is unclear (Windes 1987a:77). Near the cliffs south of Pueblo Alto are a variety of terrace features, presumably for farming, and other features that may have been the loci of ritual activities. Tsin Kletzin, another Great House, is located directly south of Pueblo Alto on the mesa top on the opposite side of the canyon (Windes 1987a:6).

As originally constructed, Pueblo Alto was comprised of 77 rooms and 3-5 kivas. Subsequent additions and remodeling activity resulted in a total of 133 rooms, but not all of these rooms are functional spaces. The 133 rooms, enclosed plaza and two exterior plazas covered a total of 16.9 hectares. This areal extent does not included New Alto, the East Ruin, the mound, or the many roads that converge on the site (Windes 1987a:12). Compared to other Great Houses in the canyon, the walls of Pueblo Alto are thinner – likely due to the fact that it was planned to be a single-story construction. The walls range between about 40 and 60 cm in width and are core-and-veneer style. Windes (1987a:143) defines core-and veneer as the wall core "filled with mortar and horizontal stone between two masonry facings." Initially, stone was fractured to size and then used; later in the building's history, stone was shaped, ground and rounded to varying extents. Some stones were decorated with incised figures (Windes 1987a:144).

The Pueblo Alto Great House was constructed in five basic stages atop an earlier building (Figure 26). The earliest construction at the Pueblo Alto site consists of a pair of rooms (50 and 51) underneath the central room block of the pueblo. These rooms are not part of the Great House and are not included in the five construction stages described below. The rooms are likely a typical Pueblo II era family home with living and storage areas and a small plaza. This site may be related to the ultimate placement of Pueblo Alto in this particular location. There are not many other Pueblo II era small sites on the mesa, and the walls were quite wide, approximately 50 cm (Windes 1987a:150-151).

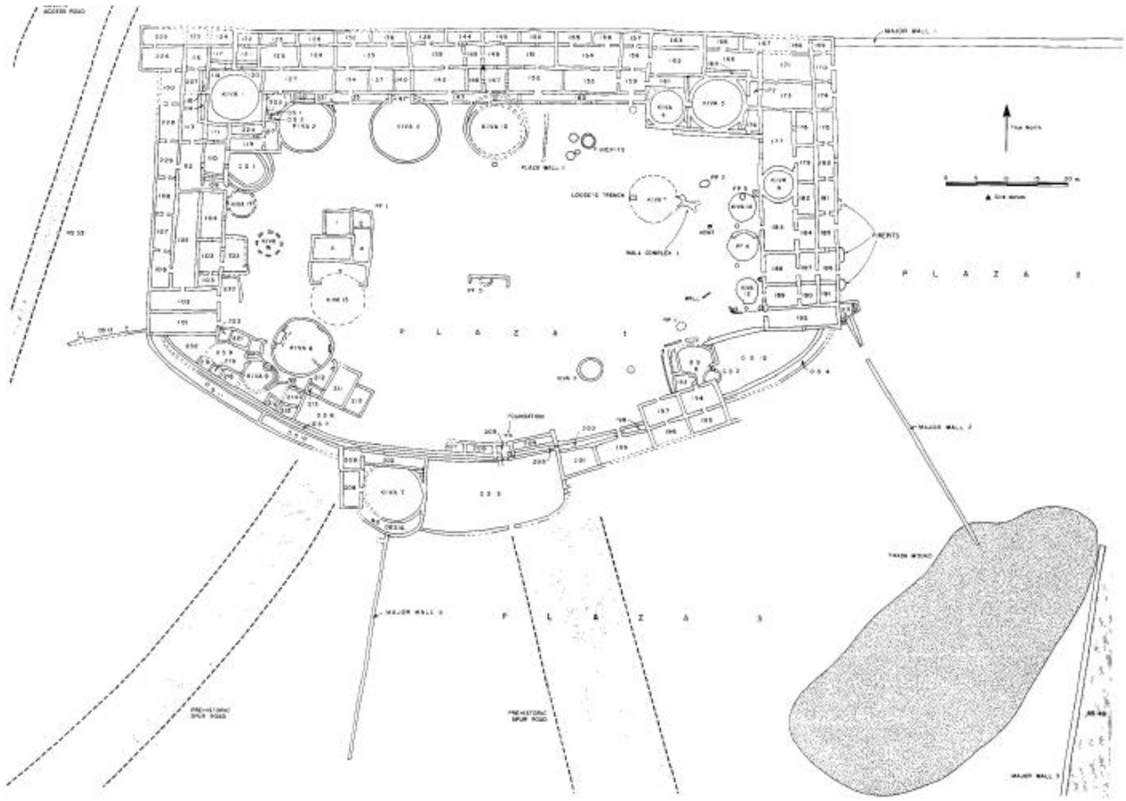


Figure 26. Pueblo Alto plan, prehistoric roads, and large trash mound. From Windes (1987a: Figure 1.4).

The central room block of Pueblo Alto was built in three sub-stages (1A, 1B, and 1C; see Figure 27 and Figure 28) between about A.D. 1020 and 1040 (Windes 1987a:151-161). The plan of this central room block corresponds with that observed at Pueblo Bonito, Kin Bineola, Penasco Blanco and Una Vida (Windes 1987a:175).

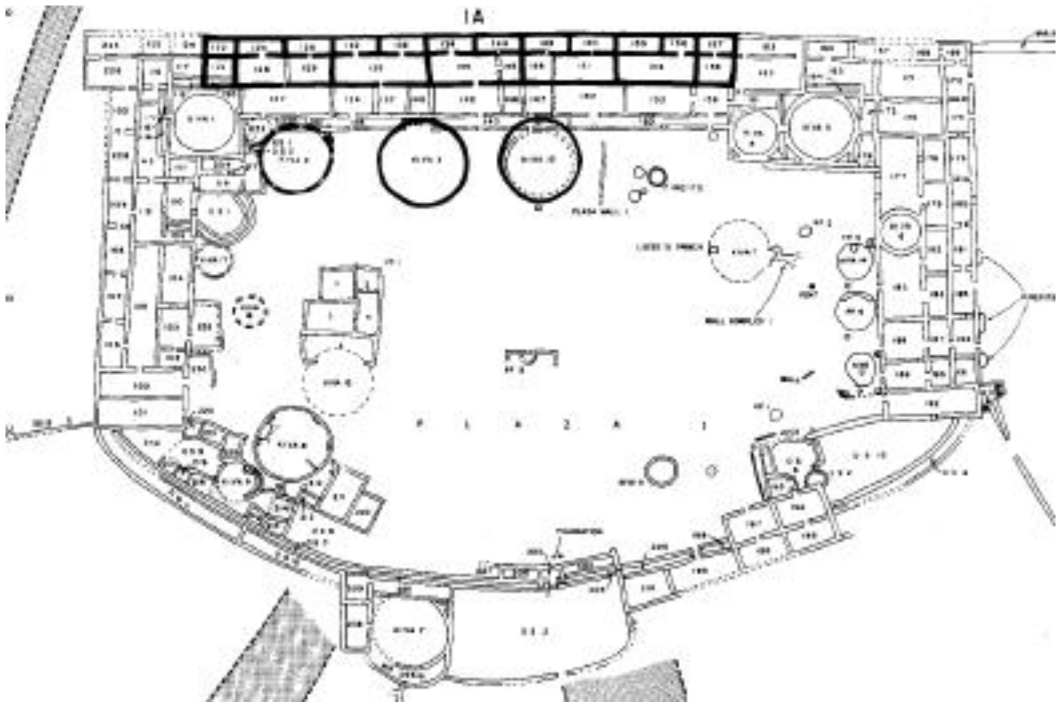


Figure 27. Pueblo Alto Construction Phase IA (A.D. 1020-1040). From Windes (1987a: Figure 6.5.)

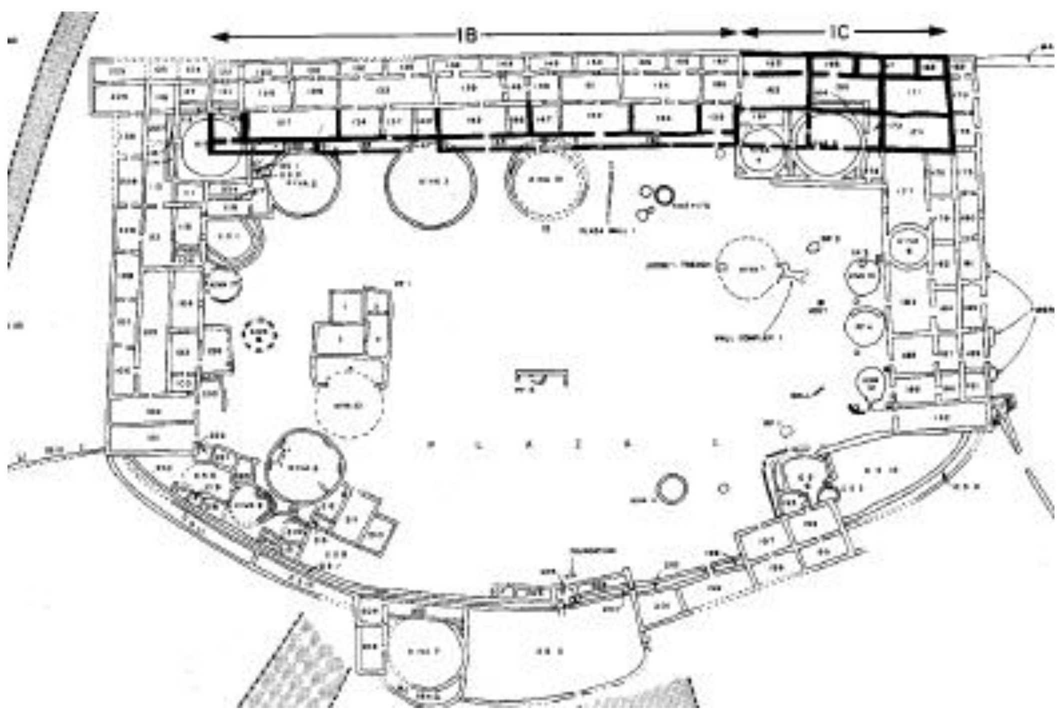


Figure 28. Pueblo Alto Construction Phases IB and IC (A.D. 1020-1040). From Windes (1987a: Figure 6.6.)

The west wing of the Great House was constructed in Stage II (A.D. 1020-1050) and the east wing in Stage III (A.D. 1040-1060) (Windes 1987a:161,166) See Figure 29.

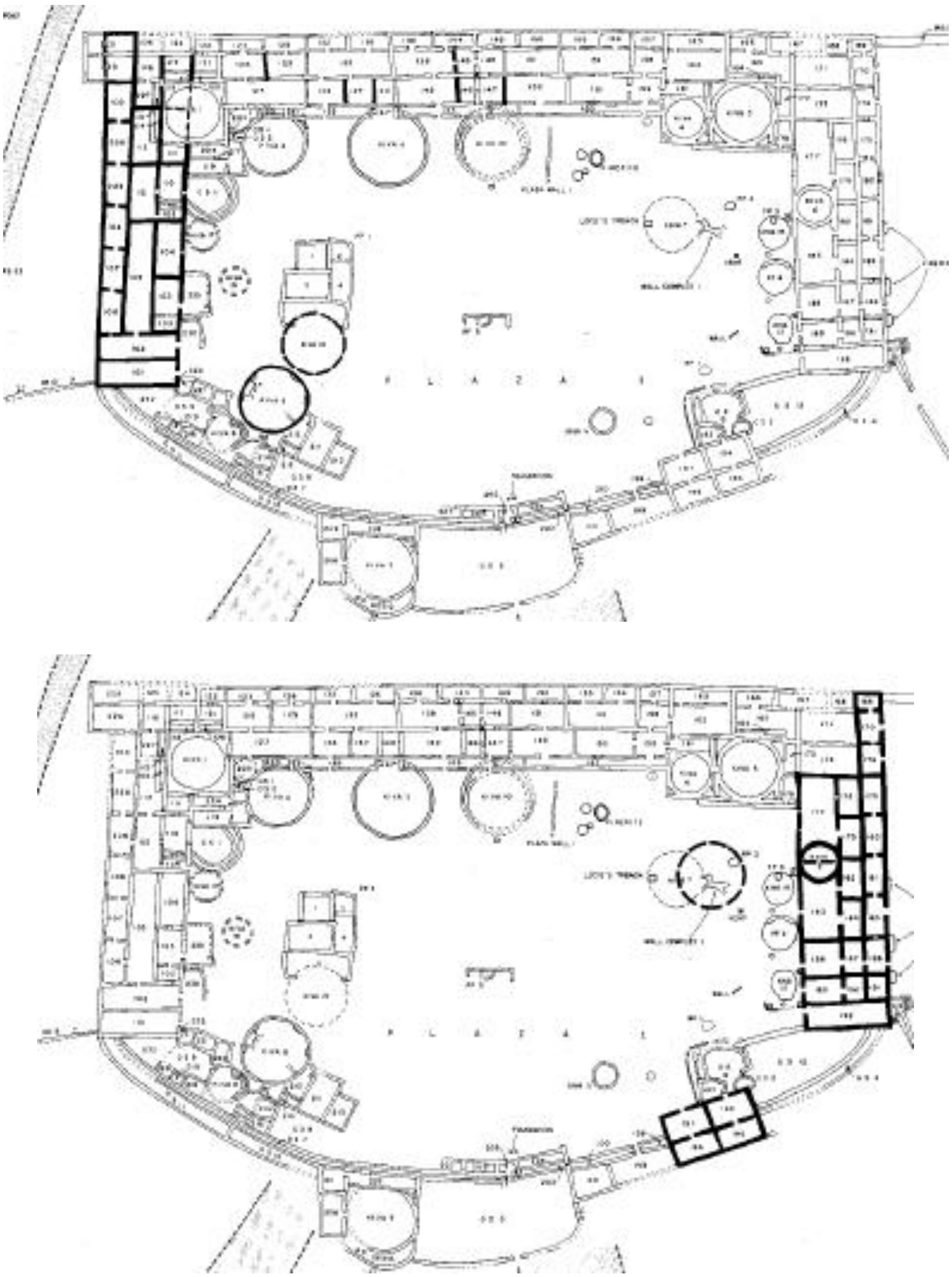


Figure 29. Pueblo Alto construction phases II (top) and III (bottom) (A.D. 1020-1050 and 1040-1060). From Windes (1987a: Figures 6.7 and 6.8).

In Stage IV (A.D. 1080-1100), builders constructed three kivas and buttresses into the northeast and northwest interior plaza corners of the Great House. Walls enclosing the south side of plaza were also constructed (Windes 1987a:170; Figure 6.9). See Figure 30.

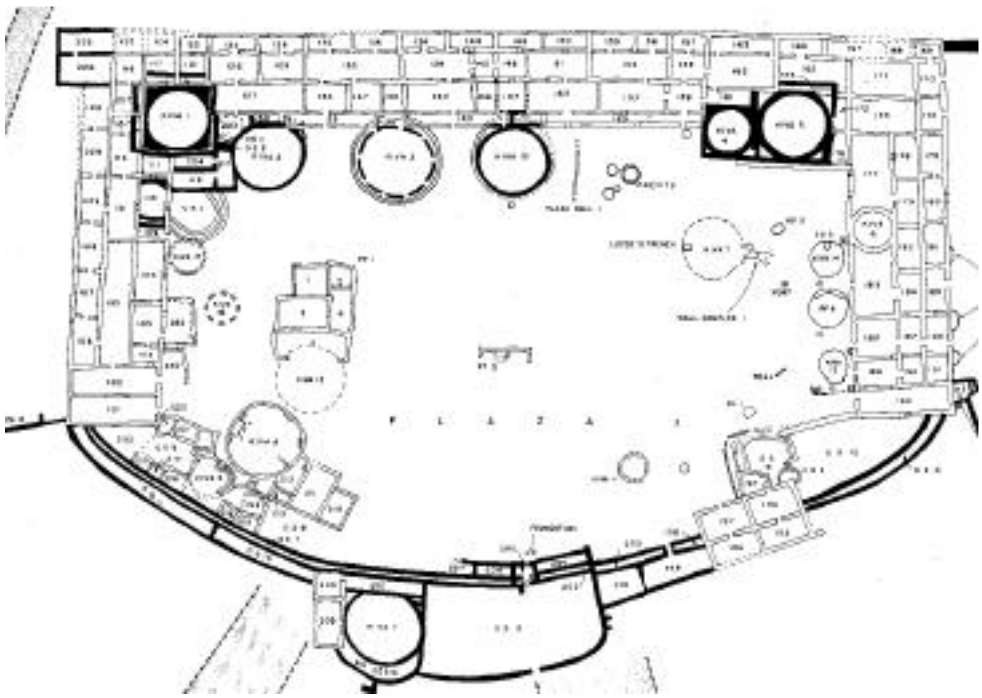


Figure 30. Pueblo Alto construction phase IV (A.D. 1080-1100). From Windes (1987a: Figure 6.9.)

In stage V (A.D. 1100-1140), a series of small, informal rooms and kivas were built in the plaza area (Windes 1987a:172; Figure 6.10). See Figure 31.

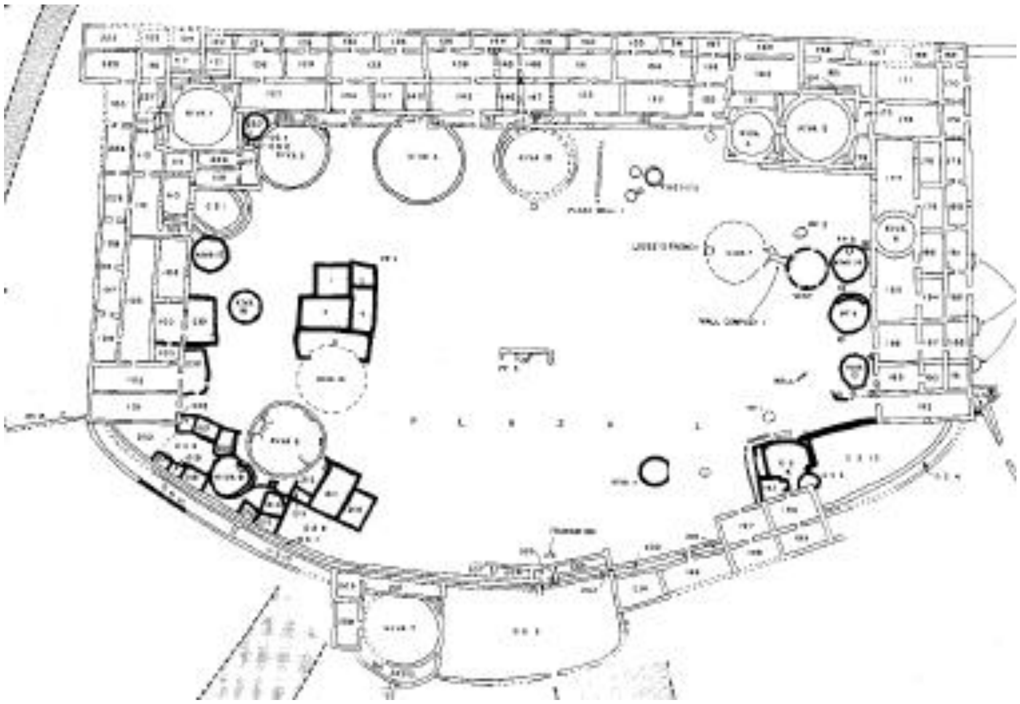


Figure 31. Pueblo Alto construction phase V (A.D. 1100-1140). From Windes (1987a: Figure 6.10).

The last formal occupation of Pueblo Alto appears to have ended sometime between A.D. 1132 and 1140. The site was reused, perhaps centuries later, as evidenced by a large firepit with an archaeomagnetic date of A.D. 1365 and by the dearth of roof timbers (Windes 1987a:172).

Multiple Chacoan round rooms (sometimes called “clan kivas”) and larger Chacoan round rooms (sometimes called “court kivas”) were recorded and investigated at Pueblo Alto (Windes 1987b). Interestingly, and maybe somewhat surprisingly, no Great Kiva was recorded at the site. Excavation and ground penetrating radar studies have shown that the bedrock lies only about 40 cm below the plaza, leaving no possibility for a Great Kiva (Windes 1987b:402-403). Kiva 6, in the west wing of the Great House, may be a tower kiva. The kiva is in an unusual position in the wing, and the walls are as high as the rooms next to it (Windes 1987a:166).

Three plaza areas were identified at Pueblo Alto (Figure 26). Plazas 1 and 2 are completely enclosed, and Plaza 3 was determined to be the least formal of the plaza areas because it is not completely enclosed (Windes 1987b:527). Excavation in Plaza 1 in front of the central room block of Pueblo Alto revealed a series of prepared surfaces, with few pits, no firepits and little cultural material (Windes 1987b:169). Investigations of the plaza in front of the west wing of the site provided evidence of a series of highly formalized and prepared surfaces. This level of formality and preparation is in direct contrast to outdoor surfaces associated with small sites that typically consist of a surface compacted by everyday traffic (Windes 1987b:350). Plaza 2 had fewer prepared surfaces than Plaza 1, but this plaza area was the nexus of roads from several directions and underwent a sustained period of use. The use of Plaza 2 did not remain static over time and may be representative of changes in the functioning of the larger Chaco System. The paucity of material culture in the area may be an indicator of its significance (Windes 1987b:526-527). No work has been conducted in Plaza 3 besides wall clearing of the peripheries of the space (Windes 1987b:528).

Prehistoric roads near Pueblo Alto were first recorded by Holsinger (1901). Pueblo Alto, along with Penasco Blanco, is the foci of multiple roads and potentially road-related architecture. In fact, the presence of so many roads was a primary reason that Pueblo Alto was chosen for exploration by the Chaco Project (Windes 1987a:96). See Figure 32.

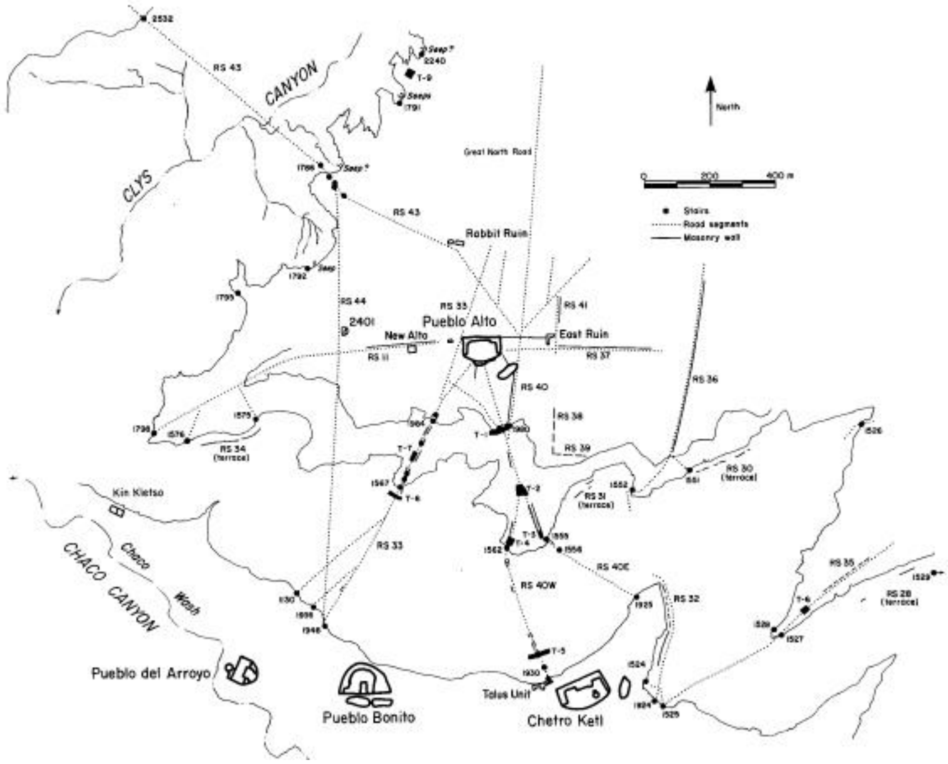


Figure 32. Prehistoric Chacoan roads associated with the Pueblo Alto Complex, Chetro Ketl and Pueblo Bonito. Site numbers are stairways marked by circles, RS numbers are road segments, and T number are ceramic transects. Heavy black lines outline road curbing or the masonry ans retaining walls of terraces. From Windes (1987:Figure 5.2).

Masonry curbing, the East Ruin, the Parking Lot Ruin in the vicinity of Pueblo Alto, and Rooms 225 and 226 and 194-197 within Pueblo Alto all appear to be related to the road system. It is possible that these rooms may have played some role in directing and controlling traffic at the site (Windes 1987a:109-111). Some of the roads evidently directly enter Pueblo on the south, east and west sides of the Great

The roads centered on Pueblo Alto are likely both of regional and local importance. All traffic coming from the north to Pueblo Bonito, Chetro Ketl, Pueblo Arroyo and the Talus Unit 1, would have had to gain access past Pueblo Alto when entering or leaving the canyon. Some roads may have been used for the acquisition of goods that may have been stored in the road related rooms described above (Windes 1987a:138-139).

The nature of earthen architecture at Pueblo Alto is debated by researchers. A large oval mound, first recorded in 1877 by William H. Jackson, is located to the southeast of Pueblo Alto. The mound is approximately 2,800 cubic meters in volume and was first trenched by Frank H. H. Roberts in 1926. Roberts determined that the materials making up the mound were quite similar to those observed in the Pueblo Bonito Mounds (Windes 1987b:561). The Chaco Project carried out further investigations by excavating one test trench and one and one half narrow and deep test units to better understand the stratigraphy of the mound (Windes 1987b:566, 569). One hundred and sixty five depositional units, ranging from single episodes of dumping to huge homogeneous layers, were identified in the first test trench (Windes 1987b:585). The mound was formed in three primary episodes: stone debris from the construction of Pueblo Alto; trash; and alluviation of early deposits and aeolian deposition after the mound was no longer in use (Windes 1987:588). The Pueblo Alto mound is different from small house middens that do not tend to display internal layering and in its lack of burials (Windes 1987b:605,612).

The layering observed within the Pueblo Alto Mound, and by extension other Great House middens, may be the result of yearly cyclic deposition (Windes 1987b:608). Windes (1987b:616) states, "Ceremonial or system-integrative activities are suggested by the mound stratigraphy and content, as well and the mound's proximity to plazas 2 and 3 and the prehistoric road network." This interpretation is not without controversy. Wills (2001) argues that the mounds in Chaco, and specifically that at Pueblo Alto, are not indicative of periodic ceremonies or intentional design. The mounds are likely the result of construction activities and are ritual in nature only insofar as the construction of Great Houses was ritualized. Contra this perspective, Toll (1985; 2001) argues that the nature and quantity of the ceramics in the Alto Mound is indicative of the gathering of large groups of people for periodic ceremonial events akin to Renfrew's (2001) conception of Chaco as a "location of high devotional expression."

29SJ 627

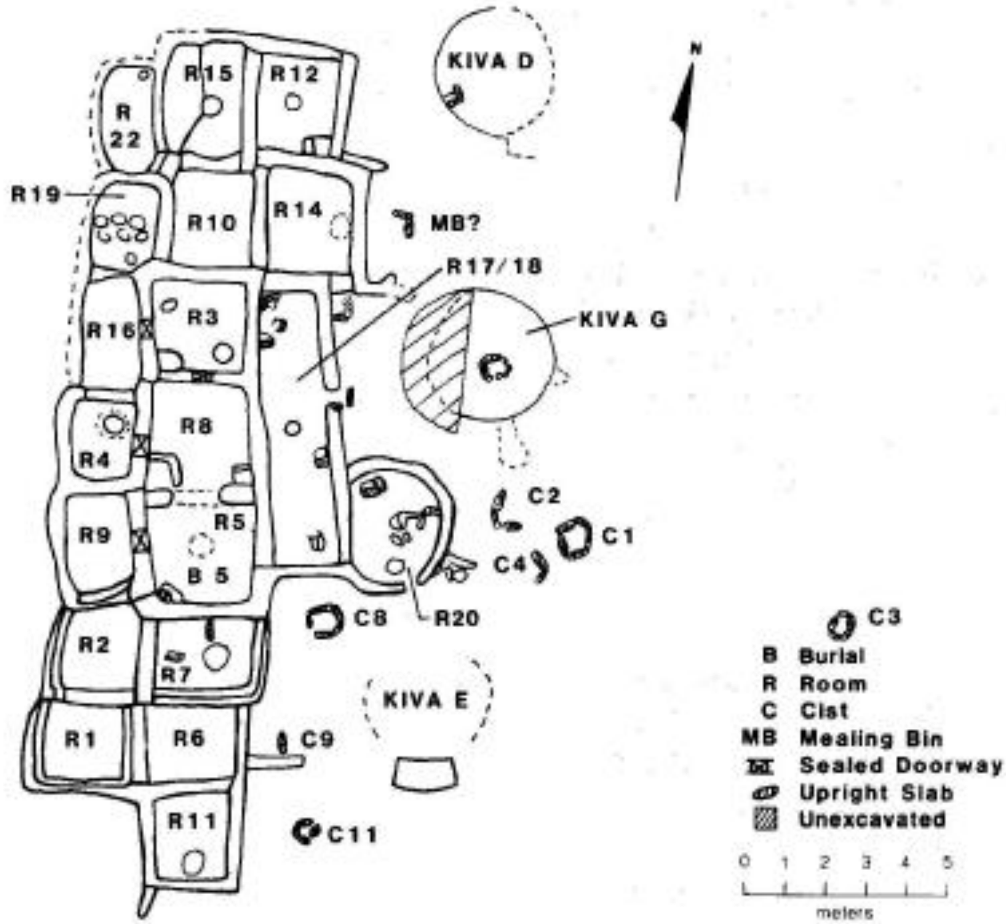


Figure 33. Plan view of 29SJ 627. From Truell (1992: Figure 2.7).

29SJ 627 is located in Marcia's Rincon on the west side of Chaco Canyon, and north of the Chaco and Fajada Washes in Chaco Canyon (Truell 1992:1). See Figure 2 and Figure 3. The site is made up of 25 rooms and 7 pit structures and is classified as a Chacoan "small site." See Figure 33. It is a large "small site." It should be noted that 29SJ 627 is on the larger side of the spectrum for Chacoan small sites, which tend to be 3-4 to 30-35 rooms, single story, and simply constructed (Truell 1986:128). For a complete discussion of the variation observed in Chacoan small sites, see Truell 1986. The roomblock at the site was constructed in three primary episodes, but relationships between these episodes and construction of pithouses in the plaza were not defined. Investigations showed that renovations within rooms was frequent and not clearly connected to larger construction efforts (Truell 1992:8).

The site where 29SJ 627 is located experienced a long period of human occupation. There is evidence of two pit structures and scattered debris dating to the A.D. 600s – early 700s (Truell 1992:37). The first roomblock at the site was constructed in the period between late A.D. 700s-middle 900s (Truell 1992:44). The use of the term "roomblock" in this instance may be inappropriate – the room suites associated with this first period of construction consist of "oval semi-subterranean storage rooms and adjacent ramada areas" (Truell 1992:14). One or possibly two pithouses (Pithouses C and H) in front of the room suites would have served as year-round shelter for the inhabitants of the site (Truell 1992:15).

During the second period of construction (late A.D. 900s – early 1000s), pit structure F was excavated and the ramada areas were reconfigured and replastered (Truell 1992:19). The walls of storage rooms consisted of adobe turtle backs covered with plaster with sandstone spalls pressed into their surfaces (Truell 1992:20).

In the final phase of construction at 29SJ 627 (middle A.D. 1000s), the above-ground work areas, or ramadas, become fully walled. Two and possibly three pit structures (D, G, and E) were utilized during this time period (Truell 1992:23). Masonry was uncommon at the site until this period (Truell 1992:164). Both simple and compound masonry were observed and the pattern of wall abutments demonstrates that wall construction was haphazard. Walls were typically appended to the existing structure in short segments and were constructed of irregularly shaped stones of all sizes (Truell 1992:167).

The terms "pithouse" and "kiva" were used interchangeably during the excavation of 29SJ 627. The original field designations were retained in the report (Truell 1992:11). This being said, nothing that very closely resembles a Chaco style kiva or round room is present at the site. The best candidate and most formal of the structures is Kiva E, the last subterranean structure built at the site, sometime in the mid to late A.D. 1000s (Truell 1992:105). The structure is masonry lined and has a very narrow bench, 6-10 cm. There are six very small pilasters, ranging from 6-8 cm across. They are very narrow, and probably did not function as roof supports of any kind (Truell 1992:100-101). The other pit structures at the site have earthen walls, and many floor features that indicate heavy domestic usage (Truell: Table 4.2).

While the term "plaza" is used throughout the report on 29SJ 627 (Truell 1992), there is no surfaced or enclosed area at the site that could be considered a plaza in the sense observed at Great Houses in Chaco Canyon. Plaza, in relationship to 29SJ 627 is used to refer to open areas in front of the initial ramada and later roomblock, where pit houses are constructed.

A trash midden, approximately 35 x 30 meters in size is located east of the site. Based on ceramic evidence, most of the mound was deposited in the A.D. 900s – 1000s. Trash from the site was also deposited in several of the pit structures, but some have speculated that the mound is not large enough to represent 400 years of site use and may be indicative of seasonal occupation (Truell 1992:193). The trash mound at 29SJ 627 seems to be just that, a trash mound (Truell 1992:210). There is no evidence for unusual deposits (like the Pueblo Alto Mound), or formalized architectural features (like the Pueblo Bonito platform mounds).

There are no road segments or Great Kiva associated with this site.

Chimney Rock Great House

Chimney Rock Great House, located in the Chimney Rock Archaeological Area, is made up of 34 rectangular rooms, two kivas, and three plazas (See Figure 4 and Figure 6). There are likely six additional rooms in the northwest corner of the structure (Rooms 19-24), but their presence has not been verified through excavation. However, the rooms were included in a map drafted by Jeancon during his initial investigations of Chimney Rock in the early 1920s (Jeancon and Roberts 1924). Geophysical research completed by the Colorado School of Mines in 2009 further indicates that these rooms are likely present (Devriese et al. 2010).

The Great House was a single story in height, with the possibility of a second story on Room 10 (Chuipka 2010:87-88). The bedrock of Chimney Rock Mesa slopes nearly 12 meters from east of Room 2 to the west of the West Kiva, approximately a 12% grade. As a result of the sloping bedrock, the structure may have been "stepped" or tiered, resulting in the illusion of a multiple story Great House. The rooms in the Great House had very high ceilings, averaging 2.62 meters (Chuipka 2010:87). This figure is comparable to the average wall height of 2.33 meters in eight Great Houses in Chaco Canyon (Lekson 2007:Table 2.1). The average size of the rectangular rooms in the Great House (excluding the buttressing rooms around the kivas) was 18.66 square meters, also on par with rooms in Chaco Canyon (Chuipka 2010:95; Lekson 2007: Figure 2.5).

The Chimney Rock Great House was constructed in two phases (Figure 34). The first phase, likely at A.D. 1076, consisted of the eastern portion of the site, including the East Kiva and the rooms that buttressed it, and the large rooms 5-9 and 11-13. The north wall of the Great

House may extend westward beyond Room 13, but further investigation would be necessary to verify this (Chuipka 2010:91). Data is lacking for the western portion of the Great House, but the West Kiva and Rooms 1-5 and 16-24 were likely built during a second phase of construction in A.D. 1093 (Chuipka 2010:93).

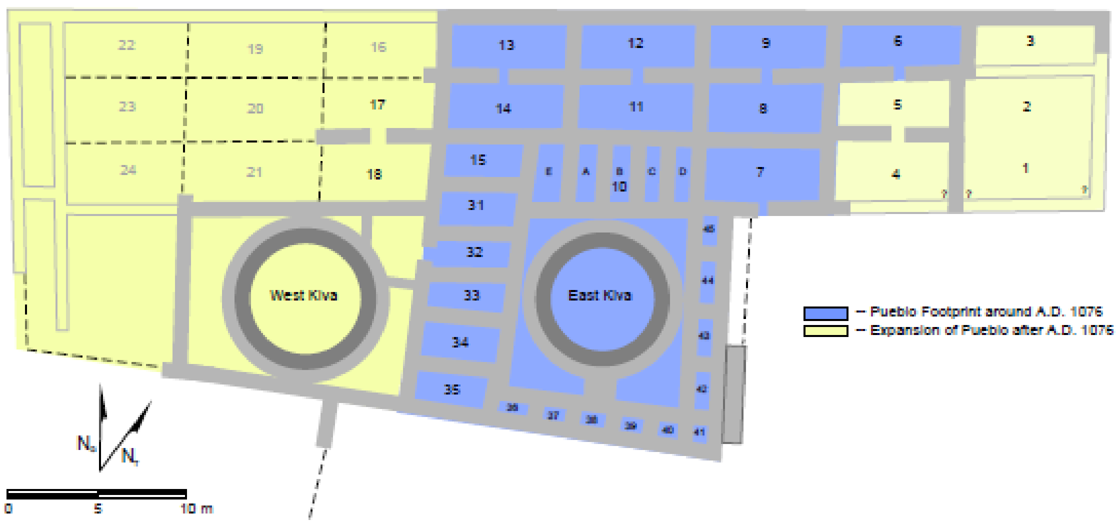


Figure 34. Two phases of construction at Chimney Rock Great House. Figure courtesy of Woods Canyon Archaeological Consultants, Inc. (Chuipka 2010).

Chimney Rock was clearly a "planned" undertaking. All of the materials necessary for the building were not easily available on top of the mesa, which is made up of exposed bedrock (Chuipka 2010:95). The Chimney Rock Mesa where the Great House is located is not a large area. If builders were harvesting the stone on the mesa top build the Great House, they would have had to do so in advance of the construction and then stockpile it elsewhere. It seems likely that the stone for Great House was collected, at least in part, from the lower mesa. The construction of the Great House would have necessitated the transport of stone, logs, dirt for mortar. Water would have also had to have been transported for the mixing of mortar because there is no source of water on the mesa top.

The East Kiva at Chimney Rock Great House is built within an aboveground enclosure of buttressing rooms (Chuipka 2010:62). Approximately 80% of the structure was investigated by Jeancon during the first round of exploration at the Great House (Jeancon 1922). Based on the stratigraphy and tree ring dates recovered from the kiva, Eddy (1977:38) concluded that the structure was originally built in A.D. 1076 and later remodeled by adding an additional 1 meter of floor fill in A.D. 1093.   The kiva floor is 7.45 meters in diameter and the upper walls are 8.35 meters in diameter. There is a banquette around the circumference, and a “rectangular masonry-lined hearth connected to a sub-floor vent tunnel” (Chuipka 2010:62-63). Eight radial beam pilasters and a small southern recess are present along the wall of the kiva (Chuipka 2010:63).

Like the East Kiva, the West Kiva is a circular structure built within and aboveground square enclosure. The West Kiva is also nearly the same size as the East, with a floor diameter of 7.20 meters and an upper wall diameter of 8.80 meters. In 1922, Roberts noted a fireplace, but there is no evidence of its existence today. A banquette surrounds the circumference of the room, but there are no other surviving features, save a re-built ventilator tunnel in the south wall (Chuipka 2010:64).

There are four potential plaza areas surrounding the Chimney Rock Great House (Figure 35). Open Area 1 is located immediate east of Rooms 1, 2, and 3. It was not investigated in the 2009-2010 architectural documentation project as no masonry is visible (Chuipka 2010:20).

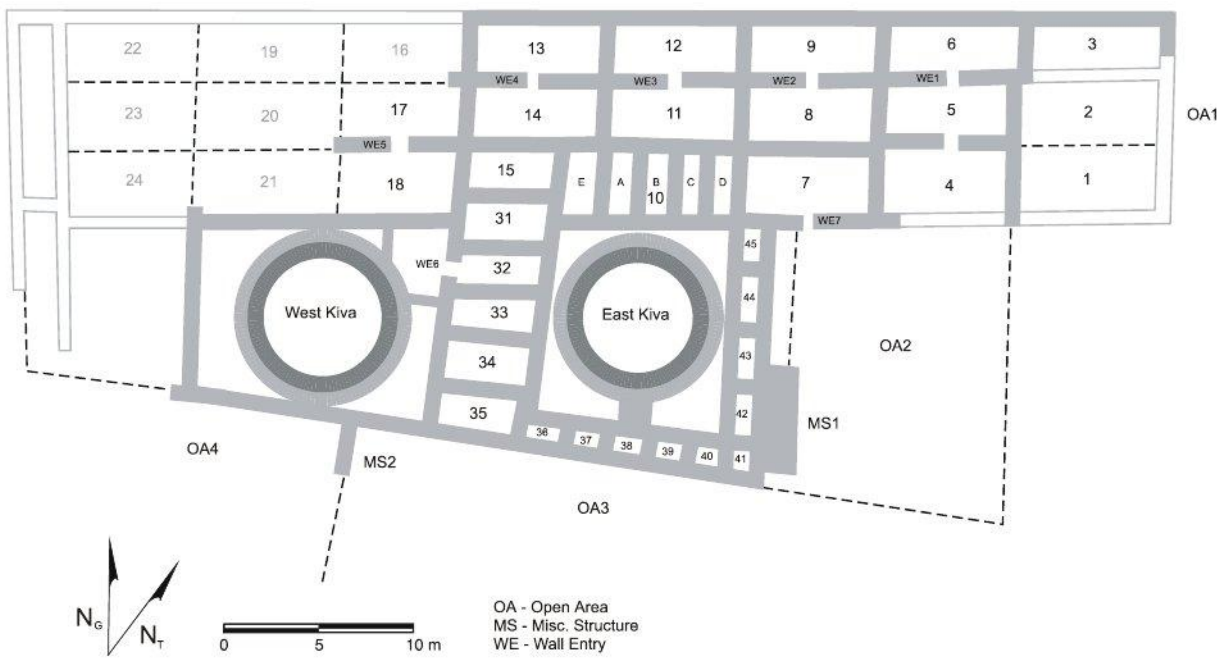


Figure 35. Chimney Rock Great House showing plaza locations. Map derived from Frank Eddy's 1972 map as annotated by Steve Lekson 2009. Drafted by Jason Chuipka, Woods Canyon Archaeological Consultants, Inc.

Open Area 2 was first described by Eddy (1977:39) as an elevated surface enclosed on the south by a masonry retaining wall. This space, also called the "East Court" is 15 x 12 meters in size and is bounded on the west by Rooms 41-43 and to the north by Rooms 4 and 7. A banquette was constructed along the exterior of rooms 41-43 (Chuipka 2010:66). Eddy (1977:40) interprets this structure as a bench for resting or for seating while viewing astronomical phenomena.

Open Area 3 is located immediately south of the Great House and extends from the eastern corner of Room 41 to a bit west of the southwest corner of Room 35 (Figure 35). The plaza is bounded on the west by a masonry wall that abuts the side of the pueblo, and on the south by the precipitous edge of the Chimney Rock Mesa (Chuipka 2010: 65-66). This space is the eastern half of the space called the South Plaza by Eddy (1977). This area was split into two halves during the HABS/HAER work completed at the site in the 1980s (Chuipka 2010: 66; LaRocque 1989). Eddy investigated this area and found evidence of a plastered surface extending 2 meters out from the wall of the Great House (1977:40).

Open Area 4 is the western half of the area originally labeled the South Plaza by Eddy (1977). The eastern boundary of the plaza is the masonry wall that abuts the pueblo and separates Open Area 4 from Open Area 3. Like the southern boundary of Open Area 3, the southern boundary of Open Area 4 is the mesa edge. In the most recent architectural study (Chuipka 2010:68), the plaza was extended to include the area west of the west wall enclosing the west kiva.

No roads, earthen architecture, or a Great Kiva have been documented at Chimney Rock. Eddy (1977:41) did investigate a "trash deposit" located at the base of the cliff past the north wall of the Great House. He interprets this as simply "the residue of garbage which was heaved over the side of the cliff by the village occupants" (Eddy 1977:41).

The Ravine Site

The Ravine Site is located approximately .8 km from the Chimney Rock Great House, on the mesa below (Figure 4). Two of the nineteen "mounds" that make up the site were examined by Truell (1975); Mound (or Structure) 17 is a Great Kiva and mound (or Structure) 16 an ovoid habitation room with three small rectangular storage/milling rooms abutted on the north side (sType equation here.ee Figure 36 and Figure 37). Structure 16 is located approximately 20 meters north of the Great Kiva (Chuipka 2010:76). Based on tree ring dates recovered from the roof of Structure 16, the building was constructed in or soon after A.D. 1077r (Eddy 1977; Truell 1975).

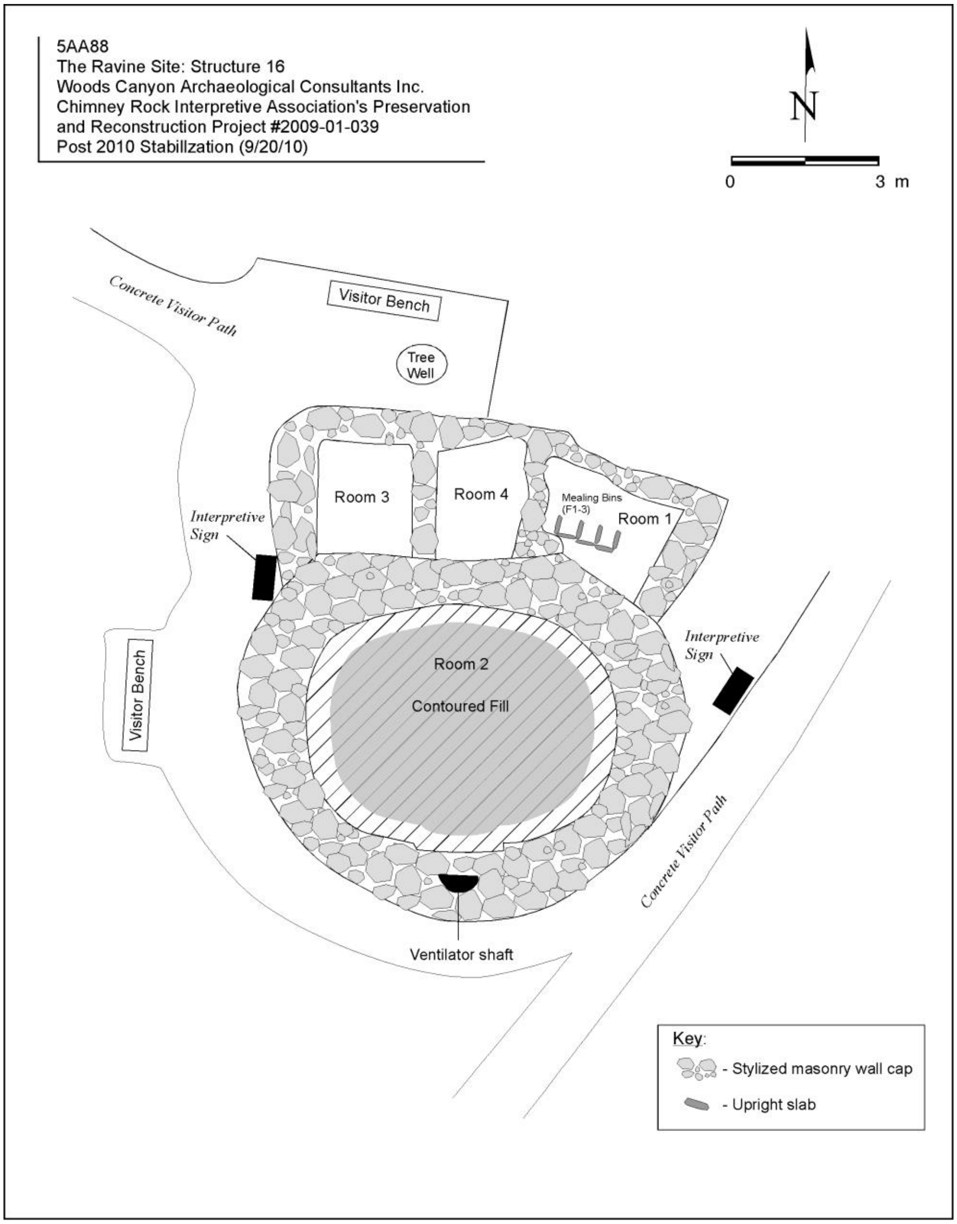


Figure 36. Feature 16 at the Ravine Site. Figure courtesy of Woods Canyon Archaeological Consultants, Inc. Redrafted from Eddy (1977: Figure 29) and including current visitor trail and benches.

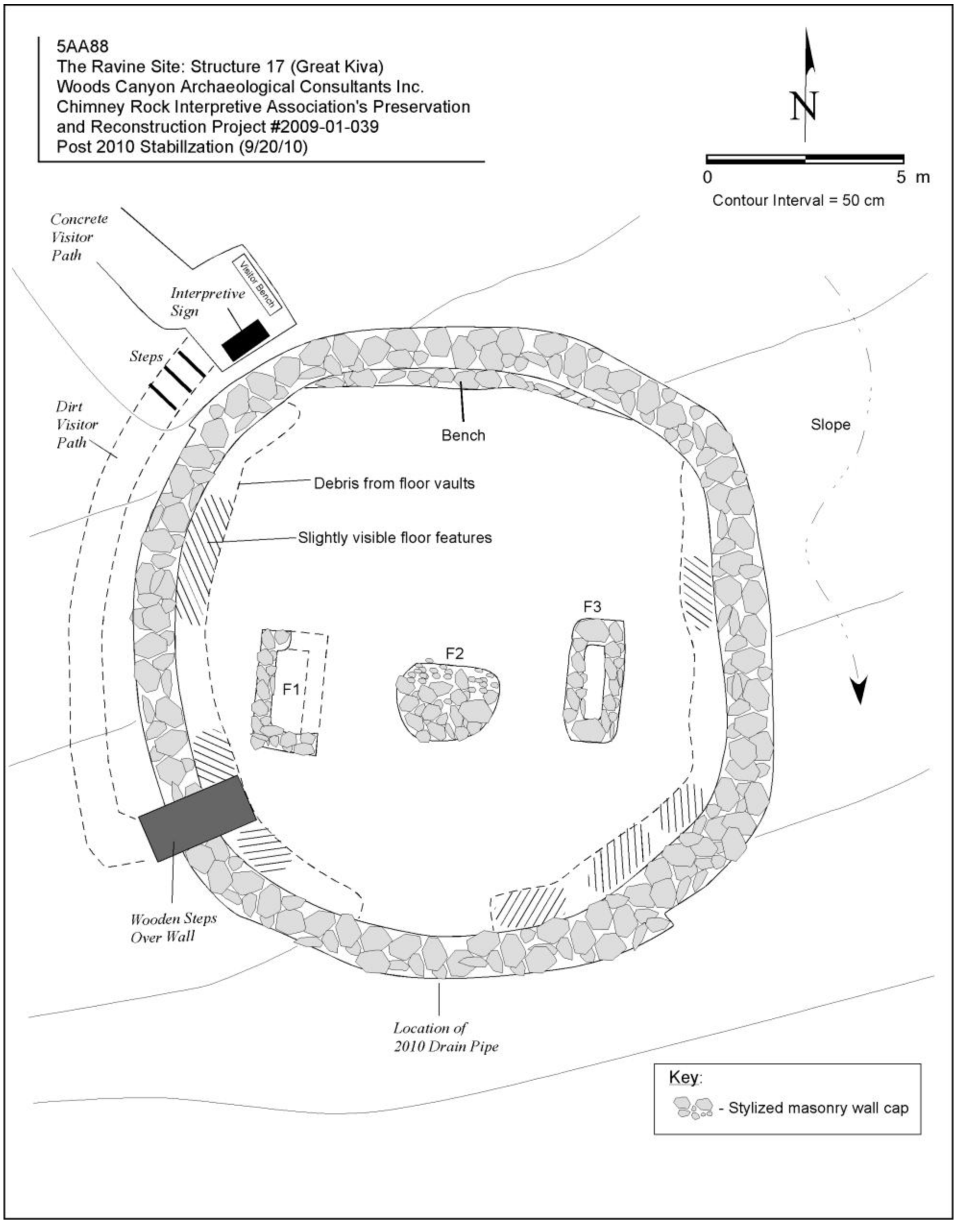


Figure 37. Feature 17 (Great Kiva) at the Ravine Site. Figure courtesy of Woods Canyon Archaeological Consultants, Inc. Redrafted from Eddy (1977: Figure 28) and including current visitor trail.

Interestingly, the walls of the ovoid habitation structure are built from core and veneer masonry, but with blocky, unshaped and tabular stones and no chinking stones (Chuipka 2010:77). The core-and-veneer masonry found at the Ravine Site is not of the same quality and precision as that of the Great House. But, it is interesting that the inhabitants of the structure would have invested so much effort into building big, wide walled structures when there is apparently no functional reason to do so. An earlier room, labeled Room 5 by Eddy (1977:55) was discovered beneath this habitation room. Unfortunately, not much more is known about the time of construction of this room, but it was likely dismantled to construct the building on top of it (Chuipka 2010:78). The three storage rooms abutted to the north of the ovoid habitation room are of double-single and compound masonry with blocky, tabular sandstone (Chuipka 2010:77, 79).

Structure 16, and other similar structures in the vicinity of the Chimney Rock Great House, resemble above-ground Pueblo I era pit houses in terms of size and layout. These structures have been referred to as "crater houses" and are not found anywhere else in the Northern San Juan Region or before or after the Chimney Rock Phase (A.D. 1075-1150) (Chuipka 2010:96).

The Great Kiva (Figure 37) at the Ravine Site is approximately 0.8 km from the Chimney Rock Great House, and is the closest recorded Great Kiva. Chuipka et al. (2009) report Great Kivas further away on Pyramid Mountain and in the North Piedra Group (as defined by Eddy 1977). See Figure 4 for site group locations. Also see Eddy (1977:17-19). However, without sufficient excavation data, it is unclear if the Pyramid Mountain and North Piedra Group Great Kivas are Chaco style Great Kivas.

Mound 17, the Ravine Site Great Kiva, measures 13.25 meters in diameter and has thick walls (0.85-1.04 meters). The kiva is built with core-and-veneer masonry and the walls are footed on bedrock (Chuipka 2010:80). Fourteen sub-floor rectangular masonry lined cists located concentrically at the base of the east, south, and west walls were identified by Truell

(1975). The cists were covered with wooden planks and a few artifacts, including a “well made granodiorite axe,” three bone artifacts, and 76 pot sherds were recovered from the (Truell 1975:52). A D-shaped masonry feature flanked by rectangular masonry subfloor vaults was located in the center of the Great Kiva. Eddy (1977:54) interprets the D-shaped feature as an altar, and Truell (1975:53) as a firebox. A bench was identified along the north side of the structure, but it does not seem to encircle the entire Great Kiva (Truell 1975; Eddie 1977)

No roads, earthen architecture or midden, or formal plaza area are reported for the Ravine Site.

Bluff Great House

The Bluff Great House is located near the north-westernmost fringes of the Chaco Region (Figure 1). The structure was constructed in the late A.D. 1000s or early 1100s and continued to be used and modified into the mid 1200s (Cameron 2008:1). At least a portion of the three (and maybe four) story Great House is constructed of Chacoan core-and-veneer walls, but does not exhibit the closely chinked masonry characteristic of Chaco Canyon. Four above-ground kivas were constructed within the main room block, and a Great Kiva is located to the southwest of the Great House (Cameron 2008:7).

Like many Great Houses, the Bluff Great House is situated in a striking location, in this case “on a prominent gravel terrace thirty to forty meters above the San Juan River (Cameron 2008:104). This location was utilized by humans at least as early as the Basketmaker III period (A.D. 600-750). Prior to building the Great House, the architects leveled the construction site (Cameron 2008:104). The Great House was constructed of poor quality local Bluff sandstone in two episodes. The western portion of the site was constructed first and is comprised of “singecoursed, scabbled masonry" and the eastern, more "Chacoan" part is "built of core-and-veneer compound masonry" (Cameron 2008:81, 105, 190). See Figure 38. The eastern, core-and-veneer component of the Great House is also the only part of the structure that has multiple stories. There are three kivas, one Chacoan-style and two San Juan-style in the east section of the Great House (Cameron 2008:81). The rooms at Bluff are large and have high ceilings, similar to rooms in Great Houses in Chaco Canyon (Cameron 2008:122).

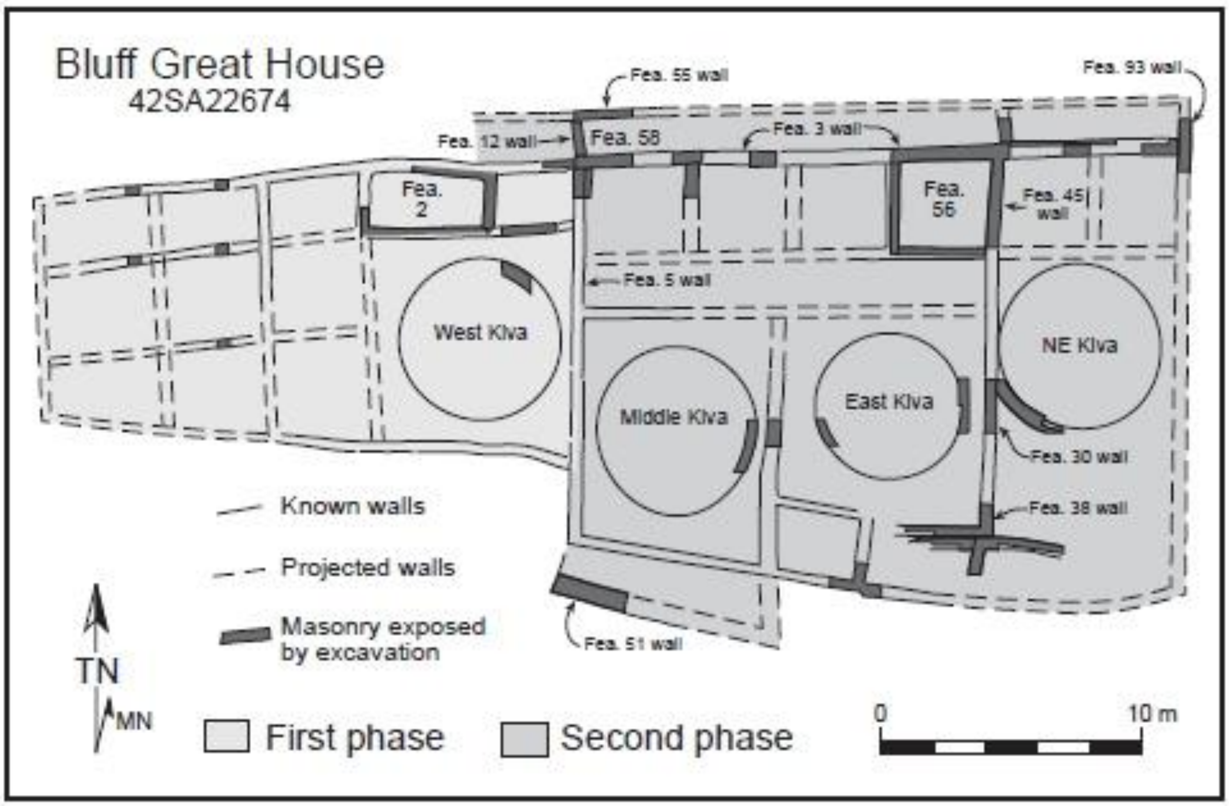


Figure 38. Bluff Great House map showing two construction episodes. Adapted from Cameron (2008: Figure 5.57).

One north-south running wall located in the center of the structure between the east and west construction phases of the Great House, was originally single-coursed masonry, but was then transformed into a faux core and veneer wall with the addition of a veneer on the east wall and a rubble core. This wall then became the western wall for the addition to the eastern part of the site (Cameron 2008:105). The core-and-veneer masonry observed at the Bluff Great House "does not replicate the carefully made, closely fitted, well-coursed walls" found in Chaco (Cameron 2008:119). Rather, courses are "irregular and undulating," with wide mortar beds and minimal chinking (Cameron 2008:119, 121). The architects at Bluff utilized footer trenches filled with cobbles and mortar to create strong foundations for multiple story walls (Cameron 2008:121, Figure 5.9).

A row of single-story rooms was added along the north wall of the Great House. These rooms connected the east and west portions of the structure together. The walls in these rooms are some of the most high quality core-and-veneer masonry at the site (Cameron 2008:121).

Four kivas were constructed within the Bluff Great House. Each was explored to some extent, and they have been labeled the West, Middle, East, and Northeast Kivas. The earliest kiva (Northeast) constructed within the Bluff Great House was a Chaco-style room with a subfloor ventilator and radial beam pilasters, while the later kivas (West, Middle, and East) were San Juan-style with pilasters (Cameron 2008:10, 160-161, 180). The later San Juan-style kivas were likely domestic spaces and were constructed by remodeling existing square rooms in the Great House (Cameron 2008:11).

A likely plaza area was investigated in front of the massive, nearly 3 meter high front wall of the Great House. This area appears to have been purposefully prepared and kept free of trash and debris, even where it abutted the front wall. The plaza was likely used for ceremonial activities during the Chaco-era, and was no longer used in the post-Chaco era (Cameron 2008:126-127). A wall enclosing the plaza is not reported, but it was enclosed by a discontinuous earthen berm that is discussed in more detail in the upcoming pages.

The Great Kiva at Bluff was constructed during the Chaco-era and appears to have been one of the last structures used at the site (Cameron 2008:11). No roof beams were recovered for dating the construction of the Great Kiva. Based on ceramic data, it appears that the Great Kiva was built during the late Pueblo II time period, contemporaneous with the Great House (Cameron 2008:262-263). The structure is located about 30 meters southwest of the Great House, and the main chamber of the Great Kiva is approximately 12.8 meters in diameter. Rooms around the periphery of the Great Kiva were identified on the northern, eastern, and western sides of the structure, and there are indications that peripheral rooms may also exist on the southern margins. The north antechamber was most extensively excavated, appears to be the largest of the peripheral rooms and may have been the entrance to the structure (Cameron 2008:196). One of a likely paired set of floor vaults was identified on the floor of the Great Kiva (Cameron 2008:229). The masonry of the Bluff Great Kiva is quite different than that found in Chaco Canyon, with blocks set in thick mortar in irregular courses. The walls of the structure also seem to be only one course thick, not of core-and-veneer masonry (Cameron 2008:259).

Many major road segments have been documented in southeast Utah, including those on the Grand Gulch Plateau, Comb Wash, Butler Wash, Black Mesa, Tank Mesa, the Cottonwood Wash Drainage, Alkali Ridge and Montezuma Canyon. Minor segments have been recorded in Monument and Cross Canyons, White Mesa, Mustang Mesa, and elsewhere along the San Juan River (Hurst and Till 2008:61). Prehistoric road swales enter the Bluff Great House Site (Figure 39). At least one of these roads crosses nearby Tank Mesa and appears to connect with the road system documented in Comb Wash (Till 2001). The row of rooms added to the north wall of the Great House may have been road related, as is thought of similar rooms within Chaco Canyon (Cameron 2008:121; Windes 1987a).

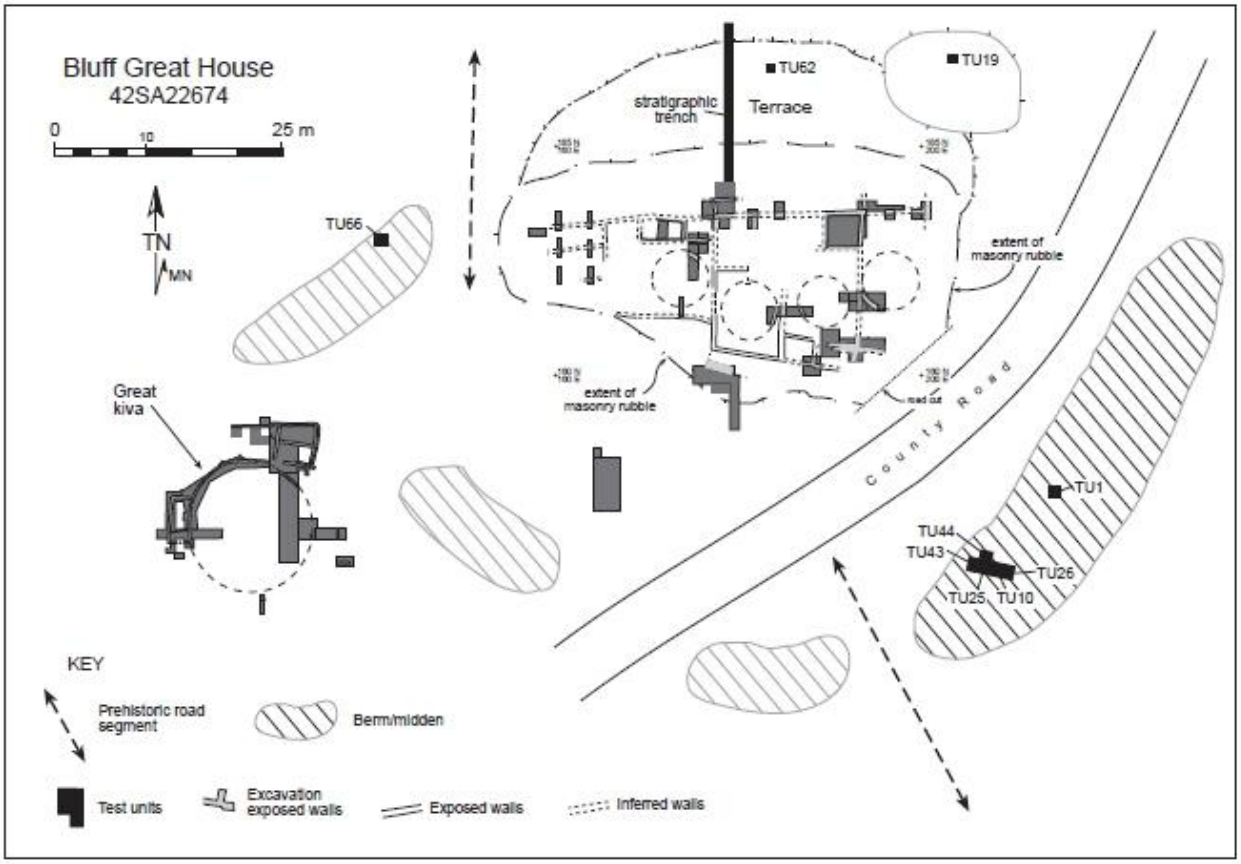


Figure 39. Bluff Great House showing berms, road entrances, and Great Kiva locations. From Cameron (2008: Figure 7.1).

The Great House is partially encircled by a discontinuous earthen berm, varying in height/depth from about 1 meter to 1.75 meters (Cameron 2008:292). Road segments enter the Great House in some of the breaks in the berm (Cameron 2008:7). The berm encloses a diameter of more than one hundred meters, and is composed of four sections on the southern, southeastern, and southwestern sides of the Great House, and one terrace directly north of the Great House. The northern portion, or terrace, of this earthen structure runs the entire length of the back wall of the Great House, forming a mound greater than fourteen meters in width. The berm required approximately 2500 cubic meters of fill, composed of primarily demolition and construction debris, but also household trash, to construct. The berm also separates the Great House from the Great Kiva (Cameron 2008:264; Figure 7.1). Cameron (2002:677) does not think that the Bluff berm was constructed as a result of ceremonial gatherings, but that its use in the Post-Chaco era was “perhaps the result of a restructuring or revival of Chacoan ideas in the northern San Juan region.”

Corral Canyon Site

The Corral Canyon Site is located in southeastern Utah, east of Highway 191, 9 km south of Blanding and approximately 32 km north of the Bluff Great House (Figure 5). The site is made up of two pit structures, one additional structure that may be a kiva, a semisubterranean mealing room, and one small surface room. No intact midden was found in association with the site, but this may be due to the significant amount of trampling by cattle that has occurred there (Firor 1998:51-52). Lipe and Varien (1999:244) note that Pueblo II era habitation sites in southwest Colorado typically consist of a kiva, a few surface rooms of jacal or masonry, a pit structure used as a mealing room, and a midden (Lipe and Varien 1999:244). The Corral Canyon site differs from this pattern with no evidence of pit houses (or kivas) and masonry rooms being utilized concurrently. It appears that pit structures were being utilized as the primary habitation longer at the Corral Canyon site than they were elsewhere. Firor (1998:155) notes that “By middle Pueblo II times, one might expect a “unit pueblo” site layout with above ground habitation structures arranged the north of a kiva.” This pattern is not observed at Corral Canyon.

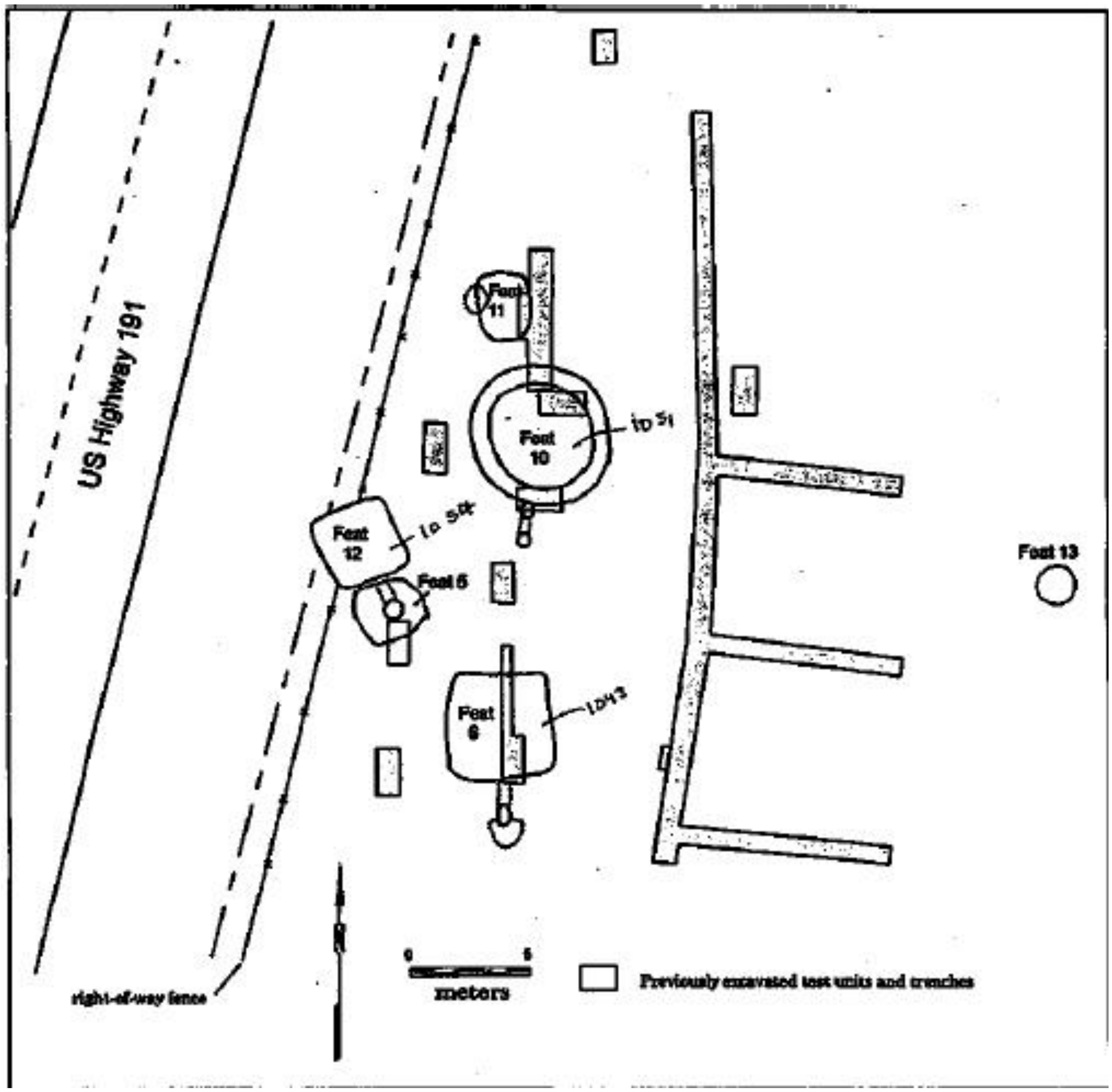


Figure 40. Plan view of Corral Canyon Site. From Firor (1998: Figure 6).

The only surface structure (Feature 5) likely served as a habitation. It was not constructed of substantial masonry or slab walls, and was probably a jacal room utilized after the abandonment of the other structures (Firor 1998:58). Feature 6 is a large (4.2 x 4.56 meter) pit house and appears to be the first structure built at the site. Based on tree ring dates, construction of the pithouse occurred in A.D. 1043 or A.D. 1049. The floor features and artifactual evidence indicate that the structure functioned primarily has a habitation, but the presence of a sipapu indicates some ritual activity (Firor 1998:74).

Feature 10 is a possible earth-walled kiva measuring 5.75 x 5.8 meters in size. The kiva has an encircling bench, eight masonry pilasters, and a ventilator system consisting of a tunnel and two vertical shafts on the south side of the structure (Firor 1998:74-75). There were ten floor features within the kiva: a central hearth; six small associated pits, an ash pit, a sipapu, and a small pit near the southeast wall (Firor 1998: 83). The kiva is round, and not "keyhole" in shape in the northern San Juan style. Based on architectural features and the lack of activity areas, Firor (1998: 89) state that the structure served both as a ritual, and to a lesser extent, domestic space. Based on a cluster of tree ring dates, the kiva was built in A.D. 1051.

Feature 11 is a semi-subterranean mealing room 3.62 by 2.45 meters in size. The above ground masonry walls of the structure were undressed blocky sandstone, and the upper portions of these may have been jacal (Firor 1998:90).

Feature 12 is another small pithouse measuring 3.62 x 3.2 meters in size (Firor 1998:103). The structure was likely built in A.D. 1054 and used as a permanent habitation structure. Feature 13 is a roasting pit measuring 1.6 meters in diameter by 34 cm in depth (Firor 1998: 115).

No formal plaza space, Great House, Great Kiva, earthen architecture/formal midden, or road segments were identified at the Corral Canyon Site.

Summary and Discussion of Architectural Attributes

Table 5 summarizes the results of the inventory of architectural features described in the preceding sections.

Table 5. Summary of architectural features found at six sites included in analysis. "X" indicates that feature is present.

	Formally Designed Great House	Great Kiva	Core-and-Veneer Masonry	Roads	Earthen Architecture	Chacoan Round Rooms/Kivas	Formal Plaza
Pueblo Alto	X		X	X	X	X	X
29SJ 627							
Chimney Rock	X		X			X	X
Ravine Site		X	X				
Bluff Great House	X	X	X	X	X	X	X
Corral Canyon Site							

If the above data is used to evaluate the export vs. emulation question as narrowly defined, only one site (Bluff Great House) has all the components on the "Chaco Checklist" of necessary architectural features for inclusion as a part of the Chaco World and an export of Chaco Canyon. Pueblo Alto and Chimney Rock both have some of these traits. The Ravine Site is the only of the small sites that has any architectural features associated with Chacoan architecture (core-and-veneer masonry, and a Great Kiva). However, it should be noted that the core-and-veneer masonry observed at the Ravine Site is not of the quality or formality as core-and-veneer masonry observed at Pueblo Alto, the Bluff Great House, and Chimney Rock.

As has been noted, Chacoan architecture encompasses considerable variability. Yet, there is enough commonality between contemporary sites for them to be identified as a category (Rapoport 1982). While there are identifiable commonalities between forms like Great Houses throughout the southwest, the table above demonstrates that not all "Chacoan" communities are made up of the same set of components. The table above is also indicative of some of the problems with using a "checklist" approach to the past.

Interestingly, the Bluff Great House is the only site that has all of the variables in the package of features commonly considered to constitute a Chacoan site. Does this then mean that the Bluff Great House is more directly connected Chaco Canyon than Pueblo Alto, a Great House actually located in the canyon? Of course not; this fact indicates a problem with the export vs. emulation model and highlights the necessity of investigating beyond a list of attributes that we expect to find at Chacoan sites. Indeed, the context and architectural history of the site may be as much or more important than the precision with which core-and-veneer masonry is executed, for one example.

The "small sites" chosen for this analysis (the Ravine Site, the Corral Canyon Site, and 29SJ 627) are all quite different from their respective Great House counterparts both in form and in function. An examination of the plan maps and architectural features of these small sites indicate that they are starkly divergent from Chimney Rock, Pueblo Alto, and the Bluff Great House. As evidenced by the construction histories of the six sites, the small sites are characterized by haphazard remodeling over time likely taking place as the need for more space arose; while the Great Houses are a result of relatively massive construction episodes. People probably lived in both the small sites and the Great Houses, but the Great Houses served additionally as integrative features and administrative centers for constituents beyond the immediate community. Research has shown that fewer people inhabited Great Houses than would be expected based upon their immense size (Bernardini 1999; Windes 1984; 1987, Lekson, Windes and McKenna 2006). The scale and planning of Great Houses is beyond what would be necessary for simple habitation, and it is likely that Great Houses served a range of habitation, administrative, storage, and ritual purposes (Lekson, Windes, and McKenna 2006). The scale, planning and formality combined with astronomical significance (Chimney Rock), roads and earthen architecture (Pueblo Alto and Bluff) point to their roles as community and integrative architecture.

Both the Ravine Site and the Corral Canyon Site date solely to the Pueblo II time period, while 29SJ 627 has a much longer period of site occupation, beginning sometime in the A.D. 600s. These issues of timing and chronology have implications for the connection of small sites to Great Houses and to Chaco. 29SJ 627 was present prior to the ramping up of Great House construction in the Canyon, while the Ravine Site and other sites surrounding Chimney Rock seem to have been constructed due to or in reaction to Chacoan presence in the area. The situation with the Corral Canyon Site is a bit less clear due to its distance from the Bluff Great House.

The history of use and occupation of the Chimney Rock area is very closely tied to Chacoan presence at the site. No one was living in the area or on the high mesa prior to the eleventh century. It appears that the Ravine Site was constructed by migrants attracted to the area by the Chacoan newcomers. Structure 16 at the Ravine Site was not a place intended for community interaction, rather it appears to have been a habitation with storage areas. Interestingly, the circular habitation structure is constructed of core-and-veneer masonry. The masonry is not of the quality and precision of the Great House above, but it may be an offshoot of the same technology. The inhabitants of the crater houses didn't need to build such massively wide walls if function was the sole concern. The Ravine Site and other small sites surrounding Chimney Rock may be the homes of migrants conscripted to construct the Great House. These laborers would have learned core-and-veneer masonry technology and then translated it into a familiar form – essentially an above ground pithouse.

On the other hand, the Great Kiva (Structure 17) associated with Structure 16 at the Ravine Site, was likely intended for communal gathering. While not as formal as Great Kivas found in Chaco Canyon, the structure associated with the Ravine Site does appear to be modeled on the concept of Great Kivas associated with the Chaco phenomenon. Why is the Great Kiva associated with the Ravine Site, and not with the Chimney Rock Great House on the mesa adjacent to the stone pillars? It may simply be a matter of space – there is limited room on the high mesa, and most of this space was required by the Great House and associated plazas. The vicinity of the Ravine Site below may have been determined to be the nearest possible location that could accommodate a Great Kiva structure. It is possible that individuals living in Structure 16 at the Ravine Site had greater prestige due to their proximity and potential association with the Great Kiva. Additionally, several feather holders (see Chapters V, VI, and VII for more on feather holders), ostensibly ritual objects were found in Structure 16, lending support to this argument (Truell 1975).

There is an alternative, and perhaps more likely scenario. The Great Kiva form was present prior to Chaco and after Chaco. The concept of a Great Kiva can be traced to Basketmaker III Great Pithouse structures. Some Great Houses have Great Kivas while others do not, and some Great Kivas are isolated. It seems likely that the Great Kiva form is not a direct correlate of a "Chacoan" site. The Great Kiva structure, with its great time depth and ubiquity, may have a broader cultural meaning beyond Chaco, that is, for Ancestral Pueblo people who used the structures. Great Kivas, of various forms, were the principal community structure for centuries. People were familiar with them, and Chaco changed and formalized the structure enough to differentiate them from earlier versions, and to associate them with the Chaco system and also to legitimate the Chaco system. Some existing Great Kivas may have, in essence, been appropriated by Chaco (Van Dyke 2007). This may have been the scenario at Chimney Rock. The inhabitants of the Chimney Rock Great House co-opted the familiar Great Kiva form and exercised enough influence to result in the one at the Ravine Site being built in a vaguely "Chacoan" style.

The proximity of the Great Kiva to Structure 16 and its distance from the Great House warrants another word of caution. The Great Kiva was determined to be associated with Structure 16 at the Ravine Site prior to excavation and based only upon proximity. It is illogical to conclude that the Great Kiva is solely associated with the habitation portion of the Ravine Site, and not with the rest of the community or the Great House on the mesa above. For the sake of the analysis presented in this chapter, the Great Kiva is included under the umbrella of the Ravine Site, but for all intents and purposes, the Chimney Rock Great House should have an "X" in the Great Kiva box in the summary table above.

29SJ 627 in Chaco Canyon, while quite a large "small site," is decidedly informal in construction and design. Inhabitants of the site lived primarily in subterranean pit structures, worked outdoors in the shelter of ramadas, and added onto the site as needed. There was no masonry present until after A.D. 1000, and this may have been a reaction to the intense architectural undertakings at Great Houses in the canyon at the same time. There are no public or formal spaces to indicate that the site was anything more than a long lived habitation that underwent centuries of use and remodeling. There are no architectural features associated with the Chacoan canon found at this site.

While 29SJ 627 has no Chacoan style architecture characteristics, its proximity to the Great Houses in downtown Chaco and similarities to the ceramic assemblage to Pueblo Alto (see Chapter V) is indicative of some level of involvement in the Chaco World. The inhabitants of the site could not have lived in isolation from the massive architectural, religious and political undertakings going on in the canyon all around them. 29SJ 627 demonstrates that sites cannot be omitted from some level of participation in Chaco simply due to a lack of specific architectural features. Other factors, including artifact assemblages, proximity to Great Houses, and location in the canyon, are indicative of some manner of connection to the Chaco World. The context and setting of a site must therefore be taken into consideration when evaluating relationships between sites.

The Corral Canyon Site in southeastern Utah is another clearly residential site. Comprised mostly of earthen walled pit structures with a small masonry structure, the site shows little or no indication of any sort of integrative function in the area. Like 29SJ 627, there is no obvious pre-planning, likely structures were built as they were needed. There are absolutely no "Chacoan" architectural features at the site.

The construction histories of Chimney Rock Great House and Pueblo Alto are similar. Both were constructed on high points and are single story structures. Both are strictly Chaco-era buildings, meaning that Chacoan architectural features were not added onto a pre-existing building and that the Great Houses were not re-used or remodeled after the collapse of the Chaco System. In contrast, Chacoan architectural features were added to an existing structure at the

Bluff Great House, and the building was remodeled and reused after the end of the Chaco era. Pueblo Alto is clearly a planned, formal, and massive Great House, despite the lack of a Great Kiva. The histories of Chimney Rock and Pueblo Alto can be contrasted with the Bluff Great House that was built in two construction episodes, the first much less formal than the second, multiple story, and core-and-veneer section. This architectural history indicates that the Bluff Great House may have become increasingly integrated into the Chaco System or world view over time, ultimately resulting in the formalized eastern section of the Great House. Chimney Rock, on the other hand, appears to have been directly connected to Chaco from the time that the first stone was laid.

The previous discussion has illustrated some of the shortfalls of using a checklist approach to make sense of the Chaco Region. As predicted at the beginning of this chapter and in Chapter II, the relationship between architecture and identity or connection to the Chaco System is not straightforward. Utilizing the export vs. emulation framework and going a step beyond the presence/absence table presented above, it would be reasonable to argue that Chimney Rock Great House is an export of the Chaco Canyon, while the Bluff Great House is an emulation of the canyon. An examination of a plan view of the Bluff Great House and of the Chimney Rock Great House indicates that the Chimney Rock Great House is more formal in design and was constructed of higher quality masonry. Additionally, the western portion of the Bluff Great House is less formal, a single story and is not built of core-and-veneer masonry. The plan view maps of the two sites also reveal that the rectangular rooms at the Chimney Rock Great House were much more regular and consistent in shape and size, while those at the Bluff Great House are quite irregular.

Is this an accurate, or a meaningful observation to make? The difference in formality and masonry between Chimney Rock and Bluff are simply a matter of degree. Is the lower quality masonry at Bluff simply a result of the fact that the sandstone in the area is lower in quality than that available at Chaco and Chimney Rock? Or, perhaps the traits that archaeologists have focused so heavily on (core-and-veneer, large formal rooms, etc.) were less important to the individuals who built Bluff and those who saw and utilized the Great House as a location for communal activities and integration? It may have been the *idea* of the Great House and the structure that may have been just enough like those in Chaco to serve the same purpose in its local community and to affiliate that community with the Chacoan political apparatus (akin to Weissner's "emblemic" style (1983) and Wobst's concept of style as functioning to communicate messages such as political affiliation (1977); see Chapter II). It is possible that even though Bluff appears to have not been built by individuals from Chaco, it became as much a part of the system as if it had been a colony of the Canyon (more on the role of emulations in Chapter VII).

The site where the Bluff Great House is located was used by humans for several centuries prior to the Chaco era. It is possible, and likely even, that the final form of the Bluff Great House was shaped both by local cultural histories, and by the developing Chaco World. In essence, the Bluff Great House was an emulation of Chaco Canyon. This can be contrasted with the Chimney Rock Area, where there was no substantial habitation or use of the area prior to the construction of the Great House. Therefore, local histories and ways of doing did not play a role in the final form of Chimney Rock. The site was established as a Chaco outpost by Chacoan people.

Clearly, the Bluff Great House, Chimney Rock Great House, and Pueblo Alto functioned on a larger scale than the Corral Canyon Site, the Ravine Site, and 29SJ 627. The administrative and integrative function of the Great Houses is evidenced by the scale and degree of planning necessary for construction, differential access to the sites, and spaces for extra-community activities (Great Kivas and plazas). Focusing on minutiae in an effort to exclude certain sites from inclusion in the Chaco system may result in an inadequate accounting of the full extent of the Chaco World.

This analysis has revealed several interesting and informative insights related to Chacoan architectural patterns and inconsistencies within those patterns. Clearly, Great Houses are different in scale and function from small sites in their respective communities and small sites in general. Chacoan architecture is characterized by variability and by different combinations of features at different sites. Does this variability negate the existence of a larger system? Great Houses, like administrative buildings in modern society, are a class of structure encompassing much variability. Despite this variability, human beings are typically able to identify official buildings (Rapoport, ed. 1976; Rapoport 1982), and these buildings were likely stylistic symbols of participation in the Chaco System. Something very similar to this probably went on in the Chaco World. An examination of these structures that takes this broader perspective, allowing for variability throughout the San Juan Basin, will prove much more fruitful than a focus on very specific, and typically "cultural" architectural traits. Further, an examination of architectural histories of individual buildings may shed light on both their origins, and connections or lack thereof to Chaco.

BEYOND THE CHECKLIST

The preceding pages have described the architectural details and histories of six sites: Pueblo Alto, 29SJ 627, Chimney Rock Great House, the Ravine Site, Bluff Great House, and the Corral Canyon Site. From this narrative description, it becomes clear that sites categorized as Great Houses have different features, functions, and construction histories than small sites. Great Houses are typically built out of fine core and veneer masonry in a few large construction events, have large rooms with high ceilings, and other features such as Chacoan round rooms. In comparison, the final forms of small sites are not planned to the extent that Great Houses are planned. They appear to develop as the need for more space arises and to be used solely for habitation purposes.

The terms "formality" and symmetry have often been used to describe this difference between Great Houses and small sites (Vivian 1990, Cameron 2008, Lekson 2007, Van Dyke 2008, and many others). Even a cursory examination of the plan maps of these structures demonstrates a different design aesthetic and organization of small sites vs. Great Houses, but how can this perceptible difference be quantified? The differences between the plans of Great Houses and of small sites also have functional implications. Is there a way to determine if a site categorized as a Great House is more or less like the Great Houses of Chaco Canyon than other sites categorized as Great Houses?

To this end, the next step of this analysis goes beyond the checklist of Chacoan traits to examine where Pueblo Alto, Chimney Rock, Bluff and their associated small community sites are situated on the continuum of Chacoan architectural characteristics. This is accomplished by examining the sizes of plaza facing rooms, rear/storage rooms, Chacoan round rooms, and Great Kivas in relationship to the sizes of each of these architectural units reported by Lekson (1986).

The scale of individual construction events is also examined and compared by determining size of the building footprint that each event encompassed. This portion of the analysis is restricted to roomblocks. Small sites are examined to the extent possible given their very different architectural characteristics.

Lekson (1986) notes that the floor area of rear row rooms remains consistent through time, while the floor area of front rooms varies considerably through time. Rear row rooms have an average floor area of about 12 m^2 over the span of the complete two centuries of Chacoan construction (Lekson 1986:40). Rear rooms in Chacoan buildings have typically been interpreted as storage areas. The rooms usually connect directly to the typically larger rooms located directly in front of them (Lekson 1986:45). The average floor area of front row rooms varies from 45 m^2 in the early 900s to a much diminished 10m^2 in the early twelfth century. Front row rooms averaged about 39 m^2 from A.D. 1000-1030 and then dropped to approximately 18 m^2 by A.D. 1000 (Lekson 1986: Figure 3.1). Intermediate row rooms mirror the size of either the front or back row of rooms until A.D. 1075. After this time, intermediate row rooms tend to follow the size pattern of rear row rooms (Lekson 1986:40).

As discussed earlier in this chapter, Chacoan round rooms are a distinctively Chacoan architectural feature. These structures are associated with the era of large scale construction within the canyon. Excavated Chacoan round rooms in the canyon (n = 65) average 7.08 m in diameter (Lekson 1986:53-54). Lekson does not provide the average size of Great Kivas within Chaco Canyon, but Van Dyke (2007:117) notes that Great Kivas “exceed 9-10 m and more typically approach 15-20 m” in diameter.

Room size measurements are available in reports for Pueblo Alto, 29 SJ627, Chimney Rock Great House, and the Ravine Site. Published metric data was used where possible with the assumption that this would be more accurate than measurements obtained manually from maps. Unfortunately, very little information regarding room dimensions is available from the Bluff Great House. In fact, exact dimensions and wall angles are only known from one room, referred to as Feature 56 (Catherine Cameron, personal communication, June 2011). The Corral Canyon Site does not conform to this method of analysis because there is no roomblock. In fact, there is only a single, jacal surface room. Residents of the site lived in pit structures.

Structures that are exports of Chaco or that served similar functions as Chacoan Great Houses (that is, extra-community, administrative, and as elite residences) will likely be more similar to buildings within Chaco in terms of the sizes of plaza facing and storage rooms, Chacoan round rooms, and will have larger building events. Structures that are emulations or functioning in different ways than Chacoan Great Houses will likely be smaller and differ from Great Houses in the categories above.

ROOM SIZE

Complete room size data for each of the six sites included in this analysis can be found in Table 26, Table 27, Table 28, Table 29, and Table 30 in Appendix B. Table 6 compares room size data from each of the sites in this analysis with those defined in *Great Pueblo Architecture* (Lekson 1986) for Chaco Canyon.

Table 6. Comparison of room size data as defined by Lekson (1986).

	Great Pueblo Architecture **(Lekson 1986)**	**Pueblo Alto**	**29SJ 627**	**Chimney Rock**	**Ravine Site**	**Bluff Great House**	**Corral Canyon Site**
Avg. Front Room Size (A.D. 1000-1100)	39-18 m^2	Stage 1A: 37.9 m^2 Stage IB: 37.6 m^2 Stage IC: 33.8 m^2 Stage II: 25.2 m^2 Stage III: 46.1 m^2	9.43 m^2	19.8 m^2	19.63 m^2	12.19 m^2*	N/A
Avg. Middle Room Size	Mirror size of either front or rear rooms.	Stage II: 26 m^2 Stage III: 14.2 m^2	6.8 m^2	20.59 m^2	None	10.17 m^2*	N/A
Avg. Rear Room Size	12 m^2	Stage IA: 9.8 m^2 Stage IC: 12 m^2 Stage II: 17.5 m^2 Stage III: 11.7 m^2	5.12 m^2	16.7 m^2	4.95 m^2	12.5 m^2 (based on Room Feature 56)	N/A

Avg. Chacoan Round Room Size**	7.08 m in diameter	7-9	N/A	8.57 m	N/A	6.25 m (NE Kiva)	N/A
Avg. Great Kiva Size	Larger than 9-10 m and often approach 15-20 m in diameter	N/A	N/A	N/A	13.24 m	12.8 m	N/A

*No measurements are available for room size at the Bluff Great House, with the exception of a single rear row room (Feature 56). These measurements were taken from project walls mapped and reported in Cameron 2008.
**Chacoan round rooms (called court kivas by Windes 1987b:13) are associated with the initial Great House occupation and are those discussed here. Later "clan" kivas, less than 5 m in diameter are found only after A.D. 1090 or 1100 at Pueblo Alto.

Front rooms at Chimney Rock and Pueblo Alto are closest in size to the standard provided by Lekson (1986). While the front, circular, living room at the Ravine Site is also quite large, it is of a fundamentally different type than front, plaza facing rooms in Great Houses. The front room at the Ravine Site is circular, served as a habitation, and does not face onto a plaza. Additionally, there is only a single room, whereas Great Houses have many plaza facing rooms. The plaza facing rooms at the Bluff Great House are large, but are not in the same class as those at Chimney Rock and Pueblo Alto. In fact, the front rooms at Bluff are closer in size to those at 29SJ 627 than to other Great Houses. Of course, the only plaza facing rooms at Bluff are in the older, western, section of the Great House. This section is not as massively or finely constructed as the more "Chacoan" eastern section.

The middle rooms at Chimney Rock Great House do mirror those in front and behind them in size. Indeed, the rooms at Chimney Rock are remarkably consistent in size. The middle rooms at Pueblo Alto and at Bluff Great House are also quite similar in size to those either in front of or behind them. Middle rooms at 29SJ 627 are smaller than those in front of them and more close in size to those behind them. There is no middle tier of rooms at the Ravine Site. The average size of rear rooms at Pueblo Alto, Chimney Rock and Bluff are all in the range, and sometimes larger, than that reported by Lekson (1986). In comparison, the rear rooms at the Ravine Site and 29SJ 6267 are much smaller in size.

Chacoan round rooms at Pueblo Alto and Chimney Rock fit comfortably into the 7-9 meter diameter range observed in Chaco Canyon. The Chacoan round room at Bluff is a bit smaller, only 6.25 meters in diameter. There are no Chacoan round rooms at any of the three small sites. The Great Kivas associated with Bluff and the Ravine Site are also in the range of size defined by Van Dyke (2007). There is no Great Kiva at any of the other sites.

This simple comparison in room size has shown that Pueblo Alto and Chimney Rock are more similar to the room sizes noted at Chaco Canyon Great Houses. The Bluff Great House, while not displaying rooms as massive as those at Chimney Rock and Pueblo Alto, does have larger rooms than 29SJ 627 and the Ravine Site. The "small sites" (29SJ 627, Ravine Site, and Corral Canyon Site) do sort out as smaller and quite different from the sites termed Great Houses here. Indeed, the Corral Canyon site was not even amenable to this comparison as it has no room block to examine. While there is a Great Kiva associated with the Ravine Site, is likely that Great Kivas belonged to communities and were co-opted by Chaco as a component of the political/religious apparatus of the system. The Great Kiva was a component of the larger community focused on the Chimney Rock Great House, not just of the Ravine Site.

SCALE OF CONSTRUCTION PHASES

Table 7 (below) reports the approximate size of building events at each of the six sites. These measurements were taken from published maps, and therefore are likely not completely accurate. While this is not an ideal situation, these measurements certainly provide an acceptable approximation of the scale of building events at each site.

Table 7. Footprint, in square meters, of individual construction events at each site.

	Pueblo Alto	**29SJ 627**	**Chimney Rock**	**Ravine Site**	**Bluff Great House**	**Corral Canyon Site**
Construction Phase 1	1049.23 m^2		695.85 m^2	34.37 m^2	211.4 m^2	N/A**
Construction Phase 2	522.22 m^2		544.32^2		431.14 m^2	N/A
Construction Phase 3	495.94 m^2					N/A
Final Site Roomblock Footprint		98 m^2*				N/A

*Only the final roomblock footprint is provided for 29SJ 627 because the construction phases are much less clear for this structure. Additionally, the masonry and construction methods were more haphazard, ephemeral, without masonry construction until after A.D. 1000 and thus more difficult to quantify. Even recording the final footprint of the building, and thus the largest footprint of the building, it is clear that the scale of 29SJ 627 was not anywhere near that of the sites that are Great Houses (Pueblo Alto, Chimney Rock, Bluff Great House).

**There is no room block at the Corral Canyon Site.

Similarly to the room size comparison above, the three Great Houses sort out from the small sites in terms of the scale of individual construction events. Pueblo Alto demonstrates the largest construction events, with Chimney Rock Great House next, and then the Bluff Great House. The final and most extensive footprints of the Ravine Site and 29SJ 27 don’t even compare to a single building phase at each of the Great Houses in terms of scale. This simple comparison demonstrates that Great Houses are on a much larger scale and represent a much greater investment in terms of labor and materials than "small" sites do. Clearly, Great Houses were much more than simple habitations.

CONCLUSIONS

This chapter has examined the architecture of six sites, three Great Houses and three small sites, from several different perspectives. First, the sites were examined to evaluate the presence or absence of specific architectural traits associated with Chaco Canyon. This analysis revealed that the sites display a variety of different combinations of Chacoan traits. For example, Pueblo Alto (an undisputed Chacoan Great House) has no Great Kiva, while the Bluff Great House (a probable emulation of the canyon) and Ravine Site (a small habitation site) do have Great Kivas.

The Great Kiva issue described above is an example of why the checklist approach is problematic when examining the Chaco World. There is not a set of structures necessary for a site to be considered Chacoan. The situation is much more complex than a checklist can ever properly address. The Chaco System was dynamic and constantly coming into being; therefore, there isn't a precise point in time that equals Chaco and can serve as the benchmark for traits a site must possess to be contemplated as a component of the Chaco World. As noted in Chapter II, the relationship between stylistic attributes of material culture and identity is variable even in ethnographic contexts; therefore, variability through time must be allowed and expected in archaeological contexts. Returning to the Great Kiva concept, as mentioned before and initially noted by Van Dyke (2007), Great Kivas have great historical depth. The form was present before, during, and after Chaco and likely had great meaning for people and for communities. In fact, the Great Kiva concept and form was likely co-opted from both existing community structures and existing communal memories. Chaco took the Great Kiva and formalized it, but its long history and social memory are key pieces of the puzzle. The Great Kiva demonstrates that there is much more to Chacoan architecture than simple presence or absence can reveal.

This chapter also describes the history of the construction of each of the sites. Both Pueblo Alto Chimney Rock were built and occupied solely during the Chaco era. Bluff was occupied before, during, and after the Chaco era. In combination with architectural characteristics, this points to Chimney Rock being a direct "export" of Chaco Canyon, while Bluff adopted the Chaco phenomenon later on. 29SJ 627 also has a long history of occupation, but is clearly not functioning in the same way as the Great Houses were. The Ravine Site and Corral Canyon Site are also clearly habitation sites, and did not function in a broader context like the Great House complexes did. The Corral Canyon Site appears to be socially and culturally isolated as individuals are still living in pithouses when most other people in the region had transitioned to above ground structures.

Finally, an examination of room size and scale of construction reveal a distinction between Great Houses and smalls sites. Great Houses typically have larger rooms and much larger construction events. This data complements the implications of the architectural history data. Chimney Rock is much more similar to Pueblo Alto and to the size standards defined for Chaco Canyon than is the Bluff Great House. However, the Bluff Great House is clearly of a much larger scale than the small sites examined here. Again, this points to Chimney Rock being an export of the Canyon and Bluff being an emulation.

However, it is possible that interpretations of "emulations" of the canyon need to be rethought. Perhaps, sites categorized as emulations should not be understood as having a less intense connection to the Chaco System than sites categorized as exports of the canyon. Bluff was clearly an important location for many hundreds of years before the Chaco era. The people in that region could have continued doing what they had been for all that time, but they found the pull of Chaco compelling enough to construct a site with all the key Chacoan architectural components – roads, earthen architecture, Great House, Great Kiva, etc. Even though the Bluff Great House doesn't appear to have been built by Chacoans as an outpost like Chimney Rock, the people at Bluff bought into the Chaco world in a major way, and this is evidenced by the architecture. Bluff has all the components requisite of a Chacoan outlier, yet they are not rendered with the precision that we see at Chimney Rock and in the Canyon. The labor and planning involved at Bluff were not accidental. Leaders at the site wanted to be a part of the Chaco World.

Chimney Rock, on the other hand, doesn't have all the traits on the checklist, but those that it does have are clearly Chacoan. The precise architecture and formal design of the Chimney Rock Great House indicate that the site was most likely an export, constructed by Chacoans. This interpretation is supported by the fact that there was not much population in the area before or after the Chaco era. Chacoans claimed the Chimney Rock Mesa for their own, constructed the Great House, and subsequently (as evidenced by a huge jump in population surrounding the spires), people were drawn to the area. The Ravine Site is a component of this burgeoning community. The architectural features of the Ravine Site indicate that the people living in the community below the Great House were most certainly not Chacoan. When the Chaco World started coming apart in the early 12th century, people left the Great House and the Chimney Rock area. This provides further indication of just how closely connected to the Chaco system local population dynamics and local histories in the Chimney Rock area were. Chimney Rock, Chaco, and the local community are discussed in greater detail in Chapter VI.

CHAPTER V

CERAMICS

This chapter, using ceramic assemblages, explores the utility of the export vs. emulation model to examine prehistoric relationships in the Chaco World.

This chapter is comprised of three main components. First, a general overview of the entire ceramic assemblages recovered from each site for all time periods represented is presented. Second, the frequencies of all ceramic wares, vessel forms, and temper types from each site for the late Pueblo II time period (A.D. 1000-1150) are described and compared. These three categories of ceramic attributes were chosen because ware and vessel form provide information on function while temper type provides information on cultural, learning and trade networks. Next, statistical analysis is used first to determine if the wares, vessel form and temper type observed at each of the sites for the late Pueblo II time period could have come from the same population as the sample from Pueblo Alto. Statistics are then used to evaluate each Great House and small site pair (Chimney Rock and Ravine Site, Bluff Great House and Corral Canyon Site), the two Great Houses outside of Chaco (Chimney Rock Great House and Bluff Great House), and the two small sites outside of Chaco (Ravine Site and Corral Canyon Site). The analysis of the paired sites outside of Chaco is intended to determine if differences exist only between the Canyon and sites outside of it, between sites of different sizes, or between sites in general. The final section of this chapter examines and discusses the unique and rare artifacts that my indicate connections between people, places, and polities.

As noted in Chapter III, the late Pueblo II (A.D. 1000-1150) time period the focus of this project because this is when both Pueblo Alto and Chimney Rock Great House were constructed and occupied. The Ravine Site and Corral Canyon Site also date to this time period. The Bluff Great House and 29SJ 627 have longer histories of site use and occupation, so it was necessary to define components of the ceramic assemblages that are contemporaneous with the other four sites.

Wares, Vessel Forms, Temper, and Types

Ceramic wares are technological sets – ways of constructing, decorating, and firing vessels. In the southwest, these technological sets are often given color names (gray, white, red, and brown). The different ware categories are typically good proxies for functional categories, but it should be noted that the distinctions between wares and their functions are not always perfect. Gray wares generally have unpolished, unslipped surfaces with coarse temper and are typically used for cooking and storage (Blinman 2008:4). White wares typically have finer temper than gray wares, and have polished and often painted surfaces. White wares were not used for cooking, and more variable in terms of form than gray wares. Red wares are vessels made of or slipped with high iron clays and subjected to oxidation in the late stages of firing, yielding a red or orange color. The distribution of red wares is typically dependent on the availability of appropriate clays (Blinman 2008:5). An examination of ceramic ware ratios can be indicative of the types of activities that individuals participated in at each site, and in the case of red wares the access to necessary resources or trading networks.

Vessels “are the cultural units of pottery production, distribution, and use” (Blinman 2008:93). Like ware, vessel forms provide insight into the types of activities that occurred at a site. For example, large gray ware jars were typically used for cooking and storage, while painted white ware bowls would have been used for serving and preparing food. There are also a few unusual vessel forms, such as cylinder vessels in Chaco, and feather holders at Chimney Rock and the Ravine site that appear to have held special or esoteric meaning. Vessel forms may be indicative of the status of the inhabitants of a site, elites vs. commoners. Sites that were primarily inhabited by elite individuals might be expected to have more white ware bowls used for serving and feasting activities, while sites that were occupied by commoners may have greater frequencies of gray ware jars used for cooking and storage activities.

Examining temper provides indications of the cultural backgrounds of the makers of pottery. The relationship between temper and ceramic types is complicated. Temper is often included in type descriptions, but is considered a necessary criterion of some types and not of others. Some ceramic “types” display multiple varieties of temper (Toll and McKenna 1997:73). If the source of temper is identifiable, the location of production can be determined, and from there, the movement of ceramics between different locations. Temper identification can provide functional and technological information, which inform on cultural and ethnic backgrounds of the manufacturers (Toll and McKenna 1997:74). Therefore, through an examination of temper, it may be possible to gain more insight into production, consumption, and even group representation (i.e. cultural learning frameworks) than through an examination of typology alone.

Specific ceramic types recovered from each site are discussed in greater detail after the statistical analysis of wares, vessel forms, and temper types. Ceramic types recovered from each site were quite variable and the frequencies of similar types were not large enough to allow statistical analysis. However, even if the frequencies of specific ceramic types are not large enough for statistical manipulation, typology is very important to understanding interactions between different sites and locations in the San Juan Basin and therefore is discussed and each site compared and contrasted. The less frequent aspects of artifact assemblages may actually be more informative than some more common components of artifacts in the context of some comparative studies, such as that attempted here. Ceramic types and production spans for each of the six sites examined in this study can be found in Tables 31-36 in Appendix C.

Using the export vs. emulation dichotomy as a foundation (inspired bythe concept of technological style described in Chapter II) for understanding the Chaco World, we would expect the ceramic assemblage of a site that is an export or colony of Chaco Canyon to be similar to Pueblo Alto in terms of ratios of different ware types, vessel forms, and temper types. These three variables are the direct result of peoples' activities and cultural networks. Ware types and vessel forms are indicative of activities that took place at a site, while temper is indicative of both available resources and of the cultural, learning, and trade networks of the pottery manufacturers. In this study, the ratios of each of these three variables are considered a low visibility trait, resulting from cultural practice in the manufacture, acquisition and use of pottery. These low visibility traits can be contrasted with high visibility traits that are obvious to the casual observer and have been shown to have great communication potential. Due to their easily observable nature and potential for communicating meaning, high visibility traits are more likely to be copied or emulated (Sackett 1977; Carr 1995; Clark 2001, Wobst 1977). Conversely, the ceramic assemblage of a site that is an emulation or all together unrelated to Chaco would be expected to be significantly different than Pueblo Alto in the ratios of wares, vessel form, and temper types because the manufacturers and users of the pottery were not participating in the same practices and cultural networks as were the manufacturers and users of pottery within Chaco Canyon.

A Note on Samples

The sample for this ceramic analysis is based on the principle of inclusion, rather than exclusion. Instead of attempting to compare specific proveniences from each site to one another, all sherds dating to the late Pueblo II time period (A.D. 1000-1150) are compared. This decision was made for the following reasons:

- The Bluff Great House, Pueblo Alto, and 29SJ 627 do not have many pristine late Pueblo II era proveniences.
- The few late Pueblo II era proveniences at these sites would not have supplied sufficient sherds for a meaningful analysis.
- Including all sherds that date to the late Pueblo II time period avoids imposing an additional layer of sampling decision making and potential skewing to those made in the initial excavations and analysis.
- The excavation, analysis and reporting on the ceramics from each of the six sites examined here differed in terms of quantity and composition to discourage more fine grained comparisons.
- Attempts to complete a more fine grained comparison of the six sites would either be impossible or result in the exclusion of large portions of available ceramic data.

This study will doubtless provide a starting point for more detailed and refined comparisons in the future.

The ceramic assemblage examined in this chapter for Pueblo Alto and 29SJ 627 conforms to the sampling strategy utilized during the original analysis of the sherds for the Chaco project (Toll and McKenna 1987; 1992). This strategy works from less detail to more detail, with all sherds being assigned a type, matching sherds that belong to the same vessel where possible, and identifying temper when it was observable (Toll and McKenna 1987:30; 1992:44-45). Since Pueblo Alto is serving as the representative sample from the population of the Chaco Canyon Great House ceramic assemblage, the sampling strategy (e.g. what temper type categories to examine, production span information, etc.) for the other sites was based on components that would be most comparable to the Pueblo Alto data.

The ceramic assemblage for the Chimney Rock Great House and the Ravine Site is comprised of sherds recovered and analyzed in 2009 and sherds recovered in the 1970s CU excavations (Eddy 1977; Truell 1975) and reanalyzed as part of the current project (Todd 2011, Wilson 2010 and Wilson 2011). The sample examined in the current study for ware at the Chimney Rock Great House includes all sherds recovered and originally reported by Eddy (1977) and all sherds recovered in 2009 (Wilson 2010). The sample examined for vessel form and temper type from the Chimney Rock Great House is comprised of the majority of the sherds recovered by Frank Eddy (1977) and all of the sherds recovered in 2009. Eighty-seven sherds were excluded from the reanalysis of ceramics from the Great House because they were from unclear proveniences.

The ceramic sample examined for ware at the Ravine Site includes all sherds recovered and reported on by Truell (1975). Wilson, in consultation with the author, selected a representative subsample of approximately half of all of the sherds recovered from the Ravine Site for reanalysis for identification of temper type and vessel form (Wilson 2011). Some information reported by Truell (1975) was problematic for the purposes of this study because all temper was tentatively identified as sand, and vessel form determinations were only made for restorable or partially restorable vessels. For these reasons, the data provided by Wilson for temper and vessel form even though it is for a subsample of sherds from the Ravine Site, is used in this investigation.

The structure of the sampling and analysis process for ceramics from the Bluff Great House is quite similar to that from Pueblo Alto and 29SJ 627. That is, all sherds recovered from the site were assigned to ceramic types, sherds from the same vessel were matched where possible, and a sample was examined for temper (Blinman 2008).

The ceramic assemblage for the Corral Canyon Site is a combination of materials recovered during two different investigations of the site, as described in Chapter III. Typological/ware information is available for all sherds recovered, but temper and vessel form is available only for the 3,245 sherds recovered in the most recent investigations of the Corral Canyon Site (Firor 1998:135-139).

Table 8 (below) summarizes all sherds for all time periods recovered from each site. Counts for vessel form and temper type for all time periods represented at each site can be found in Table 37 and

Table 38 in Appendix C. All percentages presented in this chapter are rounded to the nearest whole percent unless doing so obscures important distinctions.

Table 8. Site-wide ceramic counts for all time periods.

Site	Total Sherds	Citation
Pueblo Alto	90, 139	Toll and McKenna (1987)
29SJ 627	84,766	Toll and McKenna (1992)
Chimney Rock Great House	1,979	Wilson (2010); Wilson (2011)
Ravine Site	2,269	Truell (1975); Wilson (2011)
Bluff Great House	17,655	Blinman (2008)

Corral Canyon Site	4,785	Firor (1998)

Table 9 (below) describes the composition of the total ceramic assemblage for all time periods represented at each site. Not surprisingly, the bulk of the assemblage for all sites is composed of gray/utility ware. Neither Chimney Rock nor the Ravine Site have any ceramics classified as "other" (i.e. brown ware, etc.), and the Ravine Site has no red ware at all.

Table 9. Site-wide ware counts and percentages for analyzed for all time periods, rounded to nearest whole percent.

Site	Gray/Utility Ware	%	White Ware	%	Red Ware	%	Other	%
Pueblo Alto	47,984	53	39,594	44	1,229	1	1,332	1
29SJ 627	48,900	58	34,855	41	575	<1	436	<1
Chimney Rock Great House	1,498	76	470	24	10	<1	0	0
Ravine Site	2,162	95	107	5	0	0	0	0
Bluff Great House	11,368	64	4,593	26	1,666	9	8	<1
Corral Canyon Site	3,771	79	614	13	398	8	2	<1

For all time periods, two of the small sites, the Ravine Site and The Corral Canyon Site, have the highest percentage of gray/utility ware at 95% and 79% respectively. Chimney Rock Great House follows close behind at 76%. Pueblo Alto and 29SJ 627 have the most similar proportions of gray/utility ware at 53% and 58% respectively. The Bluff Great House falls in between 29SJ 627 and Chimney Rock in this category. Based on the previous gray/utility ware observations, predictably, the Ravine Site and Corral Canyon Sites have the lowest percentages of white ware. The Bluff Great House and Chimney Rock Great House have the most similar frequencies of white ware, with Pueblo Alto and 29SJ 627 also being quite similar in terms of overall white ware percentage of the assemblage. The Bluff Great House and Corral Canyon Site, both located in Utah, have much higher ratio of red ware to white and gray/utility ware than any of the other sites. This is likely due to the fact that much red ware was produced in the southeast Utah area (Blinman 2008; Hegmon et al. 1995). The presence of red ware at Pueblo Alto is probably an indication of the Great House's more extensive connection and interaction with communities in the southeast Utah area and overall sample size. While less than 1% of the site assemblage at 29SJ 627 and Chimney Rock Great House is composed of red ware, it is important to note that it is present in these assemblages. Due to its location in Chaco Canyon, 29SJ 627 likely had larger regional interactions than many small sites (such as the Ravine Site) located outside the canyon. As noted in Chapter II, many archaeologists believe that Chaco Canyon was multi-ethnic (Kluckhohn 1939, Vivian and Mathews 1965; Vivian 1990; Windes et al. 2000) and a destination for pilgrams from throughout the San Juan Basin and beyond (Benson et a. 2003; Cameron 2001; Judge 1989; Renfrew 2001 for a few examples). It is logical that small sites within the canyon would also be involved in these interactions (Truell 1986). The presence of cacao (Washburn et al. 2011) and turquoise (Mathien, ed. 1997) at both Great Houses and small sites within Chaco also supports this interpretation. Conversely, the presence of red ware at Chimney Rock (but not at the Ravine Site) is likely indicative of differential interaction between the Great House and surrounding community with the larger Chaco World. It is also possible that the presence of red ware at Chimney Rock Great House is a reflection of sample size.

This section describes the vessel forms for all time periods and all wares.

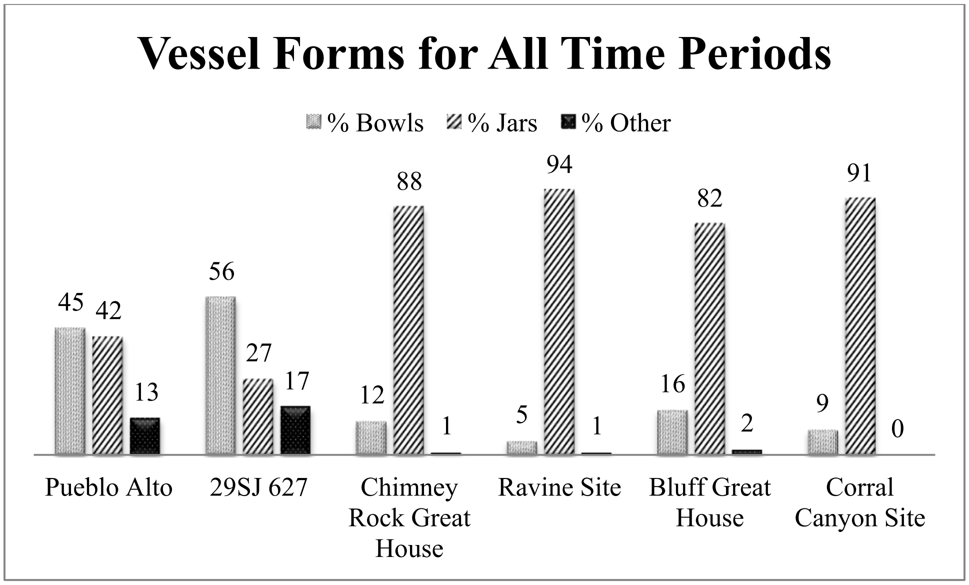


Figure 41. Vessel forms for all time periods and wares.

Figure 41 (above) presents graphically the percentages of bowls and jars - the most frequently found vessel form at each site. Less common vessel forms are encompassed in the category labeled "other." Strikingly, Pueblo Alto and 29SJ 627 are most alike in the percentage of vessels that are bowls. The Chimney Rock Great House, Bluff Great House, and Corral Canyon Site are most alike in the jar category. The frequencies of bowls, jars and other forms above are drawn from all time periods and wares represented at each site. No additional sampling bias barring that that expected in archaeological samples (partial site excavation, nearly one thousand years of weather and rodent exposure, etc.) influences this pattern.

Temper types for all sites were condensed to correspond with categories defined for Pueblo Alto and 29SJ 627. Different sandstone, igneous, and trachyte categories were integrated into general temper types. This section describes and illustrates temper types for all time periods, and temper types by wares for all time periods.

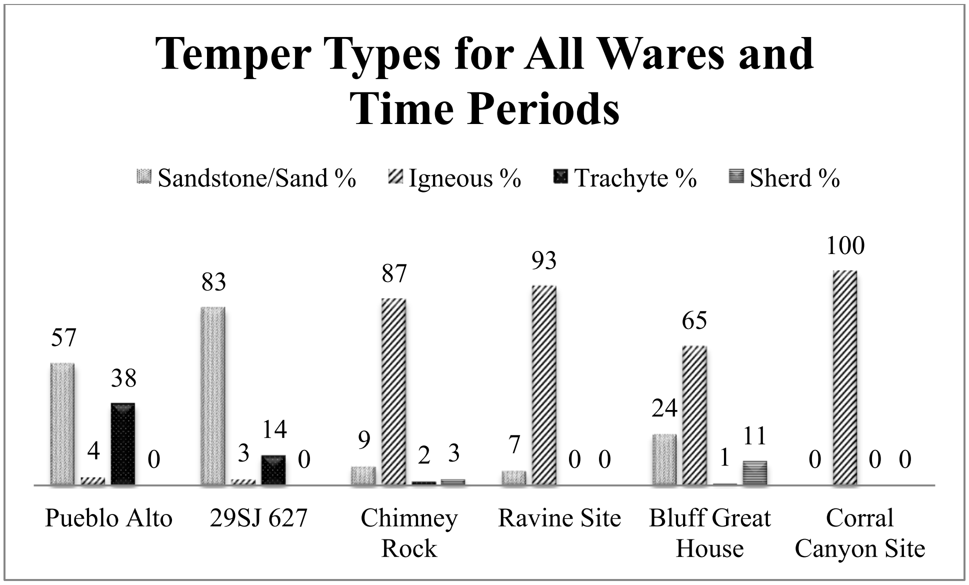


Figure 42. Temper types for all wares and time periods.

Figure 42 shows a strong pattern of a preference for igneous temper for all wares from all time periods at sites located in the Northern San Juan (Chimney Rock, Ravine Site, Bluff Great House, and Corral Canyon Site). This is not surprising given the fact that igneous temper is widely available in the Northern San Juan Region. Pueblo Alto and 29SJ 627 are dominated by sandstone/sand temper; again, a logical outcome given the availability of sandstone/sand in and around Chaco Canyon. This pattern could be a result of resource availability, cultural preference for specific temper types, or the procurement of completed pottery from different sources.

Filtering for the Late Pueblo II (A.D. 1000-1150) Time Period

The preceding discussion briefly summarized the entire ceramic assemblages for all time periods recovered from each of the six sites examined in this study. The remainder of this chapter narrows the scope of the analysis to the late Pueblo II (A.D. 1000-1150) time period. The ceramic assemblages from each site were filtered based on ceramic types; that is, types that date to the late Pueblo II time period were included in the comparison, while types that do not were excluded.

Data for ceramic chronology was obtained from Toll and McKenna (1987) for Pueblo Alto and 29SJ 627, Blinman (2008) for the Bluff Great House and the Corral Canyon Site and Wilson (2010 and 2011) for Chimney Rock Great House and the Ravine Site. In order to focus this analysis on the late Pueblo II time period and the span of occupation at Pueblo Alto, gray ware and white ware sherds are included in this analysis if their production span falls anywhere in the A.D. 1000-1150 time period, and excluded if not. Proposed production spans for some types reported by Toll et al. (1997) and Blinman (2008) differ slightly. Pueblo Alto is serving as a sample of the population of Chacoan ceramics in this study, so sherds were included in the Bluff and Corral Canyon Site samples that would not be included strictly using Blinman's production span information, but would be under Toll et al's production span information. For example, Blinman (2008:17) reports the production span of Captain Tom Corrugated as A.D. 920-1000, while Toll et al. (1997:235) report it as A.D. 900-1050. In this situation, and others like it, the Captain Tom Corrugated sherds are included in the Bluff late Pueblo II sample rather than being filtered out. The decision to proceed in this way was made due to the fact that Pueblo Alto in Chaco Canyon is the sample with which the assemblages of all the other sites are being compared. The Pueblo Alto and 29SJ 627 production span information is favored over the Bluff production span information (See Appendix C for types included in this analysis and production span information).

All sherds with the exception of one Rosa Gray utility ware sherd (A.D. 700-950) from Chimney Rock Great House were included in the analysis of Pueblo II era ceramic assemblages based on Wilson's (2010: Table 1) and Toll et al's (1997) production span information. All gray ware and all white ware pottery types reported as “indeterminate,” “unpainted,” etc. and therefore lacking temporal information from 29SJ 627, Bluff Great House, and the Corral Canyon Site were excluded, and total sample size from each site was adjusted to reflect this. These sherds were excluded from the sample in an effort to avoid skewing of the analysis from sherds that may have been manufactured and deposited during time periods other than late Pueblo II. Unidentified corrugated sherds from Pueblo Alto are included in the analysis because they were primarily recovered from the massive trash mound that was constructed or amassed during the construction and occupation of Pueblo Alto. Due to the relatively secure Pueblo II time period date for Chimney Rock Great House all unidentified sherds were included in the following tables. Rim sherds with no temporal or type information were excluded from this portion of the analysis.

Red wares are treated somewha differently. All red ware sherds reported for each site are included in this analysis due to the lack of chronological and typological detail in the Pueblo Alto and 29SJ 627 ceramic reports – the sample of the Chaco population. The reports do not allow for the determination of fine-grained temporal or typological categories. Due to small sample size and lack of detailed typological and temporal information, sherds categorized as “Other” in Table 9 are not addressed further here.

For the most part, information in the next section of this chapter is presented as percentages in bar graphs for easier visual comparison. For ware, vessel form and temper type counts applicable in the next sections of this analysis, see Table 39, Table 41, Table 40, Table 42,Table 43, Table 44, and Table 45 in Appendix C.

PUEBLO II WARE DISTRIBUTION

The following section describes the ware distribution for each site during the Pueblo II era (A.D. 1000-1150).

Table 10 and Table 11 (below) inform upon the percentage of each site's total ceramic assemblage made up of Pueblo II era gray and white wares, and by extension, the chronology of each site (see Appendix C for specific type and chronological information). Based on the observation that the majority of white and gray ware sherds recovered from Pueblo Alto, Chimney Rock Great House, and the Ravine Site date to AD. 1000-1150, it would be reasonable to conclude that these sites were primarily occupied during the late Pueblo II time period. The Bluff Great House and 29SJ 627 have longer site histories, so less of the overall site assemblage is composed of ceramics dating to the late Pueblo II time period. The Corral Canyon Site requires some explanation as the majority of gray/utility wares date to the late Pueblo II time period while approximately one third of white wares date to the Pueblo II time period. This discrepancy is due to the fact that a large portion of white wares from the site were unidentified white ware, and thus could not be firmly placed within the Pueblo II time period. Unidentified wares were removed from the overall sample size to prevent this type of skewing.

Table 10. Pueblo II gray ware, percentage of total gray ware, and adjusted total for all time periods. Percentages not rounded to nearest whole percent because doing so would mask small differences between the total site assemblages and Pueblo II assemblages at Pueblo Alto and Chimney Rock Great House.

Site	Pueblo II Gray Ware	Percentage of Total Gray/Utility Ware	Adjusted Total for All Time Periods (total gray ware minus indeterminate, etc.)
Pueblo Alto	8,775/*47,732	18/*99.5	9,023/*47,984
29SJ 627	24,753	50.6	26,207

Chimney Rock Great House	1,497	99.9	N/A
Ravine Site	2,162	100	N/A
Bluff Great House	8,584	75.5	11,341
Corral Canyon Site	3,546	94	3587

*Inclusive of the large amount (38,961) of unidentified corrugated pottery recovered from the trash mound amassed during the construction and occupation of Pueblo Alto.

Table 11. Pueblo II white ware, percentage of total white ware, and adjusted total for all time periods.

Site	**Pueblo II White Ware**	**Percentage of Total White Ware**	**Adjusted Total for All Time Periods (total white ware minus indeterminate, etc.)**
Pueblo Alto	36,366	92	39,581
29SJ 627	21,428	61	22,772
Chimney Rock Great House	470	100	N/A
Ravine Site	107	100	N/A
Bluff Great House	1876	41	2,547
Corral Canyon Site	185	30	216

Not surprisingly, the Pueblo II era ceramic ware distribution is similar to the ceramic ware distribution for the entire site occupation span for each site (Figure 43, below). The Corral Canyon Site and Ravine Site have the highest percentage of gray ware. Chimney Rock Great House and Bluff Great House are within 5% of one another, and Pueblo Alto and 29SJ 627 are within 3% of each other. Chimney Rock and the Bluff Great House, Corral Canyon and the Ravine Site, and Pueblo Alto and 29SJ 627 are most alike in terms of white ware percentage. The Bluff Great House and Corral Canyon have the highest proportion of red ware. Pueblo Alto and 29SJ 627 have very similar proportions of red ware.

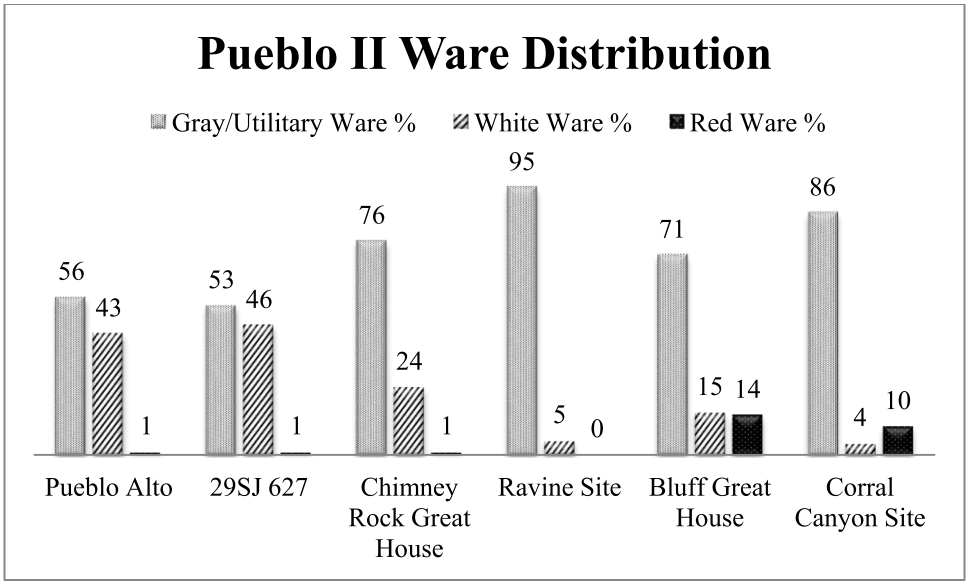


Figure 43. Pueblo II site-wide ware percentages, inclusive of 38,961 corrugated sherds from the Pueblo Alto trash mound and all red wares recovered from each site.

PUEBLO II VESSEL FORMS

The next sections examine vessel form by ware, filtered for gray and white using the production span of ceramic types for the late Pueblo II time period (A.D. 1000-1150). All red wares recovered from each site, regardless of time period are included in this analysis since more fine grained temporal information was not available for Pueblo Alto and 29SJ 627.

Figure 44 (below) demonstrates that the use of gray ware jars at each of the six sites was remarkably similar and consistent. This is not surprising, given that no matter what the function of a site is, the inhabitants of said site must eat, drink, and store food and water. It is of course possible to go to the other extreme and conclude that the striking similarity in the types of gray ware vessels observed at each site is indicative of overall similar site function and purpose. It is probably more likely that gray ware is used for utilitarian purposes throughout the southwest, and the results of an examination of gray ware vessel form at nearly any site would yield the same results. The function of gray ware, determined through an examination of vessel form, may not be the most fruitful way to get at similarities and differences in the functions and connections between sites in the southwest.

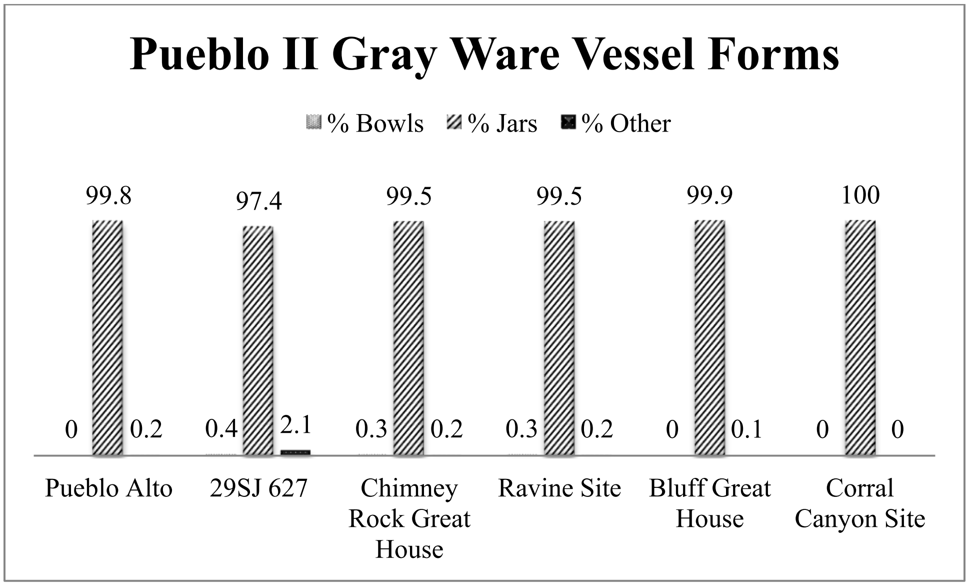


Figure 44. Pueblo II gray ware vessel forms.

For all sites, with the exception of the Corral Canyon Site, bowls are the most common white ware form (Figure 45, below). This result is not unexpected given that white ware vessels are less commonly used for storage (jars) and more commonly used for serving (bowls). Chimney Rock, Pueblo Alto, and 29SJ 627 are most similar in the amount of white ware vessels that are bowls. Pueblo Alto and 29SJ 627 are nearly identical in terms of the ratios of bowls, jars, and other white ware forms. Pueblo Alto has more white wares categorized as “other.” This may be due to a larger sample size, or due to the inhabitants of Pueblo Alto engaging in a more diverse range of activities, reflected in more diversity of white ware forms, than the inhabitants of 29SJ 627. However, both of the Chaco Canyon sites (Alto and 29SJ 627) have a greater diversity of white ware vessel forms than any of the other sites. Bluff Great House and Corral Canyon Site in southeast Utah have the highest percentage of white ware jars. This may reflect a local preference for white ware jars, and by extension slightly different cultural values and aesthetics.

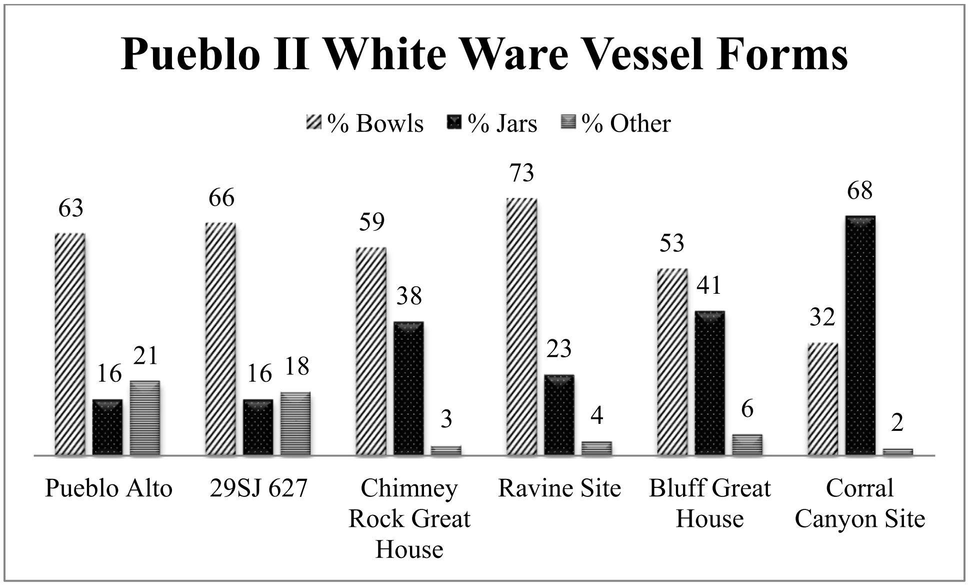


Figure 45. Pueblo II white ware vessel forms.

For Pueblo Alto, 29SJ 627, Bluff Great House, and Corral Canyon Site, the majority of the red ware examined is from bowls (Figure 46, below). For Chimney Rock, Figure 46 may be slightly misleading, as only two red ware sherds were recovered from the Great House and both were from jars. The Bluff Great House has the highest frequency of red ware, likely because red wares were manufactured in southeast Utah. There is no red ware at all at the Ravine Site, again, this is probably indicative of a more localized trade and social network than that participated in by residents of the Great House.

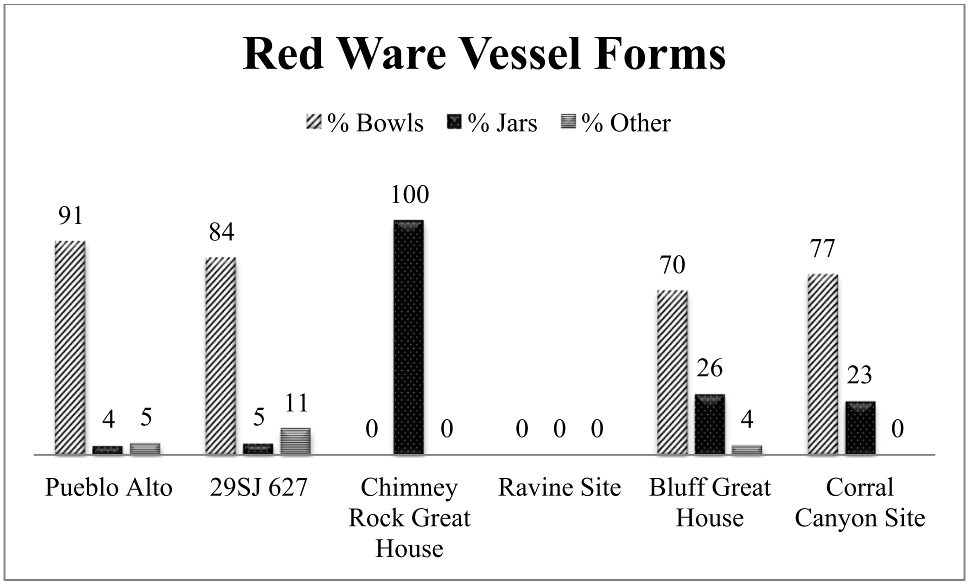


Figure 46. Red ware vessel forms for all time periods.

Pueblo II Temper Types

The following section describes temper types filtered for the Pueblo II time period (A.D. 1000-1150).

Chimney Rock, the Bluff Great House, and the Corral Canyon Site have the highest proportion of igneous temper in gray/utility ware (Figure 47, below). Pueblo Alto and 29SJ 627 have the highest proportions of trachyte temper, but it is also present at Chimney Rock, the Ravine Site, and the Bluff Great House in much smaller amounts (less than 1%). The two sites in Chaco Canyon, Pueblo Alto and 29SJ 627 have the highest percentage of sandstone temper. These results should not be influenced by sampling decisions as each site was filtered for the Pueblo II time period using the production spans of ceramic types.

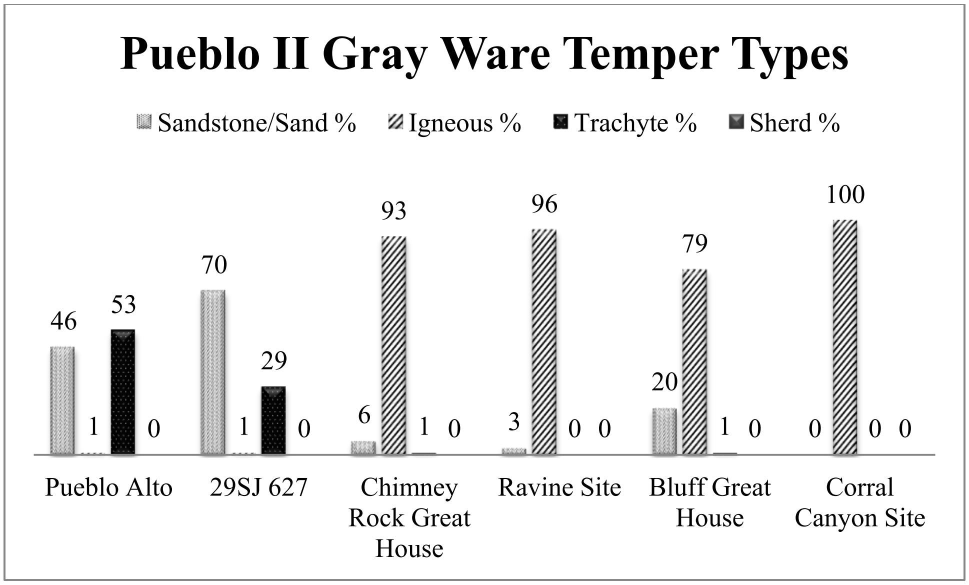


Figure 47. Pueblo II gray ware temper types.

Similar to the temper types noted for gray/utility wares, Chimney Rock Great House, the Bluff Great House and the Corral Canyon Site have the highest frequencies of igneous-tempered white wares (Figure 48, below). This pattern may be a result of the fact that igneous tempers are widely available in the Northern San Juan Basin, where these sites are located. However, the greater diversity in tempers chosen in white wares than for gray wares at all of these sites is interesting. It is likely that gray wares are more often manufactured locally, while white wares are exchanged over greater distances more frequently. Pueblo Alto, 29SJ 627 and the Ravine Site have the highest percentages of sandstone tempered white ware. As would be expected given their location within Chaco Canyon, Pueblo Alto and 29SJ 627 have the highest percentages of trachyte tempered white ware. Chimney Rock Great House also has some trachyte tempered white wares. While amounting to less than 1% of the total ceramic assemblage at the Bluff Great House, there was a small amount of trachyte tempered white ware recovered. The Ravine Site and the Corral Canyon Site do not have any trachyte tempered white wares. The Bluff Great House and Chimney Rock Great House have the highest relative percentages of sherd tempered white wares.

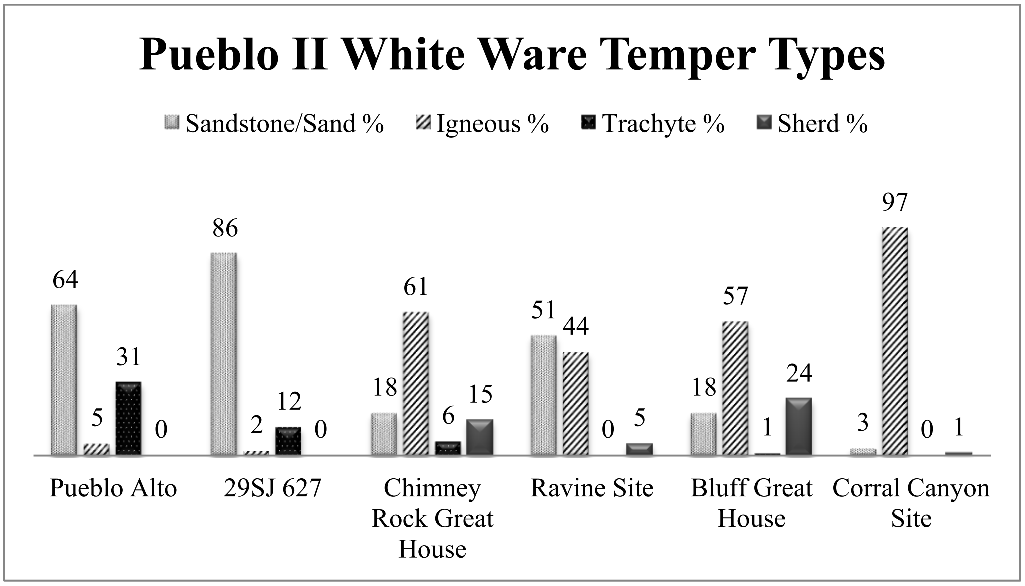


Figure 48. Pueblo II white ware temper types.

The Bluff Great House and 29SJ 627 correspond most closely with one another in terms of percentage of igneous tempered red ware with 63% and 66% respectively (Figure 49). One hundred percent of red wares from the Corral Canyon Site had igneous temper. The Ravine Site has no red wares at all, and the two red ware sherds analyzed for temper by Wilson (2010) from Chimney Rock are sherd tempered. 29SJ 627 is the only site with trachyte tempered red ware.

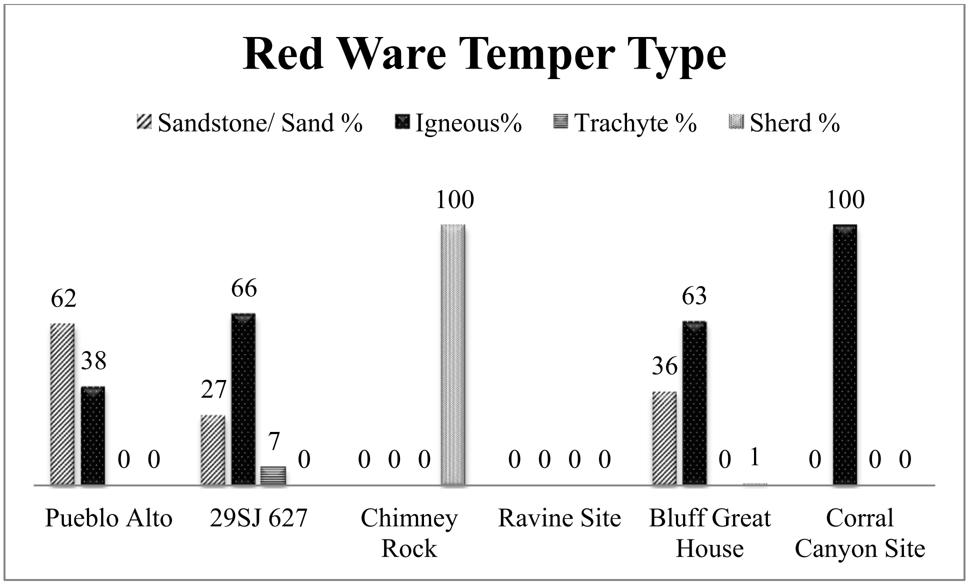


Figure 49. Red ware temper types for all time periods.

DISCUSSION

The comparison of ware, vessel form, and temper type frequencies has revealed some interesting insights regarding the differences and similarities between Great Houses inside and outside Chaco Canyon, between small sites inside and outside of Chaco Canyon, and between small sites and Great Houses. The comparison also hints at functional difference between the different site types listed above within the Chaco System. As described in Chapter III, the Bluff Great House and 29SJ 627 have longer site histories than Pueblo Alto, Chimney Rock, the Ravine Site, and the Corral Canyon Site. But, all six sites were occupied during the late Pueblo II time period, and ostensibly could have known and interacted with one another and were likely parts of the overarching Chacoan System. The following paragraphs summarize the results of this comparison and discuss their implications.

The composition of the Pueblo II ceramic assemblage at Chimney Rock Pueblo is most similar to the Bluff Great House in the categories of gray/utility ware (76% and 71%

respectively) and white ware (24% and 15% respectively), and most similar to 29SJ 627 and Pueblo Alto in the category of red ware (1%).

Chimney Rock Great House and Bluff Great House are most alike in the percentages of various vessel forms observed in their assemblages for all time periods. The Chimney Rock assemblage is 88% jars and 12% bowls. The Bluff assemblage is 82% jars and 16% bowls. The Corral Canyon site is also quite similar in terms of percentage of jars (91%) and bowls (9%). When filtered for the A.D. 1000-1150 time period for gray ware, each of the six site assemblages are dominated by jars. For Pueblo II era white wares, Chimney Rock is most similar to Pueblo Alto in the category of bowls with 59% and 63% respectively, and most similar to the Bluff Great House in the category of jars with 38% and 41% respectively. Chimney Rock displays less diversity in the white ware assemblage than do Pueblo Alto and 29SJ 627 which both have a greater percentage of white ware vessel forms categorized as "other." For red wares from all time periods represented at each site, Chimney Rock appears quite different, with 100% of red ware coming from jars. As mentioned previously, this is misleading as only two red ware sherds were recovered and analyzed at Chimney Rock.

Temper type for all time periods and wares represented at each site displays an interesting, but perhaps not unexpected pattern. The sites located in the Northern San Juan (Chimney Rock, Ravine Site, Bluff Great House, and Corral Canyon Site) show a strong preference for igneous temper, while the two sites located in Chaco (Pueblo Alto and 29SJ 627) have primarily sandstone/sand temper. When filtered for the Pueblo II time period (A.D. 1000-1150) and by ware, gray ware temper types display a pattern consistent with all wares and all time periods, that is sites located in Northern San Juan are dominated by igneous temper and sites in Chaco have more sandstone/sand tempered pottery.

In the category of Pueblo II era white wares, Chimney Rock and Bluff Great House are most similar to one another with 61% and 57% igneous temper, respectively. Pueblo Alto, 29SJ 627, Chimney Rock and the Bluff Great House all have some trachyte temper, while the two small sites located outside of the canyon (Ravine Site, and Corral Canyon Site) do not have any trachyte tempered pottery. Pueblo II era white wares at Pueblo Alto and 29SJ 627 are dominated by sandstone temper (64% and 86% respectively) with trachyte being the second most common temper type (31% and 12% respectively. The Ravine Site is most similar to Pueblo Alto and 29SJ 627 in the amount of sandstone/sand temper (51%, 64%, and 86% respectively). A huge 97% of white wares from the Corral Canyon Site are tempered with igneous temper.

It is harder to identify a clear pattern in the red wares from each site from all time periods. Red wares from Pueblo Alto are mostly sandstone/sand tempered (62%), while those from 29SJ 627 are igneous tempered 66% of the time, and sandstone/sand tempered 27% of the time. Bluff Great House, like 29SJ 627 has mostly igneous tempered red wares (63%) with sandstone/sand temper being second most common (36%). Red wares from the Corral Canyon Site were 100% tempered with igneous material.

Since the Chimney Rock Great House is most similar to the Bluff Great House most frequently in the categories examined, are we to conclude the two Great Houses are not connected to Chaco at all, but to one another? Or, perhaps that the Chimney Rock Great House and Bluff Great House are the most alike because they fulfilled similar roles as outlying Great Houses in the Chaco World? Or, that the two Great Houses were local developments that served similar purposes for their local communities independent of Chaco? The similarities could also be a result of simple geographical location and underlying cultural norms or patterns. Both sites are located in the northern San Juan and have access to similar geological resources. This may result in similar patterns in ceramic assemblages.

Pueblo Alto and 29SJ 627, sites that judging from architecture are clearly of disparate origins and functions, are quite similar in many of the variables examined. Should this be taken to mean that the two sites had the same meaning within the Chaco World? That the same class of people lived in the two sites? Based on architecture, this is an untenable interpretation; rather, it is likely that the similarities in the ceramic assemblages are simply due to proximity and access to similar resources and trade networks. As described in Chapter IV (Architecture), it is clear that Pueblo Alto and 29SJ 627 are very different architecturally, indicating that the two buildings functioned in different ways. Pueblo Alto, was likely an elite residence, administrative center, and community focal point, while 29SJ 627 was a simple habitation site. This observation indicates that ceramics may not be the best way to untangle the functions and roles of clearly architecturally disparate site types in the Chaco World.

Along these same lines, it is possible to make a few broad observations. Sites of all sizes and functions were using gray ware jars frequently. This particular vessel form dominates the gray ware assemblage at all six sites. The type of temper preferred by people at each site seems to be determined by geographic location; sites in the northern San Juan areas tend to use igneous temper more frequently, while sites in Chaco have ceramics primarily tempered with sand/sandstone. Igneous temper is widely available in the northern San Juan, and sand/sandstone is available in the Chaco area. White wares tend to be more variable in terms of temper than are gray wares. This pattern may indicate more frequent local manufacture of gray wares, and more exchange to obtain white wares. Small sites located outside of the canyon (Ravine Site and Corral Canyon Site) seem to have fewer extracommunity connections, based on the fact that no red wares were found at the Ravine Site and no trachyte tempered pottery was found at the Corral Canyon Site.

Chimney Rock Great House and Bluff Great House are clearly different from their community site counterparts. Both sites have more diverse wares, vessel forms, and temper types. It is safe to say that these sites operated in different ways than did the small sites. Based on red ware at Chimney Rock and trachyte tempered pottery at both Great Houses, these sites appear to have had more access to trade networks (and thus people and ideas in different locations) than did the small sites. While neither site is particular close to Pueblo Alto in terms of the various traits examined and could not be considered "exports" of the canyon as defined in this dissertation, they operated in similar social and cultural networks as did the individuals at Pueblo Alto. Perhaps it is not appropriate to expect the ceramic assemblage at an outlying Great House to be identical to that of a Chaco Canyon Great House because it is likely that the structures did not function in identical ways in their respective locations. It is even likely that individual Great Houses within Chaco did not function in identical ways. The presence of indicators of greater regional interaction and diversity of the ceramic assemblage at the outlying Great Houses in relation to the small sites is indicative of connection to Chaco and some role in a larger system, beyond the local community.

CHI SQUARE (X^2) TEST OF INDEPENDENCE

In the previous sections, the frequencies of wares, vessel forms and temper types from each of the six sites were compared and contrasted. The following section uses statistical analysis to determine if the assemblages observed at each site could have come from the same population as the assemblage observed at Pueblo Alto. Next, in a series of paired comparisons, statistical analysis is used to determine if assemblages Chimney Rock Great House and the

Ravine Site, Bluff Great House and the Corral Canyon Site, Chimney Rock Great House and the Bluff Great House, and the Ravine Site and Corral Canyon Site could have come from the same population. This is accomplished by using the Chi Square test of independence (Hays 1973:718). The statistical analysis is intended to compliment the architectural and ceramic comparisons to further explore the different roles and functions of different types of sites in the Chaco System (Great Houses and small sites, both inside and outside of the canyon).

Based on consultations with a statistics expert (Dr. Jeffrey Luftig, July 11, 2011), the chi-square test was determined to be appropriate for the analysis of the nominal ceramic data utilized in this dissertation. There are two types of Chi-square appropriate for this data: chi-square test of independence, and chi-square goodness of fit. The chi-square test of independence is used in this research rather than the chi-square test for goodness of fit because the test of independence assumes that the Pueblo Alto sample is just that, a sample. The goodness of fit test, in contrast, assumes that the Pueblo Alto sample is *the* distribution for ceramics in Chaco Canyon and then determines if the samples from the five other sites could have been drawn from that distribution. Given the vagaries and complexities of archaeological sampling (differential deposition, archaeological sampling, rodent and weather disturbance, etc.), it is reasonable to assume that Pueblo Alto is a sample of the ceramic assemblage from Chaco Canyon, and to determine whether or not the five other sites examined could have been drawn from the same population as the Pueblo Alto sample. The following pages examine ware ratios, vessel forms, and temper types from the late Pueblo II time period (A.D. 1000-1150). If the traits observed in an assemblage could have been drawn from the same population as those observed at Pueblo Alto, it may be indicative of functional similarities or of a closer relationship (export) to the canyon, and if an assemblage could not have been drawn from the same population as Pueblo Alto, then it may be indicative of functional difference or of a more distant or non-existent relationship to Chaco (emulation, or completely unrelated). Similarities between the ceramic assemblages of various sites may also indicate similarities in the functions of those sites.

In the following sections, the assemblage from each site is examined in turn against the assemblage recovered from Pueblo Alto to examine statistically significant relationships in ware ratios, vessel forms, and temper types. Chi-square tests were processed using IBM SPSS Statistics 19 computer program and $\alpha = .05$ for all statistical tests in this dissertation. See appendix C for the chi-square analysis tables for the statistical tests. The results are presented in this chapter as summary tables.

Chi Square ($x^{2)}$ Test of independence for Wares from the Pueblo II Time Period (A.D. 1000-1150)

H_0 There is no statistically significant relationship between sites (Pueblo Alto and each of the other sites) and ware ratios.

H_1 There is a statistically significant relationship between Pueblo Alto and each of the other sites) and ware ratios.

In plain language, H_0 means that the observed ware ratios could have come from either Pueblo Alto or the other site being analyzed (been drawn from the same population), while H_1 means that the observed ware ratios are specific to the site that the assemblage was recovered from (could not have been drawn from the same population). If the null hypothesis (H_0) is accepted, it may be indicative of an export relationship between Pueblo Alto and the other site being investigated and/or indicative of functional similarities. If the null hypothesis is rejected, it is may be indicative of an emulation, no relationship, or functional difference. See Table 46, Table 47, Table 48, Table 49, and Table 50 in Appendix C for complete chi-square analyses.

As summarized in the Table 12 (below) the test of independence for each of the sites and Pueblo Alto demonstrated that the sample ware ratios could not have been drawn from the same population.

Table 12. Summary of chi-square test of independence for ware categories for the late Pueblo II time period (A.D. 1000-1150).

Site	Chi Square (x^{2})	Degrees of Freedom (df)	Total Sample Size (n)	Significance (p)	Importance (Cramer's V)
29 SJ 627	130.439	2	132,083	.000	.031
Chimney Rock Great House	315.868	2	87,297	.000	.060
Ravine Site	1393.404	2	87,597	.000	.126
Bluff Great House	7805.321	2	97453	.000	.283
Corral Canyon Site	3473.587	2	89456	.000	.197

CHI SQUARE (x^{2}) TEST OF INDEPENDENCE FOR GRAY WARE VESSEL FORM FROM THE PUEBLO II TIME PERIOD (A.D. 1000-1150)

Due to numerous instances of expected frequencies below 5, "bowls" and "other" were pooled in this section, and both Fisher's Exact and x^2 tests were run and reported. In this situation, it is appropriate to report the results of the Fisher's Exact test (Dr. Jeffrey Luftig, personal communication July 2011)

H_0 There is no statistically significant relationship between sites (Pueblo Alto and each of the other sites) and gray ware vessel forms.

H_1 There is a statistically significant relationship between sites (Pueblo Alto and each of the other sites) and gray ware vessel forms.

In plain language, H_0 means that the observed gray ware vessel forms could have come from either Pueblo Alto or from the other site being analyzed (been drawn from the same population) while H_1 means that the observed gray ware vessel forms are specific to the site that the assemblage was recovered from (could not have been drawn from the same population). If the null hypothesis (H_0) is accepted, it may be indicative of an export relationship between Pueblo Alto and the other site being investigated and/or indicative of functional similarities. If the null hypothesis is rejected, it is may be indicative of an emulation, no relationship, or functional difference. See Table 51, Table 52, Table 53, Table 54, and Table 55 in Appendix C for complete chi-square analyses.

The results of the chi-square test of independence on gray ware vessel form indicates that the assemblage observed at the Chimney Rock Great House, the Ravine Site, and the Corral Canyon Site could have come from the same population as the gray ware vessel assemblage observed at Pueblo Alto, while the assemblages from 29SJ 627 and the Bluff Great House could not have come from the same assemblage as Pueblo Alto (Table 13). However, it is questionable how meaningful culturally these results are since each site had very similar percentages of gray wares (97% or more, see Figure 44). Since the majority of gray wares are jars at each site, it is likely that each location was mostly using the gray ware vessels for storage, cooking, and other utilitarian purposes.

Table 13. Summary of chi-square test of independence for gray ware vessel form for the Pueblo II time period (A.D. 1000-1150).

Site	Chi Square (x^2)	Degrees of Freedom (df)	Total Sample Size (n)	Significance (p) x^2/Fisher's Exact	Importance (Phi)
29 SJ 627	33.955	1	2885	.000/000	.112
Chimney Rock Great House	1.073	1	3397	.180/228	.023
Ravine Site	.959	1	2924	.327/.290	.025
Bluff Great House	6.462	1	10490	.011/.012	.030
Corral Canyon Site	.107	1	2361	.744/1	.020

CHI SQUARE (x^2) TEST OF INDEPENDENCE FOR WHITE WARE VESSEL FORM FROM THE PUEBLO II TIME PERIOD (A.D. 1000-1150)

H_0 There is no statistically significant relationship between sites (Pueblo Alto and each of the other sites) and white ware vessel forms.

H_1 There is a statistically significant relationship between sites (Pueblo Alto and each of the other sites) and white ware vessel forms.

In plain language, H_0 means that the observed white ware vessel forms could have come from either Pueblo Alto or from the other site being analyzed (been drawn from the same population), while H_1 means that the observed white ware vessel forms are specific to the site that the assemblage was recovered from (could not have been drawn from the same population). If the null hypothesis (H_0) is accepted, it may be indicative of an export relationship between Pueblo Alto and the other site being investigated and/or indicative of functional similarities. If the null hypothesis is rejected, it is may be indicative of an emulation, no relationship, or functional difference. See Table 56, Table 57, Table 58, Table 59, and Table 60 in Appendix C for full chi-square analyses.

The test of independence analysis on white ware vessel forms from Pueblo Alto and the other five sites demonstrate that the observed vessel form frequencies could not have come from the same source populations (Table 14). This outcome is indicative of an "emulative" or no relationship rather than an "export" relationship between Pueblo Alto and the other five sites examined here. This outcome could also be the result of functional differences at the sites.

Table 14. Summary of chi-square test of independence for white ware vessel form for the Pueblo II time period (A.D. 1000-1150).

Site	**Chi Square (x^2)**	**Degrees of Freedom (df)**	**Total Sample Size (n)**	**Significance (p)**	**Importance (Cramer's V)**
29 SJ 627	10.611	2	7478	.005	.038
Chimney Rock Great House	140.339	2	3370	.000	.204
Ravine Site	13.267	2	3086	.001	.066
Bluff Great House	469.024	2	4824	.000	.312
Corral Canyon Site	267.043	2	3178	.000	.290

CHI SQUARE (x^2) TEST OF INDEPENDENCE FOR RED WARE VESSEL FORM FROM ALL TIME PERIODS REPRESENTED AT EACH SITE

Due to the very general level of detail of red ware types reported form Pueblo Alto and 29SJ 627, it is impossible to filter the assemblage for the Pueblo II time period.

H_0 There is no statistically significant relationship between sites (Pueblo Alto and each of the other sites) and red ware vessel forms.

H_1 There is a statistically significant relationship between sites (Pueblo Alto and each of the other sites) and red ware vessel forms.

In plain language, H_0 means that the observed red ware vessel forms could have come from either Pueblo Alto or from the other site being analyzed (been drawn from the same population), while H_1 means that the observed red ware vessel forms are specific to the site that the assemblage was recovered from (could not have been drawn from the same population). If the null hypothesis (H_0) is accepted, it may be indicative of an export relationship between Pueblo Alto and the other site being investigated and/or indicative of functional similarities. If the null hypothesis is rejected, it is may be indicative of an emulation, no relationship, or functional difference. See Table 61, Table 62, Table 63, and Table 64 in Appendix C for complete chi-square tests.

No analysis for red ware could be completed for the Ravine Site because no red wares have been recovered. By definition, the samples from Pueblo Alto and the Ravine Site could not have been drawn from the same population.

The sample of red ware vessel form from 29SJ 627 and the Corral Canyon Site could have come from the same population as the sample of red ware vessel form from Pueblo Alto (Table 15). The red ware vessel form assemblages of the other sites are different enough from Pueblo Alto that is would not be statistically possible for their red ware vessel form samples to have been drawn from the same population.

Table 15. Summary of chi-square test of independence for red ware vessel form for all time periods represented at each site.

Site	**Chi Square/ Corrected for Continuity ($x^{2)}$**	**Degrees of Freedom (df)**	**Total Sample Size (n)**	**Significance (p) x^2/Fisher's Exact**	**Importance (Cramer's V or Phi)**
29 SJ 627	3.419	2	267	.181	.113
Chimney Rock Great	17.403/9.042	1	134	.003/.010	.360

House					
Ravine Site	N/A	N/A	N/A	N/A	N/A
Bluff Great House	32.780	2	1503	.000	.148
Corral Canyon Site	11.159/10.249	1	385	.001	.170\

Given the proximity of 29SJ 627 to Pueblo Alto and its location in Chaco Canyon, the similarity in vessel form frequencies is probably more of a result of geographic location than close cultural (export) relationships. This result does demonstrate the Pueblo Alto and 29SJ 627 both had significant access to sources of red ware vessels in southeast Utah. It is up for debate if the individuals at 29SJ 627 were obtaining red wares through individuals living in Great Houses or if they were, in fact, procuring them directly. The Bluff Great House, also located in southeastern Utah, has a larger and more diverse red ware vessel form assemblage than all of the other sites.

CHI SQUARE ($X^{2)}$ TEST OF INDEPENDENCE FOR GRAY WARE TEMPER TYPE FROM THE PUEBLO II (A.D. 1000-1150) TIME PERIOD

H_0 There is no statistically significant relationship between sites (Pueblo Alto and each of the other sites) and gray ware temper types.

H_1 There is a statistically significant relationship between sites (Pueblo Alto and each of the other sites) and gray ware temper types.

In plain language, H_0 means that the observed gray ware temper types could have come from either Pueblo Alto or from the other site being analyzed (been drawn from the same population) in each chi-square test, while H_1 means that the observed gray ware temper types are specific to the site that the assemblage was recovered from (could not have been drawn from the same population). If the null hypothesis (H_0) is accepted, it may be indicative of an export relationship between Pueblo Alto and the other site being investigated. If the null hypothesis is rejected, it is may be indicative of an emulation or no relationship. See Table 65, Table 66, Table 67, Table 68, and Table 69 for complete chi-square analyses.

The observed gray ware temper types from the five sites summarized below (Table 16) were significantly different from the observed gray ware temper type at Pueblo Alto that they could not have been drawn from the same population. This result favors an emulative or no-relationship between the sites and Chaco Canyon as represented by Pueblo Alto, or is indicative of functional differences.

Table 16. Summary of test of independence of gray ware temper type for the Pueblo II time period (A.D. 1000-1150).

Site	**Chi Square (x^2)**	**Degrees of Freedom (df)**	**Total Sample Size (n)**	**Significance (p)**	**Importance (Cramer's V)**
29 SJ 627	139.582	2	2327	.000	.245
Chimney Rock Great House	2404.795	2	2863	.000	.916
Ravine Site	2130.462	2	2342	.000	.954
Bluff Great House	2895.539	2	4704	.000	.785
Corral Canyon Site	3707.918	2	3817	.000	.986

CHI SQUARE (X^2) TEST OF INDEPENDENCE FOR WHITE WARE TEMPER TYPE FROM THE PUEBLO II (A.D. 1000-1150) TIME PERIOD

H_0 There is no statistically significant relationship between sites (Pueblo Alto and each of the other sites) and white ware temper types.

H_1 There is a statistically significant relationship between sites (Pueblo Alto and each of the other sites) and white ware temper types.

More simply, H_0 means that the observed white ware temper types could have come from either Pueblo Alto or from the other site being analyzed (been drawn from the same population), while H_1 means that the observed white ware temper types are specific to the site that the assemblage was recovered from (could not have been drawn from the same population). If the null hypothesis (H_0) is accepted, it may be indicative of an export relationship between Pueblo Alto and the other site being investigated. If the null hypothesis is rejected, it is may be indicative of an emulation or no relationship. See Table 70, Table 71, Table 72, Table 73, Table 74, Table 75, and Table 76 for complete chi-square analyses.

For all five of the sites examined in relationship to Pueblo Alto, the null hypothesis, that there is no relationship between site and white ware temper type, is rejected (Table 17). The distribution of white ware temper type is dependent on the site examined, and samples from none of the five sites and Pueblo Alto could have been derived from the same population. In the framework of the export vs. emulation/no relationship framework, the five sites would all be emulations or have no relationship to Pueblo Alto. Two versions of the chi-square analysis were completed for the Ravine Site and the Corral Canyon Site, one including all temper types, and the other omitting sherd temper due to is low frequency. The results were essentially identical including or excluding sherd temper at these two sites.

Table 17. Summary of test of independence of white ware temper type for the Pueblo II time period (A.D. 1000-1150).

Site	Chi Square (x^2)	Degrees of Freedom (df)	Total Sample Size (n)	Significance (p)	Importance (Cramer's V)
29 SJ 627	410.028	2	6792	.000	.246
Chimney Rock Great House	1258.322	3	2521	.000	.706
Ravine Site	317.157	3	2236	.000	.377

V. 1 (including all temper types)					
Ravine Site V.2 (omitting sherd temper)	212.298	2	2232	.000	.308
Bluff Great House	2496.424	3	4043	.000	.786
Corral Canyon Site V. 1 (including all temper types)	1204.646	3	2305	.000	.723
Corral Canyon Site V. 2 (omitting sherd temper)	1196	2	2304	.000	.721

CHI SQUARE (X^{2}) TEST OF INDEPENDENCE FOR RED WARE TEMPER TYPE FROM ALL TIME PERIODS REPRESENTED AT EACH SITE

H_0 There is no statistically significant relationship between sites (Pueblo Alto and each of the other sites) and red ware temper types.

H_1 There is a statistically significant relationship between sites (Pueblo Alto and each of the other sites) and red ware temper types.

H_0 means that the observed red ware temper types could have come from either Pueblo Alto or from the other site being analyzed (been drawn from the same population), while H_1 means that the observed red ware temper types are specific to the site that the assemblage was recovered from (could not have been drawn from the same population). If the null hypothesis

(H_0) is accepted, it may be indicative of an export relationship between Pueblo Alto and the other site being investigated. If the null hypothesis is rejected, it is may be indicative of an emulation or no relationship. See Table 77, Table 78, Table 79, Table 80, Table 81, and Table 82 in Appendix C for complete chi-square analyses.

Technically speaking, there is not enough red ware from the Chimney Rock Great House to do a chi-square statistical analysis. For the sake of completeness, a test was completed anyway. Despite the fact that 4 cells have an expected count less than 5, it is clear that the red ware temper type distributions observed at Chimney Rock and Pueblo Alto could not have come from the same population because the only red ware recovered from Chimney Rock is sherd tempered, and none of the red ware at Pueblo Alto was sherd tempered. No analysis for red ware could be completed for the Ravine Site because no red wares have been recovered. By definition, the samples from Pueblo Alto and the Ravine Site could not have been drawn from the same population. Two versions of the chi-square test were completed for both 29SJ 627 and the Bluff Great House due to inadequate sample size in some temper categories. The results of the chi-square analysis when the inadequate temper categories were omitted were essentially identical to when they were included; that is, the null hypothesis was rejected.

The test of independence analysis executed on the five sites against Pueblo Alto indicates that the red ware temper types from those sites and Pueblo Alto could not have been drawn from the same population (Table 18). In the export vs. emulation framework, these sites would all have to be classified as emulations or as not related to Chaco as represented by Pueblo Alto at all.

Table 18. Summary of test of independence of red ware temper type for all time periods represented at each site.

Site	Chi Square/ Corrected for Continuity (x^2)	Degrees of Freedom (df)	Total Sample Size (n)	Significance (p) x^2 or Fisher's Exact	Importance (Cramer's V or Phi)
29 SJ 627 V. 1 (including all temper types)	32.456	2	236	.000	.371
29SJ 627 V. 2 (omitting trachyte temper)	23.692	1	227	.000	.332
Chimney Rock Great House	105.000	2	105	.000	1.0
Ravine Site	N/A	N/A	N/A	N/A	N/A
Bluff Great House V. 1 (including all temper types)	27.268	2	1463	.000	.137
Bluff Great House V. 2 (omitting sherd temper)	25.453	1	1455	.000	.135
Corral Canyon Site	219.474	1	407	.000	.742

STATISTICAL ANALYSIS OF PAIRED SITES OUTSIDE OF CHACO CANYON

This section of statistical analyses seeks to explore the variation between different types of sites – Great Houses inside and outside of the canyon and small sites inside and outside of the canyon. In Chapter I, the possibility that different types of sites functioned differently within the Chaco World, and that it might be reasonable to expect Chimney Rock and Bluff to be more similar to one another than either is to Pueblo Alto was introduced. In a strict sense, the export vs. emulation dichotomy doesn't allow for this type of variation – a site should be extremely similar to sites in Chaco in order to be considered closely linked. In this dissertation, the possibility that the Chaco System encompassed functional and temporal variability is considered in concert with the export vs. emulation dichotomy.

CHI SQUARE (X2) TEST OF INDEPENDENCE FOR WARES FROM THE PUEBLO II TIME PERIOD (A.D. 1000-1150) AT PAIRED SITES

H_0 There is no statistically significant relationship between sites and ware ratios.

H_1 There is a statistically significant relationship between sites and ware ratios.

More simply, H_0 means that the observed ware ratios could have come from either site being analyzed (or, been drawn from the same population), while H_1 means that the observed ware ratios are specific to the site that the assemblage was recovered from (could not have been drawn from the same population). If the null hypothesis (H_0) is accepted, it would be indicative of a closer relationship or possibly functional similarity, while if it is rejected it is indicative of no relationship or possible functional difference. See Table 83, Table 84, Table 85, and Table 86 in Appendix C for complete chi-square analyses.

The chi-square test of independence for the paired Great Houses, Great Houses and small sites, and paired small sites demonstrates that the observed ware ratios at each site could not have been drawn from the same population (Table 19).

Table 19. Summary of test of independence for wares from the Pueblo II time period (A.D. 1000-1150) at paired Sites.

Site	Chi Square (x^2)	Degrees of Freedom (df)	Total Sample Size (n)	Significance (p)	Importance (Cramer's V)
Chimney Rock Great House and Ravine Site	333.774	2	4239	.000	.281
Bluff Great House and Corral Canyon Site	428.204	2	16255	.000	.162
Chimney Rock Great House and Bluff Great House	321.820	2	14096	.000	.151
Ravine Site and Corral Canyon Site	233.404	2	6398	.000	.191

CHI SQUARE (x^2) TEST OF INDEPENDENCE FOR GRAY WARE VESSEL FORM FROM THE PUEBLO II (A.D. 1000-1150) TIME PERIOD

H_0 There is no statistically significant relationship between sites and gray ware vessel forms.

H_1 There is a statistically significant relationship between sites and gray ware vessel forms.

H_0 means that the observed gray ware vessel forms could have come from either site being analyzed (or, been drawn from the same population), while H_1 means that the observed gray ware vessel forms are specific to the site that the assemblage was recovered from (could not have been drawn from the same population). If the null hypothesis (H_0) is accepted, it would be indicative of a closer relationship or possibly functional similarity, and if it is rejected it is indicative of no relationship or possible functional difference. See Table 87, Table 88, Table 89, and Table 90 in Appendix C for complete chi-square analyses.

The statistical analysis completed for gray ware vessel form demonstrated that assemblages from Chimney Rock and the Ravine Site, Bluff Great House and Corral Canyon Site, and Ravine Site and Corral Canyon Site, could have all been drawn from the same population (Table 20). Given the striking similarity in gray ware vessel forms noted throughout this study, this result is not surprising.

Table 20. Summary of test of independence for gray ware vessel form from the Pueblo II time period (A.D. 1000-1150) at paired sites.

Site	**Chi Square ($x^{2)}$/Corrected for Continuity**	**Degrees of Freedom (df)**	**Total Sample Size (n)**	**Significance (p) x^2/Fisher's Exact**	**Importance (Phi)**
Chimney Rock Great House and Ravine Site	.000	1	2491	1.0	.002
Bluff Great House and Corral Canyon Site	.000	1	9021	1.0	.003
Chimney Rock Great House and Bluff Great House	23.693	1	10057	.000	.053
Ravine Site and Corral Canyon Site	1.007	1	1455	.331	.039

CHI SQUARE (x^2) TEST OF INDEPENDENCE FOR WHITE WARE VESSEL FORM FROM THE PUEBLO II (A.D. 1000-1150) TIME PERIOD

H_0 There is no statistically significant relationship between sites and white ware vessel forms.

H_1 There is a statistically significant relationship between sites and white ware vessel forms.

In plain language, H_0 means that the observed white ware vessel forms could have come from either site being analyzed (or, been drawn from the same population), while H_1 means that the observed white ware vessel forms are specific to the site that the assemblage was recovered from (could not have been drawn from the same population). If the null hypothesis (H_0) is accepted, it would be indicative of a closer relationship or possibly functional similarity, and if it is rejected it is indicative of no relationship or possible functional difference. See Table 91, Table 92, Table 93, and Table 94 in Appendix C for complete chi-square analyses.

The chi-square test of independence has demonstrated that the observed white ware vessel forms at each of the paired sites could not have been drawn from the same population (Table 21).

Table 21. Summary of chi-square (x^2) test of independence for white ware vessel form from the Pueblo II (A.D. 1000-1150) time period.

Site	**Chi Square (x^2)**	**Degrees of Freedom (df)**	**Total Sample Size (n)**	**Significance (p)**	**Importance (Cramer's V)**
Chimney Rock Great House and Ravine Site	6.112	2	432	.047	.119

Bluff Great House and Corral Canyon Site	40.264	2	1978	.000	.143
Chimney Rock Great House and Bluff Great House	7.390	2	2170	.025	.058
Ravine Site and Corral Canyon Site	38.503	2	240	.000	.401

CHI SQUARE (X^2) TEST OF INDEPENDENCE FOR RED WARE VESSEL FORM FROM ALL TIME PERIODS REPRESENTED AT EACH SITE

H_0 There is no statistically significant relationship between sites and red ware vessel forms.

H_1 There is a statistically significant relationship between sites and red ware vessel forms.

More simply, H_0 means that the observed red ware vessel forms could have come from either site being analyzed (or, been drawn from the same population), while H_1 means that the observed red ware vessel forms are specific to the site that the assemblage was recovered from (could not have been drawn from the same population). If the null hypothesis (H_0) is accepted, it would be indicative of a closer relationship or possibly functional similarity, while if it is rejected it is indicative of no relationship or possible functional difference. See Table 95 in Appendix C for complete chi-square analysis.

It is not possible to run a statistical test on the data from the Chimney Rock Great House and the Ravine Site, the Chimney Rock Great House and the Bluff Great House, or the Ravine Site and the Corral Canyon Site pairs because the sample size from Chimney Rock and the Ravine Site are too small. A statistical test of independence was only possible for one pair of sites, the Bluff Great House and Corral Canyon Site. These results indicate that the observed red ware vessel forms at the two sites could not have come from the same population (Table 22).

Table 22.Summary of chi-square test of independence for red ware vessel forms from all time periods represented at each site.

Site	Chi Square (x^2)	Degrees of Freedom (df)	Total Sample Size (n)	Significance (p)	Importance (Cramer's V)
Chimney Rock Great House and Ravine Site	N/A	N/A	N/A	N/A	N/A
Bluff Great House and Corral Canyon Site	12.122	2	1,624	.002	.086
Chimney Rock Great House and Bluff Great House	N/A	N/A	N/A	N/A	N/A
Ravine Site and Corral Canyon Site	N/A	N/A	N/A	N/A	N/A

CHI SQUARE (x^2) TEST OF INDEPENDENCE FOR GRAY WARE TEMPER TYPE FROM THE PUEBLO II (A.D. 1000-1150) TIME PERIOD

H_0 There is no statistically significant relationship between the sites and gray ware temper types.

H_1 There is a statistically significant relationship between sites and gray ware temper types.

H_0 means that the observed gray ware temper types could have come from either site being analyzed (or, been drawn from the same population), while H_1 means that the observed gray ware temper types are specific to the site that the assemblage was recovered from (could not have been drawn from the same population). If the null hypothesis (H_0) is accepted, it would be indicative of a closer relationship (export), while if it is rejected it may be indicative of an emulation or of no relationship. See Table 96, Table 97, Table 98, Table 99, and Table 100 in Appendix C for complete chi-square analyses.

Two versions of the analysis were completed for the Corral Canyon Site and for the Ravine Site; one omitting trachyte tempered sherds due to their low frequency, and the other including all temper categories. The results of both versions of the test were essentially identical; the null hypothesis was rejected and the observed gray ware temper types at each site could not have been drawn from the same population (Table 23). The same was true for each of the other paired sites.

Table 23. Summary of chi square test of independence for gray ware temper type from the Pueblo II (A.D. 1000-1150) time period.

Site	**Chi Square ($x^{2)}$/Corrected for Continuity**	**Degrees of Freedom (df)**	**Total Sample Size (n)**	**Significance (p) x^2 or Fisher's Exact**	**Importance (Cramer's V or Phi)**
Chimney Rock Great House and Ravine Site	15.411	2	2539	.000	.078
Bluff Great House and Corral Canyon Site	576.591	2	5855	.000	.314
Chimney Rock Great House and Bluff Great House	151.734	2	4901	.000	.176
Ravine Site and Corral	56.483	1	3491	.000	.130

Canyon Site V. 1 (omitting trachyte temper)					
Ravine Site and Corral Canyon Site V. 2 (including all temper types)	63.996	2	3493	.000	.135

CHI SQUARE (X^2) TEST OF INDEPENDENCE FOR WHITE WARE TEMPER TYPE FROM THE PUEBLO II (A.D. 1000-1150) TIME PERIOD

H_0 There is no statistically significant relationship between sites and white ware temper types.

H_1 There is a statistically significant relationship between sites and white ware temper types.

H_0 means that the observed white ware temper types could have come from either site being analyzed (or, been drawn from the same population), while H_1 means that the observed white ware temper types are specific to the site that the assemblage was recovered from (could not have been drawn from the same population). If the null hypothesis (H_0) is accepted, it may be indicative of a closer relationship (export), while if it is rejected it may indicative of an emulation or no relationship. See Table 101, Table 102, Table 103, Table 104, and Table 105 in Appendix C for complete chi-square analyses.

Technically speaking, there are not enough observations to perform a statistical analysis on the white ware temper type data from Chimney Rock and the Ravine Site, and Bluff great

House and the Corral Canyon Site, but since only one cell had too low an expected frequency, the analysis was completed and the results are presented here. Two versions of the chi-square analysis were completed on the Ravine Site and Corral Canyon Site, one omitting sherd temper, and the other including all temper categories. The results were essentially the same; the observed white ware temper types could not have been drawn from the same population.

Statistical analysis of the paired sites for white ware temper types indicates that the observed frequencies in each pair could not have been drawn from the same population (Table 24).

Table 24. Summary of chi-square test of independence for white ware temper type from the Pueblo II (A.D. 1000-1150) time period.

Site	**Chi Square (x^2)/Corrected for Continuity**	**Degrees of Freedom (df)**	**Total Sample Size (n)**	**Significance (p) x^2 or Fisher's Exact**	**Importance (Cramer's V or Phi)**
Chimney Rock Great House and Ravine Site	40.606	3	435	.000	.306
Bluff Great House and Corral Canyon Site	86.368	3	2026	.000	.206
Chimney Rock Great House and Bluff Great House	69.075	3	2242	.000	.176
Ravine Site and Corral Canyon Site V.1 (omitting sherd temper)	74.203	1	214	.000	.601

Ravine Site and Corral Canyon Site V. 2 (including all temper types)	80.945	2	219	.000	.608

CHI SQUARE ($x^{2)}$ TEST OF INDEPENDENCE FOR RED WARE TEMPER TYPE FROM ALL TIME PERIODS REPRESENTED AT EACH SITE

H_0 There is no statistically significant relationship between sites and red ware temper types.

H_1 There is a statistically significant relationship between sites and red ware temper types.

H_0 means that the observed red ware temper types could have come from either site being analyzed (or, been drawn from the same population), while H_1 means that the observed red ware temper types are specific to the site that the assemblage was recovered from (could not have been drawn from the same population). If the null hypothesis (H_0) is accepted, it would be indicative of a closer relationship (export), while if it is rejected it may be indicative of an emulation or of no relationship. See Table 106 for complete chi-square analysis.

No statistical analysis is possible for the Chimney Rock Great House and the Ravine Site, the Chimney Rock Great House and Bluff Great House, or the Ravine Site and the Corral Canyon Site because no red wares were recovered from the Ravine Site and only two red ware sherds were recovered from the Chimney Rock Great House. The number of observations is inadequate. Technically, statistical analysis of data from the Bluff Great House and Corral Canyon Site is not ideal because there are not enough observations. But, since only 1 cell has an expected frequency less than 5, the statistical analysis was completed and the results reported here.

Statistical analysis of the paired sites for red ware temper type was possible for only the Bluff Great House and Corral Canyon site. Test results indicate that the observed red ware temper frequencies at the two sites could not have been drawn from the same population (Table 25).

Table 25. Summary of chi-square test of independence for red ware temper type from all time periods represented at each site.

Site	Chi Square (x^2)	Degrees of Freedom (df)	Total Sample Size (n)	Significance (p)	Importance (Cramer's V)
Chimney Rock Great House and Ravine Site	N/A	N/A	N/A	N/A	N/A
Bluff Great House and Corral Canyon Site	160.689	2	1664	.000	.311
Chimney Rock Great House and Bluff Great House	N/A	N/A	N/A	N/A	N/A
Ravine Site and Corral Canyon Site	N/A	N/A	N/A	N/A	N/A

Summary of Statistical Analysis

Perhaps somewhat surprisingly, the chi-square test of independence demonstrated that the observed Pueblo II assemblages in almost all of the categories examined could not have come from the same population as Pueblo Alto. The only exception to this pattern is in the category of gray ware vessel form where the observed assemblages from Chimney Rock, the Ravine Site, and the Corral Canyon Site could have come from the same population as Pueblo Alto. Consistent with this are the results of the paired comparisons of the other Great Houses and small sites where the observed gray ware vessel forms at Chimney Rock and the Ravine Site, Bluff and Corral Canyon, and the Ravine Site and Corral Canyon could have been drawn from the same population.

It is not surprising that there would be similarities in gray ware vessel forms over such a diversity of large and small sites since gray wares were most frequently used for storage and cooking purposes over much of the southwest. Interpreting the results of this statistical analysis utilizing the export vs. emulation framework, we would have to conclude that the sites do not have a significant (export) relationship with Chaco Canyon and that the sites and their inhabitants were not participating in the same activities and trade networks. The functions of the sites were different.

However, the situation was likely much more complex than a straightforward application of the export vs. emulation framework and dichotomy allows. Perhaps examining the ratios of wares, temper types, and vessel forms with the expectation that a statistical test will reveal that they are similar enough to have been drawn from the same source population sets an unreasonable standard and masks relationships between people and places.

Additionally, the individuals inhabiting the Great Houses of Chaco Canyon very likely were not manufacturing their own pottery (Toll 2001). Based on this fact, studies that use the export vs. emulation framework with the assumption that it will be possible to track ethnic/cultural relationships between Chaco and other locations may be fundamentally flawed. Studies of pottery from Chaco probably actually reveal cultural traits of individuals from the location of pottery manufacture: in Chaco's case, the Chuska Valley. The export vs. emulation framework makes the faulty assumption that artifact assemblages recovered from sites were manufactured by the very same individuals who inhabited those sites. This is simply not the case.

The export vs. emulation framework looks for cultural relationships (See Chapter II). It assumes that artifacts were made in ways that are transmitted though cultural, ethnic, and family frameworks, and that these relationships can be traced across the landscape. First of all, why is it assumed that Chaco is linked through culture? What if Chaco was multi-ethnic? What if Chaco and other components of the Chaco World obtained goods from all over the San Juan Basin and beyond? What if Chaco was a political system that integrated diverse groups of people throughout the San Juan Basin? Conceptualizing Chaco in this way encompasses a whole lot of learning frameworks/families/ways of making pottery. Building on the ideas above, why would there be any pattern among assemblages at Chaco and candidate outliers, be they emulations or exports? It is my contention that Chaco was a political entity – obtaining goods and services from a variety of sites and people across the Chaco World. Politics, not ethnicity, needs to be the focus of study when attempting to understanding Chaco. A straightforward application of the emulation vs. export dichotomy, rooted in concepts of technological style, is not suitable for understanding Chaco.

Of course, these results may be due to sampling problems, idiosyncrasies particular to projects and analysts, and a host of other issues that plague archaeology. As such, these results should be a cautionary tale against writing off connections between different locations based on the absence of a certain level of similarity in low visibility characteristics. The very small sample that archaeologists see of the past is quite likely flawed and most definitely incomplete.

Applying statistical analyses to data sets like those examined here in an effort to get at prehistoric relationships may not be the ideal method to understand the past.

DISCUSSION

The issues described above necessitate thinking about site assemblages and connections between people and places across the landscape in different ways. Where the overview of assemblages from each site described in the first section of this analysis and the subsequent statistical analysis of this data examines ceramic assemblages at the largest, most coarse grained scale, the next pages look at the unique, the infrequent, components of the ceramics from each site. The goal of this approach is to avoid the pitfall of unreasonable expectations of consistency between sites in order to posit a connection. This discussion also does not assume that artifacts recovered at a site were necessarily manufactured at that site, only that they were used by individuals of the site and were therefore a part of the lives and activities of those individuals. Low-visibility traits as indications of cultural connection are not the object of study in this section. The unusual artifacts discussed here may have been stylistically and symbolically charged, and may have signaled participation in the Chaco System (see Chapter II).

A special category of ceramic objects known as “feather holders” or “prayer plume holders” bear particular mention here. These objects are rectangular in shape, with a slightly concave profile, and have holes where a feather could have been placed. Only 17 feather holders have been recovered, eleven from the Chimney Rock Area, two from Pueblo Bonito reported by Pepper (1920:268, Fig. 111) and Judd (1954:293, Fig. 90), and two from the Wallace Ruin, another Chacoan outlier. Specific to the Chimney Rock area, four of these unusual objects were recovered from the Ravine Site (Truell 1975:87). Jeancon (1922:Plate XIX, 27) reports a prayer plume holder from his excavations on the high mesa. Jeancon refers to the prayer plume holder as a “pottery object,” and it is not entirely clear if it was recovered from the Great House or from one of the pithouses that were also explored. This particular feather holder may be one of the two reported by Sullivan (2004:62) as originating from the causeway leading up to the Great House. Two feather holders were recovered fromt the Great House, and three from 5AA92, one of the other sites in the High Mesa Group. Based on their similarity to objects associated with historic Hopi altars and with no apparent utilitarian or secular function, feather holders are thought to be used for ritual activities (Sullivan 2004:66). Sullivan completed X-ray diffraction and X-ray fluorescence analysis on fourteen of the feather holders that indicated that all the feather holders found in the Chimney Rock area, and one from Pueblo Bonito were likely manufactured in the Chimney Rock area. Those from the Wallace Ruin may have been locally manufactured (Sullivan 2004:72).

How should the anomalous and rare feather holders recoverd from the Ravine Site and from the Chimney Rock Great House be understood? The Ravine Site is part of the High Mesa Site Group closest to the Chimney Rock Great House (Eddy 1977:7). It is also closest to the only great kiva in the Chimney Rock vicinity and quite near to a circular basin pecked into the sandstone thought to be an astronomical marker. Perhaps, inhabitants of the site were ritual specialists. Individuals, who for whatever reason were perhaps known in their communities as religious leaders, and were drawn to Chimney Rock because of the presence of the Chacoans, eventually negotiating a place for themselves in the larger Chacoan ideology and in the more particular Chacoan ritual practiced at Chimney Rock. These unusual and rare objects may indicate a special relationship between the Chimney Rock community, not just the Chimney Rock Great House, and Chaco Canyon. The feather holders, along with the spectacuar geologic formations and astronomical alignments associated with the Chimney Rock area, may be part of the combination of reasons that the Great House was established.

Cibola and Chuska tradition ceramics are most relevant to an examination of connections to Chaco. An examination of the types that belong to these traditions at each site reveals that Pueblo Alto, 29SJ 627, Chimney Rock, the Ravine Site, and the Bluff Great House all have some ceramics from these traditions in their collections (See Appendix C for typological information). In the case of Pueblo Alto and 29SJ 627, this is likely explained by proximity. It is logical that sites, both large and small, located within Chaco Canyon would have similar components in their ceramic assemblages. Chimney Rock and the Ravine Site also both have Chuska and Cibola ceramics, but the Great House has a greater diversity of these types than does the smaller Ravine Site. The Bluff Great House also has ceramics from the Cibola and Chuska traditions. This is not surprising, given the architecture of the Great House, roads and earthen construction of the Bluff Great House. The Corral Canyon Site does not have any tradewares associated with the Chaco system. It is quite possible that the inhabitants of the Corral Canyon site were not integrated into the larger trade and social networks of the Chaco World.

Work completed by Douglas R. Parker (2004) supports this interpretation. Based on petrographic analyses of 60 sherds from the Chimney Rock Great House, Parker (2004) found that while Gallup Black-on-white (associated with Chaco) made up only 9.5% of the ceramics found at the site, a local imitation of Chacoan pottery (Chimney Rock Black-on-white) that used Chacoan sherds as temper made up 56% of the total pottery at the site. That is, sherds from the south were ground up for temper in locally made imitation Chacoan pottery. This evidence provides a strong indication of a Chacoan presence on the high mesa. So, despite statistical analyses indicating that the assemblages are not similar enough to have been drawn from the same population, it is clear that there was a Chacoan presence, or at least Chacoan pottery, on the High Mesa at Chimney Rock at some point. Wilson (2011) did not identify Chimney Rock Black-on-White a specific type in the current analysis, but does think this type is likely equivalent to Mancos Black-on-white wide hatchured.

Now, the question is – does the presence of similar ceramic types at these sites indicate any special relationship between them? Or, are the ceramics present at almost all of the sites examined because all or nearly all Ancestral Pueblo Sites obtained ceramics from further away, and manufactured others (like gray wares) closer to home? Perhaps it is reasonable to use ceramics as just another line of evidence for untangling prehistoric relationships, not as a smoking gun sign of export vs. emulation connection with Chaco Canyon.

Claims that Chaco was a state level society, even a secondary state society, are not typically met with much support. The intention here is not to quibble over yet more categorical determinations. But, some aspects of our understanding of states may be useful here. States are often multi-ethnic, multi-lingual. Chaco was likely multi-ethnic, multi-lingual. Architecture and artifacts are not expected to be homogenous in states. Why are they expected to be homogenous in the Chaco World?

It seems reasonable that inhabitants of Great Houses outside Chaco Canyon would also have local networks for the acquisition of necessities, e.g. pottery, and labor. Pots are heavy, and it may be necessary to only have a token few trachyte tempere, hachured pots to signal a connection to Chaco and to effectively be a part of the Chaco World, akin to Weissner's (1983) emblemic style, and Wobst's (1977) observation that style can function to transmit messages. To get at political relationships, it may be necessary to look at the unique components of a site assemblage, and not at the variables that most frequently appear.

Based on the analysis in the previous pages, it appears that Chimney Rock Great House is connected to Chaco Canyon or at least is a part of the same trade networks. The ceramic assemblage from Chimney Rock Great House has some of the same types of pottery as the assemblage from Pueblo Alto. Judging from the statististical analysis, the assemblages at Chimney Rock and Pueblo Alto are not similar enough to have come from the same population, so perhaps this means that the buildings did not function in the exact same ways. Looking at the unique and unusual aspects of the assemblages, Chimney Rock and the Ravine Site both have feather holders, some of only 17 (two of which were recovered from Pueblo Bonito), known in the southwest. Based on characteristics of the ceramic assemblages, we can conclude that Chimney Rock was a part of the Chaco World in some capacity (involved in similar trade networks and extra-community social networks). The ceramic evidence examined here is not strongly indicative of an export or emulation relationship to Chaco or origin for the Chimney Rock Great House. It may be that a single line of evidence, like ceramics, is not sufficient to make this determination.

Chapter VI

What was Chimney Rock?

This objective of this dissertation is to determine if Chimney Rock Great House is an export (built and inhabited by individuals from Chaco Canyon) or an emulation (built by locals attempting to copy architecture and activities in Chaco Canyon). This question was investigated using the export vs. emulation dichotomy (based on technological style, Chapter II) using two classes of data: architecture and ceramics. Interestingly, the two classes of data are, in some ways, contradictory. The differences in what the architecture vs. what the ceramics indicate about Chimney Rock may reveal that some artifact classes are more appropriate for untangling political relationships (architecture), while others are more appropriate for untangling cultural relationships, access to resources, and trade networks (ceramics). Architecture may have been an overt and emblemic stylistic expression of participation in the Chaco System, while ceramics mostly reflect smaller/local cultural networks and/or individual or assertive style (see Weissner 1983 and Chapter II).

This chapter summarizes and discusses the results of the analysis of architecture and ceramics; describes the origins of the Chimney Rock Great House; provides perspectives on identity, practice, and a phenomenological interpretation of the site; and finally conclusions.

Ceramics

The export vs. emulation framework used in this dissertation posits that if Chimney Rock were an export of Chaco Canyon, the ware ratios, vessel forms, and temper types observed in the ceramic assemblage would be very similar to that observed at Pueblo Alto. As discussed in

Chapter V, similar site assemblages would be indicative of both cultural networks and site function. The ceramic assemblage at Chimney Rock was, almost across the board, not similar to that at Pueblo Alto. Adhering strictly to the export vs. emulation dichotomy, Chimney Rock Great House would appear to be an emulation or not related to Chaco Canyon at all.

This notion is rejected in favor of looking at some of the unique artifacts found both at Chimney Rock and at Chaco Canyon. This is a reasonable approach because it is unlikely that Great Houses within Chaco Canyon functioned in precisely identical ways and were populated by people from the exact same cultural groups, so it is equally likely that Great Houses located outside the canyon functioned differently and were inhabited by people of unique backgrounds and disparate identities. Further, as noted in Chapter II, the relationships between stylistic aspects of material culture and identity are variable and sometimes unclear (Weissner 1983; Dietler and Herbich 1989, Lightfoot and Martinez 1995; Janusek 2002). Therefore, the material culture recovered from each Great House in the Chaco System should not be expected to be precisely identical. The realization of variation in both the composition of populations and functions of Great Houses throughout the San Juan Basin does not negate connection between these outlying Great Houses and Chaco Canyon. Approaching the ceramic assemblage in this way avoids the unreasonable assumption of homogeneity in population and artifacts through all times and places in the Chaco System and of equating people with objects (akin to the use of style to create culture areas described in Chapter II), focusing instead on the unique aspects of artifact assemblages that otherwise might be overlooked when examining coarser trait frequencies. These unique and less common traits of the ceramic assemblage may provide much more insight into the connections between sites in the Chaco World than broader trait categories.

Further, the examination of ceramic assemblages at Chimney Rock Great House, Bluff Great House, the Ravine Site, and the Corral Canyon Site, a variety of large and small sites located throughout the San Juan Basin, revealed that the individuals at these sites were often obtaining the bulk of their ceramics locally. The situation at the two sites located in Chaco Canyon (Pueblo Alto and 29SJ 627) is slightly different, as some of the ceramics were tempered with sand or sandstone, a temper source widely available in, around, and beyond Chaco. It is possible that the sandstone tempered ceramics could have been manufactured locally in Chaco, but this is unlikely given the paucity of fuel sources to fire ceramics. Many ceramics from Pueblo Alto and other sites in Chaco Canyon were tempered with trachyte and likely manufactured in the Chuska Valley and transported into Chaco (Toll 2001). From these observations, it is clear that individuals living in Chaco Canyon had more access to larger trade and social networks than did individuals living outside the canyon. Since it appears that most ceramics at sites outside of Chaco were obtained locally, it is unreasonable to expect to see overt similarities in complete ceramic assemblages and to expect these to confirm or negate claims of political complexity and connection.

While individuals at sites outside Chaco obtained most ceramics locally based on temper identification, it is possible to see some differences between the Great Houses and small sites. At Chimney Rock, trachyte tempered pottery was identified in the assemblage, indicating that individuals at Chimney Rock had access to similar trade networks as individuals at Chaco Canyon, though at a relatively less significant level. A small amount of red ware was also recovered from the Great House, indicating that inhabitants of the Great House had more significant and extensive connections to trade and social networks than did individuals living at the Ravine Site. There is also a series of ceramic types associated with Chaco Canyon (Red

Mesa Black-on-white, Gallup Black-on-white, and Escavada Black-on-white) at the Great House (Figure 50 and Figure 51). Only one sherd of Gallup Black-on-white was recovered from the Ravine Site, and this was from the Great Kiva. Examining tempers and ceramic types at the Ravine Site reveals that the Great House had more extensive extra-community connections than did the Ravine Site. The Bluff Great House and Corral Canyon Site are not the topic of this chapter, but the situation is similar there (see Chapter V) – the Great House had greater access to traded wares and types associated with Chaco Canyon than did the small site.

Figure 50. Gallup Black-on-white with fine hatchure.

Figure 51. Escavada Black-on-white with triangles.

Perhaps most telling is the presence of a local pottery type at the Chimney Rock Great House (Chimney Rock Black-on-white) tempered with crushed Chacoan pottery and decorated with Chacoesque hatchured designs (See Parker 2004 and Chapter V). This is clear evidence for the presence of Chacoan pottery, and potentially evidence for Chacoan people, at the Chimney Rock Great House. It is conceivable that the initial Chacoan colonists at the site brought pottery with them from Chaco. This doesn't mean that the pottery was made at Chaco, because as discussed previously, Chacoans likely did not make or obtain their pottery locally. When it became necessary to manufacture new pottery at Chimney Rock, the Chacoan pottery was integrated as a meaningful component of the new, local version of Chaco Black-on-white (Chimney Rock Black-on-white). The integration of Chacoan pottery into new pottery is important; individuals could have chosen to use locally available igneous tempers, but instead, they chose to use pottery that was culturally and politically meaningful as temper in newly manufactured pots. And, not in just any new pots manufactured, only pots that were copies of Chaco style white ware pots. In contrast, gray wares at the site were locally manufactured and almost always tempered with igneous, locally available temper. In this way, the individuals at Chimney Rock were drawing on the past in an effort to legitimize the present and solidify their connections to the center place at Chaco (*sensu* Van Dyke 2004; Connerton 1989).

The enigmatic feather holders (discussed in Chapter V) are another link between Chaco Canyon and Chimney Rock. Feather holders are thought to be ritual objects, and have been recovered from Chimney Rock Great House, the Ravine Site, the Wallace Ruin, and Pueblo Bonito (Sullivan 2004). It is interesting that these rare objects would be found at both the Ravine Site and Chimney Rock Great House. The feather holders recovered from the Ravine Site were likely utilized during ritual practices in the adjacent Great Kiva. Sullivan's (2004) sourcing study of these objects indicated that the feather holders in the Chimney Rock area and those at Pueblo Bonito were probably made at Chimney Rock. This is a fascinating indication of the close relationship between the Chimney Rock area and the oldest and longest lived Great House in the Chaco World – Pueblo Bonito (Neitzel ed. 2003). It has been postulated that Chimney Rock was a center for ritual and pilgrimage activities (see Malville 2004, ed.) and the presence of these rare feather holders and indications that the objects were manufactured locally and exported to Pueblo Bonito supports this hypothesis.

In summary, the ceramic assemblage observed at the Chimney Rock Great House did not prove to be overtly similar to the ceramic assemblage observed at Pueblo Alto in Chaco Canyon as was initially hypothesized to be indicative of a site being an export of the canyon. These dissimilarities could derive from a number of causes: 1) The two Great Houses did not function in identical ways; 2) Individuals at the Great Houses had access to different trade networks; 3) Ceramics are not ideal for untangling political relationships in the framework of the export vs.

emulation dichotomy. The first two possibilities are straightforward explanations for the differences observed at the Great Houses. The third possibility is a bit more complex.

The export vs. emulation dichotomy as often used in studies of the Chaco System is fundamentally flawed. Briefly, the theory goes that there are low visibility traits that can be identified in various artifact types as a result of people making things in specific ways that they learned from belonging to close-knit cultural and learning networks (Sackett 1977, 1986, 1990; Lemmonier 1986; Lechtmann 1977; see Chapter II). Therefore, if those low visibility traits can be identified in certain artifact classes, like ceramics, at Chaco, and then identified in other assemblages elsewhere, the movement of Chacoan people can be tracked. Essentially, the export vs. emulation framework hinges on identifying ways of doing things passed down through family groups. The most crucial problem in this framework is that it focuses on smaller social groups, essentially ethnicities or cultural units (Barth 1969; Jones 1997), but does not allow for the possibility that Chaco was a political system integrating multiple social and ethnic groups. Further, it assumes that individuals at Chaco Canyon actually made all of their own ceramics (and other artifacts). For the export vs. emulation framework to be useful in understanding the Chaco System, each Great House would have had to have been inhabited by similar social groups and making pots and other artifacts in the same ways for hundreds of years. And, the entire San Juan Basin would have had to have been ethnically homogenous. Chaco was a dynamic system, a system that likely integrated diverse groups of people, a system that was always changing and developing. The problem with such a static approach, one that assumes cultural and temporal homogeneity, should be obvious. Archaeologists should not examine the archaeological record in search of a single ethnicity (Chacoan) to understand a system (Chaco) that integrated multiple ethnicities.

In relation specifically to ceramics, as discussed above, it is very unlikely that individuals at Chaco made the bulk of the pottery used in the canyon. Trachyte temper in up to 30% of all vessels and 50% of gray ware vessels after A.D. 1040 at Chaco is clear indication of the non-local origin for much of the ceramics in Chaco (Toll and McKenna 1997:130-131; Toll 2001). Further, sandstone temper is available both in Chaco and much of the San Juan Basin, so it is not clear that sandstone tempered pottery was made in Chaco, either. Based on this information, it does not make sense to assume that Chacoan people can be tracked across the landscape by comparing low visibility stylistic traits in ceramics recovered at Chaco with ceramics elsewhere. What is actually being identified in these studies is access to trade networks, not movement of people. If any cultural groups at all are being identified, it is those of the people who actually made the pottery, likely in the Chuska Valley, and not the people inhabiting Great Houses in Chaco Canyon. In light of the observations made by Dietler and Herbich (1989), Lightfoot and Martinez (1995), and Janusek (2002) and discussed in Chapter II, there is no clear cut and obvious relationship between stylistic aspects of material culture and identity. This line of reasoning can be extended to other portable artifact classes, as well.

The export vs. emulation framework is designed to identify cultural networks and is much too simple to use to untangle a complex, multi-ethnic and multi-lingual Chaco System. The ceramic assemblage at Chimney Rock Great House, while not identical to that at Pueblo Alto, indicates that the individuals at Chimney Rock were operating at a level beyond the local community. They had access to trade networks to obtain trachyte tempered pottery from the Chuska Valley and red ware from southeast Utah. They used crushed Chacoan pottery to temper their own, locally manufactured version of Chacoan pottery. Finally, they made and traded unusual, rare feather holders with ritual and/or political leaders at Pueblo Bonito.

ARCHITECTURE

In some ways, interpreting the architecture at the Chimney Rock Great House is a more straightforward endeavor than is interpreting the ceramic assemblage. In Chapter IV (Architecture) the Chimney Rock Great House was investigated for a suite of architectural traits associated with Chaco Canyon: Great House; formality in layout and design of the Great House; Great Kiva and specific floor features associated with Great Kivas; Chacoan roads; earthen architecture; Chacoan round rooms; and formal plaza. Chimney Rock Great House does not have the entire suite of Chacoan architectural features, but is a formally designed Great House, with Chacoan round rooms, and a formal plaza. No roads or earthen architecture have been documented at the Great House. While there is not a Great Kiva in the immediate vicinity of the Great House, there is one located adjacent to the habitation structure at the Ravine Site. It is likely that this Great Kiva served as the communal structure for the Chimney Rock Community.

Analyzing the architecture at the six sites indicated that requiring an outlying site to have the entire suite of Chacoan architecture in order to be considered connected to the canyon in any meaningful way is unreasonable. For example, Pueblo Alto, located at Chaco Canyon and used as the example of an undisputed Chacoan Great House in the present study, does not have a Great Kiva. Conversely, the Bluff Great House in southeast Utah has every single requirement on the Chaco checklist, but was likely a local emulation, and not constructed by individuals from the Canyon. The Bluff Great House and Chimney Rock Great House are discussed in greater detail below. As noted in relationship to ceramics (above), the Chaco System developed over a number of centuries. Therefore, variability in architecture through time and through space should be expected.

In addition to the existence of a formally designed Great House, Chacoan round rooms, and formal plaza surfaces at Chimney Rock, there are a few other lines of evidence that point to a direct relationship between the Great House and the canyon. The dimensions of the square rooms and Chacoan round rooms at Chimney Rock Great House are on par with those associated with Chaco Canyon. Great Houses in Chaco are notable for, among other things, their formal planning and large construction events. As described in Chapter IV, Chimney Rock Great House also exhibits formality in planning and very sizable construction events.

When compared with the Bluff Great House, the observations above come into sharper focus. Relative to the Bluff Great House, the Chimney Rock Great House has larger rooms, and is more similar to room sizes identified by Lekson (1986) for Chaco Canyon. Chimney Rock Great House was constructed in larger building phases than Bluff was, and an examination of the floor plan of each structure reveals that Chimney Rock is more formal in appearance than the Bluff Great House.

The origins of the Chimney Rock Great House can be contrasted with those of the Bluff Great House. As discussed in Chapters III and IV, the location of the Bluff Great House had been used for centuries prior to the construction of the Great House. The Bluff Great House did not start as a Chacoan Great House structure. As evidenced by the less formal, non-Chaco west portion of the site, and the later, more Chacoan addition on the east side of the building, the original architects were not building a Chaco Great House. Inhabitants of the Bluff Great House decided to associate themselves with the Chaco System, signaling this through architecture, at a later time. Conversely, the Chimney Rock Great House was built in two large building efforts in a location that had not experienced centuries of habitation, like the Bluff Great House locale.

Examining the origins and building histories of these structures allows a departure from the strict categorical and checklist approach to identifying Chacoan Great Houses.

The unique nature of Chimney Rock Great House and its relationship to Chaco Canyon is further informed by the architectural history of the site. The architectural history of Chimney Rock and the surrounding area is not indicative of local development. Prior to the Pueblo II time period, there was not was no identifiable population in and around the Chimney Rock (Chuipka et al. 2009 and Chapter III). Though more tree ring dates from the small sites surrounding Chimney Rock would be needed to fully untangle the exact sequence of events, it seems that population levels greatly increased during the Pueblo II and Chaco era at and surrounding the Chimney Rock Mesa. Eddy (1977:Table 15) estimates that the population of the area immediately surrounding Chimney Rock Great House (High Mesa Community) at 545 individuals, and the population for all seven communities in the Chimney Rock Archaeological Area at 2,025 individuals (See Chapter III). Both estimates, even the population estimate for the kilometer immediately surrounding the Great House are above that necessary for a reproductively stable community defined as 475 by Mahoney (2000 and see Chapter I). It is possible that one of the roles that Chimney Rock played was to integrate the surrounding community thereby maintaining a reproductively stable population level.

Whether the Great House preceded all of the population aggregation or was concurrent with it, it seems that approximately coincident with the construction of the Great House and increase in Chacoan influence, population boomed. Further, constructing the Great House immediately adjacent to the towering stone pillars, on the high mesa overlooking the surrounding community, and effectively co-opting the power of the lunar standstill makes a clear statement regardless of whether there was a small resident population already in existence. Chimney Rock Great House is also connected via a line of sight communication system to Pueblo Alto at Chaco Canyon. This line of sight passes through Huerfano Mesa, a point on the landscape that can be seen from both Chimney Rock and Pueblo Alto in Chaco Canyon (Freeman et al. 1996).

The Chimney Rock Great House stands in marked contrast to the other sites surrounding it. A comparison between the Great House and the Ravine Site in Chapter IV demonstrates that the Great House is much more massive and formally constructed than the habitation sites that characterize the Chimney Rock Area. Small sites surrounding the Chimney Rock Great House tend to be made up of one larger circular room, backed by a few small storage rooms. The floor plans of these structures are much like that of a Pueblo I pit structure. The masonry of these small sites is not the fine masonry associated with Chacoan structures. Masonry (Figure 52, below) at the Great House fits comfortably into masonry types II and III associated with Chaco Canyon (Todd 2011; see also Chuipka 2010). Type II masonry is semi-coursed to coursed blocks of sandstone chinked with small flat pieces of sandstone and type III masonry is characterized by fully coursed rows of large, shaped sandstone blocks alternating with rows or bands of smaller chinking stones (Lekson 1986:17).

Figure 52. Example of Chacoan masonry from Room 5 at Chimney Rock Great House.

Chimney Rock Great House Origins

Research directed by the author in 2009 at the Great House (Chapter III and Appendix A) recovered a tree ring cutting date of A.D. 1011L comp, and near cutting dates of 1018 +LB comp (could have been cut in any year from A.D. 1018-1021), 1070 +LB comp (could have been cut in any year from A.D. 1070-1073), and A.D. 1093 +LB comp (could have been cut in any year from A.D. 1093-1096,). The dates in the A.D. 1070s and 1090s support Eddy's contention that trees were being harvested and the Great House being renewed in relationship to the major lunar standstill. Major lunar standstills occurred in A.D. 1076 and A.D. 1093 and the moon is visible rising between the stone chimneys several nights each month for a period of approximately 2 ½ years surrounding the major lunar standstill from the perspective of the Great House (Malville 2004:139).

The earlier dates require more explanation. First off, these are the only early cutting or near cutting dates recovered from the site. A.D. 1011 coincides with a minor lunar standstill event, and the A.D. 1018 date coincides with a major lunar standstill event in A.D. 1020. These dates are also very early, predating any other tree ring dates recovered from the Great House or surrounding small sites. If these tree ring dates actually date construction at Chimney Rock Great House, this would establish the Great House as the earliest constructed outside of Chaco Canyon. Since there are only two early dates, this is probably an unreasonable argument to make at this time. There are other possible explanations.

The first possibility is that the wood doesn't date the construction of the Great House or any other archaeologically meaningful event. This would require that the architects of Chimney Rock picked up old wood from the ground and integrated it into the formally constructed Great House on the high mesa adjacent to the stone spires. This interpretation can be rejected on two accounts. First, based upon the absence of beetle galleries which form when wood lays around with the bark intact, it is clear that the wood was intentionally stripped of bark soon after harvest. This evidence places human action into the situation. People were harvesting and processing wood on the Chimney Rock Mesa during years in which important astronomical phenomena occurred. Secondly, it has been noted that Chacoan architects were particular about wood – what types were used where, relic wood installed in special locations, and special treatment of wood, like stripping beams without leaving tool marks (Windes and McKenna 2001). It seems unlikely that just any wood would be integrated into the Great House.

The second and more likely scenario is that there may have been a structure, likely used to observe the moon, atop Chimney Rock Mesa prior to the construction of the Great House. Given the lengthy duration of the lunar standstill cycle, it can be concluded that people had been observing the standstill phenomena for quite some time prior to the construction of the Great House. The architects may have used wood from this early structure – special wood from special years – as a meaningful component of the new Great House, akin to the use of crushed Chacoan pottery as temper in Chimney Rock Black-on-white described previously in this chapter (Van Dyke 2004; LeFebvre 1991; Connerton 1989, Rapoport 1976). This is a practice that is repeated in the cyclical renewal of the Great House. Mills (2008) describes a similar occurrence in structures within Chaco Canyon. Essentially, objects are deposited or hidden within the building to mark certain events, typically the construction or termination of the structure. Mills (2008:85) notes that in this particular example of memory making, "things that are hidden acquire value through the acts of gathering them together and placing them in architectural cavities." More on the topic of renewal at the Chimney Rock Great House appears in upcoming sections of this chapter.

Even if the area was not heavily populated prior to the Pueblo II time period and construction of the Great House, the two stone spires made Chimney Rock a place that people would have known about. Combine the spectacular landscape that characterizes the area with the striking lunar phenomena, and Chimney Rock could have become quite a powerful place in the psyches of those who knew or heard about it. Chaco co-opted the striking astronomical event for its own, incorporating it into Chacoan ideology by constructing the Great House immediately adjacent to the stone pillars, and requisitioning work crews to harvest timbers during the standstill and integrating those into the Great House.

IDENTITY AND PRACTICE AT CHIMNEY ROCK

Drawing from theories of practice and conceptions of identity that go beyond one dimensional ideas of ethnicity described in Chapter II, the upcoming pages attempt to engage with memory, identity and landscape. Identity, described as affiliations with multiple, sometimes contradictory, overlapping collectivities (Joyce 2010:24 – see Chapter II), is complex, multi-layered, dynamic, and constantly being constructed by people, communities, and lived landscapes. The prehistoric inhabitants of the Chimney Rock Great House constructed, maintained and altered their identities by choosing among alternatives, shaping both the present and the future through their actions (Pauketat 2001). These practices have spatial, temporal, and material consequences that are often archaeologically visible (Pauketat 2001). The creation and solidification of social and political connections can be seen in archaeologically visible practices of construction, ritual, and renewal in the Chaco System.

Crown and Wills (2003) have documented what appears to be the ritual renewal of cylinder vessels and kivas within Chaco Canyon. As noted before (Chapter V), cylinder vessels are an unusual form of vessel associated with Chaco Canyon Great Houses, and may have even signaled participation in the Chaco System (Toll 1990: 297-298). Evidence has recently been discovered that indicates that cylinder vessels were also used for the consumption or preparation of cacao has (Crown and Hurst 2009; Washburn et al. 2011). Cylinder vessels were unique and important vessels that were treated in particular ways. Chacoans reslipped, repainted, and refired usable cylinder vessels. The act of painting over the existing designs made the cylinder vessels an embodiment of collective memory (Crown and Wills 2003:523). Ethnographic accounts of pueblo people renewing kiva murals may be analogous to the practice of renewing cylinder vessels described above (Crown and Wills 2003:524). It is notable that much of the pottery found at Chaco was not made at Chaco, possibly due to a lack of fuel resources. Investing precious fuel necessary for the firing of these special cylinder vessels is an indication of their importance and may have imbued them with greater importance or power (Crown and Wills 2003:526).

The act of renewing kivas (or houses) and cylinder vessels, sometimes with many years in between, would have connected people from different sub-groups in the community and people from different generations (Crown and Wills 2003:527). Architectural renewal of kivas, including razing and rebuilding, within Pueblo Bonito may trace the histories of different families or other groups of people (Crown and Wills 2003:528). These acts of renewal may have provided a foundation of collective memory and identity for individuals from different generations and groups within Chaco Canyon.

The renewal of the Chimney Rock Great House roughly each 18-19 years, concurrent with the major lunar standstill cycle, is in accord with the evidence for ritual renewal in Chaco Canyon. As noted in Chapter III and elsewhere, tree ring dates recovered from the Chimney Rock Great House correspond with years in which major lunar standstills occurred. Further, the integration of wood that was apparently curated for decades into the Great House and the use of crushed Chacoan pottery as temper at Chimney Rock is a connection to the past, people who inhabited that past, and those who first observed the lunar standstill phenomena from the Chimney Rock Mesa.

This curation and integration of wood from the early 11th century is akin to other Chacoan practices that cite the past in an effort to establish legitimacy and connection between the past and the present. Van Dyke (2004: 413) notes that "The immediate as well as the distant past is often invoked, referenced, and reconstructed in the interest of legitimating authority or consolidating group authority." In essence, the past is a resource that can be drawn from in the creation of social memory in the present. Citation of the past in the creation of social memory is a variable process; the creation of social memory may draw on vague aspects of a mythological past, more direct ancestors or connections, or it may obliterate certain aspects of the past all together (Van Dyke 2004:414).

Chacoans were clearly concerned with validating and legitimating their connection with the past. For example, Penasco Blanco was built near a Basketmaker III Village. Pueblo Bonito was remodeled over a time period of approximately 300 years, but the oldest portion of the building was carefully preserved. Not coincidentally, the richest burials were also located in this section of the Great House (Windes 2003; Akins 2003). Chacoan Great Kivas are a highly formalized reference to Basketmaker III great pitstructures (Van Dyke 2003, 2003b. 2007). By using wood that was harvested in years of major and minor lunar standstills in the Great House, Chacoan architects created a connection between the past and the present, and increased their legitimacy through association with spectacular and powerful astronomical events. Integrating this wood into the very fabric of the Chacoan Great House at Chimney Rock, a powerful architectural statement of Chacoan presence in the community, would have been a deliberate and meaningful act for the incoming population and the burgeoning community.

Chacoan Great Houses are often associated with unusual geologic features and astronomical phenomena. Pueblo Bonito, constructed in the immediate danger zone of Threatening Rock and directly across from South Gap – the only break in the south side of Chaco Canyon – is a well known example of the Chacoan preference to locate Great House structures in very particular ways (Marshall 2003). Other examples of Great Houses located adjacent to unusual geological features include Casa Chiquita which was built below anthropomorphic rock pinnacles, and Kin Bineola, built in the midst of an eerie landscape of eroded sandstone bluffs capped with earth buttes (Marshall 2003:12-13).

Anna Sofaer and the Solstice Project have found that many of the major buildings both within and outside of Chaco reflect solar and lunar cosmology in their "orientations, internal geometry, and geographic interrelationships" (Sofaer 2007:225). Five major Chacoan sites (Pueblo Bonito, Pueblo Alto, Tsin Kletsin, Hungo Pavi, and Aztec Ruins) are constructed according to a solar (cardinal) orientation – a meridian, equinox, or solstice. Seven major Chacoan Sites (Chetro Ketl, Pueblo Pintado, Salmon Ruin, Pueblo del Arroyo, Kin Kletso, Una Vida, and Penasco Blanco) are constructed according to a lunar orientation – minor or major lunar standstill (Sofaer 2007: 234-235). Further, the locations of important Chacoan sites (Aztec Ruins and Chaco) run along a north-south meridian (Lekson 1999). Many modern Pueblo groups believe that landscape features like springs, rock formations, and mountains are sacred (Bunzel 1932; Swentzell 1997). Based on observations that Chaco Canyon is a planned landscape and that many Great Houses are located in prominent or notable locations, it is likely that the prehistoric Chacoans shared in this particular ideology.

Great Houses at Chaco are massive relative to the typical PI and PII habitation sites (Prudden Units). Great Houses (as described in Chapter IV) are characterized by wide walls, multiple stories, roofs that required huge amounts of timber – in essence, they were expensive buildings, meant to impress (Lekson 2006). Great Houses were monumental structures.

Chimney Rock Great House conforms to this ethos. The Great House was situated on the mesa nearest to the two stone chimneys and connected via a line of sight communication system to Pueblo Alto in Chaco Canyon. Chimney Rock and Companion Rock are very striking features on the landscape. It is likely that the stone spires would have been known widely as landmarks, and probably as sacred geologic features. Ethnographic information supports this statement. Accounts from elders at Taos Pueblo indicate that the Chimney Rock Mesa and its stone spires were a shrine location dedicated to the Twin Warrior gods (Ellis 1969). The Day people from Taos Pueblo identify the Chimney Rock area as their place of origin (Hawley and Brody 1969).

Chimney Rock Great House, in addition to being intimately tied to the major lunar standstill, also appears to have been planned and constructed based on solar alignments. Stone basins in the Chimney Rock area have been understood as astronomical markers. One of these stone circles is located adjacent to the Ravine Site. Malville (2004:133-134) has noted that from the perspective of this stone basin, the sun rises along the north (back) wall of the Great House during the summer solstice. This is worthy of consideration as the back wall of the Great House is precariously located on the very edge of the mesa top. It would have been much easier for the architects of the Great House to build the structure further away from the cliff edge. Yet they chose, very much at their own inconvenience, to situate the structure on the very edge of the cliff, in alignment with the summer solstice sunrise.

The architects of the Great House also took advantage of the natural slope of the bedrock atop the Chimney Rock Mesa. As noted in Chapter IV, the bedrock of Chimney Rock Mesa slopes nearly 12 meters from east of Room 2 to the west of the West Kiva, approximately a 12% grade. As a result of the sloping bedrock, the structure may have been "stepped" or tiered, resulting in the illusion of a multiple story Great House when approached from the only accessible route (Figure 53). Chimney Rock Great House, like the Great Houses of Chaco, was meant to impress. In sum, Chimney Rock is adjacent to notable geologic features, utilizes the natural landscape to increase the impression of mass and size of the structure, and is connected and constructed in alignment with both solar and lunar considerations. In this way, it is evident that Chimney Rock Great House is a part of Chaco not only in form, but also as a component of Chacoan ideology.

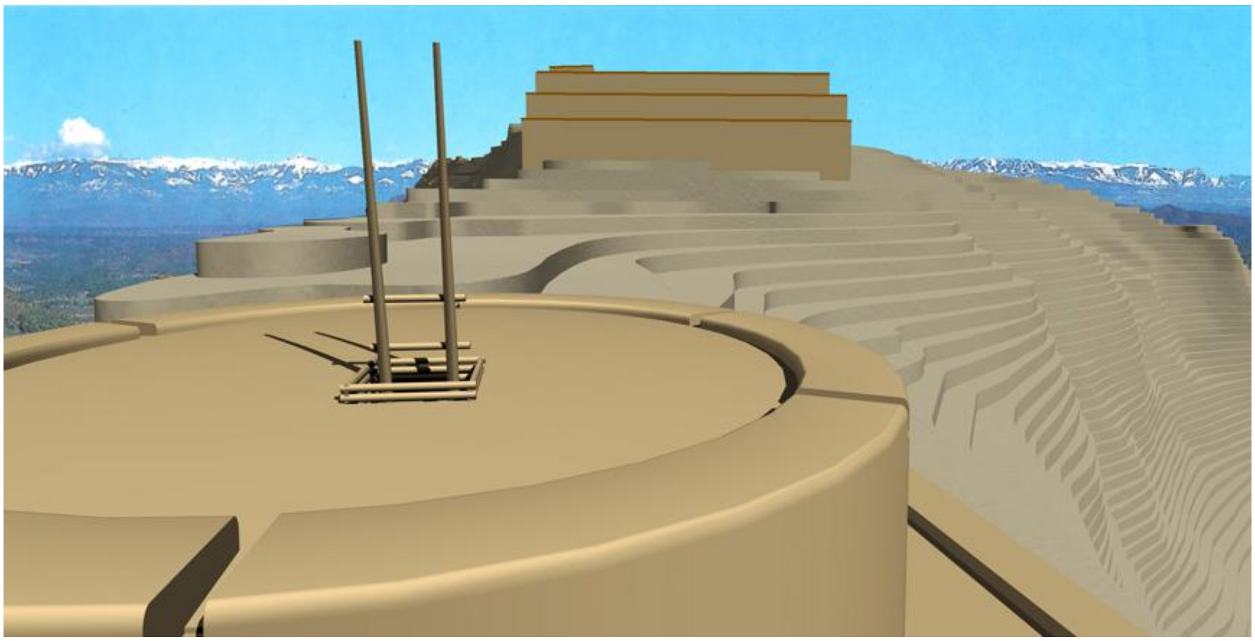


Figure 53. View of the Chimney Rock Great House from the perspective of the guard house. Note the use of the sloping bedrock to make the single story Great House appear to be multiple stories tall. Reconstruction courtesy of Dennis Holloway.

Cameron (2001:81) notes that for most of the Puebloan occupation of Chaco Canyon, much of the chipped stone raw material was acquired locally, but during the eleventh and twelfth centuries exotic materials, including Narbona Pass Chert - originating 75 km away in the Chuska Mountains - becomes much more common. Few formal tools are found within Chaco Canyon, and those that are appear not to have been made there. Cameron (2001) concludes that in addition to signaling a strong relationship between Chaco and the Chuska Mountains, the deposition of Narbona Pass chert in the trash middens at Great Houses in the canyon may have been a component of periodic ceremonial gatherings and related to Puebloan ideas of renewal

(Cameron 2001). Narbona Pass chert flake fragments and debitage were found in both rooms investigated by the University of Colorado in 2009 (Chapter III and Appendix A). The recovery of this material at Chimney Rock Great House is yet another indication of the involvement of the site in the same trade networks and ideologies as Chaco Canyon.

Based on the presence of significant quantities of timbers (Windes and McKenna 2001) and ceramics (Toll 2001) from the Chuska Mountains and Chuska Valley 75 km away from Chaco, the amount of labor necessary to build the Great Houses and other components of the formalized landscape (roads, ramps, stairways, etc.) relative to the small resident population of the canyon (Lekson 1986; Lekson et al. 2006), and the likely role of Chaco as a regional center (Judge 1989: Lekson 1999; Wills 2000: Mills 2002: Van Dyke 2004), it is probable that the canyon was a pilgrimage destination for large numbers of visitors at various times (Malville and Malville 2001; Malville and Judge 2004). The purposes of these visits by individuals who did not live in Chaco were probably varied; in some cases, people visited the canyon as part of formal work parties, carrying beams, working on Great Houses, etc.; and in other cases, people visited the canyon to participate in ritual activities. Visiting Chaco Canyon and participating in these communal rituals would have been an opportunity to create and solidify social memories, political power, and shared religious ideology.

People from elsewhere were likely visiting the Chimney Rock area periodically for labor and ceremonial purposes, much like Chaco Canyon, but at a smaller scale. Lipe (2006:289) notes that the rituals at the main Chacoan centers were probably considered to be the most important and most influential, but were probably also connected to local ritual networks in locations outside of the canyon. Leaders at Great Houses outside of Chaco were a part of this larger political/ritual network and participated to varying extents, probably hosting visitors and engaging in ceremonies and labor in a way similar to Chaco, all the while reinforcing the political and religious tenets of the Chaco System (Lipe 2006). It is conceivable that Chimney Rock was the destination for pilgrims from near and far during the major lunar standstill phenomena. Pilgrims would have participated in ritual activities relating to the standstill and in the harvesting of wood for the ritual renewal of the Great House.

Van Dyke (2004) makes an interesting and compelling argument for the active role of Chacoan Great Houses in the formation of social memory in the Chaco System. Van Dyke sees the Great Houses constructed during the eleventh century as representative of directionality, balanced dualism, and the canyon as a center place. She interprets the later, McElmo Great Houses constructed in the twelfth century during a social and environmental downturn in the San Juan Basin as an attempt by leaders to re-formalize and re-legitimize the Chacoan landscape as the center place (Van Dyke 2003).

This interpretation can be taken a step further by viewing the massive buildings in a more overtly political context. It is incomprehensible that the construction within the canyon, the clearly identifiable pattern of Chacoan outliers, roads and line of sight connections documented throughout the San Juan Basin could have developed with no guidance or overarching leadership. Leaders who constructed the buildings shaped the landscape and the experience of the individuals who visited the canyon. Bounding space and limiting access to the massive Great Houses carries social and political messages – certain people are allowed to move in these special spaces, and other people are not. The vast majority of individuals would not have had access to the formal, bounded spaces within Chaco. Chaco was meant to impress power and legitimacy upon the general population. Leaders in the canyon sent a message through the creation of a formal landscape characterized by monumental architecture, that the political capital located in Chaco was special, different from anywhere else. This is not to negate the role of ritual in the creation and functioning of the Chaco System. However, religious explanations may be too heavily favored in much of work pertaining to the Canyon, much to the detriment of an examination of the role of politics in Chaco.

Viewed in this light, the Chimney Rock Great House was a political statement. This is not to claim that ritual and astronomical associations did not also play an important role in the founding and functioning of Chimney Rock, but the Great House is part of and the result of political activity. Elite individuals living in the Great House would have had to have the cooperation of the surrounding community, as there is no water, little game, and no room for agricultural activity on the high mesa. The nature of the relationship between the inhabitants of the Great House and the residents of the surrounding community is not entirely clear. There is no evidence of violence or coercion in the immediate vicinity. The people living below the Great House may have drawn status or importance from their association with the Great House, the pillars, and the astronomical phenomena. They may also have benefited from trade in goods, marriage partners, and news with the pilgrims and visitors to the area during astronomical phenomena.

Constructed by individuals from Chaco Canyon on the highest mesa nearest to the stone chimneys, the Great House was visible for miles. The population that was drawn to live in the area around the pinnacles concurrent with the Great House and with Chacoan influence, knew that those inhabiting the Great House could also see them. In essence, the Great House located on the High Mesa with a nearly 360 degree view of the surrounding area was a panopticon – allowing viewers (elites in the Great House) to watch community activities below without the individuals being viewed being able to tell when and if they are being watched (Foucault 1977).

The concept of a panopticon, specifically how prisons could be designed as such, was first described in 1787 by social theorist Jeremy Bentham, and later closely examined by Michel Foucault (1977). Foucault (1977) argues that the panopticon, or constant threat of surveillance, creates docile individuals, people who behave as they are expected to because they are never quite sure when or if they are being watched. The benefits of this "unequal gaze" for leaders is clear – individuals behave as expected with very little necessity for actual physical force or violence to enforce cooperation (Foucault 1977).

If Chimney Rock Great House functioned as a panopticon, what sort of retribution were residents of the community afraid of? It is possible that individuals and communities were intimidated into cooperating with the Chacoan elites by fear of violent retribution perpetrated by the political capital at Chaco Canyon (LeBlanc 1999; Lekson 2002). During the time period that Chimney Rock was inhabited and Chaco was a powerful political and religious entity the southwest was remarkably peaceful. The exception to this "pax Chaco" is rare and deliberate instances of shocking and exceptionally brutal violence, mutilation, and possibly cannibalism of human bodies in the northern Pueblo world (LeBlanc 1999, Lekson 2002). Lekson builds on a model for the predictors of violence in pre-state societies developed by Ember and Ember (1992). Ember and Ember (1992:242) note that "war may be caused by a fear of nature and a partially resultant fear of others. A history of unpredictable natural disasters strongly predicts more war, as does socialization for mistrust." Lekson (2002:614) changes "socialization for mistrust" to "socialization for fear" and interprets these horrifying events as "socially sanctioned violence;" executions intended to terrify. These violent and targeted executions were perpetrated by the political organization and powerful individuals in Chaco Canyon. These events would have socialized individuals living in the Chaco System for fear and taught them appropriate ways in which to behave and the horrible consequences for not doing so (Lekson 2002:618). While there is no direct evidence of violence at Chimney Rock, the knowledge that execution (and worse) was a possible consequence for not acquiescing to the Chacoan presence in the area may have been persuasive enough to ensure cooperation. Chimney Rock Great House may have been established where it was due to both religious and astronomical significance, and political advantage.

As noted in Chapters III and IV, the Chimney Rock Great House is unusual because it was not used or remodeled in the post-Chaco era. Chimney Rock Great House was constructed, occupied, and used only during the Chaco era; again, Chimney Rock can be contrasted with the Bluff Great House that was occupied and extensively remodeled in the post-Chaco era. In the early to mid twelfth century, as the Chaco System was declining, the community around on the Chimney Rock Great House also went into decline. Chuipka et al. (2009) found that population in the Chimney Rock Area was greatly diminished in the post-Chaco era. Without the power and meaning ascribed to the area through its connection to Chaco Canyon, the threads that had held the community together began to unravel. There is no evidence for a violent end to the Chaco era at Chimney Rock. Likely, people simply began to drift away, no longer drawn to the meanings and rituals associated with the pillars, the moon, and Chaco.

The spectacular location and intriguing astronomical associations of the Chimney Rock Great House inspires a phenomenological interpretation (Figure 54). Phenomenology draws on the common aspects of human spatial perceptions to explore the ways that prehistoric peoples may have experienced the landscapes and architecture around them (Tilley 1994). This approach can be easily criticized due to the facts that the landscapes and buildings that we can experience today as researchers are not precisely the same as those experienced by prehistoric people, and that experience is culturally situated. Nonetheless, I am inspired both by Ruth Van Dyke's (2008) attempt to understand Chaco Canyon in a phenomenological framework and by my own experiences witnessing the major lunar standstill at Chimney Rock in 2005, and excavating at the site in 2009.

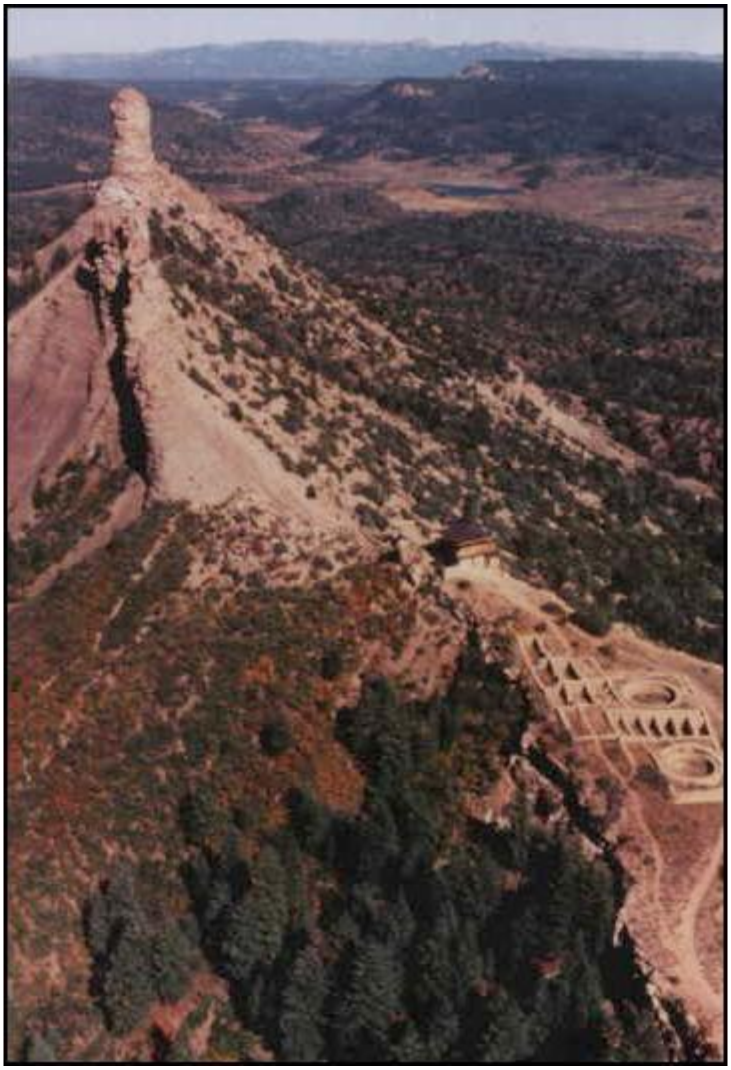


Figure 54. Chimney Rock Great House with Chimney Rock and Companion Rock.

Utilizing a phenomenological approach to understand experience at Chimney Rock during a ritual event, we can envision a group of select pilgrims processing up the narrow causeway and ascending a steep and perhaps formal stairway before cresting the ridge of the High Mesa. The High Mesa is not large, and the presence and orientation of the Great House would have served to further restrict the number of individuals who could view the lunar standstill moonrise, and the locations from which they could do so. The Great House loomed impressively above the pilgrims, and served to effectively block the view of the standstill from this perspective (Figure 53). The verticality of the building was enhanced by strategic and characteristically Chacoan use of the sloping bedrock to emphasize the mass of the Great House and to create the illusion of a multiple story structure. After being granted access to proceed past the guardhouse, the pilgrims would have viewed the full moon rising between the towering chimneys from atop the Great House (Figure 55). Observation of this astronomical event, the moon perhaps representing the ascension of humans into the fourth Puebloan world through a sacred sipapu, would have defined relationships between Chacoan ritual specialists, pilgrims, and supernatural forces of the past and present. It would also have defined relationships between those individuals who were allowed access to the High Mesa during this ritually and socially charged time, and those who were not.

This phenomenological interpretation of the experience of pilgrims during the lunar standstill moonrise illustrates how meaningful and powerful the Chacoan takeover of the high mesa likely was. Prior to Chacoan presence in the area, there is no evidence for restricted access to the high mesa and the adjacent stone pillars. The Guard House blatantly blocks free access to the High Mesa, and the Great Houses blocks free viewing of the standstill. These structures are architectural evidence of deliberate and meaningful co-optation of the High Mesa, the lunar standstill and the esoteric power that was associated with it.

Figure 55. Major lunar standstill at Chimney Rock Great House. Photo courtesy of Helen Richardson.

On a more regular basis, elite individuals living in the Great House could have seen Huerfano Mesa - discussed earlier this Chapter as a component of a line of sight communication system between Chimney Rock and Chaco Canyon. Individuals on both ends of the system – Chaco and Chimney Rock – would have been waiting and watching for messages. These messages may have concerned the timing of certain astronomical events tracked by the ritual specialists at the Chimney Rock Great House (Judge and Malville 2004).

CONCLUSIONS

The architectural components, room-size, scale of construction, and construction history of the Chimney Rock Great House are indicative of close ties to Chaco Canyon (Chapter IV). This evidence indicates that the construction of the Great House was likely directed by the leadership at Chaco. The site is an "export," or colony of Chaco Canyon. The use of the sloping bedrock on Chimney Rock Mesa to make the Great House appear larger, the association of the structure with unusual geologic features, evidence of ritual renewal, and connection to both lunar and solar phenomena are indications that Chimney Rock Great House was a component of a larger Chacoan ideology. Inhabitants of the Great House further lived their connections to the center place at Chaco through their use of Chaco style pottery with trachyte temper imported from the Chuska Mountains (Chapter V), the manufacture of pottery with crushed Chacoan pottery used as temper (Chapter V), their use of pink chert from Narbona Pass, likely of symbolic importance in the Chaco world, and their participation and contribution to Chacoan ritual practices as evidenced by the connection of the site to the lunar standstill phenomena and the presence of the enigmatic feather holders both at Chimney Rock and Pueblo Bonito (above and Chapter V).

CHAPTER VII

SUMMARY AND CONCLUSIONS

This chapter summarizes and discusses the investigations described in this dissertation. For full references, please refer to preceding chapters.

This dissertation addresses the question: Was Chimney Rock Great House in southwestern Colorado an "export" of Chaco Canyon, or an "emulation" of Chaco Canyon? If Chimney Rock Great House was an export, or colony, of Chaco Canyon, a series of subtle or low visibility traits in the architecture and artifacts recovered from the site would be expected. These low visibility traits would indicate that individuals from Chaco Canyon, with detailed and intimate knowledge of Chacoan technology, established and constructed Chimney Rock Great House. If Chimney Rock was a local copy or emulation of Chaco Canyon, architecture and artifacts from the site would be expected to be superficially similar to the architecture and artifacts of Chaco, but to differ in important, but subtle, ways. Superficial similarities between Chimney Rock and Chaco Canyon would indicate that the site was a local development – constructed by a local population in an effort to associate themselves with the central power of Chaco Canyon. If Chaco had the ability to construct exports or colonies, it is ostensibly indicative of greater political complexity than emulations that are local developments.

This approach is based on the theoretical perspective (Chapter II- technological style) that the ways in which people choose to do things (construct buildings, make pottery, etc.) is shaped by cultural and learning frameworks in which methodologies are transmitted from person to person and generation to generation. There are multiple ways in which a pot can be made and a building can be constructed. So, if similarities in subtle characteristics of architecture (formality, room size, specific architectural features associated with Chaco Canyon) and artifacts (ceramic temper type, ware ratio, vessel form ratios) are observed in different locations, cultural relationships and similar functional considerations can be inferred between the different locales. Conversely, some aspects of material culture are more visible, and hence more easily replicated by the casual observer. These more obvious traits are not considered to be as meaningful by archaeologists seeking to identify cultural connections and movements of individuals across the landscape.

To address the problem of the relationship between Chimney Rock and Chaco Canyon, Pueblo Alto in Chaco Canyon was used as a benchmark – an example of Chacoan architecture and ceramics to evaluate the architecture and ceramics from Chimney Rock. Since a comparison between only two sites is of limited value in understanding the variability, structure, and relationships between sites in the San Juan Basin during the Chaco era, the comparison was expanded to include the Bluff Great House, and a small site associated with each large site in the analysis. The small sites include 29SJ 627 in Chaco Canyon, the Ravine Site near Chimney Rock Great House, and the Corral Canyon Site near the Bluff Great House.

The architecture and the ceramic assemblage of each site are investigated in this dissertation. Architecture was chosen because the Chaco System is defined by a striking architectural pattern. The large, often multiple-story structures associated with the Chaco World have been the focus of extensive research. Architecture can send political and social messages, and appears to have been the primary way that power and connection was expressed in the Chacoan System. The ceramic assemblages from the six sites were compared because ceramics were the artifact class that was best represented at each of the six sites. Additionally, ceramics are indicators of both cultural networks and regional interaction. Like architecture, very specific ceramic traditions (Cibola and Chuska) and particular trachyte temper are associated with the Chaco World.

The remainder of this chapter summarizes the findings of the architecture and ceramics analyses, critiques the emulation vs. export framework, presents alternative methodologies for studying components of the Chaco System, and describes future research directions.

ARCHITECTURE

Six sites were examined in this study for specific architectural traits associated with Chaco Canyon – formally designed Great House, great kiva, core-and-veneer masonry, roads, earthen architecture, Chacoan round rooms, and a formal plaza. The architectural histories of each site were also considered, and the size of rooms and scale of construction events were compared and contrasted. This analysis is described in Chapter IV. Utilizing a "checklist" approach of architectural traits is inadequate for a thorough and rich understanding of the Chaco World. Pueblo Alto, a large Great House located on the mesa overlooking Chaco and at the nexus of multiple roads, does not have every trait on the list, but is clearly a component of the Chacoan System. Conversely, the Bluff Great House in southeast Utah does have every trait on the list, but is probably an emulation of Chaco Canyon rather than an export of the Canyon (discussed in Chapters IV and VI).

Another difficulty with utilizing the checklist approach is that it is somewhat subjective. For example, the Bluff Great House, while certainly a Great House, is less formal in appearance and floor plan than is the Chimney Rock Great House. To take this a step further, if the Bluff Great House were being compared to another, perhaps even less formally designed Great House, it would be reasonable to conclude that Bluff is the export and the other hypothetical site the emulation. Or, it might be reasonable to conclude that both of them are attempts to copy Chacoan technology, and that neither is related in a significant way to Chaco Canyon. This quandary is perhaps indicative of a bigger problem in the study of the Chaco World: the expectation of homogeneity and the lack of a methodology for dealing with variability. This variability – within a pattern that is identifiable over a huge area and through hundreds of years – is used to argue against connection and complexity. As noted by Lightfoot and Martinez (1995), Dietler and Herbich (1989) and Janusek (2002) the relationship between people and objects is unclear and messy (contra Wobst 1977), both in the archaeological record and in ethnographic settings (see Chapter II). The same complexity should be expected with the Chaco System.

An examination of the architectural histories, room size, and scale of construction events proved to be more informative than the checklist described above. The architectural history of the Chimney Rock Great House is indicative of a more direct relationship (export) to Chaco Canyon than is the architectural history of the Bluff Great House. Chimney Rock was established in a location without significant population or temporal occupation depth, while Bluff was constructed in a location where people had lived for centuries. Further, Chimney Rock was constructed in two large construction events, while Bluff was originally a perhaps larger than average building that was added onto, becoming more "Chacoan" in appearance over time. Chimney Rock, from the time that the very first stone was laid, was a Chacoan outpost, while Bluff became a part of the Chacoan system over time.

CERAMICS

Ware categories, vessel forms, and temper types at each of the six sites were compared and contrasted to examine cultural connections and site functions (Chapter V). Perhaps somewhat surprisingly, the six sites were very different from one another in almost every category examined. The sites varied in terms of ware type ratios, temper types, and vessel form frequencies. None of the ceramic assemblages were significantly similar to the assemblage from Pueblo Alto, besides one exception with gray ware vessel form - most gray ware vessels at the sites examined were jars. All of the sites outside of Chaco Canyon obtained the bulk of their ceramics locally, while Pueblo Alto and 29SJ 627 obtained many ceramics from sources in the Chuska Valley and elsewhere, as indicated by the presence of trachyte temper. There were some identifiable patterns, however. The sites categorized as Great Houses had a greater diversity of wares and types than did the small sites. The Great Houses also had some ceramic types associated with Chaco Canyon, while the small sites did not.

Operating strictly under the export vs. emulation framework, the analysis of the ceramic assemblage would have supported the conclusion that the sites located outside of Chaco Canyon were not culturally or politically connected to Chaco, and that the Great Houses located outside of the canyon did not function in the same ways as those within the canyon. However, an examination of the more rare components of the ceramic assemblages is indicative of esoteric connections and access to similar trade networks at Great Houses inside and outside of the canyon (Chapters V and VI). It is logical that many places in the San Juan Basin, including those sites analyzed here, obtained the bulk of ceramics locally. Chimney Rock and Bluff must have had access to the same trade networks as powerful individuals at Chaco Canyon. This access to specific trade networks differentiates the individuals living in the Great Houses, both within and outside of Chaco, from those not living in Great Houses. Additionally, there are rare and enigmatic feather holders found at both Chimney Rock and Pueblo Bonito, a further indication of connection that isn't reflected in the analysis of the coarser categories of the ceramic assemblages (Chapters V and VI).

In terms of the functions of Great Houses, it is probable that the Great Houses within the Canyon functioned differently than those outside of the canyon. Both Great Houses in the Canyon and those outside of it would have had administrative, public, and residential roles, but an outpost like Chimney Rock or Bluff would have served slightly different purposes than would a canyon Great House like Pueblo Alto. Therefore, functional differences indicated by the ceramic assemblages shouldn't be used to negate claims of political and cultural connections between Chaco Canyon and other Great Houses in the Chaco World.

Discussion and Critique of Export Vs. Emulation Framework

Do analyses that use what has been referred to as the "checklist approach" go far enough? While the checklist and presence/absence approach certainly advance knowledge and comparisons invariably turn up interesting findings, might there be a better way to examine the connections between Chaco and sites across the San Juan Basin? Further, does the export vs. emulation framework, as typically applied in studies of the Chaco World, target the appropriate focus of inquiry – that is political/ritual (not ethnic) relationships?

Theories of Style and Export Vs. Emulation

Chapter II of this dissertation summarizes the uses of the term "style" in archaeology to provide a foundation for understanding technological style upon which the export vs. emulation framework is based. Early cultural historical conceptions of style used decorative attributes of artifacts to bound groups of people and to create culture areas. The New Archaeology eschewed style as a valuable focus of study, and understood "style" to be superfluous to artifact function and to the study of the past (Binford 1965). Ethnoarchaeological studies like those of Wobst (1977) and Wiessner (1983) brought style back into the picture as worthy of consideration and as a meaningful and active component of material culture studies. Further archaeological and ethnoarchaeological studies demonstrated that the relationship between stylistic attributes of material culture and identity were variable and difficult to tease apart (Dietler and Herbich 1989, Lightfoot and Martinez 1995, Janusek 2002). The technological approach to style (especially that described by Sackett (1977, 1986, 1990) has been most influential on the use of the export vs. emulation framework in studies of the Chacoan System.

Conceptualizing style as “a way of doing things” Hegmon 1992:517-518) in combination with Sackett’s (1977, 1986, 1990) theory that the specific ways that things are done can be indicative of social and cultural groups is the very heart of the export vs. emulation theory. As noted throughout this dissertation, the technological approach to style target the wrong sort of cultural group (ethnic groups or families) to understand the Chaco System. Further, many theories of style are based on observations of living people – a luxury that archaeologists do not have and that allows a more in depth examination of individual motive and expression. The sample that archaeologists get of the past is seldom at the individual level and is representative of longer periods of time. A looser conception of “style” may be more illuminating than rigid expectations of homogeneity and similarity when considering Chaco. The “checklist approach” critiqued in this dissertation is somewhat akin to efforts by culture historians to define culture areas and group boundaries. The past, and the people in the past, were not so straightforward or easy to categorize as this approach would require.

For example, archaeologists write and talk about Chaco “style” Great Houses frequently. This would imply that there is a particular class of structures that can be differentiated from other classes of structures (Chimney Rock Great House vs. Ravine Site, for example). When subjected to the scrutiny of the technological approach to style, many of these Chaco "style" Great Houses are relegated to local emulations of the canyon; and perhaps more importantly understood as not meaningful to understanding the political structure of the Chaco System. This approach may obscure the true extent and nature of the Chaco System. "Emulations" and their potential importance in the Chaco System will be discussed in greater depth later in this chapter.

The concept of a prestigious style, defined here as architecture or artifacts that are similar to those associated with the capital and identifiable as a distinct class of structure or artifact by most reasonable people, may be useful (Rapoport 1982). Most archaeologists would agree that there is a class of buildings and artifact types that are identifiable as similar to those associated with Chaco. Expecting homogeneity and consistency in the Chaco System - a system that was dynamic and coming into being over hundreds of years and over large expanses of land, and inhabited by diverse groups of people with potentially shifting allegiances and situational identities - is not reasonable.

This dissertation has explored the utility of the technological approach to style in the framework of the export vs. emulation framework. In specific and rare situations, like Salmon Ruins and Aztec Ruins, a narrow definition of style is useful (see Reed, ed. 2006 and 2008). But, in the majority of the Chaco World, a looser conception of style (prestigious style, defined above) and a higher expectation of variation is likely to prove more useful. Theories of identity, agency, and memory (as described in Chapter II and applied in Chapters VI and VII) can augment and enrich more straightforward uses of style in archaeology and in the Chaco System.

Political/Ritual Vs. Cultural Relationships

As noted previously, the export vs. emulation framework attempts to identify the movement of cultural groups across the landscape. This would be a logical methodology to use to track Chacoans across the landscape IF the Chaco System had been composed of a single ethnic or cultural group. It is becoming more and more obvious that the Chaco World was made up of multiple cultural or ethnic groups. The export vs. emulation model, as typically used, tracks ethnic groups (or even smaller groups of people), by traits in artifacts that are the result of potentially small networks of individuals who learned to make objects in the same way (Chapter II). The object of study (ethnic groups or learning networks) is not appropriate for tracking a political system that likely integrated multiple ethnic groups, learning networks, and other cultural units. Utilizing a framework designed to track family and ethnic groups across the landscape is illogical when many archaeologists, if not most, agree that Chaco was multi-ethnic and multi-lingual. Chaco was a political system that integrated diverse groups of people over a large areal expanse.

The identities of individuals living in the Chaco System were complex and probably made up of multiple overlapping and sometimes contradictory affiliations, much like that described by Joyce (2010) in his exploration of Mixtec, Zapotec, and Chatino interactions in prehistoric Oaxaca. In certain times and situations, individuals would have drawn on connections to the overarching political organization, and in other situations, would have drawn upon connections to local social and trade networks. The patterns observed in the ceramic assemblages examined in this dissertation are evidence of these different aspects of peoples' identities. People drew heavily on connections to the local area to obtain much of their ceramics, but demonstrated connections to the Chaco System through their use of specific types of ceramics (types with trachyte temper) and manufacture and trade of special objects like feather holders. Some studies of connections between different locales in the Chaco World have worked from the expectation that individuals were or were not Chacoan. It is actually much more logical and realistic to conceptualize prehistoric individuals as both Chacoan AND as belonging to many other collectivities. Prehistoric people were complex social beings and should not be interpreted as one-dimensional by the people who study them.

Studying the Chaco World from the premise of a framework designed to look for ethnic connections is destined to fail, except for in very limited and likely uncommon circumstances like that identified by Reed and others (2006 and 2008) in the instance of Aztec and Salmon. The development of a political organization over hundreds of years, on a much larger social scale than family/cultural groups, makes variability throughout the areal and temporal extent of that system inevitable. Variability should be expected, not eschewed. This variation does not negate the fact that there is an empirical pattern of Great Houses and Chacoan communities across the landscape that has been noted by archaeologists and others in the San Juan Basin and beyond for decades. If individuals removed from the Chaco System by nearly one thousand years can pick out the pattern despite the variability, it is nearly incomprehensible that individuals who lived in the Chaco World would not have seen these connections. Political systems don't require cultural homogeneity – political systems are tools for dealing with integrating diverse groups of people.

The application of the export vs. emulation framework has been critiqued above and throughout this dissertation, but the use term "export" to describe the origins of the Chimney Rock Great House is apt. Chimney Rock, like Salmon and Aztec (Reed ed. 2006; 2008) appears to have actually been built by people originating in Chaco. This scenario was probably the exception, rather than the rule, in the Chaco World. In the current analysis, the examination of the construction history of each site proved to be most telling regarding its relationship to Chaco. A site that develops over time and eventually becomes a part of the Chacoan system is not a colony (export) of that system. On the other hand, a site that was a Chacoan Great House from its very inception can be considered a colony. In this particular analysis, Chimney Rock Great House appears to be an export and Bluff Great House, an emulation.

In order for the export vs. emulation framework to be applicable and useful in studies of the Chaco System, the population within Chaco would have had to have been huge (and culturally homogenous) in order to build 150 Chacoan settlements outside of the canyon. The point to this discussion is that the expectation of homogeneity and consistency that researchers hold to have been necessary for Chaco to have been a system or political organization is unfounded and illogical. In fact, the presence of variability within an identifiable pattern (probably the result of multiple ethnic and language groups) is indicative of greater complexity than would family units building settlements like their own in various locations. The pattern of Chacoan settlements, and especially the variability within these settlements, is an indication of complexity – defined here as the integration of multiple different groups under the umbrella of a larger system. That system was the political system emanating from Chaco Canyon.

So called emulations (local copies) of Chacoan structures have been perceived as indications of a less complex Chaco System. The general interpretation goes that if a group of locals builds a Great House, it is somehow less integrated into the Chaco System than if individuals from Chaco venture forth to establish a colony. In some ways, this is reasonable, but in other ways, we may be missing something important. What were the motives of individuals building these local copies of Chaco?

The very presence of an emulation, a site built by a local leader to be like Chaco, is an indication of complexity and of the political influence of Chaco Canyon. If Chaco were not powerful, were not influential, were not worth associating with, why would individuals go to the effort of building a massive, overbuilt Great House, and other components of the Chacoan architectural repertoire? Emulations should not be interpreted as markers of simplicity and loose organization, but as just the opposite. Local leaders would have had to persuade others to buy into the Chaco System, to contribute their time and labor to constructing a Great House, earthen architecture, etc. The concept of emulations and their function in the context of more complex societies than Chaco are discussed in greater detail later in this chapter.

As discussed in Chapter VI, the act of building a Great House, whether by Chacoans from Chaco Canyon or by other groups within the Chaco World, was a political act. A Great House, no matter what sort of variability from the ideal Chacoan template (if there is such a thing), is very deliberate signal of investment in the Chaco System. Perhaps unintentionally, leaders who spearheaded the construction of a Chaco style community also contributed to the power of the Chaco System. Using Giddens (1975) ideas on structure, practice and agency as a starting point (see Chapter II), we can speculate that local leaders drew on imperfect knowledge of the Chacoan architectural and artifactual repertoire, knowledge situated in particular social and cultural contexts, and created, recreated, and altered the structure of the Chaco system by establishing outlying communities. These communities were not always perfectly recreated, and their very recreation likely resulted in unintended results for the actors involved. The relationship between Chaco and outlying communities, when viewed in this light, is reciprocal. Communities build copies of Chaco the best way that they know how, associating themselves with the power base located in the Canyon and thereby gaining access to tangible (trade networks) and intangible benefits (esoteric and ritual power, status) associated with Chaco. In turn, Chaco becomes more powerful and influential across the landscape.

There were likely obligations for those communities that became a part of the Chaco System. Leaders at Chacoan communities outside of the Canyon probably had responsibilities within the system: providing labor for the monumental construction efforts in the canyon; visiting and participating in ritual activities; providing food and other goods to the leaders in the canyon; providing marriage partners, etc. There is evidence for pilgrimage into the canyon, the breaking of pots on a massive scale at Pueblo Alto, corn grown outside of the canyon transported into the canyon, and large amounts of goods (ceramics, Narbona Pass chert, turquoise, etc.) from around the San Juan Basin found at Chaco to substantiate these statements (Cameron 2001; Malville and Judge 2004; Toll 2001).

This scenario for the establishment of outlying settlements is a perspective that allows the individuals who constructed them to have agency in the Chaco World. This can be contrasted with perspectives that require all power to emanate from Chaco in a very top down sort of arrangement – e.g. forcing communities and individuals to become a part of the system. Chaco probably did not have standing armies to enforce its desires; and yet there is an unmistakable Chacoan presence across the San Juan Basin and beyond. It is possible that communities became a part of the Chaco System reaction to some sort of coercion – physical or mental (discussed in Chapter VI; LeBlanc, 1999; Lekson 2002); in an effort to be a part of a more powerful and influential political and religious system than they would otherwise have access to, or a combination of these two scenarios.

One way or another, these individuals and communities made the choice to become a part of the Chaco World. Chaco must have been something special and powerful to entice buy-in over such a large area and without considerable military might. Chaco, viewed in this light, does not need to be overtly top down, exercising power over individuals and communities. The Chaco System is an example of discursive action between the center of power in the Canyon and outlying settlements. The actions and practices of both the canyon and the rest of the Chaco World were mutually constitutive. Power did not only originate from the center and trickle down.

The presence of Chacoan communities, ostensibly constructed by local leaders in an effort to associate with the Chaco System, may be better understood by examining the difference between *power over* and *power to* (Miller and Tilley 1984). *Power over* and *power to* are not mutually exclusive; *power over* is domination, while *power to* "refers to the complex ways in which cultural knowledge constructs people as cultural subjects" (Joyce 2010:28). So, while power to can include domination, it can also include "positive, productive and creative aspects of cultural knowledge that create social identities and that people draw on in practice" (Joyce 2010:28). Chacoan communities across the San Juan Basin can be understood as the results of individuals drawing on the cultural knowledge that was associated with Chaco to create social identities that made them a part of the Chaco System.

Another significant problem with the export vs. emulation framework is that it is a dichotomy – a site must be one thing or the other. Determining that a Chacoan community is an export or an emulation is certainly informative, but it is possible to go further. In the case of a site that was established by individuals from Chaco Canyon, why was it established? Were the motivations of the Chacoan architects political – establishing colonies in hinterlands to expand their power and influence, perhaps? Or, were the motivations of the individuals simpler, akin to a migration in the context of no overarching political organization? In the case of a site that is a local development, what were the motivations of local leaders to garner the requisite labor and resources necessary to build a Great House to associate themselves with Chaco? What did they get out of it? The evidence favors interpretations of Chaco that view the canyon and outlying Chacoan settlements as a political system. The pattern of Chacoan communities across the landscape, clear biological differences between individuals living in Great House in Chaco Canyon and individuals living in small sites, differences in wealth between Great Houses and small sites, monumental architecture, a road system, and planned landscapes warrant at least this consideration (Akins 1986; Powers et al. 1983; Neitzel, ed. 2003; Lekson 1999; Lekson, ed. 2006).

Identifying relative levels of complexity and assigning sites to evolutionary societal categories is not the goal of this dissertation, but the study of Chaco Canyon and the Chaco System may benefit from a look at research on other societies that archaeologists agree were complex – that is, those categorized as states and empires. For example, Stark and Chance (2012), examine the diverse range of strategies employed by provincials within empires and the variability in administrative oversight in different locations within the Inka and Aztec empires. They note that the Aztec employed more direct measures of oversight within the Basin of Mexico, and exercised less direct oversight over the provinces that were further away; the Inka "engaged in various practices according to local situations, distance, and time" (Stark and Chance 2012: 196). Is there any logical reason why the relationship between Chaco and the "provinces" if you will, could not have been variable just like those in the Aztec and Inka Empire? Again, Chaco has been held to a very high standard of requisite hegemonic oversight to be viewed as a complex society. If variable methods of oversight and hierarchy are used in empires then why couldn't variable methods have been employed by leaders at Chaco?

Stark and Chance (2012) identify eight different strategies used by provincials in the context of empires. These include: bolstering (provincial elites collaborating with imperial powers to guarantee their own position); emulation (provincials employing a prestigious style or practices associated with the empire); resistance (provincials attempting to reduce or overthrow imperial control); exodus and internal population movement (provincials moving to escape imperial influence); information control (provincials withholding information from imperial elites for their own ends); appropriation (provincials adopting or modifying imperial trappings for local benefit); complicity (provincials collaborating with imperial others to further their own interests); and assimilation (provincials seeking integration with the dominant society) (Stark and Chance 2012:193). Several of these, especially bolstering, emulation, appropriation, and resistance, are potentially useful in a consideration of the relationships between Chacoan communities located outside of the canyon and the political capital.

First, consider "bolstering." Bolstering is described as "the efforts of provincial elites and especially local provincial rulers to collaborate politically with significant imperial others to guarantee their own position locally and within the empire" (Stark and Chance 2012:199). It requires no stretch of the imagination to envision local leaders associating themselves with leaders in Chaco to amass more power and influence locally and on a larger scale within the Chaco System. "Bolstering" is logically and practically related to efforts by provincial elites to emulate the capital.

“Emulation”, defined as “efforts in the province to employ a prestigious style or practices associated with the empire” (Stark and Chance 2012:203). This definition of emulation is essentially identical, to that employed in the American Southwest when examining the Chaco System. The difference here is that in this situation, archaeologists aren’t using emulations as an indicator of fragmentation or simplicity. The practice of emulation is simply a strategy employed by elites outside of the capital to associate with the larger political power structure. As discussed above, local leaders must have had a reason to want to associate themselves with the prestigious style (architecture, most notably) and practices associated with Chaco. Stark and Chance (2012:203) note that emulations within empires do not necessarily ultimately result in the complete abandonment of local identities and practices. This is exactly what is observed in much of the Chaco World – identifiable copies of Chacoan architecture, with evidence of various aspects of local technology and identity intermingled.

“Appropriation” is when “provincials selectively adopt or modify imperial practices and institutions and use them to further local ends” (Stark and Chance 2012:216). In this scenario, local leaders can exploit fissures in authority to bolster their own power. Appropriation is difficult to tease out of the archaeological record and to differentiate from bolstering and emulation, but it is conceivable that this strategy took place at some Chacoan communities. More importantly, perhaps, is the fact that this particular strategy allows for weaknesses in the overarching authority; this is a luxury that has not often been afforded to the leaders at Chaco.

“Resistance” may be expressed by provincial communities in a variety of ways, including rebellion and violence, but also in more subtle acts such as the maintenance of local cultural traditions, or even gossiping about leaders – intentionally or unintentionally diminishing their influence and power (Stark and Chance 2012:205). The variation in Chacoan communities and artifact assemblages reflecting local traditions could be interpreted as resistance to the Chacoan System or as maintaining ties to local identities. Variation is not necessarily indicative of a lack of a political system.

Viewing the Chaco System in some of the ways presented above provides a much messier, dynamic, and complex interpretation of the past than those requiring complete consistency and autocratic rule as proof of a complex Chaco. It allows people to have agency; multiple conflicting affiliations and diverse motives. It allows the prehistoric inhabitants of the Chaco World humanity. This is likely a more accurate perspective. Researchers in the Southwest could benefit from an examination of the ways that archaeologists in other regions view patterns similar to those observed in the Chaco System.

STATIC FRAMEWORK, DYNAMIC SYSTEM

Another major problem with the export vs. emulation framework, when strictly applied, is that it is a static framework being used to study a dynamic system (*sensu* Pauketat 2007; see Chapter II). The Chaco System did not come into being completely developed and remain consistent and stable for hundreds of years. There is no moment in time that equals Chaco. The architecture and material culture in the Chaco System were developing and changing constantly. Therefore, attempts to look at material culture from Chaco and from outlying sites with the expectation that they must be identical in order for a political (or any) connection to exist are misguided. Chaco was a dynamic system that was always being created and recreated by individuals both within and outside of the canyon over hundreds of years. Working from the perspective that identities, polities and communities are always in a state of becoming (Pauketat 2001) can help us understand the variation and complication that we see in the archaeological record, not just at Chaco, but with any prehistoric society.

DISTANCE, REVISITED

In the introduction to this dissertation (Chapter I), the difficulty that distance has posed for archaeologists trying to understand prehistoric societies in the present day United States was described. Is Chaco too big, too unwieldy, to actually represent a cohesive system? The evidence would indicate otherwise. Archaeologists have spent the last one hundred years studying and trying to make sense of the Chaco World. They have noted similarities, differences, and variability. Without the luxury of prehistoric writing (as with the Maya) or colonial records (as with the Aztec and Inka) to draw upon, archaeologists in the American Southwest have interpreted this variation as evidence of simplicity.

Archaeology, and specifically the study of the American Southwest and Chaco, is perfectly situated to finally appreciate the scope and extent of the prehistoric societies that inhabited the deserts. Hundreds of Great Houses have been excavated, surveyed and reported; spectacularly monumental Great Houses within the Canyon have been excavated and reported; a road system has been documented; elite burials have been recovered from Pueblo Bonito, macaws, copper bells and cacao originating in Mesoamerica have been found in Chaco, etc.; the list of evidence indicating that researchers have underestimated the Chaco System goes on. Chaco needs to be examined on its own terms, free of preconceived notions drawn from ethnographic accounts of egalitarian, peaceful pueblo farmers. Working from the perspective that Chaco was a system that spanned the San Juan Basin and beyond and was filled with diverse groups of people held together by a political system actually makes the archaeological record much easier to explain.

Nowhere in this dissertation has any social evolutionary label been applied to Chaco: it is immaterial to the goal of this research whether Chaco was organized like a chiefdom or like a state. Evolutionary typologies, based on Western ideas of how societies can and should be organized, are likely not going to be of great use in attempts to understand prehistoric Native American societies. Western conceptions of acceptable governmental organization in the present are separated both culturally, temporally, and historically from the Native societies they are often forced upon. This being said, a consideration of the organization and archaeological record of societies like the Aztec and Inka - societies that were politically complex and that have writing and/or colonial records - may be illuminating. It is possible that "provincials" (Stark and Chance 2010) in the Aztec and Inka Empires were interacting in ways with the capital that may be similar to how outlying settlements were interacting with the capital at Chaco (above).

Post-structural ideas on identity may also be helpful in understanding Chaco and the diversity in that system. Researchers now accept that humans are complex creatures with multiple overlapping identities (e.g. Joyce 2010). These identities are sometimes in conflict with one another, and are differentially drawn upon based upon the situation. Understanding the prehistoric Chacoans in this way – complex individuals negotiating multiple identities – makes the variation in the archaeological record much easier to understand. Holding the expectation that consistency in artifacts and architecture is required for complexity and connection to exist, by extension creates the expectation of a monolithic group of people with a single identity and single-minded intention around every action taken in the world. Clearly, this is not how humans work.

The use of the export vs. emulation dichotomy in studies of the Chaco World has been heavily critiqued throughout this dissertation. However, the general idea that some Chacoan communities outside of Chaco were constructed as colonies by Chacoan people (exports), and that some Chacoan communities outside of Chaco Canyon were constructed by local people in an effort to copy or associate themselves with Chaco (emulations), is not without merit. It is the ways in which these types of communities have been identified that is problematic – that is, by looking for low visibility traits that are indicative of ethnic/close knit cultural groups. The Chaco World was not comprised of a single ethnic or cultural group. Further, the interpretations drawn from whether a site is an export or an emulation are problematic. Emulations are not necessarily indicators of a loosely integrated system or weak political apparatus. The very presence of emulations may be indicators of the power that Chaco wielded.

Alternative approaches to the traditional search for low-visibility traits typically used to identify a site as an export or as an emulation have been presented. An examination of the construction history and scale of a site may inform upon its origins (Chapters IV, VI and VII). For example, the Chimney Rock Great House appears to have been a pre-planned Great House from the time that the first stone was laid. It has relatively massive construction events, and was built in a location with very little, if any, previous habitation. Conversely, the Bluff Great House was morphed into a Chaco Great House over time – it did not start out as one. So, Chimney Rock is an export and Bluff is an emulation. It may be worthwhile and illuminating for archaeologists to consider less frequent aspects of a site assemblage (Chapters V, VI, and VII). For example, the very presence of trachyte tempered pottery, regardless of its contribution to the entire site assemblage – is important. Clearly, we must go beyond the categorization of a site as an export or as an emulation and look at the big picture. The presence of this identifiable pattern of Chacoan communities across the landscape is real, and needs to be dealt with on the scale that it existed in prehistoric times.

FUTURE RESEARCH DIRECTIONS

This dissertation provides a foundation for multiple avenues of interesting and worthwhile research. First, the value of utilizing a comparative approach in studies of the Chaco World has been demonstrated. The addition of more outlying Great House and small sites to this research would further inform on the variability and dimensions of relationship between the political capital at Chaco Canyon and Chacoan communities across the San Juan Basin. Expanding the study further by comparing the Chaco System to different polities, like Cahokia, would also be interesting and valuable. An alternative perspective on the variability observed in the Chaco World has been presented. Variability should not be viewed as evidence of simplicity, but as the result of a political system coming into being over a period of centuries, people creating and recreating that system while negotiating multiple complex and overlapping identities. Research on Chaco World could benefit from shedding preconceived notions of simplicity and adopting more nuanced theoretical perspectives to better interpret the archaeological record.

Archaeologists have grappled with methods to investigate identity for the last century or more – these methods range from simplistic culture area designations to a more complex conception of multiple layers of identity and the variable expression of identity in material culture (Chapter II). This dissertation has explored both ends of the spectrum of archaeological approaches to identity and relationships in the past. Practicing archaeology in a way that includes both straightforward approaches ("checklist") and theoretical approaches that embrace a more complex conception of the past should result in a richer understanding of prehistory. This dissertation is an example of one such attempt.

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Appendix A: Chimney Rock Stabilization Project Report (See Supplemental File)

APPENDIX B: ROOM SIZE DATA

PUEBLO ALTO

Table 26. Pueblo Alto Room Size Data. AFA = Average Floor Area and SD = Standard Deviation. From Windes (1986).

Building Phase	Detail	Measurements	Description
Stage IA	5 major room suites	AFA on big rooms: 37.9 m^2, SD 2.8m^2; AFA on small rooms: 9.8 m^2, SD .8 m^2	Large plaza facing room with two smaller rooms behind (Windes 1986: 204).
	Small 2 room units	*AFA: 7.75m^2, SD .9m^2	Located at either end of the 5 major room suites; room units with one plaza facing room and one room backing it (Windes 1986: 204).
Stage IB	5 plaza facing rooms	AFA of 5 large rooms: 37.6m^2, SD 5.4m^2	Rooms added to the front of the original 5 major room suites Windes 1986: 205).
Stage IC	6 large rooms	AFA of 6 large rooms: 33.8m^2, SD 1.4m^2 (N=4) AFA of 5-6 smaller rooms: 12m^2, SD 4m^2 (N=4)	Six large rooms in two rows of three are backed by five to six smaller rooms (Windes 1986:206)

Building Phase	Detail	Measurements	Description
Stage II	West Wing	AFA of 5 large plaza facing rooms: 25.2 m^2, SD .8m^2 AFA of 3 rooms behind them (except 105): 26m^2, SD 1.9m^2 AFA of 6 back rooms: 17.5 m^2, SD .8m^2 *AFA of 2 huge rooms appended to south end: 35.8 m^2 and 36.6 m^2 *Room 105: 53.6 m^2	Room 105 appears to be double length, no evidence that it was subdivided. A pair of rooms (225 and 226) jut outward and unbalance the symmetry - these appear to be road related (Windes 1986: 207).
Stage III	East wing	AFA of large rooms in suite: 46.1m^2, SD 2.8m^2 AFA of small rooms in suite: 14.2m^2, SD .7m^2 AFA of 7-9 rooms added to outside: 11.7 m^2, SD 2.6 m^2, n=9 2 or 3 more possible room suites on south end: no measurements available	Parallels the west in positioning, form, and layout. Eliminating the end rooms reduces variation: 12.5m^2, SD 1.0m2, n=7 (Windes 1986: 207-208).
Stage IV	3 Round rooms and buttresses in NW and NE corners	No measurements available.	Additions maintain symmetry of structure.
Stage V	Late Additions (Kiva 15 in room 110, southern enclosing arc, maze of small rooms in plaza corner)	No measurements available.	Constructed A.D. 1100-1140, no measurements available. These additions are a departure from earlier planning and formality.

*Not used in analysis.

29SJ 627

Room size information for 29SJ 627 is provided by Truell (1992). Data from the last two building phases (late A.D. 900s/early 1000s, and mid-1000s) are examined in this dissertation because these are the time periods most relevant to an examination of the Chaco-era.

Table 27. 29SJ 627 room size data. AFA = Average Floor Area and SD = Standard Deviation.

Building Stage/Other Designation	**Detail**	**Measurement**	**Description**
Rear Rooms	6 small rooms	AFA: 5.12 m^2, SD .63 m^2	Includes rooms 19, 16, 4, 9, 2, 1. Excludes Room 22 because it was a partial measurement.
Middle Rooms		AFA: 6.8 m^2, SD 1.21 m^2	Includes rooms 15, 10, 3, 8, 5, 7, 6. Excludes room 11 because it was a partial measurement.
Front Rooms		AFA: 9.43 m^2, SD: 3.43 m^2	Includes rooms 12, 14, 1. Excludes room 20 because it was a partial measurement.

CHIMNEY ROCK GREAT HOUSE

Room size data for rooms with visible architecture at Chimney Rock Great House is from Chuipka (2010).

Table 28. Chimney Rock Great House room size data. Information is presented for rectangular rooms associated with building stages I and II, for rectangular rooms in the back of the structure, in the middle and front, and for buttress rooms around the East Kiva. AFA = Average Floor Area and SD = Standard Deviation.

Building Stage/Other Designation	**Detail**	**Measurement**	**Description**
Stage I	4 Rectangular Rooms	AFA 18.82 m^2, SD 2.08 m^2	Includes Rooms 3, 5, 17, and 18. Information for other rooms in first building phase not available: Rooms 1, 2, 4, 16, 19, 20, 21, 22, 23, 24 (Chuipka 2010).
Stage II	8 Rectangular Rooms	AFA 18.44 m^2, SD 3.26 m^2	Includes Rooms 6, 7, 8, 9, 11, 12, 13, 14. Does not include buttress rooms surrounding East Kiva (Chuipka 2010).
Back Rooms	5 Rectangular Rooms	AFA: 16. 7 m^2, SD 1.52 m^2	Includes Rooms 13, 12, 9, 6, 3.
Front Room	1 Rectangular Room	AFA 19.8 m^2	Room 7
Middle Rooms	6 Rectangular Rooms	AFA 20.59 m^2	Includes Rooms 5, 8, 11, 14, 17, 18
Middle and Front Rooms	7 Rectangular Rooms	AFA: 20.48 m^2, SD 1.33 m^2	Includes Rooms 5, 7, 8, 11, 14, 17, 18
North Buttress Rooms around East Kiva	4 Small rectangular rooms	AFA: 4.6 m^2, SD .21 m^2	Includes 10A, 10B, 10C, 10D. Excludes 10E because no masonry is visible and it was not documented. May

Building Stage/Other Designation	Detail	Measurement	Description
			have been constructed as one large room and then subdivided into smaller rooms.
West Buttress Rooms around East Kiva	6 Small rectangular rooms	AFA: 9.59 m^2, SD .28 m^2	Includes Rooms 15, 31, 32, 33, 34, 35.
South and East Buttress Rooms around East Kiva	10 small rectangular rooms	Range from 1.07 m^2 to 2.7 m^2	Includes Rooms 36-45. No further measurements are available (Chuipka 2010:61).

RAVINE SITE

Room size data for the Ravine Site is provided by Chuipka (2010).

Table 29. Ravine Site rooms size data. AFA = Average Floor Area and SD = Standard Deviation.

Building Stage/Other Designation	Detail	Measurement	Description
Rear Rooms	3 Small rectangular rooms	AFA: 4.95 m^2, SD .51 m^2	Includes Rooms 1, 3, 4
Room 1	1 circular room	Floor Area: 19.63 m^2	Room 2

BLUFF GREAT HOUSE

Room size data for the Bluff Great House is provided by Cameron (2008) and measured from maps by the author.

Table 30. Bluff Great House room size data.

Building Phase/Other Designation	**Detail**	**Measurement**	**Description**
Room Feature 56	Irregular square	Floor Area:12.5m^2	
Room Feature 2		Floor Area: 9.6-12m^2 (approximately)	The precise location of the western wall is unknown (Cameron 2008:127).
Westernmost Front Row Room	Irregular square	Floor Area 12.09 m^2	Measured from map provided by Cameron (2008)
Middle front Row Room	Irregular square	Floor Area: 10.77 m^2	Measured from map provided by Cameron (2008)
Easternmost Front Row Room	Irregular square	Floor Area 13.72 m^2	Measured from map provided by Cameron (2008).
Westernmost Middle Row Room	Irregular square	Floor Area: 8.98 m^2	Measured from map provided by Cameron (2008).
Middle Row Room	Irregular square	Floor Area: 10.77 m^2	Measured from map provided by Cameron (2008).
Easternmost Middle Row Room	Irregular square	Floor Area: 10.77 m^2	Measured from map provided by Cameron (2008).

APPENDIX C

CERAMIC TYPES

Ceramic types from each of the six sites examined in this study are presented in the following tables (Table 31-36). Production spans described as "N/A" are from types or categories (such as unidentified corrugated) for which no greater temporal specificity is possible. Types included in this study are noted by "*". Sherds labeled "indeterminate" by the ceramic analyst were omitted from the study since no temporal information is available.

Table 31. Type and production information for Pueblo Alto. From Toll and McKenna (1987) and Toll et al. (1997).

Type	Production Span
Gray Wares	
*Plain Gray	A.D. 550-1300
Lino Gray	A.D. 450-900
Lino Fugitive	A.D. 450-900
Polished Tan	A.D. 450-750
Wide Neckbanded	A.D. 850-925
*Narrow Neckbanded	A.D. 900-1050
*Neck Corrugated	A.D. 975-1050
*PII Corrugated	A.D. 1040-1100
*PII-III Corrugated	A.D. 1075-1150
*PIII Corrugated	A.D. 1100-1300
*Unidentified Corrugated	N/A**
Mineral-on-White Wares	
BMIII-PI Polished Mineral-on-white (m/w)	A.D. 700-850
BMIII-PI Unpolished m/w	A.D. 550-750
Early Red Mesa	A.D. 850-925
*Red Mesa Black-on-white	A.D. 875-1040
*Escavada Black-on-white	A.D. 1000-1100
*Puerco Black-on-white	A.D. 1030-1200
*Gallup Black-on-white	A.D. 1040-1150

Table 31, cont'd.	
*Chaco Black-on-white	A.D. 1075-1150
*Exotic m/w	A.D. 900-1200
*PII-III m/w	A.D. 850-1150
Carbon-on-white Ware	
BMIII-PI Polished Carbon-on-white (c/w)	A.D. 800-900
BMIII-PI Unpolished c/w	A.D. 550-875
*PII-III c/w	A.D. 1075-1300
Mesa Verde Black-on-white	A.D. 1200-1300
*Chaco McElmo Black-on-white	A.D. 1100-1150
*Chuska Black-on-white	A.D. 1000-1125
Red Mesa Design Chuska	A.D. 875-1000
*Tusayan Whiteware	A.D. 1050-1200
Unidentified Whiteware	N/A
Red Wares	
*Plain Red	N/A
*Decorated Red	N/A
*Polychrome	A.D. 1075-1300
Brown and Mud Wares	
Polished Smudged	N/A
Brownware	A.D. 500-1200
Mudware	N/A

** Unidentified corrugated was included in this study because most of that type was recovered from the Pueblo Alto trash mound which was constructed or amassed during the time period that is the focus of this dissertation.

Table 32. Type and production span information for 29SJ 627. From Toll and McKenna (1987). Toll et al. (1997), and Wilson (2011).

Types	Production Span
Gray Wares	
*Plain Gray	A.D. 550-1300
Lino Gray	A.D. 450-900
Lino Fugitive	A.D. 450-900
Polished Tan	A.D. 450-750
Wide Neckbanded	A.D. 850-925
*Narrow Neckbanded	A.D. 900-1050
*Neck Corrugated	A.D. 975-1050
PI Corrugated	Pre-Pueblo II
*PII-PIII Corrugated	A.D. 1075-1150
*PIII Corrugated	A.D. 1100-1300

Table 32, cont'd.	
Unidentified Corrugated	N/A
Mineral-on-white Wares	
BMIII-PI Polished Mineral-on-white (m/w)	A.D. 700-850
BMIII-PI Unpolished m/w	A.D. 550-750
Early Red Mesa	A.D. 850-925
*Red Mesa Black-on-white	A.D. 875-1040
*Escavada Black-on-white	A.D. 1000-1100
*Puerco Black-on-white	A.D. 1030-1200
*Gallup Black-on-white	A.D. 1040-1150
*Chaco Black-on-white	A.D. 1075-1150
*Exotic m/w	A.D. 900-1200
*PII-III m/w	A.D. 850-1150
Carbon-on-white Wares	
BMIII-PI Polished Carbon-on-white (c/w)	A.D. 800-900
BMIII-PI Unpolished c/w	A.D. 550-875
*PII-III c/w	A.D. 1075-1300
Mesa Verde Black-on-white	A.D. 1200-1300
*Chaco McElmo Black-on-white	A.D. 1100-1150
*Chuska Black-on-white	A.D. 1000-1125
*Chuska Whiteware	A.D. 900-1200
Red Mesa Design Chuska	A.D. 875-1000
*Tusayan Whiteware	A.D. 1050-1200
Unidentified Whiteware	N/A
Red Wares	
*Plain Red	N/A
*Decorated Red	N/A
Brown Wares	
Polished Smudged	N/A
Brownware	A.D. 500-1200

Table 33. Type and production information from the Chimney Rock Great House. From Wilson (2011).

Tradition and Type	**Production Span**
San Juan or Mesa Verde Gray Ware	
*Plain Gray Rim	A.D. 550 to 1050
*Indeterminate Plain Rim	A.D. 550 to 1300
*Plain Gray Body	A.D. 550 to 1300

Table 33, cont'd.	
*Indented Corrugated	A.D. 930 to 1300
*Plain Corrugated	A.D. 930 to 1300
*Alternating Corrugated	A.D. 930 to 1300
*Smeared Indented Corrugated	A.D. 930 to 1300
*Payan Corrugated	A.D. 950 to 1100
*Mummy Lake Gray	A.D. 1050 to 1200
*Mancos Corrugated Rim	A.D. 930 to 1100
*Dolores Corrugated Rim	A.D. 1000 to 1200
*Mesa Verde Corrugated Rim	A.D.1100 to 1300
Rosa Gray	A.D. 700 to 950
San Juan or Mesa Verde White Ware	
*Unpainted Undifferentiated	A.D. 900 to 1300
*Pueblo II Mineral Paint Undifferentiated	A.D. 900 to 1300
*Cortez Black-on-white	A.D. 900 to 1075
*Mancos Black-on-white Solid	A.D. 980 to 1200
*Arboles Black-on-white	A.D. 900 to 1100
*Mancos Black-on-white Hatchured	A.D. 980 to 1200
*Mancos Black-on-white solid and hatchured	A.D. 980 to 1200
*Indeterminate Organic Paint	A.D. 800 to 1200
*Mancos Black-on-white Gallup style	A.D. 980 to 1200
Cibola Gray Ware	
*Cibola Plain Gray Rim	A.D. 550 to 1300
*Plain Gray Body	A.D. 550 to 1300
*Indented Corrugated Body	A.D. 930 to 1300
*Plain Corrugated	A.D. 930 to 1300
*Indeterminate Corrugated Rim	A.D. 1000 to 1200
*Highly Everted Corrugated	A.D. 1100 to 1300
Cibola White Ware	
*Mineral Paint Undifferentiated	A.D. 900 to 1075
*Red Mesa Black-on-white	A.D. 900 to 1075
*Escavada Black-on-white	A.D. 950 to 1160
*Gallup Black-on-white	A.D. 960 to 1150
*Reserve Black-on-white	A.D. 1050 to 1200
White Mountain Red Ware	
*Unpainted White Mountain Red Ware	A.D. 1050 to 1300
Chuska Gray Ware	
*Bennet Gray	A.D. 550 to 1050
*Indented Corrugated	A.D. 930 to 1300

Table 33, cont'd.	
*Chuskan Plain Corrugated	A.D. 930 to 1300
*Alternating Corrugated	A.D. 930 to 1300
Chuska White Ware	
*Unpainted Undifferentiated	A.D. 900 to 1200
*Mineral Painted Undifferentiated	A.D. 900 to 1200
*Taylor Black-on-white	A.D. 900 to 1100
*Brimhall Black-on-white	A.D. 900 to 1100
*Chuska B/w	A.D. 900 to 1100
Tsegi Orange Ware	
*Tusayan Black-on-red	A.D. 1050 to 1250

Table 34. Type and production information from the Ravine Site. From Wilson (2011).

Tradition and Type	**Production Span**
San Juan or Mesa Verde Gray Ware	
*Plain Gray Rim	A.D. 550 to 1050
*Plain Gray Body	A.D. 550 to 1300
*Clapboarded Neckbanded	A.D. 800 to 1050
*Incised Neckbanded	A.D. 800 to 1050
*Wide Neckbanded	A.D. 775 to 1050
*Indented Corrugated	A.D. 930 to 1300
*Plain Corrugated	A.D. 930 to 1300
*Alternating Corrugated	A.D. 930 to 1300
*Smeared Indented Corrugated	A.D. 930 to 1300
*Payan Corrugated	A.D. 950 to 1100
*Mancos Corrugated Rim	A.D. 930 to 1100
*Dolores Corrugated Rim	A.D. 1000 to 1200
San Juan or Mesa Verde White Ware	
*Unpainted Undifferentiated	A.D. 900 to 1300
*Pueblo II Mineral Paint Undifferentiated	A.D. 900 to 1300
*Mancos Black-on-white Solid	A.D. 980 to 1200
*Arboles Black-on-white	A.D. 900 to 1100
*Bancos Black-on-white	A.D. 800 to 1100
*Indeterminate Organic Paint	A.D. 800 to 1200
Cibola Gray Wares	
*Cibola Plain Gray Rim	A.D. 550 to 1300

Table 34, cont'd.	
*Plain Gray Body	A.D. 550 to 1300
*Indented Corrugated Body	A.D. 930 to 1300
Cibola White Ware	
*Unpainted Undifferentiated	A.D. 900 to 1300
*Mineral Paint Undifferentiated	A.D. 900 to 1075
*Gallup Black-on-white	A.D. 960 to 1150
Chuska Gray Ware	
*Patterned Corrugated	A.D. 930 to 1300

Table 35. Ceramic type and production span for the Bluff Great House. From Blinman (2008), Toll and McKenna (1987) and Toll et al. (1997).

Type	**Production Span**
Early Brown	
Twin Trees Plain	Pre-A.D. 600 (A.D. 450-750)
Sambrito Plain	Pre-A.D. 600
Obelisk Gray	Pre-A.D. 600
Northern San Juan Gray Ware	
Indeterminate characteristics	N/A
Chapin Gray	A.D. 450-900
Moccasin Gray	A.D. 850-925
*Mancos Gray	A.D. 900-1050
*Mancos Corrugated	A.D. 975-1050, A.D. 1040-1100
*Dolores Corrugated	A.D. 1075-1150
*Mesa Verde Corrugated	A.D. 1100-1300
Plain Body	Pre-A.D. 1000
Neck Corrugated Body	A.D. 920-1000
*Corrugated Body	A.D. 1000-1075
San Juan Incised	Unclear
Tusayan Gray Ware	
Indeterminate	N/A
Lino Gray	Pre-600
*Kana'a Gray	A.D. 850-925, A.D. 900-1050
Coconino Gray (wide)	A.D. 850-920
Coconino Gray (narrow)	A.D. 850-920
*Erect Rim Corrugated	A.D. 1000-1075
*Oblique Rim Corrugated	A.D. 1075-1150
*Everted Rim Corrugated	A.D. 1250-1300

Table 35, cont'd.	
Plain Body	A.D. 920-1000
*Corrugated Body	A.D. 1000-1075
*Honani Tooled	Pueblo II or later
Cibola Gray Ware	
*Corrugated Body	A.D. 1000-1075
Chuska Gray Ware	
Indeterminate	N/A
Sheep Springs Gray	A.D. 850-925
Tocito Gray	A.D. 850-925
*Gray Hills Banded	A.D. 900-1050
*Captain Tom Corrugated	A.D. 900-1050
*Blue Shale Corrugated	A.D. 1040-1100
*Hunter Corrugated	A.D. 1075-1150
Plain Body	Pre - A.D. 1000
*Corrugated Body	A.D. 1000-1075
Indeterminate Anasazi Gray Ware	
Indeterminate	N/A
Northern San Juan White Ware	
Indeterminate	N/A
Chapin Black-on-white	A.D. 550-750
Piedra Black-on-white	A.D. 700-850
White Mesa Black-on-white	Pre-A.D. 1000
*Cortez Black-on-white	A.D. 875-1040
*Mancos Black-on-white (undif.)	A.D. 1000-1200
*Mancos Black-on-white (Sosi)	A.D. 1000-1075
*Mancos Black-on-white (Dogoszhi)	A.D. 1000-1075
*Mancos Black-on-white (Chaco)	A.D. 1075-1150
McElmo Black-on-white	A.D. 1150-1250
Pueblo III Black-on-white	A.D. 1150-1200
Transitional PIII Black-on-white	A.D. 1150-1200
Mesa Verde Black-on-white	A.D. 1075-1300, 1200-1300**
Early Black-on-white	A.D. 600-750
*Late Black-on-white	A.D. 1075-1150
Unpainted-unpolished	N/A
Unpainted-polished	N/A
Painted-unpolished	N/A
Painted-polished	N/A
Tusayan White Ware	

Table 35, cont'd.	
Indeterminate	N/A
Kana'a Black-on-white	A.D. 800-900
*Black Mesa Black-on-white	A.D. 1050-1200
*Sosi Black-on-white	A.D. 1075-1300
*Dogoszhi Black-on-white	A.D. 1075-1300
*Flagstaff Black-on-white	A.D. 1075-1300
Early Black-on-white	A.D. 600-750
*Late Black-on-white	A.D. 1075-1120
Indeterminate Black-on-white	N/A
Indeterminate White	N/A
Cibola White Ware	
*Red Mesa Black-on-white	A.D. 875-1040
*Escavada Black-on-white	A.D. 1000-1100
*Puerco Black-on-white	A.D. 1030-1200
*Gallup Black-on-white	A.D. 1040-1150
*Chaco Black-on-white	A.D. 1075-1150
*Late Black-on-white	A.D. 1075-1120
Indeterminate Black-on-white	N/A
Indeterminate Unpainted	N/A
Chuska White Ware	
*Naschitti Black-on-white	A.D. 850-920, A.D. 1040***
Newcomb Black-on-white	A.D. 920-1000
*Toadlena Black-on-white	A.D. 1000-1075
*Brimhall Black-on-white	A.D. 1040-1150
*Chuska Black-on-white	A.D. 1000-1075
*Nava Black-on-white	A.D. 1075-1300
*Late Black-on-white	A.D. 1075-1120
Painted polished	N/A
Unpainted-polished	N/A
Indeterminate Anasazi	
Indeterminate	N/A
Northern San Juan Brown Ware	
Dolores Brown	N/A
Mogollon Brown Ware	
Plain	N/A
Plain Smudged	N/A
Corrugated Smudged	N/A
Northern San Juan Red Ware	

Table 35, cont'd.	
*Indeterminate	N/A
*Abajo Red-on-orange	A.D. 750-850
*Abajo Polychrome	A.D. 750-850
*Bluff Black-on-red (unslipped)	A.D. 750-850; persists after 850
*Bluff Black-on-red (washed)	A.D. 750-850; persists after 850
*McPhee Black-on-red	A.D. 850-1000
*Deadmans Black-on-red	A.D. 850-1075
*Unpainted-unslipped	N/A
*Unpainted-washed	N/A
*Unpainted-slipped	N/A
Tusayan Red ware	
*Indeterminate	N/A
*Tallahogan Red	A.D. 600-750
*Medicine Black-on-red	A.D. 1000-1150
*Tusayan Black-on-red	A.D. 1000-1200
*Cameron Polychrome	A.D. 1150-1200
*Citadel Polychrome	A.D. 1150-1200
*Tusayan Polychrome	A.D. 1150-1300
*Kiet Siel Polychrome	A.D. 1250-1300
*Indeterminate Red	N/A
*Indeterminate Black-on-red	N/A
*Indeterminate Polychrome	N/A
Cibola Red Ware	
*Tallahogan Red	A.D. 600-750
*Puerco Black-on-red	A.D. 1000-1075
*Wingate Black-on-red	A.D. 1000-1200
*Wingate Polychrome	A.D. 1150-1200
*Unpainted	N/A
*Indeterminate Black-on-red	N/A
Indeterminate Anasazi Red Ware	
*Indeterminate Red Ware	N/A

**Mesa Verde Black-on-white is not included in this analysis because Toll and McKenna (1987) and Toll et al. (1997) place it post A.D. 1150.
***Naschitti is included in this analysis because the time span at Chaco extends to A.D. 1040 (Toll and McKenna 1987; Toll et al. 1997).

Table 36. Type and production information for the Corral Canyon Site (Firor 1998). Chronological information from Toll and Mckenna (1987) Toll et al. (1997), Blinman (2008), Wilson (2011).

Type	Production Span
Indeterminate wares	N/A
Undifferentiated Gray ware	N/A
Northern San Juan Gray Ware	
*Plain Gray	A.D. 550-1300
Chapin Gray	A.D. 450-900
Moccasin Gray	A.D. 850-925
*Mancos Gray	A.D. 900-1050
Early Corrugated Body	Pre-A.D. 1000
*Corrugated Body	A.D. 1000-1075
*Mancos Corrugated	A.D. 975-1050, A.D. 1040-1100
Indeterminate White Ware	
Indeterminate White Ware	N/A
Northern San Juan White Ware	
Undifferentiated San Juan White Ware	N/A
*Cortez Black-on-white	A.D. 875-1040
*Mancos Black-on-white	A.D. 1030-1200
Undifferentiated Mesa Verde White Ware	N/A
Chapin Black-on-White	A.D. 550-750
White Mesa Black-on-white	Pre-A.D. 1000
McElmo Black-on-white	A.D. 1150-1250
Indeterminate Black-on-white	
Undifferentiated Black-on-white	N/A
Tusayan White Ware	
Unidentified Tusayan White ware	N/A
*Black Mesa Black-on-white	A.D. 1000-1100
Northern San Juan Red Ware	
*Indeterminate San Juan Red ware	N/A
*Bluff Black-on-red	A.D. 750-850; persists after 850
*Deadmans Black-on-red	A.D. 850-1075
*Abajo Red-on-orange	A.D. 750-850

CERAMIC DATA FOR ALL TIME PERIODS AND WARES REPRESENTED AT EACH SITE

Table 37. Vessel forms for all time periods and wares.

Vessel Forms	Pueblo Alto	29SJ 627	Chimney Rock Great House	Ravine Site	Bluff Great House	Corral Canyon Site
Bowl	4,221	7,057	216	58	2,508	291
Ladle	453	866	0	0	104	0
Canteen	43	95	0	1	6	0
Pitcher	316	439	0	0	12	0
Seed Jar	59	97	0	2	26	0
Tecomate	45	236	0	0		0
Jar	3,940	3372	1,613	1,021	12,490	2,823
Olla	287	332	5	0	40	0
Effigy/Duck Pot/Miniature	30	86	0	1	11	0
Prayer Plume Holder	0	0	0	4	0	0
Cylinder Jar	1	0	0	0	0	0
Gourd Dipper	0	0	7	1	9	0
Gourd Jar	1	2	0	0	0	0
Mug	1		0	0	34	0
Pipe	0	3	1	0	0	0
Cup	0	1	0	0	0	0
Other						15
Totals	9,397	12,586	1,842	1,088	15,240	3,129

Table 38. Temper types for all wares and time periods represented at each site.

	Sandstone/ Sand	%	Igneous	%	Trachyte	%	Sherd	%	Total
Pueblo Alto	2138	57	165	4	1427	38	0	0	3730
29SJ 627	5872	83	217	3	1019	14	0	0	7108
Chimney Rock	162	9	1641	87	34	2	55	3	1892
Ravine Site	72	7	1006	93	2	<1	4	<1	1084

Bluff Great House	2358	24	6424	65	74	1	1049	11	9905
Corral Canyon Site	11	<1	3223	100	0	0	1	<1	3235

LATE PUEBLO II (A.D. 1000-1150) CERAMIC DATA

Table 39. Pueblo II site-wide ware counts and percentages, inclusive of 38,961 corrugated sherds from the Pueblo Alto trash mound and all red wares recovered from each site.

Site	**Gray Ware**	**%**	**White Ware**	**%**	**Red Ware**	**%**	**Totals**
Pueblo Alto	47,732	56	36,366	43	1,229	1	85,327
29SJ 627	24,753	53	21,428	46	575	1	46,756
Chimney Rock Great House	1,497	76	463	24	10	1	1,970
Ravine Site	2,162	95	107	5	0	0	2,269
Bluff Great House	8,584	71	1876	15	1,666	14	12,126
Corral Canyon Site	3546	86	185	4	398	10	4,129

Table 40. Pueblo II gray ware vessel forms.

Gray Ware Vessel Forms	**Pueblo Alto**	**29SJ 627**	**Chimney Rock**	**Ravine Site**	**Bluff Great House**	**Corral Canyon Site**
Bowl		4	4	4		
Jar	1,911	945	1475	1004	8,573	446
Pitcher	4	15				
Olla			2			
Ladle		3		1		
Cloudblower			1			
Effigy/Duck/Mini Pot		3			1	
Seed Jar					1	
Total	1,915	970	1, 482	1,009	8,575	446

Table 41. Pueblo II white ware vessel forms.

White Ware Vessel Forms	**Pueblo Alto**	**29SJ 627**	**Chimney Rock**	**Ravine Site**	**Bluff Great House**	**Corral Canyon Site**
Bowl	1,901	2,932	212	54	966	53
Jar	482	736	136	17	743	110
Pitcher	164	185			9	
Olla	138		3		25	
Ladle	246	522	7		64	
Effigy/Duck/Mini Pot	14				1	
Canteen	21	35		1	3	
Seed Jar	26	37		2		
Tecomate	20	19				
Mug					1	
Other						3
Total	3,012	4,466	358	74	1,812	166

Table 42. Red ware vessel forms for all times periods. No greater temporal specificity is possible.

Red Ware Vessel Forms	**Pueblo Alto**	**29SJ 627**	**Chimney Rock**	**Ravine Site**	**Bluff Great House**	**Corral Canyon Site**
Bowl	120	113			960	195
Jar	5	7	2		358	58
Pitcher	1	1			3	
Ladle		4			28	
Olla					7	
Seed Jar	4	5			10	
Tecomate	1	3				
Canteen	1				3	
Effigy/Duck/Mini Pot		2			2	
Total	132	134	2	0	1,371	253

Table 43. Gray ware temper types for the Pueblo II time period.

	Sandstone/ Sand	**%**	**Igneous**	**%**	**Trachyte**	**%**	**Sherd**	**%**	**Total**
Pueblo Alto	610	46	18	1	705	53	0	0	1,333
29SJ 627	699	70	7	1	288	29	0	0	994
Chimney Rock	98	6	1,420	93	12	1	0	0	1530
Ravine Site	34	3	973	96	2	<1	0	0	1,009
Bluff Great House	684	20	2,659	79	28	1	0	0	3,371
Corral Canyon Site	7	<1	2,477	100	0	0	0	0	2,484

Table 44. White ware temper types for the Pueblo II time period.

	Sandstone/ Sand	%	Igneous	%	Trachyte	%	Sherd	%	Total
Pueblo Alto	1,380	64	107	5	674	31	0	0	2,161
29SJ 627	3,960	86	104	2	567	12	0	0	4,631
Chimney Rock	64	18	221	61	22	6	53	15	360
Ravine Site	38	51	33	44	0	0	4	5	75
Bluff Great House	343	18	1,077	57	13	1	449	24	1,882
Corral Canyon Site	4	3	139	97	0	0	1	1	144

Table 45. Red ware temper types for all time periods.

	Sandstone/ Sand	%	Igneous	%	Trachyte	%	Sherd	%	Total
Pueblo Alto	64	62	39	38	0	0	0	0	103
29SJ 627	36	27	88	66	9	7	0	0	133
Chimney Rock	0	0	0	0	0	0	2	100	1
Ravine Site	0	0	0	0	0	0	0	0	0
Bluff Great House	494	36	858	63	0	0	8	1	1,360
Corral Canyon Site	0	0	304	100	0	0	0	0	304

CHI SQUARE (X^2) TEST OF INDEPENDENCE COMPARING PUEBLO ALTO TO FIVE OTHER SITES

CHI SQUARE ($X^{2)}$ TEST OF INDEPENDENCE FOR WARES FROM THE PUEBLO II TIME PERIOD (A.D. 1000-1150)

H_0 There is no statistically significant relationship between sites (Pueblo Alto and each of the other sites) and ware ratios.

H_1 There is a statistically significant relationship between Pueblo Alto and each of the other sites) and ware ratios.

$\alpha = .05$

29SJ 627

Table 46. Ware crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and 29SJ 627.

a.

Archaeological Site * Sherd & Ware Category Crosstabulation						
			Sherd & Ware Category			Total
			Gray/Utility Ware	White Ware	Red Ware	
Archaeological Site	Pueblo Alto	Count	47732	36366	1229	85327
		Expected Count	46826.1	37335.5	1165.4	85327.0
		% of Total	36.1%	27.5%	.9%	64.6%
	29SJ 627	Count	24753	21428	575	46756
		Expected Count	25658.9	20458.5	638.6	46756.0
		% of Total	18.7%	16.2%	.4%	35.4%
Total		Count	72485	57794	1804	132083
		Expected Count	72485.0	57794.0	1804.0	132083.0
		% of Total	54.9%	43.8%	1.4%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	130.439[a]	2	.000
Likelihood Ratio	130.382	2	.000
Linear-by-Linear Association	85.084	1	.000
N of Valid Cases	132083		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 638.60.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.031	.000
	Cramer's V	.031	.000

	Contingency Coefficient	.031	.000
N of Valid Cases		132083	

P = .000 < α

H_0 is rejected. There is a statistically significant relationship between sites and ware ratios at Pueblo Alto and 29SJ 627. The observed ware ratios at the two sites could not have been drawn from the same population.

CHIMNEY ROCK GREAT HOUSE

Table 47. Ware crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Chimney Rock Great House.

a.

Archaeological Site * Sherd & Ware Category Crosstabulation						
			Sherd & Ware Category			Total
			Gray/Utility Ware	White Ware	Red Ware	
Archaeological Site	Pueblo Alto	Count	47732	36366	1229	85327
		Expected Count	48118.1	35997.9	1211.0	85327.0
		% of Total	54.7%	41.7%	1.4%	97.7%
	Chimney Rock Great House	Count	1497	463	10	1970
		Expected Count	1110.9	831.1	28.0	1970.0
		% of Total	1.7%	.5%	.0%	2.3%
Total		Count	49229	36829	1239	87297
		Expected Count	49229.0	36829.0	1239.0	87297.0
		% of Total	56.4%	42.2%	1.4%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	315.868[a]	2	.000

Likelihood Ratio	337.818	2	.000
Linear-by-Linear Association	307.249	1	.000
N of Valid Cases	87297		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 27.96.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.060	.000
	Cramer's V	.060	.000
	Contingency Coefficient	.060	.000
N of Valid Cases		87297	

P = .000 < α

H_0 is rejected. There is a statistically significant relationship between sites and ware ratios at Pueblo Alto and Chimney Rock. The observed ware ratios at the two sites could not have been drawn from the same population.

RAVINE SITE

Table 48. Ware crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Ravine Site.

a.

Archaeological Site * Sherd & Ware Category Crosstabulation						
			Sherd & Ware Category			Total
			Gray/Utility Ware	White Ware	Red Ware	
Archaeological Site	Pueblo Alto	Count	47732	36366	1229	85327
		Expected Count	48118.1	35997.9	1211.0	85327.0
		% of Total	54.7%	41.7%	1.4%	97.7%

	Chimney Rock Great House	Count	1497	463	10	1970
		Expected Count	1110.9	831.1	28.0	1970.0
		% of Total	1.7%	.5%	.0%	2.3%
Total		Count	49229	36829	1239	87297
		Expected Count	49229.0	36829.0	1239.0	87297.0
		% of Total	56.4%	42.2%	1.4%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1393.404[a]	2	.000
Likelihood Ratio	1785.880	2	.000
Linear-by-Linear Association	1331.819	1	.000
N of Valid Cases	87597		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 31.87.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.126	.000
	Cramer's V	.126	.000
	Contingency Coefficient	.125	.000
N of Valid Cases		87597	

$P = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and ware ratios at Pueblo Alto and the Ravine Site. The observed ware ratios at the two sites could not have been drawn from the same population.

Table 49. Ware crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Bluff Great House.

a.

Archaeological Site * Sherd & Ware Category Crosstabulation						
			Sherd & Ware Category			Total
			Gray/Utility Ware	White Ware	Red Ware	
Archaeological Site	Pueblo Alto	Count	47732	36366	1229	85327
		Expected Count	49308.6	33483.6	2534.8	85327.0
		% of Total	49.0%	37.3%	1.3%	87.6%
	Bluff Great House	Count	8584	1876	1666	12126
		Expected Count	7007.4	4758.4	360.2	12126.0
		% of Total	8.8%	1.9%	1.7%	12.4%
Total		Count	56316	38242	2895	97453
		Expected Count	56316.0	38242.0	2895.0	97453.0
		% of Total	57.8%	39.2%	3.0%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7805.321[a]	2	.000
Likelihood Ratio	6219.082	2	.000
Linear-by-Linear Association	22.502	1	.000
N of Valid Cases	97453		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 360.22.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.283	.000
	Cramer's V	.283	.000

	Contingency Coefficient	.272	.000
N of Valid Cases		97453	

P = .000 < α

H_0 is rejected. There is a statistically significant relationship between sites and ware ratios at Pueblo Alto and the Bluff Great House. The observed ware ratios at the two sites could not have been drawn from the same population.

CORRAL CANYON SITE

Table 50. Ware crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Corral Canyon Site.

a.

Archaeological Site * Sherd & Ware Category Crosstabulation						
			Sherd & Ware Category			Total
			Gray/Utility Ware	White Ware	Red Ware	
Archaeological Site	Pueblo Alto	Count	47732	36366	1229	85327
		Expected Count	48911.2	34863.9	1551.9	85327.0
		% of Total	53.4%	40.7%	1.4%	95.4%
	Corral Canyon Site	Count	3546	185	398	4129
		Expected Count	2366.8	1687.1	75.1	4129.0
		% of Total	4.0%	.2%	.4%	4.6%
Total		Count	51278	36551	1627	89456
		Expected Count	51278.0	36551.0	1627.0	89456.0

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3473.587[a]	2	.000

Likelihood Ratio	3541.568	2	.000
Linear-by-Linear Association	657.017	1	.000
N of Valid Cases	89456		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 75.10.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.197	.000
	Cramer's V	.197	.000
	Contingency Coefficient	.193	.000
N of Valid Cases		89456	

P = .000 < α

H_0 is rejected. There is a statistically significant relationship between sites and ware ratios at Pueblo Alto and the Corral Canyon Site. The observed ware ratios at the two sites could not have been drawn from the same population.

Chi Square ($x^{2)}$ Test of Independence for Gray Ware Vessel Form from the Pueblo II Time Period (A.D. 1000-1150)

H_0 There is no statistically significant relationship between sites (Pueblo Alto and each of the other sites) and gray ware vessel forms.

H_1 There is a statistically significant relationship between sites (Pueblo Alto and each of the other sites) and gray ware vessel forms.

α = .05

29SJ 627

Table 51. Gray ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c) for Pueblo Alto and 29SJ 627.

a.

Archaeological Site * Vessel Form Crosstabulation					
			Vessel Form		Total
			Jar	Other	
Archaeological Site	Pueblo Alto	Count	1911	4	1915
		Expected Count	1895.8	19.2	1915.0
		% of Total	66.2%	.1%	66.4%
	29SJ 627	Count	945	25	970
		Expected Count	960.2	9.8	970.0
		% of Total	32.8%	.9%	33.6%
Total		Count	2856	29	2885
		Expected Count	2856.0	29.0	2885.0
		% of Total	99.0%	1.0%	100.0%

b.

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	36.296[a]	1	.000		
Continuity Correction[b]	33.955	1	.000		
Likelihood Ratio	34.874	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	36.283	1	.000		
N of Valid Cases	2885				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.75.					
b. Computed only for a 2x2 table					

c.

Symmetric Measures		
	Value	Approx. Sig.

Nominal by Nominal	Phi	.112	.000
	Cramer's V	.112	.000
	Contingency Coefficient	.111	.000
N of Valid Cases		2885	

P = .000 < α

H_0 is rejected. There is a statistically significant relationship between sites and gray ware vessel forms at Pueblo Alto and 29SJ 627. The observed gray ware vessel forms the two sites could not have been drawn from the same population.

CHIMNEY ROCK GREAT HOUSE

Table 52. Gray ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Chimney Rock Great House.

a.

Archaeological Site * Vessel Form Crosstabulation					
			Vessel Form		Total
			Jar	Other	
Archaeological Site	Pueblo Alto	Count	1911	4	1915
		Expected Count	1908.8	6.2	1915.0
		% of Total	56.3%	.1%	56.4%
	Chimney Rock Great House	Count	1475	7	1482
		Expected Count	1477.2	4.8	1482.0
		% of Total	43.4%	.2%	43.6%
Total		Count	3386	11	3397
		Expected Count	3386.0	11.0	3397.0
		% of Total	99.7%	.3%	100.0%

b.

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)

Pearson Chi-Square	1.797[a]	1	.180		
Continuity Correction[b]	1.073	1	.300		
Likelihood Ratio	1.784	1	.182		
Fisher's Exact Test				.228	.150
Linear-by-Linear Association	1.796	1	.180		
N of Valid Cases	3397				
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.80.					
b. Computed only for a 2x2 table					

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.023	.180
	Cramer's V	.023	.180
	Contingency Coefficient	.023	.180
N of Valid Cases		3397	

p = .300/.228 > α (x^2/Fisher's Exact)

H_0 is accepted. There is not a statistically significant relationship between sites and gray ware vessel forms at Pueblo Alto and Chimney Rock. The observed gray ware vessel forms from the two sites could have been drawn from the same population.

RAVINE SITE

Table 53. Gray ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Ravine Site.

a.

Archaeological Site * Vessel Form Crosstabulation					
			Vessel Form		Total
			Jar	Other	
Archaeological Site	Pueblo Alto	Count	1911	4	1915
		Expected Count	1909.1	5.9	1915.0

		% of Total	65.4%	.1%	65.5%
	Ravine Site	Count	1004	5	1009
		Expected Count	1005.9	3.1	1009.0
		% of Total	34.3%	.2%	34.5%
Total		Count	2915	9	2924
		Expected Count	2915.0	9.0	2924.0
		% of Total	99.7%	.3%	100.0%

b.

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.770[a]	1	.183		
Continuity Correction[b]	.959	1	.327		
Likelihood Ratio	1.666	1	.197		
Fisher's Exact Test				.290	.163
Linear-by-Linear Association	1.769	1	.183		
N of Valid Cases	2924				
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.11.					
b. Computed only for a 2x2 table					

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.025	.183
	Cramer's V	.025	.183
	Contingency Coefficient	.025	.183
N of Valid Cases		2924	

P = .327/.290 > α (x^2 and Fisher's Exact)

H_0 is accepted. There is no statistically significant relationship between sites and gray ware vessel forms at Pueblo Alto and the Ravine Site. The observed gray ware vessel forms from the two sites could have been drawn from the same population.

BLUFF GREAT HOUSE

Table 54. Gray ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Bluff Great House.

a.

Archaeological Site * Vessel Form Crosstabulation					
			Vessel Form		Total
			Jar	Other	
Archaeological Site	Pueblo Alto	Count	1911	4	1915
		Expected Count	1913.9	1.1	1915.0
		% of Total	18.2%	.0%	18.3%
	Bluff Great House	Count	8573	2	8575
		Expected Count	8570.1	4.9	8575.0
		% of Total	81.7%	.0%	81.7%
Total		Count	10484	6	10490
		Expected Count	10484.0	6.0	10490.0
		% of Total	99.9%	.1%	100.0%

b.

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.428[a]	1	.002		
Continuity Correction[b]	6.462	1	.011		
Likelihood Ratio	6.779	1	.009		
Fisher's Exact Test				.012	.012
Linear-by-Linear Association	9.428	1	.002		
N of Valid Cases	10490				
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.10.					

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	-.030	.002
	Cramer's V	.030	.002
	Contingency Coefficient	.030	.002
N of Valid Cases		10490	

P = .011/.012 < α (x^2 and Fisher's Exact)

H_0 is rejected. There is a statistically significant relationship between sites and gray ware vessel forms at Pueblo Alto and the Bluff Great House. The observed gray ware vessel forms the two sites could not have been drawn from the same population.

CORRAL CANYON SITE

Table 55. Gray ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Corral Canyon Site.

a.

Archaeological Site * Vessel Form Crosstabulation					
			Vessel Form		Total
			Jar	Other	
Archaeological Site	Pueblo Alto	Count	1911	4	1915
		Expected Count	1911.8	3.2	1915.0
		% of Total	80.9%	.2%	81.1%
	Corral Canyon Site	Count	446	0	446
		Expected Count	445.2	.8	446.0
		% of Total	18.9%	.0%	18.9%
Total		Count	2357	4	2361
		Expected Count	2357.0	4.0	2361.0
		% of Total	99.8%	.2%	100.0%

b.

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.933[a]	1	.334		
Continuity Correction[b]	.107	1	.744		
Likelihood Ratio	1.677	1	.195		
Fisher's Exact Test				1.000	.433
Linear-by-Linear Association	.933	1	.334		
N of Valid Cases	2361				
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .76.					
b. Computed only for a 2x2 table					

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	-.020	.334
	Cramer's V	.020	.334
	Contingency Coefficient	.020	.334
N of Valid Cases		2361	

p = .744/1.0 > α (x^2/Fisher's Exact)

H_0 is accepted. There is no statistically significant relationship between sites and gray ware vessel forms at Pueblo Alto and the Corral Canyon Site. The observed gray ware vessel forms from the two sites could have been drawn from the same population.

CHI SQUARE ($x^{2)}$ TEST OF INDEPENDENCE FOR WHITE WARE VESSEL FORM FROM THE PUEBLO II TIME PERIOD (A.D. 1000-1150)

H_0 There is no statistically significant relationship between sites (Pueblo Alto and each of the other sites) and white ware vessel forms.

H_1 There is a statistically significant relationship between sites (Pueblo Alto and each of the other sites) and white ware vessel forms.

$\alpha = .05$

29SJ 627

Table 56. White ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and 29SJ 627.

a.

Archaeological Site * Vessel Form Crosstabulation						
			Vessel Form			Total
			Bowl	Jar	Other	
Archaeological Site	Pueblo Alto	Count	1901	482	629	3012
		% of Total	25.4%	6.4%	8.4%	40.3%
	29SJ 627	Count	2932	736	798	4466
		% of Total	39.2%	9.8%	10.7%	59.7%
Total		Count	4833	1218	1427	7478
		% of Total	64.6%	16.3%	19.1%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.611[a]	2	.005
Likelihood Ratio	10.538	2	.005
Linear-by-Linear Association	8.805	1	.003
N of Valid Cases	7478		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 490.59.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.038	.005
	Cramer's V	.038	.005

	Contingency Coefficient	.038	.005
N of Valid Cases		7478	

P = .005 < α

H_0 is rejected. There is a statistically significant relationship between sites and white ware vessel forms at Pueblo Alto and 29SJ 627. The observed white ware vessel forms from the two sites could not have been drawn from the same population.

CHIMNEY ROCK GREAT HOUSE

Table 57. White ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Chimney Rock Great House.

a.

Archaeological Site * Vessel Form Crosstabulation						
			Vessel Form			Total
			Bowl	Jar	Other	
Archaeological Site	Pueblo Alto	Count	1901	482	629	3012
		Expected Count	1888.5	552.3	571.1	3012.0
		% of Total	56.4%	14.3%	18.7%	89.4%
	Chimney Rock Great House	Count	212	136	10	358
		Expected Count	224.5	65.7	67.9	358.0
		% of Total	6.3%	4.0%	.3%	10.6%
Total		Count	2113	618	639	3370
		Expected Count	2113.0	618.0	639.0	3370.0
		% of Total	62.7%	18.3%	19.0%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	140.339[a]	2	.000

Likelihood Ratio	150.692	2	.000
Linear-by-Linear Association	10.305	1	.001
N of Valid Cases	3370		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 65.65.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.204	.000
	Cramer's V	.204	.000
	Contingency Coefficient	.200	.000
N of Valid Cases		3370	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and white ware vessel forms at Pueblo Alto and Chimney Rock Great House. The observed white ware vessel forms from the two sites could not have been drawn from the same population.

Ravine Site

Table 58. White ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Ravine Site.

a.

Archaeological Site * Vessel Form Crosstabulation						
			Vessel Form			Total
			Bowl	Jar	Other	
Archaeological Site	Pueblo Alto	Count	1901	482	629	3012
		Expected Count	1908.1	487.0	616.8	3012.0
		% of Total	61.6%	15.6%	20.4%	97.6%
	Ravine Site	Count	54	17	3	74
		Expected Count	46.9	12.0	15.2	74.0

		% of Total	1.7%	.6%	.1%	2.4%
Total		Count	1955	499	632	3086
		Expected Count	1955.0	499.0	632.0	3086.0
		% of Total	63.4%	16.2%	20.5%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.267[a]	2	.001
Likelihood Ratio	17.810	2	.000
Linear-by-Linear Association	7.857	1	.005
N of Valid Cases	3086		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.97.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.066	.001
	Cramer's V	.066	.001
	Contingency Coefficient	.065	.001
N of Valid Cases		3086	

$p = .001 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and white ware vessel forms at Pueblo Alto and the Ravine Site. The observed white ware vessel forms from the two sites could not have been drawn from the same population.

Table 59. White ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Bluff Great House.

a.

Archaeological Site * Vessel Form Crosstabulation						
			Vessel Form			Total
			Bowl	Jar	Other	
Archaeological Site	Pueblo Alto	Count	1901	482	629	3012
		Expected Count	1790.1	764.9	457.0	3012.0
		% of Total	39.4%	10.0%	13.0%	62.4%
	Bluff Great House	Count	966	743	103	1812
		Expected Count	1076.9	460.1	275.0	1812.0
		% of Total	20.0%	15.4%	2.1%	37.6%
Total		Count	2867	1225	732	4824
		Expected Count	2867.0	1225.0	732.0	4824.0
		% of Total	59.4%	25.4%	15.2%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	469.024[a]	2	.000
Likelihood Ratio	484.965	2	.000
Linear-by-Linear Association	5.986	1	.014
N of Valid Cases	4824		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 274.96.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.312	.000
	Cramer's V	.312	.000

	Contingency Coefficient	.298	.000
N of Valid Cases		4824	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and white ware vessel forms at Pueblo Alto and Bluff Great House. The observed white ware vessel forms from the two sites could not have been drawn from the same population.

CORRAL CANYON SITE

Table 60. White ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Corral Canyon Site.

a.

Archaeological Site * Vessel Form Crosstabulation						
			Vessel Form			Total
			Bowl	Jar	Other	
Archaeological Site	Pueblo Alto	Count	1901	482	629	3012
		Expected Count	1851.9	561.1	599.0	3012.0
		% of Total	59.8%	15.2%	19.8%	94.8%
	Corral Canyon Site	Count	53	110	3	166
		Expected Count	102.1	30.9	33.0	166.0
		% of Total	1.7%	3.5%	.1%	5.2%
Total		Count	1954	592	632	3178
		Expected Count	1954.0	592.0	632.0	3178.0
		% of Total	61.5%	18.6%	19.9%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	267.043[a]	2	.000

Likelihood Ratio	209.802	2	.000
Linear-by-Linear Association	3.601	1	.058
N of Valid Cases	3178		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 30.92.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.290	.000
	Cramer's V	.290	.000
	Contingency Coefficient	.278	.000
N of Valid Cases		3178	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and white ware vessel forms at Pueblo Alto and the Corral Canyon Site. The observed white ware vessel forms from the two sites could not have been drawn from the same population.

Chi Square (x2) Test of Independence for Red Ware Vessel Form from All Time Periods Represented at Each Site

H_0 There is no statistically significant relationship between sites (Pueblo Alto and each of the other sites) and red ware vessel forms.

H_1 There is a statistically significant relationship between sites (Pueblo Alto and each of the other sites) and red ware vessel forms.

$\alpha = .05$

29SJ 627

Table 61. Red ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and 29SJ 627.

a.

Archaeological Site * Vessel Form Crosstabulation						
			Vessel Form			Total
			Bowl	Jar	Other	
Archaeological Site	Pueblo Alto	Count	120	5	7	132
		Expected Count	115.2	5.9	10.9	132.0
		% of Total	44.9%	1.9%	2.6%	49.4%
	29SJ 627	Count	113	7	15	135
		Expected Count	117.8	6.1	11.1	135.0
		% of Total	42.3%	2.6%	5.6%	50.6%
Total		Count	233	12	22	267
		Expected Count	233.0	12.0	22.0	267.0
		% of Total	87.3%	4.5%	8.2%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.419[a]	2	.181
Likelihood Ratio	3.488	2	.175
Linear-by-Linear Association	3.407	1	.065
N of Valid Cases	267		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.93.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.113	.181
	Cramer's V	.113	.181

	Contingency Coefficient	.112	.181
N of Valid Cases		267	

$p = .181 > \alpha$

H_0 is accepted. There is no statistically significant relationship between sites and red ware vessel forms at Pueblo Alto and 29SJ 627. The observed red ware vessel forms from the two sites could have been drawn from the same population.

Chimney Rock Great House

Table 62. Red ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Chimney Rock Great House.

a.

Archaeological Site * Vessel Form Crosstabulation					
			Vessel Form		Total
			Bowl	Other	
Archaeological Site	Pueblo Alto	Count	120	12	132
		Expected Count	118.2	13.8	132.0
		% of Total	89.6%	9.0%	98.5%
	Chimney Rock Great House	Count	0	2	2
		Expected Count	1.8	.2	2.0
		% of Total	.0%	1.5%	1.5%
Total		Count	120	14	134
		Expected Count	120.0	14.0	134.0
		% of Total	89.6%	10.4%	100.0%

b.

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	17.403[a]	1	.000		

Continuity Correction[b]	9.042	1	.003		
Likelihood Ratio	9.306	1	.002		
Fisher's Exact Test				.010	.010
Linear-by-Linear Association	17.273	1	.000		
N of Valid Cases	134				
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .21.					
b. Computed only for a 2x2 table					

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.360	.000
	Cramer's V	.360	.000
	Contingency Coefficient	.339	.000
N of Valid Cases		134	

$p = .003/.010 < \alpha$ (x^2/Fisher's Exact)

H_0 is rejected. There is a statistically significant relationship between sites and red ware vessel forms at Pueblo Alto and the Chimney Rock Great House. The observed red ware vessel forms from the two sites could not have been drawn from the same population.

BLUFF GREAT HOUSE

Table 63. Red ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Bluff Great House.

a.

Archaeological Site * Vessel Form Crosstabulation						
			Vessel Form			Total
			Bowl	Jar	Other	
Archaeological Site	Pueblo Alto	Count	120	5	7	132
		Expected Count	94.9	31.9	5.3	132.0

		% of Total	8.0%	.3%	.5%	8.8%
	Bluff Great House	Count	960	358	53	1371
		Expected Count	985.1	331.1	54.7	1371.0
		% of Total	63.9%	23.8%	3.5%	91.2%
Total		Count	1080	363	60	1503
		Expected Count	1080.0	363.0	60.0	1503.0
		% of Total	71.9%	24.2%	4.0%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	32.780[a]	2	.000
Likelihood Ratio	44.725	2	.000
Linear-by-Linear Association	15.279	1	.000
N of Valid Cases	1503		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.27.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.148	.000
	Cramer's V	.148	.000
	Contingency Coefficient	.146	.000
N of Valid Cases		1503	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and red ware vessel forms at Pueblo Alto and the Bluff Great House. The observed red ware vessel forms from the two sites could not have been drawn from the same population.

Table 64. Red ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Corral Canyon Site.

a.

Archaeological Site * Vessel Form Crosstabulation					
			Vessel Form		Total
			Bowl	Other	
Archaeological Site	Pueblo Alto	Count	120	12	132
		Expected Count	108.0	24.0	132.0
		% of Total	31.2%	3.1%	34.3%
	Corral Canyon Site	Count	195	58	253
		Expected Count	207.0	46.0	253.0
		% of Total	50.6%	15.1%	65.7%
Total		Count	315	70	385
		Expected Count	315.0	70.0	385.0
		% of Total	81.8%	18.2%	100.0%

b.

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	11.159[a]	1	.001		
Continuity Correction[b]	10.249	1	.001		
Likelihood Ratio	12.249	1	.000		
Fisher's Exact Test				.001	.000
Linear-by-Linear Association	11.130	1	.001		
N of Valid Cases	385				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 24.00.
b. Computed only for a 2x2 table

c.

Symmetric Measures		
	Value	Approx. Sig.

Nominal by Nominal	Phi	.170	.001
	Cramer's V	.170	.001
	Contingency Coefficient	.168	.001
N of Valid Cases		385	

p = .001/.001 < α (x^2/Fisher's Exact)

H_0 is rejected. There is a statistically significant relationship between sites and red ware vessel forms at Pueblo Alto and the Corral Canyon Site. The observed red ware vessel forms from the two sites could not have been drawn from the same population.

CHI SQUARE (X^2) TEST OF INDEPENDENCE FOR GRAY WARE TEMPER TYPE FROM THE PUEBLO II (A.D. 1000-1150) TIME PERIOD

H_0 There is no statistically significant relationship between sites (Pueblo Alto and each of the other sites) and gray ware temper types.

H_1 There is a statistically significant relationship between sites (Pueblo Alto and each of the other sites) and gray ware temper types.

29SJ 627

Table 65. Gray ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and 29SJ 627.

a.

Archaeological Site * Temper Type Crosstabulation						
			Temper Type			Total
			Sandstone/ Sand	Igneous	Trachyte	
Archaeological Site	Pueblo Alto	Count	610	18	705	1333
		Expected Count	749.8	14.3	568.8	1333.0
		% of Total	26.2%	.8%	30.3%	57.3%
	29SJ 627	Count	699	7	288	994

		Expected Count	559.2	10.7	424.2	994.0
		% of Total	30.0%	.3%	12.4%	42.7%
Total		Count	1309	25	993	2327
		Expected Count	1309.0	25.0	993.0	2327.0
		% of Total	56.3%	1.1%	42.7%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	139.582[a]	2	.000
Likelihood Ratio	142.167	2	.000
Linear-by-Linear Association	137.762	1	.000
N of Valid Cases	2327		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.68.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.245	.000
	Cramer's V	.245	.000
	Contingency Coefficient	.238	.000
N of Valid Cases		2327	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and gray ware temper type at Pueblo Alto and 29SJ 627. The observed gray ware temper types from the two sites could not have been drawn from the same population.

Table 66. Gray ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Chimney Rock Great House.

a.

Archaeological Site * Temper Type Crosstabulation						
			Temper Type			Total
			Sandstone/ Sand	Igneous	Trachyte	
Archaeological Site	Pueblo Alto	Count	610	18	705	1333
		Expected Count	329.6	669.5	333.8	1333.0
		% of Total	21.3%	.6%	24.6%	46.6%
	Chimney Rock Great House	Count	98	1420	12	1530
		Expected Count	378.4	768.5	383.2	1530.0
		% of Total	3.4%	49.6%	.4%	53.4%
Total		Count	708	1438	717	2863
		Expected Count	708.0	1438.0	717.0	2863.0
		% of Total	24.7%	50.2%	25.0%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2404.795[a]	2	.000
Likelihood Ratio	3070.609	2	.000
Linear-by-Linear Association	23.250	1	.000
N of Valid Cases	2863		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 329.64.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.916	.000
	Cramer's V	.916	.000

	Contingency Coefficient	.676	.000
N of Valid Cases		2863	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically relationship between sites and gray ware temper type at Pueblo Alto and Chimney Rock Great House. The observed gray ware temper types from the two sites could not have been drawn from the same population.

Ravine Site

Table 67. Gray ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), measures for Pueblo Alto and Ravine Site.

a.

Archaeological Site * Temper Type Crosstabulation						
			Temper Type			Total
			Sandstone/ Sand	Igneous	Trachyte	
Archaeological Site	Pueblo Alto	Count	610	18	705	1333
		Expected Count	366.5	564.0	402.4	1333.0
		% of Total	26.0%	.8%	30.1%	56.9%
	Ravine Site	Count	34	973	2	1009
		Expected Count	277.5	427.0	304.6	1009.0
		% of Total	1.5%	41.5%	.1%	43.1%
Total		Count	644	991	707	2342
		Expected Count	644.0	991.0	707.0	2342.0
		% of Total	27.5%	42.3%	30.2%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)

Pearson Chi-Square	2130.462[a]	2	.000
Likelihood Ratio	2728.113	2	.000
Linear-by-Linear Association	10.567	1	.001
N of Valid Cases	2342		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 277.45.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.954	.000
	Cramer's V	.954	.000
	Contingency Coefficient	.690	.000
N of Valid Cases		2342	

p = .000 < α

H_0 is rejected. There is a statistically significant relationship between sites and gray ware temper type at Pueblo Alto and the Ravine Site. The observed gray ware temper types from the two sites could not have been drawn from the same population.

BLUFF GREAT HOUSE

Table 68. Gray ware temper type crosstabulation, chi-square tests and symmetric measures for Pueblo Alto and Bluff Great House.

a.

Archaeological Site * Temper Type Crosstabulation						
			Temper Type			Total
			Sandstone/ Sand	Igneous	Trachyte	
Archaeological Site	Pueblo Alto	Count	610	18	705	1333
		Expected Count	366.7	758.6	207.7	1333.0

		% of Total	13.0%	.4%	15.0%	28.3%
	Bluff Great House	Count	684	2659	28	3371
		Expected Count	927.3	1918.4	525.3	3371.0
		% of Total	14.5%	56.5%	.6%	71.7%
Total		Count	1294	2677	733	4704
		Expected Count	1294.0	2677.0	733.0	4704.0
		% of Total	27.5%	56.9%	15.6%	100.0 %

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2895.539[a]	2	.000
Likelihood Ratio	3364.898	2	.000
Linear-by-Linear Association	162.015	1	.000
N of Valid Cases	4704		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 207.71.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.785	.000
	Cramer's V	.785	.000
	Contingency Coefficient	.617	.000
N of Valid Cases		4704	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and gray ware temper type at Pueblo Alto and the Bluff Great House. The observed gray ware temper types from the two sites could not have been drawn from the same population.

CORRAL CANYON SITE

Table 69. Gray ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Corral Canyon Site.

a.

Archaeological Site * Temper Type Crosstabulation						
			Temper Type			Total
			Sandstone/ Sand	Igneous	Trachyte	
Archaeological Site	Pueblo Alto	Count	610	18	705	1333
		Expected Count	215.5	871.3	246.2	1333.0
		% of Total	16.0%	.5%	18.5%	34.9%
	Corral Canyon Site	Count	7	2477	0	2484
		Expected Count	401.5	1623.7	458.8	2484.0
		% of Total	.2%	64.9%	.0%	65.1%
Total		Count	617	2495	705	3817
		Expected Count	617.0	2495.0	705.0	3817.0
		% of Total	16.2%	65.4%	18.5%	100.0 %

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3707.918[a]	2	.000
Likelihood Ratio	4648.910	2	.000
Linear-by-Linear Association	13.765	1	.000
N of Valid Cases	3817		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 215.47.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.986	.000
	Cramer's V	.986	.000
	Contingency Coefficient	.702	.000
N of Valid Cases		3817	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and gray ware temper type at Pueblo Alto and the Corral Canyon Site. The observed gray ware temper types from the two sites could not have been drawn from the same population.

CHI SQUARE ($X^{2)}$ TEST OF INDEPENDENCE FOR WHITE WARE TEMPER TYPE FROM THE PUEBLO II (A.D. 1000-1150) TIME PERIOD

H_0 There is no statistically significant relationship between sites (Pueblo Alto and each of the other sites) and white ware temper types.

H_1 There is a statistically significant relationship between sites (Pueblo Alto and each of the other sites) and white ware temper types.

$\alpha = .05$

29SJ 627

Table 70. White ware temper type crosstabulation (a), chi-square tests (b) and symmetric measures (c), for Pueblo Alto and 29SJ 627.

a.

Archaeological Site * Temper Type Crosstabulation		
	Temper Type	Total

			Sandstone/ Sand	Igneous	Trachyte	
Archaeological Site	Pueblo Alto	Count	1380	107	674	2161
		Expected Count	1699.0	67.1	394.8	2161.0
		% of Total	20.3%	1.6%	9.9%	31.8%
	29SJ 627	Count	3960	104	567	4631
		Expected Count	3641.0	143.9	846.2	4631.0
		% of Total	58.3%	1.5%	8.3%	68.2%
Total		Count	5340	211	1241	6792
		Expected Count	5340.0	211.0	1241.0	6792.0
		% of Total	78.6%	3.1%	18.3%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	412.028[a]	2	.000
Likelihood Ratio	390.310	2	.000
Linear-by-Linear Association	401.518	1	.000
N of Valid Cases	6792		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 67.13.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.246	.000
	Cramer's V	.246	.000
	Contingency Coefficient	.239	.000
N of Valid Cases		6792	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and white ware temper type at Pueblo Alto and 29SJ 627. The observed white ware temper types from the two sites could not have been drawn from the same population.

CHIMNEY ROCK GREAT HOUSE

Table 71. White ware temper type crosstabulation (a), chi-square tests (b) and symmetric measures (c), for Pueblo Alto and Chimney Rock Great House.

a.

Archaeological Site * Temper Type Crosstabulation							
			Temper Type				Total
			Sandstone/Sand	Igneous	Trachyte	Sherd	
Archaeological Site	Pueblo Alto	Count	1380	107	674	0	2161
		Expected Count	1237.8	281.2	596.6	45.4	2161.0
		% of Total	54.7%	4.2%	26.7%	.0%	85.7%
	Chimney Rock Great House	Count	64	221	22	53	360
		Expected Count	206.2	46.8	99.4	7.6	360.0
		% of Total	2.5%	8.8%	.9%	2.1%	14.3%
Total		Count	1444	328	696	53	2521
		Expected Count	1444.0	328.0	696.0	53.0	2521.0
		% of Total	57.3%	13.0%	27.6%	2.1%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1258.322[a]	3	.000
Likelihood Ratio	933.759	3	.000
Linear-by-Linear Association	90.432	1	.000
N of Valid Cases	2521		
a. 0 cells (.0%) have expected count less than 5. The minimum			

expected count is 7.57.

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.706	.000
	Cramer's V	.706	.000
	Contingency Coefficient	.577	.000
N of Valid Cases		2521	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and white ware temper type at Pueblo Alto and Chimney Rock Great House. The observed white ware temper types from the two sites could not have been drawn from the same population.

RAVINE SITE VERSION 1: WITH ALL CATEGORIES

Table 72. White ware temper type crosstabulation (a), chi-square tests (b) and symmetric measures (c), for Pueblo Alto and Ravine Site (including all temper categories).

a.

Archaeological Site * Temper Type Crosstabulation							
			Temper Type				Total
			Sandstone/ Sand	Igneous	Trachyte	Sherd	
Archaeological Site	Pueblo Alto	Count	1380	107	674	0	2161
		Expected Count	1370.4	135.3	651.4	3.9	2161.0
		% of Total	61.7%	4.8%	30.1%	.0%	96.6%
	Ravine Site	Count	38	33	0	4	75
		Expected Count	47.6	4.7	22.6	.1	75.0
		% of Total	1.7%	1.5%	.0%	.2%	3.4%
Total		Count	1418	140	674	4	2236

	Expected Count	1418.0	140.0	674.0	4.0	2236.0
	% of Total	63.4%	6.3%	30.1%	.2%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	317.157[a]	3	.000
Likelihood Ratio	153.746	3	.000
Linear-by-Linear Association	.467	1	.495
N of Valid Cases	2236		
a. 3 cells (37.5%) have expected count less than 5. The minimum expected count is .13.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.377	.000
	Cramer's V	.377	.000
	Contingency Coefficient	.352	.000
N of Valid Cases		2236	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and white ware temper type at Pueblo Alto and the Ravine Site. The observed white ware temper types from the two sites could not have been drawn from the same population.

RAVINE SITE VERSION 2: OMITTING SHERD TEMPER

Table 73. White ware temper type crosstabulation (a), chi-square tests (b) and symmetric measures (c), for Pueblo Alto and Ravine Site (omitting sherd temper).

a.

Archaeological Site * Temper Type Crosstabulation						
			Temper Type			Total
			Sandstone/Sand	Igneous	Trachyte	
Archaeological Site	Pueblo Alto	Count	1380	107	674	2161
		Expected Count	1372.9	135.5	652.6	2161.0
		% of Total	61.8%	4.8%	30.2%	96.8%
	Ravine Site	Count	38	33	0	71
		Expected Count	45.1	4.5	21.4	71.0
		% of Total	1.7%	1.5%	.0%	3.2%
Total		Count	1418	140	674	2232
		Expected Count	1418.0	140.0	674.0	2232.0
		% of Total	63.5%	6.3%	30.2%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	212.298[a]	2	.000
Likelihood Ratio	126.376	2	.000
Linear-by-Linear Association	3.616	1	.057
N of Valid Cases	2232		
a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 4.45.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.308	.000
	Cramer's V	.308	.000
	Contingency Coefficient	.295	.000
N of Valid Cases		2232	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and white ware temper type at Pueblo Alto and the Ravine Site. The observed white ware temper types from the two sites could not have been drawn from the same population. These results are almost identical to the test completed including the 4 sherd tempered ceramic sherds recovered from the Ravine Site.

BLUFF GREAT HOUSE

Table 74. White ware temper type crosstabulation (a), chi-square tests (b) and symmetric measures (c), for Pueblo Alto and Bluff Great House.

a.

Archaeological Site * Temper Type Crosstabulation							
			Temper Type				Total
			Sandstone/Sand	Igneous	Trachyte	Sherd	
Archaeological Site	Pueblo Alto	Count	1380	107	674	0	2161
		Expected Count	921.0	632.9	367.2	240.0	2161.0
		% of Total	34.1%	2.6%	16.7%	.0%	53.5%
	Bluff Great House	Count	343	1077	13	449	1882
		Expected Count	802.0	551.1	319.8	209.0	1882.0
		% of Total	8.5%	26.6%	.3%	11.1%	46.5%
Total		Count	1723	1184	687	449	4043
		Expected Count	1723.0	1184.0	687.0	449.0	4043.0
		% of Total	42.6%	29.3%	17.0%	11.1%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)

Pearson Chi-Square	2496.424[a]	3	.000
Likelihood Ratio	3018.230	3	.000
Linear-by-Linear Association	382.300	1	.000
N of Valid Cases	4043		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 209.01.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.786	.000
	Cramer's V	.786	.000
	Contingency Coefficient	.618	.000
N of Valid Cases		4043	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and white ware temper type at Pueblo Alto and the Bluff Great House. The observed white ware temper types from the two sites could not have been drawn from the same population.

CORRAL CANYON SITE VERSION 1: INCLUDING ALL TEMPER CATEGORIES

Table 75. White ware temper type crosstabulation (a), chi-square tests (b) and symmetric measures (c), for Pueblo Alto and Corral Canyon Site (including all temper categories).

a.

Archaeological Site * Temper Type Crosstabulation							
			Temper Type				Total
			Sandstone/Sand	Igneous	Trachyte	Sherd	
Archaeological Site	Pueblo Alto	Count	1380	107	674	0	2161
		Expected Count	1297.5	230.6	631.9	.9	2161.0
		% of	59.9%	4.6%	29.2%	.0%	93.8%

		Total					
	Corral Canyon Site	Count	4	139	0	1	144
		Expected Count	86.5	15.4	42.1	.1	144.0
		% of Total	.2%	6.0%	.0%	.0%	6.2%
Total		Count	1384	246	674	1	2305
		Expected Count	1384.0	246.0	674.0	1.0	2305.0
		% of Total	60.0%	10.7%	29.2%	.0%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1204.646[a]	3	.000
Likelihood Ratio	685.827	3	.000
Linear-by-Linear Association	16.501	1	.000
N of Valid Cases	2305		
a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is .06.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.723	.000
	Cramer's V	.723	.000
	Contingency Coefficient	.586	.000
N of Valid Cases		2305	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and white ware temper type at Pueblo Alto and the Corral Canyon Site. The observed white ware temper types from the two sites could not have been drawn from the same population.

CORRAL CANYON SITE VERSION 2: OMITTING SHERD TEMPER

Table 76. White ware temper type crosstabulation (a), chi-square tests (b) and symmetric measures (c), for Pueblo Alto and Corral Canyon Site (omitting sherd temper).

a.

Archaeological Site * Temper Type Crosstabulation						
			Temper Type			Total
			Sandstone/Sand	Igneous	Trachyte	
Archaeological Site	Pueblo Alto	Count	1380	107	674	2161
		Expected Count	1298.1	230.7	632.2	2161.0
		% of Total	59.9%	4.6%	29.3%	93.8%
	Corral Canyon Site	Count	4	139	0	143
		Expected Count	85.9	15.3	41.8	143.0
		% of Total	.2%	6.0%	.0%	6.2%
Total		Count	1384	246	674	2304
		Expected Count	1384.0	246.0	674.0	2304.0
		% of Total	60.1%	10.7%	29.3%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1196.912[a]	2	.000
Likelihood Ratio	680.275	2	.000
Linear-by-Linear Association	14.987	1	.000
N of Valid Cases	2304		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 15.27.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.721	.000
	Cramer's V	.721	.000
	Contingency Coefficient	.585	.000
N of Valid Cases		2304	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and white ware temper type at Pueblo Alto and the Corral Canyon Site. The observed white ware temper types from the two sites could not have been drawn from the same population. These results are almost identical to the run of this test including the single sherd tempered white ware sherd recovered from Pueblo Alto.

Chi Square (X^{2}) Test of Independence for Red Ware Temper Type from all Time Periods Represented at Each Site

H_0 There is no statistically significant relationship between sites (Pueblo Alto and each of the other sites) and red ware temper types.

H_1 There is a statistically significant relationship between sites (Pueblo Alto and each of the other sites) and red ware temper types.

$\alpha = .05$

29SJ 627 VERSION 1: INCLUDING ALL TEMPER CATEGORIES

Table 77. Red ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and 29SJ 627 (including all temper categories).

a.

Archaeological Site * Temper Type Crosstabulation						
			Temper Type			Total
			Sandstone/ Sand	Igneous	Trachyte	
Archaeological Site	Pueblo Alto	Count	64	39	0	103
		Expected Count	43.6	55.4	3.9	103.0
		% of Total	27.1%	16.5%	.0%	43.6%
	29SJ 627	Count	36	88	9	133
		Expected Count	56.4	71.6	5.1	133.0
		% of Total	15.3%	37.3%	3.8%	56.4%
Total		Count	100	127	9	236
		Expected Count	100.0	127.0	9.0	236.0
		% of Total	42.4%	53.8%	3.8%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	32.456[a]	2	.000
Likelihood Ratio	36.004	2	.000
Linear-by-Linear Association	32.301	1	.000
N of Valid Cases	236		
a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 3.93.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.371	.000
	Cramer's V	.371	.000

	Contingency Coefficient	.348	.000
N of Valid Cases		236	

p = .000 < α

H_0 is rejected. There is a statistically significant relationship between sites and red ware temper type at Pueblo Alto and 29SJ 627. The observed red ware temper types from the two sites could not have been drawn from the same population.

29SJ 627 VERSION 2: OMITTING TRACHYTE TEMPER

Table 78. Red ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and 29SJ 627 (omitting trachyte temper).

a.

Archaeological Site * Temper Type Crosstabulation					
			Temper Type		Total
			Sandstone /Sand	Igneous	
Archaeological Site	Pueblo Alto	Count	64	39	103
		Expected Count	45.4	57.6	103.0
		% of Total	28.2%	17.2%	45.4%
	29SJ 627	Count	36	88	124
		Expected Count	54.6	69.4	124.0
		% of Total	15.9%	38.8%	54.6%
Total		Count	100	127	227
		Expected Count	100.0	127.0	227.0
		% of Total	44.1%	55.9%	100.0%

b.

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)

Pearson Chi-Square	25.017[a]	1	.000		
Continuity Correction[b]	23.692	1	.000		
Likelihood Ratio	25.405	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	24.907	1	.000		
N of Valid Cases	227				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 45.37.					
b. Computed only for a 2x2 table					

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.332	.000
	Cramer's V	.332	.000
	Contingency Coefficient	.315	.000
N of Valid Cases		227	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and red ware temper type at Pueblo Alto and 29SJ 627. The observed red ware temper types from the two sites could not have been drawn from the same population.

CHIMNEY ROCK GREAT HOUSE

Table 79. Red ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Chimney Rock Great House.

a.

Archaeological Site * Temper Type Crosstabulation						
			Temper Type			Total
			Sandstone/Sand	Igneous	Sherd	
Archaeological Site	Pueblo Alto	Count	64	39	0	103
		Expected	62.8	38.3	2.0	103.0

		Count				
		% of Total	61.0%	37.1%	.0%	98.1%
	Chimney Rock Great House	Count	0	0	2	2
		Expected Count	1.2	.7	.0	2.0
		% of Total	.0%	.0%	1.9%	1.9%
Total		Count	64	39	2	105
		Expected Count	64.0	39.0	2.0	105.0
		% of Total	61.0%	37.1%	1.9%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	105.000[a]	2	.000
Likelihood Ratio	19.805	2	.000
Linear-by-Linear Association	37.176	1	.000
N of Valid Cases	105		
a. 4 cells (66.7%) have expected count less than 5. The minimum expected count is .04.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	1.000	.000
	Cramer's V	1.000	.000
	Contingency Coefficient	.707	.000
N of Valid Cases		105	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and red ware temper type at Pueblo Alto and the Chimney Rock Great House. The observed white ware temper types from the two sites could not have been drawn from the same population.

BLUFF GREAT HOUSE VERSION 1: INCLUDING ALL TEMPER CATEGORIES

Table 80. Red ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Bluff Great House (including all temper categories).

a.

Archaeological Site * Temper Type Crosstabulation						
			Temper Type			Total
			Sandstone/ Sand	Igneous	Sherd	
Archaeological Site	Pueblo Alto	Count	64	39	0	103
		Expected Count	39.3	63.2	.6	103.0
		% of Total	4.4%	2.7%	.0%	7.0%
	Bluff Great House	Count	494	858	8	1360
		Expected Count	518.7	833.8	7.4	1360.0
		% of Total	33.8%	58.6%	.5%	93.0%
Total		Count	558	897	8	1463
		Expected Count	558.0	897.0	8.0	1463.0
		% of Total	38.1%	61.3%	.5%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	27.268[a]	2	.000
Likelihood Ratio	26.806	2	.000
Linear-by-Linear Association	26.198	1	.000
N of Valid Cases	1463		
a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is .56.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.137	.000
	Cramer's V	.137	.000
	Contingency Coefficient	.135	.000
N of Valid Cases		1463	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and red ware temper type at Pueblo Alto and the Bluff Great House. The observed red ware temper types from the two sites could not have been drawn from the same population.

BLUFF GREAT HOUSE VERSION 2: OMITTING SHERD TEMPER

Table 81. Red ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Bluff Great House (omitting sherd temper).

a.

Archaeological Site * Temper Type Crosstabulation					
			Temper Type		Total
			Sandstone/ Sand	Igneous	
Archaeological Site	Pueblo Alto	Count	64	39	103
		Expected Count	39.5	63.5	103.0
		% of Total	4.4%	2.7%	7.1%
	Bluff Great House	Count	494	858	1352
		Expected Count	518.5	833.5	1352.0
		% of Total	34.0%	59.0%	92.9%
Total		Count	558	897	1455
		Expected Count	558.0	897.0	1455.0

	% of Total	38.4%	61.6%	100.0%

b.

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	26.524[a]	1	.000		
Continuity Correction[b]	25.453	1	.000		
Likelihood Ratio	25.635	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	26.506	1	.000		
N of Valid Cases	1455				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 39.50.					
b. Computed only for a 2x2 table					

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.135	.000
	Cramer's V	.135	.000
	Contingency Coefficient	.134	.000
N of Valid Cases		1455	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and red ware temper type at Pueblo Alto and the Bluff Great House. The observed red ware temper types from the two sites could not have been drawn from the same population.

CORRAL CANYON SITE

Table 82. Red ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Pueblo Alto and Corral Canyon Site.

a.

Archaeological Site * Temper Type Crosstabulation					
			Temper Type		Total
			Sandstone/ Sand	Igneous	
Archaeological Site	Pueblo Alto	Count	64	39	103
		Expected Count	16.2	86.8	103.0
		% of Total	15.7%	9.6%	25.3%
	Corral Canyon Site	Count	0	304	304
		Expected Count	47.8	256.2	304.0
		% of Total	.0%	74.7%	74.7%
Total		Count	64	343	407
		Expected Count	64.0	343.0	407.0
		% of Total	15.7%	84.3%	100.0%

b.

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	224.139[a]	1	.000		
Continuity Correction[b]	219.474	1	.000		
Likelihood Ratio	217.494	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	223.588	1	.000		
N of Valid Cases	407				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 16.20.					
b. Computed only for a 2x2 table					

c.

Symmetric Measures		
	Value	Approx.

			Sig.
Nominal by Nominal	Phi	.742	.000
	Cramer's V	.742	.000
	Contingency Coefficient	.596	.000
N of Valid Cases		407	

p = .000 < α

H_0 is rejected. There is a statistically significant relationship between sites and red ware temper type at Pueblo Alto and the Corral Canyon Site. The observed red ware temper types from the two sites could not have been drawn from the same population.

Chi Square (x2) Test of independence for Paired Sites outside of Chaco Canyon

Chi Square ($x^{2)}$ Test of independence for Wares from the Pueblo II Time Period (A.D. 1000-1150)

H_0 There is no statistically significant relationship between sites and ware ratios.

H_1 There is a statistically significant relationship between sites and ware ratios.

Chimney Rock Great House and Ravine Site

Table 83. Ware crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Chimney Rock Great House and Ravine Site.

a.

Archaeological Site * Sherd & Ware Category Crosstabulation						
			Sherd & Ware Category			Total
			Gray/Utility Ware	White Ware	Red Ware	
Archaeological Site	Chimney Rock Great House	Count	1497	463	10	1970
		Expected Count	1700.5	264.9	4.6	1970.0

		% of Total	35.3%	10.9%	.2%	46.5%
	Ravine Site	Count	2162	107	0	2269
		Expected Count	1958.5	305.1	5.4	2269.0
		% of Total	51.0%	2.5%	.0%	53.5%
Total		Count	3659	570	10	4239
		Expected Count	3659.0	570.0	10.0	4239.0
		% of Total	86.3%	13.4%	.2%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	333.774[a]	2	.000
Likelihood Ratio	353.972	2	.000
Linear-by-Linear Association	331.957	1	.000
N of Valid Cases	4239		
a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 4.65.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.281	.000
	Cramer's V	.281	.000
	Contingency Coefficient	.270	.000
N of Valid Cases		4239	

P = .000 < α

H_0 is rejected. There is a statistically significant relationship between sites and ware ratios at Chimney Rock Great House and the Ravine Site. The observed ware ratios at the two sites could not have been drawn from the same population.

BLUFF GREAT HOUSE AND CORRAL CANYON SITE

Table 84. Ware crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Bluff Great House and Corral Canyon Site.

a.

Archaeological Site * Sherd & Ware Category Crosstabulation						
			Sherd & Ware Category			Total
			Gray/Utility Ware	White Ware	Red Ware	
Archaeological Site	Bluff Great House	Count	8584	1876	1666	12126
		Expected Count	9048.8	1537.5	1539.7	12126.0
		% of Total	52.8%	11.5%	10.2%	74.6%
	Corral Canyon Site	Count	3546	185	398	4129
		Expected Count	3081.2	523.5	524.3	4129.0
		% of Total	21.8%	1.1%	2.4%	25.4%
Total		Count	12130	2061	2064	16255
		Expected Count	12130.0	2061.0	2064.0	16255.0
		% of Total	74.6%	12.7%	12.7%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	428.204[a]	2	.000
Likelihood Ratio	496.184	2	.000
Linear-by-Linear Association	231.608	1	.000
N of Valid Cases	16255		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 523.52.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.162	.000
	Cramer's V	.162	.000
	Contingency Coefficient	.160	.000
N of Valid Cases		16255	

$P = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and ware ratios at Bluff Great House and the Corral Canyon Site. The observed ware ratios at the two sites could not have been drawn from the same population.

CHIMNEY ROCK GREAT HOUSE AND BLUFF GREAT HOUSE

Table 85. Ware crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Chimney Rock Great House and Bluff Great House.

a.

Archaeological Site * Sherd & Ware Category Crosstabulation						
			Sherd & Ware Category			Total
			Gray/Utility Ware	White Ware	Red Ware	
Archaeological Site	Chimney Rock Great House	Count	1497	463	10	1970
		Expected Count	1408.9	326.9	234.2	1970.0
		% of Total	10.6%	3.3%	.1%	14.0%
	Bluff Great House	Count	8584	1876	1666	12126
		Expected Count	8672.1	2012.1	1441.8	12126.0
		% of Total	60.9%	13.3%	11.8%	86.0%
Total		Count	10081	2339	1676	14096
		Expected Count	10081.0	2339.0	1676.0	14096.0

	% of Total	71.5%	16.6%	11.9%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	321.820[a]	2	.000
Likelihood Ratio	484.427	2	.000
Linear-by-Linear Association	120.298	1	.000
N of Valid Cases	14096		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 234.23.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.151	.000
	Cramer's V	.151	.000
	Contingency Coefficient	.149	.000
N of Valid Cases		14096	

$P = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and ware ratios at Chimney Rock Great House and Bluff Great House. The observed ware ratios at the two sites could not have been drawn from the same population.

Table 86. Ware crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Ravine Site and Corral Canyon Site.

a.

Archaeological Site * Sherd & Ware Category Crosstabulation						
			Sherd & Ware Category			Total
			Gray/Utility Ware	White Ware	Red Ware	
Archaeological Site	Ravine Site	Count	2162	107	0	2269
		Expected Count	2024.3	103.6	141.1	2269.0
		% of Total	33.8%	1.7%	.0%	35.5%
	Corral Canyon Site	Count	3546	185	398	4129
		Expected Count	3683.7	188.4	256.9	4129.0
		% of Total	55.4%	2.9%	6.2%	64.5%
Total		Count	5708	292	398	6398
		Expected Count	5708.0	292.0	398.0	6398.0
		% of Total	89.2%	4.6%	6.2%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	233.404[a]	2	.000
Likelihood Ratio	363.160	2	.000
Linear-by-Linear Association	199.938	1	.000
N of Valid Cases	6398		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 103.56.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.191	.000
	Cramer's V	.191	.000

	Contingency Coefficient	.188	.000
N of Valid Cases		6398	

P = .000 < α

H_0 is rejected. There is a statistically significant relationship between sites and ware ratios at Ravine Site and Corral Canyon Site. The observed ware ratios at the two sites could not have been drawn from the same population.

Chi Square (x^2) Test of independence for Gray Ware Vessel Form from the Pueblo II (A.D. 1000-1150) time Period

H_0 There is no statistically significant relationship between sites and gray ware vessel forms.

H_1 There is a statistically significant relationship between sites and gray ware vessel forms.

Chimney Rock Great House and Ravine Site

Table 87. Gray ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c) for Chimney Rock Great House and Ravine Site.

a.

Archaeological Site * Vessel Form Crosstabulation					
			Vessel Form		Total
			Jar	Other	
Archaeological Site	Chimney Rock Great House	Count	1475	7	1482
		Expected Count	1474.9	7.1	1482.0
		% of Total	59.2%	.3%	59.5%
	Ravine Site	Count	1004	5	1009
		Expected Count	1004.1	4.9	1009.0
		% of Total	40.3%	.2%	40.5%

Total	Count	2479	12	2491
	Expected Count	2479.0	12.0	2491.0
	% of Total	99.5%	.5%	100.0%

b.

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.007[a]	1	.935		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.007	1	.935		
Fisher's Exact Test				1.000	.576
Linear-by-Linear Association	.007	1	.935		
N of Valid Cases	2491				
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.86.					
b. Computed only for a 2x2 table					

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.002	.935
	Cramer's V	.002	.935
	Contingency Coefficient	.002	.935
N of Valid Cases		2491	

P = .935/.1 > α ($x^{2/}$Fisher's Exact Test)

H_0 is accepted. There is no statistically significant relationship between Chimney Rock Great House and the Ravine Site and gray ware vessel forms. The observed gray ware vessel forms at the two sites could have been drawn from the same population.

BLUFF GREAT HOUSE AND CORRAL CANYON SITE

Table 88. Gray ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c) for Bluff Great House and Corral Canyon Site.

a.

Archaeological Site * Vessel Form Crosstabulation					
			Vessel Form		Total
			Jar	Other	
Archaeological Site	Bluff Great House	Count	8573	2	8575
		Expected Count	8573.1	1.9	8575.0
		% of Total	95.0%	.0%	95.1%
	Corral Canyon Site	Count	446	0	446
		Expected Count	445.9	.1	446.0
		% of Total	4.9%	.0%	4.9%
Total		Count	9019	2	9021
		Expected Count	9019.0	2.0	9021.0
		% of Total	100.0%	.0%	100.0%

b.

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.104[a]	1	.747		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.203	1	.652		
Fisher's Exact Test				1.000	.904
Linear-by-Linear Association	.104	1	.747		
N of Valid Cases	9021				
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .10.					
b. Computed only for a 2x2 table					

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	-.003	.747
	Cramer's V	.003	.747

	Contingency Coefficient	.003	.747
N of Valid Cases		9021	

P = 1.0 > α

H_0 is accepted. There is no statistically significant relationship between Bluff Great House and Corral Canyon Site and gray ware vessel forms. The observed gray ware vessel forms at the two sites could have been drawn from the same population.

CHIMNEY ROCK GREAT HOUSE AND BLUFF GREAT HOUSE

Table 89. Gray ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c) for Chimney Rock Great House and Bluff Great House.

a.

Archaeological Site * Vessel Form Crosstabulation					
			Vessel Form		Total
			Jar	Other	
Archaeological Site	Chimney Rock Great House	Count	1475	7	1482
		Expected Count	1480.7	1.3	1482.0
		% of Total	14.7%	.1%	14.7%
	Bluff Great House	Count	8573	2	8575
		Expected Count	8567.3	7.7	8575.0
		% of Total	85.2%	.0%	85.3%
Total		Count	10048	9	10057
		Expected Count	10048.0	9.0	10057.0
		% of Total	99.9%	.1%	100.0%

b.

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	28.493[a]	1	.000		

Continuity Correction[b]	23.693	1	.000		
Likelihood Ratio	17.937	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	28.490	1	.000		
N of Valid Cases	10057				
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 1.33.					
b. Computed only for a 2x2 table					

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	-.053	.000
	Cramer's V	.053	.000
	Contingency Coefficient	.053	.000
N of Valid Cases		10057	

$P = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and gray ware vessel forms at Chimney Rock Great House and Bluff Great House. The observed ware ratios at the two sites could not have been drawn from the same population.

RAVINE SITE AND CORRAL CANYON SITE

Table 90. Gray ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c) for Ravine Site and Corral Canyon Site.

a.

Archaeological Site * Vessel Form Crosstabulation					
			Vessel Form		Total
			Jar	Other	
Archaeological Site	Ravine Site	Count	1004	5	1009
		Expected Count	1005.5	3.5	1009.0

		% of Total	69.0%	.3%	69.3%
	Corral Canyon Site	Count	446	0	446
		Expected Count	444.5	1.5	446.0
		% of Total	30.7%	.0%	30.7%
Total		Count	1450	5	1455
		Expected Count	1450.0	5.0	1455.0
		% of Total	99.7%	.3%	100.0%

b.

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.218[a]	1	.136		
Continuity Correction[b]	1.007	1	.316		
Likelihood Ratio	3.668	1	.055		
Fisher's Exact Test				.331	.160
Linear-by-Linear Association	2.216	1	.137		
N of Valid Cases	1455				
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.53.					
b. Computed only for a 2x2 table					

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	-.039	.136
	Cramer's V	.039	.136
	Contingency Coefficient	.039	.136
N of Valid Cases		1455	

$p = .331 > \alpha$

H_0 is accepted. There is no statistically significant relationship between Chimney Rock Great House and the Ravine Site and gray ware vessel forms. The observed gray ware vessel forms at the two sites could have been drawn from the same population.

CHI SQUARE (X^2) TEST OF INDEPENDENCE FOR WHITE WARE VESSEL FORM FROM THE PUEBLO II (A.D. 1000-1150) TIME PERIOD

H_0 There is no statistically significant relationship between sites and white ware vessel forms.

H_1 There is a statistically significant relationship between sites and white ware vessel forms.

CHIMNEY ROCK GREAT HOUSE AND RAVINE SITE

Table 91. White ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c) for Chimney Rock Great House and Ravine Site.

a.

Archaeological Site * Vessel Form Crosstabulation						
			Vessel Form			Total
			Bowl	Jar	Other	
Archaeological Site	Chimney Rock Great House	Count	212	136	10	358
		Expected Count	220.4	126.8	10.8	358.0
		% of Total	49.1%	31.5%	2.3%	82.9%
	Ravine Site	Count	54	17	3	74
		Expected Count	45.6	26.2	2.2	74.0
		% of Total	12.5%	3.9%	.7%	17.1%
Total		Count	266	153	13	432
		Expected Count	266.0	153.0	13.0	432.0
		% of Total	61.6%	35.4%	3.0%	100.0%

b.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.112[a]	2	.047
Likelihood Ratio	6.451	2	.040
Linear-by-Linear Association	3.154	1	.076
N of Valid Cases	432		
a. 1 cell (16.7%) has an expected count less than 5. The minimum expected count is 2.23.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.119	.047
	Cramer's V	.119	.047
	Contingency Coefficient	.118	.047
N of Valid Cases		432	

$P = .047 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and white ware vessel forms at Chimney Rock Great House and the Ravine Site. The observed ware ratios at the two sites could not have been drawn from the same population.

Bluff Great House and Corral Canyon Site

Table 92. White ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c) for Bluff Great House and Corral Canyon Site.

a.

Archaeological Site * Vessel Form Crosstabulation						
			Vessel Form			Total
			Bowl	Jar	Other	
Archaeological Site	Bluff Great House	Count	966	743	103	1812
		Expected	933.5	781.4	97.1	1812.0

		Count				
		% of Total	48.8%	37.6%	5.2%	91.6%
	Corral Canyon Site	Count	53	110	3	166
		Expected Count	85.5	71.6	8.9	166.0
		% of Total	2.7%	5.6%	.2%	8.4%
Total		Count	1019	853	106	1978
		Expected Count	1019.0	853.0	106.0	1978.0
		% of Total	51.5%	43.1%	5.4%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	40.264[a]	2	.000
Likelihood Ratio	40.662	2	.000
Linear-by-Linear Association	13.096	1	.000
N of Valid Cases	1978		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.90.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.143	.000
	Cramer's V	.143	.000
	Contingency Coefficient	.141	.000
N of Valid Cases		1978	

P = .000 < α

H_0 is rejected. There is a statistically significant relationship between Bluff Great House and Corral Canyon Site and white ware vessel forms. The observed white ware vessel forms at the two sites could not have been drawn from the same population.

CHIMNEY ROCK GREAT HOUSE AND BLUFF GREAT HOUSE

Table 93. White ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c) for Chimney Rock Great House and Bluff Great House.

a.

Archaeological Site * Vessel Form Crosstabulation						
			Vessel Form			Total
			Bowl	Jar	Other	
Archaeological Site	Chimney Rock Great House	Count	212	136	10	358
		Expected Count	194.3	145.0	18.6	358.0
		% of Total	9.8%	6.3%	.5%	16.5%
	Bluff Great House	Count	966	743	103	1812
		Expected Count	983.7	734.0	94.4	1812.0
		% of Total	44.5%	34.2%	4.7%	83.5%
Total		Count	1178	879	113	2170
		Expected Count	1178.0	879.0	113.0	2170.0
		% of Total	54.3%	40.5%	5.2%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.390[a]	2	.025
Likelihood Ratio	8.155	2	.017
Linear-by-Linear Association	6.532	1	.011
N of Valid Cases	2170		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 18.64.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.058	.025
	Cramer's V	.058	.025
	Contingency Coefficient	.058	.025
N of Valid Cases		2170	

P = .025 < α

H_0 is rejected. There is a statistically significant relationship between sites and white ware vessel forms at Chimney Rock Great House and Bluff Great House. The observed ware ratios at the two sites could not have been drawn from the same population.

RAVINE SITE AND CORRAL CANYON SITE

Table 94. White ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c) for Ravine Site and Corral Canyon Site.

a.

Archaeological Site * Vessel Form Crosstabulation						
			Vessel Form			Total
			Bowl	Jar	Other	
Archaeological Site	Ravine Site	Count	54	17	3	74
		Expected Count	33.0	39.2	1.9	74.0
		% of Total	22.5%	7.1%	1.3%	30.8%
	Corral Canyon Site	Count	53	110	3	166
		Expected Count	74.0	87.8	4.2	166.0
		% of Total	22.1%	45.8%	1.3%	69.2%
Total		Count	107	127	6	240
		Expected Count	107.0	127.0	6.0	240.0
		% of Total	44.6%	52.9%	2.5%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	38.503[a]	2	.000
Likelihood Ratio	39.895	2	.000
Linear-by-Linear Association	26.121	1	.000
N of Valid Cases	240		
a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 1.85.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.401	.000
	Cramer's V	.401	.000
	Contingency Coefficient	.372	.000
N of Valid Cases		240	

$P = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between sites and white ware vessel forms at Chimney Rock Great House and the Ravine Site. The observed ware ratios at the two sites could not have been drawn from the same population.

CHI SQUARE (X^2) TEST OF INDEPENDENCE FOR RED WARE VESSEL FORM FROM ALL TIME PERIODS REPRESENTED AT EACH SITE

H_0 There is no statistically significant relationship between sites and red ware vessel forms.

H_1 There is a statistically significant relationship between sites and red ware vessel forms.

Table 95. Red ware vessel form crosstabulation (a), chi-square tests (b), and symmetric measures (c) for Bluff Great House and Corral Canyon Site.

a.

Archaeological Site * Vessel Form Crosstabulation						
			Vessel Form			Total
			Bowl	Jar	Other	
Archaeological Site	Bluff Great House	Count	960	358	53	1371
		Expected Count	975.1	351.2	44.7	1371.0
		% of Total	59.1%	22.0%	3.3%	84.4%
	Corral Canyon Site	Count	195	58	0	253
		Expected Count	179.9	64.8	8.3	253.0
		% of Total	12.0%	3.6%	.0%	15.6%
Total		Count	1155	416	53	1624
		Expected Count	1155.0	416.0	53.0	1624.0
		% of Total	71.1%	25.6%	3.3%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.122[a]	2	.002
Likelihood Ratio	20.285	2	.000
Linear-by-Linear Association	8.980	1	.003
N of Valid Cases	1624		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.26.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.086	.002
	Cramer's V	.086	.002

	Contingency Coefficient	.086	.002
N of Valid Cases		1624	

$P = .002 < \alpha$

H_0 is rejected. There is a statistically significant relationship between Bluff Great House and Corral Canyon Site and red ware vessel forms. The observed red ware vessel forms at the two sites could not have been drawn from the same population.

Chi Square (x^2) Test of Independence for Gray Ware Temper Type from the Pueblo II (A.D. 1000-1150) Time Period

H_0 There is no statistically significant relationship between the sites and gray ware temper types.

H_1 There is a statistically significant relationship between sites and gray ware temper types.

Chimney Rock Great House and Ravine Site

Table 96. Gray ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Chimney Rock Great House and Ravine Site.

a.

Archaeological Site * Temper Type Crosstabulation						
			Temper Type			Total
			Sandstone/Sand	Igneous	Trachyte	
Archaeological Site	Chimney Rock Great House	Count	98	1420	12	1530
		Expected Count	79.5	1442.0	8.4	1530.0
		% of Total	3.9%	55.9%	.5%	60.3%
	Ravine Site	Count	34	973	2	1009
		Expected Count	52.5	951.0	5.6	1009.0
		% of Total	1.3%	38.3%	.1%	39.7%

Total	Count	132	2393	14	2539
	Expected Count	132.0	2393.0	14.0	2539.0
	% of Total	5.2%	94.2%	.6%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.411[a]	2	.000
Likelihood Ratio	16.620	2	.000
Linear-by-Linear Association	6.589	1	.010
N of Valid Cases	2539		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.56.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.078	.000
	Cramer's V	.078	.000
	Contingency Coefficient	.078	.000
N of Valid Cases		2539	

P = .000 < α

H_0 is rejected. There is a statistically significant relationship between Chimney Rock Great House and the Ravine Site and gray ware temper types. The observed gray ware temper types at the two sites could not have been drawn from the same population.

BLUFF GREAT HOUSE AND CORRAL CANYON SITE

Table 97. Gray ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Bluff Great House and Corral Canyon Site.

a.

Archaeological Site * Temper Type Crosstabulation						
			Temper Type			Total
			Sandstone/Sand	Igneous	Trachyte	
Archaeological Site	Bluff Great House	Count	684	2659	28	3371
		Expected Count	397.8	2957.0	16.1	3371.0
		% of Total	11.7%	45.4%	.5%	57.6%
	Corral Canyon Site	Count	7	2477	0	2484
		Expected Count	293.2	2179.0	11.9	2484.0
		% of Total	.1%	42.3%	.0%	42.4%
Total		Count	691	5136	28	5855
		Expected Count	691.0	5136.0	28.0	5855.0
		% of Total	11.8%	87.7%	.5%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	576.591[a]	2	.000
Likelihood Ratio	790.082	2	.000
Linear-by-Linear Association	478.213	1	.000
N of Valid Cases	5855		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.88.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.314	.000
	Cramer's V	.314	.000
	Contingency Coefficient	.299	.000
N of Valid Cases		5855	

P = .000 < α

H_0 is rejected. There is a statistically significant relationship between Bluff Great House and the Corral Canyon Site and gray ware temper types. The observed gray ware temper types at the two sites could not have been drawn from the same population.

CHIMNEY ROCK GREAT HOUSE AND BLUFF GREAT HOUSE

Table 98. Gray ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Chimney Rock Great House and Bluff Great House.

a.

Archaeological Site * Temper Type Crosstabulation						
			Temper Type			Total
			Sandstone/Sand	Igneous	Trachyte	
Archaeological Site	Chimney Rock Great House	Count	98	1420	12	1530
		Expected Count	244.1	1273.4	12.5	1530.0
		% of Total	2.0%	29.0%	.2%	31.2%
	Bluff Great House	Count	684	2659	28	3371
		Expected Count	537.9	2805.6	27.5	3371.0
		% of Total	14.0%	54.3%	.6%	68.8%
Total		Count	782	4079	40	4901
		Expected Count	782.0	4079.0	40.0	4901.0
		% of Total	16.0%	83.2%	.8%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	151.734[a]	2	.000
Likelihood Ratio	173.977	2	.000
Linear-by-Linear Association	139.165	1	.000
N of Valid Cases	4901		
a. 0 cells (.0%) have expected count less than 5. The			

minimum expected count is 12.49.

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.176	.000
	Cramer's V	.176	.000
	Contingency Coefficient	.173	.000
N of Valid Cases		4901	

P = .000 < α

H_0 is rejected. There is a statistically significant relationship between Chimney Rock Great House and Bluff Great House and gray ware temper types. The observed gray ware temper types at the two sites could not have been drawn from the same population.

RAVINE SITE AND CORRAL CANYON SITE VERSION 1: OMITTING TRACHYTE

Table 99. Gray ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Ravine Site and Corral Canyon Site omitting trachyte temper.

a.

Archaeological Site * Temper Type Crosstabulation					
			Temper Type		Total
			Sandstone/ Sand	Igneous	
Archaeological Site	Ravine Site	Count	34	973	1007
		Expected Count	11.8	995.2	1007.0
		% of Total	1.0%	27.9%	28.8%
	Corral Canyon Site	Count	7	2477	2484
		Expected Count	29.2	2454.8	2484.0
		% of Total	.2%	71.0%	71.2%
Total		Count	41	3450	3491

	Expected Count	41.0	3450.0	3491.0
	% of Total	1.2%	98.8%	100.0%

b.

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	59.119[a]	1	.000		
Continuity Correction[b]	56.483	1	.000		
Likelihood Ratio	52.523	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	59.102	1	.000		
N of Valid Cases	3491				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.83.					
b. Computed only for a 2x2 table					

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.130	.000
	Cramer's V	.130	.000
	Contingency Coefficient	.129	.000
N of Valid Cases		3491	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between Ravine Site and Corral Canyon Site and gray ware temper types. The observed gray ware temper types at the two sites could not have been drawn from the same population.

RAVINE SITE AND CORRAL CANYON SITE VERSION 2: INCLUDING TRACHYTE

Table 100. Gray ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Ravine Site and Corral Canyon Site including trachyte.

a.

Archaeological Site * Temper Type Crosstabulation						
			Temper Type			Total
			Sandstone/Sand	Igneous	Trachyte	
Archaeological Site	Ravine Site	Count	34	973	2	1009
		Expected Count	11.8	996.6	.6	1009.0
		% of Total	1.0%	27.9%	.1%	28.9%
	Corral Canyon Site	Count	7	2477	0	2484
		Expected Count	29.2	2453.4	1.4	2484.0
		% of Total	.2%	70.9%	.0%	71.1%
Total		Count	41	3450	2	3493
		Expected Count	41.0	3450.0	2.0	3493.0
		% of Total	1.2%	98.8%	.1%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	63.996[a]	2	.000
Likelihood Ratio	57.493	2	.000
Linear-by-Linear Association	49.154	1	.000
N of Valid Cases	3493		
a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is .58.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.135	.000
	Cramer's V	.135	.000

	Contingency Coefficient	.134	.000
N of Valid Cases		3493	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between Ravine Site and Corral Canyon Site and gray ware temper types. The observed gray ware temper types at the two sites could not have been drawn from the same population.

CHI SQUARE (X^2) TEST OF INDEPENDENCE FOR WHITE WARE TEMPER TYPE FROM THE PUEBLO II (A.D. 1000-1150) TIME PERIOD

H_0 There is no statistically significant relationship between sites and white ware temper types.

H_1 There is a statistically significant relationship between sites and white ware temper types.

CHIMNEY ROCK GREAT HOUSE AND RAVINE SITE

Table 101. White ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Chimney Rock Great House and Ravine Site.

a.

Archaeological Site * Temper Type Crosstabulation							
			Temper Type				Total
			Sandstone/Sand	Igneous	Trachyte	Sherd	
Archaeological Site	Chimney Rock Great House	Count	64	221	22	53	360
		Expected Count	84.4	210.2	18.2	47.2	360.0
		% of Total	14.7%	50.8%	5.1%	12.2%	82.8%
	Ravine Site	Count	38	33	0	4	75
		Expected	17.6	43.8	3.8	9.8	75.0

		Count					
		% of Total	8.7%	7.6%	.0%	.9%	17.2%
Total		Count	102	254	22	57	435
		Expected Count	102.0	254.0	22.0	57.0	435.0
		% of Total	23.4%	58.4%	5.1%	13.1%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	40.606[a]	3	.000
Likelihood Ratio	40.057	3	.000
Linear-by-Linear Association	25.742	1	.000
N of Valid Cases	435		
a. 1 cells (12.5%) have expected count less than 5. The minimum expected count is 3.79.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.306	.000
	Cramer's V	.306	.000
	Contingency Coefficient	.292	.000
N of Valid Cases		435	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between Chimney Rock Great House and the Ravine Site and white ware temper types. The observed white ware temper types at the two sites could not have been drawn from the same population.

Table 102. White ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Bluff Great House and Corral Canyon Site.

a.

Archaeological Site * Temper Type Crosstabulation							
			Temper Type				Total
			Sandstone/Sand	Igneous	Trachyte	Sherd	
Archaeological Site	Bluff Great House	Count	343	1077	13	449	1882
		Expected Count	322.3	1129.6	12.1	418.0	1882.0
		% of Total	16.9%	53.2%	.6%	22.2%	92.9%
	Corral Canyon Site	Count	4	139	0	1	144
		Expected Count	24.7	86.4	.9	32.0	144.0
		% of Total	.2%	6.9%	.0%	.0%	7.1%
Total		Count	347	1216	13	450	2026
		Expected Count	347.0	1216.0	13.0	450.0	2026.0
		% of Total	17.1%	60.0%	.6%	22.2%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	86.368[a]	3	.000
Likelihood Ratio	116.705	3	.000
Linear-by-Linear Association	13.485	1	.000
N of Valid Cases	2026		
a. 1 cells (12.5%) have expected count less than 5. The minimum expected count is .92.			

c.

Symmetric Measures		
	Value	Approx. Sig.

Nominal by Nominal	Phi	.206	.000
	Cramer's V	.206	.000
	Contingency Coefficient	.202	.000
N of Valid Cases		2026	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between Bluff Great House and the Corral Canyon Site and white ware temper types. The observed white ware temper types at the two sites could not have been drawn from the same population.

CHIMNEY ROCK GREAT HOUSE AND BLUFF GREAT HOUSE

Table 103. White ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Chimney Rock Great House and Bluff Great House.

a.

Archaeological Site * Temper Type Crosstabulation							
			Temper Type				Total
			Sandstone/Sand	Igneous	Trachyte	Sherd	
Archaeological Site	Chimney Rock Great House	Count	64	221	22	53	360
		Expected Count	65.4	208.4	5.6	80.6	360.0
		% of Total	2.9%	9.9%	1.0%	2.4%	16.1%
	Bluff Great House	Count	343	1077	13	449	1882
		Expected Count	341.6	1089.6	29.4	421.4	1882.0
		% of Total	15.3%	48.0%	.6%	20.0%	83.9%
Total		Count	407	1298	35	502	2242
		Expected Count	407.0	1298.0	35.0	502.0	2242.0
		% of Total	18.2%	57.9%	1.6%	22.4%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	69.075[a]	3	.000
Likelihood Ratio	52.311	3	.000
Linear-by-Linear Association	4.586	1	.032
N of Valid Cases	2242		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.62.			

c

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.176	.000
	Cramer's V	.176	.000
	Contingency Coefficient	.173	.000
N of Valid Cases		2242	

$p = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between Chimney Rock Great House and Bluff Great House and white ware temper types. The observed white ware temper types at the two sites could not have been drawn from the same population.

Ravine Site and Corral Canyon Site Version 1: Omitting Sherd Temper

Table 104. White ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Ravine Site and Corral Canyon Site omitting sherd temper.

a.

Archaeological Site * Temper Type Crosstabulation			
	Temper Type		Total
	Sandstone/	Igneous	

			Sand		
Archaeological Site	Ravine Site	Count	38	33	71
		Expected Count	13.9	57.1	71.0
		% of Total	17.8%	15.4%	33.2%
	Corral Canyon Site	Count	4	139	143
		Expected Count	28.1	114.9	143.0
		% of Total	1.9%	65.0%	66.8%
Total		Count	42	172	214
		Expected Count	42.0	172.0	214.0
		% of Total	19.6%	80.4%	100.0%

b.

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	77.385[a]	1	.000		
Continuity Correction[b]	74.203	1	.000		
Likelihood Ratio	77.361	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	77.023	1	.000		
N of Valid Cases	214				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 13.93.					
b. Computed only for a 2x2 table					

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.601	.000
	Cramer's V	.601	.000
	Contingency Coefficient	.515	.000
N of Valid Cases		214	

P = .000 < α

H_0 is rejected. There is a statistically significant relationship between Ravine Site and Corral Canyon Site and white ware temper types. The observed white ware temper types at the two sites could not have been drawn from the same population.

RAVINE SITE AND CORRAL CANYON SITE VERSION 2: INCLUDING SHERD TEMPER

Table 105. White ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Ravine Site and Corral Canyon Site including sherd temper.

a.

Archaeological Site * Temper Type Crosstabulation						
			Temper Type			Total
			Sandstone/ Sand	Igneous	Sherd	
Archaeological Site	Ravine Site	Count	38	33	4	75
		Expected Count	14.4	58.9	1.7	75.0
		% of Total	17.4%	15.1%	1.8%	34.2%
	Corral Canyon Site	Count	4	139	1	144
		Expected Count	27.6	113.1	3.3	144.0
		% of Total	1.8%	63.5%	.5%	65.8%
Total		Count	42	172	5	219
		Expected Count	42.0	172.0	5.0	219.0
		% of Total	19.2%	78.5%	2.3%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	80.945[a]	2	.000
Likelihood Ratio	81.878	2	.000
Linear-by-Linear Association	27.959	1	.000
N of Valid Cases	219		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 1.71.

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.608	.000
	Cramer's V	.608	.000
	Contingency Coefficient	.519	.000
N of Valid Cases		219	

$P = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between Ravine Site and Corral Canyon Site and white ware temper types. The observed white ware temper types at the two sites could not have been drawn from the same population.

Chi Square (X^2) Test of Independence for Red Ware Temper Type from all Time Periods Represented at Each Site

Bluff Great House and Corral Canyon Site

H_0 There is no statistically significant relationship between sites and red ware temper types.

H_1 There is a statistically significant relationship between sites and red ware temper types.

Table 106. Red ware temper type crosstabulation (a), chi-square tests (b), and symmetric measures (c), for Bluff Great House and Corral Canyon Site.

a.

Archaeological Site * Temper Type Crosstabulation						
			Temper Type			Total
			Sandstone/ Sand	Igneous	Sherd	
Archaeological Site	Bluff Great House	Count	494	858	8	1360
		Expected Count	403.8	949.7	6.5	1360.0
		% of Total	29.7%	51.6%	.5%	81.7%
	Corral Canyon Site	Count	0	304	0	304
		Expected Count	90.3	212.3	1.5	304.0
		% of Total	.0%	18.3%	.0%	18.3%
Total		Count	494	1162	8	1664
		Expected Count	494.0	1162.0	8.0	1664.0
		% of Total	29.7%	69.8%	.5%	100.0%

b.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	160.689[a]	2	.000
Likelihood Ratio	246.601	2	.000
Linear-by-Linear Association	131.319	1	.000
N of Valid Cases	1664		
a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 1.46.			

c.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.311	.000
	Cramer's V	.311	.000
	Contingency	.297	.000

	Coefficient		
N of Valid Cases		1664	

$P = .000 < \alpha$

H_0 is rejected. There is a statistically significant relationship between Bluff Great House and the Corral Canyon Site and red ware temper types. The observed red ware temper types at the two sites could not have been drawn from the same population.